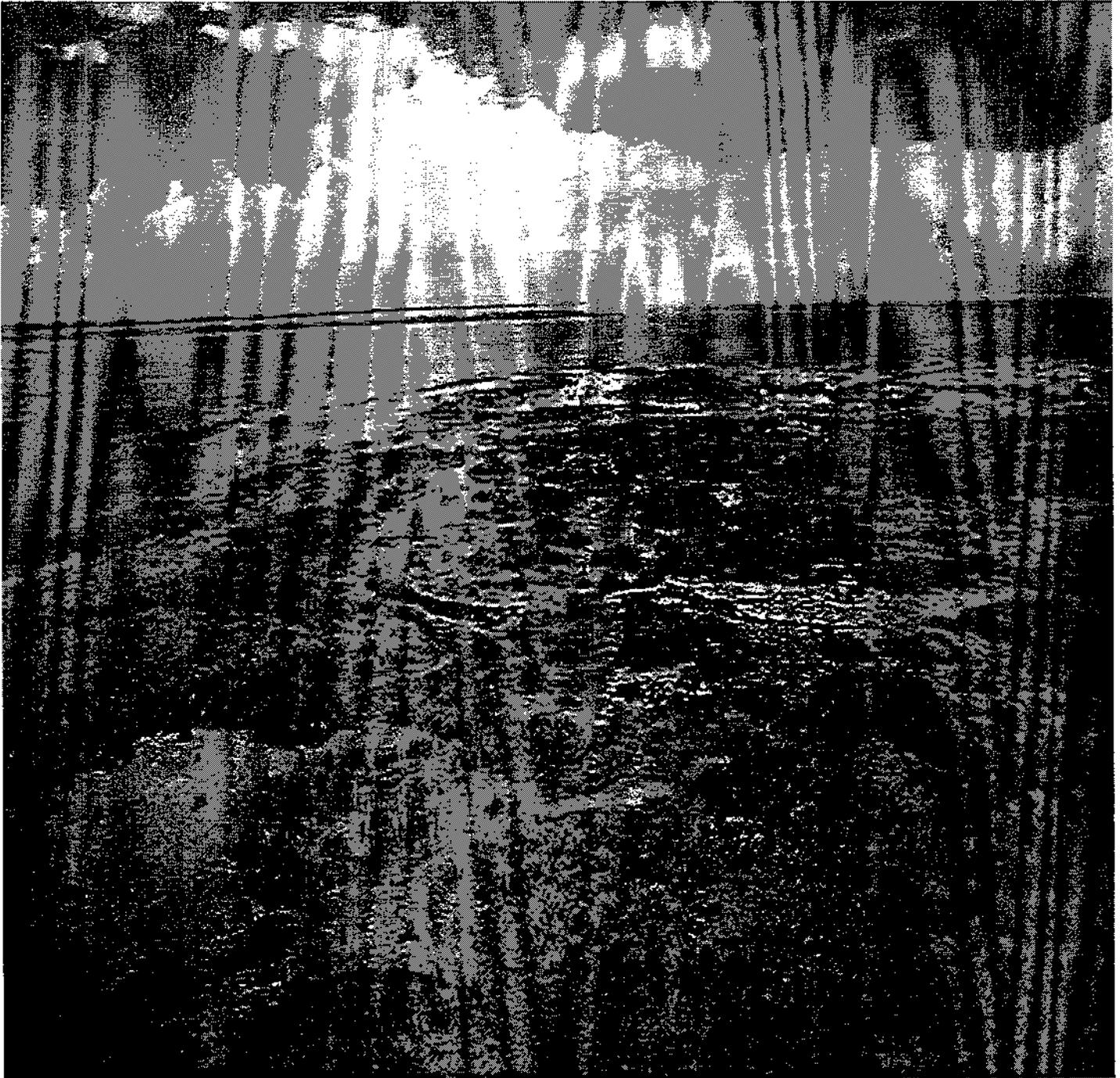


LAKE OKEECHOBEE REGULATION SCHEDULE STUDY

ERRATA TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT



March 2000



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAR 31 2000

TO WHOM IT MAY CONCERN:

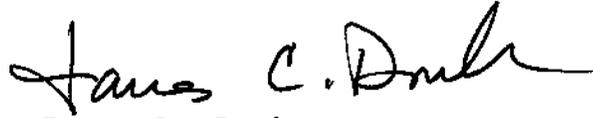
Enclosed is a copy of the Errata to the Final Environmental Impact Statement (FEIS) for Lake Okeechobee Regulation Schedule Study and Annex A which was sent out for public review on February 4, 2000. The FEIS and Annex A were revised from the draft EIS to incorporate comments made on the draft and to provide the final Fish and Wildlife Coordination Act Report. The other 2 volumes, Lake Okeechobee Regulation Schedule Study Appendix A, B & C, June 1999 and Lake Okeechobee Regulation Schedule Study Appendix D, E & Annex A and B, June 1999 were not changed from what was sent out with the Draft EIS. The following enclosed items are changes from the FEIS and should be inserted into the final document:

- LIST OF TABLES, FEIS-xii should replace the current LIST OF TABLES, FEIS-xii.
2 tables have been added.
- Figure 1.1-1 should be inserted on page FEIS-3. Figure 1.1-1 was inadvertently left out.
- Figures 6.1-1, 6.1-2, and 6.1-3 should replace the current figures on pages FEIS 79, 80 and 81, respectively. These 3 figures have been modified since the FEIS.
- Section 6.1.8 and 6.1.9 should replace existing sections 6.1.8 and 6.1.9. These two sections were modified and were to replace the old sections.
- Replace existing pages 30, 31, 65, and 92 in the FEIS with new pages 30, 31, 65, and 92, respectively.
- The APPENDIX F - Response to Comments should be inserted into the document. This Appendix was inadvertently left out of the FEIS.

-2-

The point of contact is Mr. Olice Carter at 904-232-1140 or Mr. Elmar Kurzbach at 904-232-2325.

Sincerely,

A handwritten signature in cursive script that reads "James C. Duck". The signature is written in black ink and is positioned above the typed name and title.

James C. Duck
Chief, Planning Division

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FIGURE 1.1-1

28JUN99 12:55:18

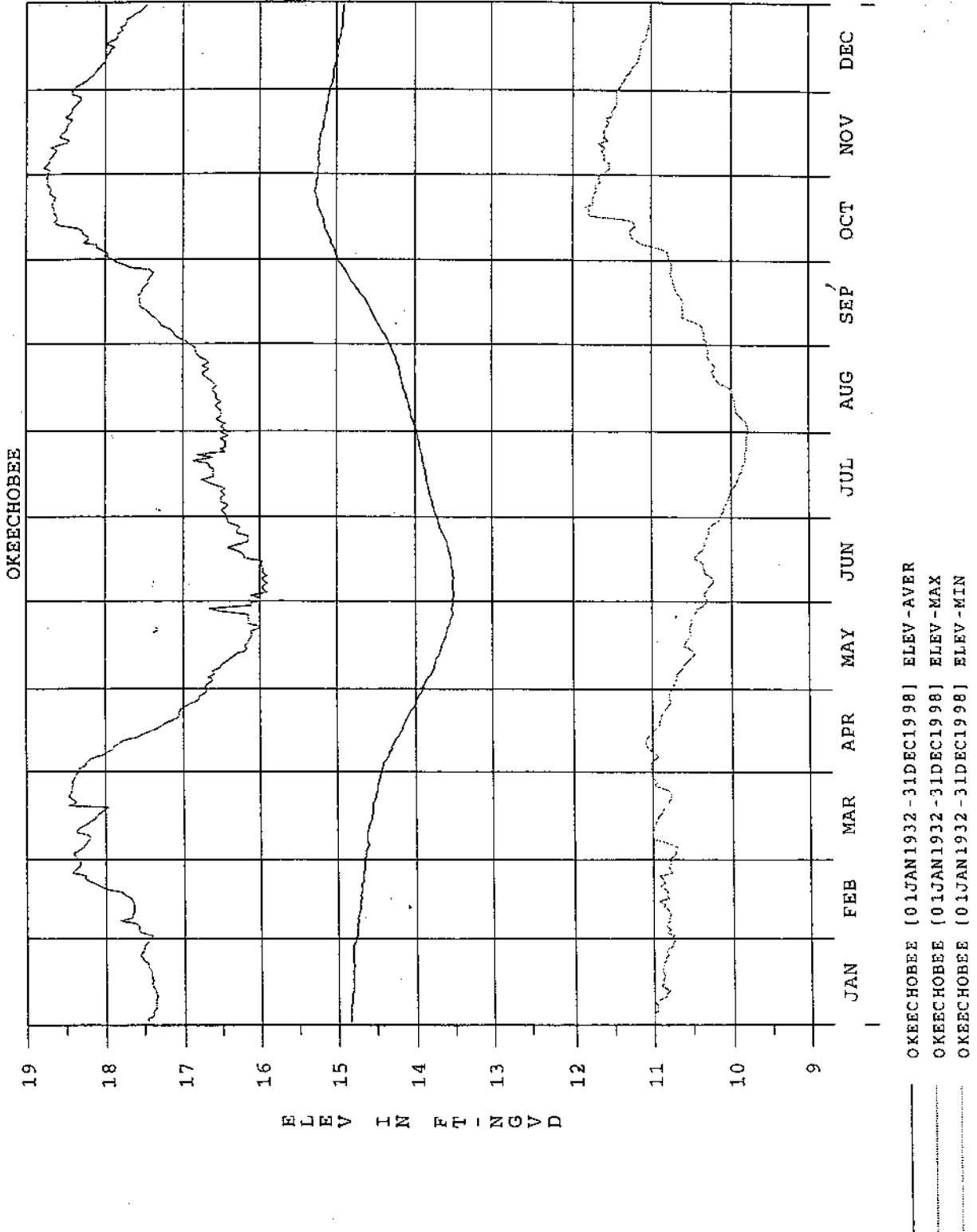
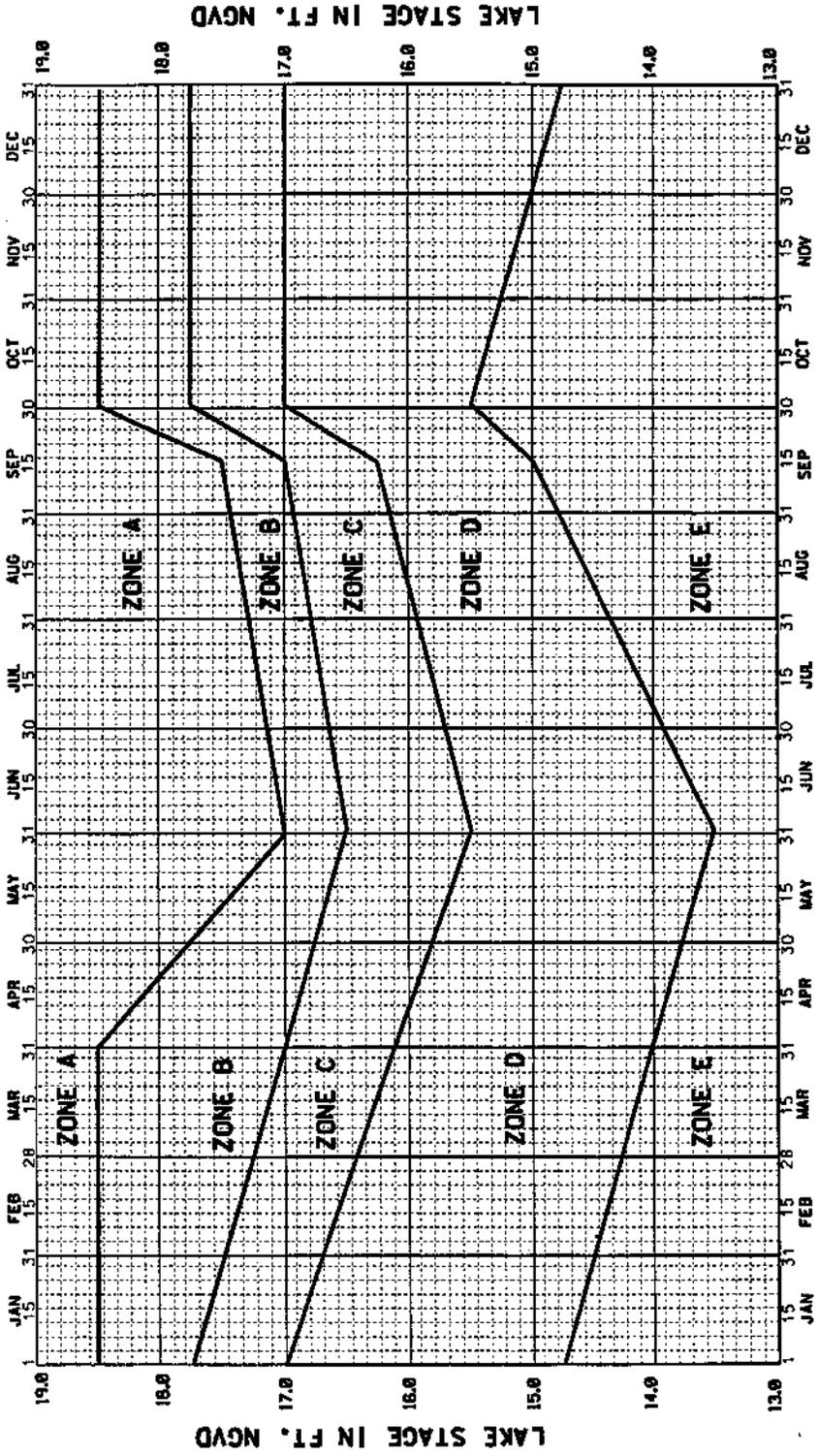


Figure 1.1-1

FIGURES 6.1-1
FIGURES 6.1-2
FIGURES 6.1-3



RELEASE THROUGH OUTLETS AS INDICATED

ZONE	AGRICULTURAL CANALS TO WCAB (1.2)	CALOOSAHATCHEE RIVER AT S-77 (1.2.4)	ST. LUCIE CANAL AT S-80 (1.2.4)
A	PUMP MAXIMUM PRACTICABLE	UP TO MAXIMUM CAPACITY	UP TO MAXIMUM CAPACITY
B (3)	MAXIMUM PRACTICABLE RELEASES	RELEASES PER DECISION TREE (THESE CAN RANGE FROM MAXIMUM PULSE RELEASE UP TO MAXIMUM CAPACITY)	RELEASES PER DECISION TREE (THESE CAN RANGE FROM MAXIMUM PULSE RELEASE UP TO MAXIMUM CAPACITY)
C (3)	MAXIMUM PRACTICABLE RELEASES	RELEASES PER DECISION TREE (THESE CAN RANGE FROM NO DISCHARGE UP TO 6500 CFS)	RELEASES PER DECISION TREE (THESE CAN RANGE FROM NO DISCHARGE UP TO 3500 CFS)
D (3.5)	AS NEEDED TO MINIMIZE ADVERSE IMPACTS TO THE LITTORAL ZONE WHILE NOT ADVERSELY IMPACTING THE EVERGLADES. (SEE NOTE 5.)	RELEASES PER DECISION TREE (THESE CAN RANGE FROM NO DISCHARGE UP TO 4500 CFS)	RELEASES PER DECISION TREE (THESE CAN RANGE FROM NO DISCHARGE UP TO 2500 CFS)
E	NO REGULATORY DISCHARGE	NO REGULATORY DISCHARGE	NO REGULATORY DISCHARGE

NOTES: (1) SUBJECT TO FIRST REMOVAL OF RUNOFF FROM DOWNSTREAM BASINS
 (2) GUIDELINES FOR WET, DRY AND NORMAL CONDITIONS ARE BASED ON: 1) SELECTED CLIMATIC INDICES AND TROPICAL FORECASTS AND 2) PROJECTED INFLOW CONDITIONS. RELEASES ARE SUBJECT TO THE GUIDELINES IN THE WSE OPERATIONAL DECISION TREE, PARTS 1 AND 2.
 (3) RELEASES THROUGH VARIOUS OUTLETS MAY BE MODIFIED TO MINIMIZE DAMAGES OR OBTAIN ADDITIONAL BENEFITS. CONSULTATION WITH EVERGLADES AND ESTUARINE BIOLOGISTS IS ENCOURAGED TO MINIMIZE ADVERSE EFFECTS TO DOWNSTREAM ECOSYSTEMS.
 (4) PULSE RELEASES ARE MADE TO MINIMIZE ADVERSE IMPACTS TO THE ESTUARIES
 (5) ONLY WHEN THE WCAB ARE BELOW THEIR RESPECTIVE SCHEDULES

CENTRAL AND SOUTHERN FLORIDA
 INTERIM REGULATION SCHEDULE
 LAKE OKEECHOBEE
 DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT
 CORPS OF ENGINEERS, JACKSONVILLE, FLORIDA
 DATED: 5 NOVEMBER 1999

Figure 6.1-1

WSE (WITH CLIMATE OUTLOOK)

WSE Operational Guidelines Decision Tree

Part 1: Define Lake Okeechobee Discharges to the Water Conservation Areas

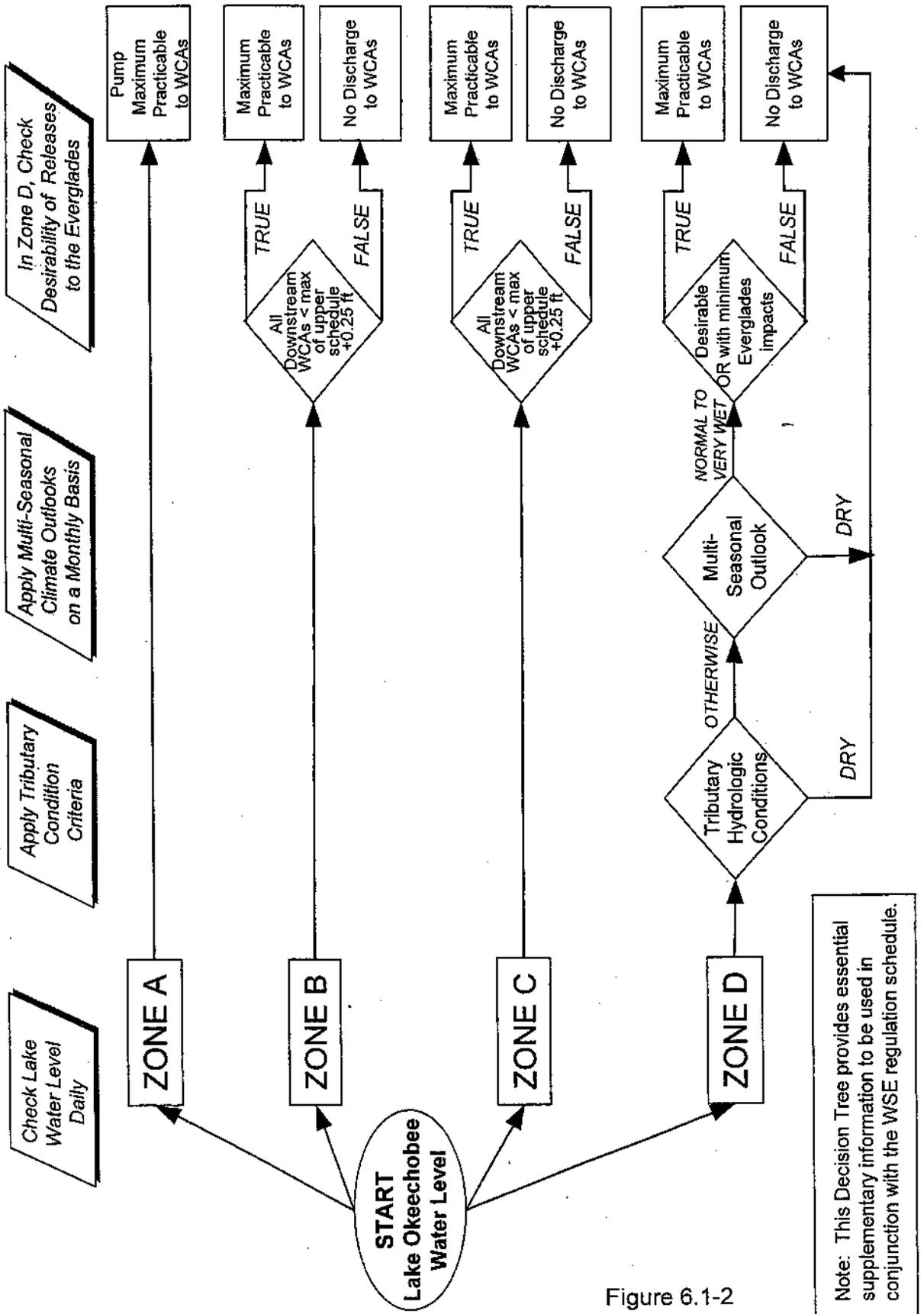


Figure 6.1-2

WSE Operational Guidelines Decision Tree

Part 2: Define Lake Okeechobee Discharges to Tidewater (Estuaries)

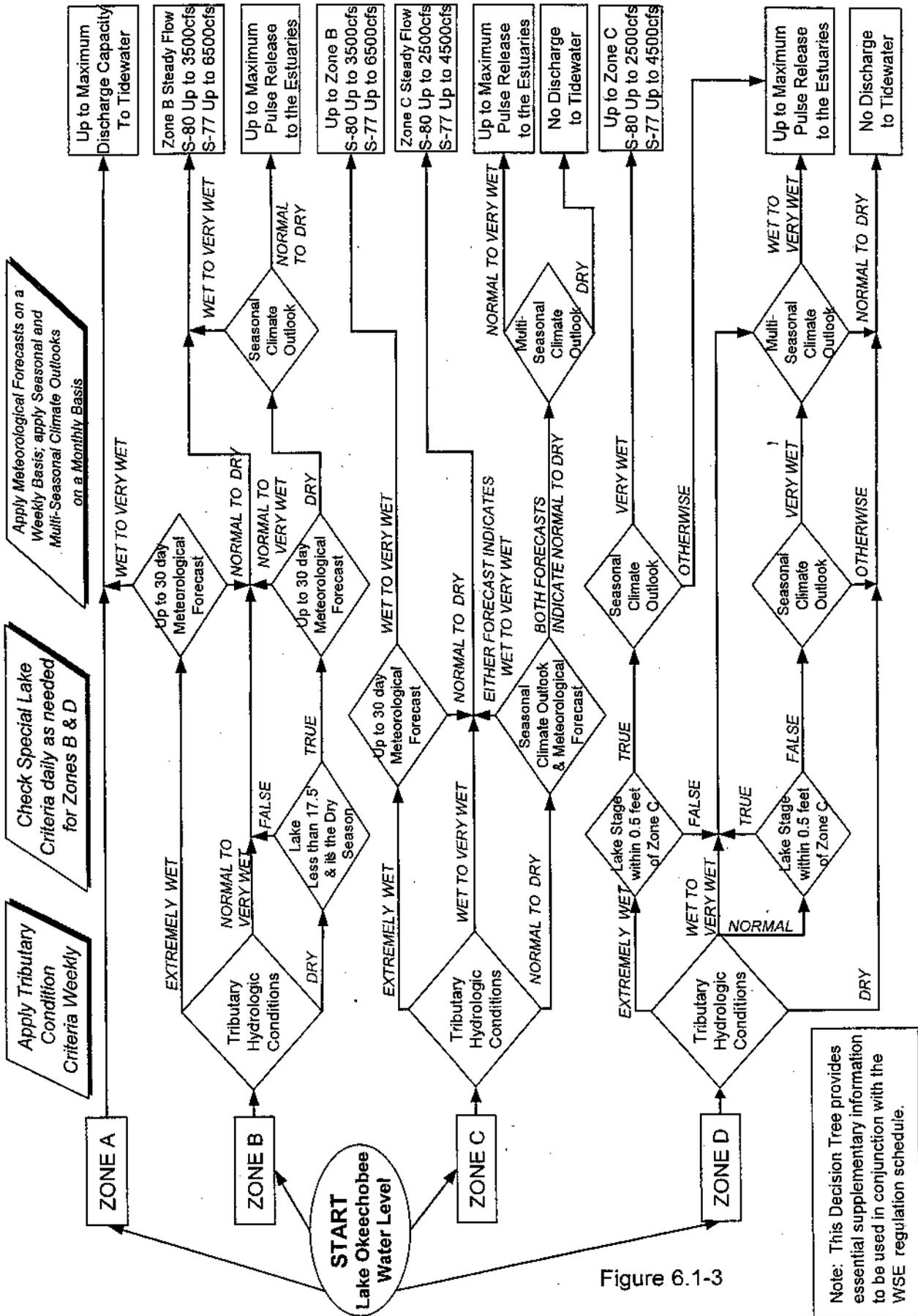
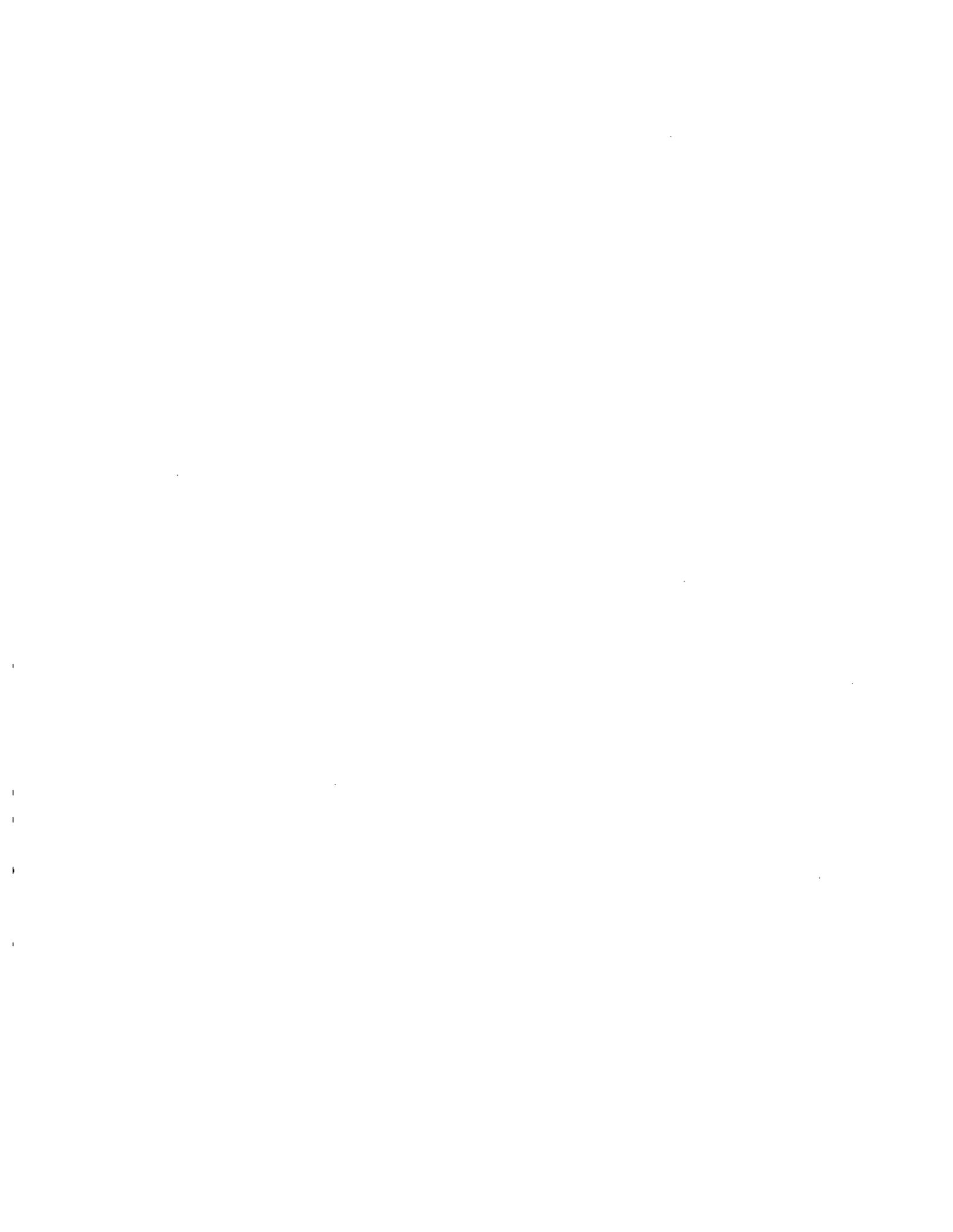


Figure 6.1-3

Sections 6.1.8 and 6.1.9



Replace Sections 6.1.8 and 6.1.9 on page FEIS-87 with the following paragraphs/tables:

6.1.8 Classification of Seasonal Climatic Outlooks

Due to the intricate and vast nature of the Central & Southern Florida Flood Control Project and the complex interactions of tropical and extra-tropical weather systems that affect Florida's weather, it should not be expected that extended forecasts can be made to a very precise level of accuracy. However, with recent advances in climate prediction, it is now possible to predict with some level of confidence, whether the upcoming season is likely to have above, below, or near normal rainfall. Changnon (1982) indicated that certain longer term regional water resources operational planning decisions can be enhanced by applying climate forecasts that are classified into three such categories. It is at this level of detail at which the official seasonal forecasts from the National Center of Environmental Predictions, Climate Prediction Center (CPC) are to be referenced in this application.

The WSE seasonal operational outlook is based on the prediction of total six-month net inflow into Lake Okeechobee, which will be updated each month. These classifications are for the expected net gain in storage in the Lake after taking into account ET losses during the six-month period. The various classifications of the net inflow are listed in Table 6.1.8-1. Utilizing the official CPC three-month overlapping climate outlooks together with the Lake Okeechobee historical inflows for the appropriate months allows the development of these hydrologic outlooks. The methodologies for this transformation will be detailed in the water control manuals currently being developed for the WSE schedule. The term 'seasonal' is not applied in the most typical sense in that it actually refers to a six-month moving window that is updated each month of the year and does not pertain to a particular season of the year. This is similar to the CPC seasonal three-month climate outlooks, which include overlapping windows that do not necessarily correspond with a particular season of the year.

Table 6.1.8-1. Classification of Lake Okeechobee Net Inflow Seasonal Outlooks

Lake Net Inflow Outlook (million acre-feet)	Equivalent Depth ¹ (feet)	Lake Net Inflow Classification
>1.5	>3.2	Very Wet
1.0 to 1.5	2.1 to 3.2	Wet
0.5 to 1.0	1.1 to 2.1	Normal
< 0.5	< 1.1	Dry

¹ Volume-depth conversion based on lake surface area of 467,000 acres.



6.1.9 Classification of Multi-Seasonal Outlook

It has long been recognized that the onset of hydrologic drought in Florida is often initiated with below normal wet season (May-October) rainfall. Since each month of the wet season contributes significantly to the surplus of water available for the dry season, a deficit in just one or two months during the wet season can lead to increased risk of hydrologic drought during the dry season. For example, September and October of 1988 received below normal rainfall over large regions of the SFWMD just prior to hydrologic drought conditions that occurred in 1989 and 1990. Likewise, an active tropical wet season followed by an El Nino event during the dry season could create prolonged periods of very wet conditions and high water levels in the Lake. Therefore it was found to be of significant value in the design of the WSE operational schedule to define a multi-seasonal outlook that included the remainder of the current hydrologic (wet or dry) season and the entire six-months of the next season. Lake net inflow classifications are identified in Table 6.1.9-1. The multi-seasonal outlook is therefore defined by specific seasons of the year. The multi-seasonal hydrologic outlook is defined either as:

1. The remainder of the wet season and the upcoming dry season; or
2. The remainder of the dry season and the upcoming wet season.

Climate shifts are most often identified with global climate phenomena that affect the regional climate during a particular season of the year. Prolonged wet or dry periods may be caused by a sequence of independent global phenomena that cause two seasons to experience wetter or drier than normal conditions. Close to the transition from the dry to the wet season, in the months of March and April, and under the outlook that the two upcoming consecutive seasons (wet + dry) have below normal rainfall, the multi-seasonal outlook will use the 12-months beginning with May. The idea is to preserve water under increased probabilities of extended drought conditions.

Table 6.1.9-1 Classification of Lake Okeechobee Net Inflows Multi-Seasonal Outlook

Lake Net Inflow Outlook (million acre-feet)	Equivalent Depth ² (feet)	Lake Net Inflow Classification
>2.0	>4.3	Very Wet
1.5 to 2.0	3.2 to 4.3	Wet
0.5 to 1.5	1.1 to 3.2	Normal
< 0.5	< 1.1	Dry

2 Volume-depth conversion based on lake surface area of 467,000 acres.



Table 2.7.1-1
Listed Species Present in the Study Area and Which May
be Affected by Lake Regulation Schedule Alternatives

Scientific Name	Common Name	USFWS	FW C
<i>Trichechus manatus</i>	West Indian manatee	E	E
<i>Rostrhamus sociabilis plumbeus</i>	snail kite	E	E
<i>Mycteria americana</i>	wood stork	E	E
<i>Haliaeetus leucocephalus</i>	bald eagle	T	T
<i>Ammodramus maritimus mirabilis</i>	Cape Sable seaside sparrow	E	E
<i>Drymarchon corais couperi</i>	Eastern indigo snake	T	T
<i>Alligator mississippiensis</i>	American alligator		SSC
<i>Ajaja ajaja</i>	roseate spoonbill		SSC
<i>Aramus guarauna</i>	Limpkin		SSC
<i>Egretta caerulea</i>	little blue heron		SSC
<i>Egretta rufescens</i>	reddish egret		SSC
<i>Egretta thula</i>	snowy egret		SSC
<i>Egretta tricolor</i>	tri-colored heron		SSC
<i>Eudocimus albus</i>	white ibis		SSC
<i>Grus canadensis pratensis</i>	Florida sandhill crane		T
<i>Pelecanus occidentalis</i>	brown pelican		SSC
<i>Rhynchops niger</i>	black skimmer		SSC
<i>Centropomus undecimalis</i>	common snook		SSC
<i>Cucurbita okeechobeensis</i>	Okeechobee gourd	E	

E Endangered

T Threatened

SSC State Listed Species of Special Concern

2.8 Water Management & Water Supply

2.8.1 Water Management

Lake Okeechobee is regulated to provide flood control; water supply for agricultural irrigation, municipalities and industry, and Everglades National Park; regional groundwater control and salinity control; enhancement of fish and wildlife; navigation and recreation.

Lake water levels in Lake Okeechobee are regulated by a complex system of pumps, spillways and locks. The regulation schedule attempts to achieve the multiple-use purposes mentioned above as well as provide seasonal lake level fluctuations. The schedule lowers the lake stage prior to the wet season to provide both storage capacity and flood protection for the surrounding areas during the wet season. After the peak of

the hurricane season, lake levels are allowed to increase to store water for the upcoming dry season. The general plan of operation for Lake Okeechobee is based on the following: (1) flood protection from lake waters and hurricane-driven wind tides for lands adjacent to the lake; (2) maintenance of an 8-foot navigation channel across Lake Okeechobee, as part of the Okeechobee Waterway; and (3) storage of water to meet the requirements of the agricultural area south and east of the lake.

Flood control works on Lake Okeechobee consist of a system of about 1,000 miles of encircling levees designed to withstand a severe combination of flood stage and hurricane occurrence, plus the regulatory outlets of St. Lucie Canal and the Caloosahatchee River. The design discharge of Moore Haven Spillway is 9,300 cfs; that of St. Lucie Spillway is about 16,000 cfs. Following removal of local runoff from the agricultural areas south of the lake, an additional regulatory capability of several thousand cfs is available through the Miami, North New River, Hillsboro, and West Palm Beach Canals by pumping into the three Water Conservation Areas. The crest elevation of the levee system surrounding the lake ranges from 32 to 45 feet, NGVD. The likelihood of overtopping the levees from excess storage is almost non-existent. Possible flooding due to overtopping of levees within the Herbert Hoover Dike system is limited to short duration events involving wave runup in addition to hurricane-induced storm surge. The likelihood of such events is remote and the expected extent of flooding is minimal.

Trimble and Marban (1988) performed an analysis of the Lake Okeechobee regulation schedule which incorporated a trade off analysis framework and resulted in the recommendation of an improved schedule now in use (Figure 2.8-1). This recommended schedule reduced the frequency and distribution of regulatory discharges to the St. Lucie and Caloosahatchee estuaries to lessen the undesirable impacts to the natural ecosystems within these estuaries. This was accomplished without significantly impacting existing flood control, water supply and environmental benefits provided by the previous (15.5 – 17.5 feet) schedule approved in 1978. This schedule was approved by the District's Governing Board in December 1991 and approved on a two year interim basis by the USACE in May of 1992. This schedule was approved by the District's Governing Board in December 1991 and approved on a two year interim basis by the USACE in May of 1992. Regulatory releases are to occur at lower lake stage and at lower and more environmentally sensitive rates of discharge than the previous schedule. In Zone D discharges to the St. Lucie and Caloosahatchee Basins are made in a "pulse" fashion, which attempts to simulate a natural rainstorm event within the basins. The series of three pulse discharge levels was developed to control rising lake stages by starting off slow, meaning with the lowest rate of discharge required. If the lower rate of pulse did not bring the lake down to the desired level, then the subsequent releases would be at the next higher release rate. Each pulse takes 10 days to complete. This method was designed to allow estuarine biota to tolerate changes in salinity and to allow the discharges to remain within the natural range of freshwater flow to the estuary.

5.3 Evaluation of Lake Regulation Schedule Alternatives

The section below provides a brief assessment of the alternative regulation schedules from the perspective of how they will affect the natural environment, the human environment, including local and regional economic conditions, water quality, water management and water supply. A summary of key performance measure results for all of the lake regulation schedule alternatives is included at the end of section 5.3 (see Table 5.3-1). For additional detail and modeling results of performance measures for the various alternatives, reference *Appendices A and C*.

5.3.1 Environmental

Both alternatives HSM and Corps 2010 were determined to be, at a minimum, no improvement for the lake ecosystem, and at worst, an exacerbation of already existing adverse conditions within the littoral zone and marsh. HSM produced several more extreme high lake stages than the existing Run 25 using the 2010 base (*Appendix A*). Neither alternative allows the lake the opportunity to recede sufficiently to levels thought to encourage regeneration of the littoral zone as does the WSE and 22 AZE alternatives. Although both alternatives HSM and Corps 2010 perform reasonably well in diverting existing regulatory discharges away from the estuaries, southward towards the WCAs, it is not known what impact these may have on existing water quality and cattail expansion in these areas since this was not included in the modeling. By and large, it is reasonable to conclude that since neither of these alternatives improves in any real way, and may in fact adversely impact Lake Okeechobee, then they do not meet the study goals of optimizing environmental benefits to the natural areas. These two alternatives are henceforth not considered any further for the purposes of this study. Under the WSE schedule, there is a small (about 5%) reduction in the frequency of high lake stage events (>15 feet), but no significant increase in lows (>12 feet), as compared to Run 25. In other words, the WSE schedule takes a small step towards fixing the problem with high lake stages, without doing it at the expense of creating more lows. Furthermore, WSE should actually perform better as climate forecasting abilities evolve.

5.3.1.1 Lake Okeechobee

Alternative 25 appears to be slightly better for the lake littoral zone given conditions assumed under the 2010 base. This may be attributable to the increased demands on water supply from the lake expected in the future, which results in lower overall lake stages. Alternative 25 has fewer low stage events than the other alternatives under the 2010 base. WSE has four low stage events, one more than Run 25, and one low stage event less than 22AZE. Alternative 25 performs about the same as WSE in terms of mimicking "historical" (defined as that period from 1953-1972) lake stage conditions. WSE has shorter flooding events (duration above 15 feet NGVD) compared to Run 25, although not as good as 22AZE. While there is no significant difference between the alternatives for prolonged low lake stages (<12 feet for >1 year), WSE performs slightly

There are several useful measures and tools that are currently available for Lake Okeechobee operational decisions. One of the most valuable sets of tools may be the regional hydrologic models that are available within the Hydrologic Systems Modeling Division of the SFWMD Planning Department. These models are summarized in Table 6.1.11-1. Table 6.1.11-2 lists additional meteorological and climate forecasts that may be considered.

6.3 Implementation of WSE Schedule

The section below explains the technical details underlying the implementation of the WSE lake regulation schedule, including the modeling tools used and references for more detailed information available on various web sites.

6.3.1 Introduction

The Internal Operational Planning Core (OPI) team has developed a decision tree for implementation of the WSE Operational Schedule (Operational Planning Team, 1999). The operational decision tree has been separated into two schematic diagrams. One diagram depicts the decision tree for discharges from the lake to the WCAs, while the second diagram depicts discharges from the lake to tidewater. If discharges to the WCAs are not large enough to control the lake levels at the desired level, then the WSE operational guidelines would allow releases to tidewater. The WSE Operational Schedule was developed with the primary intention of relieving stress on the lake littoral zone. By incorporating additional information (such as tributary basin hydrologic conditions, and meteorologic and climatic forecasts) directly into the operational guidelines, it was determined that it is possible to relieve the stress on the littoral zone while also improving the other objectives for managing the lake levels and discharges. This has become possible because of the very recent advances in understanding climate variability.

The additional water management objectives include: (1) flood protection, (2) water supply and (3) Everglades hydro-pattern enhancement. The WSE Operational Schedule decision trees were developed to act as a decision support system. The WSE operational guidelines and the decision support schematics are included in Figures 6.1-2 and 6.1-3. If one of the major ecosystems has experienced a large level of stress in recent months and/or years, it may be appropriate to hedge the operational guidelines in a direction that would allow for the recovery of that particular ecosystem. This type of action should be taken only with the support of hydrologic analysis, which documents the benefits that would be achieved and the risks that may occur due to such an action. The benefits and risks for all of the multiple objectives for operation of Lake Okeechobee should be considered before modifying the operational guidelines in a directions that would allow for the recovery of a particular ecosystem. These results should be reviewed by the Internal Operational Planning Core (OPI) team which should include environmental experts for the Lake Okeechobee littoral zone, the downstream estuaries, and the Everglades, to review any proposed deviations. The OPI will meet on a regular basis.



APPENDIX F

FINAL ENVIRONMENTAL IMPACT STATEMENT COMMENTS AND RESPONSES



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United States Environmental Protection Agency	09-29-1999	101
United States Department of the Interior, Office Of The Secretary, Office Of Environmental Policy And Compliance	09-20-1999	103

31 July 1999

Dear Sir

I HAVE GONE OVER THE THREE BOOKS ON LAKE OKEECHOBEE REGULATION SCHEDULE STUDY. AFTER LOOKING AT THE STUDY INFORMATION, I AGREE WITH THE W.S.E. SCHEDULE.

IT KEEPS THE WATER AT A LEVEL, WE ALL CAN LIVE WITH AT THIS TIME FRAME. OUR OTHER PROBLEM IS PHOSPHORUS RUN-OFF LEVELS. IT IS NOW TIME FOR ENFORCEMENT, TO BE DONE AND CARRIED OUT, TO DROP THESE HIGH PHOSPHORUS LEVELS.

THE CATTLE PEOPLE WHO HAVE NOT, COME IN LINE WITH PHOSPHORUS MUST NOW DO SO, AND ENFORCEMENT OF S.W.I.M., WATER QUALITY, AND STRONG MONITORING, IS TO BE DONE.

Robert M. Norton
4200 Hwy. 441 SE
Okeechobee, FL 34974

Robert M Norton
ECOSYSTEM WATCH
OKEECHOBEE FLORIDA

1160 38th Avenue
Vero Beach, FL 32960

September 14, 1999

Mr. James C. Duck
Chief , Planning Division
US. Army Corps of Engineers
Jacksonville District
P.O. Box 4970
Jacksonville, FL 32232-0019

Attn: Mark Ziminske

Dear Mr. Duck:

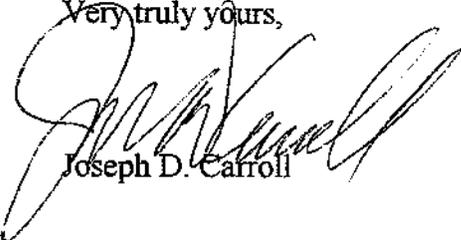
I have reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Okeechobee Regulation Schedule Study. The reports were well prepared and I have a few comments for your consideration.

The Abstract of the document would be improved if the second or third sentence emphasized the wildlife values within the levees of Lake Okeechobee. Wildlife values, if mentioned and emphasized(as they are in the Introduction on page DEIS-1), would provide the reader a better balance to view the entire statement.

The Fish and Wildlife Coordination Act report which is prepared by the U.S. Fish and Wildlife Service, is normally made a part of a plan or study of this type as required by the Fish and Wildlife Coordination Act. This omission should be corrected before the Final Document is presented to Congress or Higher Authority in the Corps.

I hope you will move forward to implement the new schedule and follow it after implementation. This will require resolve to go ahead and discharge when the schedule calls for it and to make sure the South Florida Water Management District has the capability and personnel to make Meteorological predictions as required. Thank you for the opportunity to comment and please add my name to the mailing list for this project

Very truly yours,


Joseph D. Carroll

cc: Robert Pace.

Friends of Lake Okeechobee
2252 SW 22nd Circle North
Okeechobee, FL 34974
Chead@ircc.net

941-763-3568

FAX 941-763-6943

Mr. Mark Ziminske
U.S. Army Corps of Engineers
Jacksonville District Planning Div.
P.O. Box 4970 PD-ES
Jacksonville, Florida 32232-0019

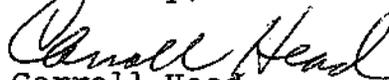
Dear Mark:

It was nice to meet the real person after our conversations and e-mail correspondence. I appreciate your coming down for the public hearings on our 'special' lake. Please consider this letter our statement accompanying the petitions I submitted to Colonel Boruch with 1242 signatures from the shores of Lake Okeechobee supporting the proposed WSE schedule.

Mark, I asked in the meeting a key question which I think still needs more clarification. That is, after implementation of WSE, will the lake's littoral zone response be allowed to affect the day to day management of lake level. With the tremendous latitude available, especially in Zone D of the schedule, that is vital in restoration of our lake. Please pass on this concern to your management as I plan to do to SFWMD.

Thanks again.

Sincerely,



Carroll Head
President,
Friends of Lake Okeechobee

Fishermen against Destruction of Environment, Inc.
P.O. Box 16061
W. Palm Beach, FL 3346
9/29/99

TO: Jim Duck, Chief of Planning, USCOE
Jacksonville, FL 904-232-3442

FROM: Wayne L. Nelson 561-655-2660 fone/fax

Subj: WSE schedule for Lake Okechobee

Pages 1

Our organization endorses proposed WSE schedule for the Lake and its swift implementation. We began to campaign for lower lake stages eleven years ago and would like to protest the long and frustrating process to reach this point while watching the lake virtually die before our eyes with loss of 75% of its vegetation.

Wayne L. Nelson
Exec. Director



**SIERRA
CLUB**
FOUNDED 1892

SOUTH FLORIDA / EVERGLADES OFFICE:
2937 S.W. 27th Avenue, Suite 101, Miami, FL 33133
Phone: 305-476-9898 Fax: 305-476-9414

July 29, 1999

Mr. Jim Duck
Chief of Planning
Army Corps of Engineers
VIA FACSIMILE: 1-904-232-3442

Dear Mr. Duck:

The Sierra Club would like to offer its support of the Lake Okechobee water management schedule WSE as the best alternative within the current conditions. We are hopeful that this schedule will maximize shoreline benefits.

This is an important first step in a larger, iterative process associated with Restudy's improvements.

WSE is important now for critical, littoral and ecological improvements, but there may be need for future modifications as conditions change.

Sincerely,


Jonathan Ullman
Sierra Club Everglades Committee

National Audubon Society



Everglades Ecosystem
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Mr. Mark Ziminske
United States Army Corps of Engineers
Jacksonville District, Planning Division
400 West Bay Street
Jacksonville, Florida 32232

Dear Mr. Ziminske,

National Audubon Society (NAS) has reviewed the *Lake Okeechobee Regulation Schedule Study Draft Integrated Feasibility Report and Environmental Impact Statement*. NAS thanks the United States Army Corps of Engineers, the South Florida Water Management District, and other involved agencies (collectively, the Study Team) for this opportunity to provide to the Study Team the enclosed comments regarding the above referenced document. Furthermore, NAS expresses its continued commitment to working with the Study Team and all interested parties toward the restoration of central and southern Florida's ecosystem. If you have questions or comments regarding the enclosed document, please do not hesitate to contact us at (305) 371-6399.

Sincerely,

Mark Kraus, Ph.D.
Director of Restoration Science

cc: Col. Joe Miller (USACE)
Mr. Frank Finch (SFWMD)



*Comments of the National Audubon Society
regarding the*

Lake Okeechobee Regulation Schedule Study

**Draft Integrated Feasibility Report and
Environmental Impact Statement**



EVERGLADES CONSERVATION OFFICE

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September 1999

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1 Executive Summary

The following are comments by the National Audubon Society (NAS) regarding the Lake Okeechobee Regulation Schedule Study (LORSS) Draft Integrated Feasibility Report and Environmental Impact Statement (DEIS). NAS has a long-standing interest in restoration efforts in southern Florida, beginning with the establishment of Audubon Wardens in the early 1900's and continuing to this day with Audubon researchers, Sanctuary Managers, educators, and policy staff. Whereas NAS has identified the Everglades as a region requiring significant research and advocacy efforts to support and spearhead environmental restoration initiatives, NAS established an Everglades Conservation Office (ECO) in Miami, Florida in 1992.

The overall goals of NAS in regards to Everglades restoration are:

- **Hydrology:** Restoration of a more natural hydrologic regime throughout the Everglades ecosystem, including the amount, flow, depth, timing, and distributions of water throughout the system.
- **Water Quality:** Restoration of natural water quality throughout the Everglades ecosystem.
- **Ecology:** Restoration and protection of a healthy, self-sustaining mosaic of ecological community types that represents the unique diversity of the historic Everglades ecosystem.
- **Biological Diversity:** Protection and restoration of native biological diversity in the Everglades.
- **Economic Sustainability:** Economic sustainability and high quality of life are integrally linked to Everglades restoration, environmental health, and ecological viability in South Florida.

In order to achieve these goals, NAS participates in local, regional, state, and federal processes that aim towards restoration of the Everglades. Such processes include land use planning efforts, permitting and regulatory concerns, development of restoration criteria and parameters, and large-scale environmental impact statements. Recognizing that Lake Okeechobee is an essential component of Everglades restoration, NAS offers its comments and recommendations to the USACE for consideration. In general, the comments address the following:

- NAS encourages the USACE and all involved parties to further develop sections which deal with ecological impacts and benefits associated with the proposed regulation schedule changes. In doing so, NAS encourages the USACE to provide more background information on historical ecological conditions in Lake Okeechobee and its vicinity.
- NAS encourages the USACE and all involved parties to expedite and modify if necessary, the design, construction, and related activities necessary to address and correct the recognized water quality issues associated with the proposed regulation schedules. NAS also encourages the USACE and related parties to work diligently to develop and establish appropriate water quality standards for Lake Okeechobee inflows (e.g.: 40 parts per billion total water column phosphorus) and appropriate phosphorus total maximum daily loads for Lake Okeechobee inflows (e.g.: inflow contributions of less than 90 tons per year).
- NAS finds that, of the presented alternative regulation schedules, WSE is acceptable as an interim regulation schedule. However, NAS is concerned about issues related to the re-routing of "dirty" water into the Everglades. Although this undesirable trade-off is anticipated by the USACE to be a short-term impact, NAS recognizes the potential for these discharges to impact portions of the WCAs that are presently recognized as "unimpacted." Whereas NAS does not support the discharging of "dirty" water into the Everglades, NAS recommends that all attempts to eliminate these impacts should be made. Therefore, NAS strongly encourages the USACE, SFWMD, and other collaborating agencies to incorporate the recommendations contained in this document by accelerating to the maximum extent

possible, the design, construction, and related activities necessary to implement water storage (i.e.: Talisman reservoirs) and treatment components (i.e.: STA 3/4) of regional restoration projects in the vicinity of Lake Okeechobee. Furthermore, NAS recommends that existing storage and treatment components should be used to the maximum extent possible and enhanced wherever possible through the application of knowledge gained through ongoing research efforts.

- NAS recommends that the distribution of discharges from Lake Okeechobee be reevaluated on a regular basis and modified if necessary to minimize impacts associated with the poor quality of Lake Okeechobee discharges.

2 Introduction

One may think of Lake Okeechobee as the life-giving heart of the Everglades, having historically provided unbridled seasonal flows of fresh-water to the Everglades. However, this notion of Lake Okeechobee fails to do justice to the true nature and wonder of Lake Okeechobee's natural character.

The United States Army Corps of Engineers (USACE) identified Lake Okeechobee as one of the most critical components of the Central and Southern Florida Project (C&SF) Comprehensive Review Study (Restudy) and Everglades restoration efforts. As such, Lake Okeechobee bears the burden of serving several competing interests. Since the 1940s, Lake Okeechobee has provided the services of flood protection and water supply to southern Florida's ever-increasing population. The regulation of water levels in Lake Okeechobee for these purposes has severely harmed its ecological framework due to a combination of widely-varying water depths and poor water quality. The intent of the Lake Okeechobee Regulation Schedule Study (LORSS) Draft Integrated Feasibility Report and Environmental Impact Statement (DEIS) is to recommend a regulation schedule for immediate implementation that will optimize environmental benefits with little or no impact to competing interests.

2.1 Summary of Present Conditions

Lake Okeechobee is the second largest fresh-water lake contained within the United States. It covers approximately 730 square miles (467,200 acres) of Florida's interior (Fernald and Purdum 1998) and is a shallow-water, wind-influenced lake with a mean depth of between 8.6 (Fernald and Purdum 1998) to 9 feet (USACE 1999). Lake Okeechobee's 4,205,000 acre-feet of water (maximum storage of over 5,000,000 acre-feet [USACE 1999]) is impounded by approximately 140 linear miles of levees that were constructed following the devastating 1928 hurricane.

Lake Okeechobee receives inflows from the Kissimmee River, Taylor Creek, Fisheating Creek and other upstream and inflow canals (Fernald and Purdum 1998, SFWMD 1981). The Caloosahatchee and St. Lucie Canals are two major outlets for Lake Okeechobee, which also serve as navigable waterways across the peninsula of Florida. Additionally, the Miami, North New River, Hillsboro, and West Palm Beach Canals also serve as outflows for Lake Okeechobee, and as delivery mechanisms for agricultural and urban water supply.

Since the early 1900s, water levels in Lake Okeechobee have ranged from approximately 14.5 to 17.5 feet above MSL, more recently it has been regulated to provide maximum flood-protection capabilities and for growing water supply demands (USACE 1999). Lake Okeechobee has also received water containing high concentrations of nutrients from upstream and downstream watersheds (Fernald and Purdum 1998, SFWMD 1977). Due to inflows with unnaturally-high nutrient concentrations and internal nutrient recycling, Lake Okeechobee has changed from oligotrophic (low nutrient) to eutrophic/hypereutrophic (USACE 1999, SFWMD 1990). Subsequently, wide-spread algae blooms, fish kills, cattail spread, and a wide variety of other adverse ecological impacts to Lake Okeechobee's littoral zone and benthic communities have occurred due to a combination the poor water quality (particularly high nutrient loads) and unnaturally fluctuating water depths.

2.2 Summary of Historical Conditions

Prior to major hydrological modifications that began during early to mid 1900s with the construction of the Caloosahatchee (present connection to the Gulf of Mexico) and St. Lucie (present connection to the Atlantic Ocean) Canals, Lake Okeechobee had no immediate hydrologic connection to the Florida's coastline. Lake Okeechobee received inflows primarily from the Kissimmee River, Taylor Creek/Nubbin Slough, Fisheating Creek, and adjacent wetlands while sheetflow over the southern peripheral wet prairies and swamp forests was the predominant outflow mechanism (Fernald and Purdum 1998). Consequently, water levels in Lake Okeechobee ranged from as shallow as 12 feet during droughts to as deep as 20 to 21

feet above MSL, alternately drying and saturating its once expansive littoral zone, providing abundant habitat for wetland species and wading bird populations. The historically oligotrophic, phosphorus-limited Lake Okeechobee system has been changed by human activities over the past several decades into a eutrophic, nitrogen-limited system (SFWMD 1981).

2.3 Summary of Past and Present Water Budget

The table that follows shows a summary of historical and present Lake Okeechobee mean annual inflow and outflow volumes (in acre-feet), as modeled with the Natural System Model (NSM, Version 4.5) and South Florida Water Management Model (SFWMM, Version 3.5 under 1995 conditions) for a 31 year simulation.

	NSM 4.5 Flow Volumes (ac-ft)	SFWMM 3.5 Flow Volumes (ac-ft)
Surface Inputs	1,587,000	1,858,000
Precipitation Inputs	1,689,000	1,684,000
Input Totals	3,276,000	3,542,000
Surface Outputs	868,000	1,154,000
Evapotranspiration Outputs	2,381,000	2,361,000
Output Totals	3,249,000	3,515,000

One notable observation is that evapotranspiration losses account for roughly 67% to 73% of Lake Okeechobee's outflows. Furthermore, evapotranspiration volumes are roughly 1.4 times greater than the precipitation volumes (historically and presently). Assuming that waters from surface sources (e.g.: backpumping and stormwater discharges from upstream basins) and precipitation are well mixed upon entering Lake Okeechobee, roughly 1/2 of the water that leaves Lake Okeechobee due to evapotranspiration originated as stormwater runoff. Consequently, the evaporating water leaves behind and concentrates the various compounds that were "picked up" and transported from various urban and agricultural lands into Lake Okeechobee.

3 *Lake Okeechobee Regulation Schedule Study*

3.1 **Purposes and Goals of Proposed Actions**

The USACE states in the LORSS DEIS that "The purpose of this study is to recommend a plan for immediate implementation, a regulation schedule that will optimize environmental benefits at minimal to no impact to competing project (lake) purposes" (USACE 1999). The USACE also indicates that the modified lake operations should reduce adverse impacts to the environment while increasing the storage capacity of Lake Okeechobee. To achieve these objectives, the USACE established the following project goals:

- a. Maintain or improve existing water storage so that it is available when needed to attend to the urban and agricultural needs of Central and Southern Florida while ensuring that sufficient water capacity within the lake to provide adequate flood protection for surrounding areas still exists
- b. Increase species diversity and productivity within the lakes littoral zone
- c. Enhance species diversity and productivity in the estuaries
- d. Improvements to benefit hydropatterns in the Everglades

(USACE 1999)

Although NAS understands that the USACE intends for all goals to be of equal importance, NAS believes that the above-referenced objectives, as quoted from Section 1.3.1 of the LORSS DEIS, would be better represented by goals that prioritize the optimization of environmental benefits (i.e.: species diversity and productivity and Everglades hydropattern improvements). NAS recognizes that water supply and flood protection are fundamental needs of existing water users, and that such services should be maintained. However, NAS believes that the above-referenced goals are not fully supportive of, although not contrary to, the aforementioned objectives. Therefore, NAS encourages the USACE to amend the project goals in a manner that is more supportive of the study's purpose, and offers the following as recommended language:

- a. Increase species diversity and productivity within the lakes littoral zone
- b. Enhance species diversity and productivity in the estuaries
- c. Improve timing, distribution, quantity, and quality of Lake Okeechobee's discharges to benefit hydropatterns in the Everglades
- d. Maintain existing water storage so that it is available when needed to attend to the urban and agricultural needs of Central and Southern Florida while ensuring that sufficient water capacity within the lake to provide adequate flood protection for surrounding areas still exists

In addition to these editorial notes, NAS encourages the USACE and SFWMD to continue their efforts to improve upon the work and research that has been conducted to this time. Although NAS supports the present preferred alternative as an interim regulatory schedule, NAS recognizes the need for further improvements which should be based on natural short and long term lake-level cycles. In developing the follow-up regulation schedule (to be implemented with the Restudy or sooner), NAS recommends that the restoration of Lake Okeechobee's ecological structure be the overriding goal, using other offsite water storage components to provide maximum ecological benefits to Lake Okeechobee.

3.2 **Summary of the Alternative Evaluation**

The USACE evaluated 4 alternative regulation schedules (i.e.: Run 22 AZE, HSM, CORPS 2010, and WSE) in addition to the existing regulation schedule (i.e.: Run 25). The evaluation process made use of

various performance measures that were developed to quantify the benefits of the proposed regulation schedules relative to one another. Based on these analyses, the USACE chose a preferred alternative that improved lake-levels, while attempting to minimize adverse impacts elsewhere in the system.

3.3 Summary of Preferred Alternative

The WSE schedule is presented in the LORSS DEIS as the preferred alternative. The WSE schedule is one of two (HSM and WSE) proposed regulation schedules that makes use of hydrological forecasting (USACE 1999). The recent advancements in forecasting technology that have allowed for its use as a component of the WSE Operational Decision Trees (USACE 1999).

The WSE schedule is one of two regulation schedules that allows for discharges to occur when lake-levels are below 14 feet (Run 22AZE and WSE). Whereas Run 22AZE discharges are governed by lake and downstream stages, the WSE schedule makes allowances for anticipated hydrological conditions (i.e.: holding water when conditions are expected to be dry, and releasing water when conditions are expected to be wet [USACE 1999]).

3.4 Summary of Environmental Impacts

The performance measures presented in LORSS DEIS, make it appear that the WSE schedule slightly improves Lake Okeechobee stages (in terms of high-water events) providing slight relief to Lake Okeechobee's littoral zone. With the exception of the Water Conservation Areas (WCAs), associated impacts to other natural areas appear to be minimal.

3.4.1 Ecological Impacts

NAS finds the discussion of the impact of water levels on the various ecological parameters of Lake Okeechobee to be in need of additional detail and conceptual development, and encourages the USACE to improve these sections. The treatment of Snail Kites illustrates one way in which improvements could be made. The Snail Kite narrative in the section entitled "Existing Conditions" (Section 2.7.1.2, p. 27) tells generally about the Kite's life history, but has no citations, and does not actually cover "Kites on Lake Okeechobee." Vital information that has been omitted from this section includes: the Kite's population status in Florida, what percent of the Kite population uses Okeechobee during various parts of the year, what habitat conditions on Lake Okeechobee are beneficial for kites during different parts of the year, and how snail kites have responded to past Lake Okeechobee water level changes (or are likely to respond to any of the proposed schedules). In "Environmental Effects," of the LORSS DEIS, Section 7.7 simply states, "These improvements would be expected to improve, or have no adverse on snail kites or wood storks which require a fairly specific hydrologic regime to flourish." Once again, this statement does not state what "specific hydrologic regime" Kites prefer, or how similar Lake Okeechobee is expected to be to that "specific hydrologic regime" under the proposed regulation schedules, or how the Kites are likely to be affected. NAS encourages the USACE to rework all the species accounts in a manner that more carefully links species relationships to Lake Okeechobee itself and how changing water conditions will affect these species.

The discussion also has confusing interpretations of wetland ecology and function. Section 7, "Environmental Effects," has the quote, "Recent research and empirical data seem to suggest that there is a relationship between Lake Okeechobee hydroperiods and vegetation assemblages." (Section 7.5.2.1, p. 100, vegetation within Lake Okeechobee). It would have been more accurate to say, "Hydroperiod is the most important single factor in wetland vegetation assemblages." The latter statement is a basic paradigm of wetland ecology and as such, the LORSS DEIS describes changing the single most important environmental variable to Lake Okeechobee's ecology. Expected changes in hydrology should be used as the basis of detailed, specific, interpretations of the biological effects from the proposed schedules throughout the entire LORSS DEIS.

In a similar vein, Page 104 of the LORSS DEIS says, "When lake stage declines below 11 ft NGVD for instance, the stage considered to be extreme on the low end, 95 percent of the littoral zone is exposed land

without standing water. In that condition, it no longer can function as habitat for fish or wildlife that depend on local fish populations as a food resource. Spike rush and bulrush are almost completely dry at this lake-level, and can no longer support the fish and bird communities that depend on them for foraging and nesting (Havens 1998)." This statement sounds as though these drying periods are harmful, when the opposite is true. NAS thinks this narrative should emphasize that wetlands must dry periodically to remain healthy and productive (drying encourages nutrient recycling, seed germination, enhances wading-bird foraging, and performs other vital functions and this is a large reason NAS favors a lower regulation schedule). Dry periods also are conducive to fires, which are an integral part of Florida wetland ecology. The above quote also omitted the fact that during Lake Okeechobee stages of 11 ft and less, there are many rain-driven, ponded areas in the littoral zone that are not connected to the pelagic areas of Lake Okeechobee, but nonetheless form important refugia for wetland-related species. Once again, including more detailed discussions of the expected ecological effects of new water levels on Lake Okeechobee would greatly strengthen (and support) the proposed Lake Okeechobee schedule changes. (4)

Lastly, the LORSS DEIS could build on the "Wildlife Survey and Habitat Utilization Study of Western Littoral Zone, Lake Okeechobee, Florida" (Appendix E) by relating the USACE's findings to the literature. The USACE's study covered a period of less than 2 years, and therefore cannot assess long-term changes on Lake Okeechobee (such as prolonged flooding, prolonged drought, plant community succession, animal response to succession, and so on). By comparing the USACE's findings to the many years of data from the many other studies conducted on Lake Okeechobee, more information could be gained about trends in biotic communities on Lake Okeechobee. As the study is presently treated, it is a snap-shot in time of Lake Okeechobee that by itself, yields very limited insights to Lake Okeechobee's ecology. (5)

3.4.2 *Water Quality Impacts*

Because Lake Okeechobee's water contains phosphorus at concentrations on the order of 100 parts per billion (USACE 1999, SFWMD 1977), it is likely that additional discharges from Lake Okeechobee to the WCAs will result in negative impacts to the WCAs (USACE 1999). Because the WSE schedule would deliver an additional, approximately 48,000 acre-feet of water on a mean annual basis (approximately 14,000 acre-feet per year due to regulatory releases) to the WCAs, additional phosphorus loading of the WCAs is expected (USACE 1999). Based on the summaries of Everglades Phosphorus Gradient Model results presented in the LORSS DEIS, the additional loading is expected to provide for increased cattail growth (above and beyond that which would occur under Run 25/present operation conditions) in the WCAs as follows:

- 400 acres of expansion in WCA 1
- 50 acres of expansion in WCA 2A
- 85 acres of expansion in WCA 3A

Furthermore, the additional loading is expected to increase the area in which water-column phosphorus concentrations exceed 10 parts per billion as follows:

- 3,800 acres in WCA 1
- 395 acres in WCA 2A
- 5,700 acres in WCA 3A

In comparison, alternative 22AZE (performing better than WSE relative to the Caloosahatchee and St. Lucie Estuaries) delivers more water to the WCAs than does alternative WSE. Although 22AZE appears to provide greater benefits to the Caloosahatchee and St. Lucie Estuaries, alternative 22AZE would increase phosphorus-related impacts to the WCAs.

As noted in the LORSS DEIS, it is likely that the phosphorus-related impacts will be temporary pending the completion of the Everglades Construction Project Stormwater Treatment Areas. However, NAS has concerns related to the potentially irreversible (for the foreseeable future) impacts associated with the untreated discharges from Lake Okeechobee to the WCAs. To minimize and/or mitigate the impacts that

are likely to occur, NAS offers the following recommendations (NAS realizes that some of the following recommendations are structural in nature. However, it is apparent to NAS that they are and have been necessary to minimize impacts to the Everglades and other natural areas downstream of Lake Okeechobee):

- 1) NAS encourages the USACE and SFWMD to work with the Florida Department of Environmental Protection and United States Environmental Protection Agency to address water quality concerns associated with Lake Okeechobee inflows and outflows. NAS recognizes that this recommendation may extend beyond the intended scope/action of the LORSS, however we feel that water quality issues, having been identified (and to some extent, quantified) should be addressed as an integral part of the preferred alternative by appropriate agencies in response to the recognized impacts in a manner consistent with the following statements:
 - a) Establish appropriate water quality standards for Lake Okeechobee inflows (e.g.: 40 parts per billion total water column phosphorus).
 - b) Establish appropriate phosphorus total maximum daily loads for Lake Okeechobee inflows (e.g.: inflow contributions of less than 90 tons per year based on 40 parts per billion inflow concentrations and 1.6 million acre-feet of water per year).
 - c) Wherever possible, amend the design criteria for Stormwater Treatment Areas (e.g.: STA 3/4) to account for the increased Lake Okeechobee outflows associated with the WSE schedule.
 - d) Expedite the authorization, design and related activities, permitting, and construction/modification of structural components (e.g.: Talisman Property Reservoir[s], increasing the carrying capacity of associated canals, and modification of associated infrastructure) necessary for the storage/dampening of water discharges from Lake Okeechobee to the Stormwater Treatment Areas and subsequently WCAs.
 - e) Expedite (to the maximum extent possible) the authorization, design and related activities, and construction of structural components that aim to treat water from Lake Okeechobee to the EFA default total phosphorus criteria of 10 parts per billion or less.
- 2) NAS encourages the USACE and SFWMD to, wherever possible, eliminate (from the plan) adverse environmental (phosphorus-related) impacts to the WCAs. Any unavoidable WSE-related impact to the WCAs should be limited to areas that are already impacted. Unfortunately, the LORSS DEIS leads one to one of two conclusions; improve Lake Okeechobee at the expense of the WCAs, or protect the WCAs at the expense of Lake Okeechobee. It is necessary to restore/protect Lake Okeechobee and the WCAs.

3.5 Summary of Socio-Economic Impacts

To assist with the selection of a preferred alternative, an evaluation of socio-economic impacts was conducted for each of the four alternatives. The alternatives were evaluated against each other and against the existing schedule (Run25). The economic evaluation focused on impacts on agricultural and urban water supply, recreation, navigation, and commercial fishing due to resulting Lake Okeechobee water-level fluctuations and corresponding regulatory releases.

3.5.1 Water Supply Impacts

The WSE schedule appears to meet water supply demands well. The potential effects of the alternative schedules on agricultural water supply are based on the magnitude and frequency of irrigation and water supply shortages. Table ES-1 illustrates how an estimated annual economic gain by the agriculture industry is anticipated with the implementation of the WSE schedule.

3.5.2 *Navigation Impacts*

During the evaluation of impacts related to navigation on Lake Okeechobee, the frequency of low lake-levels was the major performance measure of concern. The more frequently low lake-levels occur (below 12.65 feet NGVD), the more frequently large barges would be incapable of navigating Lake Okeechobee's waterways. Currently, there are no commercial shipping lines that maintain regular service through the Okeechobee waterway. Likewise, there are no dedicated commercial fleets of waterway users. Furthermore, there are no regularly-scheduled commodity shipments routed through the waterways.

Existing commercial traffic consists of special barge shipments that use the waterway as a shortcut to avoid traveling around the peninsula. Fortunately, the infrequent and irregular nature of this usage makes it possible for shipments to be deferred until lake-levels permit passage, which minimizes associated economic impacts.

3.5.3 *Commercial Fishing Operation Impacts*

In general, commercial fishing operations on Okeechobee appear not to be very sensitive to lake-level fluctuations. Commercial fishing boats are not allowed to fish within one mile of the edge of Lake Okeechobee or littoral zone, so lower water levels do not affect their ability to fish. Very shallow levels have resulted in cessation of fishing (justified because the fish become very concentrated and vulnerable to over-harvest). The economic impacts on commercial fishing operations are anticipated to be negligible. (7)

3.5.4 *Recreation Impacts*

In comparison with other factors, recreation is a complex and difficult economic factor to evaluate. Appendix D presents a good attempt to address the various trade-offs of the proposed Lake Okeechobee regulation schedules. However, NAS thinks the threat to the recreational values of Lake Okeechobee might be conservative for the reasons stated in the last two sentences of the appendix (page 5-13), namely that "...this analysis focuses on the short-term recreation impacts of the alternative regulation schedule. It does not reflect the important role of a healthy littoral zone in maintaining the long-term health of the fishery." Clearly, if the fishery were to substantially collapse, the fishing industry would follow, and other tourism attractions, such as wading bird watching, would suffer the same fate. NAS thinks this "declining resource" scenario deserves further analysis in light of the serious changes in ecosystem functioning previously observed with prolonged high Lake Okeechobee stages, and the already-observed problems from the present, long-term, deep water event on Lake Okeechobee. (8)

Another area of concern in the model is the use of the "unit day value" (UDV) in estimating the value of the resource. The UDV quantifies changes in recreational activities primarily through "the ability of visitors to access Lake Okeechobee's recreation resource" (page 5-8). This general assumption that, "more access facilitates more visitors," is plausible, but omits that different visitors favor different water levels, which would render this single variable ambiguous. For example, the high water level stages that make fishing more attractive, make duck hunting, or wading bird watching, less attractive (ducks and wading birds cannot feed well in deep water). NAS suggests refining the "access" variable to better model the various user group responses. (9)

Another area of concern with the UDV variable arises from visiting patterns by tourists. Okeechobee County nearly doubles in population during the winter season, as is characteristic in communities around Lake Okeechobee. Many of these tourists purposely winter near lake Okeechobee for fishing. These people do not fish every day, but do pump tourism dollars into the economy every day they are here. By counting the impact of these people only the day they are using Lake Okeechobee tends to underestimate the full economic impact of these visitors (and of Lake Okeechobee), perhaps greatly. This underestimated source of tourism dollars is in jeopardy with long-term declines in Lake Okeechobee environmental health.

3.5.5 *Summary of Socio-Economic Impacts*

While no individual alternative stands alone by meeting all socio-economic factors, the WSE schedule appears to reasonably balance the needs of competing socio-economic demands. Although associated impacts appear to be minimal, it is recognized that Lake Okeechobee plays a large role in the economies of neighboring populations.

Considering the socio-economic and environmental impacts associated with the each of the proposed alternatives, it appears that alternative WSE is the most appropriate of the proposed interim regulation schedules.

10

4 *Conclusions and Recommendations*

In conclusion, NAS finds that although the WSE schedule is not perfect, it is acceptable (although reluctantly so) as an interim regulation schedule. The WSE schedule does not reproduce natural short-term or long-term hydrological conditions for Lake Okeechobee, but does provide some improvement to water levels in Lake Okeechobee and somewhat reduces the volumes of harmful flows to the northern estuaries. In and of itself, the proposed Lake Okeechobee regulation schedule appears to be a step in the right direction. However the resulting impacts to other parts of the system echo and amplify the needs for additional water storage and treatment, needs that should have been satisfied prior to the writing of this paper. All attempts should be made to avoid having to trade one part of the system for another and to avoid having to decide which part of the system will endure the brunt of human impacts.

Likewise, NAS is concerned about issues related to the re-routing of "dirty" water into the Everglades. Although this undesirable trade-off is anticipated by the USACE to be a short-term impact, NAS recognizes the potential for these discharges to impact portions of the WCAs that are presently recognized as "unimpacted." All attempts to eliminate these impacts should be made and should include the following:

- NAS encourages the USACE and all involved parties to further develop sections which deal with ecological impacts and benefits associated with the proposed regulation schedule changes. In doing so, NAS encourages the USACE to provide more background information on historical ecological conditions in Lake Okeechobee and it's vicinity.
- NAS encourages the USACE and all involved parties to expedite and modify if necessary, the design, construction, and related activities necessary to address and correct the recognized water quality issues associated with the proposed regulation schedules. NAS also encourages the UACE and related parties to work diligently to develop and establish appropriate water quality standards for Lake Okeechobee inflows (e.g.: 40 parts per billion total water column phosphorus) and appropriate phosphorus total maximum daily loads for Lake Okeechobee inflows (e.g.: inflow contributions of less than 90 tons per year).
- NAS finds that, of the presented alternative regulation schedules, WSE is acceptable as an interim regulation schedule. However, NAS is concerned about issues related to the re-routing of "dirty" water into the Everglades. Although this undesirable trade-off is anticipated by the USACE to be a short-term impact, NAS recognizes the potential for these discharges to impact portions of the WCAs that are presently recognized as "unimpacted." Whereas NAS does not support the discharging of "dirty" water into the Everglades, NAS recommends that all attempts to eliminate these impacts should be made. Therefore, NAS strongly encourages the USACE, SFWMD, and other collaborating agencies to incorporate the recommendations contained in this document by accelerating to the maximum extent possible, the design, construction, and related activities necessary to implement water storage (i.e.: Talisman reservoirs) and treatment components (i.e.: STA 3/4) of regional restoration projects in the vicinity of Lake Okeechobee. Furthermore, NAS recommends that existing storage and treatment components should be used to the maximum extent possible and enhanced wherever possible through the application of knowledge gained through ongoing research efforts.
- NAS recommends that the distribution of discharges from Lake Okeechobee be reevaluated on a regular basis and modified if necessary to minimize impacts associated with the poor quality of Lake Okeechobee discharges.

5 *References*

Fernald, E. A. and Purdum, E. D. (Eds.). 1998. *Water Resources Atlas of Florida*, Florida State University and Institute of Science and Public Affairs.

SFWMD. 1977. *Investigations of the Relationship Between Land Use, Rainfall, and Runoff Quality in the Taylor Creek Watershed*. A. Federico. SFWMD Technical Publication #77-3. SFWMD, Resource Planning Department.

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- Office of the Secretary
- Office of International Relations
- Division of Elections
- Division of Corporations
- Division of Cultural Affairs
- Division of Historical Resources
- Division of Library and Information Services
- Division of Licensing
- Division of Administrative Services



- State Board of Education
- Trustees of the Internal Improvement Trust Fund
- Administration Commission
- Florida Land and Water Adjudicatory Commission
- Siting Board
- Division of Bond Finance
- Department of Revenue
- Department of Law Enforcement
- Department of Highway Safety and Motor Vehicles
- Department of Veterans' Affairs

FLORIDA DEPARTMENT OF STATE
Katherine Harris
 Secretary of State

DIVISION OF HISTORICAL RESOURCES

Mr. James C. Duck
 Planning Division, Environmental Branch
 Jacksonville District, Corps of Engineers
 P.O. Box 4970
 Jacksonville, Florida 32232-0019

August 17, 1999

RE: DHR Project File No. 996002
 Cultural Resource Assessment Request
 Draft Integrated Feasibility Report and Environmental Impact Statement for
 Lake Okeechobee Regulation Schedule Study and Appendices

Dear Mr. Duck:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*. The authority for this procedure is the National Historic Preservation Act of 1966 (Public Law 89-665), as amended.

We have reviewed the referenced draft environmental impact statement. We specifically reviewed sections 2.14 and 7.14, both dealing with Cultural Resources. In addition we note that the preferred alternative, *Water Supply and Environmental (WSE)*, will not effect significant historical resources. Therefore, it is our opinion that the project will have no effect on any sites listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical, architectural or archaeological value.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservation Planner, at 850-487-2333 or 800-847-7278. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

for 

George W. Percy, Director
 Division of Historical Resources and
 State Historic Preservation Officer

GWP/Ese

R.A. Gray Building • 500 South Bronough Street • Tallahassee, Florida 32399-0250 • <http://www.flheritage.com>

- Director's Office
(850) 488-1480 • FAX: 488-3355
- Archaeological Research
(850) 487-2299 • FAX: 414-2207
- Historic Preservation
(850) 487-2333 • FAX: 922-0496
- Historical Museums
(850) 488-1484 • FAX: 921-2503
- Historic Pensacola Preservation Board
(850) 595-5985 • FAX: 595-5989
- Palm Beach Regional Office
(561) 279-1475 • FAX: 279-1476
- St. Augustine Regional Office
(904) 825-5045 • FAX: 825-5044
- Tampa Regional Office
(813) 272-3843 • FAX: 272-2340



STATE OF FLORIDA

DEPARTMENT OF COMMUNITY AFFAIRS

"Dedicated to making Florida a better place to call home"

JEB BUSH
Governor

STEVEN M. SEIBERT
Secretary

January 4, 2000

Mr. Mark Ziminske
Department of the Army
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

RE: Department of the Army and the South Florida Water
Management District - Draft Integrated Feasibility
Report and Environmental Impact Statement for Lake
Okeechobee Regulation Schedule Study and Appendices
SAI: FL9907160610C

Dear Mr. Ziminske:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the above-referenced project.

The Department of Environmental Protection (DEP) offers a number of comments and recommendations. Please refer to the enclosed DEP comments.

The Florida Fish and Wildlife Conservation Commission (FWC) has enclosed a report which coordinates input from its Division of Freshwater Fisheries, The Division of Marine Fisheries, and the Florida Marine Research Institute. The FWC notes that a preliminary report, dated April 16, 1999, and under the letterhead of the former Florida Game and Fresh water Fish Commission, was previously sent to the applicant. This letter, in combination with the comparison of Run 22AZE with WSE presented in the FWC's preliminary FWCA report, constitutes the FWC's final FWCA report. Please refer to the enclosed FWC comments.

2555 SHUMARD OAK BOULEVARD • TALLAHASSEE, FLORIDA 32399-2100
Phone: 850.488.8466/Suncom 278.8466 FAX: 850.921.0781/Suncom 291.0781
Internet address: <http://www.dca.state.fl.us>

FLORIDA KEYS
Area of Critical State Concern Field Office
2796 Overseas Highway, Suite 212
Marathon, Florida 33050-2227

GREEN SWAMP
Area of Critical State Concern Field Office
205 East Main Street, Suite 104
Bartow, Florida 33830-4641

22

Mr. Mark Ziminske
January 4, 2000
Page Two

The Department of State (DOS) notes that the preferred alternative, Water Supply and Environmental (WSE) will have no adverse impact on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical, architectural or archaeological value. Please refer to the enclosed DOS comments.

Based on the information contained in the draft Integrated Feasibility Report and Environmental Impact Statement and the enclosed comments provided by our reviewing agencies, the state has determined that the above-referenced project is consistent with the Florida Coastal Management Program.

Thank you for the opportunity to review this project. If you have any questions regarding this letter, please contact Ms. Cherie Trainor, Clearinghouse Coordinator, at (850) 414-5495.

Sincerely,



Ralph Cantral, Executive Director
Florida Coastal Management Program

RC/cc

Enclosures

cc: Robert Hall, Department of Environmental Protection
Bradley Hartman, Fish and Wildlife Conservation Commission
George Percy, Department of State

COUNTY: State

DATE: 07/14/1999

COMMENTS DUE-2 WKS: 07/28/1999

CLEARANCE DUE DATE: 09/30/1999

Message:

SAI#: FL9810150676CR2

STATE AGENCIES

WATER MANAGEMENT DISTRICTS

OPB POLICY UNITS

X Agriculture
 Community Affairs
 Environmental Protection
 Fish & Wildlife Conserv. Comm
 OTTED
 State
 Transportation

South Florida WMD
 Southwest Florida WMD
 St Johns River WMD

Environmental Policy/C & ED

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

Department of the Army and the South Florida Water Management District - Draft Integrated Feasibility Report and Environmental Impact Statement for Lake Okeechobee Regulation Schedule Study and Appendices - Can also be reviewed at <http://www.saj.usace.army.mil/pd/env-doc.htm>

To: Florida State Clearinghouse
 Department of Community Affairs
 2555 Shumard Oak Boulevard
 Tallahassee, FL 32399-2100
 (850) 922-5438 (SC 292-5438)
 (850) 414-0479 (FAX)

EO. 12372/NEPA

Federal Consistency

- No Comment
- Comments Attached
- Not Applicable

- No Comment/Consistent
- Consistent/Comments Attached
- Inconsistent/Comments Attached
- Not Applicable

From:

Division of Forestry
 Forest Resource Planning
 & Support Services Bureau
 3125 Conner Blvd., Mail Stop 1023
 Tallahassee, FL 32399-1650

Division/Bureau:

Reviewer:

Date:

[Signature]
 7-27-99

PROJECT TO BE REVIEWED BY: (Div/Program)	ASSIGNED REVIEWERS (Print Last Name)	IS PROJECT LOCATED IN APPROVED DRI? (Circle Yes/No)				Is Project CONSISTENT w/ COMPLAN?		Is Project CONSISTENT w/ FCMP?		Do you have any COMMENTS on project?		DATE REVIEW COMPLETED	RVWR/ SUPV INIT
		YES		NO		YES	NO	YES	NO	YES	NO		
		Is Project Consistent with DO?	Monitoring Letter?	Is Project DRI Scale?	Monitoring Letter?								
DCP 7/16 (Date Rec'd)	Deadman	YES	NO	YES	NO	N/A				YES	NO	7/19/99	[Signature]
Complete and forward to Div/Prog Below no later than: 07/21/1999													
CMP 7/19 (Date Rec'd)	Vlason	Wetlands?		Stormwater?						YES	NO	7.21.99	[Signature]
Complete and forward to ACC Coordinator no later than: 07/28/1999													

UNIT COORDINATORS for Intergovernmental Coordination and Review:

ACC	Agency Contact Coordinator	Glenn Church	Room 320.05	414-5497
CMP	Florida Coastal Management Program	Glenn Church	Room 320.05	414-5497
FCT	Florida Communities Trust (Ofc of Sec)	Keith McCarron	Room 310C	922-1703
DCP	Division of Community Planning	Debbie Johnson	Room 365.02	488-2356
DEM	Division of Emergency Management	Mary Lou Heath	Room 120.03	413-9969

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
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Project Description:

Department of the Army and the South Florida Water Management District - Draft Integrated Feasibility Report and Environmental Impact Statement for Lake Okeechobee Regulation Schedule Study and Appendices - Can also be reviewed at <http://www.saj.usace.army.mil/pd/env-doc.htm>

No Comment
 Comments Attached
 Not Applicable
 Federal Consistency
 No Comment/Consistent
 Consistent/Comments Attached
 Inconsistent/Comments Attached
 N/A

- INSTRUCTIONS:
- UNIT COORDINATORS are responsible for logging in, logging out, and hand-carrying/mailling project packages to the next reviewing unit on this form, or to the ACC if all review requirements have been met. Failure to meet internal suspense dates may result in loss of opportunity to comment on critical issues.
 - Requests for EXTENSIONS should be made prior to due date, especially if COMMENTS will be submitted. Contact your UNIT COORDINATOR, who will request the EXTENSION from the ACC.
 - Agency COMMENTS on SAIs will be sent to the State Clearinghouse (SCH) and should be prepared in LETTER format for the Secretary's signature. Forward the project package to the next review unit while your COMMENTS are being drafted. Coordinate your comments with other reviewers prior to finalizing.



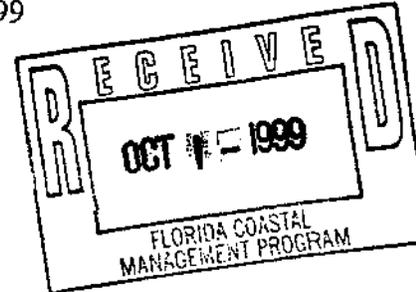
Jeb Bush
Governor

Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

September 29, 1999



Ms. Cherie Trainor
Florida State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

Re: Department of the Army and the South Florida Water Management District, Draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Okeechobee Regulation Schedule Study and Appendices

SAI: FL9907160610C

Dear Ms. Trainor:

This Department has reviewed the above-described project proposal and based on the information provided, we submit the following comments and recommendations.

Background:

The conflicts over competing uses of Lake Okeechobee for water supply, flood control, navigation, environmental protection and enhancement as well as for recreation are well documented. In the past, protection of the lake's ecological health has been given the lowest priority. Prolonged periods of high water levels in Lake Okeechobee have caused impacts to the lake's littoral marsh and the fish and wildlife resources it supports. High water levels have contributed to the movement of high phosphorus content turbid water from the central mud zone of the lake into the near-shore clear water areas. This has promoted algal blooms and impacted ecologically important submerged plant communities. Maximizing water storage in the lake for agricultural and urban water supply has deprived the remnant Everglades system of needed water. In addition, past regulation schedules have resulted in large releases of freshwater to the St. Lucie and Caloosahatchee estuaries, caused adverse water quality impacts, and degraded estuarine ecosystems. Under the current as well as past regulation schedules, wide fluctuations in the lake level have occurred without adequate consideration of the resulting lake ecological impacts. Insufficient consideration has been given to environmental conditions in the lake as well as downstream natural areas when making water management decisions.

The stated purpose of this study is an attempt to fine-tune the existing regulation schedule to optimize environmental benefits at little or no impact to the competing purposes of flood control and water supply. The adopted schedule will be an interim operational change until the

recommendations of the more comprehensive C&SF Restudy can be implemented over the next decade or two. The schedules evaluated in this study do not require structural modifications and were developed by the USACE and the SFWMD with performance measures and objectives developed by an interagency group.

Comments:

1. We agree that the adverse effects to Lake Okeechobee, remnant Everglades and estuarine systems have significant environmental and economic impacts that should not be deferred to the Restudy. Operational changes that can maximize benefits to the natural system with little impacts to other users should be quickly implemented.

2. It is clear that both Run WSE and Run 22AZE are environmentally preferable to the current operational schedule, Run 25 or COE and HSM. However, when compared to all performance measures under 1990 conditions Run 22 AZE performs best for the lake, estuaries and the Everglades. Under 2010 conditions, there is not a clearly superior schedule. However, Run 22 AZE is deemed to decrease the water supply of the lake and, therefore, have adverse economic effects (see comment 5 below). Over time, regulatory releases from Lake Okeechobee have adversely affected the St. Lucie and Caloosahatchee River estuarine systems and the Everglades marshes. An improved regulation schedule minimizing damaging releases would be beneficial to those downstream ecosystems. Both the recommended plan (WSE) and alternative 22AZE would create significant improvement in the downstream estuaries.

Run 22 AZE performs better environmentally for the Lake, estuaries, WCAs (longer hydroperiod and less oxidation of WCA soils), and Everglades National Park than WSE. However, Run 22 AZE delivers more (53 %) water with phosphorus levels exceeding 10 ppb to the WCAs than WSE. This has the potential to effect periphyton loss and cattail expansion. Page DEIS-66 provides an analysis of the net expansion of cattails in the WCAs under WSE. However, there is not a comparable analysis for Run 22AZE. Nevertheless, with the operation of STA 3/4 in 2003 phosphorus loads and concentrations should be reduced making the alternatives similar in effects on the WCAs, except that Run 22 AZE has better hydroperiod benefits. Furthermore, a project component of the C & SF Restudy Comprehensive Plan calls for 60,000 ac. of additional water storage in the EAA north of STA 3/4, which should complement the function of STA 3/4, further offsetting increased phosphorus loads directed southwards as contemplated in the proposed regulation schedule. But, that project component is not yet authorized by Congress, and according to the current implementation schedule, the first phase of the EAA storage component would not be completed until 2009.

3. To fully evaluate the potential impact of the proposed regulation schedule on STA 3/4 and phosphorus loading into Everglades marshes, a two-step evaluation should be undertaken:

a) To evaluate the impact of immediate implementation of the proposed regulation schedule on phosphorus loading to the Everglades, the difference in phosphorus loading to the Everglades resulting from the immediate (no STA 3/4) implementation of the proposed regulation schedule should be compared to phosphorus loading from lake discharges to the WCAs from the baseline period of record for the Everglades Construction Project conceptual design (1979-1988). This comparison should be done using the current average phosphorus concentration for Lake

Okeechobee water (100 ppb). To clarify the potential impact of the proposed regulation schedule, this comparison should be done for lake regulatory discharges only; phosphorus loading to the WCAs from EAA runoff should not be included. If this comparison indicates a significant increase in phosphorus loading to the Everglades resulting from changing the regulation schedule, the benefits of decreased regulatory discharges to the St. Lucie estuary should be considered in light of increased phosphorus loads to the Everglades. The analysis of the effect of the proposed regulation schedule contained in Section 9.5.1 of the draft Report/EIS does not sufficiently clarify the effect of changing the lake regulation schedule because it considers net loads to the WCAs, including loads from EAA runoff.

b) The effect of increased phosphorus loading to STA 3/4 in the interim period 2003-2009 should be evaluated to ensure that the performance of the STA is not compromised by the proposed regulation schedule. If adverse impacts are predicted to occur, the design and operation of STA 3/4 may have to be modified.

4. The report states that none of the operational schedules are expected to impact existing lake water quality. However, Run 22 AZE with its lower stage has the potential to reduce the mixing of high phosphorus content water from the central part of the lake to cleaner near-shore areas thereby reducing the impact of internal nutrient sediment recycling in the lake. This would protect near shore submerged plant communities from increased algal blooms and turbid water, and slow the spread of cattails through the littoral marsh.

5. Estimated average annual economic effects of the alternatives show that Run 22 AZE is expected to result in an economic loss of \$3,055,875. When compared to the profits gained from agricultural activities in the lake's service area, even during the most severe drought periods, this "loss" represents a very small percentage of the total economic activity. Since these loss figures are calculated using irrigation "demands not met" as defined by canal stages, and past severe droughts seem to have failed to reduce harvest profits, it is recommended that past economic data be used to determine if such economic effects actually occurred in the various sectors of the economy under similar water supply conditions to those resulting from use of Run 22AZE. This analysis also fails to consider the economic benefits that an environmentally improved lake and estuarine system will produce through improved recreational and commercial fishing, increased tourism, and improved real estate conditions.

6. If adopted, one of the most important components of the WSE Schedule is the potential water management flexibility provided by the use of long-range weather forecasting information. To ensure that adequate consideration is given to environmental benefits, it is recommended that a broad based interagency committee be created to include this Department and other agency staff who are familiar with all segments of the natural system that can be impacted by lake management decisions. This interagency committee should be given the responsibility to review long-range weather forecast information; consider existing and expected environmental conditions in all the potentially affected natural areas; and make lake water level management recommendations to the SFWMD Board of Governors.

7. The average phosphorus concentration in discharges from the lake "at lower water levels" should be modeled. The South Florida Water Management District's Lake Okeechobee Water Quality Model can be used for such a determination. Discharges from the lake at low water

levels may be higher (than concentrations in "average" discharges) in phosphorus, resulting in an increased phosphorus loading downstream.

8. We disagree with the statement that "an assumed 100 ppb inflow (from Lake Okeechobee to the WCAs) total phosphorus concentration describes a worst case scenario" (p. DEIS-66, bottom paragraph). According to current water quality data (SFWMD, FDEP), this is an accurate description of the phosphorus concentration in lake discharges.

9. We would like to see a summary of Dr. Walker's results (referred to on p. DEIS-70, end of first paragraph) in the Final Report/EIS. The reference to Dr. Walker's work in Section 13, "References" is somewhat cryptic and appears to be incomplete. This work is not presently posted at his Internet website.

Thank you for the opportunity of commenting on this proposal. If you have any questions regarding this letter please give me a call at (850) 487-2231.

Sincerely,



Robert W. Hall
Office of Intergovernmental
Programs

cc: John Outland
Herb Zebuth
Eric Bush



Florida Fish and Wildlife Conservation Commission

James L. "Jamie" Adams, Jr. Bushnell	Barbara C. Barsh Jacksonville	Patrick E. Geraghty Ft. Myers	Quinton L. Hedgepeth, DDS Miami	H.A. "Herky" Huffman Deltona	
Thomas B. Kibler Lakeland	David K. Meehan St. Petersburg	Julie K. Morris Sarasota	Tony Moss Miami	Edwin P. Roberts, DC Pensacola	John D. Rood Jacksonville

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

August 5, 1999

OFFICE OF ENVIRONMENTAL SERVICES
BRADLEY J. HARTMAN, DIRECTOR
620 South Meridian Street
Tallahassee, FL 32399
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(850)488-9222
FAX (850)922-9222
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RECEIVED
AUG 11 1999

Ms. Cherie Trainor
Florida State Clearinghouse
Florida Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

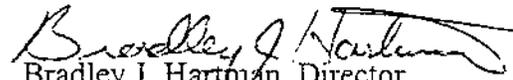
State of Florida Clearinghouse

Re: SAI #FL9810150676CR2 (Lake Okeechobee Regulation Schedule Study, Draft Integrated Feasibility Study and Environmental Impact Statement), Multiple Counties

Dear Ms. Trainor:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission is in the process of reviewing the referenced document, coordinating input from other relevant divisions of the agency, and preparing a Fish and Wildlife Coordination Act report to the U.S. Army Corps of Engineers. As soon as this report is complete, we will be pleased to provide a copy to your office.

Sincerely,


Bradley J. Hartman, Director
Office of Environmental Services

BJH/MAP
ENV 1-3-2
LORSS.SAI



FL 990716 0610C

Florida Fish and Wildlife Conservation Commission

James L. "Jamie" Adams, Jr. Bushnell	Barbara C. Barsh Jacksonville	Quinton L. Hedgepeth, DDS Miami	H.A. "Herky" Huffman Deltona	Thomas B. Kibb Lakeland
David K. Meehan St. Petersburg	Julie K. Morris Sarasota	Tony Moss Miami	Edwin P. Roberts, DC Pensacola	John D. Rood Jacksonville

ALLAN L. EGBERT, Ph.D., Executive Director
 VICTOR J. HELLER, Assistant Executive Director

August 31, 1999

OFFICE OF THE EXECUTIVE DIRECTOR
 620 South Meridian Street
 Tallahassee, FL 32399-1400
 www.state.fl.us/ffwcc
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Colonel Joe R. Miller
 District Engineer
 U.S. Army Corps of Engineers
 P.O. Box 4970
 Jacksonville, Florida 32232-0019

RECEIVED
 SEP 13 1999

State of Florida Clearinghouse

Re: Draft Integrated Feasibility Study and
 Environmental Impact Statement: Lake
 Okeechobee Regulation Schedule Study,
 Multiple Counties

Dear Colonel Miller:

The Office of Environmental Services (OES) of the Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the draft Integrated Feasibility Report and Environmental Impact Statement ("draft report") that analyzes the modeled effects of several potential regulation schedules for Lake Okeechobee, and identifies the schedule termed WSE as the preferred alternative. In preparing this letter, staff of OES has consulted with staff of the FWC's Division of Freshwater Fisheries, Division of Marine Fisheries, and the Florida Marine Research Institute. We have sent a preliminary Fish and Wildlife Coordination Act (FWCA) report (attached), signed April 16, 1999, under the letterhead of the former Florida Game and Fresh Water Fish Commission. This letter, in combination with the comparison of Run 22AZE with WSE presented in our preliminary FWCA report, constitutes our final FWCA report, as provided for under §662(b) of the FWCA of 1973.

Background

The alternatives under consideration are Run 25, Run 22AZE, COE, HSM, and WSE. Run 25 is the current schedule, and has been in place since 1992. It is characterized by a 15.62- to 16.75-foot schedule, with multiple operational zones above that, until the maximum release rates are reached at water levels of 18.5 to 17.0 feet. Run 22AZE is a derivative of a schedule (Run 22) that was considered, but not adopted, in the early 1990s, on the basis of recommendations by the Lake Okeechobee Littoral Zone Technical Group in 1988. The basis of this recommendation was the fact that its 13.5- to 15.6-foot schedule would allow the littoral zone to dry periodically, a condition necessary to maintain its vegetative structure. COE and HSM, developed by the U.S. Army Corps of Engineers and the South Florida Water Management District (SFWMD),

Colonel Joe R. Miller
August 31, 1999
Page 2

respectively, have been introduced more recently. COE is essentially the same as Run 25, but with a slightly lower (14.5 to 16.0 feet) schedule. HSM, with a 14.0- to 16.75-foot schedule, introduces the concept of weather forecasting by adjusting releases for each zone based in part on a six-month inflow forecast. It also allows pulse releases to the estuaries when conditions are very wet. Finally, WSE (Water Supply and Environment) is the newest of the proposed alternatives, having been introduced by SFWMD after the comparison of model output for the other alternatives was released in draft version. It represents an attempt to integrate the benefits of those other schedules. Like HSM, it relies on climate forecasting, and is therefore more flexible than are previously proposed schedules; it also incorporates HSM's pulse releases to the estuaries. Notably, from the standpoint of maintaining a healthy littoral zone, it incorporates a 13.5- to 15.5-foot lower operational zone (Zone D).

The draft report identifies WSE as the preferred alternative. Because of the flexibility of this schedule to make use of climate forecasting and to take into consideration conditions in the tributary basins, the draft plan also provides a detailed description as to how the WSE schedule would be implemented. Much of this implementation relies on the use of an artificial "neural network," a computer program that analyzes emerging patterns as data are collected, in this case in terms of climate trends. In addition, the draft report presents operational decision trees for describing how to determine when to discharge water to the Water Conservation Areas and to tide. No operational decision tree is provided to describe how to determine when to discharge water from the lake in order to protect the littoral zone; we assume that this is because inflow predictions would be used to accomplish the primary intention of the WSE schedule, to relieve stress on the littoral zone (as stated on p. DEIS-88).

Discussion

Overall, we concur with the analyses of the data presented in the draft report and the assessment that WSE is the best of the alternatives reviewed. No single alternative provides benefits at all times for the lake, estuaries, and Everglades; and it is unlikely that it would be possible to balance the environmental, water supply, and flood protection functions of the lake until storage components proposed by the Comprehensive Review Study for the Central and South Florida Project come on line. It has been difficult to compare all of the alternatives equally, since the modeling results for Run 22AZE, HSM, and COE were produced at a different scale than that for WSE. (Please refer to our preliminary report for a fuller description of the problem.) In addition, some of the model runs (e.g., those based on 1995 infrastructure and water-use levels; the stage hydrographs and stage duration curves produced by Trimble et al. 1999) were produced only for Run 25 and WSE. Consequently, our FWCA report is limited to a discussion of the relative merits of WSE over Run 25, and the limited analysis of Run 22AZE in comparison to WSE, as already provided by our preliminary report.

Lake Okeechobee. Issues surrounding the health of Lake Okeechobee, including its littoral zone, have been extensively documented (see SFWMD 1997 for a summary of technical reports and

published journal articles). Moreover, a conceptual ecological model (Havens and Rosen 1999) of the lake has recently been developed to show the pathways by which human-induced stressors affect the lake; this model indicates the relationship between extreme lake levels and their effects on fish communities, selected wildlife species, and the vegetation in the littoral zone. Concern over the effects of water regulation has been heightened by the loss of much of the littoral zone vegetation, particularly in the northwestern portion of the lake. This loss has been so extensive that whole areas, such as Grassy Island, that were sufficiently large to appear on regional maps, have been eliminated. The loss of the protective bulrush zone has allowed suspended sediments to be washed into the littoral zone, where they combine with dead and decaying marsh vegetation to form a nearly continuous peaty berm along the denser vegetation fringing the levee (D. Fox, FWC, pers. comm.). The turbid water and loss of the submerged macrophyte community has eliminated much of the spawning habitat for bluegills, redear sunfish, largemouth bass, and other recreationally and commercially important fish species. Although the results may not be immediately apparent, it would not be unreasonable to expect that the age class structure of these species would change over time if this lack of breeding habitat persists. Although the model runs over the 31-year period of record do not indicate dramatically different results over Run 25, WSE appears to reduce slightly the severity of many of the high-water events. Since the 31-year period of record is thought to represent an overall somewhat dry cycle of years, Trimble et al. (1999) has produced a preliminary analysis comparing the stage-duration curves for Run 25 and WSE from 1926 to 1969 and from 1965 to 1995. In addition, this report shows a stage-duration curve for the two alternatives for an extended simulation period, from 1914 to 1996, a time period that presumably would encompass a series of dry and wet climatic cycles. The results of this report indicate that WSE may be even more pronounced in its potential to maintain somewhat lower lake levels during wetter climatic conditions than have occurred during the past 30 years. Since it is anticipated that south Florida is entering a wet climatic cycle, these model runs are of particular note to those interested in maintaining the lake's natural resources.

Caloosahatchee and St. Lucie estuaries. Because the problems associated with discharges to the estuaries are primarily due to lack of storage in their respective basins, the potential for any one of the regulation schedules to improve estuarine conditions is likely to be very limited. As with the comparison of WSE and Run 22AZE, the differences between WSE and Run 25 are minimal. The draft report (p. DEIS-108) determines that improvements in habitat, in particular the seagrass community, would result in benefits to the West Indian manatee (endangered) and bald eagle (state-listed as threatened); however, we find such determinations to be difficult at this time. On the other hand, any regulation schedule that would avoid long-term, sustained releases of fresh water to the estuaries and reduce the number of extreme events would be beneficial.

Water Conservation Areas (WCAs). WSE is predicted to introduce somewhat more water into WCA-2 and -3 than they presently receive. The stage-duration curves presented in Appendices E and G indicate only minor differences, and small increases that would be seen in the northern extreme of WCA-3A would be beneficial, given the fact that this area has become overdrained. Our major concern with the increase in water delivered to WCA-2A and -3A is the increased loading of phosphorus (a net amount of 0.7 tons per year) predicted to occur during the four years

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before Stormwater Treatment Area (STA)-3/4 is operational. The draft report estimates that this increased loading would cause 9 additional acres of cattail invasion in WCA-2A and 3 additional acres in WCA-3A, while decreased water discharges, and therefore phosphorus loading, in WCA-1 would reduce the spread of cattails by 52 acres. Page 1 of Appendix B ("Water Quality Modeling Results") then concludes that WSE would actually result in an approximately 40-acre net reduction of cattail spread; however, it is not intuitively obvious what is meant by a "52-acres reduction in cattail spread" in WCA-1. We assume that this statement is intended to reflect a decrease in the rate at which cattails are spreading, such that there would be a real difference in the acreage of cattails in WCA-1 at the end of four years of operating WSE. We also assume that this decrease is due in part to the operation of STA-1E and -1W during that four-year period, since WCA-1 receives water from this STA, as opposed to STA-3/4, which is the last one scheduled to come on line.

Although nine and three acres of cattails do not seem overwhelming in a 100,958-acre system (WCA-2A) or a 450,342-acre system (WCA-3A), respectively, of more concern is the size of the area expected to receive more water with a phosphorus concentration greater than 10 ppb, an amount that appears to be at the threshold where one sees changes in the periphyton community. During our review of the Programmatic Environmental Impact Statement to implement the Everglades Forever Act, it became evident that the development of cattails is a secondary vegetation shift, occurring only after compositional changes occur in the periphyton community. In that sense, the appropriate indicator of negative impacts from additional phosphorus introduced by WSE would be the area that would receive phosphorus in excess of 10 ppb, or 790 acres in WCA-2A and 2,134 acres in WCA-3A. On the other hand, WCA-1 would see a reduction of 1,087 acres of impact. Our preliminary FWCA report expressed concern over these increases, and it remains of concern to the FWC.

Conclusions, Questions, and Recommendations

1. Of the alternatives identified by the draft report, WSE appears to have the best potential to balance the often competing needs for water supply, flood protection, and the natural system. These benefits are seen in large part due to the flexibility to adjust operations based on basin conditions and climate predictions over a six-month period. These benefits may be more pronounced as climate conditions become wetter, as has been speculated to occur over the next decade. Since we wrote our preliminary FWCA report, we have received enlarged graphics depicting the "wading bird windows" that we had requested. On the whole, it appears that WSE would result in slightly improved foraging conditions, relative to Run 25, for wading birds in the littoral zone, as well.
2. We remain very concerned about the predicted impacts to water quality in WCA-2 and -3, and request clarification as to why less loading would occur in WCA-1. In addition, we request clarification as to the nature of the reduction in cattail spread. Specifically, does this represent a reduction in the rate of spreading, or does this refer to an anticipated actual

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reduction in acres of existing cattails? Finally, we request that the U.S. Environmental Protection Agency and the Florida Department of Environmental Protection examine the water-quality analysis very carefully to determine if the excess loading would violate water-quality standards.

3. In order to provide further guidance as to the implementation of WSE, we recommend that the decision-making trees presented as Figures 6.1-2 and 6.1-3 be explicitly incorporated as a part of the regulation schedule for WSE.
4. We understand that the SFWMD and the U.S. Army Corps of Engineers will form an in-house group of biologists, hydrologists, and operational experts to make the decisions that would occur during the implementation of WSE. Many of these decisions are expected to occur on a daily level; however, we note that the decision trees indicate that there are also monthly climate assessments. Because WSE attempts to provide an unprecedented level of balance among the competing uses of the lake, we recommend that the SFWMD appoint an advisory group, operating under the Florida Sunshine Act, to its in-house team. The purpose of this advisory group would be to provide planning input from other agencies that have responsibilities to manage the resources affected by the decisions that would be made through the implementation of WSE. It would also provide a level of comfort to those agencies that impacts to their programs would be adequately taken into account, and would provide an opportunity to coordinate management programs among agencies. For example, if climate forecasting and basin conditions allow, we might suggest operating in Zone D to lower water levels in the littoral zone for one season in order to allow for us to do a prescribed burn to control torpedograss. The composition of that advisory group should be sufficiently broad to take into account the "water supply" and "environmental" aspects that characterize WSE. Realizing that it would be unwieldy to convene this advisory group at every decision-making point, we recommend that it meet with the in-house team of experts quarterly. The FWC would very much like to assist on this advisory group, given our responsibilities to manage Lake Okeechobee, the WCAs, and the estuarine resources, all of which would be directly affected by this lake-regulation schedule.

Sincerely



Allan L. Egbert, Ph.D.
Executive Director

ALE/MAP
ENV 2-18/5
locar.let
Enclosure

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Page 6

cc: Mr. Stephen Forsythe, FWS, Vero Beach
Mr. Frank Finch, SFWMD, West Palm Beach
Mr. Lewis Hornung, SFWMD, West Palm Beach
Mr. Robert Pace, FWS, Vero Beach
Mr. Mark Ziminske, COE, Jacksonville
Ms. Cherie Trainor, Governor's Clearinghouse, DCA, Tallahassee

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Page 7

References Cited

Havens, K. E., and B. H. Rosen. 1999. Lake Okeechobee conceptual model. *In*: J. C. Ogden and S. M. Davis (eds.), *The Use of Conceptual Ecological Landscape Models and Planning Tools for the South Florida Ecosystem Restoration Programs*. June 19, 1999, South Florida Water Management District, West Palm Beach, Florida. Pp. 15 - 31.

South Florida Water Management District (SFWMD). 1997. *Surface Water Improvement and Management (SWIM) Plan - Update for Lake Okeechobee, Volume I: Planning Document*. August 8, 1997, South Florida Water Management District, West Palm Beach, Florida. 9 chapters, paginated separately.

Trimble, P., R. E. Santee, and B. Trimble. 1999. *Draft Supplement: Benefits of the WSE Operational Schedule for the Littoral Zone Evaluated over a More Extensive Climatological Period*. August 1999, Planning Department, South Florida Water Management District, West Palm Beach, Florida. Unpaginated.



FLORIDA GAME AND FRESH WATER FISH COMMISSION



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April 16, 1999

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Colonel Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: Lake Okeechobee Regulation Schedule
Study, Multiple Counties

Dear Colonel Miller:

The Office of Environmental Services of the Florida Game and Fresh Water Fish Commission (GFC) has reviewed the proposed set of regulation schedules for Lake Okeechobee, and has consulted with the GFC's Division of Fisheries staff who manages the lake fishery. We have sent two Planning Aid Letters, one cosigned with the U.S. Fish and Wildlife Service and dated 24 September 1997, and another under GFC letterhead and dated 20 May 1998. This letter constitutes our preliminary Fish and Wildlife Coordination Act (FWCA) report, as provided for under §662(b) of the FWCA of 1973. Our input is based on information provided in four reports (see the attachment) primarily by the local sponsor, the South Florida Water Management District (SFWMD).

Background

The alternatives under consideration are Run 25, Run 22AZE, COE, HSM, and WSE. Run 25 is the current schedule, and has been in place since 1992. It is characterized by a 15.62- to 16.75-foot schedule, with multiple operational zones above that until the maximum release rates are reached at water levels of 17.0 to 18.5 feet. Run 22AZE is a derivative of a schedule (Run 22) that was considered, but not adopted, in the early 1990s on the basis of recommendations by the Lake Okeechobee Littoral Zone Technical Group in 1988. The basis of this recommendation was the fact that the schedule would allow the littoral zone to dry periodically, a condition necessary to maintain its vegetative structure. COE and HSM, developed by the U.S. Army Corps of Engineers and the SFWMD, respectively, have been introduced more recently. COE is essentially the same as Run 25, but with a slightly lower (14.5 to 16.0 feet) schedule. HSM, with a 14.0- to 16.75-foot schedule, introduces the concept of weather forecasting by adjusting releases for each zone based in part on a six-month inflow forecast. It also allows pulse releases to the estuaries when conditions are very wet. Finally,

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WSE is the newest of the proposed alternatives, having been introduced by SFWMD after the comparison of model output for the other alternatives was released in draft version. It represents an attempt to integrate the benefits of those other schedules. Like HSM, it relies on climate forecasting, and is therefore more flexible than are previously proposed schedules; it also incorporates HSM's pulse releases to the estuaries. Notably from the standpoint of maintaining a healthy littoral zone, it also allows the lake levels to fall to 13.5 feet, as would Run 22AZE.

The report titled *Simulation of Alternative Operational Schedules for Lake Okeechobee* (final report dated 7 May 1998) uses output from the South Florida Water Management Model to make predictive comparisons among the alternative schedules for a number of performance measures that were developed by an interagency team of biologists and planners in 1996. The performance measures include considerations of conditions that would affect the lake's littoral zone, the St. Lucie and Caloosahatchee estuaries, the Water Conservation Areas, and Everglades National Park. Performance measures for water supply for the Everglades Agricultural Area and the lower east coast (Palm Beach, Broward, and Miami-Dade counties) were also developed. These performance measures were used to evaluate the effects of each of the alternatives both on the natural system in and downstream of the lake, and on consumers who depend on the lake as a source of water. For each performance measure, model output was used to simulate a hypothetical 1990 base condition and a hypothetical 2010 future condition (i.e., model runs of the 31-year period of rainfall record, assuming 1988-1990 infrastructure, and model runs of the same period of record, assuming demands in 2010, respectively).

Unfortunately, it is not possible at this time to compare the performance of WSE with the other schedules for all of the performance measures. The output for Run 25, Run 22AZE, COE, and HSM was produced in a unified set of graphs for the draft report, which was released before WSE was introduced. Rather than revise the original figures to incorporate WSE, the final report tacked on an additional section that only compared the output for WSE with Run 25. Although it was possible to transcribe some of the WSE information onto the graphs for the other alternatives, the output for a number of important performance measures (e.g., the bar-and-whisker diagrams for the littoral zone) was presented at a different scale for WSE than it was for the original set of alternatives. In addition, it was not possible to compare the stage hydrographs and, to a lesser extent, the stage duration curves due to the fact that they are compressed into an 8-inch by 11-inch page format. This was a particular problem in terms of our ability to read the stage hydrographs that depict the wading bird "windows." Our 20 May 1998 Planning Aid Letter had requested that these difficulties be resolved, but as of this time we have not received the output in a form that would allow us to make a more thorough comparison. The attachment provides a breakdown of the performance measures that we were able to use to compare WSE with alternatives other than Run 25.

Comparison of Run 22AZE and WSE

The focus of our report is a comparison of WSE and Run 22AZE. HSM was not as closely reviewed since WSE is considered to be an improvement over HSM, and COE was not closely reviewed due to the lack of a sufficiently low schedule to benefit the lake's littoral zone. Both WSE and Run 22AZE appear to be clear improvements over Run 25; however, neither WSE nor Run 22AZE is obviously better in terms of protecting the lake's littoral zone, the estuaries, or the Everglades. The primary difference between the two schedules appears to be WSE's greater ability to satisfy water demands within the Everglades Agricultural Area.

Lake Okeechobee. The stage duration curves and the number of undesirable stage events for the lake indicates that WSE would result in somewhat higher lake stages than would Run 22AZE, but WSE would not result in as many instances of extremely low levels (i.e., below 12 feet NGVD), particularly as modeled for the 2010 condition. The extent to which the difference in output is significant, given the limits of the model itself, is not clear; however, the fact that both schedules would allow lake levels to fall to 13.5 feet NGVD, as opposed to 15.5 feet under Run 25, would greatly benefit the littoral zone by allowing it to dry periodically. These periodic dryouts are necessary for the germination of graminoid species that provide the community structure that support the fish and wildlife that depend on a healthy littoral zone.

St. Lucie and Caloosahatchee estuaries. Run 22 AZE appears to produce generally slightly better results in terms of amount and number of discharges from the lake to the estuaries, number of times that the salinity envelope criteria would not be met, and times that the high-discharge criteria (1,600 cfs and 2,500 cfs for the St. Lucie estuary; 2,500 cfs and 4,500 cfs for the Caloosahatchee estuary) would be exceeded. On the other hand, both estuaries suffer from discharge volumes that are affected by far greater problems than can be solved through a regulation schedule for Lake Okeechobee, and differences in model output are swamped by the larger problem of needing to provide alternative methods of water storage on a regional scale. For example, the best performance of any alternative for meeting the high-discharge criteria for the St. Lucie estuary is 540% of the target (Run 22AZE for meeting the criterion for 2,500 cfs under the 2010 condition) and 255% of the target for the Caloosahatchee estuary (Run 22AZE for the 2,800 cfs under the 2010 condition). The need to reduce discharges and attenuate flows is an issue that is currently being addressed through the Central and South Florida Comprehensive Review Study (the "Restudy"). Until the Restudy components that would alleviate these problems come on line, we anticipate that the difference between WSE and Run 22AZE would be minimal in terms of impacts on the estuaries.

Water Conservation Areas (WCAs). The only types of model output that we could use to compare the performance of all alternatives in the WCAs were (1) the frequency and percent of time that water levels would fall below ground for over 30 days and (2) the mean number of matches with the Natural System Model for a 31-year period of record. The first of these

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performance measures was chosen on the basis of observation that damaging muck fires in the WCAs appear to be correlated with groundwater levels falling lower than a foot below ground. The model output for this performance measure indicates that there is very little difference between Run 22AZE and WSE with regard to low-water impacts to the WCAs.

The second of the two performance measures is based on the best available hydrologic model of predrainage conditions at the individual model cells where water gages are currently located. At the time that the performance measures were developed in 1996, this approach seemed reasonable; however, a review of certain features of the Natural System Model (and, by extension, the South Florida Water Management Model) by the U.S. Geological Survey since then indicates that predictions of water conditions on a cell-by-cell basis, as is the case for this performance measure, are not as reliable as originally anticipated. We therefore have not relied on the model output for this performance measure, and recommend that this approach be changed so that it uses indicator regions identified by the Restudy. If this change is made, we are willing to work with your staff and that of the South Florida Water Management District to identify a suitable suite of indicator regions in the WCAs. We note that it would be desirable to change the stage duration curves and hydrographs, which are also based on output for single grid cells, to reflect this better understanding of the strengths and weaknesses of the model. If this change is not made, then we can only use this performance measure as a very crude indicator of trend among models.

Finally, our 20 May 1998 Planning Aid Letter mentioned a concern as to whether implementation of WSE would cause water-quality problems in the interim before the Stormwater Treatment Areas mandated by the Everglades Forever Act in 1994 came on line. According to the model output that displays the number of flood-control releases from the lake, WSE would send 220% as much water into the WCAs as would Run 25 under 1990 conditions and 140% under 2010 conditions. Run 22AZE would be even more problematic in terms of phosphorus loading by sending 260% and 270%, respectively. Accordingly, the SFWMD has analyzed the potential impacts of implementing WSE versus Run 25 in the WCAs in terms of increased acres of cattails and increased acres of water with a phosphorus concentration above 10 ppb (the fall-back criterion of the Everglades Forever Act, and an approximate concentration where changes in the periphyton community are seen), assuming phosphorus concentrations of 70 ppb and 100 ppb, as measured at the inflow structures to the WCAs. Although this analysis determines that only 3 to 5% of the phosphorus load comes from the lake (the rest coming from the Everglades Agricultural Area), the difference between acres affected by Run 25 versus WSE can be assumed to be due to the schedules themselves.

Water Conservation Area-1 (A.R.M. Loxahatchee National Wildlife Refuge) is the only WCA predicted to have a decreased phosphorus loading under WSE, resulting in a decline of 52 acres of cattails and a decline of 1,087 acres of water with a phosphorus concentration over 10

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ppb, given concentrations of either 70 ppb and 100 ppb through S-5A and S-6. (As it turned out, the difference in the two phosphorus concentrations at the inflow structures did not result in a difference in acreage of impact.) This effect is due to a decrease in discharges from the lake to WCA-1 under WSE. On the other hand, WSE would result in an increase of cattails in WCA-2A by 31 acres, presumably in addition to the existing expanding area of cattails south of the S-10 structures; and cause a 790-acre area to have phosphorus concentrations over 10 ppb. Water Conservation Area-3A does not fare much better, with a predicted increase in cattails of 13 acres, presumably in addition to an existing large area of cattails that has developed north of Alligator Alley (I-75) during the past decade; and result in a 2,134-acre area with phosphorus concentrations over 10 ppb.

It is not clear whether these results should be interpreted as meaning that, for example, WCA-3A would experience a 2,147-acre impact (13 acres of cattails + 2,134 acres) of higher than desirable concentrations of phosphorus, or whether the 13 acres of cattails is a subset of the acreage with phosphorus concentrations over 10 ppb. Presumably, these figures represent the number of acres in addition to the impacts that have already occurred in the WCAs. We are extremely uneasy with the idea of allowing more impacts to two WCAs that have already suffered from water-quality impacts and cattail expansion. Not only have cattails invaded the northern part of WCA-2A, but their distribution has also greatly expanded in northeastern WCA-3A since the early 1990s (T. Towles, GFC, pers. comm.). The cause of this phenomenon is not clear, but it may be a combination of deeper water from the recent series of wet years in areas where muck has burned in the past and poor-quality water spreading into WCA-3A from the Miami Canal. In any case, although we are pleased to see that conditions in WCA-1 would actually be improved through the implementation of WSE, we are concerned that this improvement appears to come at the expense of the other WCAs.

Everglades National Park. The performance measures for impacts of the alternatives for Everglades National Park were limited to stage hydrographs and stage duration curves for selected cells (i.e., ones with gages) within the South Florida Water Management Model, mean Natural System Model hydroperiod matches for the park over the 31-year period of record, and various computations of average annual overland flow. We did not review the results of the hydrographs and duration curves for the same reason that we did not do so for the WCAs. Furthermore, the U.S. Geological Survey review of the Natural System Model also pointed out that one of the least reliable forms of model output is overland flow, and that all forms of predictions are least reliable at the model boundaries. For these reasons, we conclude that the model output for Everglades National Park may be too crude to use to detect differences in regulation schedules in Lake Okeechobee.

Recommendations

From the information that we have been able to compare, it is not clear whether Run 22AZE or WSE is preferable as a replacement for Run 25; therefore, we defer our recommendation as to which schedule should be supported until we can review the information that will be presented in the draft Environmental Impact Statement (EIS). We do, however, offer the following recommendations for issues to be included in the EIS.

1. We assume that questions we have raised and information we have requested in our two Planning Aid Letters will be provided by the draft EIS that is under development. One exception is our request to include the climate-forecasting capability of HSM and WSE to Run 22AZE and COE, since it has been explained by SFWMD staff why such an effort would not be possible. If the outstanding issues have not been incorporated into that draft report, then we strongly recommend that the graphic representations (including an enlarged version of the daily stage hydrograph for Lake Okeechobee with the "wading bird windows" clearly marked) requested be included and that our questions be addressed, either through the draft EIS itself or under separate cover to us by the time that the draft EIS is released.
2. Model output for performance measures that are based on individual grid cells in the WCAs should be based instead on selected indicator regions, as identified by the Restudy. If this is not feasible, then we recommend that the EIS indicate the degree of precision with which one may interpret the output for these performance measures.
3. The draft EIS should contain a section that clearly lays out the rationale for decreasing the amount of water, and therefore the phosphorus load, that WCA-1 would receive under WSE, while increasing it to the other WCAs. This rationale should be sufficiently compelling to override the damage that is predicted to occur in WCAs-2A and -3A.
4. Should WSE be implemented, we very strongly recommend that a standing, interagency team of biologists be formed to consult with the U.S. Army Corps of Engineers and SFWMD to interpret the operational guidelines [e.g., the references in Zone A(ii) to "reasonable time frame," in Zone B(iv) to "prolonged periods," in Zone C(iii) to "when necessary to minimize impacts to coastal estuaries," and in Zone D to "when necessary to minimize impacts to coastal estuaries"]. This recommendation is consistent with and provides further guidance on the footnote to the

Colonel Joe R. Miller
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WSE schedule that "consultation with Everglades and estuarine biologists is encouraged to minimize adverse effects to downstream ecosystems."

Sincerely,


Bradley J. Hartman, Director
Office of Environmental Services

BJH/MAP
ENV 2-18/5
LOCARI.LET
Attachment

cc: Mr. Stephen Forsythe, FWS, Vero Beach
Mr. James Harvey, SFWMD, West Palm Beach
Mr. Robert Pace, FWS, Vero Beach
Dr. Barry Rosen, SFWMD, West Palm Beach
Mr. Mark Ziminske, COE, Jacksonville

Colonel Joe R. Miller

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Page 8

Reports reviewed for this FWCA report

Anonymous. 1999. *Phosphorus Issues Associated with the Lake Okeechobee Regulation Schedule*, draft white paper dated 12 March 1999. South Florida Water Management District, West Palm Beach. 10 pages.

Neidrauer, C., P. J. Trimble, and E. R. Santee. 1998. *Simulation of Alternative Operational Schedules for Lake Okeechobee*, final report dated 7 May 1998. Hydrologic Systems Modeling Division, Planning Department, South Florida Water Management District, West Palm Beach. 6 sections, paginated independently.

Operational Planning Core Team. 1999. *Implementation Strategies towards the Most Efficient Water Management: The Lake Okeechobee WSE Operational Guidelines*, final draft report dated 9 February 1999. Jointly produced by South Florida Water Management District, West palm Beach, and U.S. Army Corps of Engineers, Jacksonville. Unpaginated + 7 unpaginated appendices.

Trimble, P.J., E. R. Santee, and C. J. Neidrauer. 1998. *Special Report: A Refined Approach to Lake Okeechobee Water Management: An Application of Climate Forecasts*, dated June 1998. Hydrologic Systems Modeling Division, Planning Department, South Florida Water Management, West Palm Beach. 57 pages + 5 appendices, paginated separately.

Model Output Reviewed

Total Flood Control Releases from Lake Okeechobee for 31 Years

Number of Undesirable Lake Okeechobee Stage Events

Number of Times Salinity Envelope Criteria Were NOT Met: St. Lucie Estuary

Number of Times High Discharge Criteria (over 1600 and 2500 cfs) Were Exceeded: St. Lucie Estuary

Number of Times Salinity Envelope Criteria Were NOT Met: Caloosahatchee Estuary

Number of Times High Discharge Criteria (over 2800 and 4500 cfs) Were Exceeded: Caloosahatchee Estuary

Caloosahatchee Estuary

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 2-17

Number of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 2-17

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 3A-3

Number of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 3A-3

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 3A-28

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Number of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage
3A-28

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage
3A-2

COUNTY: State

DATE: 07/14/1999

COMMENTS DUE - 2 WKS: 07/28/1999

Message:

CLEARANCE DUE DATE: 09/30/1999

SAI#: FL9810150676C1

STATE AGENCIES

WATER MANAGEMENT DISTRICTS

OPB POLICY UNITS

Agriculture
 Community Affairs
 Environmental Protection
 Fish & Wildlife Conserv. Comm
 X OTTED
 State
 Transportation

South Florida WMD
 Southwest Florida WMD
 St. Johns River WMD

Environmental Policy/C & ED

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

Department of the Army and the South Florida Water Management District - Draft Integrated Feasibility Report and Environmental Impact Statement for Lake Okeechobee Regulation Schedule Study and Appendices - Can also be reviewed at <http://www.saj.usace.army.mil/pd/env-doc.htm>

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 (850) 414-0479 (FAX)

EO. 12372/NEPA

Federal Consistency

- No Comment
- Comments Attached
- Not Applicable

- No Comment/Consistent
- Consistent/Comments Attached
- Inconsistent/Comments Attached
- Not Applicable

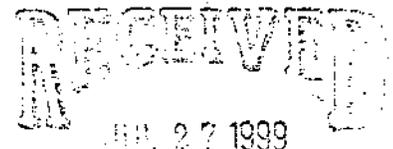
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Division/Bureau: _____

Reviewer: _____

Date: _____

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6100
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FLORIDA DEPARTMENT OF STATE
Katherine Harris
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Ms. Cherie Trainor
State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

July 23, 1999

RECEIVED
JUL 29 1999

RE: DHR Project File No. 995255
Cultural Resource Assessment Request
SAI# FL9810150676CR2
Draft Integrated Feasibility Report and Environmental Impact Statement for
Lake Okeechobee Regulation Schedule Study and Appendices
State of Florida Clearinghouse

Dear Ms. Trainor:

In accordance with the provisions of Florida's Coastal Zone Management Act and Chapter 267, *Florida Statutes*, as well as the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical or architectural value.

We have reviewed the referenced environmental impact statement. We specifically reviewed sections 2.14 and 7.14, both dealing with Cultural Resources. In addition we note that the preferred alternative, *Water Supply and Environmental (WSE)*, will not effect significant historical resources. Therefore, it is our opinion that the project will have no effect on any sites listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical, architectural or archaeological value. The project is also consistent with the historic preservation laws of Florida's Coastal Management Program.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservation Planner, at 850-487-2333 or 800-847-7278. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

George W. Percy

George W. Percy, Director
Division of Historical Resources and
State Historic Preservation Officer

GWP/Ese

xc: Jasmin Raffington, FCMP-DCA

COUNTY: State

DATE: 07/14/1999

COMMENTS DUE-2 WKS: 07/28/1999

CLEARANCE DUE DATE: 09/30/1999

SAI#: FL9810150676C

Message:

STATE AGENCIES

WATER MANAGEMENT DISTRICTS

OPB POLICY UNITS

Agriculture
 Community Affairs
 Environmental Protection
 Fish & Wildlife Conserv. Comm
 OTTED
 State
 X Transportation

South Florida WMD
 Southwest Florida WMD
 St. Johns River WMD

Environmental Policy/C & ED

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

Department of the Army and the South Florida Water Management District - Draft Integrated Feasibility Report and Environmental Impact Statement for Lake Okeechobee Regulation Schedule Study and Appendices - Can also be reviewed at <http://www.saj.usace.army.mil/pd/env-doc.htm>

To: Florida State Clearinghouse
 Department of Community Affairs
 2555 Shumard Oak Boulevard
 Tallahassee, FL 32399-2100
 (850) 922-5438 (SC 292-5438)
 (850) 414-0479 (FAX)

EO. 12372/NEPA

Federal Consistency

- No Comment
- Comments Attached
- Not Applicable

- No Comment/Consistent
- Consistent/Comments Attached
- Inconsistent/Comments Attached
- Not Applicable

From:

Division/Bureau: Environmental Management

Reviewer: _____

Date: 1/9

NTY: State

Message:

487.99 = 761

DATE: 07/14/1999
COMMENTS DUE-2 WKS: 07/28/1999
CLEARANCE DUE DATE: 09/30/1999
SAI#: FL98101506761

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPS POLICY UNITS
Agriculture Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm OTTED State Transportation	X South Florida WMD Southwest Florida WMD St. Johns River WMD	Environmental Policy/C & ED

Tommy,
 Per our discussion,
 Does your staff
 respond to these
 types of clearinghouse
 LTAs (FS), call me,
 I need to make out EXD
 assignment form. Stan Mulline
 6261

The attached document requires a Coastal Zone Management Act/Federal Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart A). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to obtain consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

the South Florida
 Draft Integrated
 Environmental Impact
 Statement Regulation
 Consistency - Can also be
 found at
<http://www.sfwmd.com/epd/env-doc.htm>

To: Florida State Clearinghouse
 Department of Community Affairs
 2555 Shumard
 Tallahassee, FL 32309
 (850) 922-5437
 (850) 414-0477

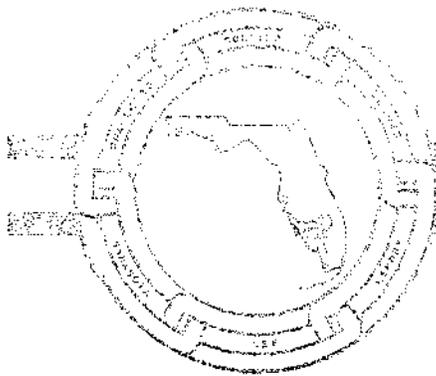
Send to Tommy
 STROUD FOR
 Review

From: _____
 Division/ _____
 Reviewed: _____
 Date: _____

Federal Consistency

- No Comment/Consistent
- Consistent/Comments Attached
- Inconsistent/Comments Attached
- Not Applicable

* SFUMD IS REVIEWING DOCUMENT AND PUBLIC COMMENTS AS COORDINATED W/ C.O.E.
 SPECIFIED/PLAN
 NEEDS WORKING
 7/29/99



Southwest Florida Regional Planning Council

4080 Foyline Drive, 4th Floor N. Ft. Myers, FL 33917-3909 (941) 656-7780

P.O. Box 8455, N. Ft. Myers, FL 33918-8455 SURCOM 749-7780

FAX 941-656-7780

September 15, 1999

Mr. James C. Duck, Chief
USACOE - Jacksonville District
Planning Division
P.O. Box 4970
JACKSONVILLE, FL 32232-0019

RE: IC&R Project #99-299

Draft Integrated Feasibility Report and Environmental Impact Statement
for the Lake Okeechobee Regulation Schedule Study.

Dear Mr. Duck:

The staff of the Southwest Florida Regional Planning Council reviews various proposals, Notifications of Intent, Preapplications, permit applications, and Environmental Impact Statements for compliance with regional goals, objectives, and policies, as determined by the Strategic Regional Policy Plan. The staff reviews such items in accordance with the Florida Intergovernmental Coordination and Review Process (Chapter 29I-5, F.A.C.), and adopted regional clearinghouse procedures.

These designations determine Council staff procedure in regards to the reviewed project. The four designations are:

Less Than Regionally Significant and Consistent no further review of the project can be expected from Council.

Less Than Regionally Significant and Inconsistent Council does not find the project of regional importance, but will note certain concerns as part of its continued monitoring for cumulative impact within the noted goal area.

Regionally Significant and Consistent project is of regional importance, and appears to be consistent with Regional goals, objectives, and policies.

Regionally Significant and Inconsistent project is of regional importance and does not appear to be consistent with Regional goals, objectives, and policies. Council will oppose the project as submitted, but is willing to participate in any efforts to modify the project to mitigate the concerns.

To: Mr. James C. Duck, Chief
Date: September 15, 1999
Re: SWFRPC #99-299
Page: 2

The above referenced document has been reviewed by this office, based on the information contained in the document, and on local knowledge, has been found **Regionally Significant and Consistent** with adopted goals, objectives, and policies of the Strategic Regional Policy Plan.

Should you or any other party request this finding to be reconsidered, please contact Nichole L. Gwinnett, IC&R Coordinator, with this request, or any questions concerning staff review of this item. This recommendation will be discussed at the next scheduled Council meeting. Should Council action differ from the staff recommendation, you will be notified.

Sincerely,

SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL


Wayne E. Daltry
Executive Director

WED/NLG



Florida Department of Agriculture & Consumer Services
BOB CRAWFORD, Commissioner
The Capitol • Tallahassee, FL 32399-0800

September 30, 1999

Please Respond to:

Colonel Joe R. Miller
District Engineer, Jacksonville District
U.S. Army Corps of Engineers
400 West Bay Street
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel Miller:

Thank you for providing this opportunity for comment on the draft Integrated Feasibility Report and Environmental Impact for the Lake Okeechobee Regulation Schedule Study. The proposed WSE schedule is a significant departure from any previous methodology for managing Lake Okeechobee and we view its adoption as a positive step. However, increasing the discretion given to the operational staff makes it more difficult for interested parties to predict the impact of the new schedule. In addition to the flexibility within the WSE schedule the report states "*there will be times for 'hedging'*" (p. DEIS-75) when it is likely that deviations will be made from the WSE guidelines.

Water users need to know that the new schedule will be implemented in a way that is consistent with what has been presented in this Report. To that end it is essential that the WSE schedule that is adopted be applied as shown in Appendix C, and that the Operational Decision Tree be formally incorporated as part of the schedule. We would also like to suggest that when a significant deviation from the WSE guidelines is contemplated this department be brought into the process as early as possible so we can assist in keeping all water users informed and involved in these issues.

Attached you will find more detailed comments and concerns prepared by the Department's Office of Agricultural Water Policy. If you have any questions regarding these comments, please feel free to contact me at (850) 922-7925, or Linda J. McCarthy at (561) 682-2845.

Sincerely,

BOB CRAWFORD
COMMISSIONER OF AGRICULTURE


Charles C. Aller, Director
Office of Agricultural Water Policy

cc: Secretary David Struhs
Mr. Frank Finch
Mr. J. Allison DeFoor, II
Ms. Terry L. Rhodes
Dr. Martha Roberts



Florida Agriculture and Forest Products
\$53 Billion for Florida's Economy

**Florida Department of Agriculture and Consumer Services
Additional Comments on the Draft LORSS EIS**

- 2 DEIS-75, paragraph 1: It is not clear if the detailed operational decision tree (Figs. 5.2.5-1, 6.1-2 and 6.1-3) become an official part of the WSE schedule (Fig. 6.1-1). We recommend that it is included, especially since the tree indicates where operational "hedging" would or could occur. This could be done by including the following phrase at the beginning of Note 5 on the bottom of the figure: "*Releases are subject to the attached WSE Operational Decision Tree and will be made only when the WCAs are below their respective schedules.*" (new wording in italics)
- 3 DEIS-64, paragraph 1: The level of uncertainty present in the Lake Okeechobee Water Quality Model is probably higher than the differences observed in the performances of the different regulation schedule runs. Additionally, the section describing the phosphorus concentration results is very confusing. It's hard to determine how far apart the runs are in their respective performances when total number of years is used in one description and relative percentage of years in the next (lines 11-14).
- 4 DEIS-77, Fig. 6.1-1: There seems to be an inconsistency with this figure and the decision tree. The WSE schedule states that Zone D operations for releases from the Agricultural Canals to the WCAs will occur "as needed to minimize adverse impacts to the littoral zone while not impacting the Everglades, ...". There is no reference to using climate forecasts when considering whether to make releases to the WCAs. The decision tree incorporates the forecasting capability developed as part of the WSE schedule.
- 5 DEIS-88, last paragraph: There is a discussion of the possibility of deviating from the WSE guidelines "to allow for the recovery of a particular ecosystem." Elsewhere in the report, "Everglades hydro-pattern enhancement" is listed as an additional objective. Obviously this phrase means different things to different people and its meaning may change considerably as our understanding of the Everglades evolves. The paragraph also stresses the need for additional hydrologic support before a decision to deviate from the guidelines is made. This last point is critical. To be effective, the WSE schedule has to provide more operational flexibility than the rules now being followed. However it cannot be interpreted as an open-ended license to make dramatic changes in water delivery practices without performing the necessary evaluations. Agricultural water users in the Caloosahatchee Basin and the EAA are dependent on water from Lake Okeechobee and they must be kept well informed with regard to the implementation of this schedule. We would like to request that you include the Department of Agriculture and Consumer Services on your WSE Operational Team.
- 6 DEIS-92, second paragraph: The statement that the logic and reasoning behind crucial decisions 'should' be noted and the forecast tools that were used 'should' be listed is very important. Documentation of crucial operation decisions should not be at the discretion of the operations staff. Thorough, real time documentation of operational decisions under this proposed schedule must be a mandatory component of implementing this schedule.
- 7 General Comment: A single web page with all the information used to make Lake Okeechobee decisions should be set up by either the Corps or SFWMD. At this time the climate information is on one or more WMD web locations while the operational summary is on the Corps site.

Miscellaneous

- 8 DEIS-9, last paragraph: While we are glad to read about your recent guidance to "avoid duplicity", the correct term in this context is "duplication".

9

DEIS-12, Table 2.2-1: Several of the numbers in this table appear to be in the wrong place.

10

DEIS-36, paragraph 3: Where do the EAA canals enter Martin County or the St. Lucie River?

11

DEIS-53, paragraph 2: SFWMD has some information that indicates lake levels do have an impact on in-lake water quality, at least in some zones of the lake. Also, the lake sediments are a source of phosphorus ("pollution").

12

DEIS-71, paragraph 1, line 1: It is not clear what "further study" was conducted that resulted in the conclusion that WSE is better than HSM for water supply, or has the topic changed here?

South
Florida
Regional
Planning
Council



August 18, 1999

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: SFRPC #99-0748, Request for comments on the Draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Okeechobee Regulation Schedule Study.

Dear Mr. Duck:

We have reviewed the above-referenced draft report and have the following comments:

- The Lake Okeechobee Regulation Schedule, as proposed, is generally consistent with the goals and policies of the *Strategic Regional Policy Plan for South Florida*, particularly the following:

Strategic Regional Goal

- 3.8 Enhance and preserve natural system values of South Florida's shorelines, estuaries, benthic communities, fisheries, and associated habitats, including but not limited to, Florida Bay, Biscayne Bay and the coral reef tract.

Regional Policies

- 3.8.3 As a result of proposed project reviews, include conditions that result in a project that enhances and preserves marine and estuarine water quality by:
- a) improving the timing and quality of freshwater inflows;
 - b) reducing turbidity, nutrient loading and bacterial loading from wastewater facilities, vessels;
 - c) the number of improperly maintained stormwater systems; and
 - d) requiring port facilities and marinas to implement hazardous materials spill plans.
- 3.8.4 Enhance and preserve commercial and sports fisheries through monitoring, research, best management practices for fish harvesting and protection of nursery habitat and include the resulting information in educational programs throughout the region. Identified nursery habitat shall be protected through the inclusion of suitable habitat protective features including, but not limited to:
- a) avoidance of project impacts within habitat area;
 - b) replacement of habitat area impacted by proposed project; or
 - c) improvement of remaining habitat area within remainder of proposed project area.

Mr. James C. Duck
August 18, 1999
Page 2

- 3.8.5 Enhance and preserve habitat for endangered and threatened marine species by the preservation of identified endangered species habitat and populations. For threatened species or species of critical concern, on-site preservation will be required unless it is demonstrated that off-site mitigation will not adversely impact the viability or number of individuals of the species.

Strategic Regional Goal

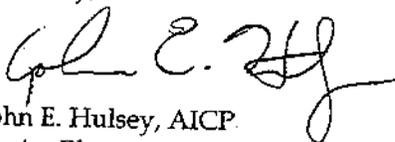
- 3.9 Restore and protect the ecological values and functions of the Everglades System

Regional Policies

- 3.9.4 Restore natural volume, timing, quality and distribution of water to the Everglades, Florida Bay, Biscayne Bay, other eastern estuaries, and the Atlantic Ocean by:
- a) supporting structural and operational modifications to the Central and Southern Flood Control Project and recommended by the US Army Corps of Engineers C&SF Feasibility Study;
 - b) supporting implementation of East Coast Buffer Plan; and
 - c) supporting a water supply plan that meets the needs of the natural system.
- 3.9.5 Conserve water entering the Everglades system and increase the self sufficiency of urban and agricultural water supplies by:
- a) creating water storage areas near or within urban areas;
 - b) promoting increased efficiency of water use in agriculture, business uses and residential use; and
 - c) promoting the development of alternative water supply sources.
- 3.9.6 Restore water quality throughout the system by:
- a) requiring stormwater treatment and storage areas for existing and newly developed areas and agricultural lands; and
 - b) protecting existing wetlands, native uplands and identified aquifer recharge areas.
- 3.9.7 Include the Everglades system in the ecological studies so that the successes of restoration may be expanded and included in adaptive management of the system.

Thank you for the opportunity to comment. If you require further information, please contact me.

Sincerely,



John E. Hulsey, AICP
Senior Planner

JEH/cp



Florida Fish and Wildlife Conservation Commission

PD-E 3 DP 19H

James L. "Jamie" Adams, Jr. Bushnell	Barbara C. Barsh Jacksonville	Quinton L. Hedgepeth, DDS Miami	H.A. "Herky" Huffman Deltona	Thomas B. Kibler Lakeland
David K. Meehan St. Petersburg	Julie K. Morris Sarasota	Tony Moss Miami	Edwin P. Roberts, DC Pensacola	John D. Rood Jacksonville

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

August 31, 1999

OFFICE OF THE EXECUTIVE DIRECTOR
620 South Meridian Street
Tallahassee, FL 32399-1600
www.state.fl.us/fwc
(850)487-3796
TDD (850)488-9542

Colonel Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: Draft Integrated Feasibility Study and
Environmental Impact Statement: Lake
Okeechobee Regulation Schedule Study,
Multiple Counties

Dear Colonel Miller:

The Office of Environmental Services (OES) of the Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the draft Integrated Feasibility Report and Environmental Impact Statement ("draft report") that analyzes the modeled effects of several potential regulation schedules for Lake Okeechobee, and identifies the schedule termed WSE as the preferred alternative. In preparing this letter, staff of OES has consulted with staff of the FWC's Division of Freshwater Fisheries, Division of Marine Fisheries, and the Florida Marine Research Institute. We have sent a preliminary Fish and Wildlife Coordination Act (FWCA) report (attached), signed April 16, 1999, under the letterhead of the former Florida Game and Fresh Water Fish Commission. This letter, in combination with the comparison of Run 22AZE with WSE presented in our preliminary FWCA report, constitutes our final FWCA report, as provided for under §662(b) of the FWCA of 1973.

Background

The alternatives under consideration are Run 25, Run 22AZE, COE, HSM, and WSE. Run 25 is the current schedule, and has been in place since 1992. It is characterized by a 15.62- to 16.75-foot schedule, with multiple operational zones above that, until the maximum release rates are reached at water levels of 18.5 to 17.0 feet. Run 22AZE is a derivative of a schedule (Run 22) that was considered, but not adopted, in the early 1990s, on the basis of recommendations by the Lake Okeechobee Littoral Zone Technical Group in 1988. The basis of this recommendation was the fact that its 13.5- to 15.6-foot schedule would allow the littoral zone to dry periodically, a condition necessary to maintain its vegetative structure. COE and HSM, developed by the U.S. Army Corps of Engineers and the South Florida Water Management District (SFWMD),

respectively, have been introduced more recently. COE is essentially the same as Run 25, but with a slightly lower (14.5 to 16.0 feet) schedule. HSM, with a 14.0- to 16.75-foot schedule, introduces the concept of weather forecasting by adjusting releases for each zone based in part on a six-month inflow forecast. It also allows pulse releases to the estuaries when conditions are very wet. Finally, WSE (Water Supply and Environment) is the newest of the proposed alternatives, having been introduced by SFWMD after the comparison of model output for the other alternatives was released in draft version. It represents an attempt to integrate the benefits of those other schedules. Like HSM, it relies on climate forecasting, and is therefore more flexible than are previously proposed schedules; it also incorporates HSM's pulse releases to the estuaries. Notably, from the standpoint of maintaining a healthy littoral zone, it incorporates a 13.5- to 15.5-foot lower operational zone (Zone D).

The draft report identifies WSE as the preferred alternative. Because of the flexibility of this schedule to make use of climate forecasting and to take into consideration conditions in the tributary basins, the draft plan also provides a detailed description as to how the WSE schedule would be implemented. Much of this implementation relies on the use of an artificial "neural network," a computer program that analyzes emerging patterns as data are collected, in this case in terms of climate trends. In addition, the draft report presents operational decision trees for describing how to determine when to discharge water to the Water Conservation Areas and to tide. No operational decision tree is provided to describe how to determine when to discharge water from the lake in order to protect the littoral zone; we assume that this is because inflow predictions would be used to accomplish the primary intention of the WSE schedule, to relieve stress on the littoral zone (as stated on p. DEIS-88).

Discussion

Overall, we concur with the analyses of the data presented in the draft report and the assessment that WSE is the best of the alternatives reviewed. No single alternative provides benefits at all times for the lake, estuaries, and Everglades; and it is unlikely that it would be possible to balance the environmental, water supply, and flood protection functions of the lake until storage components proposed by the Comprehensive Review Study for the Central and South Florida Project come on line. It has been difficult to compare all of the alternatives equally, since the modeling results for Run 22AZE, HSM, and COE were produced at a different scale than that for WSE. (Please refer to our preliminary report for a fuller description of the problem.) In addition, some of the model runs (e.g., those based on 1995 infrastructure and water-use levels; the stage hydrographs and stage duration curves produced by Trimble et al. 1999) were produced only for Run 25 and WSE. Consequently, our FWCA report is limited to a discussion of the relative merits of WSE over Run 25, and the limited analysis of Run 22AZE in comparison to WSE, as already provided by our preliminary report.

Lake Okeechobee. Issues surrounding the health of Lake Okeechobee, including its littoral zone, have been extensively documented (see SFWMD 1997 for a summary of technical reports and

published journal articles). Moreover, a conceptual ecological model (Havens and Rosen 1999) of the lake has recently been developed to show the pathways by which human-induced stressors affect the lake; this model indicates the relationship between extreme lake levels and their effects on fish communities, selected wildlife species, and the vegetation in the littoral zone. Concern over the effects of water regulation has been heightened by the loss of much of the littoral zone vegetation, particularly in the northwestern portion of the lake. This loss has been so extensive that whole areas, such as Grassy Island, that were sufficiently large to appear on regional maps, have been eliminated. The loss of the protective bulrush zone has allowed suspended sediments to be washed into the littoral zone, where they combine with dead and decaying marsh vegetation to form a nearly continuous peaty berm along the denser vegetation fringing the levee (D. Fox, FWC, pers. comm.). The turbid water and loss of the submerged macrophyte community has eliminated much of the spawning habitat for bluegills, redear sunfish, largemouth bass, and other recreationally and commercially important fish species. Although the results may not be immediately apparent, it would not be unreasonable to expect that the age class structure of these species would change over time if this lack of breeding habitat persists. Although the model runs over the 31-year period of record do not indicate dramatically different results over Run 25, WSE appears to reduce slightly the severity of many of the high-water events. Since the 31-year period of record is thought to represent an overall somewhat dry cycle of years, Trimble et al. (1999) has produced a preliminary analysis comparing the stage-duration curves for Run 25 and WSE from 1926 to 1969 and from 1965 to 1995. In addition, this report shows a stage-duration curve for the two alternatives for an extended simulation period, from 1914 to 1996, a time period that presumably would encompass a series of dry and wet climatic cycles. The results of this report indicate that WSE may be even more pronounced in its potential to maintain somewhat lower lake levels during wetter climatic conditions than have occurred during the past 30 years. Since it is anticipated that south Florida is entering a wet climatic cycle, these model runs are of particular note to those interested in maintaining the lake's natural resources.

Caloosahatchee and St. Lucie estuaries. Because the problems associated with discharges to the estuaries are primarily due to lack of storage in their respective basins, the potential for any one of the regulation schedules to improve estuarine conditions is likely to be very limited. As with the comparison of WSE and Run 22AZE, the differences between WSE and Run 25 are minimal. The draft report (p. DEIS-108) determines that improvements in habitat, in particular the seagrass community, would result in benefits to the West Indian manatee (endangered) and bald eagle (state-listed as threatened); however, we find such determinations to be difficult at this time. On the other hand, any regulation schedule that would avoid long-term, sustained releases of fresh water to the estuaries and reduce the number of extreme events would be beneficial.

Water Conservation Areas (WCAs). WSE is predicted to introduce somewhat more water into WCA-2 and -3 than they presently receive. The stage-duration curves presented in Appendices E and G indicate only minor differences, and small increases that would be seen in the northern extreme of WCA-3A would be beneficial, given the fact that this area has become overdrained. Our major concern with the increase in water delivered to WCA-2A and -3A is the increased loading of phosphorus (a net amount of 0.7 tons per year) predicted to occur during the four years

before Stormwater Treatment Area (STA)-3/4 is operational. The draft report estimates that this increased loading would cause 9 additional acres of cattail invasion in WCA-2A and 3 additional acres in WCA-3A, while decreased water discharges, and therefore phosphorus loading, in WCA-1 would reduce the spread of cattails by 52 acres. Page 1 of Appendix B ("Water Quality Modeling Results") then concludes that WSE would actually result in an approximately 40-acre net reduction of cattail spread; however, it is not intuitively obvious what is meant by a "52-acres reduction in cattail spread" in WCA-1. We assume that this statement is intended to reflect a decrease in the rate at which cattails are spreading, such that there would be a real difference in the acreage of cattails in WCA-1 at the end of four years of operating WSE. We also assume that this decrease is due in part to the operation of STA-1E and -1W during that four-year period, since WCA-1 receives water from this STA, as opposed to STA-3/4, which is the last one scheduled to come on line.

Although nine and three acres of cattails do not seem overwhelming in a 100,958-acre system (WCA-2A) or a 450,342-acre system (WCA-3A), respectively, of more concern is the size of the area expected to receive more water with a phosphorus concentration greater than 10 ppb, an amount that appears to be at the threshold where one sees changes in the periphyton community. During our review of the Programmatic Environmental Impact Statement to implement the Everglades Forever Act, it became evident that the development of cattails is a secondary vegetation shift, occurring only after compositional changes occur in the periphyton community. In that sense, the appropriate indicator of negative impacts from additional phosphorus introduced by WSE would be the area that would receive phosphorus in excess of 10 ppb, or 790 acres in WCA-2A and 2,134 acres in WCA-3A. On the other hand, WCA-1 would see a reduction of 1,087 acres of impact. Our preliminary FWCA report expressed concern over these increases, and it remains of concern to the FWC.

Conclusions, Questions, and Recommendations

1. Of the alternatives identified by the draft report, WSE appears to have the best potential to balance the often competing needs for water supply, flood protection, and the natural system. These benefits are seen in large part due to the flexibility to adjust operations based on basin conditions and climate predictions over a six-month period. These benefits may be more pronounced as climate conditions become wetter, as has been speculated to occur over the next decade. Since we wrote our preliminary FWCA report, we have received enlarged graphics depicting the "wading bird windows" that we had requested. On the whole, it appears that WSE would result in slightly improved foraging conditions, relative to Run 25, for wading birds in the littoral zone, as well.
2. We remain very concerned about the predicted impacts to water quality in WCA-2 and -3, and request clarification as to why less loading would occur in WCA-1. In addition, we request clarification as to the nature of the reduction in cattail spread. Specifically, does this represent a reduction in the rate of spreading, or does this refer to an anticipated actual

Colonel Joe R. Miller
August 31, 1999
Page 5

reduction in acres of existing cattails? Finally, we request that the U.S. Environmental Protection Agency and the Florida Department of Environmental Protection examine the water-quality analysis very carefully to determine if the excess loading would violate water-quality standards.

3. In order to provide further guidance as to the implementation of WSE, we recommend that the decision-making trees presented as Figures 6.1-2 and 6.1-3 be explicitly incorporated as a part of the regulation schedule for WSE.
4. We understand that the SFWMD and the U.S. Army Corps of Engineers will form an in-house group of biologists, hydrologists, and operational experts to make the decisions that would occur during the implementation of WSE. Many of these decisions are expected to occur on a daily level; however, we note that the decision trees indicate that there are also monthly climate assessments. Because WSE attempts to provide an unprecedented level of balance among the competing uses of the lake, we recommend that the SFWMD appoint an advisory group, operating under the Florida Sunshine Act, to its in-house team. The purpose of this advisory group would be to provide planning input from other agencies that have responsibilities to manage the resources affected by the decisions that would be made through the implementation of WSE. It would also provide a level of comfort to those agencies that impacts to their programs would be adequately taken into account, and would provide an opportunity to coordinate management programs among agencies. For example, if climate forecasting and basin conditions allow, we might suggest operating in Zone D to lower water levels in the littoral zone for one season in order to allow for us to do a prescribed burn to control torpedograss. The composition of that advisory group should be sufficiently broad to take into account the "water supply" and "environmental" aspects that characterize WSE. Realizing that it would be unwieldy to convene this advisory group at every decision-making point, we recommend that it meet with the in-house team of experts quarterly. The FWC would very much like to assist on this advisory group, given our responsibilities to manage Lake Okeechobee, the WCAs, and the estuarine resources, all of which would be directly affected by this lake-regulation schedule.

Sincerely,



Allan L. Egbert, Ph.D.
Executive Director

ALE/MAP
ENV 2-18/5
locar.let
Enclosure

Colonel Joe R. Miller

August 31, 1999

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cc: Mr. Stephen Forsythe, FWS, Vero Beach
Mr. Frank Finch, SFWMD, West Palm Beach
Mr. Lewis Hornung, SFWMD, West Palm Beach
Mr. Robert Pace, FWS, Vero Beach
Mr. Mark Ziminske, COE, Jacksonville
Ms. Cherie Trainor, Governor's Clearinghouse, DCA, Tallahassee

Colonel Joe R. Miller
August 31, 1999
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References Cited

Havens, K. E., and B. H. Rosen. 1999. Lake Okeechobee conceptual model. *In*: J. C. Ogden and S. M. Davis (eds.), *The Use of Conceptual Ecological Landscape Models and Planning Tools for the South Florida Ecosystem Restoration Programs*. June 19, 1999, South Florida Water Management District, West Palm Beach, Florida. Pp. 15 - 31.

South Florida Water Management District (SFWMD). 1997. *Surface Water Improvement and Management (SWIM) Plan - Update for Lake Okeechobee, Volume I: Planning Document*. August 8, 1997, South Florida Water Management District, West Palm Beach, Florida. 9 chapters, paginated separately.

Trimble, P., R. E. Santee, and B. Trimble. 1999. *Draft Supplement: Benefits of the WSE Operational Schedule for the Littoral Zone Evaluated over a More Extensive Climatological Period*. August 1999, Planning Department, South Florida Water Management District, West Palm Beach, Florida. Unpaginated.



FLORIDA GAME AND FRESH WATER FISH COMMISSION



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April 16, 1999

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Colonel Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: Lake Okeechobee Regulation Schedule
Study, Multiple Counties

Dear Colonel Miller:

The Office of Environmental Services of the Florida Game and Fresh Water Fish Commission (GFC) has reviewed the proposed set of regulation schedules for Lake Okeechobee, and has consulted with the GFC's Division of Fisheries staff who manages the lake fishery. We have sent two Planning Aid Letters, one cosigned with the U.S. Fish and Wildlife Service and dated 24 September 1997, and another under GFC letterhead and dated 20 May 1998. This letter constitutes our preliminary Fish and Wildlife Coordination Act (FWCA) report, as provided for under §662(b) of the FWCA of 1973. Our input is based on information provided in four reports (see the attachment) primarily by the local sponsor, the South Florida Water Management District (SFWMD).

Background

The alternatives under consideration are Run 25, Run 22AZE, COE, HSM, and WSE. Run 25 is the current schedule, and has been in place since 1992. It is characterized by a 15.62- to 16.75-foot schedule, with multiple operational zones above that until the maximum release rates are reached at water levels of 17.0 to 18.5 feet. Run 22AZE is a derivative of a schedule (Run 22) that was considered, but not adopted, in the early 1990s on the basis of recommendations by the Lake Okeechobee Littoral Zone Technical Group in 1988. The basis of this recommendation was the fact that the schedule would allow the littoral zone to dry periodically, a condition necessary to maintain its vegetative structure. COE and HSM, developed by the U.S. Army Corps of Engineers and the SFWMD, respectively, have been introduced more recently. COE is essentially the same as Run 25, but with a slightly lower (14.5 to 16.0 feet) schedule. HSM, with a 14.0- to 16.75-foot schedule, introduces the concept of weather forecasting by adjusting releases for each zone based in part on a six-month inflow forecast. It also allows pulse releases to the estuaries when conditions are very wet. Finally,

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Colonel Joe R. Miller

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WSE is the newest of the proposed alternatives, having been introduced by SFWMD after the comparison of model output for the other alternatives was released in draft version. It represents an attempt to integrate the benefits of those other schedules. Like HSM, it relies on climate forecasting, and is therefore more flexible than are previously proposed schedules; it also incorporates HSM's pulse releases to the estuaries. Notably from the standpoint of maintaining a healthy littoral zone, it also allows the lake levels to fall to 13.5 feet, as would Run 22AZE.

The report titled *Simulation of Alternative Operational Schedules for Lake Okeechobee* (final report dated 7 May 1998) uses output from the South Florida Water Management Model to make predictive comparisons among the alternative schedules for a number of performance measures that were developed by an interagency team of biologists and planners in 1996. The performance measures include considerations of conditions that would affect the lake's littoral zone, the St. Lucie and Caloosahatchee estuaries, the Water Conservation Areas, and Everglades National Park. Performance measures for water supply for the Everglades Agricultural Area and the lower east coast (Palm Beach, Broward, and Miami-Dade counties) were also developed. These performance measures were used to evaluate the effects of each of the alternatives both on the natural system in and downstream of the lake, and on consumers who depend on the lake as a source of water. For each performance measure, model output was used to simulate a hypothetical 1990 base condition and a hypothetical 2010 future condition (i.e., model runs of the 31-year period of rainfall record, assuming 1988-1990 infrastructure, and model runs of the same period of record, assuming demands in 2010, respectively).

Unfortunately, it is not possible at this time to compare the performance of WSE with the other schedules for all of the performance measures. The output for Run 25, Run 22AZE, COE, and HSM was produced in a unified set of graphs for the draft report, which was released before WSE was introduced. Rather than revise the original figures to incorporate WSE, the final report tacked on an additional section that only compared the output for WSE with Run 25. Although it was possible to transcribe some of the WSE information onto the graphs for the other alternatives, the output for a number of important performance measures (e.g., the bar-and-whisker diagrams for the littoral zone) was presented at a different scale for WSE than it was for the original set of alternatives. In addition, it was not possible to compare the stage hydrographs and, to a lesser extent, the stage duration curves due to the fact that they are compressed into an 8-inch by 11-inch page format. This was a particular problem in terms of our ability to read the stage hydrographs that depict the wading bird "windows." Our 20 May 1998 Planning Aid Letter had requested that these difficulties be resolved, but as of this time we have not received the output in a form that would allow us to make a more thorough comparison. The attachment provides a breakdown of the performance measures that we were able to use to compare WSE with alternatives other than Run 25.

Comparison of Run 22AZE and WSE

The focus of our report is a comparison of WSE and Run 22AZE. HSM was not as closely reviewed since WSE is considered to be an improvement over HSM, and COE was not closely reviewed due to the lack of a sufficiently low schedule to benefit the lake's littoral zone. Both WSE and Run 22AZE appear to be clear improvements over Run 25; however, neither WSE nor Run 22AZE is obviously better in terms of protecting the lake's littoral zone, the estuaries, or the Everglades. The primary difference between the two schedules appears to be WSE's greater ability to satisfy water demands within the Everglades Agricultural Area.

Lake Okeechobee. The stage duration curves and the number of undesirable stage events for the lake indicates that WSE would result in somewhat higher lake stages than would Run 22AZE, but WSE would not result in as many instances of extremely low levels (i.e., below 12 feet NGVD), particularly as modeled for the 2010 condition. The extent to which the difference in output is significant, given the limits of the model itself, is not clear; however, the fact that both schedules would allow lake levels to fall to 13.5 feet NGVD, as opposed to 15.5 feet under Run 25, would greatly benefit the littoral zone by allowing it to dry periodically. These periodic dryouts are necessary for the germination of graminoid species that provide the community structure that support the fish and wildlife that depend on a healthy littoral zone.

St. Lucie and Caloosahatchee estuaries. Run 22 AZE appears to produce generally slightly better results in terms of amount and number of discharges from the lake to the estuaries, number of times that the salinity envelope criteria would not be met, and times that the high-discharge criteria (1,600 cfs and 2,500 cfs for the St. Lucie estuary; 2,500 cfs and 4,500 cfs for the Caloosahatchee estuary) would be exceeded. On the other hand, both estuaries suffer from discharge volumes that are affected by far greater problems than can be solved through a regulation schedule for Lake Okeechobee, and differences in model output are swamped by the larger problem of needing to provide alternative methods of water storage on a regional scale. For example, the best performance of any alternative for meeting the high-discharge criteria for the St. Lucie estuary is 540% of the target (Run 22AZE for meeting the criterion for 2,500 cfs under the 2010 condition) and 255% of the target for the Caloosahatchee estuary (Run 22AZE for the 2,800 cfs under the 2010 condition). The need to reduce discharges and attenuate flows is an issue that is currently being addressed through the Central and South Florida Comprehensive Review Study (the "Restudy"). Until the Restudy components that would alleviate these problems come on line, we anticipate that the difference between WSE and Run 22AZE would be minimal in terms of impacts on the estuaries.

Water Conservation Areas (WCAs). The only types of model output that we could use to compare the performance of all alternatives in the WCAs were (1) the frequency and percent of time that water levels would fall below ground for over 30 days and (2) the mean number of matches with the Natural System Model for a 31-year period of record. The first of these

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performance measures was chosen on the basis of observation that damaging muck fires in the WCAS appear to be correlated with groundwater levels falling lower than a foot below ground. The model output for this performance measure indicates that there is very little difference between Run 22AZE and WSE with regard to low-water impacts to the WCAs.

The second of the two performance measures is based on the best available hydrologic model of predrainage conditions at the individual model cells where water gages are currently located. At the time that the performance measures were developed in 1996, this approach seemed reasonable; however, a review of certain features of the Natural System Model (and, by extension, the South Florida Water Management Model) by the U.S. Geological Survey since then indicates that predictions of water conditions on a cell-by-cell basis, as is the case for this performance measure, are not as reliable as originally anticipated. We therefore have not relied on the model output for this performance measure, and recommend that this approach be changed so that it uses indicator regions identified by the Restudy. If this change is made, we are willing to work with your staff and that of the South Florida Water Management District to identify a suitable suite of indicator regions in the WCAs. We note that it would be desirable to change the stage duration curves and hydrographs, which are also based on output for single grid cells, to reflect this better understanding of the strengths and weaknesses of the model. If this change is not made, then we can only use this performance measure as a very crude indicator of trend among models.

Finally, our 20 May 1998 Planning Aid Letter mentioned a concern as to whether implementation of WSE would cause water-quality problems in the interim before the Stormwater Treatment Areas mandated by the Everglades Forever Act in 1994 came on line. According to the model output that displays the number of flood-control releases from the lake, WSE would send 220% as much water into the WCAs as would Run 25 under 1990 conditions and 140% under 2010 conditions. Run 22AZE would be even more problematic in terms of phosphorus loading by sending 260% and 270%, respectively. Accordingly, the SFWMD has analyzed the potential impacts of implementing WSE versus Run 25 in the WCAs in terms of increased acres of cattails and increased acres of water with a phosphorus concentration above 10 ppb (the fall-back criterion of the Everglades Forever Act, and an approximate concentration where changes in the periphyton community are seen), assuming phosphorus concentrations of 70 ppb and 100 ppb, as measured at the inflow structures to the WCAs. Although this analysis determines that only 3 to 5% of the phosphorus load comes from the lake (the rest coming from the Everglades Agricultural Area), the difference between acres affected by Run 25 versus WSE can be assumed to be due to the schedules themselves.

Water Conservation Area-1 (A.R.M. Loxahatchee National Wildlife Refuge) is the only WCA predicted to have a decreased phosphorus loading under WSE, resulting in a decline of 52 acres of cattails and a decline of 1,087 acres of water with a phosphorus concentration over 10

Colonel Joe R. Miller

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ppb, given concentrations of either 70 ppb and 100 ppb through S-5A and S-6. (As it turned out, the difference in the two phosphorus concentrations at the inflow structures did not result in a difference in acreage of impact.) This effect is due to a decrease in discharges from the lake to WCA-1 under WSE. On the other hand, WSE would result in an increase of cattails in WCA-2A by 31 acres, presumably in addition to the existing expanding area of cattails south of the S-10 structures; and cause a 790-acre area to have phosphorus concentrations over 10 ppb. Water Conservation Area-3A does not fare much better, with a predicted increase in cattails of 13 acres, presumably in addition to an existing large area of cattails that has developed north of Alligator Alley (I-75) during the past decade; and result in a 2,134-acre area with phosphorus concentrations over 10 ppb.

It is not clear whether these results should be interpreted as meaning that, for example, WCA-3A would experience a 2,147-acre impact (13 acres of cattails + 2,134 acres) of higher than desirable concentrations of phosphorus, or whether the 13 acres of cattails is a subset of the acreage with phosphorus concentrations over 10 ppb. Presumably, these figures represent the number of acres in addition to the impacts that have already occurred in the WCAs. We are extremely uneasy with the idea of allowing more impacts to two WCAs that have already suffered from water-quality impacts and cattail expansion. Not only have cattails invaded the northern part of WCA-2A, but their distribution has also greatly expanded in northeastern WCA-3A since the early 1990s (T. Towles, GFC, pers. comm.). The cause of this phenomenon is not clear, but it may be a combination of deeper water from the recent series of wet years in areas where muck has burned in the past and poor-quality water spreading into WCA-3A from the Miami Canal. In any case, although we are pleased to see that conditions in WCA-1 would actually be improved through the implementation of WSE, we are concerned that this improvement appears to come at the expense of the other WCAs.

Everglades National Park. The performance measures for impacts of the alternatives for Everglades National Park were limited to stage hydrographs and stage duration curves for selected cells (i.e., ones with gages) within the South Florida Water Management Model, mean Natural System Model hydroperiod matches for the park over the 31-year period of record, and various computations of average annual overland flow. We did not review the results of the hydrographs and duration curves for the same reason that we did not do so for the WCAs. Furthermore, the U.S. Geological Survey review of the Natural System Model also pointed out that one of the least reliable forms of model output is overland flow, and that all forms of predictions are least reliable at the model boundaries. For these reasons, we conclude that the model output for Everglades National Park may be too crude to use to detect differences in regulation schedules in Lake Okeechobee.

Recommendations

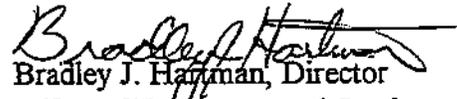
From the information that we have been able to compare, it is not clear whether Run 22AZE or WSE is preferable as a replacement for Run 25; therefore, we defer our recommendation as to which schedule should be supported until we can review the information that will be presented in the draft Environmental Impact Statement (EIS). We do, however, offer the following recommendations for issues to be included in the EIS.

1. We assume that questions we have raised and information we have requested in our two Planning Aid Letters will be provided by the draft EIS that is under development. One exception is our request to include the climate-forecasting capability of HSM and WSE to Run 22AZE and COE, since it has been explained by SFWMD staff why such an effort would not be possible. If the outstanding issues have not been incorporated into that draft report, then we strongly recommend that the graphic representations (including an enlarged version of the daily stage hydrograph for Lake Okeechobee with the "wading bird windows" clearly marked) requested be included and that our questions be addressed, either through the draft EIS itself or under separate cover to us by the time that the draft EIS is released.
2. Model output for performance measures that are based on individual grid cells in the WCAs should be based instead on selected indicator regions, as identified by the Restudy. If this is not feasible, then we recommend that the EIS indicate the degree of precision with which one may interpret the output for these performance measures.
3. The draft EIS should contain a section that clearly lays out the rationale for decreasing the amount of water, and therefore the phosphorus load, that WCA-1 would receive under WSE, while increasing it to the other WCAs. This rationale should be sufficiently compelling to override the damage that is predicted to occur in WCAs-2A and -3A.
4. Should WSE be implemented, we very strongly recommend that a standing, interagency team of biologists be formed to consult with the U.S. Army Corps of Engineers and SFWMD to interpret the operational guidelines [e.g., the references in Zone A(ii) to "reasonable time frame," in Zone B(iv) to "prolonged periods," in Zone C(iii) to "when necessary to minimize impacts to coastal estuaries," and in Zone D to "when necessary to minimize impacts to coastal estuaries"']. This recommendation is consistent with and provides further guidance on the footnote to the

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WSE schedule that "consultation with Everglades and estuarine biologists is encouraged to minimize adverse effects to downstream ecosystems."

Sincerely,


Bradley J. Hartman, Director
Office of Environmental Services

BJH/MAP
ENV 2-18/5
LOCARI.LET
Attachment

cc: Mr. Stephen Forsythe, FWS, Vero Beach
Mr. James Harvey, SFWMD, West Palm Beach
Mr. Robert Pace, FWS, Vero Beach
Dr. Barry Rosen, SFWMD, West Palm Beach
Mr. Mark Ziminske, COE, Jacksonville

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Reports reviewed for this FWCA report

Anonymous. 1999. *Phosphorus Issues Associated with the Lake Okeechobee Regulation Schedule*, draft white paper dated 12 March 1999. South Florida Water Management District, West Palm Beach. 10 pages.

Neidrauer, C., P. J. Trimble, and E. R. Santee. 1998. *Simulation of Alternative Operational Schedules for Lake Okeechobee*, final report dated 7 May 1998. Hydrologic Systems Modeling Division, Planning Department, South Florida Water Management District, West Palm Beach. 6 sections, paginated independently.

Operational Planning Core Team. 1999. *Implementation Strategies towards the Most Efficient Water Management: The Lake Okeechobee WSE Operational Guidelines*, final draft report dated 9 February 1999. Jointly produced by South Florida Water Management District, West palm Beach, and U.S. Army Corps of Engineers, Jacksonville. Unpaginated + 7 unpaginated appendices.

Trimble, P.J., E. R. Santee, and C. J. Neidrauer. 1998. *Special Report: A Refined Approach to Lake Okeechobee Water Management: An Application of Climate Forecasts*, dated June 1998. Hydrologic Systems Modeling Division, Planning Department, South Florida Water Management, West Palm Beach. 57 pages + 5 appendices, paginated separately.

Model Output Reviewed

Total Flood Control Releases from Lake Okeechobee for 31 Years

Number of Undesirable Lake Okeechobee Stage Events

Number of Times Salinity Envelope Criteria Were NOT Met: St. Lucie Estuary

Number of Times High Discharge Criteria (over 1600 and 2500 cfs) Were Exceeded: St. Lucie Estuary

Number of Times Salinity Envelope Criteria Were NOT Met: Caloosahatchee Estuary

Number of Times High Discharge Criteria (over 2800 and 4500 cfs) Were Exceeded:

Caloosahatchee Estuary

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 2-17

Number of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 2-17

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 3A-3

Number of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 3A-3

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage 3A-28

Colonel Joe R. Miller

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Number of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage
3A-28

Percent of Times Marsh Stage is Lower than 1 Foot below Ground for More than 30 Days: Gage
3A-2



South Florida Water Management District

CON 39

August 31, 1999

Mr. James C. Duck
Chief of Planning
U.S. Army Corps of Engineers
400 West Bay Street
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

Please find enclosed the reviews by staff at the South Florida Water Management District regarding the draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Okeechobee Regulation Schedule Study. Included are comments from Dr. Karl Havens, chief consulting scientist in my Division, Mr. Tommy Strowd, Director of the Operations Division, Dr. Peter Doering and Mr. Bob Chamberlain, estuarine ecologists within my division, and myself. In general, we felt this was a well-prepared document, although some of our comments are substantive.

Mark Ziminske is to be congratulated for his efforts in preparing this document and his collaborative and cooperative attitude in our interactions. Speaking personally, it was a pleasure interacting with Mark, and we hope to do so again in the future.

I hope you find these comments to be of some help. Please do not hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Alan Steinman", written over a horizontal line.

Dr. Alan D. Steinman, Director
Okeechobee Systems Research Division
voice mail: (561) 682-6492
email: astein@sfwmd.gov

attachments

c: Lewis Hornung, SFWMD
Tommy Strowd, SFWMD
Karl Havens, SFWMD
Peter Doering, SFWMD
Bob Chamberlain, SFWMD
Mark Ziminske, USACE

Governing Board:

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Harkley R. Thornton
Trudi K. Williams

Frank R. Finch, P.E., *Executive Director*
Michael Slayton, *Deputy Executive Director*
Trevor Campbell, *Deputy Executive Director*

Subject: comments on regulation schedule document

Date: Sun, 29 Aug 1999 19:42:06 -0400

From: "Karl Havens" <khavens@sfwmd.gov> Internal

Organization: South Florida Water Management District

To: Al Steinman <astein@sfwmd.gov>

CC: Lewis Hornung <lhornun@sfwmd.gov> , Charles Hanlon <chanlon@sfwmd.gov>

The following are my comments on the Draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Okeechobee Regulation Schedule Study (dated June 1999 and prepared by the USACE).

(A) First a general comment. On page ii the authors identify clearly what the objective was in this project -- "to fine-tune the existing regulation schedule to optimize environmental benefits at little or no impact to the competing purposes of flood control and water supply." This central objective reflects the origin of the study -- a recognition among scientists, managers, and members of the concerned public that the ecological resources of the lake have been harmed by high water levels. I.e., the prime focus of this study is to fix an environmental problem. With this in mind, I strongly recommend that the authors revise the wording of subsequent statements in the report that suggest that the primary goal is water supply. Such statements, listed below, fly in the face of what the study was intended to do.

The statements I refer to are as follows:

1. page 5, section 1.3.1 "modified lake operations should increase the storage capacity of the lake"
2. page 5, section 1.3.2 "maintain or improve existing water storage" is listed as the FIRST objective

B. On page 5, under section 1.3.2, one of the objectives says "increase biodiversity and productivity in the lake's littoral zone." I have no idea where this objective came from; certainly it does not have a scientific basis. I know of no scientific-based objective dealing with increasing biodiversity. In fact, some of the most environmentally critical regions of the littoral zone (e.g., Moonshine Bay) have a relatively low diversity of certain organisms, such as vascular plants. This also is the case for regions of the pristine Florida Everglades. Perhaps the authors intention was to say that we desire the littoral zone to have a community dominated by native species, rather than monocultures of exotic species such as torpedograss. If this is so, it should be clarified. Second, we certainly are not striving to increase productivity of the marsh. The fastest way to do that would be to fertilize the marsh with phosphorus, or increase lake stages so high that polluted water from the pelagic region flows into the marsh causing eutrophication of that pristine region. Clearly this is not the goal. I recommend that the statement about biodiversity and productivity be omitted.

C. If possible, perhaps the current vegetation map could be used. The map of Richardson has a high degree of error.

D. On page 14 in the first full paragraph, it should be indicated that many of the submerged plant beds along the western and northern lake shore have been eliminated (by high lake stages we think) in the last FIVE years. I also recommend that the report mention the formation of an organic berm along the western lake shore.

E. On page 15 the statement that torpedograss "largely outcompetes other species at most water levels" has no basis in science. In fact, preliminary results from our collaborative research with USACE WES indicate that at high water levels, torpedograss experiences stress (at least in terms of being able to colonize new areas) that certain native species (Eleocharis) do not.

F. On page 15, there are NOT any "hot debates" about whether Hydrilla provides good habitat for fish foraging -- it does. See the paper by Furse and Fox, which was provided to the authors some time ago for the data.

G. Page 21 -- Wayne Nelson is not a "fishing guide."

H. A general comment. I find it surprising that with all of the published literature that was provided to the USACE by District staff dealing with lake levels, nutrients, and other topics about the lake, nearly all of the citations are "personal communications," many of them with non-scientists. I suspect that this will significantly weaken the credibility of the document. Ditto for use of 2nd hand information from a DEP 309 report for water quality data.

I. On page 33 at the bottom -- the lake is not "tending to become hypereutrophic." By most classification schemes it reached that state in the early 1980s and things have not changed significantly since then.

J. On page 34 in the 1st full paragraph, I have no idea what the authors are referring to when they mention a "continuous algal bloom." Certainly not the lake.

K. On page 34 in the 2nd full paragraph. The concept that flooding the littoral zone might result in increased P in the water was shown to be nonsensical when critically evaluated (Havens 1997, water levels and total P in Lake Okeechobee). I see no reason to include all sorts of statements, even those with no scientific basis, in the report.

L. On page 34 at the bottom. The wouthwest region of the lake has very poor water quality (Havens and James, 1999, Increased transparency due to mud sediment resuspension in the near-shore region of Lake Okeechobee, Lake and Reservoir Management).

M. On page 51 in section 4.1 the authors say that the LEC has "strong legitimate needs." I don't understand the basis for this judgemental statement. It does not strike me as the sort of think to say in an objective report.

N. On page 51, it might be good to mention the clear link between SAV (please replace sub-aquatic with submerged aquatic) and water quality. Plants hold sediments in place and compete with algae for nutrients. In this way, they can help to maintain better water quality (less turbidity, less nutrients, less phytoplankton).

O. On page 53 in the 2nd paragraph, the statement that the "lake itself is not a source of pollution" is incorrect. The lake sediments are the major source of high turbidity in the lake, and equal to external loads as a P source.

P. On page 64, I am very surprised that the WASP model showed improved water quality under any of the scenarios considering the very small changes in the hydrographs. Even in the C&SF Restudy, the 1-box WASP model runs indicated no significant changes in water quality with changes in hydrology alone. Those changes were much more pronounced than the ones produced here. I would double check these conclusions.

Q. The summation of "undesirable events" is problematic because it gives equal weight to highs and lows (as opposed to the Restudy evaluations, which weighted high stages more strongly). The present study largely came about because of harm caused by high lake stages. High lake stages also are known to have

more far-reaching ecological impacts than lows. Most likely it is too late to fix this problem, but I would prefer to see the "number of undesirable lake stage events" metric dropped in favor of a simple look at the stage duration curve. What it shows is quite simple -- under the WSE schedule, there is a small (about 5%) reduction in the frequency of high lake stage events (>15 ft), but no significant increase in lows (>12 ft), as compared to Run 25. In other words, the WSE schedule takes a small step towards fixing the problem with high lake stages, without doing it at the expense of creating more lows. Furthermore, we should expect that WSE actually will perform better as climate forecasting abilities evolve. This simple explanation is about all that is needed, in my opinion.

R. The performance measures listed on page 99 are NOT "generally accepted by lake researchers." There is no scientific rationale for the durations. We can certainly link specific harmful effects with high lake stages, and make some pretty educated guesses about effects of lows. However, there is no scientific basis for saying that 100 days is OK at 11 or 17 ft. What you are dealing with are performance measures intended to mimic a certain portion of the lake's historical hydrograph. That's it.

S. On page 100 it is stated that high lake stages have "furthered the spread of exotics." There is no evidence in support of this. In fact this is the first time I ever have heard anyone say such a thing. If anything, high lake stages may have reduced the rate of torpedograss and meeleuca expansion. Perhaps increased nutrient transport at high stage has led to increases in Typha and Nymphaea, but these are not exotics.

T. On page 100, I recommend that the authors modify the description of how SAV has responded to lake stages in the last year. We have conducted two quarterly surveys of SAV, at 42 fixed sampling locations. We found that along the western and northern shoreline, where SAV was entirely eliminated in recent years, no SAV has returned. At the south end of the lake, where SAV never was entirely eliminated, some increases in biomass and spatial extent did occur this year.

Hope these comments are helpful to the authors as they revise the report.

Karl E. Havens, Ph.D.
Chief Environmental Scientist
SFWMD

Subject: Re: Lake Okeechobee Regulation Schedule
Date: Mon, 16 Aug 1999 14:04:10 -0400
From: "Tommy Strowd" <tstrowd@sfwmd.gov>
Organization: South Florida Water Management District
To: Al Steinman <astein@sfwmd.gov>
CC: Ron Mierau <rmierau@sfwmd.gov>, George Hwa <ghwa@sfwmd.gov>
, Cal Neidrauer <cal@sfwmd.gov>
, Paul Trimble <ptrimble@sfwmd.gov>

The following are my comments on the draft Lake Okeechobee Regulation Schedule Study.

1. The WSE schedule represented in figure 6.1-1 does not indicate that the Decision Tree is a supplemental element of the schedule. I would recommend that the Decision Tree be formally incorporated as part of the new schedule.

2. There appears to be an inconsistency between the Regulation Schedule Table and the Decision Tree for discharges to the WCAs. In ZONE D, discharges from the Agricultural Canals to the WCAs are governed by the following conditions;

- * [discharge]... "as needed to minimize adverse impacts to the littoral zone while not adversely impacting the Everglades (see note 5.)
- * "Releases through various outlets may be modified to minimize damages or obtain additional benefits. Consultation with Everglades and Estuarine biologists is encouraged to minimize adverse effects to downstream ecosystems."
- * [discharge]... "only when the WCAs are below their respective schedules."

The table makes no reference to long-term forecasts as a condition to consider in making releases to the WCAs. However, the Decision Tree incorporates the long-term forecasting capability developed as part of the WSE schedule.

Please let me know if you have any questions or comments.

-Tommy

Tommy Strowd, P.E. <tstrowd@sfwmd.gov>
Director
Operations Division

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Last Name Strowd, P.E.
First Name Tommy
Version 2.1

PRO ESTUARY

Memorandum

TO: Al Steinman, Director, OSRD
FROM: Peter Doering, OSRD
DATE: August 27, 1999
SUBJECT: Lake Okeechobee Regulation Schedule Study

I have reviewed the Lake Okeechobee Regulation Schedule Study: Draft Integrated Feasibility Report and Environmental Impact Statement. I have paid special attention to the sections on estuaries.

Specific Comments:

2.5.2 Estuarine Vegetation:

- ① page 16, 2nd paragraph of section. The scientific name of manatee grass is *Syringodium filiforme* not *Cymodocea manatorum*.
- ② Page 16, 3rd paragraph. I believe *Vallisneria* is misspelled as *Vallisnaria*.
- ③ Page 16, 3rd paragraph. Last sentence. *Thalassia* (turtle grass) also occurs in Charlotte Harbor.
- ④ Page 17 1st paragraph. The Haddad and Sargent, 1994 reference was not in the Literature Cited Section.

2.6.2 Estuarine Fish and Wildlife.

- ⑤ This entire section is about the fauna of the Indian River Lagoon, a fun subject, but only marginally related to the heavily impacted St. Lucie and really unrelated to the Caloosahatchee.

2.7 Threatened and Endangered Species

- ⑥ 2.7.1.4 Bald eagle
Second sentence in this section is not a complete one.
- ⑦ 2.10 Socia economics: This is all about the Lake. Nothing about estuaries.
- ⑧ Page 52: @Line 13-15 Senetence should read:

At flows from the lake exceeding 1,500 cfs the estuary becomes increasingly *fresher* until the whole system is freshwater at flows near 3,500 cfs.

General Comments:

This document did not make the argument that WSE was the best of the several alternative lake schedules very persuasively. Below are some directly quoted and paraphrased excerpts from relevant sections.

5.3.1.1 Lake O:

9 Alternative 25 seems to be slightly better for the lake littoral zone given conditions assumed under the 2010 base. Alt 25 performs about the same as WSE in terms of mimicking "historical" lake stage conditions. WSE has shorter flooding events compared to Run 25 but not as good as 22AZE. No significant differences between alternatives for prolonged low lake stages. Given limited modeling information available, 22AZE would be slightly favored over 25 and WSE for in-lake water quality.

5.3.1.2 St. Lucie: Estuary

It is concluded that WSE appears the best because it had 2 fewer releases over 2500 cfs than run 22AZE. Remember this is in a 31 year period of record. However WSE had 10% more discharges >1600 cfs than 22AZE. Finally mean annual flood control releases from L.O. , shows 22AZE as having the least flow to the St. Lucie.

5.3.1.3 Caloosahatchee: 22AZE performed best. 22AZE was by far the best at reducing high volume (>2800 and >4500 cfs) discharges (18 fewer events than WSE). For low flow events alternatives ranged from 107 for WSE to 111 for 22AZE, a difference of only 4.

5.3.1.4 Water Conservation areas: "...no significant differences, and in many instances no differences at all between alternatives."

5.3.1.5 Everglades National Park: "Review of stage duration curves, hydrographs, and graphical plots of overland flow to ENP, show minimal differences between alternatives Run 25 and WSE, and only limited improvements with 22AZE"

10 5.3.3 Water Quality: "Run 22AZE, Corps 2010, HSM, and WSE are all improvements over the base condition of run 25 in terms of reducing the number of undesirable high freshwater discharge events to the estuaries. WSE does not have a significant difference from the other alternatives when compared to the base condition for this aspect." This statement seems to contradict the impression given in sections 5.3.1.2 and 5.3.1.3 which describe discharges to the St. Lucie and Caloosahatchee Estuaries under the 3 alternatives. Certainly for the Caloosahatchee, 22AZE was much better than Run25 or WSE.

⑪ Page 69 Last paragraph. Here we find that during periods of water scarcity, Run 25 puts more water to the estuaries than WSE. During such periods salt water intrusions stressful to organisms living in the head waters of the estuary. "The general consensus is that the wet season benefits to the affected estuarine systems under the WSE schedule outweigh the negative benefits of the dry season possibility of hypersalinity in the affected estuarine systems." First, I believe strongly that for the Caloosahatchee, which has *Vallisneria* beds in its head waters that require some freshwater during the dry season, that WSE would be more detrimental than the present condition of Run 25. Second, doesn't 22AZE subject the estuaries to fewer high discharge events in the wet season?

⑫ 5.3.4 Water Management and Water Supply: "Because of the small differences in performance of the alternatives...it would appear that the recommendation of any of the top three schedules would be satisfactory."

Two Last Bottom Line Points:

- ⑬ 1) The report fails to convey an understanding of estuarine problems associated with water quantity. They are simple. In the Caloosahatchee there is too much freshwater in the wet season and too little in the dry season. Too much freshwater in the wet season causes problems for seagrasses and associated fauna at the seaward end of the system. Too little freshwater in the dry season, allows salt water intrusion which stresses organisms, like *Vallisneria*, that live in the ordinarily fresher head waters. At this point the thinking is the same for the St. Lucie, although it is so degraded that an overall reduction in discharge might be best.
- ⑭ 2) Given the conclusions about the three alternatives listed above, the justification of WSE, especially for the estuaries, is weak at best.

PRO ESTUARY

MEMORANDUM

TO: Al Steinman, Div. Dir., OSR

FROM: Robert Chamberlain, Sen. Env. Scientist, OSR *RAC*

DATE: August 30, 1999

SUBJECT: Review of Lake Okeechobee Regulation Schedule Study Draft EIS

As per your request, I offer the following comments regarding the subject Environmental Impact Statement (EIS). I focused on the sections and statements within the document related to the estuaries and the predicted impacts to them from alternative Lake schedules.

Upon review, it appears the performance measures for the estuaries are based on the same criteria that I provided the COE in 1997, which I believe are the most up to date guidelines. Therefore, the model output that enumerates violations of the criteria should be accurate for basing decisions regarding impacts to the estuaries associated with each alternative schedule.

The remaining comments refer to the summary volume.

1. p. DEIS ii: It believe the high lake stages (past /current schedule) do not make large regulatory releases more frequently than the proposed lower schedules, which makes this sentence a little misleading.
2. p.1: The statement, "discharges control the ecology of the SLE and CE" is too strong and probably erroneous.
3. p.5 and throughout the document: It is either said or implied that an important goal is to reduce the past harmful effects to the estuaries by choosing a schedule that "enhances species diversity and productivity." However, what becomes evident is that this goal is a secondary consideration behind improving the lake. Therefore, it would be more honest to state that the goal was to improve the lake condition while minimizing adverse impacts to the estuaries. In the end, WSE doesn't really improve estuarine conditions within the confidence limits of the models and may actually be less helpful than 22AZE.
4. p.8: I don't think the C. River extends into Collier and Charlotte Co. (unless the EIS is referring to the watershed).
5. p.16: Correct the species name of manatee grass. Vallisneria is upstream in the CE (and is not a seagrass). Shoal grass is downstream in the estuary and extends beyond Shell Point. Shoal grass and turtle grass are in San Carlos Bay and lower Charlotte Harbor.

6. p.22: There is no discussion of fishery resources, etc. in the Caloosahatchee Estuary (CE). Doering and my work in the estuary regarding flows and biota are not referenced. This work is the basis for the estuarine performance measures.
7. p.31: I think a more in-depth discussion of pulse releases would be helpful.
8. p.32. The estuaries (and other environs), as a water user, is not discussed and included in water supply considerations. Discharges are also used for: environmental enhancements that include lowering salinity for the potable water intakes upstream of S-79; and flushing-out harmful phytoplankton from the same area.
9. p.34-36: Lacks almost any discussion of water quality in estuaries and preferred discharge ranges.
10. p.36-38: Lacks discussion of Socio-Econ impacts to estuaries.
11. p.49: How was "only slight negative impact to estuaries" (from increased nutrient diversion) determined.
12. p.51: Are estuarine scientist among those advocating for a lower lake schedule?
13. p.52 needs more references and further development. Also, the minimum inflow requirements in the CE is 300 cfs I believe, not the stated 500.
14. p.55: The reference to pulse releases as being non-harmful is wrong. They are considered to be the least harmful method for releasing Lake water to the estuaries when trying to avoid larger required discharges. No Figure 2.8-1.
15. p.65: Pulse releases up to 3000 cfs are not necessarily considered environmentally friendly.
16. p.70: The most appealing aspect of WSE regarding the estuaries is that an estuarine biologist will be consulted and weather forecasting is included.
17. p.103: Pulse releases up to 3000 cfs are not necessarily environmentally friendly. High discharges are not an adverse concern for Vallisneria since it is a freshwater plant. However, it is important to the seagrass species located further downstream.
18. p.106: Past high discharges are suspected to cause fish kills and lesions. No references to CE fish, etc.
19. p.109: Again, no reference to CE water quality.

Let me know if you have any questions.

cc. Hunter Carrick
Peter Doering

Alan Steinman's Comments on Draft EIS

General Comments:

This is a well-written document that nicely outlines the major issues facing the regulation schedule. I see no fatal flaws in the write-up or analysis, although there are many individual concerns that should be addressed for the final EIS. The author is to be commended for his product.

Specific Comments:

- ① Table 2.2-1: need to offset the columns in two of the rows.

Section 2.5:

You might want to take a look at Steinman et al. (in press), which describes the past, present, and proposed future hydrology and vegetation in the region.

- ② p. 14, para 3: you should include *Chara* in this list of species; see the following references for more information: Zimba et al. (1993) J. Aquat. Plant Manage 31: 76-81; Zimba et al. (1995) Arch. Hydrobiol. Spec. Issues Advanc. Limnol. 45: 241-246; Steinman et al. (1997) JNABS 16: 781-793.

- ③ p. 14, para 4; I don't think of *Scirpus* as a floating plant.

p. 15, para 2: Just so you are aware, the fishermen in the lake were complaining this year (1999) because there was too little Hydrilla!!!

p. 15, para 3: I strongly recommend that you take a look at the publications of Chris Lockhart on melaleuca: (1996) Can. J. Bot. 74:243-246.

p. 19, para 3: There has been a lot of new work done on the macrophyte communities in the WCAs since the studies reported here. You might want to consider contacting Tom Fontaine to get the latest pubs, including those of Sue Newman and Shili Miao.

Section 2.6:

- ④ P. 20, para 3: Why not list the 5 T&E species here, or at least reference section 2.7?

- ⑤ p. 21, para 3: I agree that these changes have been unfortunate, but is it appropriate to include this value judgement in the EIS?

- ⑥ p. 21, para 5, line 6: it is a "tricolored" heron.

Section 2.9:

- ⑦ p. 34, para 2: This may not be necessary to amend, but we do suspect other sources may be important in the loading. We have inadequate data at present to know with certainty how important they are, but you might consider listing sludge and waste disposal and stormwater runoff as other problem sources.

Section 3:

- ⑧ As far as I could tell, there is no reference to any actual output (i.e. in appendices or figures) from the "without project" condition. Is that correct? Should some data be included in the document?

Section 4:

- ⑨ p. 51, para 4, line 4: I have no idea what "sub-aquatic" means, although it is an interesting term. Do you mean submerged aquatic vegetation? Why not just leave it as aquatic, since fish will suffer from the loss of both submergent and emergent vegetation?
- ⑩ p. 53, para 2: I tend to disagree with the statement that operational changes to the regulation schedule will not impact one way or another the existing water quality of the lake. Although the regulation schedule does not affect loading, lake stage can impact the distribution of nutrients within the lake, and this in turn can influence bloom formation and eutrophication processes in the littoral zone. High lake stage promotes the lateral transport of phosphorus-rich sediments to near-shore regions, and also facilitates the mixing of nutrient rich water from the open water into the nutrient poor littoral marsh.

Section 5:

- ⑪ p. 56, para 5: By denoting stage height in terms of NGVD here, but not for Run 25 or 22 AZE, a reader may wonder if you are using other vertical data for those stage ranges.
- ⑫ p. 64, para 1: I think the concluding sentence, even qualified as written, is still too strong. The differences in water quality among the runs is trivial compared to the uncertainty in the model, and if were compared using normal inferential statistics, would be shown to have no significant differences. Given that, I see no scientific basis in claiming one alternative should be favored over another.
- ⑬ p. 69, para 4: see comment (2) in Section 4 regarding affects of regulation schedule on water quality. I recommend that both sections be amended accordingly.

14 p. 71, para 1, line 1: The logic here is not clear. The data in Table 5.3.4-1 clearly show that HSM meets water supply needs better than WSE, yet the sentence reads that WSE was an improvement over HSM. Are you now referring to an improvement in terms of environmental benefits? If so, it is unclear when the transition from water supply to environment occurred. This needs to be clarified, one way or another.

Section 6:

15 p. 81, para 3, line 4: It is not clear to me how this table tells the reader that lake level can be successfully regulated by releases southward or to tide. There is no information in the table regarding directional release or magnitude. I am assuming that the reader is being asked to use their logic to make this conclusion, but I recommend that instead of relying on the reader to guess what the author means, rewrite this so no guesswork is needed.

16 p. 91, para 2: There is an implicit, and sometimes explicit, assumption throughout this document that the only discharge problem experienced by the estuaries is too much freshwater. However, they can also be impacted by hypersalinity, and at those times, they would benefit from freshwater releases. We experienced this phenomenon this past spring, where we were in the unusual, but enviable, position of having too much water in the lake and too much salinity in the estuaries, so releases represented a win-win situation. Is it worth pointing out that from an environmental viewpoint, releases may sometimes be desirable to attain the preferred salinity envelope?

Section 7:

17 p. 93: Would the movement of sediments be a consideration here, especially with respect to high discharge events in the St. Lucie canal and the Caloosahatchee River?

18 p. 99, para 5, line 11: Do you mean "phosphorus-laden sediments" instead of "phosphorus-laden waters"? This makes more sense to me.

19 p. 100, para 1: You might also consider referencing Steinman et al. (1997), which shows that high lake stage is negatively correlated with *Chara* abundance, and shows mechanistically that light limitation is the causative agent.

Steinman, A.D., Meeker, R.H., Rodusky, A.J., Davis, W.P., and S-J. Hwang. 1997.
Ecological properties of charophytes in a large, subtropical lake. *Journal of the North American Benthological Society* 16: 781-793.

20 p. 102, para 2: It seems to me that the performance criteria of the runs was discussed previously, and this section should be devoted toward the vegetation responses, not a reiteration of alternative results. I suggest that you take the

salinity envelopes established for the seagrass species, as outlined in Chamberlain et al., and apply them to the discharge regimes for the different alternatives. This approach should be applied for all trophic levels.

Chamberlain, R.H., D. E. Haurert, P.H. Doering, K.M. Haurert, J.M. Otero, and A.D. Steinman. Preliminary estimate of optimum freshwater inflow to the Caloosahatchee Estuary, Florida. White Paper, SFWMD.

21

p. 105, para 1: I don't see the significance of improved light regimes for invertebrates.

22

p. 105, para 3: I am not sure which stage hydrographs are being used to determine the impact on lake stage. Hydrographs based on periods from 1926-1945, 1946-1964, and 1990-1996 that I viewed do show lower lake stages with WSE relative to base, in general. The lower stages are most discernible for simulations run during high water years. Have you seen these simulated water level graphs?

23

p. 105, para 4: I refer you to the Chamberlain et al. white paper above, for salinity envelopes for key fish and wildlife species.

24

p. 109, para 3: As noted earlier, there are likely to be water quality impacts in LO as a function of lower lake stages. Phosphorus-rich mud sediments will be less likely to move laterally to near-shore regions, thereby keeping water transparency (relatively) high and TP levels lower than might occur with higher lake stages.

Alan Steinman, Director
Okeechobee Systems Research Division

From: Paul Trimble
To: Lewis Hornung; Al Steinman; Tommy Strowd
Cc: Jobey@sfwmd.gov; cadauid@sfwmd.gov
Subject: Comments on EIS report for the WSE Schedule

Here are additional comments and editorials on the EIS for WSE Operational schedule:

Comments on:

Lake Okeechobee Regulation Study

Integrated Feasibility Report and Environmental Impact Statement

① **1. Abstract: Line 13**

'meteorological forecasting' >
'climatological outlooks and meteorological forecasts'

② **2. DEIS1**

'576000 acres' should be '476000 acres' and '720 square miles'
should be '730 square miles' for consistency

3. DEIS4 First 7 lines

③ It would be very helpful to indicate when the 16.4 flat was in place. Also, the 15.517.5 schedule were in 1959 or is this supposed to be 1979? I didn't think they allowed such high schedules prior to 1960 as it seem to indicate in the text.

④ **DEIS 11. Climate section**

'Winter months' should be replaced with 'The months of November through April' or 'November through May'. In the same light 'summer months' should be replaced with 'May through October' or 'June through October'

an alternative is simply to define which months are considered winter and summer.

DEIS 12 Table 2.2.2

5

Clewiston and Moore Haven columns of climate variables are shifted within the Table.

DEIS 30. Last Paragraph

6

Replace:

The schedule maintains a low lake stage to provide both storage capacity and flood protection for the surrounding areas during the wet season. During the winter, lake levels may be increased to store water for the upcoming dry season.'

With:

The schedule lowers the lake stage prior to the wet season to provide both storage capacity and flood protection for the surrounding areas during the wet season. After the peak of the hurricane season and prior to the beginning of the dry season, lake levels are allowed to increase to store water for the upcoming dry season.'

Deis 31 Last paragraph

7

This recommended schedule reduced the water quality impacts associated with regulatory discharges'

should read:

This schedule reduced the frequency and distribution of regulatory discharges to the St Lucie and Caloosahatchee estuaries to lessen the undesirable impacts to the natural ecosystems within these estuaries. This was accomplished was accomplished without.....'

DEIS 33 paragraph 2

8

Seems to me that 'wet periods' for use during 'dry season' should be made consistent by replacing 'dry season' with 'dry periods' or 'wet periods' with 'wet season'

DEIS 55-56

9

Last paragraph on page 55 (Run 25). Even though these pulse releases are low in volume compared to other flood control

releases, they may cause problems in the estuaries if used too frequently" seems inconsistent with statement under Run 22 AZE, first paragraph page 56: "In Zone D, discharges may be made to the estuaries for extended periods of time when the stages is rising without adverse effects'.

Deis56

- ⑩ The schedule was designed for 'agressively discharging' from the Lake through out the year. This is especially not true during June, July and August.

Deis 57 WSE Alternative

- ⑪ The Lake Okeechobee inflow forecasts is computed applying a methodology which uses global climate indices that are made available by National Oceanic and Atmosheric Adminstration".

The methodology is still under review. Instead: the National Climate Prediction Center official climate and ENSO outlooks are applied to estimate expected inflow to the Lake.

- ⑫ Finally, I believe the WSE Operational Schedule should refer to the decision tree as a recognized part of the schedule.

LEWIS, LONGMAN & WALKER, P.A.

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REPLY TO: WEST PALM BEACH

September 29, 1999

Mr. Mark Ziminske
U.S. Army Corps of Engineers
Jacksonville District, Planning Division
4970 West Bay Street
Jacksonville, FL 32232-0019

Re: Comments on the Draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Okeechobee Regulation Schedule Study

Dear Mr. Ziminske:

On behalf of the Seminole Tribe of Florida (Tribe), I have been authorized to submit the following comments on the U.S. Army Corps of Engineers (ACOE) Draft Integrated Feasibility Report and Environmental Impact Statement on the Lake Okeechobee Regulation Schedule Study (Draft Report). The Tribe supports the efforts of the ACOE and other entities to restore the south Florida ecosystem and improve the environmental health of Lake Okeechobee (Lake). However, the Tribe generally believes that the problems these ecosystems are facing are not of its making. While the Tribe will take part in these restoration initiatives, it is not willing to bear a disproportionate share of these initiatives.

This letter initially presents the Tribe's general comments on the Draft Report. It next provides specific comments on the effect of the preferred alternative, the WSE Schedule, on water supply issues. Finally, this letter discusses the Tribe's comments on the Economic Impact Report, which is attached as Appendix D to the Draft Report.

I. General Comments on the Draft Report

The Tribe does not object to the adoption of the preferred alternative where implementation of the WSE Schedule will provide positive benefits to the littoral zone of Lake Okeechobee and will benefit the Everglades hydrology. These comments are intended to increase the ACOE's awareness of the obligations of its local sponsor, the South Florida Water Management District's (SFWMD), to the Tribe. As is stated in Section 2.8.2 of the Draft Report, the SFWMD develops a water supply management plan according to the severity of conditions exhibited in the lake regulation schedule. The Tribe seeks to ensure that the ACOE and the SFWMD have considered the impacts of the preferred alternative on the SFWMD's obligations to provide water to the Brighton Reservation in accordance with the terms of the Agreement Between the South Florida Water Management District and the Water Supply Plan for the Brighton Reservation Implementing Section VI.B. of the Water Rights Compact and Subparagraph 3.3.3.2.A.3 of the Criteria Manual dated November 30, 1992 (Agreement). A copy of the Agreement is attached at Tab 1. The specific obligations are discussed in Section II below. ①

II. Specific Comments on the Draft Report

A. Section 5.3 - Evaluation of Lake Regulation Schedule Alternatives (pp. 60-73)

The Draft Study states that the preferred alternative will cause an increase in low lake stage events and a slight increase in extremely low lake stage events (level of less than 11 feet for greater than 100 days) upon implementation. Section 5.3.1.1. Since the key feature of the WSE Schedule is the lower operational zone D (with a range of 13.5-15.5 feet NVGD in contrast to the 15.65-16.75 feet NVGD of the no action alternative), the preferred alternative may cause potential increases in water shortage conditions for the Lake. Section 5.2.1. The Tribe questions whether the SFWMD's obligations to the Tribe under the Agreement have been accounted for in the alternative selection process. ②

Specifically, the Agreement states that the SFWMD agrees to provide the Tribe's entitlement for the Brighton Reservation by supplying water from the Lake through pumps locate at S-71 and S-72 when necessary. Should water shortage conditions occur in the Lake, however, the pumping will cease. See paragraph 3. Additionally, the Agreement guarantees that a minimum volume of water will be set aside for use by the Brighton Reservation to satisfy the Tribe's entitlement. See paragraph 4. The Tribe would like to

know what steps the ACOE and SFWMD will take to ensure these obligations are met if the preferred alternative is adopted. (3)

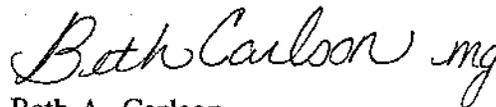
III. Comments to Appendix D- Economic Impact Evaluation

A. Section 2 - Agricultural Water Supply (pp. 2-1 - 2-26)

The Tribe is concerned that the Economic Impact Evaluation does not evaluate the water supply impacts of the alternatives on the Lake's north shore agricultural areas. The report states in Section 2.1.2 that no land use data is available for the north shore sub area. The evaluation presents an incomplete impact analysis and an incomplete report on the percentage water supply demand not met for all agricultural areas affected by the proposed schedule change. The Tribe does note that the data presented for the Lower East Coast and the Everglades Agricultural Area indicate that the preferred alternative will reduce the overall value of the unmet demand for agricultural water supply from the no action proposal. Section 2.7.1. It also notes that the demand not met percentages in the St. Lucie and Caloosahatchee Basins will not increase under the preferred alternative. Section 2.7.2. However, the Tribe cannot extrapolate from these findings to determine the economic impacts to north shore agricultural area. To assist the ACOE is developing this information, the Tribe is attaching a copy of the Water Need Analysis for the Brighton Reservation at Tab 2. (4)

Thank you for the opportunity to comment on the Lake Okeechobee Regulation Schedule Study Draft Report. The Tribe reiterates its commitment to partnering with those entities who are working to restore the South Florida ecosystem. If you have any questions regarding the Tribe's concerns, please contact me at (561) 640-0820 or Craig Tepper at (954) 967-3401.

Sincerely,



Beth A. Carlson

BAC/mg

cc: Craig Tepper, Director, Water Resource Management Dep't, Seminole Tribe of Florida
Stephen A. Walker, Esquire

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LEHTINEN O'DONNELL
ATTORNEYS AT LAW
A PROFESSIONAL ASSOCIATION
VARGAS & REINER

September 22, 1999

COL Joe R. Miller
District Engineer
400 West Bay Street
Jacksonville, Florida 32232-0019

Dear COL Miller:

The Miccosukee Tribe of Indians of Florida (the "Tribe") has reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement for Lake Okeechobee Regulation Schedule Study, dated June 1999. The Tribe is very concerned about the implementation of the WSE Regulation Schedule, which we are told is on a fast track and is scheduled for the spring of 2000.

This EIS clearly indicates that the WSE Regulation Schedule will cause additional loading of phosphorous into the Water Conservation Areas, where Tribal lands are located. The following quotes illustrate why the Tribe is so concerned:

Excessive phosphorous loading to the WCAs will continue until such time as the proposed STA 3/4 recommended by the Everglades Construction project is completed in late 2003. This loading will likely result in continued impacts to these areas in the form of cattail expansion into historical sawgrass areas, and unknown impacts to important periphyton communities throughout a much larger area. More importantly, these impacts may be irreversible, at least in the short term, as nutrients deposited into the Everglades marsh sediment will not, in all likelihood, be economically recoverable in such a fragile and sensitive ecosystem without recovery efforts themselves causing equivalent damage.

(Page DEIS - iv)

In all likelihood, the additional loading to the WCAs due to WSE, would contribute to an already existing cattail problem in the northern WCAs, expanding the range wherein cattail have out competed sawgrass by an unknown, but relative to the area affected, modest number of acres. Possible impacts to periphyton may also occur over a larger area, although the ability to quantify with any precision the number of acres of either periphyton or cattail spread is rather imprecise.

(Page DEIS - 104)

Lake waters discharged into the WCAs are currently estimated to contain between 70 and 100 ppb phosphorous concentration, which is considerably above that present in the receiving waters. . . . In the long term, such additional loading of phosphorous would be expected to have significant and long lasting adverse effects on the fish and wildlife habitat of the area. Existing cattail stands would probably expand rapidly into areas currently and historically occupied by sawgrass, displacing one cover type for another.

(Page DEIS - 107)

The increased phosphorous loading into northern WCA 3A is predicted to result in a vegetative change from sawgrass to cattail in at least 3 and at most 13 acres (depending on [P] in-flow assumptions) and

Page 2

from 9 to 31 acres in WCA 2A. Furthermore, this additional loading is predicted to result in an area of over 2100 acres in WCA 3A and about 790 acres in WCA 2A which is expected to exceed 10 ppb [P] a concentration which has been determined may affect periphyton communities (Appendix B). These values are over and above what would be predicted for the future without project condition (alternative 25, 2010 base). As these numbers are based on numerous assumptions, and are subject to a wide variety of environmental factors unrelated to the LORSS, they should be interpreted with some caution. It is reasonable to conclude that the additional loading of phosphorous to WCAs 2A and 3A as a result of the proposed action, will contribute to the spread of cattail that already exists, further exacerbating, albeit to a limited and relatively minor extent, an existing ecological problem.

(Page DEIS - 113)

Conversion of a minimum of 12 and a maximum of 44 total acres of existing sawgrass to cattail due to an increase, albeit temporary, in phosphorous loading to northern WCA 3A and WCA 2A may be considered an irreversible impact, at least in the short term, as there are currently no cost effective means to "reverse" an established community change of this nature without incurring significant environmental and financial costs.

(Page DEIS - 113)

COL Miller, the Tribe requests that you consider the following points carefully:

1. WSE Regulation Schedule will violate the Miccosukee Water Quality Standards

The Tribe's Alligator Alley Reservation is located in the northern portion of Water Conservation Area 3A and is very close to the point of discharge. The Tribe has adopted water quality standards, which have been approved by the United States Environmental Protection Agency. These water quality standards require a numeric criterion for total phosphorous of 10 parts per billion (ppb), or less in many locations. The proposed WSE Regulation Schedule will violate this 10 ppb criterion by as much as 10 times. If Lake Okeechobee water were being treated prior to discharge into the WCAs, perhaps a benefit could be derived; however, the WSE Regulation Schedule is an operational change only and does not afford any water quality treatment benefits. The Tribe objects to any plan that discharges water to the Everglades without a treatment technology that makes certain that water meets all applicable water quality standards. Further, the EIS is inadequate to the extent that it does not address all reasonable alternatives.

2. WSE Regulation Schedule will violate the federal Settlement Agreement and Consent Decree.

The Settlement Agreement and Consent Decree require a 80% and 35% load reduction be achieved for waters entering the Everglades Protection Area regardless of where the water originally came from. The WSE Regulation schedule will not achieve the 80% load reduction required under the Consent Decree. In fact, phosphorous loading to WCA 3-A is expected to increase under the WSE Regulation Schedule. Page DEIS 120 says "the proposed WSE regulation schedule for Lake Okeechobee will not cause a violation of the phosphorus load provisions of the proposed modifications to the consent decree." However, the shifting of pollution contemplated by the WSE, polluting one area of the Everglades to aid other portions of the Everglades, does not meet the letter

Page 3

or intent of the Settlement Agreement, with or without modification. Furthermore, the proposed modification to the consent decree has not been accepted by the Federal District Court, at this time. The Tribe has objected repeatedly, including objections to the court, to the premature implementation of WSE and warned the court of its impacts.

3. WSE Regulation schedule will violate the 404 Dredge and Fill Permit for the Everglades Construction Project. 3

The WSE Regulation schedule would violate your agencies' own permit. The Corps of Engineers 404 Dredge and Fill Permit clearly prohibits additional water quality degradation in the guise of "hydropattern restoration."

The works authorized by this permit, alone or in combination with other works, shall not be caused to be operated at any time (including any incremental increase of flows toward the 28% increase provided by law) in a manner that would result in the total load of phosphorus exceeding the limits in paragraph 8.A. (80% to the EPA and 85% to the Refuge) of the Settlement Agreement between the United States of America and the South Florida Water Management District et al., Case Number 88-1886-CIV-HOEVELER (Southern District of Florida), as it may be amended.

4. The United States Environmental Protection Agency has determined that the discharge contemplated by the WSE Regulation Schedule will forever damage the receiving waterbody. The Water Conservation Areas are Class III waters and the United States Environmental Protection Agency determined: 4

The Everglades marsh system is naturally extremely oligotrophic. Un-impacted interior portions of the Everglades marsh have long-term average water column phosphorus concentrations of approximately 10 ppb or even less. The native plant and animal communities in the Everglades marsh developed under and are adapted to these very low phosphorus conditions. Phosphorus is the primary limiting nutrient in the oligotrophic Everglades marsh system. Microbial processes are important in controlling nutrient cycling in wetlands and they play an important role in determining water quality and maintaining an ecosystem's normal productivity. Elevated water column or soil phosphorus concentrations in the Everglades have been implicated as cause for disruption of various microbial processes. Periphyton communities are an important defining characteristic of the Everglades marsh ecosystem. According to the scientific literature, Everglades periphyton accounts for much of marsh primary productivity in wet prairies and sloughs; provides habitat for aquatic animals such as invertebrates; along with macrophyte detritus, forms the base of the Everglades aquatic food web; is the major source of oxygen for fish and other animal life in sloughs and wet prairies; maintains low water TP concentrations; plays a role in cycling of nitrogen, phosphorus, carbon and oxygen; and affects formation of marl soils. Periphyton communities are extremely sensitive to phosphorus enrichment. Phosphorus enrichment at levels above 10 ppb TP has been shown to cause a loss of Everglades native periphyton communities. Surface water dissolved oxygen in pristine Everglades wet prairie and slough communities often exhibits a strong diel cycle, with concentration at a particular location ranging from 0 mg/l in early morning to over 12 mg/l in late afternoon. Everglades fish are adapted to these conditions. In contrast, oxygen levels in nutrient-rich locations within WCA2A have been shown to often be undetectable and rarely exceed 2 mg/l, with protracted periods of oxygen depletion. Unenriched portions of the Everglades are reported to have some of the lowest rates of phosphorus accumulation in peatlands in North America. Increased surface water phosphorus has caused elevated soil phosphorus concentrations. Over 51 % of WCA2A has been reported as having increased soil phosphorus. The oligotrophic Everglades marsh system contains a mosaic of macrophyte

Page 4

communities, such as sloughs, wet prairies and sawgrass marshes, all of which are adapted to low nutrient conditions. This mosaic is an important defining characteristic of the Everglades. Wet prairies and sloughs in particular provide critical habitat for animals and provide cover, nesting, and feeding sites for all animal groups. Elevated water phosphorus concentrations or elevated soil phosphorus concentrations in the Everglades are associated with elimination of submerged vegetation species including the important *Utricularia*-periphyton complex and expansion of nutrient-tolerant macrophytes such as cattail or *Sagittaria* into areas previously dominated by sawgrass, sloughs or wet prairies. Shallow, open water areas with scattered to moderately dense emergent macrophytes are the preferred foraging habitat for Everglades wading birds. Conversion of these areas to dense emergent macrophytes due to phosphorus enrichment constitutes a loss of wading bird foraging habitat. Phosphorus enrichment initiates a succession of changes within the marsh system. Initial changes, such as those that occur at the microbial level, are not visible. Visible impacts eventually occur, such as loss of native flora or fauna. The oligotrophic Everglades marsh system has very low assimilative capacity, or tolerance, for phosphorus before changes in ecosystem structure and function occur. The well-documented phosphorus impacts in WCA2A have taken place since the discharge of phosphorus-rich water through the S-10 structures beginning about 1960 (a period of about four decades). There is no information available concerning low-level additions of excess phosphorus for a century or more. The nutrient dosing studies and observational studies described below indicate that total phosphorus concentrations above 10 ppb have been shown to cause impacts to native Everglades periphyton and macrophytes such as *Utricularia purpurea* that are adapted to low phosphorus conditions. The best available scientific information indicates that average TP concentrations greater than 10 ppb, in general, can be expected to be inadequate for long-term protection of the Class III-A designated use. Therefore the Tribe's adopted numeric phosphorus criterion of 10 ppb is not overly protective. Currently available scientific information reviewed also indicates that the Tribe's proposed numeric criterion of 10 ppb is protective of the Class III-A use and the native Everglades periphyton and macrophytes. Although some data have identified long-term phosphorus concentrations within the Everglades as low as 5.0 ppb, EPA's review identified no currently available published scientific information documenting changes in the natural flora or fauna resulting from total phosphorus concentrations in the 5 ppb to 10 ppb range. If new data or information are presented in the future that demonstrate that 10 ppb is not protective of the Class III-A use, the Tribe should revise the criterion accordingly. Therefore, USEPA has determined that the 10 ppb total phosphorus criterion is protective of the Class III-A designated use, is reasonable, and is scientifically defensible.

5. It is the understanding of the Tribe that with some minor operational adjustments the WSE Regulation Schedule could be implemented in such a way that there would be no additional phosphorus diverted into WCA 3A. This understanding is based on presentations by SFWMD technical personnel. However, this EIS clearly contemplates additional pollution of Tribal lands.

As currently written, the Lake Okeechobee Regulation Schedule DEIS, unfortunately, shifts pollution from one area to another, unnecessarily pitting Everglades Restoration efforts against one another. The failure to propose or evaluate a phosphorus clean-up alternative simply offers Everglades advocates a choice of which part of the system they prefer to destroy. The Tribe will not allow its lands to be further degraded.

Please advise the Tribe regarding your agencies' intentions with regard to the WSE Regulation Schedule implementation. Will permits be issued? Will COE regulations be amended? What opportunities exist for the Tribe to influence the outcome of the decision? On a positive note, the Tribe will fully support the WSE as soon as the water quality concerns are addressed and is willing to cooperate to address these concerns.

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If you have questions or comments concerning this letter, please direct them to Mr. Gene Duncan, Tribal Water Resources Director, at (305) 223-8380, extension 2240. Please respond to the questions in the above paragraph to Ms. Dionè Carroll, Tribal Attorney, at (305) 279-1474.

Sincerely yours,

A handwritten signature in cursive script that reads "Dionè Carroll". The signature is written in black ink and is positioned to the right of the typed name.

Dionè Carroll, Esq.

c: Mark Ziminske



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
(727) 570-5312; FAX 570-5517

SEP 22 1999

F/SER3:BH

Mr. James C. Duck
Chief, Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

This responds to your September 13, 1999 letter relaying additional information requested by the National Marine Fisheries Service (NMFS) in a letter dated July 21, 1999 regarding the Lake Okeechobee Regulation Schedule Study (LORSS). That letter requested additional information regarding implementation of the Water Supply and Environment (WSE) alternative of the LORSS. This information was requested so NMFS could evaluate this project's potential for adverse impacts to Johnson's seagrass located downstream in the St. Lucie Estuary.

The information in your letter demonstrates that the WSE alternative may have a marginally beneficial effect in terms of timing and delivery of the freshwater flow to the St. Lucie Estuary. This improved flow represents a marginal improvement for the ecology of the St. Lucie Estuary. Based on this information, NMFS concurs with your conclusion that this project is not likely to affect species protected by the Endangered Species Act under NMFS purview.

This concludes Jacksonville District's consultation responsibilities under section 7 of the ESA for the implementation of the LORSS for species under NMFS purview. Consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity. If you have any questions, please call Bob Hoffman, fishery biologist, at (727) 570-5312.

Sincerely yours,

William T. Hogarth, Ph.D.
Regional Administrator





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

SEP 29 1999

District Engineer, Jacksonville
P.O. Box 4970
Jacksonville, FL 32232

Attention.: Mr. James Duck, Chief
Planning Division

Subject: Draft Environmental Impact Statement (EIS) for the Lake Okeechobee (Lake)
Regulation Schedule Study, Central and Southern Florida (C&SF) Project

Dear Sir:

Pursuant to Section 309 of the Clean Air Act and Section 102 (2)(C) of the National Environmental Policy Act, EPA, Region 4 has reviewed the documentation in which the consequences of attempting to fine tune the existing regulation schedule of the Lake are evaluated. This proposal seeks to optimize environmental benefits accruing from changing water releases concomitant with nominal consequences to existing competing purposes such as flood control and water supply. As all involved parties are well aware, this has been a demanding challenge. After a great deal of deliberation, the Water Supply and Environmental alternative (WSE) was selected as the preferred option to achieve these goals. It incorporates increased operational flexibility in the intermediate depth zones and permits excess water to be discharged from the lake at lower water levels when large inflows are expected.

Experience suggests that this change in the regulation schedule will provide multiple environmental benefits to the lake's ecology. Although no quantification has been done of specific water quality benefits which will result from changing the present regulation schedule, a number of parameters should be positively affected. For example, the lower water depths in the littoral zone along the western portion of the lake will experience incremental improvements in water clarity (along with sedimentation of adsorbed nutrients), increased vascular plant productivity/diversity, and boosts in fisheries' activities.

This schedule change can not be viewed in isolation, i.e., it has importance through its connection with the ongoing lake-wide phosphorus reduction program. It is also significant to note that sensitive downstream habitats will be materially benefitted, e.g., the estuaries will receive needed freshwater discharges and the Everglades will benefit in terms of improved water supply deliveries. While the most current/technically advanced models were used in developing the subject regulation schedule, more sophisticated methods continue to be formulated to improve

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overall understanding of the relationship between the project area's hydrology and ecology.

The EIS notes that additional phosphorous will accompany the extra water being discharged south to the oligotrophic wetlands of the Everglades Protection Area (EPA). This is an unavoidable, adverse project impact. However, we understand that this additional water will be treated by Stormwater Treatment Area 3/4, which is scheduled for completion in October 2003. Hence, this should be a relatively short-term concern. Nonetheless, because the EPA is such an important national wetland resource, every effort should be made to quantify this incremental elevation in phosphorous loading as well as determine even the transient ramifications of this increase. Toward that end, we urge that a comprehensive downstream monitoring program be implemented to assure that this projected increase in phosphorous levels in the EPA does not result in irreparable harm. We suggest that the model already used by the Jacksonville District in the Section 404 permit for the Everglades Construction Project be employed in this instance. 3

On the basis of our review a rating of EC-2 has been assigned to this proposal. That is, we have a degree of environmental concerns about the implementation of the WSE alternative, but believe that the additional information being developed as the research proceeds can address these issues. 4

Thank you for the opportunity to comment on this action. If we can be of further assistance or if a meeting is desirable to discuss this or related projects, Dr. Gerald Miller (404-562-9626) will serve as initial point of contact.

Sincerely,



Heinz J. Mueller, Chief
Office of Environmental Assessment
Environmental Accountability Division



United States Department of the Interior

OFFICE OF THE SECRETARY

OFFICE OF ENVIRONMENTAL POLICY AND COMPLIANCE

Richard B. Russell Federal Building

75 Spring Street, S.W.

Atlanta, Georgia 30303

September 20, 1999

ER-99/616

Mark Ziminske
U. S. Army Corps of Engineers
Jacksonville District, Planning Division
P. O. Box 4970 PD-ES
Jacksonville, FL 32232-0019

Dear Mr. Ziminske:

The Department of the Interior has reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement for Lake Okeechobee Regulation Schedule Study, FL, as requested.

General Comments

Interpretation of the Model Simulations and Selection of the Appropriate Planning Horizon

The hydrologic modeling for the Lake Okeechobee Regulation Schedule Study (LORSS) has proceeded through several iterations, which presents a challenge in interpreting the results and in clearly conveying the information to the public in the Draft Environmental Impact Statement (DEIS). In the majority of the DEIS, the Corps has chosen to use water model simulations completed in 1998, for a broader array of alternatives, which incorporated estimates of 2010 urban and agricultural water demands for both the future-without-project condition and the alternatives. On Page DEIS-101, the Corps also discusses the results of a simulation run in 1999, that compared only the existing Run 25 with a revised version of the preferred alternative, WSE. That latter simulation run was based on 1995, infrastructure and water supply demands. The Corps has included summary paragraphs of the results of the more recent simulation on Pages DEIS-101 to DEIS 103, but used numbers from the 2010 demand-based simulation in the summary matrix in Table 5.3-1. The decision to more completely address the earlier simulations in the DEIS appears to be motivated by the Corps' interest in fulfilling NEPA's requirement in § 1502.13 (b) to "devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits."

Although we agree with the necessity to demonstrate in the DEIS that the Corps considered a broad array of alternatives, the July 30, 1999, draft Fish and Wildlife Coordination Act (FWCA) report relied exclusively on the most recent modeling of the preferred alternative (WSE) versus the no action alternative (Run 25). We find several reasons to support the decision to base our evaluation on the more recent simulations:

~~alternative (Run 25). We find several reasons to support the decision to base our evaluation on the more recent simulations.~~

1. The preferred WSE schedule requires no changes in infrastructure and could be implemented immediately. Therefore, we find that the 1995 infrastructure and demand-based simulation provides a more reasonable estimation of the likely impact of WSE over the next three years, prior to completion of the Everglades Construction Project. This is in keeping with the Corps' statement on Page DEIS-101, "It may be argued that the 1995 base provides a more appropriate assessment 'snapshot' of short-term effects due to the interim nature of the proposed action and short-term effects to certain resources, notably WCA 3A, which will begin receiving 'treated' lake water from STA 3/4 in 2003." Please also note the Corps' statement regarding cumulative effects on Page DEIS-114 that the WSE schedule "is expected to operate only in the short to intermediate timeframe." These statements support the Service's decision to evaluate WSE using the most recent 1995-based simulations.
2. The most recent simulation of WSE included revisions to the operational rules developed in the WSE Implementation Plan.
3. The original modeling of the full range of alternatives, while incorporating predicted 2010 water demands, did not include those features of the C&SF Restudy's Comprehensive Plan that are likely to be in operation by 2010.

The slightly different output from the most recent simulations, combined with different subjective decisions about what conditions correspond with a significant beneficial or adverse ecological effect, account for the somewhat different interpretations in the Corps' DEIS and the draft FWCA report. Both the Corps and the Fish and Wildlife Service (Service) believe that WSE will slightly improve ecological conditions in the littoral zone of Lake Okeechobee, but the Service is not confident that WSE will significantly improve conditions in the St. Lucie estuary, as concluded by the Corps. This distinction should be clarified in the Final EIS. (2)

Rationale for Deviation from the Schedule

The Corps states on Page DEIS-88 that, "If one of the major ecosystems has experienced a large level of stress in recent months and/or years, it may be appropriate to hedge the operational guidelines in a direction that would allow for the recovery of that particular ecosystem." Although this idea has an intuitive appeal, all technical evaluations of regulation schedules, including WSE, have demonstrated the unavoidable trade-offs among ecosystems in the lake, the estuaries, and the Everglades. All of those ecosystems are at risk for adverse ecological conditions during drought or flood. We agree that any given flood or drought is not equally severe throughout south Florida, and deviations from the operational schedule may be able to respond to the localized intensity of extreme events. However, it is often difficult to precisely weigh the severity of impacts in different parts of (3)

the C&SF system, and the concept of shared adversity must enter into any proposal to deviate from the schedule. The weighing of shared adversity should not be limited to trade-offs among the estuaries, Lake Okeechobee, and the Everglades, but should also allow for impacts on urban and agricultural areas.

The balance of beneficial and adverse consequences in the WSE schedule will be shifted by any deviation from the schedule. Although we recognize that deviations may be justifiable in certain circumstances, these cases should be minimized. All of our experience in evaluating regulation schedules for Lake Okeechobee shows that a deviation to protect one portion of the C&SF system is likely to have adverse consequences elsewhere in south Florida. We recommend the Corps add a brief discussion in the Final EIS of the need to weigh shared adversity before deviating from the approved schedule.

Threatened and Endangered Species

Following publication of the DEIS, the Service found that the proposed WSE schedule was not likely to adversely affect any threatened or endangered species or critical habitat. Informal consultation was concluded on July 30, 1999, not requiring issuance of a biological opinion. Therefore, the Corps should correct the statements in Section 7.7 (Page DEIS-108) and Section 9.3 (Page DEIS-119) that a biological opinion will be prepared. The Service found that expected improvement in habitat conditions in Lake Okeechobee's littoral zone would likely be beneficial to the Okeechobee gourd, bald eagle (currently proposed for de-listing), the wood stork, and the snail kite. The Service did not conclude that WSE will improve habitat conditions in the St. Lucie estuary to the extent that we could confidently state that WSE will benefit the West Indian manatee or bald eagles in the vicinity of the St. Lucie estuary. The Corps suggests on Page DEIS-108 that WSE would benefit the West Indian manatee and the bald eagle in the St. Lucie estuary. We find that this discrepancy is attributable to a difference in the subjective evaluation of what constitutes a significant improvement in ecological conditions in considering what are mixed results for the estuaries in the simulations.

Specific Comments

Section 1.35, Page DEIS-9 - The word "duplicity" is inappropriate in this context; we recommend substituting "duplication".

Section 2.5.1, Page DEIS-14 - The genus *Hydrocotyle* should be capitalized.

Section 2.5.1, Page DEIS-15 and Section 2.13.2, Page DEIS-44 - We believe the correct name is "Moore Haven Canal", not "Moorehaven Canal".

Section 2.5.2, Page DEIS-16 - The Corps uses *Cymodocea manatorum* as the scientific name for manatee grass; we believe the currently accepted scientific name is *Syringodium filiforme*.

Table 5.3-1, Page DEIS-73 - It seems that either the title for the fourth column in Table 5.3-1 needs to be changed, or preferably (to maintain consistency with the second and third columns), the numbers within the fourth column need to be changed. The second and third columns are titled correctly as reporting loss or gain in performance of the alternatives, relative to Run 25. However, the fourth column reports the absolute number of events in the simulation period meeting the specified performance criteria, not, as the title indicates, the loss or gain relative to Run 25.

Section 7.5.7.6.4, Page 2.2, Page DEIS-103 - "Vallisnaria" should be spelled "Vallisneria".

Section DEIS-107 - "Agelaius phoenicues" should be spelled "Agelaius phoeniceus".

Section 7.7, Page DEIS-107 - The correct worldwide web address for the South Florida Multi-Species Recovery Plan is: <http://www.fws.gov/r4eao/wildlife/vbms.html>.

Section 7.12, Page DEIS-110 - The Corps states that, "Improvements to the lake's hydroperiod should reduce the occurrence of prolonged high lake stage events in particular, that may be adversely impacting native aquatic and marsh vegetation around the lake (emphasis ours)." The scientific literature clearly supports a more affirmative statement that vegetation in the lake's littoral zone and wading bird foraging conditions were adversely affected by prolonged high lake stages between 1978 and 1992. There is also adequate evidence that the current Run 25 schedule also has allowed, to a lesser degree than in the 1978 to 1992 period, high lake stages that were detrimental to the littoral zone.

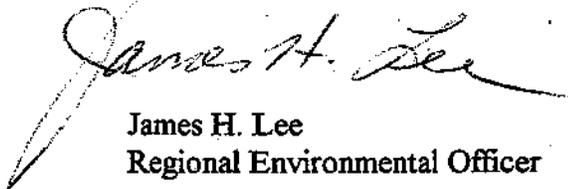
Throughout the document - Many of the citations in the text of the document do not appear in the list of references. It appears that large portions of the DEIS were assembled from other documents available to the Corps, but the references were not carried over from the source documents. The following are among the references that we noticed were missing:

Page in DEIS	Author(s) and Year
21	Bull <i>et al.</i> 1995
24	McDiarmid and Pritchard 1978
26	USFWS 1996
27	Kahl 1964 Ogden <i>et al.</i> 1976 Coulter 1987

29	Walters <i>et al.</i> 1992 Walters and Decker-Walters 1993
31	Trimble and Marban 1988
36	Woodward-Clyde Consultants 1994
37	Snyder and Davidson 1994 USACE 1998
38	Diemer and Moler 1995
40	SCS 1994
42	SCORP 1994
45	Almy 1996 Milanich 1994
84	Changon 1982
87	Zhang and Trimble 1996
100	Richardson <i>et al.</i> 1995
103	Bierman 1993

Thank you for the opportunity to review and provide comments on the Draft Feasibility Report and EIS. If you have questions about the comments on fish and wildlife resources, please call Bruce Bell at 404/679-7089.

Sincerely,



James H. Lee
Regional Environmental Officer

CC: Laura Brown, Chief of Staff
Office of Water & Science
Washington, DC

OEPC, WASO
FWS-ES, ATL

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Robert M. Norton
4200 Hwy 444 SE
Okeechobee, FL 34974
July 31, 1999

Response: Agrees with selection of WSE Schedule. No response needed.

Joseph D. Carroll
1160 38th Avenue
Vero Beach, FL 32960
September 14, 1999

Comment: The Fish and Wildlife Coordination Act Report which is prepared by the U.S. Fish and Wildlife Service, is normally make a part of a plan or study of this type as required by the Fish and Wildlife Coordination Act. This ommission should be corrected before the Final Document is presented to Congress or Higher Authority in the Corps.

Response: Agree. On page DEIS-17, paragraph 9.2 the Corps mentioned that the U.S. Fish and Wildlife Service was unable to meet it's deadline for preparing the draft Fish and Wildlife Coordination Act Report (CAR), but did commit to preparing one in time for the Final EIS. The final CAR has been received and is included in the FEIS as ANNEX A.

Friends of Lake Okeechobee
2252 SW 22nd Circle North
Okeechobee, FL 34974
Not Dated

Response: Supports WSE and states the lake's resources (littoral zone) should be used to determine suitable lake levels. Provided a petition with 1,242 signatures supporting the WSE schedule. No response needed.

Fishermen Against Destruction of Environment, Inc.
P.O. Box 16061
West Palm Beach, FL 33466
September 29, 1999

Response: Supports the WSE schedule and it's swift implementation. No response needed.

Sierra Club
South Florida/Everglades Office
2937 SW 27th Avenue
Suite 101
Miami, FL 33133
July 29, 1999

Response: Supports WSE schedule. No response needed.

National Audubon Society
444 Brickell Avenue
Suite 850
Miami, FL 33131-2405
September 1999

1. Comment: The National Audubon Society (NAS) encourages the Corps to provide more background information on historical ecological conditions in Lake Okeechobee and it's vicinity.

Response: The Corps has prepared a draft and final EIS that is intended to provide the decision maker with sufficient information with which to make an informed decision regarding the nature of the proposed action, alternative actions and the impacts associated with the array of alternatives. In keeping with NEPA and Department of the Army guidance, it is intended to be a brief and concise document with appropriate use of references to guide the reader to more detailed documents which may provide background information. In this instance, additional background information would not affect, in any way, selection of the plan, nor the anticipated impacts associated with the plan. For further information on ecological conditions within and around Lake Okeechobee, you may reference the 1995 publication entitled "Ecological studies on the littoral and pelagic systems of Lake Okeechobee, Florida (USA)" or the Final Integrated Feasibility Report and Programmatic Environmental Impact Statement for the Central and Southern Florida Project Comprehensive Review Study, Appendix J. Both citations are included in the list of references in the Final EIS.

2. Comment: NAS finds the discussion of impact of water levels on the various ecological parameters of Lake Okeechobee to be in need of additional detail and conceptual development, and encourages the Corps to improve these sections. The treatment of snail kites for instance does not include the Florida population status, what percent of the Kite population uses Lake Okeechobee during various parts of the year, what habitat conditions on Lake Okeechobee are beneficial during various parts of the year, and how snail kites have responded to past Lake Okeechobee water level changes (or are likely to respond to any of the proposed schedules).

Response: Section 2.7.1 (Threatened and Endangered Fauna) of the draft EIS states: "For a complete species description, taxonomy, distribution, habitat requirements, management objectives, and current recovery status, reference the Draft Multi-Species Recovery Plan for the Threatened and Endangered Species of south Florida, Volume I" (web site address provided). The description of existing conditions of the snail kite and other fauna, including their relationship to hydroperiods in Lake Okeechobee are succinctly described in the EIS. Certainly there is a wealth of information that has not been included, but is included by reference (in keeping with NEPA guidelines). Further detailed information is also included in the Final EIS, as a part of the Final Fish and Wildlife Coordination Act Report (Annex A), specifically section IX addresses the ecological conditions and anticipated impacts to threatened and endangered species.

3. Comment: In Section 7.5.2.1, Vegetation within Lake Okeechobee, it would be more accurate to state that "hydroperiod is the most important single factor in wetland vegetation assemblages."

Response: The reference statement has been modified in the Final EIS to emphasize the critical impact of hydroperiod on lake vegetation assemblages.

4. Comment: Page 104 of the draft EIS states that "When lake stage declines below 11 ft NGVD for instance, the stage considered to be extreme on the low end, 95 percent of the littoral zone is exposed land without standing water. In that condition, it no longer can function as habitat for fish and wildlife that depend on local fish populations as a food resource. This statement sounds as though these drying periods are harmful, when the opposite is true. NAS recommends that the narrative emphasize that wetlands must dry periodically to remain healthy and productive.

Response: The Corps simply paraphrased published literature (Havens 1998) in stating that prolonged extreme low lake stages can also have a detrimental effect, even though periodic dry down of the marsh is acknowledged as a benefit to the marsh ecosystem. The reference paragraph has been edited accordingly.

5. Comment: The LORSS DEIS could build on the "Wildlife Survey and Habitat Utilization Study of Western Littoral Zone, Lake Okeechobee, Florida" (Appendix E)...as the study is presently treated, it is a snap-shot in time of Lake Okeechobee..."

Response: The referenced Appendix was intended to provide just that, a "snap-shot" of Avian and herpetological communities observed within specific vegetation communities. Simple trends related to hydrological conditions were also addressed as a part of the study, but due to the short term nature of the study, and other circumstances described in the report, it was not possible, nor appropriate to extrapolate these data to infer long term effects on Lake Okeechobee wildlife or vegetation communities. The study was beneficial in identifying a list of species, their relative abundance and possible trends regarding species preferred habitat.

6. Comment: NAS recommends that USACE and SFWMD work with other state agencies to address water quality concerns associated with Lake Okeechobee inflows and outflows... Expedite authorization, design, permitting and construction...necessary for storage/dampening of water discharges from Lake Okeechobee...Expedite construction...to treat water from Lake Okeechobee to the EPA default total phosphorus criteria of 10 Parts per billion.

Response: We agree that the referenced standards and modifications are necessary, but do not concur that it would be advantageous to further delay regulation schedule adoption pending water quality actions. Establishing water quality standards, total maximum daily loads and other State regulatory standards is not within the scope of the Federal Lake level regulation study. All of these actions are urgent and desirable, but they can occur

with or without the regulatory schedule modification, and adoption of a water regulation schedule is urgently needed now. It cannot be held contingent upon water quality regulation. All of the referenced design and construction activities are planned for upcoming years, but the urgent need for water level regulation schedule change cannot be held in abeyance until the construction of future structures, adoption of future standards, or other future activities are achieved. The schedule can be adapted to future needs as many times as needed.

7. Comment: Navigation impacts are expected to be minimal, given the infrequent and irregular nature of commercial traffic. Occasional delays would likely cause fairly infrequent deferred shipments.

Response: We acknowledge that the navigation impacts most likely will be fairly insignificant. The relatively very small impacts mentioned in the report (summarized in Table ES-1, Appendix D) represent worst case scenarios. The minor nature of low lake level-caused transportation delays and associated economic impacts would be negligible.

8. Comment: The threat to Lake Okeechobee recreation values in the report might be conservative because the analysis focuses on the short-term recreation impacts of alternative regulation schedules. If the fishery were to substantially collapse, the fishing industry would follow, as would other tourism attractions such as wading bird watching. This "declining resource" scenario deserves further analysis.

Response: While such further detailed evaluation of these potential long term effects has not been undertaken, doing so most likely would not alter the recommendation to adopt the WSE schedule. WSE is considered to be the best schedule in terms of environmental impacts, and the economic impacts that were identified are very small. With the limited scope and resources available for this investigation, decision support analysis and its documentation have focused on relevant differences between expected conditions with a continuation of the without-project condition (Run 25), and with the various alternative regulation schedules that have been addressed. The "declining resource" scenario would shed light on the importance of the Lake Okeechobee resource, which we acknowledge is significant. But since we do not envision this scenario realistically as a consequence of any of the regulation schedules considered, including the existing Run 25, we did not undertake this analysis.

9. Comment: The "unit day value" (UDV) approach for estimating recreational resource values with Run 25 vs. the alternative schedules does not go far enough. The "access" variable should be refined to better model the various user groups. The full impact of tourists is missed by the UDV approach since it doesn't include the impact of tourism spending on the local/regional economy, which would be in serious jeopardy with long-term declines in Lake Okeechobee's environmental health.

Response: We acknowledge the less than perfect approach to assessing recreational impacts with the UDV methodology. Further detailed analysis is beyond the scope of this study, and would not change the decision to recommend a change to WSE.

Economic impacts associated with changing the schedule, as identified in the report, are relatively small, and economic considerations comprise only one of the factors that have combined to help in making a decision to recommend a change in the regulation schedule. The evaluation of ecosystem benefits to the lake's littoral zone and marsh, while not translated into economic effects, are acknowledged and are the primary reason for recommending WSE as an improved regulation schedule.

10. Comment: Considering the social-economic and environmental impacts associated with each of the proposed alternatives, it appears that alternative WSE is the most appropriate of the proposed interim regulation schedules.

Response: Agree.

11. Comment: The NAS recommended that distribution of discharges from Lake Okeechobee be reevaluated on a regular basis and modified if necessary to minimize impacts associated with the poor quality of Lake Okeechobee discharges.

Response: Note 3 of the WSE regulation schedule states that releases through various outlets may be modified to minimize damages or obtain additional benefits. Consultation with Everglades and estuarine biologists is encouraged to minimize adverse effects to downstream ecosystems.

**Florida Department of State
Division of Historical Resources
State Historic Preservation Officer
R.A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399
August 17, 1999**

Comment: Following review of the Draft EIS, we note that WSE will not affect significant historical resources. This project will therefore have no effect on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical, architectural or archaeological value.

Response: Concur.

**State of Florida Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
January 4, 2000**

Comment: The letter provides consolidated State review comments on the DEIS. The State of Florida has determined that the Lake Okeechobee Regulation Schedule Study is consistent with the Florida Coastal Management Program.

Response: Concur.

- (1) Division of Forestry
Forest Resource Planning & Support Services Bureau
3125 Conner Blvd., Mail Stop C23
Tallahassee, FL 32399-1650

Comment: Consistent with the Florida Coastal Management Program

Response: Concur

- (2) Division of Community Planning
3125 Conner Blvd., Room 365.02
Tallahassee, FL 32399-1650

Comment: No Comment

Response: Concur

- (3) Florida Coastal Management Program
3125 Conner Blvd., Room 320.05
Tallahassee, FL 32399-1650

Comment: Project is consistent with the Florida Coastal Management Program

Response: Concur

**Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000
September 29, 1999**

1. Comment: We agree that the adverse effects to Lake Okeechobee, remnant Everglades and estuarine systems have significant environmental and economic impacts that should not be deferred to the Restudy. Operational changes that can maximize benefits to the natural system with little impacts to others should be quickly implemented.

Response: Concur

2. Comment: It is clear that both Run WSE and Run 22 AZE are environmentally preferable to the current operational schedule, Run 25 or COE and HSM. However,...the first phase of the EAA storage component would not be complete until 2009.

Response: Concur

- 3a. Comment: To fully evaluate the potential impact of the proposed regulation schedule on STA $\frac{3}{4}$ and phosphorous loading into Everglades marshes, a two step evaluation should be undertaken:...the difference in phosphorous loading to the Everglades resulting from the immediate (no STA $\frac{3}{4}$) implementation of the proposed regulation schedule.

Response: Water quality modeling of the regulation schedules was conducted to evaluate the overall conditions in the estuaries and the Water Conservation Areas that would result from implementing the different schedules. These results are discussed in Section 5.3.1.4 on pages FEIS 66-68. The modeling conducted includes describing the "worse case scenario" because of time and budget constraints since it was not feasible to model a large number of scenarios to reach a decision on whether or not to implement a new regulation schedule for the Lake.

- 3b. Comment: The effect of increased phosphorous loading to STA $\frac{3}{4}$ in the interim period 2003-2009 should be evaluated to ensure that the performance of the STA is not compromised by the proposed regulation schedule. If adverse impacts are predicted to occur, the design and operation of STA $\frac{3}{4}$ may have to be modified.

Response: Water quality modeling to evaluate the effect of inflows into STA $\frac{3}{4}$ for the years 2003-2009 will be accomplished during subsequent studies(to this EIS) as part of the Comprehensive Study.

-
4. Comment: The report states that none of the operational schedules are expected to impact existing lake water quality. However, Run 22 AZE with its lower stage...reducing the impact of internal nutrient sediment recycling...and slow the spread of cattails through the littoral marsh.

Response: See response numbers 10, 12, and 13 from Dr. Alan Steinman's Comments from the South Florida Water Management District Letter dated Aug 31, 1999.

5. Comment: Estimated average annual economic effects of the alternatives show that Run 22 AZE...increased tourism, and improved real estate conditions.

Response: Concur

6. Comment: If adopted, one of the most important components of the WSE Schedule is the potential water management flexibility...it is recommended that a broad based interagency committee be created to include this Department and other agency staff...This interagency committee should be given the responsibility to review long range weather forecast information...and make lake water level management recommendations to the SFWMD Board of Governors.

Response: Agree

7. Comment: The average phosphorus concentration in discharges from the lake "at lower water levels" should be modeled. The SFWMD Lake Okeechobee Water Quality Model can be used for such a determination. Discharges from the lake at low water levels may be higher in phosphorus, resulting in an increased phosphorus loading downstream.

Response: Additional water quality modeling at different water levels will not be conducted prior to implementation of the WSE. Sufficient modeling was conducted to evaluate the different regulation schedules sufficiently enough to determine that unacceptable phosphorous levels will not result from implementing the WSE. Refer to page FEIS-53. Refer also to responses to SFWMD, Dr Alan Steinman's comment numbers 12 and 13.

8. Comment: We disagree with the statement that "an assumed 100 ppb inflow ... According to current water quality data (SFWMD, FDEP), this is an accurate description of the phosphorus concentration in lake discharges.

Response: See Pages 67-68 FEIS

9. Comment: We would like to see a summary of Dr. Walker's results ... This work is not posted at his Internet website.

Response: At the time of publication the data summary was not available.

Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600
August 5, 1999

1. Comment: Of the alternatives identified by the draft report, WSE appears to have the best potential to balance of often competing needs for water supply ... On the whole, it appears that WSE would result in slightly improved foraging conditions, relative to Run 25, for wading birds in the littoral zone, as well.

Response: Concur

2. We remain very concerned about the predicted impacts to water quality in WCA-2 and -3 and request clarification as to why less loading would occur in WCA-1. In addition ... we request the US EPA and FDEP examine the water-quality analysis very carefully to determine if the excess loading would violate water-quality standards.

Response: The hydraulics of the WCA(s) dictate the flows into each WCA. Also reference United States Environmental Protection Agency, Region 4, Comment letter dated September 29, 1999.

3. In order to provide further guidance as to the implementation of WSE, we recommend that the decision-making trees presented as Figures 6.1-2 and 6.1-3 be explicitly incorporated as a part of regulation schedule for WSE.

Response: Incorporated, see pages FEIS 79-81.

4. Comment: The FWC suggested that they participate in the WSE operational advisory group.

Response: The day-to-day operation of Lake Okeechobee and its environs, and the interpretation of the regulation schedule operational guidelines are the responsibility of the SFWMD and the Corps, and cannot be shared with or assumed by entities outside of these two agencies. However, when necessary, we will continue to coordinate with appropriate agencies as we have in the past. When emergency situations arose which could potentially affect communities or resources under other agencies' authority, the Corps and SFWMD called upon the expertise of those agencies to assist us with assessing the problem, formulating solutions and mitigating potential impacts. After implementation of the WSE schedule, the Corps and the SFWMD will coordinate to plan an annual public information meeting/workshop to keep the public and other agencies informed of operational decisions performed throughout the year. The Corps and SFWMD also welcome input at any time by interested agencies through informal channels. Additional meetings may be held to address special issues, such as El Nino. A SFWMD/Corps linked webpage is also being planned that will display updated Lake Okeechobee and related operations.

Southwest Florida Regional Planning Council
4980 Bayline Drive, North
Ft. Myers, FL 33917-3909
September 15, 1999

Comment: The Council reviewed the DEIS and found it to be "Regionally Significant and Consistent" with adopted goals, objectives, and policies of the strategic Regional Policy Plan.

Response: No response needed

**Florida Department of Agriculture & Consumer Services
The Capitol
Office of Agricultural Water Policy
Tallahassee, FL 32399
September 30, 1999**

Comment: The proposed WSE schedule is a significant departure from any previous methodology for managing Lake Okeechobee and we view its adoption as a positive step.

Response: Concur.

1. Comment: In addition to the flexibility within the WSE ... when is it likely that deviations will be made from the WSE guidelines.

Response: See FEIS page 77

2. Comment: DEIS-75, paragraph 1: It is not clear if the detailed operational decision tree ... We recommend that it is included, especially since the tree indicates where operational ... their respective schedules.

Response: See FEIS pages 79-81.

3. Comment: DEIS-64, paragraph 1: The level of uncertainty present in the Lake Okeechobee Water Quality Model is ... when total number of years is used in one description and relative percentage of years in the next.

Response: This has been simplified, See FEIS pages 65-67.

4. Comment: DEIS-77, Fig. 6.1-1: There seems to be an inconsistency with this figure and the decision tree... The decision tree incorporates the forecasting capability developed as part of the WSE schedule.

Response: Figure 6.1-1 has been modified see FEIS page 79.

5. Comment: DEIS-88, last paragraph: There is a discussion of the possibility from the WSE guidelines ... We would like to request that you include the Department of Agriculture and Consumer Services on your WSE Operational Team.

Response: The WSE team will be made of several Federal, State and other agencies that have an interest in Lake Okeechobee.

-
6. Comment: DEIS-92, second paragraph: The statement that the logic and reasoning behind crucial decisions 'should' be noted ... real time documentation of operational decisions under this proposed must be a mandatory component of implementing this schedule.

Response: Scientific research models were extensively used to determine the best schedule for the Lake Okeechobee Regulation Schedule Study.

7. General Comment: A single web page with all the information used to make Lake Okeechobee decisions should be set up by either the Corps or SFWMD. At this time the climate information is on one or more WMD web locations while the operational summary is on the Corps site.

Response: Noted, good suggestion.

8. Comment: DEIS-9, last paragraph: While we are glad to read about your recent guidance to "avoid duplicity", the correct term in this context is "duplication".

Response: This error has been corrected in the FEIS. See FEIS page 9, section 1.3.5.

9. Comment: DEIS-12, Table 2.2-1: Several of the numbers in this table appear to be in the wrong place.

Response: This has been corrected in the FEIS. See FEIS page 12 Table 2.2-1.

10. Comment: DEIS-36, paragraph 3: Where do the EAA canals enter Martin County or the St. Lucie River?

Response: The EAA canals do not enter Martin County or the St. Lucie River.

11. Comment: DEIS-53, paragraph 2: SFWMD has some information that indicates lake levels do have an impact on inlake water quality, at least in some zones of the lake. Also, the lake sediments are a source of phosphorus ("pollution").

Response: These issues are discussed in much detail in the FEIS page 53.

12. Comment: DEIS-71, paragraph 1, line 1: It is not clear what "further study" was conducted that resulted in the conclusion that WSE is better than HSN for water supply, or has the topic changed here?

Response: This has been explained more clearly in the FEIS page 73 paragraph 1.

**South Florida Regional Planning Council
3440 Hollywood Boulevard,
Suite 140
Hollywood, FL 33021
August 18, 1999**

Response: Letter States the proposed schedule is consistent with the goals and policies of the Strategic Regional Policy Plan for South Florida.

**Florida Fish and Wildlife Conservation Commission
Office of the Executive Director
620 South Meridian Street
Tallahassee, FL 32399-1600
August 31, 1999**

Response: This letter covered under the same cover letter dated August 5, 1999.
Please refer to page 14 for Comments and Responses.

**South Florida Water Management District
P.O. Box 24680
West Palm Beach, FL 33416-4680**

The SFWMD had the following comments:

Dr. Karl E. Havens' Comments

A. DEIS-5, Section 1.3.1: Delete the sentence, "Modified lake operations should increase the storage capacity of the lake, while reducing damaging environmental impacts."

Response: Agreed. Sentence deleted. See Page: FEIS-5

B. DEIS-5, Section 1.3.2: Delete statement about biodiversity and productivity and revise wording of the rest of the paragraph to define objectives more clearly.

Response: Agreed. Delete entire Section 1.3.2 and replace with: "The objective of this study is to develop and select a new regulation schedule that will optimize environmental benefits with little or no impact to the competing purposes of flood control, water supply, navigation, salinity control and recreational purposes." See Page: FEIS-5

C. If possible, perhaps the current vegetation map could be used. The map of Richardson has a high degree of error.

Response: Not sure to what the comment is referring. The map used to illustrate vegetation with Lake Okeechobee, presented in Appendix E, was in fact the most current vegetation map at that time, developed by the South Florida Water Management District and provided to the Corps for this study. See Page: FEIS-Appendix E

D. The report should indicate that many of the submerged plant beds along the western and northern lake shore have been eliminated, possibly by high lake stages, in the last FIVE years (not "a couple" as the Draft EIS indicated). The report should also include mention of the formation of an organic berm along the western lake shore.

Response: The time frame has been corrected in the Final EIS. The organic berm has also been mentioned as an element of the existing condition. See Page: FEIS-14

E. DEIS-15: The statement that "torpedograss outcompetes other species at most water levels" is not supported by scientific data and is contrary to recent scientific work which indicates that torpedograss is stressed at high water levels relative to certain native species (e.g. Eleocharis).

Response: Concur. The statement has been omitted from the Final EIS. See Page: FEIS-15

F. DEIS-15: Hydrilla does provide good fish habitat for fish foraging. The text of the Draft EIS should state this emphatically and not refer to the issue being “hotly debated”.

Response: This was a reference from a personal communication, although not cited. We agree, however, that hydrilla does probably provide good fish foraging habitat and the text has been edited accordingly. See Page: FEIS-15

G. DEIS-21: Sentence alluding to Wayne Nelson as a fishing guide needs to be reworded.

Response: Agreed. Fishing guides has been changed to read “Fishermen”. See Page: FEIS-21

H. Nearly all of the citations in the Draft EIS are “personal communications”, many from non-scientists. This weakens the document.

Response: There are over 70 cited scientific publications that were referenced in preparing this document. Several personal communications were cited as they reflect the first hand investigation that the authors of the Draft EIS performed in order to gather relevant information from individuals with extensive and in-depth experience on the lake, as resource users, to bolster the scientific evidence. Also, the DEP 305 B report is considered to be a fairly authoritative compilation of water quality information and is considered to be an appropriate reference.

I. The lake is not “tending to become hypereutrophic”. By most classification schemes, it reached that state in the early 1980’s.

Response: Noted No response necessary.

J. Please clarify the extent of a “continuous algal bloom”, it likely was not continuous across the entire lake.

Response: The text was clarified in the Final EIS to “a large algal bloom”, as it was a significant bloom of undetermined size.

K. The concept of flooding the littoral zone resulting in increased phosphorus concentrations in the water was shown to be nonsensical when critically evaluated (Havens 1997, water levels and total P in Lake Okeechobee).

Response: Noted No response necessary.

L. DEIS-34, last paragraph: The southwest region of the lake has very poor water quality.

Response: Concur. See Page: FEIS-35. Delete the last sentence and replace with: “According to a generalized assessment, the lake has fair water quality conditions, except for Myrtle Slough and the southwest region of the lake in the near shore area which were

shown to have poor water quality (Havens and James, 1999, Decreased transparency due to mud sediment resuspension in the near-shore region of Lake Okeechobee, Lake and Reservoir Management). The extreme south-southwest section of the lake has good water quality conditions which are described by the 305(b) report (FDEP, 1996).”

M. DEIS-51, Section 4.1: Rewrite sentence to be more objective.

Response: Agreed. Section 4.1 has been rewritten as follows: See Page: FEIS-51

“Public sentiment surrounding Lake Okeechobee and the issues involved in this study have been controversial and are not far removed from the conflict between encroaching human development and the natural environment. The lake plays a very important role as a primary source of water supply for nearby urban areas, the Lake Okeechobee Service Areas and the productive Everglades Agricultural Area that lies to the immediate south of the lake. The lake also continues to grow in importance as a backup water supply source for the already heavily populated, and continually growing, urbanized areas of the Lower East Coast of Florida. Increased heavy rainfall over the past several years has contributed to higher lake stages, resulting in impacts to the lake littoral zone. This has also resulted in more frequent freshwater discharges to the Caloosahatchee River and St. Lucie estuaries, which can impact their ecosystems. Public concern over these environmental impacts is increasing as these important diverse and productive ecosystems continue to decline. Some environmentalists and scientists advocate lower lake stages to protect the lake littoral zone, an important habitat for fish and wildlife. This study will attempt to address all of these concerns.”

N. DEIS-51: Explaining the relationship between submerged aquatic vegetation and water quality will bolster this section on Ecological Problems and Opportunities.

Response: The suggested text has been added to the Final EIS. See Page: FEIS-51/52

O. DEIS-53, paragraph 2: The statement that the “lake itself is not a source of pollution” is incorrect.

Response: Concur. See Page: FEIS-53. The second sentence has been deleted and replaced with: “The lake has very large deposits of sediments that have accumulated from the various pollution sources over the years. These nutrient deposits are so substantial that they are a significant cause of turbidity. Based on current modeling, even if all existing external loads were discontinued immediately, a significant time period (at least 20-25 years) would pass before the nutrient concentration outflows from the lake would start to show a response (concentration levels falling). This is due to the buffering effect of these large sediment deposits of nutrients.”

P. DEIS-64, paragraph 1: Double check conclusions shown by the WASP model.

Response: Concur. See Page: FEIS-65. Last sentence in paragraph 1 deleted and replaced with: “The limited modeling available over the period being simulated (31

years) illustrates that there is a slight advantage to Run 22AZE over Run 25 and WSE. However, given the uncertainty/accuracy of the available modeling, there appears to be no significant differences for overall water quality in the lake between the different schedules. Yet, it should be noted that lower lake stages are desirable for the health of the lake in the littoral zones. The WSE schedule is anticipated to best achieve this effect (lower lake stages) because it uses climatological forecasting.”

Q. DEIS-63: The summation of “undesirable events” is problematic because it gives equal weight to highs and lows.

Response: In paragraph 5.3.1, delete the entire second sentence. Replace with “HSM produced several more extreme high lake stages than the existing Run 25 using the 2010 base (Appendix A).” Also, in the eighth line, after the word “alternatives” add the following: “Under the WSE schedule, there is a small (about 5%) reduction in the frequency of high lake stage events (>15 feet), but no significant increase in lows (>12 feet), as compared to Run 25. In other words, the WSE schedule takes a small step towards fixing the problem with high lake stages, without doing it at the expense of creating more lows. Furthermore, WSE should actually perform better as climate forecasting abilities evolve.” See Page: FEIS-64

R. DEIS-99: The performance measures listed are not “generally accepted by lake researchers.”

Response: Sentence will be clarified. Replace the words, “It is generally accepted by...” with “Over the course of several performance measure workshops and study team meetings, it was generally accepted by the attending ...”. See Page: FEIS-101

S. DEIS-100: There is no scientific evidence that supports the statement that high lake stages “furthered the spread of exotics”.

Response: Agree. The statement has been edited out of the Final EIS. See Page: FEIS-100

T. DEIS-100: The SFWMD has conducted two quarterly surveys of submerged aquatic vegetation, at 42 sampling locations. They have found that along the western and northern shore, where SAV was entirely eliminated in recent years, no SAV has returned. Recommend the EIS be revised on page 100 where empirical data suggested otherwise.

Response: Noted. Will review data again.

Mr. Tommy Strowd's Comments

1. Figure 6.1-1, following DEIS-76: Recommend that the Decision Tree be incorporated as part of the new schedule.

Response: Concur. A note has been added to Note (2) of the WSE regulation schedule referencing the Decision Tree, and a note has been added to the Decision Tree, Parts 1 and 2, that references the WSE regulation schedule. Figure(s) 6.1-1, 6.1-2, and 6.1-3 should replace the current figures on pages: FEIS 79, 80, & 81.

2. Figure 6.1-1, following DEIS-76: The regulation schedule table makes no reference to long-term forecasts.

Response: A note has been added to the schedule.

Mr. Peter Doering's Comments

Specific Comments

2.5.2 Estuarine Vegetation

1. DEIS-16 : The scientific name of manatee grass is *Syringodium filiforme*.

Response: So noted and edited in the Final EIS. See Page: FEIS-16

2. DEIS-16: *Vallisneria* is misspelled.

Response: So noted and edited in the Final EIS. See Page: FEIS-16

3. DEIS-16: *Thalassia* also occurs in Charlotte Harbor.

Response: So noted and edited in the Final EIS. See Page: FEIS-16

4. DEIS-17: Haddad and Sargent, 1994 reference was not in the literature cited section.

Response: So noted and edited for the Final EIS. See Page: FEIS-17

2.6.2 Estuarine Fish and Wildlife

5. DEIS-22, Section 2.6.2 Estuarine Fish and Wildlife: This section needs more information on the St. Lucie Canal and the Caloosahatchee River.

Response: Disagree, no additional information added. See Page: FEIS-22

2.7 Threatened and Endangered Species

2.7.1.4 Bald Eagle

6. DEIS-28: Third sentence is not complete.

Response: The sentence has been revised to read: "Eagle numbers have responded positively to the banning of DDT and other organochlorines, and bald eagles have now been reclassified from an endangered to a threatened species." See Pages: FEIS-27 & 28

2.10 Socio-Economics

7. DEIS-36, Section 2.10: Include some socio-economics about the estuaries.

Response: The estuaries are important, and there is discussion concerning the St. Lucie and Caloosahatchee Basins in Appendix D, "Socio-Economics Final Report" (Appendix D: Section 2.1.1, Agriculture in the Caloosahatchee and St. Lucie Basins and the North Shore, Lake Okeechobee Service Area; Section 2.7.2, Agricultural Water Supply Evaluation of Alternative Regulation Schedules, St. Lucie and Caloosahatchee Basins; and especially Section 7, Commercial and Recreational Fishing in the Caloosahatchee and St. Lucie Estuaries). See Page: FEIS-Appendix D

8. DEIS-52, paragraph 2, sixth sentence: Change this sentence to read: "At flows from the lake exceeding 1,500 cfs, the estuary becomes increasingly fresher until the whole system is freshwater at flows near 3,500 cfs."

Response: Sentence revised. See Page: FEIS-52

General Comments:

Sections: 5.3.1.1 Lake Okeechobee, 5.3.1.2 St. Lucie: Estuary, 5.3.1.3 Caloosahatchee, 5.3.1.4, & 5.3.1.5

9. Evaluate the effects of the different alternatives on Lake Okeechobee, the estuaries, the WCA(s) and Everglades National Park.

Response: WSE appears to perform better for some areas (most notably in the lake) over the other alternatives, with no adverse impact to existing project purposes, including water supply. However, it is not without some minor adverse impacts and other alternatives demonstrated positive attributes as well.

10. DEIS-69, Section 5.3.3: "Certainly for the Caloosahatchee, 22AZE was much better than Run 25 or WSE."

Response: The modeling did indicate that the Caloosahatchee had a better outcome for Run 22AZE under some conditions, but the subject statement, i.e., "WSE does not seem to have a significant difference relative to the other alternatives..." was addressing the overall analysis of both estuaries. Please see Appendix A of the EIS, Table 4, page 19, Section 6 "Trade-Off Analysis" for clarification. WSE is not the solution to all problems, but appears to benefit the lake without worsening the estuaries' situation relative to the other modeling runs. Correcting the estuaries' problems of hyper and hypo salinity can only be addressed with greater storage in the system. This component is being addressed in the Restudy.

11. DEIS-69, last paragraph: Comment concerning the differences between WSE and Run 25 in regard to Vallisneria beds. Also, doesn't Run 22AZE subject the estuaries to fewer high discharge events in the wet season?

Response: Reply to the comment that addresses the lack of freshwater problems with Vallisneria beds during the dry season, etc.: Agree that when looking at individual estuaries under certain conditions, the Run 25 and Run 22AZE have some benefits to the estuaries relative to WSE. However, without trying to value one estuary over another, based on the limited modeling, it appears that WSE improves the lake's health without sacrificing the estuaries (looking at both estuaries) relative to the other schedules. Once again, without more storage in the system there is a limit to what can be done to address these problems. It comes down to a series of tradeoffs. The Restudy will address this problem and provide better options in the future.

12. DEIS-70, Section 5.3.4: The sentence that begins, "Because of the small differences in performance..." doesn't make the argument that WSE was the best schedule very persuasively.

Response: Agree

13. The report fails to convey an understanding of estuarine problems associated with water quantity (recommended text is offered to include with Final EIS).

Response: The proffered text has been integrated into the Final EIS to strengthen this point.

14. Given the conclusions about the three alternatives (WSE, Run 25 and 22 AZE), the justification of WSE, especially for the estuaries, is weak.

Response: As the comment points out, in actuality there does not exist a strong rationale to implement WSE for the benefit of the estuaries. The principal benefit of WSE, as explained in the Draft and Final EIS, is within the lake.

Mr. Robert Chamberlain's Comments

1. DEIS-ii: High lake stages do not make large regulatory releases more frequently than the proposed lower schedules, which makes the sentence a little misleading.

Response: Concur. Delete the first sentence of the third paragraph. See Page: FEIS-ii

2. DEIS-1: The statement in the Draft EIS "discharges control the ecology of the SLE and CE" is too strong.

Response: Concur. This has been edited as suggested in the Final EIS. See Page: FEIS-1

3. DEIS-5, Section 1.3.2: Restate the study goals.

Response: Concur. This paragraph has been rewritten. See Page: FEIS-5

4. DEIS-8, paragraph 3: Caloosahatchee River does not extend into Collier and Charlotte Counties.

Response: Concur. See Page: FEIS-8. The sentence now reads: "The Caloosahatchee River passes through parts of Glades, Hendry, and Lee Counties."

5. DEIS-16: Correct the species name of manatee grass. *Vallisneria* is upstream in the CE (Caloosahatchee Estuary) and is not a seagrass. Shoal grass is downstream in the estuary and extends beyond Shell Point. Shoal grass and turtle grass are in San Carlos Bay and lower Charlotte Harbor.

Response: These changes have been made in the Final EIS. See Page: FEIS-16.

6. DEIS-22: There is no discussion of fishery issues in the existing conditions for the Caloosahatchee River.

Response: Concur. This section has been enhanced to include a discussion of fishery issues. See Page: FEIS-22

7. Provide a more in-depth discussion of pulse releases.

Response: Concur. Revisions and additions were made in two areas of the EIS, as follows:

On page DEIS-31, the last paragraph: Replace the last three sentences with "In Zone D, discharges to the St. Lucie and Caloosahatchee Basins are made in a "pulse" fashion, which attempts to simulate a natural rainstorm event within the basins. The series of three pulse discharge levels was developed to control rising lake stages by starting off slow, meaning with the lowest rate of discharge required. If the lower rate of pulse did not

bring the lake down to the desired level, then the subsequent releases would be at the next higher release rate. Each pulse takes 10 days to complete. This method was designed to allow estuarine biota to tolerate changes in salinity and to allow the discharges to remain within the natural range of freshwater flow to the estuary.” See Page: FEIS-31

On page DEIS-83, the following paragraph and table have been added after the last paragraph in Section 6.1.7:

“Three levels of 10-day pulses are defined for the St. Lucie and Caloosahatchee estuaries under the WSE Operational Guidelines. These pulse release hydrographs are listed in Table 6.1.7-1. The level of pulse release selected at a particular juncture of the operational decision tree will depend on a number of factors including, but not limited to: (a) the ecological status of the lake’s littoral zone; (b) the ecological status of the downstream estuaries; (c) the current tributary hydrologic conditions; (d) the seasonal and multi-seasonal climate based hydrologic outlooks; and (e) water levels in the WCAs. The benefits of pulse releases can be best realized if desired lake water level targets are identified for future months and hydrologic position analysis is applied for determining the likelihood of being within a particular range of these target levels. Recognizing climate shifts and associated hydrologic events is a crucial part of position analysis. The level of pulse should be selected to best follow the future targets while not taking unnecessary risk towards meeting any of the major objectives for managing the lake water levels. In general, pulse releases should not exceed Level 3 when pulse releases are called for in the operational decision tree. See Page: FEIS-86

Table 6.1.7-1
Pulse Release Hydrographs for Three Levels of Pulse (units = cfs/day)

Day	St. Lucie Estuary			Caloosahatchee Estuary		
	I	II	III	I	II	III
1	1,200	1,500	1,800	1,000	1,500	2,000
2	1,600	2,000	2,400	2,800	4,200	5,500
3	1,400	1,800	2,100	3,300	5,000	6,500
4	1,000	1,200	1,500	2,400	3,800	5,000
5	700	900	1,000	2,000	3,000	4,000
6	600	700	900	1,500	2,200	3,000
7	400	500	600	1,200	1,500	2,000
8	400	500	600	800	800	1,000
9	0	400	400	500	500	500
10	0	0	400	500	500	500

Page: FEIS-86

8. DEIS-32: Add estuaries as a water user.

Response: Concur. Added to end of second paragraph: "The Caloosahatchee River is also considered a water user. During the dry months of April and May, the Caloosahatchee River flow may drop to near zero. When this happens, navigation lockages can allow a salt water wedge to move upstream. A short term high rate of discharge from Lake Okeechobee is then made to protect the potable water intakes for Ft. Myers and Lee County upstream of S-79. Short term high rates of discharge from Lake Okeechobee to the Caloosahatchee River are also required to break up severe algae blooms that develop during the dry months from December to April when the flow diminishes."

See Page: FEIS-32

9. DEIS-34 and DEIS-36: Lacks discussion of water quality in estuaries and preferred discharge ranges.

Response: Water quality is addressed in terms of nutrients, D.O., etc.

10. DEIS-36 and DEIS-38: Lacks discussion of Socio-Economic impacts to estuaries.

Response: This is correct. The discussion in Section 2.10 is not about impacts. It is about "socio-economic existing conditions." The potential for impact to the estuaries is discussed in Appendix D, particularly in Section 7. All of the alternative regulation schedules considered would result for the most part in either a slight improvement or no change, based on simulated hydrologic performance regarding salinity criteria, the primary focus for the hydrology-ecology-economy linkage in this evaluation. All of the alternative schedules fall far short of meeting target salinity envelope criteria.

11. DEIS-49: How was "only slight negative impact to estuaries" (from increased nutrient diversion) determined?

Response: The existing large nutrient load to the estuaries will continue regardless of the schedule used. The amount of nutrients that would be routed to the estuaries in the "without project" condition would be slightly higher than that under the WSE schedule. This minor amount of additional nutrients is considered to be undesirable in a system that is already stressed, but relative to the overall load it is minor in impact because it is so small relative to the current loading.

12. DEIS-51: Are estuarine scientists among those advocating for a lower lake schedule?

Response: Concur. Changed to scientists. See Page: FEIS-51

13. DEIS-52: The minimum inflow requirements in the CE is 300 cfs, not 500 cfs as stated on page 52 of the Draft EIS.

Response: Concur. This has been corrected and the section revised to include additional references as suggested. See Page: FEIS-52

14. DEIS-55: Revise sentence about "non-harmful" discharges. Also, where is Figure 2.8-1?

Response: Concur. On page DEIS-55, Section 5.2.1, the third sentence has been replaced with: "When the stage is rising in Zone D, pulse releases, described in the following paragraph, are made to the estuaries. These multi-level releases are the least harmful method for releasing lake water to the estuaries when trying to avoid larger required discharges." See Page: FEIS-56

Also, the last sentence in the second paragraph of that section has been revised to read: "See Figure 2.8-1 on page DEIS-32." See Page: FEIS-32

15. DEIS-65, paragraph 1: Pulse releases up to 3000 cfs are not necessarily environmentally friendly.

Response: Probably not the best choice of words. See Page: FEIS-66

16. DEIS-70: The most appealing aspect of WSE regarding the estuaries is that an estuarine biologist will be consulted and weather forecasting is included.

Response: WSE also shifts more water towards the WCAs away from the estuarine systems. See Page: FEIS-71

17. DEIS-103: High discharges are not an adverse concern for Vallisneria since it is a freshwater plant. However, it is important to the seagrass species located further downstream.

Response: Agree. See Page: FEIS-103

18. DEIS-106: Past high discharges are suspected to cause fish kills and lesions. No references to CE fish, etc.

Response: Agree. See Page: FEIS-108

19. DEIS-109: No reference to CE water quality.

Response: Water quality is addressed in terms of nutrients, D.O., etc.

Dr. Alan D. Steinman's Comments

Specific Comments:

Section 2.5

1. DEIS-12, Table 2.2-1: Offset the Moore Haven and Clewiston columns in two of the rows.

Response: Concur. See Page: FEIS-12

2. DEIS-14, paragraph 3: Include Chara in the list of species.

Response: Concur. See Page: FEIS-14

3. DEIS-14, paragraph 4: Scirpus should not be identified as a "floating" plant.

Response: Agree. This has been corrected in the Final EIS to indicate Scirpus as an emergent plant species. See Page: FEIS-14

Section 2.6

4. DEIS-20, paragraph 3: The five threatened and endangered species should be identified in Section 2.61.

Response: Agree. The five listed species have been identified in the Final EIS.
See Page: FEIS-20

5. DEIS-21, paragraph 3: While changes have occurred on the lake, it is probably not appropriate to include the value judgement precursor "unfortunate".

Response: Agree. The word "Unfortunately" has been dropped from the beginning of the first sentence. See Page: FEIS-21

6. DEIS-21, paragraph 5, line 6: "Tricolor heron" as described in the draft EIS should be "tricolored" heron.

Response: Concur. See Page: FEIS-21

Section 2.9

7. DEIS-34, paragraph 2: Consider listing sludge and waste disposal and stormwater runoff as other problem sources.

Response: Agree. Insert sentences prior to last sentence in this paragraph: "A potentially very significant source of phosphorus loading to the lake is from atmospheric deposition. It could be on the order of 70 tons/year. Atmospheric loading is very difficult to quantify and efforts are underway to improve our understanding of this significant source of nutrient loading. Other potential problem sources that currently lack sufficient data to properly judge their impacts are sludge/waste disposal and stormwater runoff." See Page: FEIS-34.

Section 3

8. Should some data be included in the document that references actual output from the "without project" condition?

Response: No, this data was not included to reference actual output from the modeling results of the "without project" condition.

Section 4

9. DEIS-51, paragraph 4, line 4: "Sub-aquatic" is used inappropriately.

Response: The term has been edited to read "aquatic vegetation". See Page: FEIS-51

10. DEIS-53, paragraph 2: Disagree with the statement that operational changes to the regulation schedule will not impact one way or another the existing water quality of the lake.

Response: Agree that this needs to be clarified. Remove and replace the 4th sentence in paragraph 2 with the following. "During the period of time before the downstream STA is on line (approximately four years), the different regulation schedules are not anticipated to have significant differences in phosphorus outflows from the lake under similar volumetric outflows from the lake. However, the schedules that tend to keep the lake stages lower will reduce nutrients being transported from the center of the lake (with the existing phosphorus-rich mud sediments) to the lower nutrient near shore areas. This will provide a clear and demonstrable benefit to the lake littoral zones by keeping water transparency higher and total phosphorus lower in these areas than would occur with higher lake stages. The WSE schedule showed the most benefit in achieving this effect because it takes into account the climatological forecasting." See Page: FEIS-53

Section 5

11. DEIS-56, paragraph 5: Suggested that the NGVD be deleted from this paragraph.

Response: Agreed. NGVD has been deleted from this paragraph. See Page: FEIS-57

12. DEIS-64, paragraph 1: The differences in water quality among the runs is trivial compared to the uncertainty in the model. No scientific basis in claiming one alternative should be favored over another.

Response: Agree. Revised to read as follows: Change last sentence to read: "The limited modeling available over the period being simulated (31 years) shows that there is a slight advantage to Run 22AZE over Run 25 and WSE. However, given the uncertainty/accuracy of the available modeling, there appears to be no significant differences for overall water quality in the lake between the different schedules. Yet, it should be noted that lower lake stages are desirable for the health of the lake in the littoral zones. The WSE schedule is anticipated to best achieve this effect (lower lake stages) because it uses climatological forecasting." See Page: FEIS-65

13. DEIS-69, paragraph 4: Amend Sections 4 and 5 to reflect the opinion stated in Comment 22.

Response: Concur. Add words similar to the comment response addressed in #22: Replace the third sentence in the third paragraph of Section 5.3.3 with "During the period of time before the downstream STA is on line (approximately four years), the alternative regulation schedules are not anticipated to have significant differences in phosphorus outflows from the lake under similar volumetric outflows from the lake. However, the schedules that tend to keep the lake levels lower will reduce nutrients being transported from the center of the lake (with the existing phosphorus-rich mud sediments) to the lower nutrient concentration near shore areas. This will provide a clear and demonstrable benefit to the lake littoral zones by keeping water transparency higher and total phosphorus lower in these lower nutrient areas than would occur with higher stages. The WSE schedule is anticipated to best achieve this effect (lower lake stages) because it uses climatological forecasting." See Pages: FEIS-70 and 71

Also, amend the last sentence in the third paragraph of Section 5.3.3 to read as follows: "The major differences in the alternative schedules' downstream effects are in the timing and direction of the discharge flows." See Page: FEIS-71

14. DEIS-71, paragraph 1, line 1: This sentence should be clarified.

Response: Revise the first sentence as follows: "Following the initial comparison of the first four schedules, the SFWMD developed the WSE schedule to combine the most desirable features of those four schedules to better achieve a desired balance among the competing objectives for managing the lake. Since HSM produced a greater number of undesirable high lake stage events and provided no improvement for the lake ecosystem, it was dropped out of the final comparisons. In addition, the Corps 2010 schedule lacked

a zone low enough to benefit the littoral zone. For these reasons, comparisons were performed again between the remaining three alternatives: WSE, Run 22AZE and Run 25." See Page: FEIS-73

Section 6

15. DEIS-81, paragraph 3, line 4: Clarify how this table tells the reader that lake level can be successfully regulated by releases southward or to tide.

Response: The opening sentences have been revised to read: "Table 6.1.5-1 summarizes the percentage of time that historical rainfall and S-65E flow indicated that tributary hydrologic conditions were classified within various hydrologic regimes depicted in Table 6.1.4-1. Also listed in 6.1.5-1 are the net rainfall, S-65E flow, and the total net inflow that includes the effect of net rainfall on the lake. During periods that normal hydrologic conditions exist in the tributary basin, the lake water levels can most often be successfully regulated by low impact pulse releases to tidewater. This relationship is established by comparing the average net Lake Okeechobee inflow under normal conditions in Table 6.1.5-1 to the sum of the mean Level 2 pulse releases through the St. Lucie and Caloosahatchee estuaries to tidewater. The sum of the mean pulse releases through the St. Lucie and Caloosahatchee outlets is equal to 3,200 cfs/day, which approximately equals the average net inflow when the tributary conditions are in the normal range. During these normal to dry tributary conditions, the majority of the lake inflow would be required for water supply and natural ecosystem enhancement. For wet to very wet conditions..."(continue with existing text from this point on). See Page: FEIS-83

16. DEIS-91, paragraph 2: Although estuaries are impacted by freshwater at certain times, they can also be impacted by hypersalinity, and at those times, they would benefit from freshwater releases.

Response: This sentence was added to end of paragraph 6.3.5 Estuary: "Estuaries can also be impacted by hypersalinity. From an environmental standpoint, during these times the estuaries would benefit from freshwater releases to attain the preferred salinity envelope." See Page: FEIS-93

Section 7

17. DEIS-93: Would the movement of sediment be a consideration especially given high discharge events to the St. Lucie canal and Caloosahatchee River?

Response: The potential for erosion and movement of soils into canals and transport downstream is addressed in paragraph 5, page 93. Under each of the alternative regulation schedules there would still exist periodic high volume discharges from the lake causing bank erosion, surface soil erosion from precipitation, and transport of sediment downstream. See Page: FEIS-93

18. DEIS-99, paragraph 5, line 11: "Phosphorus laden waters" should read "phosphorus laden sediment".

Response: Concur. See Page: FEIS-101.

19. DEIS-100, paragraph 1: Including a reference to Steinman et al. (1997) which shows that high lake stage is negatively correlated with Chara abundance, and shows mechanistically that light limitation is the causative agent, strengthens the case as presented in page 100, para 1.

Response: Concur. See Page: FEIS-102.

20. DEIS-102, paragraph 2: This section should be devoted toward the vegetation responses, not a reiteration of alternative results.

Response: Concur

21. DEIS-105, paragraph 1: What is the significance of improved light regimes for invertebrates?

Response: Many invertebrate species are phototropic, which means they respond positively to light. Moreover, increased light penetration is positively correlated to benthic vegetation and algae production, which provides food and cover for invertebrates. See Page: FEIS-107

22. DEIS-105, paragraph 3: It is not clear which stage hydrographs were being used to determine the impact on lake stage. Hydrographs based on periods from 1926-1945, 1946-1964 and 1990-1996 do show lower lake stages with WSE relative to base, in general. The lower stages are most discernible for simulations run during high water years.

Response: The above subject hydrographs were made available to the Corps only after release of the draft EIS. We have since reviewed these data and forwarded them to the U.S. Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission. Both agencies have included an analysis of these results, which the Corps agrees show more favorable lake stages during high water years for WSE, in their respective Fish and Wildlife Coordination Act Reports (included in the Final EIS as an Annex). See Page: FEIS-Annex A

23. DEIS-105, paragraph 4: Refer to the Chamberlain et al. White paper above for salinity envelopes for key fish and wildlife species.

Response: Concur. See Page: FEIS-107

24. DEIS-109, paragraph 3: There are likely to be water quality impacts in Lake Okeechobee as a function of lower lake stages.

Response: Concur. This paragraph has been amended as shown below to address the positive effect of lower lake stages that reduce nutrient transport from the center of the lake to the littoral zones. See Page: FEIS-111

Amend the last two sentences in paragraph 3 to read: "There is no measurable impact to Lake Okeechobee outflow nutrient concentrations from any of the schedules being considered. This is due to the limitations of regulation schedule adjustments and the coarseness of the modeling tool. Reference Appendix B for more detailed results. However, the schedules that tend to keep the lake stages lower will reduce nutrients being transported from the center of the lake (with the existing phosphorus-rich mud sediments) to the lower nutrient concentration near shore areas. This will provide a clear and demonstrable benefit to the lake littoral zones by keeping water transparency higher and total phosphorus lower in these lower nutrient concentration areas than would occur with higher stages." See Page: FEIS-111

Mr. Paul Trimble's Comments:

1. Abstract, line 13: Change "meteorological forecasting" to "climatological outlooks and meteorological forecasts".

Response: Concur. See Page: FEIS Abstract

2. DEIS-1: Change "576,000 acres" to "476,000 acres" and "720 square miles" to "730 square miles" for consistency.

Response: Concur. See Page: FEIS-1

3. DEIS-4, first 7 lines: Indicate when the 16.4 ft. flat schedule was in effect. Also, the 15.5 – 17.5 ft. schedule probably went into effect in 1979, not 1959.

Response: Do not concur. See Page: FEIS-4

4. DEIS-11, Climate Section: Replace "winter months" with "The months of November through April". Also, replace "summer months" with "May through October".

Response: Concur. See Page: FEIS-11

5. DEIS-12, Table 2.2.2: Shift Columns for Clewiston and Moore Haven. Climate variables for these two cities are transposed.

Response: Concur. See Page: FEIS-12

6. DEIS-30, last paragraph: Replace, "The schedule maintains a low lake stage to provide both storage capacity and flood protection for the surrounding areas during the wet season. During the winter, lake levels may be increased to store water for the upcoming dry season." With: "The schedule lowers the lake stage prior to the wet season to provide both storage capacity and flood protection for the surrounding areas during the wet season. After the peak of the hurricane season and prior to the beginning of the dry season, lake levels are allowed to increase to store water for the upcoming dry season."

Response: Concur. See Page: FEIS-30

7. Section 2.8.1, DEIS-31, last paragraph: The second sentence should be revised to read: "This schedule reduced the frequency and distribution of regulatory discharges to the St. Lucie and Caloosahatchee estuaries to lessen the undesirable impacts to the natural ecosystems within these estuaries. This was accomplished without significantly impacting existing flood control, water supply and environmental benefits provided by the previous (15.5 – 17.5 feet) schedule approved in 1978."

Response: Concur. See Page: FEIS-31

8. DEIS-33, paragraph 2: Replace “periods” with “season”.

Response: Do not concur. See Page: FEIS-33

9. DEIS-55 and 56, Section 5.2.1: Revise “Even though these pulse releases are low in volume compared to other flood control releases, they may cause problems in the estuaries if used too frequently.” for consistency. See Page: FEIS-56

Response: Concur. Section 5.2.2, See Page: FEIS-57: “In Zone D, pulse release discharges may be made to the estuaries for extended periods of time when the stage is rising to lessen undesirable impacts of large volumes of fresh water.”

10. DEIS-56, Section 5.2.2: Revise the first sentence.

Response: Concur. Revise the first sentence as follows: “The schedule was designed to discharge water from the lake during the dry season to lower lake levels for the perceived benefit of enhancing the littoral zone of the lake.” Section 5.2.2, See Page: FEIS-57

11. DEIS-57, paragraph 5, 2nd sentence, and p. 87, paragraph 2, 3rd sentence, beginning, “The Lake Okeechobee inflow forecast...”: Revise this sentence to read: “The National Climate Prediction Center official climate and ENSO outlooks are applied to estimate expected inflow to the lake.”

Response: Concur. Revise both sentences. Section 5.2.5, See Page: FEIS-58 and Section 6.2, See Page: FEIS-90, respectively

12. The WSE schedule should refer to the Decision Tree as a recognized part of the schedule.

Response: Concur. See Pages: FEIS-79, 80 and 81, Figures 6.1-1, 6.1-2 and 6.1-3.

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September 29, 1999

General Comment

1. The Seminole Tribe of Florida does not object to the adoption of the preferred alternative where implementation of the WSE Schedule will provide positive benefits to the littoral zone of Lake Okeechobee and will benefit the Everglades hydrology.

Response: Noted No response needed.

Specific Comment

2. The Seminole Tribe of Florida states concerns whether the South Florida Water Management District (SFWMD) obligations to the Tribe under the Agreement Between the South Florida Water Management District and the Water Supply Plan for the Brighton Reservation Implementing Section VI.B. of the Water Rights Compact and Subparagraph 3.3.3.2.A.3 of the Criteria manual dated November 30, 1992 (Agreement) have been accounted for in the WSE Regulation Schedule.

Response: The Agreement is a legal binding document between the SFWMD and the Seminole Tribe and if violated can be held accountable in court.

3. The Seminole Tribe of Florida would like to know what steps the ACOE and SFWMD to ensure these obligations are met if the preferred alternative (WSE) regulation is adopted.

Response: The Agreement assures the Brighton Reservation with water supply in drought and water shortage events occurring in Lake Okeechobee and Lake Istokpoga.

4. The Seminole Tribe of Florida is concerned that the Economic Impact Evaluation ... To assist the ACOE in developing this information, the Tribe is attaching a copy of the Water Need Analysis for the Brighton Reservation at Tab 2.

Response: Noted, The information provided will be used to develop this information.

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Miami, FL 33156
September 22, 1999

1. Comment: WSE Regulation Schedule will violate the Miccosukee Water Quality Standards

Response: No factual basis has been submitted to support the allegation that water quality standards are being violated.

2. Comment: WSE Regulation Schedule will violate the federal Settlement Agreement and Consent Decree

Response: The Consent Decree requires reductions in phosphorous loads discharged from the Everglades Agricultural Area according to a schedule; however, the negligible additional phosphorous loads likely to result from the implementation of the WSE regulation schedule is within the range of acceptable loads under the Consent Decree. This is explained in more detail in the FEIS pages 125-126, and the commenters have referred to that.

3. Comment: WSE Regulation Schedule will violate the 404 Dredge and Fill Permit for the Everglades Construction Project.

Response: The commenters do not explain how WSE would violate permit term. In any case, the Department of the Army Permit for the Everglades Construction Project references and incorporates provisions of the Consent Decree but does not create additional or more restrictive requirements with regard to phosphorous load reductions. WSE regulation schedule would not violate the Consent Decree and would not violate any permit terms.

4. The United States Environmental Protection Agency has determined that the discharge contemplated by the WSE Regulation Schedule will forever damage the receiving waterbody. The Water Conservation Areas are Class III waters

Response: The United States Environmental Protection Agency, Region 4, Comment Letter dated September 29, 1999 does not reach this conclusion about the WSE.

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5. It is the understanding of the Tribe that with some minor operational adjustments the WSE Regulation Schedule could be implemented in such a way that there would be no additional phosphorous diverted into WCA 3A. This understanding is base on presentations by SFWMD technical personnel. However, this EIS clearly contemplates additional pollution of Tribal lands. As currently written, the Lake Okeechobee Regulation Schedule DEIS, unfortunately, shifts pollution from one area to another,...The Tribe will not allow its lands to be further degraded.

Response: The commenters do not explain what changes to the schedule would result in no additional phosphorous loads. The Corps has evaluated a full range of alternatives and their effects.

**United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
September 22, 1999**

Comment: Information in DEIS demonstrates that the WSE alternative may have a marginally beneficial effect in terms of timing and delivery of the freshwater flow to the St. Lucie Estuary. This improved flow represents a marginal improvement for the ecology of the St. Lucie Estuary. National Marine Fisheries Service (NMFS) concurs with Corps conclusion that this project is not likely to affect species protected by the Endangered Species Act under NMFS purview.

Response: Noted. No response needed.

**United States Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, GA 30303-8960
September 29, 1999**

1. Comment: Experience suggests that this change in the regulation schedule will provide multiple environmental benefits to the lake's ecology. Although no quantification has been done of specific water quality benefits which will result from changing the present regulation schedule, a number of parameters should be positively affected.

Response: Concur

2. Comment: The EIS notes that additional phosphorous will accompany the extra water being discharged south to the oligotrophic wetlands of the Everglades Protection Area (EPA). This is an unavoidable, adverse project impact. However, we understand that this additional water will be treated by Stormwater Treatment Area 3/4, which is scheduled for completion in October 2003. Hence, this should be a relatively short-term concern. Nonetheless ... every effort should be made to quantify this incremental elevation in phosphorous loading as well as determine even the transient ramifications of this increase.

Response: Noted, Section 2.9.2 Downstream Water Quality, page FEIS-35 and Table 5.3.1 page FEIS-75 address these concerns.

3. Comment: We urge that a comprehensive downstream monitoring program be implemented to assure that this projected increase in phosphorous levels in the EPA does not result in irreparable harm. We suggest that the model already used by the Jacksonville District in the Section 404 permit for the Everglades Construction Project be employed in this instance.

Response: This recommendation will be given to the WSE operational advisory groups. After implementation of the WSE schedule, the Corps and the SFWMD will coordinate to plan an annual public information meeting/workshop to keep the public and other agencies informed of operational decisions performed throughout the year. The Corps and SFWMD also welcome input at any time by interested agencies through informal channels.

4. Comment: On the basis of our review a rating of EC-2 has been assigned to this proposal. That is, we have a degree of environmental concerns about the implementation of the WSE alternative, but believe the additional information being developed as the research proceeds can address these issues.

Response: Noted. No response needed.

**U.S. Department of the Interior
Office of the Secretary
Office of Environmental Policy and Compliance
75 Spring Street, S.W.
Atlanta, GA 30303
September 20, 1999**

1. Comment: Although we (USDOJ) agree with the necessity to demonstrate in the DEIS that the Corps considered a broad array of alternatives, the July 30, 1999, draft Fish and Wildlife Coordination Act (FWCA) report relied on exclusively on the most recent modeling of the preferred alternative (WSE) versus the no action alternative (Run 25).

Response: Noted. No comment necessary.

2. Comment: Both the Corps and the Fish and Wildlife Service (Service) believe that WSE will slightly improve ecological conditions in the littoral zone of Lake Okeechobee, but the Service is not confident that WSE will significantly improve conditions in the St. Lucie estuary, as concluded by the Corps. This distinction should be clarified in the Final EIS.

Response: The Corps agrees with the Service's assessment of the ecological effects in the St. Lucie and will modify the text accordingly in the Final EIS for Lake Okeechobee. Although any beneficial effects are probably highly subjective, the Corps anticipates *an improvement* in lake hydrologic and ecological conditions overall. This said, the lake will likely require a more ambitious, structural and operational alternative (as the Restudy proposes), including significantly increased storage outside of the lake, water quality pre-treatment and in lake treatment or removal of bottom sediments before substantial and sustainable improvements may be realized.

3. Comment: The Corps states on Page DEIS-88 that. " If one of the major ecosystems has experienced a large level of stress in recent months and/or years, it may be appropriate to hedge ... We recommend the Corps add a brief discussion I the Final EIS of the need to weigh shared adversity before deviating from the approved schedule.

Response: The following change emphasizes the need to consider all interests when considering any change in the operational schedule. In the last paragraph on page DEIS-88, change the fifth sentence that begins "This type of action.." to read, "This type of action should be taken only with support of hydrologic analysis that documents the benefits that would be achieved and the risks that may occur due to such an action. The benefits and risks for all of the multiple objectives for operation of Lake Okeechobee should be considered before modifying the operational guidelines in a direction that would allow for the recovery of a particular ecosystem.

These results should be reviewed by the Internal Operational Planning Core (OPI) Team which should include environmental experts from several federal/state/ and local agencies.”

4. Comment: The Corps should correct the statement in Section 7.7 and Section 9.3 that a biological opinion will be prepared. A biological opinion is not necessary in this instance as informal consultation under the Endangered Species Act was concluded on July 30, 1999 with a decision that WSE was not likely to adversely affect any threatened or endangered species or critical habitat.

Response: Concur, and the above editions have been made to the Final EIS.

5. Comment: The Corps suggests that WSE would benefit the West Indian manatee and the bald eagle in the St. Lucie estuary. We find that this discrepancy is attributable to a difference in the subjective evaluation of what constitutes a significant improvement in ecological conditions in considering what are mixed results for the estuaries in the simulations.

Response: The Corps concurs with USFWS opinion that there will likely be no adverse nor beneficial effect anticipated for the above species. The assessment has been modified accordingly in the Final EIS.

6. Comment: There are editorial corrections that need to be corrected in the Final EIS, including species names, mis-spellings, grammar etc.

Response: The Corps appreciates USFWS technical and editorial review and has corrected all of the reference mistakes in the Final EIS.

7. Comment: The Corps should make a more affirmative statement on page DEIS 110 that vegetation in the lake's littoral zone and wading bird foraging conditions were adversely affected by prolonged high lake stages between 1978 and 1992. This is supported by the literature as well as evidence that Run 25, to a lesser degree than the 1978 to 1992 period, high lake stages were detrimental to the littoral zone.

Response: Concur. The Corps has made an appropriate change in emphasis to the Final EIS.

8. Comment: Several citations were in the text of the Draft EIS, do not appear in the list of references. This should be corrected (list of missing references included).

Response: The noted references, as well as others, have been incorporated into the Final EIS.

