Appendix 1-2: Comments on the *2005 South Florida Environmental Report* from Outside Persons and Organizations

These comments were provided to the public
on the District's WebBoard.

With the exception of reformatting some information for better readability, the Chapter 1 appendices were not edited or spellchecked by the SFER production staff. They appear as posted on the District's WebBoard.

Topic: DOI Technical Comments (1 of 1), Read 66 times, 1 File Attachment NEW
Conf: VOLUME I ********** THE SOUTH FLORIDA ENVIRONMENT - WATER YEAR 2004
From: Trudy Morris -Webboard Manager tmorris@sfwmd.gov
Date: Friday, September 17, 2004 02:34 PM

DOITECHNICALCOMMENTSSFER2005.PDF (317KB)

Topic: Martin Co. IRL Response - Patrick Hayes (1 of 1), Read 11 times, 1 File Attachment NEW
Conf: VOLUME I ********** THE SOUTH FLORIDA ENVIRONMENT - WATER YEAR 2004
From: Trudy Morris -Webboard Manager tmorris@sfwmd.gov
Date: Tuesday, September 28, 2004 02:18 PM

The Attached was submitted by Patrick Hayes, Supervisor, Martin Soil and Water Conservation District, Stuart.

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Topic: DOI technical comments (1 of 1), Read 30 times NEW
Conf: CHAPTER 1: Introduction
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:45 PM

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Topic: USFWS SFFO Technical Comments (1 of 1), Read 13 times NEW
Conf: CHAPTER 1: Introduction
From: Todd Hopkins todd_hopkins@fws.gov
Date: Thursday, September 23, 2004 02:49 PM

Dr. Jeffrey L. Jordan, Professor and Panel Chair
2005 South Florida Environmental Report Peer Review Panel
Dept. of Agricultural and Applied Economics
University of Georgia
Griffin, GA

Dear Dr. Jordan:

Please find enclosed comments on the draft 2005 South Florida Environmental Report (SFER). These comments were provided by technical staff of the U.S. Fish and Wildlife Service (Service), South Florida Ecological Services Office. These comments are technical in nature and do not necessarily represent official policy of the Service or the Department of the interior.

We appreciate all of the hard work that the authors have done to prepare their chapters, and we commend the SFWMD, FDEP, and the other agencies and entities involved for developing a comprehensive report.

The combination of a short review window and this year's very active hurricane season has made it particularly challenging to provide a thorough review of this important report. The comments enclosed reflect our best efforts to dedicate resources to meet this challenge. A lack of comments on other aspects of the document therefore does not indicate a lack of interest, nor should it be interpreted as implied consent to the technical aspects of the document.

Respectfully submitted,

Todd E. Hopkins, Ph.D.
USFWS

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Chapter 2C: Status of Phosphorus and Nitrogen in the EPA

General Comments

The only reason mentioned as contributing to the improvement of levels of TP and TN in the system in this chapter was the success of the BMP and/or STA programs. Since the Plan details a measurement methodology flexible enough to account for "natural heterogeneity of the ecosystem while taking into account natural spatial and temporal variability," were other contributing factors such as climatic conditions or changes to water management practices over the same period considered as well? Some mention should be made if only to rule them out.

Although not specifically required by the Rule, will there be any consideration of P and N bound up in the soils of the EPA? These levels will not change as rapidly as nutrient levels in the water column and changes in habitat structure such as cattail expansion and loss of slough habitat can be more attributed to resident nutrient levels rather than inflow.

The entire chapter structure could be improved.

Chapter 3: Phosphorus Controls for the Basins Tributary to the EPA

Specific Comments

Page 3-3, Paragraph 1. How can the exceptions listed for non-ECP basins (i.e. "phosphorus concentrations, dissolved oxygen (DO), and occasional excursions from standards for pH and specific conductance") exist and the water quality be considered "generally acceptable"? Please justify this interpretation.

Page 3-15, Paragraph 2. "The basin-level reductions are generally supported by the UF/IFAS on-farm research." What does this really mean?

Chapter 4: STA Performance, Compliance and Optimization

Specific Comments

Page 4-1 paragraph 3. The suggested test changes below are more consistent with language in the other STA sections.

A 6 to 18 –month vegetation start-up period is anticipated before STA 1E is expected to discharge to the Arthur R. Marshall Loxahatchee National Wildlife Refuge, depending on meeting start-up requirements.

Table 4-1. Why are there TBD entries for the hydraulic residence time (d) values on this table?

Table 4.2. Operational status of STA-1W and STA 5. Are not flow weighted mean TP values averaging 148 ppb into the Refuge and 367 ppb through G-406 above the " design objective of the EFA," and "achievement of the interim discharge goal of less than 50 ppb for TP"?

Page 4-4. STA-1E. Does the 94,000 acre feet from the C-51 basin include stormwater from Acme Basin B? Does the 31,000 acre feet from the S-5A basin

moving through the G-311 represent replacement of Acme B water sent to tide?

Page 4-7. Second paragraph. STA-1W Operations. How do these STA bypass events which discharge stormwater into the Refuge affect the oligotrophic ecosystem in the marsh interior? Do these bypass events cause elevated TP levels in the Refuge?

Page 4. Management Activities Implemented Since the Overload Event–Number 8. A successful experiment delivering water around the Refuge to meet water supply demands is mentioned. Clarification of the route around the Refuge would be helpful. More detail on the experimental design and reference to these data and statistical analyses would be valuable.

Page 4-11. STA-1W Total Phosphorus. It would be more consistent and easier for the reader to interpret and compare performance of the STAs if the same language was used to describe the performance of each STA. The language used for describing the performance of all the other STAs is: Under the design objectives of the EFA, STA x is achieving/not achieving its interim discharge goal of less than 50 ppb for TP. It would be helpful to let the reader know if the interim goal of 50 ppb TP is or is not achieved for STA 1W similar to the text used to convey this information on page 4-40 (STA 5).

STA-3/4 Operations. Page 4-35. It would be helpful to add detailed information as to what the mercury levels were at inflow, at outflow when discharges were made, and downstream.

Figure 4-20 page 4-41. It would be helpful to add a line for the 50 ppb TP on this graph as was done in the similar graphs for the other STAs.

. Pages 4-12, 4-43 and 4-59. second paragraph. STA-1W, STA -5, and STA 6. Other Water Quality Parameters. These sentences should be revised as follows. “However, because these parameters have no applicable numeric state water quality standards, STA -1W, 5, 6 is deemed to be in full compliance with the permit.” Is it true that just because there are narrative standards for these parameters that there will not be investigation as to whether discharges having outflow concentrations above inflow concentrations (for parameters such as chlorides, conductivity, and nitrogen) will not contribute to an imbalance to native flora and fauna or degradation of the class III designated uses? The A.R.M. Loxahatchee National Wildlife Refuge is designated an Outstanding Florida Water body and it is our understanding that the anti-degradation standards are more protective than the class III designated use standards.

Chapter 5, Hydrology of the South Florida Environment

General Comments

The word "groundwater" appears only once, on page 5-7, fourth paragraph; and it is only indicated as being one of the parameters in the Palmer Drought Severity Index. This seems to be to be quite a shortcoming, given that the title of the chapter is Hydrology of the South Florida Environment. Most people use ground water as their home supply and wetlands would be considerably less wet with low water table conditions. Also, transmissivities are so high that aquifers have to have a considerable influence on the surface water environment. The word "aquifer" never occurs in the chapter.

Inflows and outflows are discussed as if only what comes in and leaves through streams is of any consequence. Interconnectedness between lakes, streams, and aquifers is not addressed.

The text is largely a description of what is already presented in the many histograms and other figures. The figures obviate the necessity for much of the text, and present the information much more effectively. If it is desirable to present numbers, as opposed to the qualitative figures as determined from the graphs, then one or more tables would be more readable than presenting this kind of information in a written format. Appendix 5-2 may have this information in tabular format.

As this report is to be used by resource agencies to support their management decisions, it would be helpful if the comparisons of WY2004 with WY2003 and the historical data throughout the chapter could include analysis and discussions on why differences are observed. For example, were the water levels observed in Lake Okeechobee during WY2004 consistent with rainfall recorded in the upper watershed and over the lake or did other factors influence the observed stages. Most notable would be changes to the Kissimmee watershed as part of restoration or implementation of the Lake Okeechobee WSE water regulation schedule. Providing information in this manner would meet the intended use of the document while easing the review process of outside agencies on the District's programs, projects, and plans. By providing such analysis and discussion, the interpretation of wording in the report could truly be a technical perspective. The general form of the chapter, characterization of rainfall followed by water levels and then water management, distracts the reader from visualizing the significance of these factors by constantly having to refer back to figures. Without understanding what specifically the chapter wishes to accomplish for its audience it might be more informative to present the rainfall, water levels and flow data geographically, top down. The data could be summarized in the context of its implications for flood control, water supply and environmental objectives across the watershed in addition to contributions to the downstream receiving watersheds. Complicating any interpretation of the information presented is the use of different analysis windows to calculate the historical averages. Different periods of record are used to calculate averages for rainfall, water levels and flows. For example, WCA3 rainfall may be calculated from a variety of periods 1900-1995, 1901-1980, 1941-1985 and 1971-2000, while average stage is calculated on data from 1962-2003 and flow data from 1978 to 2003. These analysis windows would not allow a regional comparison with water levels in Lake Okeechobee or WCA2 for example.

Typically, reporting of information such as contained in this chapter has two parts. The first is the status or the current conditions. The second, and perhaps more important is the general trend of the information of interest. By not providing any indication of whether objectives are being met, the chapter provides little or no analysis allowing a determination of whether changes to operational criteria or lake regulation schedules are necessary. For example, are the higher water levels observed throughout south Florida a response to increased rainfall or the significant changes that have occurred throughout these watersheds over the last decade? Without providing some indication of the direction of the hydrology using metrics capable of quantifying change for a particular objective it seems unrealistic to assume that decision makers will be able to use the technical information presented to make sound decisions.

For the data presented in the appendices it would be useful to include the DBKEYs used to generate the graphical and tabular data presented.

Specific Comments

Page 5-1. Why is it important that the WY2004 water levels are higher or lower then WY2003 or the historical average? Wouldn't it be more important to present the information in the context of specific project objectives and whether the observed stages contributed to our meeting them? or failing to meet them. From an ecological perspective what is the significance of an annual average water level? A large part of Everglades restoration involves the change in volume, timing and distribution. Why there is no discussion on the relationship between the alteration of the rainfall and runoff relationship due to water management and their effect on water levels?

Page 5-4, Paragraph 4. What is the importance of the percentage of summer rainfall occurring on undisturbed sea breeze days, unless a definition of sea breeze is given and there is some understanding as to whether the distribution of these events is changing over time?

Page 5-5 Figure 5-2 Everglades National Park is missing from the legend.

Page 5-7, Paragraph 2-4. It would be noteworthy if the occurrence of extreme meteorological conditions such as El Niño or droughts could be tied to the trends observed in historical water levels and their significance to computing an average over abbreviated period of records.

On page 5-30, Paragraph 1. An inflow of 3,620,483 acre feet is reported for Lake Okeechobee. We are doubtful of the ability to measure these flows to seven figure accuracy. Perhaps 3,620,000 would be a more accurate estimation. The same comment applies to other numbers.

Page 5-71, Paragraph 1. The majority of the stations presented in the appendices are within the immediate influences of water management, i.e. the lake stage. Would not a resource manager/decision maker be more interested in analysis showing the influence of these water management activities on the adjacent aquifer or wetlands? If this document is to be effective as a decision making tool would not establishing and documenting the relationship between the lake and adjacent water table levels or a percentage of wetland habitat in a particular depth class for some duration throughout the year be more useful?

Page 5-24, Paragraph 4. Why mention WCA-3B without any analysis of rainfall, water levels or structure flows for this area?

Page 5-25, Paragraph 1. What about the eastern half of Everglades National Park, the Rocky Glades and the Eastern Panhandle?

Page 5-27 Paragraph 1. It seems some discussion is warranted on the applicability of using only annual and monthly intervals and their relationship to understanding whether operational criteria and regulation schedules are fulfilling expectations for meeting the multi-purpose objectives of the project.

Page 5-35, Last Paragraph. Was back pumping to the EAA from the WCAs and Lake

Okeechobee greater historically than in recent times such as WY2003 or WY2004?

Page 5-38, Last Paragraph. The S-197 discharges into Manatee Bay not Everglades National Park. Additionally, the implementation of IOP included new structures including S-332B and S-332C which were operational during WY2004.

Page 5-40. Including the flow distribution between western and eastern Shark Slough, S-12 total flows and S-333 respectively in Figure 5-49 may be useful to readers in understanding the disparate proportion of flows diverted from historic Shark Slough.

Page 5-41, Figure 5-5. The arrows depicted on this figure are not proportioned or scaled correctly. The total outflow from WCA3A is about 1,221,000 ac-ft. Outflows from Lake Kissimmee are about 1,193,000 ac-ft. The WCA3 outflow arrow should be approximately the size of the Lake Kissimmee outflow arrow, not double the size. The placement of outflow arrows from ENP is not appropriate given the omission of data either in the main body of the document or its appendices. The placement of a flow arrow from ENP to Biscayne Bay without explanation of how flows were calculated is also not appropriate.

Appendix 5-2, Table 10. Although S190 is about 18 miles upstream of the WCA-3A the L-28 Interceptor canal is leveed for its full length on both banks. Therefore, it appears that the only place S-190 discharge can go is out the downstream terminus to south central WCA-3A. One would suspect that this is why 1-2 mile east-west outfall canal was originally constructed. What rationale can be provided for not including S-190 as a WCA-3A inflow?

Chapter 7: Update on RECOVER Implementation and Monitoring for the CERP

General Comments

The term “revisited” is overused throughout this chapter and this clouds the true meaning. The term revisited implies no action, so it would be more accurate to use terms such as revised, reviewed or updated.

Page 7-11, Greater Everglades Regional Aquatic Fauna Baseline Characterization
The last sentence in the paragraph under this heading is incorrect. The underlined text needs to be added to this sentence: “This project….. by USGS to determine appropriate sampling methods to assess fish populations in forested wetlands.”

Specific Comments

Page 7-17, Evaluation, Performance Measures
The first sentence of this paragraph needs to be rewritten. It appears to be a combination of two sentences with a missing conjunction.

Page 7-17, Evaluation, Performance Measures
In the fourth bullet under this heading: omit the text “completed and” as it is redundant.

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Topic: DOI technical comments (1 of 1), Read 10 times NEW
Conf: CHAPTER 2A - Water Quality Compliance in the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:44 PM

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Topic: DOI technical comments (1 of 1), Read 9 times NEW
Conf: CHAPTER 2B - Mercury Monitoring and Environmental Assessment in South Florida
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:44 PM

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Topic: DOI technical comments (1 of 1), Read 5 times NEW
Conf: CHAPTER 2C - Status of Phosphorus and Nitrogen in the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:43 PM

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Topic: DOI technical comments (1 of 1), Read 7 times NEW
Conf: CHAPTER 3: Source Controls in Basins Tributary to the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:42 PM

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Topic: DOI technical comments (1 of 1), Read 17 times NEW
Conf: CHAPTER 4: Performance, Compliance and Optimization of the Stormwater Treatment Areas
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:42 PM

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Topic: DOI technical comments (1 of 1), Read 14 times NEW
Conf: CHAPTER 5: Hydrology of the South Florida Environment
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:41 PM

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Topic: DOI technical comments (1 of 1), Read 8 times NEW
Conf: CHAPTER 6: Effects of Hydrology on the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:40 PM

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Topic: DOI technical comments (1 of 1), Read 4 times NEW
Conf: CHAPTER 7: Update on RECOVER Implementation and Monitoring for the Comprehensive Everglades Restoration Plan
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:39 PM

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Topic: DOI technical comments (1 of 1), Read 5 times NEW
Conf: CHAPTER 8: Implementation of the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:38 PM

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Topic: DOI technical comments (1 of 1), Read 10 times NEW
Conf: CHAPTER 9: Comprehensive Review of Exotic Species in the South Florida Environment
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:37 PM

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Topic: DOI technical comments (1 of 1), Read 10 times NEW
Conf: CHAPTER 10: Lake Okeechobee Protection Program - State of the Lake and Watershed
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:37 PM

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Topic: Dr. Paul Grey, Audubon, Comments (1 of 1), Read 9 times, 1 File Attachment NEW
Conf: CHAPTER 10: Lake Okeechobee Protection Program - State of the Lake and Watershed
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Date: Thursday, September 23, 2004 03:05 PM

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Topic: DOI technical comments (1 of 1), Read 11 times NEW
Conf: CHAPTER 11: Kissimmee River Restoration and Upper Basin Initiatives
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:36 PM

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Conf: VOLUME I ********** THE SOUTH FLORIDA ENVIRONMENT - WATER YEAR 2004
From: Trudy Morris -Webboard Manager tmorris@sfwmd.gov
Date: Friday, September 17, 2004 02:34 PM

DOITECHNICALCOMMENTSSFER2005.PDF (317KB)

United States Department of the Interior

NATIONAL PARK SERVICE
FISH AND WILDLIFE SERVICE
Everglades Program Team
A.R.M. Loxahatchee National Wildlife Refuge
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September 17, 2004

Dr. Jeffrey L. Jordan, Professor and Panel Chair
2005 South Florida Environmental Report Peer Review Panel
Dept. of Agricultural and Applied Economics
University of Georgia
Griffin, GA

Dear Dr. Jordan:

Please find enclosed comments on the draft *2005 South Florida Environmental Report (SFER)*. These comments were provided by technical staff of the Department of the Interior, including the DOI - Everglades Program Team, the U.S. Fish and Wildlife Service, the National Park Service, and the United States Geological Survey. These comments are technical in nature and do not necessarily represent official policy of the Department of Interior or its agencies.

We appreciate all of the hard work that the authors have done to prepare their chapters, and we commend the SFWMD, FDEP, and the other agencies and entities involved for developing a comprehensive report.

The combination of a short review window and this year's very active hurricane season has made it particularly challenging to provide a thorough review of this important report. The comments enclosed reflect our best efforts to dedicate resources to meet this challenge. A lack of comments on other aspects of the document therefore does not indicate a lack of interest, nor should it be interpreted as implied consent to the technical aspects of the document.

While we have provided a number of detailed comments, there are a few major comments that we would like to bring to your attention here. First, there would be great benefit if chapter authors could share early drafts of their chapters with each other. This sharing would facilitate development of discussion and conclusions across chapter topics. For example, Chapter 6 presents the results of a study examining the influence of water mineral content on Refuge periphyton structure. Significant changes in periphyton structure were observed with small increases in conductivity. Chapter 2A presents data that shows increases in Refuge conductivity that occurred since last year's report. A

discussion of the potential impacts of conductivity increases on Refuge biota would be very helpful in light of the results of these two chapters.

Another major concern that we have is the potential for nutrient enrichment of the Rotenberger Wildlife Management Area as a result of hydropattern restoration using water with high levels of phosphorus. Last year's report presented preliminary data for water, soil, and plant tissue total phosphorus concentrations, but no data are presented in the present draft report. Science and experience shows that recovery of a marsh from nutrient enrichment likely will take much longer than recover from being too dry. In fact, Chapter 6 reports on responses of marsh vegetation with only a couple of years of increased hydroperiod. Because of the importance of this portion of the Everglades, we believe a presentation of any nutrient-related data and a thorough discussion of the trends observed since hydropattern restoration began would be very useful.

Finally, as we have commented before, it would be extremely useful for the review panel and others (including chapter authors) if the draft version of future *SFER*s were distributed with line numbers on each page to facilitate reference of review comments. This minor additional step will greatly enhance the ability of the review panel and others to provide input on the draft report.

Respectfully submitted,
Matt Harwell
The Everglades Program Team, U.S. Department of Interior

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James Smoot, U.S. Geological Survey
Molly Wood, U.S. Geological Survey

Chapter 1

1) p. 1-16, 2nd paragraph: This paragraph would be an appropriate place to discuss the impacts of loss of flow in the Everglades, particularly in the ridge and slough habitat. A good reference is the Science Coordination Team's flow paper (Science Coordination Team. 2003. The role of flow in the Everglades ridge and slough landscape. Report to the South Florida Ecosystem Restoration Task Force Working Group), which was externally pee-reviewed, and submitted to the Working Group and the Task Force.

2) p. 1-17: Mention of the Everglades lawsuit and the relevance of the Settlement Agreement would be useful under this heading.

Chapter 2A

1) General: This chapter provides a valuable assessment of the water quality data collected during the year throughout the EPA.

2) General: As in previous years, there is concern that this chapter gives too much credibility to the Florida Class III Numerical Criteria. From the perspective of resource and ecosystem protection, it is inadequate to focus exclusively on numerical criteria, especially when they are known to be inappropriate or not protective in the EPA. The minimum conductivity criterion of <1275 µmho/cm not to be exceeded is far above historic values for most of the EPA, and is completely unprotective of the Refuge interior. As discussed in the chapter, the alkalinity criterion of >20 mg/L is also inappropriate for the naturally soft water dominated Refuge. Prior to construction of drainage canals and agricultural land use changes, much of the rest of the Everglades was probably also soft water with low alkalinity. We are encouraged by the inclusion (as in the previous ECR) of an analysis of sulfate concentrations for which a numerical criterion has not been defined, to see (Page 2A-26) that FDEP intends to continue its evaluation of conductivity in the EPA and Everglades Agricultural Area (EAA) canals, and (Page 2A-31) is considering a SSAC, revised standard, or definition of background conditions.

3) General: As in previous years, there is little consideration of anti-degradation of the Refuge and park as outstanding Florida Waters (OFWs). Simply applying numerical criteria is not protective of OFWs. Recommend that the DEP develop estimates of the appropriate background concentrations for use in assessment of compliance with anti-degradation within the OFWs. Background concentrations of at least chloride, TDS, hardness, alkalinity, conductivity, calcium, sulfate, and total nitrogen should be estimated and used in future reports.

4) General: The report emphasizes results only for the current water year. Results are difficult to interpret without historical perspective. Detection of change is a major management objective. The report should present cumulative analyses of historical data using consistent data-reduction and data display methods. Statistical trend analyses should be performed for key indicators. This applies to water quality, hydrology, inflow and outflow nutrient loads treatment technology, and biological data.

5) General: The authors should consider providing a table of numerical criteria for all contaminants investigated in this chapter. This table could appear in the chapter or in an appendix. For pesticides, Tables 5-6 in Appendix 3-2 could be cited.

6) p. 2A-2: In the first full paragraph discussing alkalinity in the interior of the Refuge, a couple of sentences should be added:

> "The Refuge interior has naturally low alkalinity and pH that are not protected by current numerical criteria. Refuge staff have voiced concerns on numerous occasions that impingement of pumped stormwater into the Refuge interior would endanger the natural periphyton community that is dependent on low alkalinity and is adapted to low pH conditions."

A link to the study presented in Chapter 6 (6-11) would also be appropriate.

6) p. 2A-11, Excursion Analysis: As commented in previous years, when uncertainty is higher we need to be more (not less) conservative and protective of the ecosystem and human health. This is particularly true for OFWs. The statistical approaches used in this chapter is troubling because it violates this principal. We understand the desire for consistency with other evaluations including the Florida Impaired Waters 303d designations and understand that it may reduce the required effort and increase efficiency. However, no justification is developed in the chapter that these methods are appropriate for the purposes of this report. From Chapter 1, the stated objective of the 2005 SFER is

> "to provide information for decisions and updates on important programs of the District. Information provided in this volume will be used by the South Florida Water Management District and the Florida Department of Environmental Protection for making decisions affecting implementation of the Everglades Construction Project (ECP), the Lake Okeechobee Construction Project (LOCP), and other restoration and management activities in South Florida."

The binomial test method is inconsistent with this objective.

The example provided on page 2A-11 clearly illustrates one problem with this excursion analysis approach. It is stated that:
"For example, one of six measurements above the criterion is clearly a weaker case for impairment than six of 36; however, both cases result in an excursion frequency of 16.7 percent."
From an environmental quality management and protection perspective, the case of one in six is of greater potential concern because, under a binomial hypothesis, we may have a failure rate much larger than 16.7%, perhaps 33%, and with this limited number of samples we cannot reject this possibility.

The excursion analysis approach proposed in the report would lead to the result that any reduction in sampling frequency would likely reduce the number of identified sites of concern. This violates the fundamental principle of environmental management practice and common interpretation of the Clean Water Act that where

greater uncertainty exists we need to be more cautious in making environmental management decisions.

7) p. 2A-12: The change of evaluation criterion from 5% to 10% exceedance frequency needed to define a "variable of concern" is troubling because it weakens protection of the aquatic resources. The argument that this is recommended EPA guidance ignores the fact that Florida defined the numerical criteria based on an assumption that a 5% exceedance rate would be applied. More stringent numerical criteria should first be defined that anticipate a doubling of exceedance frequency. Only after this numerical criteria adjustment should the 10% exceedance rate be applied in identification of concerns.

8) p. 2A-13: The use of a 20% exceedance rate for variable with fewer than 28 samples further reduces protection of the resource. As discussed above, the added uncertainty of small sample size increases, rather than reduces, the need to identify the cause of a potential problem or impact.

9) Table 2A-3, the meaning of the table entry "- -" should be defined in the caption or footnote.

10) p. 2A-19, Table 2A-3: Note that while there were improvements in some water quality parameters in WY2004 as compared to WY2003, there were some significant increases in the occurrences of concern, potential concern, and minimum concern. Increases were noted in: Refuge -- inflow conductance, interior DO and pH, outflow pH and conductance, and rim conductance; WCA-2 -- inflow DO, pH, and conductance, interior DO; WCA-3 -- inflow DO; and Park -- interior DO. Chapter 2C speaks of improvements in P and N water quality due to BMPs and changes in water management practices, yet Chapter 2A indicates some downturns in parameters that should have responded positively to BMPs. There should be some explanation across these two chapters that attempts to reconcile these disparate findings.

11) p. 2A-22: the citation "Environmental Services and Permitting, Inc. 1992" in the second full paragraph does not appear in the Literature Cited section.

12) Figure 2A-10: please identify in the caption which rain gage(s) was used as a basis for this graph.

13) Table 2A-8: please add a column that gives the limit of detection for each pesticide. Without this it is difficult to assess the significance of a detection.

14) p. 2A-22, 4th para: There is discussion about "unimpacted Refuge marsh", yet other text indicates the determination of impacted vs unimpacted areas has not been made by DEP. It may be that these excursions are indications that these areas of the Refuge interior have become impacted.

15) p. 2A-22, 4th para: The last two sentences are a bit of a reach. Five-year average geometric TP concentrations are not the best means to assess whether or not these four stations have nutrient impacts. There is overwhelming evidence from many studies that impacts occur long before significant changes are seen in water column TP, especially when averaged over such a long time period.

16) p. 2A-26, 2nd para: As indicated in a previous comment, there have been significant increases in excursions for several parameters when compared to the previous water year. The text in this paragraph points out that WY2004 conductance in the Refuge inflows is lower than the historical period, but fails to mention that conductance is double what it was in the previous water year. The text should present a balanced and complete view of all the results, not just the ones that are positive. This comment is not meant to downplay the improvements that have occurred -- only that all results should be discussed.

17) p. 2A-30, last para: There is no levee on the Refuge interior side of L-7 or L-40. Intrusion can occur when canal stages exceed marsh stages (this point has been stated correctly elsewhere).

18) p. 2A-37: DEP should be commended for including a section on sulfate, even though there is no Class III standard. However, the text should be expanded to indicate that even drops in sulfate enrichment can be bad news with respect to Hg methylation. USGS and other research has suggested the highest Hg methylation rates at intermediate sulfate concentrations. So, even though drops in sulfate could be a reflection of BMPs, sulfate concentrations above background levels still can lead to elevated methyl-Hg concentrations and biomagnification.

19) Appendix 2A-1: more than 10% (35/290) of the Park inflow specific conductance values were excluded. A footnote explaining this unusually high rate would be helpful.

20) Appendix 2A-3: the "Mean Annual DO" and "Annual SSAC" columns appear to be mislabeled.

Chapter 2B

1) General: Overall, this is a technically accurate and fairly complete report on the current state of understanding of mercury sources, cycling, bioaccumulation and toxicity of mercury in the Florida Everglades. Mercury is probably the greatest environmental contaminant issue facing the world today, and along with phosphate, is a major concern for Everglades as well. Mercury contamination is a concern worldwide because it is an airborne pollutant, derived from atmospheric emissions, that has global circulation patterns. Resolving how much atmospheric mercury deposition is derived from local-, regional-, or global-scale emission sources is the center of much debate by lawmakers presently, and the past research in the Florida Everglades is a pivotal data set in that debate. It is not inaccurate to say that much of

what the scientific community now knows about mercury contamination was discovered through the combined efforts of the South Florida Mercury Program. That being said, however, many aspects of the behavior and controlling factors of mercury cycling and toxicity remain unresolved and warrant more research.

2) General: One general aspect where the report could be improved is the degree of certainty by which the authors of the report ascribe the decline in mercury levels of indigenous fish and wild life of the Everglades to local emission reductions about fifteen years ago. These comments start in the Executive Summary for the Chapter, "…Its (methylmercury) production is controlled by the rate of supply of mercury…..but is also influenced by water quality, with sulfate and sulfide being important factors". At this point, most aquatic chemists that study mercury in the environment would concur that mercury loading is "controlling" and that other water quality parameters are of lesser importance. There is strong evidence now to say that mercury, sulfur, and carbon play equal roles in the set of complex processes that lead to the transformation of mercury to methylmercury, the most bioaccumulative form of mercury in the environment. The reason this point is being made is because evidence from field studies conducted by the ACME Team strongly implicate all three elements as being equally complicit in the process, and other data collected by the South Florida Mercury Science Program point to factors other than just atmospheric mercury load as being "controlling". The observation that is brought out in the Executive Summary that fish mercury levels in the National Park have not declined (in fact many places in the National Park show rapidly increasing mercury levels in fish), thus one can logically conclude that while local emission reductions have had a positive effect overall, I do not believe you can conclude that it is "controlling" the overall observations that are seen across the entire ecosystem. It would be nice to see the Executive Summary reflect this, as well as the bulleted points in Chapter 2B itself.

3) General: One of the major discoveries that the ACME Team has made over the past 12 months is the observation that dissolved organic carbon (DOC) appears to play an equally important role (to that of sulfur and mercury) in regulating methylmercury production in the Everglades. This discovery has enabled ACME Team scientists to make sense of data that has been perplexing them for years, and we now realize that much of the DOC present at any point in the ecosystem is derived from runoff distributed by the canals. Previously, scientists did not put much attention on the DOC component of the overall mercury cycle, but a much different picture is now becoming evident. Most experiments conducted by the ACME Team have revealed that the DOC dominantly present in runoff from the EAA has a substantial ability to increase the bioavailability of mercury to the methylation process, thereby yielding more methylmercury where DOC levels are elevated. Because DOC and sulfur are greatly attributed in the Everglades to runoff from the EAA, and the existing canal system is the conveyance system for the runoff, one can logically conclude that the magnitude and distribution of methylation "hotspots" in the Everglades is at least partially controllable by water distribution and land use practices in south Florida. The figure used in the appendix for Chapter 2B support the overall importance of runoff-derived sulfate and DOC in regulating methylmercury levels in Water

Conservation Area 3A, and how dramatically the methylmercury levels have declined there over the past 4 years, which is apparently due to declines in sulfate and DOC. Of immediate concern is to identify whether a methylmercury hotspot still exists in the Everglades, and if so, where? It is likely that the water redistribution pattern that is an outcome of some of the Everglades Restoration efforts has lead to a movement of the hotspot, but the South Florida Mercury Science Program does not have an ecosystem-wide monitoring effort to track such changes.

4) p. 2B-2, first bullet on the page: include the DOC in the listing of controlling water quality factors.

5) p. 2B-2, fourth bullet on the page: should say that in fact some monitoring locations showing rapidly increasing Hg levels in fish in the National Park.

Chapter 2C

1) General: Again, where is the discussion on compliance with consent decree levels, limits, and load-reduction requirements? We believe that the quarterly Settlement Agreement Reports should be summarized here. We are encouraged by the appearance in Appendix 4-11 of the plan to automate the quarterly Settle Agreement reports and hope this aids in the expeditious publication of future quarterly Settlement Agreement reports.

2) General: On Figure 2C-2 consider showing scale, N-arrow, Region labels, hydrography (canals) with labels, and possibly sampling points.

3) General: Relying on lumped results expressed in terms of a geometric mean could be missing much of what is going on spatially and temporally. While a geometric mean might be a reasonable measure of central tendency for a variable that is log-normally distributed, we do not know from what is presented that these data are log-normally distributed. The trend in extremes might be important and that is not seen when only using the mean. Consider using all points plotted over time or represent the distribution with a box plot instead of a single mean value. If a scatter plot over time is selected then a LOESS smooth could be used to show the general trend of the data. The box plots could be prepared by site, by sites lumped within Regions, by season (monthly), and so forth to look at how the data are distributed spatially and temporally. This would give more insight about what is driving the conditions reflected. These plots could replace the table summary of the data.

4) General: A systematic analysis of TP and TN trends at individual long-term monitoring sites in each area would add a lot to this chapter (i.e., Seasonal Kendall test or the like). Detecting changes is a major management concern. This should be made a routine component of the ERC, which has focused on each year separately and provides little historical perspective.

5) p. 2C-1: Please change the wording from "Once the rule has been approved …" to "If the rule is approved …"

6) p. 2C-2: How were grab and composite samples at inflow sites combined in the dataset? Were inflow evaluations based on both types, only composites, or only grab samples? Were composite samples time-proportional or flow-proportional? Each of these questions needs to be addressed in the text of the chapter.

7) p. 2C-2, 3rd para: Decreasing gradient also due to dilution from rainfall and other sources.

8) p. 2C-3. The pattern of TN showing a gradual reduction is also caused by dilution. As reported in Chapter 5, in WY2004, 521 thousand acre-feet flowed into WCA-2, while 750 thousand acre-feet flowed out. Thus, there is a significant gain in flow through WCA-2.

9) p. 2C-3: The first purpose listed is to "Summarize phosphorus and nitrogen concentrations measured in the surface waters within the different portions of the EPA, and describe spatial and temporal trends observed." Although the report does describe spatial trends across the entire EPA, it does not describe spatial trends and patterns within the individual components of the EPA (such as those within WCA-1, 2, 3, ENP). Within each of these components, water quality varies depending on location of sampling stations. For example, water quality at stations near canals, such as LOX 4 or P-33, has been affected by canal waters, whereas water quality at stations remote from canals, such as LOX 8 or P-34, has been little affected by canal waters. On page 2C-13, the report states that in WY 2004 the annual geometric mean TP concentrations for interior marsh stations ranged from 4.0 to 55.5 µg/L, but does not show how these different mean values are distributed.

10) p. 2C-3: The second purpose on page 2C-3 is to "Discuss factors contributing to any spatial and temporal trends observed.". Figure 2C-1 shows year-to year changes in mean TP for the different components of the EPA. The decrease of inflow concentrations from highest values in the early 1980s to lower values in the late 1980s and 90s were attributed to continued implementation of BMPs in upstream agricultural and urban watersheds and treatment of water in STAs. The mean TP concentrations at the interior stations were highest in the mid-1980s and decreased in subsequent years. Although there is mention of the effects of drought on nutrient concentrations, it would be helpful to show trends in rainfall and water level for the years the nutrient data are presented. Very dry conditions will tend to increase concentrations of TP and TN, especially at the interior stations. During very dry periods, we have observed spikes in the concentration of TP at interior marsh stations of ENP. Also, we have observed good relationships between both TP and TN versus water level (higher nutrient concentrations at low water levels) at Loxahatchee National Wildlife Refuge (LNWR) interior stations (see figures below). Suggest showing water levels on the nutrient Figure 2C-1, or, at the very least, referring to a figure elsewhere in the report that shows water levels over this time span.

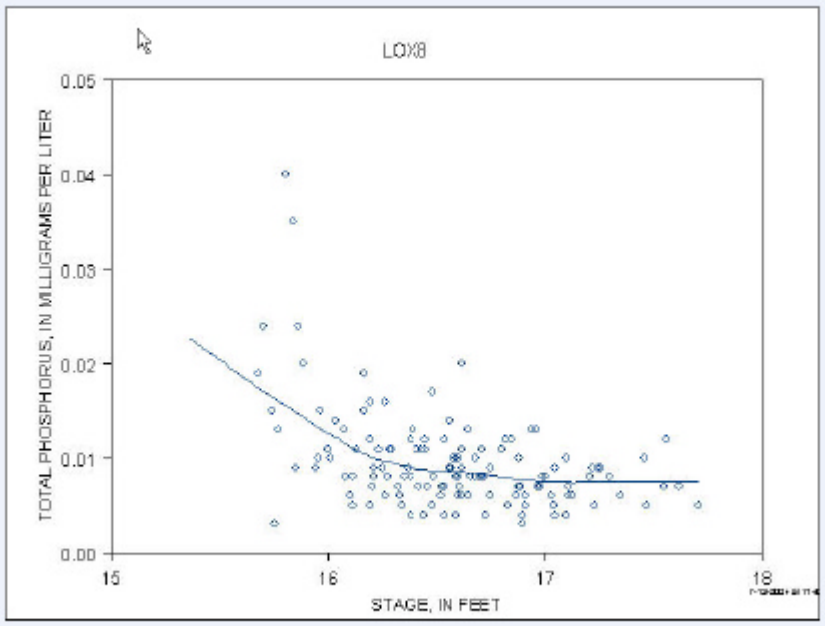

Figure 1. Total phosphorus concentrations at Lox 8 versus nearby water level (stage) in Loxahatchee National Wildlife Refuge for period of record. (loess smooth line)

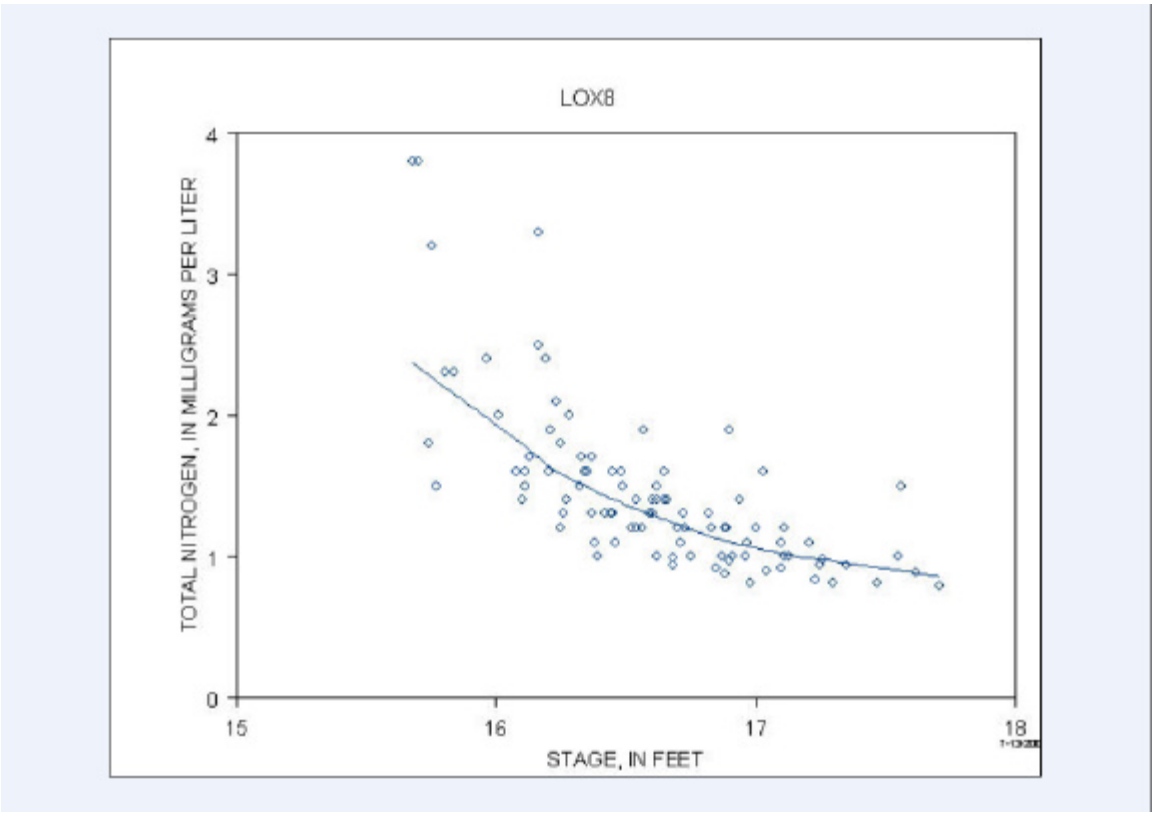

Figure 2. Total nitrogen concentrations at Lox 8 versus nearby water level (stage) in Loxahatchee National Wildlife Refuge for period of record. (loess smooth line).

11) p. 2C-4: Change the first word in paragraph 2 from "Once" to "If."

12) p. 2C-6, Methods: The use of ½ of the MDL is frequently used for analysis of datasets that contain observations that are less than detection (in statistics this is termed "censored" data). For datasets with most samples considerably above the MDL, this approach adds very little error. For sites with total phosphorus means near the MDL, considerable estimate error may result from the assumption of ½ MDL. From the 2004 ECR for example, Park interior site EP has a geometric mean (Appendix 2C-2) of 2.4 µg/L and arithmetic average of 2.5 µg/L. Other approaches have been intensively researched and are available (Ahn 1988; Berthouex and D. Robert 1993; Gilliom et al. 1984; Malcolm and P 1994; She 1997; Travis and Miriam L 1990). One simple approach is to calculate the geometric mean using a value of zero, ½ MDL, the MDL in three alternative calculations. The variation of the statistical results among the three assumptions quantifies the uncertainty caused by the censoring of the observations. In the case of the geometric mean, however, the zero assumption cannot be used because the geometric mean of any set of number containing a zero is zero. In this case, only the ½ MDL and full MDL assumptions can be evaluated and used to estimate uncertainty caused by the assumption.

Ahn, H. (1988). Estimating the mean and variance of censored phosphorus concentrations in Florida rainfall. Journal of the American Water Resources Association, 34(3), 583-593.
Berthouex, P. M., and D. Robert, G. A. N. (1993). A Model of Measurement Precision At Low Concentrations. Water Environment Research, 65, 759-763.
Gilliom, R. J., Hirsch, R. M., and Gilroy, E. J. (1984). Effect of censoring trace-level water-quality data on trend-detection. Environmental Science and Technology, 18(7), 530-535.
Malcolm, J. R. C., and P, H. W. (1994). Conflicting Perspectives About Detection Limits and About Censoring of Environmental Data. Water Resources Bulletin, AWRA, 30(6), 1063-1079.
She, N. (1997). Analyzing censored water quality data using a non-parametric approach. Journal of the American Water Resources Association, 33(3), 615-624.
Travis, C. C., and Miriam L, L. (1990). Estimating the Mean of Data Sets With Nondetectable Values. Environmental Science and Technology, 24(7), 961-962.

13) p. 2C-6: For fairness and balance, it would be appropriate at this point to describe the moderating provisions. It is true that the ERC-approved criterion is 10 ppb, but it is also true (and quite significant) that numeric compliance with this criterion does not have to be met for discharges into impacted areas. These moderating provisions are authorized until 2016.

14) p. 2C-9 and Figure 2C-1: What stations are used in this evaluation? Are the stations the same over the entire period-of-record that was examined? For example, were stations LOX1 and LOX2 (also named CA1-1 and CA1-2) used in the baseline period? Were the XYZ Refuge sites used for more recent years? Again, what samples were used for inflow characterization?

15) 2C-11, 1st paragraph: Lower TP levels in Park in 2004 do not necessarily support the contention that higher TP concentrations in previous years were due to low water levels. There may be a correlation, but that does not prove cause-and-effect. I believe there have been other times when water levels were low and TP concentrations were low. This is the type of relationship that will be explored further with an expanded monitoring network in the Refuge and in the Park.

16) p. 2C-13, 1st para: To what extent do the lower TP levels in WY 2004 also reflect an absence of drought conditions that year? The occurrence of droughts during other years might explain higher nutrient levels in those years, as was mentioned (page 2C-11).

17) Table 2C-1 shows the very high maximum TP concentrations at interior stations (494 to 3,189 µ/L), which, I assume, occur during droughts or when canal water flows into the marsh at a station? The large spatial variation across the marsh stations might complicate an evaluation of temporal trends? An alternate or supplemental approach for evaluating temporal trends would be to compare individual stations over time.

18) p. 2C-15, 2nd sentence: It states that LOX 4 is in an area relatively uninfluenced by canal inflows. Actually, LOX 4 is near a perimeter canal (less than about a mile) and water quality at that station shows a strong canal influence.

19) Figure 2C-1: Why are TP concentrations in ENP before 1986 missing for the interior stations? The water quality data at some ENP stations go back to as early as 1959. (Also, Figure 2C-3 shows ENP interior station data for 1987-2002?)

20) Table 2C-1: Table 2C-1 indicates a single less-than values for TP for a specific set of data. We found that in historical data from ENP and LNWR the censoring level for less-than values changed during the period of record, so I assume the values in Table 2C-1 are the smallest less-than value reported during the period of record. In an evaluation of historical trends in ENP, we report some probable false time trends in concentrations of sulfate and TP that were likely attributable, in part, to the high percentages of less-than and zero values and to changes in reporting levels over the period of record (Miller and McPherson, 2004). It may be worth noting that the less-than values in Table 2C-1 are the smallest and that higher less-than values may have been reported.

21) 2C-17, 2nd paragraph: The text notes that "Mean and median TN concentrations measured across all portions of the EPA during WY2004 were similar to or slightly lower than those observed during WY2003..." However, Table 2C-3 shows that higher values were observed in WY2004 for the Refuge inflow, outflow, rim, and WCA-2 inflow. These points should be noted in the text, along with the reductions.

22) Although not specifically cited in this chapter, the authors might consider mentioning several relevant studies: (1) Richardson, J.R. and others 1990. An evaluation of Refuge habitat and relationships to water quality, quantity, and hydroperiod. A synthesis report. Some of the earlier data included in this chapter was presented and discussed in the "Richardson" report. (2) http://www.wwwalker.net/ A number of reports in the Everglades Protection Area are available at this web site. Some of these reports include evaluations of trends in water quality, especially phosphorus, at inflow, outflow, and interior stations.

23) Appendix 2C-2, add a column showing whether samples are grab, flow-proportional composite, or time-composite.

Chapter 3

1) p. 3-3, final para, 2nd sentence: Should be changed to read "Except during bypass events, the basins designated as ECP do not discharge directly to the EPA, but discharge to the STAs for further treatment."

2) p. 3-10: It is difficult to reconcile the farm level monitoring results with estimated EAA concentration and load calculations presented elsewhere in this report. This section does present plausible conjectures about why these values are so different, but we should also consider the possibility that the simplified methods for budgeting loads from the Lake and runoff may be flawed. A better understanding of these mechanisms is not simply a regulatory issue. Water quality improvements from new

management practices and water operations depend on a clear understanding of sources and mechanisms.

3) p. 3-12: The BMP research reported here provides vital information for management and operational improvements. Continued support of such studies is clearly of central importance to improved water quality.

4) p. 3-20, Section II: The non-ECP basin information is important. More of this information should be moved from appendices to the main body of the report.

5) Table 3-5: under "EAA to WCAs" the flow and load through the G-300/301 structures should be reported. Table 8-4 reports 2629 Kg of TP (2.6 mtons) from the EAA were passed by these structures in WY04. These structures should be included every year, even if it is zero in a particular WY.

6) Tables 3-10 and 3-11: It would be of value to the reader to also display a line on the graph (or alternatively a note) showing the median and average values for the percent of farms.

7) App. 3-2, General: This appendix is clear and well written. The information presented here is a major component of the monitoring supporting Everglades restoration. The appendix is essential reading for all reviewers interested in water quality in the EPA. Future reports could consider adding this information to the main volume by adding a chapter or incorporating it into an existing chapter.

8) App. 3-2-5: It is stated that Appendix 3-2 does not track compliance with the interim and long term TP concentration levels set forth in the consent decree. This information from the quarterly Settlement Agreement Reports should probably be summarized or referenced somewhere in the SFER.

9) App. 3-2-9: The specific conductance numerical criterion of 1275 µmhos per centimeter or 50% above background, whichever is *greater*, is not protective of low conductivity water like that naturally present in most of the Northern Everglades. Background concentrations in the Refuge are in the range of 100-200 µmhos per centimeter. A reasonable value for comparison, 50% above background, would be 300 µmhos per centimeter. All Refuge sites (App 3-2b) appear to have conductivities well above this value and are of great concern.

10) App. 3-2-11: The alkalinity numerical criterion is not appropriate for the Refuge. Water in the Refuge is naturally very low in alkalinity, and the native communities of periphyton within the Refuge are dependent on the continued maintenance of this condition. Thus, the numerical criterion of alkalinity not being below 20 is not protective or appropriate.

11) App. 3-2-13: The first sentence is confusing. Are these gates always open, or always open when the upstream pumps are in operation?

12) App. 3-2-15: the use of G-94B as a surrogate for G-94A and G-94C may no longer be appropriate. As STA-1E comes into operation, we expect that significant changes in flow patterns will occur. In particular, G-94A and B may be in canal reaches that gain flow from the interior. There may also be significant differences in water quality between these sites because of velocity differences. Canal cross sectional area is considerable larger at G-94A, and some change in entrained sediments from the reduction of velocity at this site may occur.

13) App. 3-2-15: The statement that direction of flow at the G-94 structures has "always" been toward LWDD is not correct. At times the LWDD canal stages are higher than the Refuge L-40 Canal. Historically, flows into the Refuge have occurred through the G-94C, and perhaps other structures.

14) Appendix 3-2a: Quarterly sampling of major ions at non-ECP sites is not adequate. There are concerns within the Refuge for impacts from alkalinity, calcium, chloride, and hardness. These concerns are greatly increased by the potential impacts of STA-1E discharges on Refuge flow patterns and impingement of canal water into the interior. Sampling frequency for major ions should, at a minimum, be monthly with biweekly sampling when flowing. Because nutrient sampling is already performed at this frequency, little added cost of collection would be involved.

Chapter 4

1) General: The discussion of water quality at sites downstream of STA discharges is very limited in scope and discusses only dissolved oxygen. These discussions should be amplified to include nutrients and other relevant water quality parameters.

2) General: Very large amounts of effort and funding are expended in collection of flow and water quality data within the STAs. It seems, therefore, uneconomic to fail to gain as much useful information as possible from these data. Past ECRs have provided annual water and total phosphorus budgets for the STA treatment cells. This was a valuable part of the report that provided insight not only into STA performance, but also helps to evaluate data quality and future data needs. It was therefore disappointing to find that once again these analyses were not a part of the draft 2005 SFER. In previous years comments it has been suggested that mass balances should be extended to other constituents. At a minimum this should include chloride and total nitrogen. For discharges to the Refuge, it would also be of value to see such an analysis for calcium and alkalinity. It is recommended that these balances be incorporated in next year's SFER, and that previous mass balances for all previous years be included in appendices of that report. We do note that Appendix 4-11 suggests that there is an effort underway to automate these budget analysis reports. We strongly support any effort that will make this valuable information once again available.

3) p. 4-1, 2nd para: Does "as early as this summer" refer to summer of CY 2005?

4) p. 4-2, Table 4: This table should include values or ranges of design specifications for hydraulic and TP area loading rates. This will give the reader a better understanding of the implications of the WY2004 annual loading rates relative to design (i.e. was there overloading or underloading).

5) Table 4-2 and Page 4-7 paragraph 1: The authors conjecture that "Had STA-1E been operational, the TP loads and concentrations entering the Refuge would have been lower; performance enhancements are under way." This is not factual. Even if STA-1E removes TP as efficiently as STA-1W has in peak-performance years, it will very significantly increase loading because it substantially increases the total inflow to the Refuge. STA-1E will aid the restoration of the EPA by providing new water that previously has been sent to the Lake Worth Lagoon. This benefit, also presents the challenge of limiting total Refuge TP loading while delivering this new water to the natural areas south of the Refuge. STA-1E is designed to take only a small part of the load now entering STA-1W, and would have had little value in reducing the 80% overloading cited in the chapter. STA-3/4 was designed to treat 250,000 acre-feet of Lake water annually (Page 4-33). Had the much larger STA-3/4 been fully operational during the time of STA-1W overloading, substantial quantities of the Lake water might have been diverted to the STA-3/4 system.

6) p. 4-8, number 8: The SFWMD demonstrated innovative and adaptable management in finding novel ways to minimize water supply deliveries through the Refuge.

7) Table 4-5 and Figure 4-7, the site of MESO01 should be added to the map.

8) p. 4-17: The XYZ transects are miles from the STA-1W discharge, and are nearly totally irrelevant to a discussion of DO in the STA-1W discharge. Downstream monitoring should be located closer to the outfalls. The XYZ transects are relevant to penetration of water and contaminants, including TP from STA-1W, into the Refuge in their vicinity.

9) p. 4-17: Of the 9 marsh XYZ sites, all but Z3 and Z4 fail the SSAC test (Appendix 2A-3) and are highly impacted by canal water intrusion, much of which likely originating at STA-1W. Comparison of pump outfalls to heavily impacted marsh sites does not demonstrate a lack of impact. Future monitoring might consider locating sondes at LOX 11, LOX 12, and LOX 13.

10) p. 4-51: The concept that hydropattern restoration with contaminated water has a net benefit to Everglades wetlands is unproven. It may take many years for recovery of P contaminated wetland soils following this practice. A better approach may be to delay discharge to these sensitive wetlands until appropriate treatment levels can be achieved.

11) p. 4-62 and Figure 4-33: There are several problems with this figure and analysis (See Attachment 1 below). First, it is suggested that if the figure is retained, a 1:1 line of

complete removal be added. Second, the regression line should be forced to have an intercept of zero. With no loading there is no removal. Third, the R^2 statistic is improperly applied here. More complex statistical tools must be used when the x and y values in a regression use the same or highly correlated variables in their calculation. Removal equals the input load minus the outflow load. Thus, inflow load appears on both axes. Additionally, inflow and outflow discharge is highly correlated. Both circumstances cause the apparent quality of the regression to be artificially high. This statistical problem is widely recognized by hydrologists in the analysis of stream loads – plotting load against discharge gives an artificially good fit because discharge is used to calculate load. Sophisticated statistics are required to analyze such problems.

12) p. 4-68: The citation of Tukey-Kramer HSD is not listed in the Literature Cited.

13) App. 4-12: This pdf is unreadable.

14) App. 4-13: Tracer studies are of great value and should be continued.

Chapter 5

1) General - Historical average for WCA-1 (throughout document): There have been four different regulation schedules in WCA-1. The "historical" information masks the effects of each schedule. It may be more relevant to look at the period of record for the current regulation schedule (1995 on).

2) p. 5-1, Summary, 1st para: "This chapter updates hydrologic data and analysis from the *2004 Everglades Consolidated Report* and has expanded coverage to address the hydrology of the area within the District's boundaries, providing a more comprehensive overview of the South Florida hydrology."

   Be more explicit as to what this means. What areas were added that were not in last year's report?

3) p. 5-4, 3rd para: Thank you for correctly describing the relationship between WCA-1 and the Arthur R. Marshall Loxahatchee National Wildlife Refuge!

4) p. 5-4, Hydrology: In sentences like the one below (throughout the chapter), make one sentence by eliminating the parts after the reference to the figure:
   "The SFWMD area is divided into 14 rainfall areas for operational purposes. Figure 5-2 depicts these rainfall areas…"

5) p. 5-4, Hydrology: It would be very helpful to have a table showing which stations are used for which summaries, the period of record and any references to data summaries.

6) p. 5-4, Hydrology: Which stations are used for WCA-1 and WCA-2 rainfall values? Are they averaged? Why is it mentioned that the ENP rainfall is an average of 4 stations, but there is no indication of how other values are calculated?

7) p. 5-4, Hydrology: The varying length of data from rainfall stations means that among areas comparisons are being made to different benchmarks. We know that there are decadal and greater patterns in rainfall. The table mentioned above would help the reader be able to evaluate the data in the appropriate temporal context.

8) p. 5-7, 3rd full paragraph: Hydrologic indicator for what? This seems out of place.

9) p. 5-4, Hydrology, Figures: Lines on monthly rainfall and ET graphs were hard to distinguish when printed in black and white. Maybe use a third type of dashed line and increase the symbol size.

10) p. 5-16, Evapotranspiration: Same comment as for rainfall stations- a table listing the sites used would be helpful.

11) p. 5-16, Evapotranspiration: Are ETp values based on pan evaporation at weather sites, other field measurements, or on some equation? If an equation is used, please provide the equation and a citation to support its appropriate use.

12) p. 5-17, Water Levels, General: Make it clear what stations are used for the analysis.

13) p. 5-24: There are six water level stations in WCA-1(1-8c, 1-8t, 1-7, 1-9, north Lox, south Lox). Four of them are used for determining water management (1-8c, 1-8t, 1-7, 1-9) depending on the time of year and whether water is rising or falling. Whether WCA-1 is within the regulation schedule is not measured by the 1-7 gauge alone.

14) p. 5-24: The regulation schedule for WCA-1 has two parts the upper line and the lower line. In the discussions in this chapter only the upper bound is mentioned.

15) p. 5-25, Figure 5-29: As mentioned earlier, it may be more relevant to compare water year 2004 to water levels since the implementation of the current regulation schedule, rather than the entire period of record.

16) p. 5-25, Figure 5-29: For those of us who are used to looking at the regulation schedule as prepared by the COE, the presentation here was a little confusing. A note in the caption of how the values on the graph relate to what we see on the schedule would be helpful.

17) p. 5-35, 1st sentence: Give some examples of what the "other water management decision factors" are.

18) p. 5-35: For a better historical understanding of flows in WCA-1 and WCA-2, it should be noted that the S-10E structure has not been significantly used since April 1997, and that the S-6 pump was diverted from the Refuge to STA-2 in May 2001.

19) p. 5-25, Everglades Protection Area Flows, General: Same comment as previously with historic values (#1). Maybe more relevant to use 1995 on.

20) p. 5-25, 2nd para: Mention that discharges through G-300 and G-301 are bypass events and point the reader to where in the report these are discussed in relation to water quality compliance issues.

21) p. 5-25, 2nd para: Were there outflows through S-10E? If not delete it from the list.

22) p. 5-41, Figure 5-50: Inflows and outflow arrows were confusing since outflows from one area are inflows to another. In looking at WCA-1 I expected to see an inflow arrow at the north end. For the outflow arrow from WCA-1, since 51% of the outflow is out S39, move the arrow south. What criteria were used to put the arrows on the map? In the text more outflow areas are discussed. 29% from WCA-1 goes into WCA-2, but this is not shown. Explain what is meant by major hydrologic components.

23) p. 5-42: It would be nice in the future to have a synthesis for each major area that pulls together all the pieces of the water budget presented- rainfall, ET, inflow, outflow and discusses it in the context of recent and longer term conditions. The conclusions section is a start on this, but does not discuss how rainfall and ET relate to inflows and outflows.

24) p. 5-42, paragraph 4: Please note that the difference between current average annual stage and historic average is likely the result of the change in regulation schedule in 1995.

25) App. 5-1-11: Make it clear what station the data are from how does this relate to the discussion in the text since it appears the text was based on the 1-7 and appendix is for 1-8c?

26) App. 5-1 general: Make the graph landscape (or at least two panels) so that it can be read more easily. Put on labels for when the WCA-1 regulation schedule changed.

Chapter 6

1) General: This chapter is an important component of the *SFER* and contains much information that is relevant to restoration, particularly CERP. The authors have made great improvements over previous years' efforts to tie together the loosely organized compendium of sections that are written in different styles and that contain different levels of detail. The chapter would benefit even further from a synthesis section that suggests what the management implications are of the results presented – that is, a

more refined version of the existing Summary section. The management implications are very important to elucidate, and the authors should present possible implications wherever possible. This would be more useful if it was a synthesis of the needs, objectives, and results in a synthesized form, rather than a cut and past of the individual section summaries.

For example, here are a few of the main take-home messages from this chapter with potential management implications we observed:

- Several water level reversals (from rain events) led to more variable wading bird nesting in 2004 than 2003.
- While hydropatterns were improved in Rotenberger, cattail continued to expand and high phosphorus levels near the inflow remain of concern. The District is committed to continuing detailed efforts to better understand the ecological effects of hydropattern restoration.
- Conductivity is a sensitive measure of canal intrusion and continuous monitoring may be a valuable tool to optimize operational decisions to protect the softwater nature of the Refuge.
- Structural changes in Refuge periphyton occurred over a temporal period of less than one month when exposed to high-conductivity marsh water.

2) General (may be applicable to other chapters too): Is the correct term flood control or flood protection?

3) General (may be applicable to other chapters too): What is the time period that the report/chapter covers? The hydrology chapter covers the water year. This chapter goes beyond that through at least June.

4) General: The first paragraph of the summary states that the "Programs of study were based on the short-term and long-term needs of the South Florida Water Management District operations, regulations, permitting, environmental monitoring, Everglades Forever Act mandates, and the Comprehensive Everglades Restoration Plan (CERP)" but there is not a consistent description of the need or tie-back to these needs in the individual sections. How are these studies relevant to management? There needs to be a more explicit tie to how the information presented here will be used in water management decisions. Some sections do a better job than others.

5) General (may be applicable to other chapters too): A stronger tie to the hydrologic analyses presented in Chapter 5 would help to pull the hydrologic and ecologic chapters together.

6) General: Out of all the projects being conducted, why were the ones presented here included and others not? For example, where is the update on LILA?

7) p. 6-1: There is no mention of the conductivity mapping in the summary section for ecosystem.

8) p. 6-3, Introduction, 1st para, 4th sentence: van der Valk, not Valk.

9) p. 6-4, Wading Bird Monitoring: In the first paragraph there is reference to wading birds playing a prominent role in adaptive protocols, minimum flows and levels and day-to-day operations of the District. We expected further discussion of this. How do the findings tie back to this?

10) p. 6-4, Wading Bird Monitoring: A graphic of the nesting effort by region would help to illustrate the spatial distribution of nesting.

11) p. 6-4, Wading Bird Monitoring: Discuss levels of uncertainty associated with bird count estimates.

12) p. 6-5 last para: Three groups of species met the numeric nesting targets proposed by the South Florida Restoration Task Force. Need a reference for this. The table references CERP targets. These are not the same thing. The targets may be the same, but the origins are different.

13) p. 6-5, Table 6-1: What is the Base Low/High. Explain in the caption.

14) p. 6-6: It is clear from this section that Rotenberger Wildlife Management Area is responding to increased hydroperiods as part of the hydropattern restoration effort. However, there are no corresponding water quality data provided as part of this section to allow the assessment of hydropattern restoration with nutrient-rich water. It is our understanding that the SFWMD has been collecting water quality data, and perhaps sediment nutrient data. A "preliminary analysis" is noted in the last paragraph, although data were presented in the 2004 ECR. The primary concern is that research and experience strongly suggests that recovery of a marsh from nutrient enrichment takes far longer than recovery from being too dry. In fact, the relatively rapid response of the plant community in Rotenberger supports this suggestion. Also, data from other marshes that have been subjected to nutrient enrichment suggest that it will take decades or more for recovery without human intervention. These different time scales raise the very important question of the wisdom of hydrological restoration proceeding with dirty water.

15) p. 6-6, Restoration of Rotenberger: Include data and sample locations for phosphorus concentration levels in relation to vegetation types.

16) p. 6-6, 5th para: It would help to have citations supporting statements about obligate plant species and their response to nutrient status.

17) p. 6-7, Figures 6-1 and 6-2: Explain why there is a 0.25 ft offset.

18) p. 6-7, Figure 6-2: Make the graphic larger (change stage scale to 11-13.5) so that the confidence intervals can be seen. Maybe present as a shaded band with the lines as overlays.

19) p. 6-8, Tree island seedling study: Need a reference for pond apple, red maple, and gumbo limbo as being dominant tree island species. Also explain that they are dominant in WCA 3 and 2(?). They are not dominant in WCA-1. Why these species when litterfall work show greatest volume from pond apple, cocoplum, wax myrtle, and willow?

20) p. 6-8, Tree island seedling study: Define for the reader what "compound treatments" are.

21) p. 6-8, Tree island seedling study: How will the results of this study provide the district with critical information necessary to meet urban water demands…? Give examples.

22) p. 6-8, Tree island seedling study: Will the treatments of wet and dry correspond to the times of year when the trees would experience wet and dry conditions? Could this be a factor in the results?

23) p. 6-11, Influence of water mineral content: In first paragraph write out Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge).

24) p. 6-11, Influence of water mineral content: Synoptic survey information is not described in the summary.

25) p. 6-11: The SFWMD is to be commended for initiating this very important research effort, as it has significant implications to the Refuge. Chapter 2A of this report indicates significant increases in conductivity and other indicators of canal water intrusion (such as sulfate) into the Refuge interior. Chapter 6 should included a discussion of those potential impacts to the Refuge using the actual data that are presented in another section of the very same report. This observation points out the need for some level of discussion or collaboration between authors of different chapters.

26) p. 6-15, 1st para: It should be no surprise that a biologically reactive element such as P shows no distinct spatial pattern when compared to conservative tracers such as chloride. It is much more likely that uptake of reactive P species led to the lack of a spatial pattern than artifacts potentially introduced by sampling methods. In fact, grab sampling is the method utilized in the Refuge to collect water quality samples used for assessing compliance with the Settlement Agreement.

27) p. 6-18, Table 6-3 caption: delete the $^{-1}$ for "tube^{-1}".

28) p. 6-19, last para: Again, actual data reported in Chapter 2A should be used in this discussion section to relate the experimental results to patterns of water chemistry inside the Refuge.

29) p. 6-21, Tree island ecological process: Have one introduction for the two sections: litterfall and belowground biomass that explains how these two projects are related to the creation of tree island performance measures and other management.

30) p. 6-21, Tree island ecological process: Is there a report further describing the determination of the inundation depths and durations? If so, cite it.

31) p. 6-21, 2nd para: Should long hydroperiod be "inundated more than 50 percent…" or 59 percent as written? If 59 what is the category between 50 and 59?

32) p. 6-21, Tree island ecological process: Explain how the results help establish performance measures as is stated in the first paragraph. What does the relationship between hydrology and litterfall tell you about the condition of the tree island and what we hope to achieve with restoration/appropriate water management?

33) p. 6-22, Fig. 6-10: What are these error bars?

34) p. 6-23, Belowground biomass: How does below ground biomass help with understanding how the vegetation composition, diversity and structure vary over the range of environmental conditions? Is biomass a vegetation structure attribute? More information is needed as to how hydrology is directly related to the creation of organic matter.

35) p. 6-23, Belowground biomass: How does this section relate to the previous section on litterfall and the bigger picture of establishing performance measures and making appropriate management decisions?

36) p. 6-23: The four islands sampled have both different hydropatterns and different species yet the conclusions/discussions focus on the former with only a brief mention of the later. Don't the tree species have different growth forms that might significantly affect the patterns?

37) p. 6-25, Figure 6-11: Define in the caption the box-whisker plots.

38) p. 6-26, Landscape Ecology: First paragraph does not match with what is in the section. It appears to be from last year's report.

39) p. 6-26, WCA-3 Mapping: What year was the photography? Why are these results being presented here if they are from an effort started in 1994? Do they represent an update?

40) p. 6-26, WCA-3 Mapping: How will this information be used within the context of DECOMP?

41) p. 6-26, WCA-3 Mapping: How will what was learned be incorporated into RECOVER vegetation mapping?

42) p. 6-34: Discuss the status and intent of the external peer review of the ELM so the reader knows where the model development stands overall.

43) p. 6-35, Options for accelerating: Should be "Recovery" not "RECOVER".

Chapter 7

1) p. 7-2, 2nd full para (starts "RECOVER is developing an adaptive management program…"): Should not expected responses, as well as unexpected ones, be explicitly noted to bolster the underlying planning hypotheses? It seems that both forms of feedback should be important in applying adaptive management.

2) p. 7-2, 4th full para: the CERP Systemwide Performance Measures Report is likely to not be finished before Spring 2005.

3) p. 7-2, 3rd full para (starts "A total system…"): This paragraph does not appear to fit well in this section. As the content is described in the subsequent section (p. 7-3), suggest removing here.

4) p. 7-3, RECOVER Activities: Another significant effort was focused on the CERP Evaluation Methodology Workshop and products.

5) p. 7-4, Integrated Assessment Protocol, 3rd sentence: the subteam has developed a draft report. Also note for footnotes 4 and 5 that these documents may yet be in further state of development by the time the SFER is published on 1 Jan, so the FTP links may need to be updated.

6) p. 7-16, Evaluation: Many of the hydrological performance measures applied to the SFWMM and, potentially to the RSM, address ecological considerations. For example, during the Restudy, SFWMM output included the number of days that water levels exceeded X level on a continuous basis during Y season (e.g., the deer herd performance measure), or similar hydrologic performance measures based on ecologic considerations. This section does not capture this integration of hydrologic performance measures with ecological consideration, and so does not do justice to the process that has evolved during the Restudy.

7) p. App. 7-2-1: Need to add to intro paragraph after 2nd sentence, "An asterisk next to an "Evaluation Tool" indicates that the tool is proposed, but not yet approved." Then an asterisk needs to be added to GE-E7 through GE-E10.

Chapter 8

1) General: A portion of the excess load to the Refuge is attributed to excess runoff from the S5A basin that was not considered in the STA design. STA1E will not solve this problem.

2) p. 8-12, Source Control Measures: It is asserted, “comparatively little is known about the technical efficacy and economics of controlling total phosphorus (TP) loads from these other non-ECP basins.” We disagree. Great effort has been expended in recent years to investigate both the efficacy and economics of source controls within the EAA and elsewhere. Often, controlling pollution at its source is found to be far more effective and economical. This conclusion is supported by information presented in Chapter 3 that describes (page 3-12) the efficacy of specific management alternatives, and by TP reduction success reported in Chapter 2C and attributed to BMPs. Failure to address source controls under the LTP program cannot be justified by lack of understanding. We urge the LTP program to pursue source controls as an important element in Everglades restoration.

3) p. 8-14: Table 8-4 fails to include the G-94C flow in the “From WCA1” section. In Appendix 5-2 Table 7 the total from G-94C was listed as 26 thousand acre-feet. Concentrations for G-94A, B, and C are monitored at the G-94B. The G-94B TP concentrations are the highest of all outflow monitoring sites averaging 118 µg/L (App. 3-2b-20). Thus, this is not an insignificant part of the “From” load.

4) p. 8-14, Table 8-4: The report of "ENP Outflows" is inaccurate & misleading. Structures S334 and S197 are not outflows from the Park. S334 is clearly "upstream" of the Park (usually an inflow) and S197 reflects flows passing through C-111 canal into Biscayne Bay and not entering the Park. The Park primarily discharges to Florida Bay as marsh sheet flow at concentrations in the <4-6 ppb range, as reflected by the Park interior marsh sites.

5) p. 8-16, Deduction of STA-1W load recycled from the Refuge would be acceptable only if the STA outflow does not mix with the rim canal or marsh before reentering the STA.

6) p. 8-15 through 8-17: This text provides an accounting and discussion of the cumulative P loads to the Refuge relative to 1978-1988 conditions and evaluation of compliance with the consent decree’s load reduction requirements. We support inclusion of the SFWMD’s interpretation of this information in the SFER. However, there are potential areas of disagreement about the interpretation of the Settlement Agreement language and how the details of these calculations should be performed. These issues have not yet been fully discussed by the settling parties, and no agreement on specific computational methods has been reached. We therefore urge the authors to add sentences similar to:

> “Settling parties have not agreed on specific interpretation of load reduction language in the Settlement Agreement and Consent Decree, or details of load reduction calculation algorithms for compliance determination. Therefore, the interpretations and calculations presented here may be different from methods ultimately selected for compliance determination.”

Chapter 9

1) General: Overall, the invasive species chapter (9) of the document adequately addresses most of the issues, and contains the most current and updated information with regards to invasive species management in general. The individual problematic species accounts are also thorough.

2) General: What is missing from this chapter is a discussion of what effort were undertaken in FY2003 for all species listed (and what the preliminary results/conclusions were for all) except melaleuca and torpedograss, where some treatment information was provided.

3) p. 9-14, Where Herbicides Can Be Used: This section overall was well-written and provided clarification with regards to licensing issues or site-specific uses of herbicides. For clarification, perhaps a discussion on how herbicides may be employed to treat 'new' threats to CERP or EPA *if those species are not specifically listed or identified on the label*….What is the law or regulations concerning this issue specifically for species such as ficus microcarpa, java plum, shoebutton ardisia, earleaf acacia, bischofia, climbing cassia, etc?? At least two different opinions or view points on this issue exist. A detailed answer could be placed under this section as well.

4) p. 9-14, Herbicide Toxicity to Wildlife: Believe section too short and not particularly well-composed. Maybe or perhaps include a table listing the most commonly used herbicides in the EPA or CERP area for treatment of aquatic and upland species, their toxicity or not, and cite studies or research indicating low toxicity or their effectiveness. Just felt section did not contain enough information.

5) p. 9-15 and 9-16, Prescribed Burning & Water Level Manipulation: Sections poorly written, more information actually available and sections lacked flow entirely.

6) p. 9-19: As with the two previous reports, there are several recent *Lygodium* citations missing:

   Brandt, L.A. and Black, D.W. (2001) Impacts of the introduced fern, *Lygodium microphyllum*, on the native vegetation of tree islands in the Arthur R. Marshall Loxahatchee National Wildlife Refuge. Florida Scientist. 64(3): 191-196.

   Darby, C. and McKercher, L.R. (2002) Bones wrapped in *Lygodium microphyllum* rachis suggest a potential problem for wildlife. Wildland Weeds. Fall, 2002. p. 14.

7) p. 9-27, Lobate Lac Scale: Section is entirely too short. Additional detailed information is available on this subject (e.g., the UFL/USDA fact sheet is 3 pages long).

I believe also that USDA-ARS is in the initial stages of doing an insect inventory, and collecting and identifying potential biological control agents in India. The process is already underway.

Chapter 10

1) General: This chapter was well written (and technically sound) and the authors should be commended for making efforts to draw linkages among all the different pieces of information presented. The illustrations and tables used are pretty clear overall, and useful. It is also well referenced, with a good mix of peer-reviewed journal articles, and agency publications. The information was useful in understanding how the Lake Okeechobee Protection Program (LOPP) will complement work being conducted by the Lake Okeechobee Watershed Project (LOWP) of CERP.

2) General: The major portion of the chapter deals with the phosphorus loading issue to Lake Okeechobee, and the impacts of the excess P on the biogeochemistry and plant community structure in the lake. Phosphorus biogeochemistry, of course, is a strength area of the South Florida Water Management District, and the section on P reflects this strength. The research done on P in the lake and its watershed has done a good job of documenting overall loads to the lake, and the major P sources. The relationship between high levels of P in the lake and cyanobacterial blooms appears well documented. Less clear, from the evidence presented in this chapter, is the relationship between increased P and declines in diatoms and other phytoplankton species, though this may have been discussed more thoroughly in earlier reports. The sections on the relationship between P biogeochemistry, lake water levels, and plant response in different zones of the lake were very interesting. This section demonstrates the complexities involved in restoration of large waterbodies like Lake Okeechobee.

3) General: One major technical comment about the chapter is that water quality is virtually synonymous with phosphorus only. In Lake Okeechobee (not true of other parts of the Everglades, though), phosphorus does appear to be the major water quality issue. But that does not mean it is the only problem. Except for nitrogen, other potential water quality issues are essentially ignored in this chapter. For example, what about organic contaminants (herbicides and pesticides) and their impacts on lake aquatic organisms? How do high levels of sulfate in the lake water affect sediment redox chemistry, sulfide, buildup, trace metal micronutrient cycling, methylmercury production in the lake, and what are the impacts on biota? What about the effects of increased conductivity (salinity) on biota? None of this is addressed in the report, and it is unclear if any of these potentially important water quality issues have been looked at in great detail.

4) General: The estimated "lag time" for seeing water quality improvements in the lake as a result of reduced phosphorus loads is approximately 30 years. Has the LOPP developed any more refined estimates of lag time based on modeling that has been conducted? It would be nice to see a rough estimate of lag time in the report,

particularly if the modeling predicts a time that is more or less than previously believed.

5) p. 10-4, 3rd para: How reliable are the reported estimates of atmospheric deposition? Are data collected from atmospheric deposition stations within the lake unreliable due to contamination of sampling media (i.e. bird excrement) or other problems? Are phosphorus inputs to the lake via atmospheric deposition considered "uncontrollable"?

6) p.10-6, 1st para: What incentives does FDACS offer to farmers who participate in the voluntary BMP program?

7) p. 10-6, 2nd para: How will the locations of FDEP non-point source BMPs be chosen? Will the selection process be similar to the land suitability model procedure used by the CERP LOWP? Will any consideration be given to the locations of LOWP facilities so as not to coincide (e.g., avoid placing a detention facility next to an LOWP STA)?

8) General: The number of programs and projects associated with LOPP is extensive and overwhelming – suggest adding a bulleted list or table of all the major programs, the responsible agency, and each program's goals. Table 10-2 presents the major programs associated with phosphorus reduction; perhaps you could expand this to include programs associated with water level regulation and control of exotic species.

9) p. 10-8, 3rd para: "annual" should be changed to "annually"?

10) p. 10-9, 2nd para, last sentence: Does "n=25" correspond to the number of basins in this study or to the number of observations (net phosphorus imports)? If observations, suggest caution in referencing a parametric regression model based on only 25 observations.

11) p. 10-10, 2nd para: How will the success of FDEP's public education programs be measured? Public surveys?

12) General: An annual meeting/conference on all restoration activities in the Lake Okeechobee area would be extremely valuable for all parties involved in the restoration process. It would increase learning among all involved in the LOPP (particularly successes, lessons learned, etc.). Perhaps this is already in place?

13) p. 10-11, 4th para: It would be really informative to provide the locations of all of the micro-basin monitoring stations in the LOWOD network.

14) p. 10-12, 3rd para: What is meant by "coarse-scale"? A rough estimate or approximate range? Qualitative?

15) p. 10-15, 5th para and Figure 10-16, Panel A: Since inflow water volume is discussed, suggest plotting this as a 2nd y-axis in Figure 10-16.

16) p. 10-15, 5th para, 2nd sentence: It is expected that inflow volume would be highly correlated with total phosphorus loading because flow is incorporated into the load calculation (and is on both sides of the regression equation, if regression was performed). You later state that concentration and flow are not correlated. Perhaps you could remove or reword the sentence regarding inflow volume and load, as it is misleading.

17) p. 10-17, 1st para: Have you considered measuring turbidity along with Secchi disk transparency? Secchi disk readings can be subjective and can vary significantly from operator to operator. Recording a corresponding turbidity in the water column may help quantify operator error.

18) p. 10-23, 3rd para, last sentence: Though it is early in the planning process, have you identified a reasonable response time that would elapse before you would consider the lake "unresponsive" and then apply chemical treatment?

19) p. 10-45, Figure 10-8: Please include the USGS sub-basin monitoring stations associated with the LOWP. These stations provide both flow and concentration information. USGS can provide you with station information and coordinates, if you feel it would be useful to include them on your figure.

20) p. 10-51, Table 10-4: Why do you think that mean loads (and at some sites, median loads) are significantly higher at watershed sampling sites than at the structure outlet?

21) pp. 10-65 and 10-67, Figures 10-19 and 10-21: SAV data are shown at the northeastern edge of the lake in Fig. 10-21; however, the sampling transects for these data are omitted from Fig. 10-19.

22) p. 10-73, Figure 10-27: Suggest using lines of different weight or style to represent the 3 conditions presented. On a black-and-white copy, these lines are indistinguishable.

Chapter 11

1) General: This chapter was well written and informative.

Attachment 1:

THE LOADING GRAPH TRAP
IN
TREATMENT WETLAND DESCRIPTION

THE LOADING GRAPH TRAP
IN
TREATMENT WETLAND DESCRIPTION

Robert H. Kadlec
December 16, 2001

The purpose of this document is to illustrate the fallacy of graphical data representations and associated regressions between variables that contain the same multiplier, and the extrapolation errors that may accompany an incorrect model choice. As an example, consider a pollutant reduction process in which water is passed through a "green box" that achieves concentration reduction. The concentrations entering are presumed to vary randomly between 0.2 and 1.2 (gm/m^3). Likewise, the concentrations leaving are also random, ranging from 0.1 to 0.3 (gm/m^3). Therefore, the mean inlet concentration is 0.7 gm/m^3 and the mean outlet concentration is 0.2 gm/m^3, and the resulting average concentration reduction is 71% (5/7).

A set of fifty "experiments" is run, in which the hydraulic loading is varied linearly between 1 and 50 m/yr. For any experiment, the inlet and outlet concentrations are independently random within the ranges selected (Figure 1). Not surprisingly, linear regression of the input-output concentrations explains virtually none of the variability. It is a crap shoot as to what the output may be. There is a 84 ± 14 % (mean ± sd) concentration reduction, and that is all that may be determined.

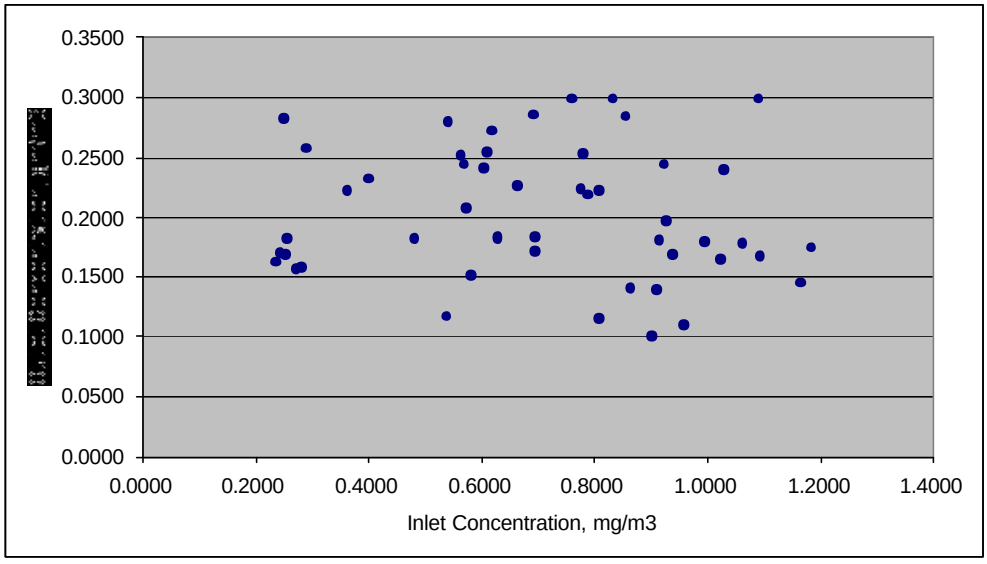

Figure 1. Scatter plot of input and output concentrations.

Next, hydraulic loading is explored as a means of explaining performance. We know in advance that there is no correlation whatsoever between performance and load, and indeed our random dataset bears this out. Linear regression of concentration reduction vs. hydraulic loading has an $R^2 = 0.001$.

Next, we examine a correlation between pollutant load reduction and inlet pollutant loading. Pollutant loading is defined as hydraulic loading times concentration, for both the inlet and outlet. Pollutant load reduction is the difference between inlet and outlet pollutant loadings.

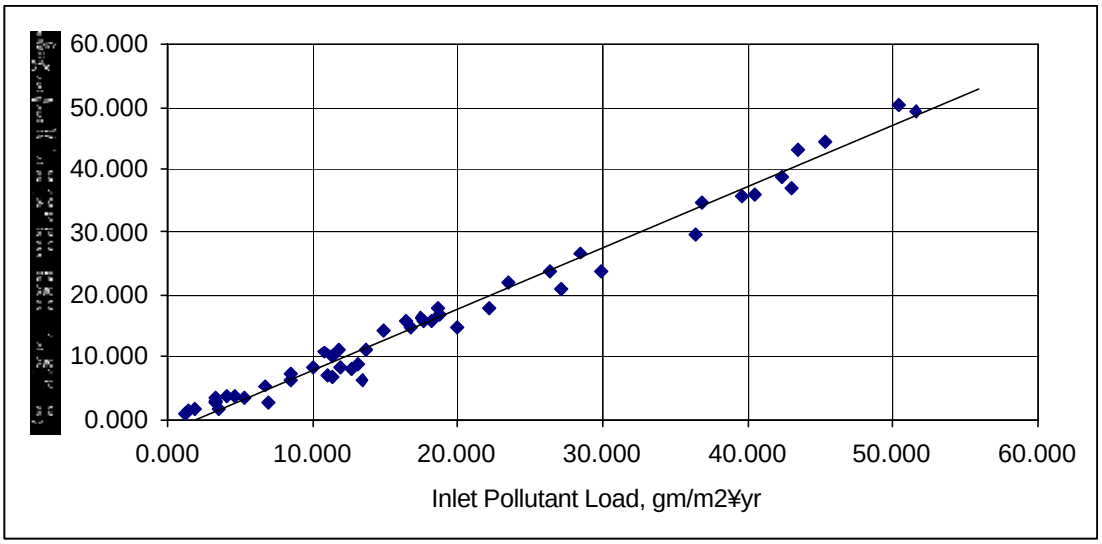

Figure 2. Load reduction versus incoming load.

Wow! A wonderful correlation, with an $R^2 = 0.981$. Certainly makes our data look great, and makes us feel that we can use this for design.

Unfortunately, in reality we haven't gained a thing. This green box device is a random result generator, with only one explainable feature: on average, it produces about 71% concentration reduction. There is no connection to inlet loading, no matter how much the load graph appeals to us. The hydraulic loading appears in both the ordinate and the abcissa, thus causing a stretching of a random two-dimensional cloud along a diagonal axis.

Next, let us examine the formerly popular first-order plug flow model. The same computed random "data" set is easily manipulated to calculate a k-value for each pair of input-output concentrations:

$$k = q \cdot \ln\left(\frac{C_{in}}{C_{out}}\right) \qquad (1)$$

The k-values so calculated may then be plotted as a function of the pollutant loading (Figure 3).

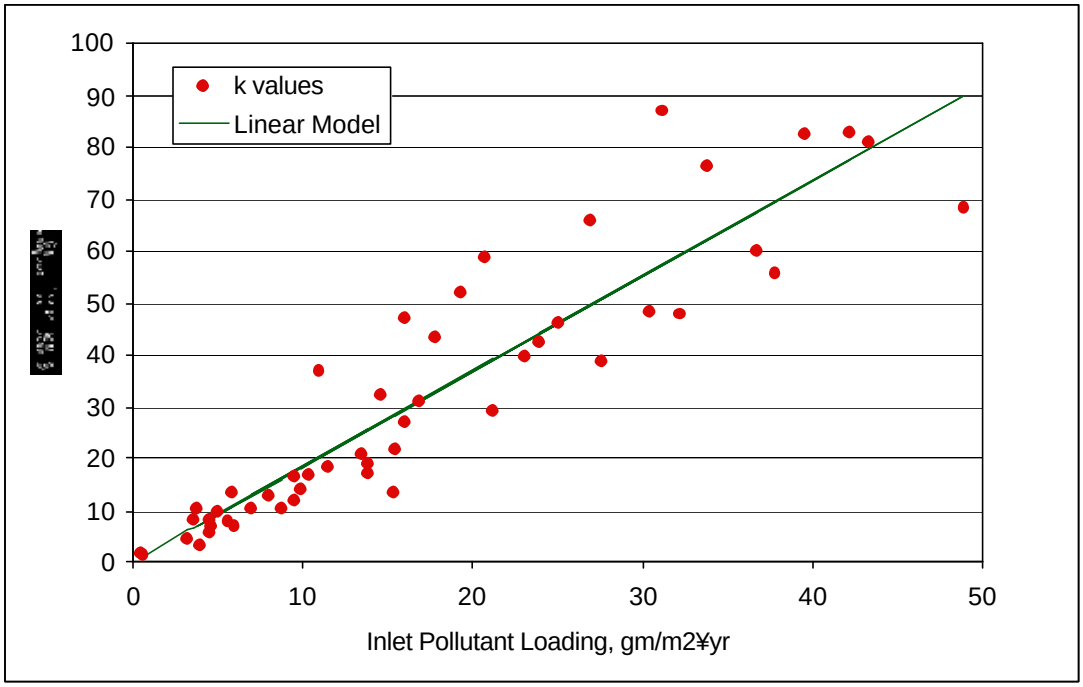

Figure 3. Calculated first order rate constants versus inlet loading.

Wow again. These k-values are nicely correlated with pollutant loading. The linear regression has an R^2 = 0.85. But, no matter how much this rate vs load graph appeals to us, there is no exponential performance relation involved. The average k-value produced from the 50 single I/O data pairs is 31 m/yr. Or, the Excel™ Solver routine can be used to find the k-value that minimizes the summed square concentration errors, which produces k = 47 m/yr. Again, all we have done is stretch a random two-dimensional cloud along a diagonal axis.

The subtle trap that has gotten us into trouble is the failure to check whether or not the model has any validity. That can be done in a number of ways, we will look at three methods here. The first method is the direct examination of the data trends expected from the model. For the simple first order case, we expect the fraction of pollutant remaining to decline exponentially with detention time, or equivalently with the inverse of hydraulic loading, as per a simple rearrangement of Equation 1. In the present example, log-linear regression of data has an R2 = 0.000. For more complicated models, a linearized version is not available, and other methods must be used.

So as a second choice, we can use nonlinear parameter estimation, but retain use of the "R^2" metric, defined as:

$$R^2 = 1 - \frac{\sum (C_o - C_{model})^2}{\sum (C_o - C_{avg})^2} \qquad (2)$$

where C_o = outlet concentration, gm/m3
C_{avg} = average outlet concentration, gm/m3
C_{model} = predicted outlet concentration, gm/m3

When the model reproduces outlet concentrations exactly, the numerator sum is zero, and R^2 = 1.000. When the model concentrations are equal to the average, R^2 = 0.000. If the model values are more in error than the use of the average outlet concentration, negative values of R^2 result. Here, the calculated variable is outlet concentration, as opposed to the logarithm of concentration used in method 1. This nonlinear parameter estimation results in k = 47 m/yr, and produces R^2 = -6.1, which is a very strong signal that the PFR model is useless for this example.

A third method of checking the model is via the residual errors in the model fit:

$$RE = C_{model} - C_o \qquad (3)$$

If the model is correct, then errors should not favor one end or the other of the hydraulic loading spectrum. However, as seen in Figure 4, there is a very strong trend in model results, with large over-prediction at high loadings, and large under-prediction at low loadings.

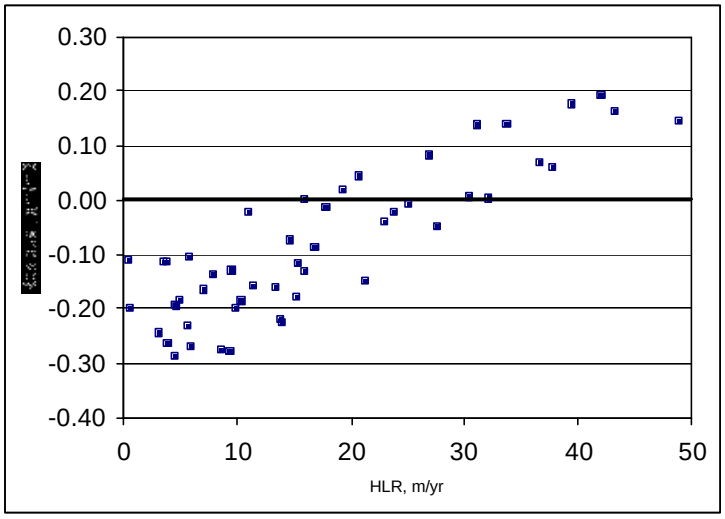

Figure 4. Distribution of residual errors with hydraulic loading for the first order fit.

The effect of this incorrect model is devastating when it is used for extrapolation. For example, suppose the "experiments" were carried out only at low hydraulic loadings, the lower twenty percent of the range of 1 - 10 m/yr. Across that low range, it correctly produces about 71% concentration reduction. The first order model coefficient obtained from regression is k = 9.0 m/yr. It is then conceivable (but not wise) to extrapolate the model to higher loadings, such as the upper twenty percent of the range, 41 - 50 m/yr. This extrapolation suggests an outlet concentration of 0.52 gm/m3. The result of this ill-advised calculation is the forecast of a 26% concentration reduction.

The reverse of this loading discrepancy is even worse. We suppose that the "experiments" were carried out only at high hydraulic loadings, the upper twenty percent of the range of 41 - 50 m/yr. Across that high range, it correctly produces about 76% concentration reduction. The first order model coefficient obtained from regression is k = 60 m/yr. It is then conceivable (but not wise) to extrapolate the model to lower loadings, such as the lower twenty percent of the range, 1 - 10 m/yr. This extrapolation suggests an outlet concentration of 0.0003 gm/m3. The result of this ill-advised calculation is the forecast of a 100% concentration reduction.

It is interesting to examine what happens when the also-popular k-C* model is calibrated to this "data." The Excel™ Solver routine is used to get the best-fit values of the two parameters for three TIS, which are k = 6697 m/yr and C* = 0.176. In other words, the model produces C_o = C* = 0.176 no matter what the inlet concentration may be. The value of R^2 = 0.000 correctly reflects the fact that this model is also useless, in that it adds nothing to the estimate of a mean value for outlet concentrations.

Conclusions

The presumption of first order treatment wetland behavior must be checked for validity, else serious misinterpretations of data may result. Among the possible consequences of an incorrect presumption are:

- An invalid (spurious) load removed vs load added graph.
- An invalid (spurious) k-value vs load added graph.
- Disastrously incorrect extrapolations.

It is noted that both invalid graph types appear in the PSTA reports (e.g., Exhibit 5-5 in the STSOC and Exhibit 3-20 in the Summary). It is further noted that the second method of model validation (explained above) produces very small or negative R2 in several data sets for which the first order model has been used in the PSTA STSOC and Summary. For instance, my non-linear k-C* analysis of PP4 (once it was past startup) had an R^2 = -0.25. That tells me that the model is

wrong, and therefore any inference about C* and the lower limits of P concentration is meaningless.

These concepts have been nicely elucidated in the following reference:

Von Sperling, M., 1999. "A Critical Analysis of Classical Design Equations for Waste Stabilization Lagoons and Other Wastewater Treatment Systems," Wat. Env. Res., Vol. 71, No. 6, pp.1240-1243.

Topic: Martin Co. IRL Response - Patrick Hayes (1 of 1), Read 11 times, 1 File Attachment NEW
Conf: VOLUME I ********** THE SOUTH FLORIDA ENVIRONMENT - WATER YEAR 2004
From: Trudy Morris -Webboard Manager tmorris@sfwmd.gov
Date: Tuesday, September 28, 2004 02:18 PM

The Attached was submitted by Patrick Hayes, Supervisor, Martin Soil and Water Conservation District, Stuart.

PHAYES_SFER.PDF (190KB)

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September 23, 2004

Jeff Jordan, Chair
South Florida 2005 Environmental Report

Dear Jeff:

I enjoyed meeting with you on Tuesday, September 21st and appreciate the opportunity to make public comment. In reviewing the day's proceedings I was surprised that the critical and chronic state of our local ecosystem did not seem to reveal itself in the presentations submitted to the panel.

In Martin County, the health of the Indian River Lagoon continues to degrade and the large volume discharges to tide through the C44 Canal into the St. Lucie estuary and the discharges from S46 into the Loxahatchee River estuary, (the two southernmost inlets of the Indian River Lagoon) have reduced the health of these estuarties to critical levels. Significant destruction of sea grass habitats and oyster beds, in addition to continually worsening overall water quality, has left these estuaries unable to recover their biological diversity. In the case of the Loxahatchee River, salt water intrusion during normal periods has taken approximately six miles of the fresh water ecosystem so ~~flawed~~ valued by this, the state's first designated wild and scenic river. Current minimum flows and levels seem to have institutionalized several decades of critical losses while appropriate "reservations" of water have yet to be determined and enacted which might ensure some restoration to this system.

The St. Lucie and Loxahatchee Rivers and their estuaries in Martin County need meaningful ~~and~~ minimum flows and levels of water along with limits on volume discharges during storm events in hopes of providing some stability to these ecosystems. Without these measures, these systems will continue to degrade and the losses in this, the nation's most bio diverse estuary, will continue, at what are currently alarming rates.

We support your efforts to objectively review South Florida's environment and trust that you will reflect the urgency associated with remedying these conditions.

Respectfully,

Patrick J. Hayes
Supervisor

Topic: DOI technical comments (1 of 1), Read 30 times NEW
Conf: CHAPTER 1: Introduction
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:45 PM

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Topic: USFWS SFFO Technical Comments (1 of 1), Read 13 times NEW
Conf: CHAPTER 1: Introduction
From: Todd Hopkins todd_hopkins@fws.gov
Date: Thursday, September 23, 2004 02:49 PM

Dr. Jeffrey L. Jordan, Professor and Panel Chair
2005 South Florida Environmental Report Peer Review Panel
Dept. of Agricultural and Applied Economics
University of Georgia
Griffin, GA

Dear Dr. Jordan:

Please find enclosed comments on the draft 2005 South Florida Environmental Report (SFER). These comments were provided by technical staff of the U.S. Fish and Wildlife Service (Service), South Florida Ecological Services Office. These comments are technical in nature and do not necessarily represent official policy of the Service or the Department of the interior.

We appreciate all of the hard work that the authors have done to prepare their chapters, and we commend the SFWMD, FDEP, and the other agencies and entities involved for developing a comprehensive report.

The combination of a short review window and this year's very active hurricane season has made it particularly challenging to provide a thorough review of this important report. The comments enclosed reflect our best efforts to dedicate resources to meet this challenge. A lack of comments on other aspects of the document therefore does not indicate a lack of interest, nor should it be interpreted as implied consent to the technical aspects of the document.

Respectfully submitted,

Todd E. Hopkins, Ph.D.
USFWS

Reviewers:

Roger Congdon, Ph.D
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Todd E. Hopkins, Ph.D.
Freddie James
Shawn Komlos
Susan Teel
Les Vilcheck

Chapter 2C: Status of Phosphorus and Nitrogen in the EPA

General Comments

The only reason mentioned as contributing to the improvement of levels of TP and TN in the system in this chapter was the success of the BMP and/or STA programs. Since the Plan details a measurement methodology flexible enough to account for "natural heterogeneity of the ecosystem while taking into account natural spatial and temporal variability," were other contributing factors such as climatic conditions or changes to water management practices over the same period considered as well? Some mention should be made if only to rule them out.

Although not specifically required by the Rule, will there be any consideration of P and N bound up in the soils of the EPA? These levels will not change as rapidly as nutrient levels in the water column and changes in habitat structure such as cattail expansion and loss of slough habitat can be more attributed to resident nutrient levels rather than inflow.

The entire chapter structure could be improved.

Chapter 3: Phosphorus Controls for the Basins Tributary to the EPA

Specific Comments

Page 3-3, Paragraph 1. How can the exceptions listed for non-ECP basins (i.e. "phosphorus concentrations, dissolved oxygen (DO), and occasional excursions from standards for pH and specific conductance") exist and the water quality be considered "generally acceptable"? Please justify this interpretation.

Page 3-15, Paragraph 2. "The basin-level reductions are generally supported by the UF/IFAS on-farm research." What does this really mean?

Chapter 4: STA Performance, Compliance and Optimization

Specific Comments

Page 4-1 paragraph 3. The suggested test changes below are more consistent with language in the other STA sections.

A 6 to 18 –month vegetation start-up period is anticipated before STA 1E is expected to discharge to the Arthur R. Marshall Loxahatchee National Wildlife Refuge, depending on meeting start-up requirements.

Table 4-1. Why are there TBD entries for the hydraulic residence time (d) values on this table?

Table 4.2. Operational status of STA-1W and STA 5. Are not flow weighted mean TP values averaging 148 ppb into the Refuge and 367 ppb through G-406 above the " design objective of the EFA," and "achievement of the interim discharge goal of less than 50 ppb for TP"?

Page 4-4. STA-1E. Does the 94,000 acre feet from the C-51 basin include stormwater from Acme Basin B? Does the 31,000 acre feet from the S-5A basin

moving through the G-311 represent replacement of Acme B water sent to tide?

Page 4-7. Second paragraph. STA-1W Operations. How do these STA bypass events which discharge stormwater into the Refuge affect the oligotrophic ecosystem in the marsh interior? Do these bypass events cause elevated TP levels in the Refuge?

Page 4. Management Activities Implemented Since the Overload Event–Number 8. A successful experiment delivering water around the Refuge to meet water supply demands is mentioned. Clarification of the route around the Refuge would be helpful. More detail on the experimental design and reference to these data and statistical analyses would be valuable.

Page 4-11. STA-1W Total Phosphorus. It would be more consistent and easier for the reader to interpret and compare performance of the STAs if the same language was used to describe the performance of each STA. The language used for describing the performance of all the other STAs is: Under the design objectives of the EFA, STA x is achieving/not achieving its interim discharge goal of less than 50 ppb for TP. It would be helpful to let the reader know if the interim goal of 50 ppb TP is or is not achieved for STA 1W similar to the text used to convey this information on page 4-40 (STA 5).

STA-3/4 Operations. Page 4-35. It would be helpful to add detailed information as to what the mercury levels were at inflow, at outflow when discharges were made, and downstream.

Figure 4-20 page 4-41. It would be helpful to add a line for the 50 ppb TP on this graph as was done in the similar graphs for the other STAs.

. Pages 4-12, 4-43 and 4-59. second paragraph. STA-1W, STA -5, and STA 6. Other Water Quality Parameters. These sentences should be revised as follows. “However, because these parameters have no applicable numeric state water quality standards, STA -1W, 5, 6 is deemed to be in full compliance with the permit.” Is it true that just because there are narrative standards for these parameters that there will not be investigation as to whether discharges having outflow concentrations above inflow concentrations (for parameters such as chlorides, conductivity, and nitrogen) will not contribute to an imbalance to native flora and fauna or degradation of the class III designated uses? The A.R.M. Loxahatchee National Wildlife Refuge is designated an Outstanding Florida Water body and it is our understanding that the anti-degradation standards are more protective than the class III designated use standards.

Chapter 5, Hydrology of the South Florida Environment

General Comments

The word "groundwater" appears only once, on page 5-7, fourth paragraph; and it is only indicated as being one of the parameters in the Palmer Drought Severity Index. This seems to be to be quite a shortcoming, given that the title of the chapter is Hydrology of the South Florida Environment. Most people use ground water as their home supply and wetlands would be considerably less wet with low water table conditions. Also, transmissivities are so high that aquifers have to have a considerable influence on the surface water environment. The word "aquifer" never occurs in the chapter.

Inflows and outflows are discussed as if only what comes in and leaves through streams is of any consequence. Interconnectedness between lakes, streams, and aquifers is not addressed.

The text is largely a description of what is already presented in the many histograms and other figures. The figures obviate the necessity for much of the text, and present the information much more effectively. If it is desirable to present numbers, as opposed to the qualitative figures as determined from the graphs, then one or more tables would be more readable than presenting this kind of information in a written format. Appendix 5-2 may have this information in tabular format.

As this report is to be used by resource agencies to support their management decisions, it would be helpful if the comparisons of WY2004 with WY2003 and the historical data throughout the chapter could include analysis and discussions on why differences are observed. For example, were the water levels observed in Lake Okeechobee during WY2004 consistent with rainfall recorded in the upper watershed and over the lake or did other factors influence the observed stages. Most notable would be changes to the Kissimmee watershed as part of restoration or implementation of the Lake Okeechobee WSE water regulation schedule. Providing information in this manner would meet the intended use of the document while easing the review process of outside agencies on the District's programs, projects, and plans. By providing such analysis and discussion, the interpretation of wording in the report could truly be a technical perspective. The general form of the chapter, characterization of rainfall followed by water levels and then water management, distracts the reader from visualizing the significance of these factors by constantly having to refer back to figures. Without understanding what specifically the chapter wishes to accomplish for its audience it might be more informative to present the rainfall, water levels and flow data geographically, top down. The data could be summarized in the context of its implications for flood control, water supply and environmental objectives across the watershed in addition to contributions to the downstream receiving watersheds. Complicating any interpretation of the information presented is the use of different analysis windows to calculate the historical averages. Different periods of record are used to calculate averages for rainfall, water levels and flows. For example, WCA3 rainfall may be calculated from a variety of periods 1900-1995, 1901-1980, 1941-1985 and 1971-2000, while average stage is calculated on data from 1962-2003 and flow data from 1978 to 2003. These analysis windows would not allow a regional comparison with water levels in Lake Okeechobee or WCA2 for example.

Typically, reporting of information such as contained in this chapter has two parts. The first is the status or the current conditions. The second, and perhaps more important is the general trend of the information of interest. By not providing any indication of whether objectives are being met, the chapter provides little or no analysis allowing a determination of whether changes to operational criteria or lake regulation schedules are necessary. For example, are the higher water levels observed throughout south Florida a response to increased rainfall or the significant changes that have occurred throughout these watersheds over the last decade? Without providing some indication of the direction of the hydrology using metrics capable of quantifying change for a particular objective it seems unrealistic to assume that decision makers will be able to use the technical information presented to make sound decisions.

For the data presented in the appendices it would be useful to include the DBKEYs used to generate the graphical and tabular data presented.

Specific Comments

Page 5-1. Why is it important that the WY2004 water levels are higher or lower then WY2003 or the historical average? Wouldn't it be more important to present the information in the context of specific project objectives and whether the observed stages contributed to our meeting them? or failing to meet them. From an ecological perspective what is the significance of an annual average water level? A large part of Everglades restoration involves the change in volume, timing and distribution. Why there is no discussion on the relationship between the alteration of the rainfall and runoff relationship due to water management and their effect on water levels?

Page 5-4, Paragraph 4. What is the importance of the percentage of summer rainfall occurring on undisturbed sea breeze days, unless a definition of sea breeze is given and there is some understanding as to whether the distribution of these events is changing over time?

Page 5-5 Figure 5-2 Everglades National Park is missing from the legend.

Page 5-7, Paragraph 2-4. It would be noteworthy if the occurrence of extreme meteorological conditions such as El Niño or droughts could be tied to the trends observed in historical water levels and their significance to computing an average over abbreviated period of records.

On page 5-30, Paragraph 1. An inflow of 3,620,483 acre feet is reported for Lake Okeechobee. We are doubtful of the ability to measure these flows to seven figure accuracy. Perhaps 3,620,000 would be a more accurate estimation. The same comment applies to other numbers.

Page 5-71, Paragraph 1. The majority of the stations presented in the appendices are within the immediate influences of water management, i.e. the lake stage. Would not a resource manager/decision maker be more interested in analysis showing the influence of these water management activities on the adjacent aquifer or wetlands? If this document is to be effective as a decision making tool would not establishing and documenting the relationship between the lake and adjacent water table levels or a percentage of wetland habitat in a particular depth class for some duration throughout the year be more useful?

Page 5-24, Paragraph 4. Why mention WCA-3B without any analysis of rainfall, water levels or structure flows for this area?

Page 5-25, Paragraph 1. What about the eastern half of Everglades National Park, the Rocky Glades and the Eastern Panhandle?

Page 5-27 Paragraph 1. It seems some discussion is warranted on the applicability of using only annual and monthly intervals and their relationship to understanding whether operational criteria and regulation schedules are fulfilling expectations for meeting the multi-purpose objectives of the project.

Page 5-35, Last Paragraph. Was back pumping to the EAA from the WCAs and Lake

Okeechobee greater historically than in recent times such as WY2003 or WY2004?

Page 5-38, Last Paragraph. The S-197 discharges into Manatee Bay not Everglades National Park. Additionally, the implementation of IOP included new structures including S-332B and S-332C which were operational during WY2004.

Page 5-40. Including the flow distribution between western and eastern Shark Slough, S-12 total flows and S-333 respectively in Figure 5-49 may be useful to readers in understanding the disparate proportion of flows diverted from historic Shark Slough.

Page 5-41, Figure 5-5. The arrows depicted on this figure are not proportioned or scaled correctly. The total outflow from WCA3A is about 1,221,000 ac-ft. Outflows from Lake Kissimmee are about 1,193,000 ac-ft. The WCA3 outflow arrow should be approximately the size of the Lake Kissimmee outflow arrow, not double the size. The placement of outflow arrows from ENP is not appropriate given the omission of data either in the main body of the document or its appendices. The placement of a flow arrow from ENP to Biscayne Bay without explanation of how flows were calculated is also not appropriate.

Appendix 5-2, Table 10. Although S190 is about 18 miles upstream of the WCA-3A the L-28 Interceptor canal is leveed for its full length on both banks. Therefore, it appears that the only place S-190 discharge can go is out the downstream terminus to south central WCA-3A. One would suspect that this is why 1-2 mile east-west outfall canal was originally constructed. What rationale can be provided for not including S-190 as a WCA-3A inflow?

Chapter 7: Update on RECOVER Implementation and Monitoring for the CERP

General Comments

The term “revisited” is overused throughout this chapter and this clouds the true meaning. The term revisited implies no action, so it would be more accurate to use terms such as revised, reviewed or updated.

Page 7-11, Greater Everglades Regional Aquatic Fauna Baseline Characterization
The last sentence in the paragraph under this heading is incorrect. The underlined text needs to be added to this sentence: “This project….. by USGS to determine appropriate sampling methods to assess fish populations in forested wetlands.”

Specific Comments

Page 7-17, Evaluation, Performance Measures
The first sentence of this paragraph needs to be rewritten. It appears to be a combination of two sentences with a missing conjunction.

Page 7-17, Evaluation, Performance Measures
In the fourth bullet under this heading: omit the text “completed and” as it is redundant.

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From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:44 PM

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Date: Friday, September 17, 2004 01:42 PM

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Conf: CHAPTER 4: Performance, Compliance and Optimization of the Stormwater Treatment Areas
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Conf: CHAPTER 5: Hydrology of the South Florida Environment
From: DOI Everglades Program Team matthew_harwell@fws.gov
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Conf: CHAPTER 6: Effects of Hydrology on the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
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From: DOI Everglades Program Team matthew_harwell@fws.gov
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Conf: CHAPTER 8: Implementation of the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area
From: DOI Everglades Program Team matthew_harwell@fws.gov
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Conf: CHAPTER 9: Comprehensive Review of Exotic Species in the South Florida Environment
From: DOI Everglades Program Team matthew_harwell@fws.gov
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Conf: CHAPTER 10: Lake Okeechobee Protection Program - State of the Lake and Watershed
From: DOI Everglades Program Team matthew_harwell@fws.gov
Date: Friday, September 17, 2004 01:37 PM

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Topic: Dr. Paul Grey, Audubon, Comments (1 of 1), Read 9 times, 1 File Attachment NEW
Conf: CHAPTER 10: Lake Okeechobee Protection Program - State of the Lake and Watershed
From: Trudy Morris -Webboard Manager tmorris@sfwmd.gov
Date: Thursday, September 23, 2004 03:05 PM


2005 S FL ENVIRO REPORT.PDF (75KB)

Audubon OF FLORIDA

Comments on the 2005 South Florida Environmental Report

September 22, 2004

Submitted by Paul N. Gray, Ph.D., Lake Okeechobee Watershed Coordinator, Audubon of Florida

Abstract: Lake Okeechobee plans are designed to meet phosphorus conditions from a 1990s "baseline." However, continued phosphorus imports into the watershed will likely create increased P runoff in the future. Therefore, Lake Okeechobee plans should be designed to meet future conditions, rather than past conditions.

Introduction

It is appropriate this year's "2005 South Florida Environmental Report" (2005 Report) was expanded to include information about the Lake Okeechobee watershed, including the Kissimmee Chain of Lakes region. Clearly, the Kissimmee River Restoration and Kissimmee Chain of Lakes Long Term Management Plan will affect the ultimate success of Everglades restoration. As noted in the 2005 Report, the three main stressors in the region include nutrient pollution (especially phosphorus), water level management (human-induced changes), and exotic species control. These three focal points appear appropriate. The following comments will be limited to the long-term problems with phosphorus (P) control.

The Lake Okeechobee Watershed component of CERP relies on integration with the Lake Okeechobee Protection Plan (LOPP). The LOPP was completed on January 1, 2004 and lays out a strategy to reach Lake Okeechobee's phosphorus inflow goal (the TMDL of 105 metric tons of P inflow per year) by the year 2015. The LOPP is well organized and based on sound, detailed, technical information. Similarly, Chapters 10 (Lake Okeechobee) and 11 (Kissimmee region) of the 2005 Report are comprehensive, and well written. I commend the cooperating agencies for producing these high-quality products.

The challenge created by continued P import

One of the largest challenges of these projects will be dealing with continued P imports into the watershed. Presently, there is an estimated net import of about 5,627 tons of P to the watershed each year (Table 1). Continued P import into the watershed directly threatens the waterbodies with high P runoff, and contributes to a longer-term problem, P saturation of the watershed. As saturation progresses, increasing amounts of P are shed in runoff. In describing P imports into the "Northern Watershed" of Lake Okeechobee, page 10-9 of the 2005 Report stated,

> "Overall, 83 percent of the net phosphorus import was stored in the watershed, with only 17 percent entering the lake. This relative storage is 7 percent lower than what was reported in 1991 [note: 90% was stored in 1991]. Hiscock et al. (2003) concluded that this was a result of reduced assimilative capacity of soils and wetlands for phosphorus in the Lake Okeechobee watershed. The authors also concluded that phosphorus loads to the lake could be appreciably reduced by a reduction in net phosphorus imports to the tributary basins."

This reduction in P storage over time indicates the watershed is showing increased signs of P saturation, leading to increased P runoff. Lake Okeechobee appears to be reaching saturation as well, as evidenced by its P absorption dropping from an estimated 78-80% of P entering the lake before the 1990s, to present estimates of 60% absorption (see page 10-15 of the 2005 Report for a description of this).

Table 1. Recent estimates of annual net import of P into the Lake Okeechobee watershed. These estimates are for the upstream part of the Lake's watershed and do not include areas downstream of the Lake (e.g., the Everglades Agricultural Area).

Region	Net P import per year (metric tons)	% of Okeechobee watershed area	Source
"Northern Watershed"	1,717	~50	Mock Roos 2002
Kissimmee Chain of Lakes	3,256*	~40	Mock Roos 2003
Istokpoga watershed	664	~10	Mock Roos 2003
Watershed total	5,637	100	

* At least 1500 tons of this estimate are for human food (theme parks, hotels and housing), therefore much of this P is contained in municipal waste treatment activities and not released directly to the watershed.

The conclusion quoted above that, "phosphorus loads to the lake could be appreciably reduced by a reduction in net phosphorus imports to the tributary basins" is not being fully realized in CERP or in LOPP's Best Management Practices (BMP) programs. Presently, there is no prohibition against the net importation of P into the watershed and there is no discrete plan to balance the watershed's P budget. BMPs have a general goal to balance P budgets, but BMPs do not have a *requirement* to balance P budgets, and BMPs allow net P imports. Therefore, P imports likely will continue to the watershed, and P saturation will progress at some rate.

Continued P import becomes a serious problem because CERP is supposed to be a 50-year plan. The LOPP and Lake Okeechobee Watershed Projects are being designed to address P conditions from the baseline years of 1991-2000 (see Table 2-1 of the LOPP for the P numbers from this period). Therefore, CERP and the LOPP are designed to address conditions in the 1990s, yet future conditions are likely to be worse.

A good example of this threat can be seen in the Kissimmee Chain of Lakes. Recent estimates are that the major lakes in the Kissimmee Chain are likely to reach P saturation (of inorganic receptors) in about 10 years (White et al. 2003, see Appendix). If and when that happens, it is likely that P outflows from Lake Kissimmee will increase. The LOW project is designing water quality treatment to meet 1990s conditions, and the water treatment structures are scheduled to be completed in about the year 2015. Coincidentally, this is the approximate time we can expect increased P outflows from the Kissimmee Chain. In this case, the CERP project could be inadequate by some amount, almost immediately.

Not only is the possible P saturation of the Kissimmee Chain of Lakes a challenge to Lake Okeechobee and Everglades restoration, it threatens the health of these lakes and the Kissimmee River restoration. The River restoration has no water quality component and without further measures, we could end up with a hydrologically restored, but polluted river. The Kissimmee Chain of Lakes Long Term Management will investigate the P problem in the Kissimmee Chain and hopefully will be able to develop remedies for this threat. It is imperative the Long Term Plan be given great support and attention.

Recommendation

It appears that because the CERP Lake Okeechobee Watershed project, and LOPP, are unlikely to be able to stop net import of P to the watershed, they need to design systems that will address continued P loading and saturation effects. BMP implementation promises to reduce imports to some extent but as noted earlier, BMPs do not require cessation of P import. I recommend that the LOW, LOPP, and Kissimmee Chain, plans all incorporate predictions of future P import rates, estimated saturation effects, and design systems that will meet P control needs for the project life (50 years in the case of CERP).

Literature Cited

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Appendix

Phosphorus Sediment Water Interactions in Lakes Istokpoga, Kissimmee, Tohopekaliga, Cypress and Hatchineha

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The following tables are from the above report, given to the Interagency Committee in December 2003:

Table 4. Average maximum P sorption capacity, P capacity and estimated time that the sediments can adsorb P from the water column.

Lake	Average Smax	Average bulk dens.	Lake area	P load	P capacity	Time of P sorption
	mg kg^{-1}	g cm^{-3}	ha	tons yr^{-1}	tons	yr
Cypress	285	0.21	2200	11	133	11
Hatchineha	220	0.21	7160	35	330	9
Istokpoga	122	0.48	11200	42	653	15
Kissimmee	186	0.18	17900	57	600	10
Tohopekaliga	65	0.70	9840	44	442	10

Table 5. Estimated time in years the sediments can potentially adsorb P from the water column as a function of the reduction of the current P load to each lake determined from the sorption isotherm study.

Lake	current load	25% reduction	50% reduction	75% reduction
Cypress	11	15	23	46
Hatchineha	9	12	18	37
Istokpoga	15	20	30	60
Kissimmee	10	14	20	41
Tohopekaliga	10	13	20	39

Note: estimates based on laboratory analysis of sediments collected from the lakes and current phosphorus loading to the lakes. "Time of sorption" can be considered the time until the lakes are saturated with phosphorus.

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