

# **Appendix 1-4: Authors' Responses to Comments on the Draft *2011 South Florida Environmental Report – Volume I***

In September 2010, the panel and the public posted their comments on the District's SFER WebBoard at [www.sfwmd.gov/webboards](http://www.sfwmd.gov/webboards) (Appendices 1-2 and 1-3, respectively). This appendix includes authors' responses to major comments and recommendations provided on the WebBoard. With the exception of reformatting some information for better readability, this appendix was not edited or spellchecked by the SFER production staff and appears verbatim as posted on the WebBoard.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 2

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**Posted:** 10/08/10 at 07:51 AM by Wossenu Abteu

Wossenu Abteu

**Level of Panel Review: Accountability (primary); Integrative (secondary)**

Reviewers: V. Singh (AA), O. Stein (A), V. Novotny (A)

***Review of Draft 2011 SFER – Volume I, Chapter 2  
Responses to Comments by Otto Stein, “A” reviewer***

*The review is divided in to several sections. First are several broad questions and comments regarding the interpretation of reported results followed by relatively minor questions about specific sections/sentences phrases etc. This is followed by comments on figures and tables and lastly, editorial suggestions.*

### **Broad Questions and Comments**

**Comment:** *This chapter on Hydrology continues to be a one of the most fundamental of the SFER reports as it is the management of water that is the District’s primary mission, and it is the presence and movement of that water that influences water quality and ecological resources throughout the District’s jurisdiction. However, unless there is promulgation of new priorities and/or a new set management decisions, it is fair to say the chapter is concerned primarily with the reporting of the data and how current management decisions were made in response to that data. Therefore the Accountability review level is very appropriate.*

*The authors have made a several changes in response to last year’s panel’s recommendations. Most notable is the inclusion of new Figures 2-24 and 2-25 which provides a nice overview of how decisions are made for the movement of water from Lake Okeechobee to meet various competing needs, while maintaining the Lake’s water level within management goals. These figures are welcome additions to the Report.*

*The panel also acknowledges the inclusion of new lines 60-73, instructing the readers as to locations of other hydrological aspects of the District’s plan. However, as noted in the final comments to last year’s draft, the panel believes that an introductory section describing how the District attempts to balance the often conflicting goals and needs of water users within South Florida is a missing component to the document. Many of these goals and needs are listed at various times, but the document would benefit from a listing these in once location in some logical manner. For example, a reader can learn that water is moved through the St Lucie Canal for various purposes (estuary ecological health, minimization of groundwater salt intrusion, navigation, perhaps (direct water use?), and flood control. These uses must be balanced for similar uses in the Caloosahatchee River basin, the STAs, WCAs and ENP and municipalities south of the STAs, as well as maintaining acceptable lake levels. This is obviously a highly complex system, and the district generally does an exemplary job of management, but it seems the goals of the management, despite the inclusion of Figures 2-24 and 2-25 are not clearly*

*articulated anywhere. Articulation of these goals should be a permanent component of the "Introduction" section.*

*The panel notes that much of the District's hydrological analysis of data, this year the correlation between El Nino and La Nina years, is of high caliber as evidenced by the results being published in refereed journals. Please include all acronyms in the introductory section to the Report that contain many others.*

**Response:** Thank you for the thorough review and comments. The SFER report has "Acronyms and Abbreviations" at the front. It is the preference of the editor to have acronyms and abbreviations from all chapters presented at the front of the report.

Purpose of Water Management section is revised as follows:

"The District manages water resources for multi purposes and are defined as flood control; water supply for municipal, industrial, recreational and agricultural uses; groundwater recharge for well fields; prevention of saltwater intrusion; water supply for environmental needs; protection of fish and wildlife resources; navigation and water quality improvements. These purposes are grouped into two categories - flood control and water supply as major objectives of water management. During the wet season, the primary purpose of water management is flood control. During the dry season, the water management system is operated primarily to satisfy various water supply needs that include environmental deliveries, irrigation requirements, urban demands, prevention of salt water intrusion in groundwater, etc.

Multi-purpose water resources objectives are met by using established regulation schedules that integrate different objectives. Regulation schedules are developed, and are published in water control plans, to manage the regional storage to satisfy flood control and water supply needs on long-term basis using historical data for each of the water bodies.

Water control structures and water bodies are managed in accordance with operating criteria and regulation schedules described in water control plans. For multiple-purpose lakes and reservoirs, regulation schedules are designed to balance competing objectives including water supply, flood control, navigation, and environmental needs. An unintended consequence of managing for better performance of one objective often leads to poorer performance in a competing objective. For example, higher regulation schedules benefit water supply but may harm the ecology of a lake. Lower lake schedules may produce stages more desirable for lake ecology and flood protection, but reduce water supply potential and potential excess releases to estuary. A regulation schedule typically triggers flood control releases so as to protect the design integrity of the structures and levees and preserve native flora and fauna."

### **Specific Questions**

**Comment:** *Lines 594-596 The text on these lines contradicts itself and the data shown in Fig 2-16. The figure shows below average Nov- Jan and above Feb-April.*

**Response:** Statement is revised to confirm to what is shown in Table 2-11, October and November of 2009 and January of 2010 were dry. The flows in Figure 2-16 show below average flows for December, 2010. The reason is that the first rains of the dry season have to fill surface and subsurface storage before generating runoff.

***Comment:*** Lines 709-711. The significance of these statements is not clear and a little more information is warranted. One could assume all 16 named storms impacted South Florida in WY 2009, but I do not believe that was the case. This small confusion can be avoided by consistency in reporting of the data from year the year.

***Response:*** The segment is revised showing clearly which tropical systems affected the region in previous water years and this water year. The revision is shown below.

#### “HURRICANE SEASON

No hurricanes impacted South Florida during WY2007 and WY2008. But, the WY2009 hurricane season (June 1–November 30, 2008) ended with 16 named storms – of which eight were hurricanes. Four of these systems, Gustav, Hanna, Ike and Fay, threatened the District area necessitating activation of emergency management. Hurricane Gustav passed through the Gulf of Mexico west of the District from August 31–September 1, 2008, and contributed rainfall to South Florida (Beven and Kimberlain, 2009). Hurricane Hanna passed east of South Florida on September 5 and 6, 2008, contributing rainfall to the coastal areas from Palm Beach to Indian River Counties (Brown and Kimberlain, 2008). Hurricane Ike which devastated Galveston, Texas, contributed rainfall to South Florida as it passed through the Gulf of Mexico from Cuba to Galveston from September 8–13, 2008 (Berg, 2009). Tropical Storm Fay made direct landfall in South Florida, moving across the region longitudinally from the southwest to the northeast and impacting all 16 counties of the District.

But, tropical activities in WY2010 were low in the Atlantic and Gulf of Mexico. There were only 11 named storms for the season (June 1, 2009–November 30, 2009). The decrease in tropical activities is mainly attributed to the strong El Niño weather pattern that persisted into spring 2010. Three hurricanes developed in the season, but only Hurricane Ida (November 4–10, 2009) passed through the Gulf of Mexico from Nicaragua to the Alabama Gulf coast and Florida panhandle, weakening to a tropical storm and later to an extratropical state as it moved inland (Avila and Cangialosi, 2010). It contributed some rainfall to the District from November 9–11, 2009. Out of the eight tropical storms and depressions, Tropical Storm Claudette (August 16–17, 2009) contributed some rainfall to South Florida. Claudette moved through the Florida Straits heading north northwest and made landfall near Fort Walton Beach (Pasch, 2010). In conclusion, the contribution of tropical systems to rainfall of South Florida in WY2010 is small compared to the expected contribution 15 to 20 percent (Walther and Abtew, 2007).”

#### Figure and Table Comments

***Comment:*** Table 2-5 The years are ranked by the strength of the event but the way the table is organized it is not clear if one should move across row first then columns or visa versa.

***Response:*** Table caption is edited to show the arrangement is by column.

“**Table 2-5.** Strong El Niño-Southern Oscillation (ENSO) years ordered by column from the strongest event (Abtew and Trimble, 2010).”

***Comment:*** Figure 2-9 The scale appears to be radar intensity. This should be converted to a depth of rainfall.

**Response:** Suggested change is made. Figure with cumulative rainfall in inches and associated text are changed.

**Comment:** *Figure 2-17 The first symbol on the solid line appears to be wrong and the significance of the small lines protruding from the open symbols is not defined.*

**Response:** Figure is changed into bar graph showing the comparisons clearly. The problem was in the pdf conversion of the document where the dashed line in the figure did not come out correctly.

**Comment:** *Figure 2-22 The lines are not properly shown in the legend, therefore it is not clear which line represents what variable.*

**Response:** The problem was in pdf conversion at the editor level where a dashed legend is lost. It is being corrected.

**Comment:** *There is some confusion, or at least redundancy, between Figures 2-18, 2-22b and 2-23. Perhaps it is because the data on Fig 2-18 overlaps two different management schedules but 2-18 is very hard to decipher. The actual data from WY 2010 is repeated in 2-22b, I assume for consistency between other panels of that figure. Finally, it seems that it would be more logical to present the lines in Figure 2-23 (which are in both of the preceding figures) on a water year as done in the previous figures rather than calendar year. Presentation would at least be consistent that way.*

**Response:** Although, the three Figures have many features in common but provide specific details. Figure 2-18 provides lake regulation schedule, daily lake water level, management decisions for the last three years and projected lake stages.

Figure 2-22b shows, simplified regulation schedule, daily water level and daily rainfall in the same format as the other water bodies.

Figure 2-23 is the official regulation with more details about the different bands and notes on water realizes. The original document developed by ACOE is on calendar year basis.

## **Editorial Comments**

**Comment:** *Line 27: the average rainfall the summer had average rainfall, and October and November were drier than*

**Response:** Passage is corrected and reads as follows:

“Because of El Niño, the dry season was wetter than normal. May and December 2009; February, March and April 2010, were wet. May, 2009 had two times the average rainfall. The summer had average rainfall, and October and November were drier than normal.”

**Comment:** *Lines 332-333*

**Deleted:** *Table 2-4 depicts average stage, surface area, and storage for each major water body in WY2010, as well as storage at end of WY2009 and WY2010, and change in storage between those years.*

**Response:** Sentence is revised as follows to add clarity:

“**Table 2-4** depicts average stage, surface area and storage for each major water body; storage at end of WY2009; storage at the end of WY2010 and change in storage between WY2009 and WY2010.”

**Comment:** Line 461

Comparison of *the* annual rainfall deviations relationship to strong ENSO events demonstrates

**Response:** Correction made.

**Comment:** Lines 527-540

*El Niño-related dry season rainfall is associated with cold fronts coming from the north and northwest. There were six major rainfall events with large amounts of rainfall; two in December 2009 (Dec. 2–6 and Dec. 15–19), two in March 2010 (March 11–13 and March 28–30) and two in April 2010 (April 11–14 and April 26–27). Generally, an El Niño event impact on rainfall is highest in the northern part of the District because the fronts usually come through that area. **Figure 2-9** depicts a frontal rainfall passing from north to south of the District on March 29, 2010. In cases where the front blows through at a faster speed and slows in the south or retreats back, the southern half of the District gets more rainfall. In WY2010, there were fronts that moved fast through the northern half of the District and slowed down in the south. **Table 2-8**, **Table 2-9**, and **Table 2-10** show for each major frontal rainfall event total rain catches over each rainfall area and a single day maximum rainfall at a site. **Figure 2-10** depicts total rainfall from the six major frontal rainfall events. WY2010 monthly rainfall complete data and analysis are presented in the Water Year 2010 Hydrology section of this chapter.*

*A characteristic of frontal rainfall is that the coverage area is large and the total volume of since 1982 when data first became available. **Figure 2-19** depicts number of acres burned in a water year*

**Response:** All corrections are made as marked.

***Review of Draft 2011 SFER – Volume I, Chapter 2  
Responses to Comments by Vijay P. Singh, “AA” reviewer***

***Comment:*** *This chapter is well written, well organized and well presented. There are a few comments for purposes of further strengthening the chapter.*

***Response:*** Thank you for your remarks.

***Comment:*** *1. Chapter title: The term environment has a much broader connotation than what is described in the chapter. Therefore, I suggest that the title of the chapter should be amended.*

***Response:*** We agree with the comment. The chapter title will be revised to “Hydrology of South Florida” starting from SFER2012, the next report. This was decided to avoid cross referencing miscommunication in the current report.

***Comment:*** *2. I think a short abstract will be useful. The summary as such is too long.*

***Response:*** Abstract does not fit to the format of the South Florida Environmental Report. The “Summary” at the front of the chapter provides important extract of the chapter.

***Comment:*** *3. General comments: It will be desirable to have a discussion on (a) the impact of climate change on hydrology, (b) the impact of land use changes on hydrology, and (c) the impact of changing demographics on hydrology. Each of these topics will require separate sections. These three factors, climate change, land use change and demographic change, have a direct impact on water management, energy management and environmental management, and the South Florida region is experiencing all these changes. Therefore, what water management strategy will look like in the foreseeable future under the influence of three changes should at least be explored. Water managers should be interested in learning more about the linkages between hydrology and these changes.*

***Response:*** The author’s agree the importance of climate change, land use changes and demographic changes on hydrology. We also acknowledge these subjects require significant time for analysis and documentation. These subjects should be studied external to SFER report and be included as a special topic. Past SFER experiences include:

a) a study outside the SFER was included as appendix in the 2007 report, Appendix 2-3: Consideration of Long-Term Climatic Variability in Regional Modeling for SFWMD Planning & Operations. This is a preliminary documentation of climatic change impact on South Florida hydrology.

b) El Niño Southern Oscillation (ENSO) impact on South Florida Hydrology (SFER 2011),

c) The Hydrologic Monitoring Network of the South Florida Water Management District (SFER 2007, Appendix 2-4).

***Comment:*** *4. Extreme value statistics: It will be desirable to have two sections on statistical description, including probabilistic, of peak flows and the other on that of low flows.*

***Response:*** In a managed system, probabilistic peak flow and low flow analysis could give misleading results. We present monthly rainfall return periods which represents the frequency of the region’s hydrology.

***Comment:*** 6. *Future outlook: It will be a good idea to have a discussion on the future outlook or what the hydrology will be like in the future and how it will impact the water management strategy.*

**Response:** Please see response comment # 3.

***Comment:*** 7. *Minor comments: These are given below:*

**Response:** All minor comments are addressed.

***Comment:*** 2-1 18 *The sentence-surface water flows during the dry season-should be rephrased. It gives the impression that it does not flow during other seasons while it does.*

**Response:** Sentence is edited as follows.

“During El Niño years the region gets above-average rainfall and above-average surface water flows during the dry season”

***Comment:*** 2-1 61 *Change: to various to on various.*

**Response:** Change made.

***Comment:*** 2-4 Table 2-1: *The term discharge normally denotes volumetric flow per unit of time. The way it is being used in the table is volume of flow. I suggest change discharge to volume of flow.*

**Response:** Changes made as suggested.

***Comment:*** 2-5 119 *I think rivers should be Rivers. If I am not mistaken, lower case r in the name of river(s) is used if there are more than two rivers. You may want to check-I may be mistaken.*

**Response:** Change made as suggested.

***Comment:*** 2-5 84-86

2-6 127-129 *The description here does not match that in the above lines. Make them compatible.*

**Response:** Couldn't see incompatibility between the two sentences.

***Comment:*** 2-6 143 *Insert a after on.*

**Response:** Change made as suggested.

***Comment:*** 2-9 235 *Change when to as*

**Response:** Change made as suggested.

***Comment:*** 2-35 633 *Replace depth by amount.*

**Response:** Change made as suggested.

***Comment:*** 2-36 650 *Change less of to less.*

**Response:** Change made as suggested.

**Comment:** 2-49 885 *The discussion is less than clear.*

**Response:** Couldn't see problem with the sentence.

**Comment:** 2-64 1207 *Change rose to rise.*

**Response:** Change made as suggested.

**Comment:** 2-64 1222 *S-10 structures should be S-10 structure. Check.*

**Response:** There are more than one structure (S-10A, S-10B, S-10C, S10-D)

**Review of Draft 2011 SFER – Volume I, Chapter 2**  
**Responses to Comments by Vladimir Novotny, “A” reviewer**

## **ACCOUNTABILITY REVIEW**

**Comment:** Does the draft document present a definitive account of data and findings for the areas being addressed that is complete and appropriate?

1. On many pages of Chapter 2, starting with page 2-19, the authors advance the hypothesis that rainfall and flow patterns as well as water level fluctuations are tied to El Niño Southern Oscillation (ENSO) and La Niña Pacific Ocean warming and cooling. While these hypotheses have been discussed in media and hydrological literature they authors of the chapter did not reference a single peer review article with an exception of their own agency reports. One would expect that if such linkages are true and have such effects on the weather and hydrology of South Florida there should be somewhere peer review papers that would prove it. While in the chapter authors' correlations seem to be interesting and to some degree persuasive, without peer review publishing in hydrological and meteorological scientific papers there may be some who would classify them as speculative, especially when it is very difficult to predict ENSO and most of its impact is apparently felt in cold weather and the entire South Florida water management system is heavily manipulated. If authors have such literature references they should be included. There are many articles on this topic in the literature and some of them can be pertinent to South Florida.

**Response:** The hypothesis that rainfall and flow patterns as well as water level fluctuations are tied to El Niño Southern Oscillation (ENSO) and La Niña Pacific Ocean warming and cooling is published in a peer review journal and is included in the Literature Cited section> “Abteu, W. and P. Trimble. 2010. El Niño Southern Oscillation Link to South Florida Hydrology and Water Management Applications. *Water Resources Management Journal* DOI:10.1007/s11269-010-9656-2.”

Other related publications are cited in the above paper. A related citation included in this chapter is the following where the ENSO tracking method was published.

“Abteu, W., A. Melesse and T. Dessalegne. 2009. El Niño Southern Oscillation Link to the Blue Nile River Basin Hydrology. *Hydrological Processes*, 23:3653-3660; DOI:10.1002/hyp.7367”

**Comment:** 2. Table 2-1 shows the flows in 2009 and 2010. 2010 is not finished. The table should report partiality of the 2010 (first 6 months?) otherwise a reader at the end of the year would be wondering why the flows were so low in a “wet” year. Apparently, WY 2010 is not a calendar year but this was not clearly stated in the Chapter and throughout the report.

**Response:** Table 2-1 shows flows in WY2009 and WY2010. WY2009 covers the period from May of 2008 to April of 2009. WY2010 covers the period from May of 2009 to April 2010. To clarify the period covered by a water year, the following sentence is added in the first paragraph of the chapter. “A water year covers the twelve months from May of the previous year to end of April of the reporting year.”

**Comment:** 3. Figure 2-7 show the “proof” of the ENSO effect on Lake Okeechobee. However, this lake is highly managed; therefore, one has to distinguish what fluctuations are due to lake management and which ones are attributed to ENSO.

**Response:** Correlation of ENSO events and Lake Okeechobee watershed hydrology has been shown in detail in the article “*Abtew, W. and P. Trimble. 2010. El Niño Southern Oscillation Link to South Florida Hydrology and Water Management Applications. Water Resources Management Journal DOI:10.1007/s11269-010-9656-2.*” Table 2-6, Arbuckle Creek flow and strong ENSO events and Table 2-7, Upper Kissimmee Basin dry season rainfall anomalies and strong ENSO events is shown in this Chapter.

**Comment:** 4. Table 2-6. Metric conversions of ac-ft and other US dimensions should be included.

**Response:** On Table 2-1 annotation is added that 1 ac-ft = 0.1233 ha-m. The report also has conversion table at the front.

**Comment:** 5. Line 170, p. 2-6 – Define “standard project flood”. Many readers do not know that this is an “ultra catastrophic” flood. The word “standard” is somewhat misleading and saying that the flood protection is meeting only 30 – 40 % of a “standard” flood is misleading.

**Response:** The following passage is added under section “Use of Regulation Schedules for Water Management” to define Standard Project Flood.

“The Standard Project Flood is defined as the runoff flow generated from the Standard Project Storm (SPS) within the watershed. SPS is considered as one of +several design storms over the watershed. A design storm is the most severe storm for which the canals and water control structures will accommodate that storm’s runoff without an unacceptable level of flooding occurring in the watershed. A severe storm is described by the frequency with which it may occur. On a long term average basis, a storm of given rainfall intensity may occur, for example, the storm that has a four percent chance of being equaled or exceeded in any given year and it is also known as 1 in 25 years storm. The US Army Corps of Engineers specifies a Standard Project Storm that has the rainfall amounts, which are 125 percent of the 1 in 100 year storm. The design storms are assumed to occur most often during the wet season in the south Florida when water tables are high and soils are wet. The runoff from the SPS is designated as SPF. The capacity of canal and its structures may be given as percent of the SPF, for example 30 percent of SPF.”

**Comment:** 6. Lines 348 + on pages 2-13. How often the Kissimmee River is flooding? There have been significant changes made to the channelization of the river to actually increase the flooding which is beneficial. More discussion on this topic should be included.

**Response:** Chapter 11 addresses details of the Kissimmee River restoration and conditions. Please refer to Chapter 11 for the details on the Kissimmee River flood plain.

**Comment:** 7. Lines 1050 to 1055 on p. 2-57 talk about the critical level of 11 ft in Lake Okeechobee. What is the reference of this level (the deepest point or average?). The average depth is less than 9 ft. Also what is NGVD?

**Response:** NGVD is National Geodetic Vertical Datum of 1929. This is a reference of elevation from sea level. Since the depth of the lake varies over the surface area, the elevation of its water level from sea level is used as a measure of the state of storage. At 11.00 ft elevation, gravity withdrawal of water is restricted and large area of lake is out of water, its storage is reduced. Water supply restrictions result.

*Is the synthesis of this information presented in a logical manner, consistent with earlier versions of the Report?*

**Comment:** 1. Line 100 on p 2-5 states that “The development of South Florida has required a complex management system to manage .....”. It has been proven that some of these complex management systems have been actually damaging and were not required. This issue should be addressed in the report.

**Response:** The issue of ecological changes due to water management is best addressed in Chapters which deal with the ecology as Chapter 6.

**Comment:** 2. The two paragraphs between lines 299 to 313 sound like an introduction and should be moved up front.

**Response:** The paragraph is in the right place. For water movement the topographic relief is important. It determines flows by gravity. This is relevant to the hydraulics and operations.

**Comment:** 3. It would be wise in the 21st century to provide metric conversions to US units. Most of US government reporting requires SI units or at least conversions throughout the report and this chapter.

**Response:** Please see response to Comment # 4 on page 2.

**Comment:** 4. Line 629-630 p2-35 to 36. The drought of 2006-2009 was regional affecting entire southeast not just South Florida.

**Response:** Since this report’s domain is limited to South Florida we did not analyze the extent of the drought to the rest of the country.

**Comment:** 5. In Figures 2-20 to 2-22 the dashed line is not visible in the legend box.

**Response:** The problem was in the pdf conversion of the document where the dashed line in the legend did not come out correctly. It is being corrected.

*Are findings linked to management and objectives?*

**Comment:** 1. This chapter extensively discusses water management and manipulation. However, only two objectives were mentioned (1) flood control, and (2) water supply. The ecological dimension of the water management in South Florida is not well covered, especially in this chapter. Are there any ecological objectives stated and incorporated into water management, such as beneficial effect of flooding, minimum ecological flow, mitigating impacts of channelization and ecosystem fragmentation?

**Response:** On page 2-2 the following passage is added to guide readers to other subjects than the hydrology. “Hydrology is linked to all aspects of water management at the District. Influences of the water year hydrology to various aspects of the system can be found in other chapters of this volume as follows:

Chapter 3A Status of Water Quality in the Everglades Protection Area

Chapter 3B Mercury and Sulfur Monitoring, Research And Assessment in South Florida

Chapter 4 Nutrient Source Controls for the South Florida Environment

Chapter 5 Performance and Optimization of the Everglades Stormwater Treatment Areas

Chapter 6 Ecology of the Everglades Protection Area  
Chapter 10 Lake Okeechobee Protection Program – State of the Lake and Watershed  
Chapter 11 Kissimmee Basin  
Chapter 12 Coastal Ecosystems”

The Purpose of Water Management Section is revised as follows to address this issue.

“The District manages water resources for multi purposes and are defined as flood control; water supply for municipal, industrial, recreational and agricultural uses; groundwater recharge for well fields; prevention of saltwater intrusion; water supply for environmental needs; protection of fish and wildlife resources; navigation and water quality improvements. These purposes are grouped into two categories - flood control and water supply as major objectives of water management. During the wet season, the primary purpose of water management is flood control. During the dry season, the water management system is operated primarily to satisfy various water supply needs that include environmental deliveries, irrigation requirements, urban demands, prevention of salt water intrusion in groundwater, etc.

Multi-purpose water resources objectives are met by using established regulation schedules that integrate different objectives. Regulation schedules are developed, and are published in water control plans, to manage the regional storage to satisfy flood control and water supply needs on long-term basis using historical data for each of the water bodies.

Water control structures and water bodies are managed in accordance with operating criteria and regulation schedules described in water control plans. For multiple-purpose lakes and reservoirs, regulation schedules are designed to balance competing objectives including water supply, flood control, navigation, and environmental needs. An unintended consequence of managing for better performance of one objective often leads to poorer performance in a competing objective. For example, higher regulation schedules benefit water supply but may harm the ecology of a lake. Lower lake schedules may produce stages more desirable for lake ecology and flood protection, but reduce water supply potential and potential excess releases to estuary. A regulation schedule typically triggers flood control releases so as to protect the design integrity of the structures and levees and preserve native flora and fauna.”

***Comment:*** 2. *The section on Water Conservation Areas (p2-63) should begin with stating the purpose of the WCAs, without it the discussion is overwhelming with details of management, gate closing, etc. without knowing what was the purpose and impact of these actions.*

***Response:*** On page 2-63 starting from line 1180, the following passage provides the purpose of the WCAs.

“The primary objectives of the WCAs are to provide (1) flood control; (2) water supply for agricultural irrigation, municipalities, industry, and the ENP; (3) regional groundwater control and prevention of saltwater intrusion; (4) enhancement of fish and wildlife; and (5) recreation. A secondary objective is the maintenance of marsh vegetation in the WCAs, which is expected to provide a dampening effect on hurricane-induced wind tides.”

***Comment:*** 3. *How does all of this hydraulic management differ from the natural pre-management system?*

***Response:*** In the natural system on the left, flow is from north to south and the figure on the right shows the current managed system.

## INTEGRATIVE REVIEW

*Are large programs presented so that overall goals are clear and linked systematically to descriptions across the Report?*

**Comment:** *The chapter does not clearly describe the effects on the recent system management and channelization changes, especially on the Kissimmee River.*

**Response:** The Kissimmee River is presented in Chapter 11.

**Comment:** *2. The chapter contains brief references to many “large picture” programs, for example, for ENP (pages 2-66 +) without stating what they are; what are the major requirements, and how the water management and manipulation program outside ENP affect the national park. The list of key “large programs” dealing with ENP should be presented and explained.*

**Response:** Everglades Restoration program report is presented in Appendix 7-1: Comprehensive Everglades Restoration Plan Annual Report and Appendix 7-3: Recover Activities Update.

**Comment:** *3. Throughout the chapter presentations were made on WY 2010 hydrology year. Is the hydrologic year different from the calendar year which is common in hydrology? In Chapter 10 the WY2010 graphs were made from May to April. The calendar year has not ended; hence, the report cannot make statements such as “WY 2010’s hydrology was wetter than usual” (line 1395) when the report only covers a portion of the year. This should be clarified throughout the chapter.*

**Response:** To clarify the period covered by a water year, the following sentence is added in the first paragraph of the chapter.

“A water year covers the twelve months from May of the previous year to end of April of the reporting year.”

WY2010 covers eight months from 2009 (May through December) and four months from 2010 (January through April).

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 3A

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**Posted:** 10/07/10 at 02:20 PM by Garry Payne

Grover G. Payne<sup>1</sup>, Katie Hallas<sup>2</sup> and Shi Kui Xue

**Level of Panel Review: Accountability (primary); Integrative (secondary)**

Reviewers: V. Novotny (AA), R. Ward (A)

### ACCOUNTABILITY REVIEW

*Does the draft document present a definitive account of data and findings for the areas being addressed that is complete and appropriate?*

***Comment #1:*** *The current District monitoring programs were described by Germain in 1998 (line 297). Germain (1998) is not a 'live' link in the SFER, thus it is difficult to follow up the brief monitoring program descriptions in Chapter 3A with a more specific evaluation regarding how water quality data originate for placement in DBHYDRO (a major source of data to support Chapter 3A's computations). Is Germain (1998) online? If so, could it be made 'live' in the text? Given the many changes in the District's water quality monitoring efforts over the past 12 years (e.g. lines 486-487), are there plans to update Germain (1998)? The Panel had been led to believe such an update was in progress, under a 'monitoring re-engineering' effort, but there is not longer mention of re-engineering monitoring efforts in the SFER. Why? Are there new plans to update descriptions of the District's monitoring programs?*

***Response #1:*** It does not appear that Germain (1998) is online. The document has not been updated. The District continues to work on its re-engineering monitoring effort throughout its boundaries. Once these results have been compiled, the authors will coordinate with the District to ensure that the appropriate links are included in this chapter. Furthermore, the authors would suggest that the status of this effort be included in Chapter 1 of the *South Florida Environmental Report*.

***Comment #2:*** *What is the cause of the long-term reductions in specific conductance levels reported in lines 649-650? Panel Comment (in italics; copy verbatim from web posting)*

***Response #2:*** The reductions in specific conductance are likely the result of changes in water management practices, including the implementation of agricultural Best Management Practices (BMPs), that have reduced the amount of higher conductivity groundwater pumped into the system.

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<sup>1</sup> Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Environmental Assessment and Support Program, Tallahassee, FL

<sup>2</sup> Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Restoration Planning and Permitting Program, Tallahassee, FL

***Comment #3:*** No quality and potential contamination of sediments (substrate) were found. Sediments store and bind hydrophobic contaminants (pesticides, metals, including mercury, phosphorus) and may provide history of past contamination. Furthermore, due to the increased sulphur inputs from the agricultural areas into the EPA (see Chapter 3B), the retention capability of sediments may change and some pollutants may be released as it is occurring now with mercury. Routine but not necessarily frequent sediment sampling should have been included. In the reference section there is no literature source listed that would address sediment quality.

***Response #3:*** The authors agree that sediment analyses can provide a history of past contamination; however, the primary focus of this chapter is to provide an overview of the current status of “water quality” within the EPA (Everglades Protection Area). Also, if the retention capability of the sediments changes sufficiently to cause significant release of adsorbed pollutants, the released pollutants should be detected in the water column. Further, the effect of increased sulfur inputs on mercury levels is not through a simple release of bound mercury as suggested by the reviewer. Instead, sulfate concentrations within a certain range enhance the methylation of inorganic mercury in the sediment pore water by naturally occurring sulfate-reducing bacteria. Methylmercury is a more toxic and bio-accumulative form of mercury compared to the inorganic form. It should be noted that the District does analyze sediment for select parameters periodically at a limited number of sites primarily located at or near discharge structures; however, the assessment of that data is outside the scope of this chapter except when explaining the results of the water quality assessment.

***Comment #4:*** The equation for the site specific minimum DO standard on page 3A-22 seems to be formally incorrect because it puts the variable  $t_i$  into the denominator instead of nominator. When the standard is calculated for 6:00 am (360 minutes after midnight) and 30° C temperature, the minimum DO standard comes as  $DOL = 2.35$  mg/L which is lethal to fish and other aquatic organisms. For 6:00 pm the standard is 5.35 mg/L. Temperature in EPA in summer can be expected to be even greater than 30° C. Hence, the standard may not be protective but to what degree it resembles natural conditions is not clear.

***Response #4:*** The equation for the Site Specific Alternative Criteria (SSAC) for DO within the EPA is correct as provided. The SSAC equation was designed to mimic the natural diurnal DO fluctuations based on temperature and time of day. As illustrated by the reviewer’s example, the minimum daily DO concentrations generally occur just before sunrise with maximum values occurring in late afternoon with overall DO levels decreasing with increased water temperature.

The authors take exception with the reviewer’s broad statement that the DO criteria provided by the DO SSAC are “lethal to fish and other aquatic organisms”. While the DO SSAC criteria may be too low for some northern cold-water fish and aquatic organisms, the criteria are not lethal to biological communities within the EPA. In fact, such low DO concentrations are common in many Florida streams and wetlands due to the high temperatures, abundance of organic matter, and low water velocities. Since the DO SSAC describes the natural DO regime at minimally impacted sites within the EPA, the criteria are inherently protective of the natural biological communities found there.

***Comment #5:*** Table 3A-3 on pages 3A-20-21 reports violations of the DO. In 2010 the site specific min DO standard, which is already in the lethal range, was violated in 18.8 % of samples in the interior of the refuge area, 45% of samples in WCA-2 zone, 17.6 % in the interior of the WCA-3, meaning that the aquatic organisms anticipated frequently lethal DO concentrations. Fortunately, excursions of the standard did not occurred in 2010 in the park area but, because of the unprotective nature of the standard, some damages to the sensitive biota could have occurred.

*Federal criteria allow the minimum DO standards (which are much higher) to be violated in less than 1% of samples. A much worse situation with the excursions of the minimum DO standard had been typical for years prior 2010. Because of this conflict between federal DO criteria and implicit lethality of the standard, we should ask whether an Use Attainability Analysis has been done?*

**Response #5:** Again, the authors take exception with the reviewer's unsubstantiated assertions that the criteria provided by the DO SSAC are "unprotective" and "implicitly lethal". We provide the following as useful background information for the reviewer to understand the process the Department has followed in adopting the DO SSAC. After being developed and adopted by the State, the DO SSAC, which accurately describes the natural DO regime in the EPA, was submitted to the US EPA (United States Environmental Protection Agency) as a revision to Florida's water quality standards. In their approval of the DO SSAC, the US EPA found that:

*"The Everglades DO SSAC establishes a revised water quality criteria for the Everglades Protection Area (Water Conservation Areas 1, 2A, 2B, 3A, 3B, the Arthur R. Marshall National Wildlife Refuge, and the Everglades National Park), which remains classified and protected for all designated uses of Class III waters, including recreation and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. ... Based on our review of the supporting information as provided by FDEP for the Everglades DO SSAC, it is the Environmental Protection Agency's conclusion that the requirements of the Clean Water Act and provisions of 40 CFR Part 131 have been met."*

Because the designated uses of the surface waters within the EPA were not changed and are protected and supported by the DO SSAC, a Use Attainability Analysis was not required.

**Comment #6:** *Page 3A-17 correctly states that the 10% standard excursion frequency cannot be used for pesticides and by the same reasoning for un-oxidized ammonia which is also in the category of the priority pollutants. Because both NH<sub>4</sub><sup>+</sup> and NH<sub>3</sub> are toxic, the latter one more toxic than the former, US EPA developed criteria for ammonium, which combines both ammonium forms together, that are based on moving averages of daily samples. Since daily sampling is rarely done, moving averages must be calculated by Monte Carlo simulations and the allowable excursion of the CCC and CMC standards which also must be calculated from temperature and pH can have only one excursion in 3 years (approximately 0.2%) which is also true for other toxic compounds (pesticides and metals). Luckily, un-oxidized ammonia was not a problem (based on the old standard) in 2010 but it was a problem in the previous years. Unionized ammonia water quality was discussed on page 3A-26.*

**Response #6:** The reviewer appears to be confused on several points. First, un-ionized ammonia is not considered as a priority pollutant by the US EPA or the state. Second, the analyses presented in the chapter utilize water quality criteria that have been adopted by the state and approved by the US EPA to evaluate the water quality conditions throughout the State, including the EPA. Criteria proposed by the US EPA that have not been adopted by the state are not considered in this chapter. The authors also question the reviewer's suggestion that "simulated" data be used to make regulatory assessments. The implementation of any standard that must be assessed using simulated data would be severely problematic and any regulatory action based on those assessments highly subject to technical dispute and not likely to stand up under legal challenges.

***Comment #7:*** Specific conductance (pages 3A24-25) in the inflows of the refuge area and WCA2 area seem to be high and at the level that could be dangerous to fresh water aquatic life. Salt ground water intrusion was specified as a probable source which itself may be a problem. It looks that the frequency component of the specific conductance (salinity) standard was misinterpreted. Logically, the 1,275 micromhos should not be perceived as permanent salinity, which seem to be the case.

**Response #7:** As described in the text, the specific conductance assessment provided in the chapter was performed using the existing state Class III water quality criteria for fresh waters which specifies that specific conductance “Shall not be increased more than 50% above background or to 1275, whichever is greater”. Since the background conductivities within the EPA are low, the assessment provided in the chapter was based on the 1,275  $\mu\text{mhos/cm}$  limit in conjunction with the binomial methodology described in the chapter.

Since Florida’s specific conductance criteria described above has been approved by the US EPA as being protective of all designated uses of Class III freshwaters, including the propagation and maintenance of a healthy, well-balanced population of fish and wildlife, there is no justification for suggesting that conductivity levels below the criteria are “dangerous to fresh water aquatic life”.

***Comment #8:*** Pages 3A-33 till 3A54 deal with the phosphorus in the EPA. Phosphorus load and internal concentrations are the major stresses. The native flora in the EPA is adapted to very low nutrient-poor conditions that would be characterized as oligotrophic. The state of the art knowledge and criteria characterizes oligotrophic state of a water body which is phosphorus limited as the one where phosphorus concentrations are less than 10  $\mu\text{g/L}$ , mesotrophic between 10 and 20  $\mu\text{g/L}$ , and eutrophic with P concentrations of more than 20  $\mu\text{g/L}$ . Many states have only narrative criteria for phosphorus, numeric criteria for Florida may be developed soon. FDEP interpreted the narrative criterion as being 10  $\mu\text{g/L}$  for EPA. This criterion is applicable mainly to the interior of the water bodies. Figures 3A10 and 3A-11 show that the 10  $\mu\text{g/L}$  criterion is way exceeded in the inflows into the Refuge and WC zones but is now (2010) maintained in WC-3 and Park zones. The progress in reducing P concentration is evident. However, very high P concentrations in inflows is still a warning.

**Response #8:** To clarify, the 10  $\mu\text{g/L}$  TP criterion for the EPA and the associated rule (Chapter 62-302.540, Florida Administrative Code) were developed and adopted by the state and approved by the US EPA as a permanent water quality standard. The TP criterion for the EPA will not change with the development/adoption of nutrient criteria for other Florida waters.

The authors agree that the elevated TP concentrations in the inflows to some areas continue to be a reason for concern, and the state is continuing efforts to reduce phosphorus levels entering the Everglades.

***Comment #9:*** Using geometric means for expressing P concentration and excursions is appropriate for water bodies with a very long retention time. Concentration of less than or equal 10  $\mu\text{g/L}$  are today maintained throughout the interiors of all four zones of EPA (Figure 3A-14 on page 3A-42).

**Response #9:** Geometric means were used to express TP (and other nutrients) concentrations in the EPA primarily due to the demonstrated log-normal distribution of phosphorus concentrations at minimally disturbed sites. The authors agree that the annual geometric mean TP concentration at the interior sites in all portions of the EPA were below 10  $\mu\text{g/L}$  during WY2010.

*Is the synthesis of this information presented in a logical manner, consistent with earlier versions of the Report?*

**Comment #1:** *On page 3A-14, the data screening methods are described. Regarding consistency from year-to-year, how many years have the data screening methods been the same or are they tweaked each year?*

**Response #1:** To maintain comparability between years and reports, the general screening methods have remained consistent for several (i.e., 8 – 9) years. Additionally, to assure the reliability of the data used in the TP criterion assessment, a slightly more stringent screening protocol was developed for data used in that analysis. The TP criteria data screening protocol was finalized in July 2004 and incorporated into the TP criteria rule by reference. This protocol has not been revised and any change to the screening method would require a formal rule-making procedure.

**Comment #2:** *Lines 493-494 mention that future phosphorus criterion achievement assessments will improve as additional datasets for all sites within the monitoring network are added. Lines 545-547 also mention insufficient data available for assessing DO assessments. Lines 1152-1153 report that even with the data limitations, the un-impacted portions of each WCA passed all four parts of the compliance test. This statement is confusing in that it implies the data limitations did not limit the ability to complete the criterion compliance test. Should this conclusion be further clarified to state that at the sites with sufficient data, the criterion compliance tests were met? Or did the data limitations not prevent use of the criterion compliance test, in which case they are not data limitations from the standpoint of applying the test?*

**Response #2:** The reviewer brings up two independent issues. First, as described in the text, the application of the DO SSAC results in all of the individual DO measurements collected at a given site during a year to be combined into a single datum, which is then used to assess annual compliance with the SSAC. Since this data aggregation effectively reduces the amount of data available for any area for a single year below that required to confidently apply the binomial hypothesis test, the assessment is therefore performed using a five-year period of record in order to satisfy the data sufficiency requirements of the binomial test. Unless the number of monitoring sites is increased significantly, future assessments using the binomial hypothesis test will continue to be performed using a five-year period of record to satisfy data sufficiency requirements.

The second issue deals with the assessment of the total phosphorus criterion. As stated in the text, monitoring at the full suite of stations was not initiated until January 2007 (WY2008). Since the assessment of portions of the four-part test is based on a five-year period record (i.e., WY2006 - WY2010 for this report), not all stations included in the specified monitoring networks that are used in the assessment have data for the full five-year assessment period. This data limitation does not preclude a preliminary application of the four-part test utilizing the available data. However, since the effects of the “missing” data on the assessment are unknown, the results of the assessment and their interpretation must be qualified given the data limitations noted, as was done in the text. Once the full monitoring network has been monitored for five-years, the data qualification will no longer be required.

**Comment #3:** *Pages 3A-8 to 3A-19 describe the water quality monitoring program of the Everglades Protection Area. Acronym EPA is sometimes confusing to a reader who is new because in almost all other states it is associated with Environmental Protection Agency (denoted in the report as US EPA). Page 3A7- which is a start of the Chapter should have clearly*

*introduced and identified the acronyms used throughout the chapter. This applies to most chapters in the SFER.*

**Response #3:** The authors have defined all acronyms upon first use, including the U.S. Environmental Protection Agency (US EPA) and the Everglades Protection Area (EPA).

**Comment #4:** *Page 3A-19 is the beginning of the water quality excursion analysis and excursions of water quality standards. Although the standards for the analyzed constituents are mentioned (hidden) in the subsequent text there is no summary table of the magnitude of the standards. Federal criteria in pertinent documents and summary of Water Quality Criteria specify standards and criteria in terms of magnitude and duration and frequency of allowable excursions. A table of the pertinent magnitudes of the standards should be included in this report. A reference to previous annual reports is not sufficient.*

**Response #4:** The magnitude of the pertinent water quality criteria are provided in the discussion of each parameter in the text. Additionally, the authors also reference Florida's relevant water quality standards rule (e.g., Chapter 62-302, Florida Administrative Code (F.A.C.)) which provide all of the available information concerning the State's water quality criteria and their application throughout the chapter.

**Comment #5:** *Table 3A-1 lists allowable frequencies. These are consistent with the US EPA guidelines for Clean Water Act (CWA) Section 305 screening annual reports of states to US Congress but are in conflict with the federal water quality criteria (and most likely state standards because states were required to accept federal criteria) whereby the durations and frequencies are more stringent. States are allowed to adopt less stringent site specific standards as it occurred, for example, for DO (line 535 on page 3A-22), only if a scientific Use Attainability was performed. Naturally low DO could justify lower DO standards but these may not be typical for low nutrient (oligotrophic) natural water bodies such as the EPA. Using the Section 305 reporting frequencies of excursions is inappropriate for water quality assessment.*

**Response #5:** The reviewer is incorrect concerning Florida's water quality criteria and assessment methods as well as the Federal requirements for developing alternative criteria and when a Use Attainability Analysis (UAA) is required. Florida has developed an "Identification Of Impaired Surface Waters" rule (Chapter 62-303, Florida Administrative Code), which establishes a detailed methodology that is used to perform water quality assessments under Clean Water Act (CWA) sections 303(d) and 305(b). The state developed the methodology during a public process and formally adopted the method into rule. The resulting rule was then submitted to the US EPA as a permanent change to Florida's water quality standards. The rule and assessment methodology was approved by the US EPA and is part of the Florida's water quality standards and has been used to conduct water quality assessments for approximately eight years. The assessment methodology used for the assessments presented in this chapter is based on the approach provided in the "Identification of Impaired Surface Waters" rule, but it utilizes different periods of record to satisfy the objectives of this chapter.

Since it is recognized that a single criteria may not be appropriate for every waterbody, states are able to develop and adopt more or less stringent site specific alternative criteria as the reviewer correctly points out. However, the reviewer is incorrect in stating that less stringent alternative criteria can "only" be adopted after a UAA is performed. If it is demonstrated that the alternative criteria fully maintain and protect human health, existing uses, and designated beneficial uses of the waterbody, no UAA is necessary. Since the DO SSAC for the Everglades reflects natural background and is fully protective of the designated uses, no UAA was conducted or required. A

UAA is only required when the designated or existing uses of a waterbody are being downgraded. For example if an alternative criterion cannot be demonstrated to be protective of the existing designated uses of a waterbody, a UAA must be completed for that waterbody before the less stringent criteria can be adopted.

***Comment #6:*** *Pesticides have not been compared with the priority pollutants criteria. In most states and presumably also in Florida, federal criteria for priority pollutants have or should have been adopted as state standards. The report speaks about the “guidelines” but if the “guidelines” are the same as the federal priority pollutant criteria they are the standards in a legal meaning. The SFER compared pesticide concentrations only with maximum detectable limit, as it appears. The pesticide section indicates a problem, including in the park, but it is not specific.*

***Response #6:*** Not all of the federal criteria have been adopted by Florida. Since it was recognized that many of the pesticides for which data is available do not have numeric criteria that have been adopted by the state, a set of toxicity-based guideline concentrations for these pesticides was developed using available acute and chronic toxicity data. The guideline concentrations as well as details concerning their development were presented in the 2001 Everglades Consolidated Report (Weaver et al., 2001) as referenced in the text. These guideline concentrations were developed based on the requirement in Subsection 62-302.530(62), F.A.C., which calls for Florida’s surface waters to be free from “substances in concentrations, which injure, are chronically toxic to, or produce adverse physiological or behavioral response in humans, plants, or animals.” The pesticide guideline concentrations have not been formally adopted into rule and therefore do not have the same legal meaning as formally adopted criteria and standards. The guidelines are meant to provide a basis for screening detected concentrations of pesticides within the EPA.

The reviewer is inaccurate in stating that the observed pesticide concentrations were only compared to the MDL. As indicated in the text, since it is inappropriate to the binomial hypothesis test used for most other parameters to pesticides, concentration levels were used to evaluate the potential risk associated with various pesticides. As described in the test, pesticides not detected (levels below the analytical detection limit (MDL)) were classified as non-concerns. Any pesticide that is detected at concentrations above the MDL but below the criteria or guideline concentration was classified as a potential concern since the pesticide was present but hasn’t reached potentially toxic levels. Any pesticide exceeding the approved criteria or the specified guideline concentration was classified as a parameter of concern based on the increased risk of adverse biological impacts.

Table 3A-5 indicates that only two pesticides (Atrazine and Metolachlor) were detected in the Park. The concentrations of both pesticides were above the MDL but below the criteria or guideline concentration and were therefore classified as parameters of potential concern.

***Comment #7:*** *Section on Total Phosphorus Loads (pages 3A-46 -53) is suffering from inconsistencies with units. This report should be a representative scientific report that should use at least both SI and US (one in parentheses) throughout the entire report, which is not the case. Using archaic units such as acre-ft may not be appropriate today without reporting a metric equivalent (m3). Also it took the reviewer a while to decipher what is mt (is it milliton, megaton and is the ton US or SI units?). A metric milliton is kilogram but milliton is not used at all. In metric units m denotes milli and M denotes mega but this section has it all mixed up. It is also inappropriate to mix US and SI units in one table (for example, mg/L and acre-ft) without providing conversions. US equivalent for mg/L used to be years ago grains/ac-ft but today no one uses this unit.*

**Response #7:** The authors and editors of the SFER (*South Florida Environmental Report*) have developed guidelines regarding the appropriate units for use in the report. Since acre-ft is a unit of measure accepted and widely used by the South Florida Water Management District and its constituents, it remains an acceptable unit for use in the SFER. Also, the acre-ft units have been used in the SFER since its inception and its continued use provides a measure of consistency that allows easier comparison between reports. A footnote will be added that provides a conversion to the appropriate SI units.

In accordance with accepted protocol, the “mt” abbreviation, as well as all other abbreviations used, was defined with its first use in both the summary section and again in the body of the chapter. Additionally, a table with the units utilized in the report along with metric – SI conversions will be included as a preface to the final SFER.

*Are findings linked to management and objectives?*

**Comment #1:** *Chapter 3A is driven by legal reporting requirements, thus its contents support management goals and objectives related to implementation of the Everglades Forever Act (line 218).*

**Response #1:** The authors concur with this statement. In addition, the chapter also provides an assessment of achievement with the TP criterion (Rule 62-302.540-Water Quality Standards for Phosphorus Within the Everglades Protection Agency).

**Comment #2:** *Figures 3A 10-13 indicate reduced variability, over time, among annual Geometric Mean TP Concentrations. 1994 seems to be the breakpoint at which time variability is noticeably reduced. What caused this reduction in variability? Was it improved consistency in monitoring system design and operations, or impact of STAs coming on line, or both? Or is there another explanation? The flows presented in Figures 3A 16-19 do not reflect as dramatic a reduction in annual variability.*

**Response #2:** The reduced variability apparent after WY1994 is likely the result of a combination of several factors. During this period, the agricultural Best Management Practice (BMP) Program was being increasingly implemented which helped limit the amount of phosphorus and water discharged from the Everglades Agricultural Area (EAA). Prior to the implementation of the BMP program, the pumping of surface and groundwater for irrigation was largely uncontrolled with much of the excess irrigation and rain water freely flowing from the farms into the EPA. Several of the BMPs focused on limiting the pumping of off-farm water for irrigation and retaining more water on-farm for reuse. Additionally, starting in 1994, the District implemented a more comprehensive and consistent monitoring program which provided a better and more reliable estimate of water quality conditions within the EPA. Additionally, during the subsequent years (i.e., Phase I period, WY1994-WY2004) all the initial Stormwater Treatment Areas (STAs) were constructed and became operational. In addition to reducing the amount of phosphorus entering the EPA, the operation of the STAs helped minimize the peaks in TP load and flows entering the EPA in response to storm events which also reduced the variability in TP concentrations in both the inflows and the interior of the EPA.

**Comment #3:** *Chapter 3A contains relatively little discussion that would link water quality assessment findings to management objectives.*

**Response #3:** The chapter is intended to provide an assessment of achievement of water quality standards and criteria in the EPA. This in itself is a management objective. However, any further

linkage between the water quality assessment findings to management objectives is outside the scope of this chapter.

## INTEGRATIVE REVIEW

*Are large programs presented so that overall goals are clear and linked systematically to descriptions across the Report?*

***Comment #1:*** *The SFER, apparently for regulatory reporting reasons, places considerable focus on water quality standard compliance in the Everglades Protection Area by devoting Chapter 3 to the subject. Compliance with water quality standards in the Kissimmee Basin, Lake Okeechobee, and coastal ecosystems is addressed in separate chapters devoted to the separate regions. This split in focus on water quality standard compliance does not result in an easy to grasp view of District-wide water quality standard compliance.*

***Response #1:*** The authors agree; however, an assessment of areas other than the EPA is outside of the scope of this chapter. Additionally, different regulatory requirements and in some cases, different criteria among the various regions makes presenting single unified analysis of water quality criteria compliance very difficult.

***Comment #2:*** *Evolution of water quality monitoring in South Florida is reaching the point where more integration of water quality outcomes with broad scale restoration goals should be explored. Chapter 8, in particular, could be connected to findings reported in Chapter 3A (as well as Chapters 10, 11 and 12) to gain a District-wide accounting of water quality changes connected to implementation and operation of restoration projects and programs.*

***Response #2:*** The authors agree. However, we are limited to a short timeframe for analyzing all of the data, interpreting the results and writing the chapters to meet various legislative mandates.

***Comment #3:*** *Chapter 3A contains the water quality assessment situation with excursions of standards and criteria and trends in water quality without a reference to the causes of the problem which are addressed in the chapters dealing with the agricultural areas and tributaries to the EPA. Chapter 7 and 8 deal with restoration but without a reference to the current and past water quality problems. The link between the water quality assessment and restoration alternatives seems to be ignored. True, these chapters were written by different authors but it seems that the teams did not communicate.*

***Response #3:*** The primary objective of this chapter is to assess whether various water-quality parameters in the EPA are in compliance with the applicable state criterion and standards. Whenever possible, the authors try to provide an explanation for observed exceedances, especially those that are reoccurring or are widespread. A detailed analysis of the link between the results of the water quality assessment and restoration activities is outside the scope of this chapter. Such an analysis would be difficult due to the long and variable lag-time between a particular restoration active and a measurable change in water quality. Additionally, there are frequently multiple overlapping restoration activities that can have an impact of water quality occurring at once. These projects are also typically multi-year projects that are completed incrementally over the period.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 3B

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**Posted:** 10/08/10 at 05:31 PM by Chris King

Don Axelrad<sup>3</sup>, Ted Lange<sup>4</sup> and Mark Gabriel<sup>5</sup>

**Level of Panel Review: Technical (primary); Integrative (secondary)**

Reviewers: J. Burger (AA), O. Stein (A)

### INTEGRATIVE REVIEW

***Comment:** Mercury and sulfur issues cross-cut several chapters, and this year's report makes a better attempt to include mercury and sulfur in these chapters. The problem remains, however, that the SFWMD is not primarily responsible for the research with mercury, making it more difficult to integrate the findings with the other chapters, and with the overall program of SFWMD. It is not clear that the integration occurs in the management and recovery decisions, but rather within sections of the report itself. Integration of mercury issues could be clearer in Chapter 12 having to do with the estuaries, and in Chapter 9 having to do with ecological studies. Issues discussed in the mercury section of chapter 5 are not well integrated with 3B, and the role of the STAs in mercury accumulation in the Everglades generally needs to be further explored. Relative differences in methylation in the STAs should be further explored in chapter 5. Information on hydrology (chapter 2) is integrated in the sense that the models include hydrological factors.*

### TECHNICAL REVIEW

***Comment:** The Mercury and Sulfur Monitoring, Research and Environmental Assessment chapter (3B) is an excellent overview of the mercury and sulfur problems in the Everglades, on-going problems with high levels of mercury in bass (a fish at the top of the food chain that serves as an ecological bioindicator, and is consumed by people), how mercury and sulfur interact with other nutrients (and with each other), on-going research with biota and mercury, the role of sulfur, and the new research initiatives to understand mercury and sulfur cycling, as well as sulfur eutrophication.*

*The authors are to be commended on writing a chapter that is very readable and accessible to a broad range of readers. It is written in a style that can be easily followed, and that makes the main points clear, as well as making the data readily available to scientists not familiar with the Everglades. Appropriate references to the primary literature are a key component of the report.*

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<sup>5</sup> Affiliated with U.S. Environmental Protection Agency – Region 4, Athens, GA, as of August 2010

*Authors have also done a commendable job to improve the statistical analysis of time and spatial trends in LMB mercury in response to last year's suggestion. As anticipated, the statistical analysis of time trends seem to weaken last year's claims to large reductions in LMB mercury with time, as only two of the five sites show a statistically relevant decrease. Nevertheless, there are still at least places in the document where reductions in time are stated, but not warranted by the data. These should be removed. Specifically, lines 240-241 indicate reductions with time (in this case for Florida panther samples) but with the large standard errors shown in the 1978-1991 data in Table 3B-3 it is highly unlikely, at least for blood samples. Regardless, a statistical analysis should be conducted before time trend statements can be made.*

*As stated last year "Once suspected trends are confirmed, the next step will be to determine why. This is necessary if Floridians have any hope of making long term improvements. Questions in need of answers include but are not limited to:*

- A) What caused the readily observable decline in the WCA up to about 1999?*
- B) Why has there been no improvement since?*
- C) Why have those generally not been repeated in the areas further south in the ENP?*
- D) What causes the general north south increase in mercury?*
- E) Why does STA-1 data seem to show much lower levels?*
- F) Could the mechanism apparently at work in STA-1, be employed elsewhere?*
- G) Do annual concentration variations correlate with annual variations in hydrology?"*

*The authors have speculated answers to questions A, B, (related to hydroperiod) and perhaps C (difference in sulfur and organic carbon), but the other questions remain unanswered despite their continued validity, and should be answered where possible.*

*The normalization of LMB mercury concentrations to length is a cause of concern. If normalizing parameters can reduce variability of the data (presumably by factoring out covariates), their use is recommended. However the authors provide no information as to how this normalization helps. In fact, the plot shown in figure 3B-7 indicates it doesn't improve anything. The authors should indicate why dividing by length is an appropriate normalization method. One could assume that multiplying by length would be equally appropriate. Further, (and more importantly), the plots and presentation of the data suggest that the normalization was not done as described in lines 396-403. If concentration is divided by length (either mm or inches) then the resultant units must be in ppm/length and not ppm. So apparently the described normalization is not what was conducted or alternatively what was conducted is not properly described.*

### ***Mercury in Fish and Wildlife***

***Comment:*** *They have effectively used bass as bioindicators of mercury exposure (although data on a short-lived species such as mosquitofish are also useful), and have one of the longest running such data sets in the country. The Hg data on bass continue to remain one of the most important long-term data sets in the country, both for understanding differences within the Everglades, and for understanding the potential for human exposure. Still, the Hg hotspots remain, and require further study, especially the potential effect of dry-downs on Hg methylation and accumulation in bass in the STAs*

*The inclusion of data on mercury in Florida Panther and the Burmese Python are interesting, and will potentially be very useful because of the critical status of the panther, and the high trophic level of the python. The Alligator data is both important biologically in terms of understanding trophic dynamics of alligators and the food chain, but also because of the threat to humans that consume them – this research should have a high priority. The panther Hg data, particularly for Big Cypress National Preserve, is disturbing even if not yet significant, and suggests the need for a focused study on mercury in different components of the system. Readers will miss data on Great Egrets, missing from the main Chapter 3B (although some are in appendix 3B-1). The graph showing Hg concentrations in feathers was a useful bioindicator that is missing in this report, and should be added in future reports.*

*The major problems are noted, along with new research needed to understand how to reduce mercury levels further, particularly in fish in the Everglades National Park, in the Everglades Protection Area, and in the Kissimmee River Basin. All three are problematic because of the longevity of the fish, and their consumption by people. Further, eutrophication is a problem that requires additional study, which is on-going.*

*The data, models and conclusions in chapter 3B (and in the appendix) reflect the complex problem faced by many agencies dealing with mercury and sulfur in freshwater ecosystems, particularly since often the problem relates to atmospheric deposition (sources of mercury from elsewhere not under their direct jurisdiction). The data generated by the various agencies, and the SFWMD, are proving useful for other aquatic ecosystems throughout the United States.*

*Unlike many models to understand the fate and effects of mercury, the Everglades Mercury Cycling Model is dynamic and makes use of additional data as it becomes available. This is a key point that will increase our general understanding of mercury cycling. The suggestion that further modeling is required to understand how to reduce mercury still further is a move in the right direction, as is the work on eutrophication. Integration of sulfur into the models is an important step in understanding chemical dynamics within the Everglades, and should be given high priority. The models would profit from data that examine mercury and sulfur levels in water and biota from the same location at the same time (at greater frequency), at the hot spots (being initiated), and on-going an in-depth and transparent peer-review.*

*The findings are exciting in that they include four important areas: 1) Continued biomonitoring to explore temporal and spatial trends in mercury (bass, panther, alligator, and python data are extremely important within this context), 2) Results of experiments to determine if the mercury levels are having effects on key bioindicators (wading birds), 3) The relationship between mercury and sulfur, 4) Assessment of practical approaches to reduce sulfur levels and restore the appropriate hydro pattern, and 5) Studies of Mercury hot spots and eutrophication. The inclusion of previous findings provides a context for the current work, and allows the general reader to get up to speed with previous work (although hot links would help). The inclusion of sufficient references in the previous findings was extremely helpful, and continues to be important in each report.*

*Problems that remain mainly include: 1) Lack of clarity with respect to on-going monitoring, such as Great Egret feather Hg levels, 2) Lack of clarity with respect to which data are in Chap 3B versus in Appendix 3B-1, 3) Insufficient detail to evaluate the individual studies (although the appendices provide some of the needed information), 4) Lack of a context for levels in fish with those from other southeastern areas, 5) Lack of variance measure for some of the tables, and 6) Lack of statistical analyses of some trends (see section below). The provision of information on lakes impaired north of the ENP was extremely useful.*

*The Wildlife section would profit from an information needs and recommendation section, similar to the one provided for the Sulfur section. While the mercury program is obviously much more extensive, far-reaching, and long-term, it would still profit from an overview look at research needs, given the new emphasis on both mercury and sulfur.*

**Response:** These specific deficiencies are noted and will be addressed.

### **Sulfur Levels, Sources and Effects**

**Comment:** *The Sulfur issue in the Everglades is critical not only because of its effect on methylation, and thus potentially toxic levels to humans and wildlife, but because of the potential for affecting other biogeochemical cycles, and its potential toxicity to plants and animals. This section provides extremely useful background information, but not a clear statement of objectives for this section, or for the experiments conducted. The authors provide a particularly strong summary of the interactions between sulfur and mercury problems in the introductory section on pages 27-35. This section is an excellent overview of previous collected information.*

**Response:** We will add a statement of objectives for this section

**Comment:** *The relatively new emphasis on determining mass balance of sulfur within large sections, and smaller sections (such as the STAs) is critical to determining how to best handle management of sulfur levels. The STAs may have a critical role in understanding the relationship between sulfur levels and Hg methylation, but also in examining the effect on Hg levels in fish.*

### **Research Reports**

**Comment:** *The overall research described in the chapter is important, timely, and will add greatly to understanding of mechanisms, as well as meeting management and RECOVER goals. However, the specific objectives of each project, the expected outcomes, and the relationship to RECOVER goals is not always clear. Further, some of the quantitative data are not presented graphically (e.g. Hg effects on birds). It would be useful to have a general format for each research section, so that all include objectives, background, results, future result or information needs, and relevance to RECOVER goals.*

**Response:** Objectives, expected outcomes, and the relationship to RECOVER goals will be added for each project. Some of the quantitative data cannot be presented graphically as research is intended to be published elsewhere.

**Comment:** *Further, In general, a description of the individual research projects is adequate for this report, although some questions and comments are provided by line number below. Despite this general adequacy, an introductory section explaining how these studies interact is required but presently missing. As written, it would appear that there is significant overlap and potential redundancies between individual studies. For example, it seems the goals and objectives of the E-MCM/D-MCM study is very similar to the ACME Phase III, and for that matter, similar to the Regional Mass Balance Study. How will results be integrated or alternatively is it necessary to look at the same issues from three different perspectives? The District needs to consider if all these simultaneous studies are required, and if they are all justified, how information and data will be shared by each performing group and otherwise integrated.*

**Response:** An introductory section explaining how these studies interact will be added. We do not agree that there is presently significant overlap and redundancies between individual studies, and the text will be edited to clarify that.

**Comment:** *The models for understanding Hg and sulfur in the Everglades remain one of the most important research projects because it can both lead to an understanding of the mechanisms, but also to RECOVER goals. Integrating the two will require considerable time and effort, and future targeted research to address specific data needs.*

*The South Florida Hg Hot Spot Study is an extremely important effort that will provide data for many different questions regarding the methylation and bioaccumulation of mercury in the Everglades. The SFWMD is the leader in understanding Hg dynamics in freshwater systems, and this project will greatly enhance these efforts.*

## TECHNICAL COMMENTS AND QUESTIONS

### **Mercury in Fish and Wildlife Historical Monitoring**

**Comment #1:** *Is alligator meat still under a ban?*

**Response:** FWC continues to ban the sale of alligator meat from recreationally caught alligators from Francis S Taylor WMA (WCAs 2 and 3). The ban will be in place until such time as testing shows levels that are safe to allow sale of the meat. FWC highly recommends that hunters do not consume this alligator meat but the decision ultimately lies with the hunter.

### **Alligators**

**Comment #1:** *Could you provide SE or other indication of variance?*

**Response:** This information will be provided in Table 3B

**Comment #2:** *It is difficult to evaluate these results without knowing the size of the alligators in question? Are alligators of only a certain size collected for me? What is the range?*

**Response:** When available, alligator size information is provided. Additional data mining is ongoing to further formalize data for evaluation of size data. All collections do consist of “harvestable size” alligators as determined by project biologists.

**Comment #3:** *Table 3B-1: Please give SE or SD. In terms of health the Hg values are critical, but in terms of understanding mercury bioaccumulation, it is essential to know the relationship between size and Hg levels?*

**Response:** Data will be provided in Table 3B-1.

**Comment #4:** *Management Unit (AMU) where multiple testing was performed, while only 1 individual was tested from?*

**Response:** Text corrected for consistency with Table 3B-2.

**Comment #5:** *MeHg criterion, recent declines have been evident (Gabriel et al., 2010a). It is possible that the concurrent declines have occurred in alligator tissues?*

**Response:** It is very likely as multiple biotic endpoints indicate declines in mercury. Testing is planned as identified in this section to determine trends and conduct a human health risk assessment to evaluate sales of and consumption of recreationally caught alligators from Francis S Taylor WMA and from other select Alligator Management Units (AMUs) in Florida.

**Comment #6:** *Were there 12 animals harvested from each site or a total of 12 from all the WCAs combined?*

**Response:** 12 alligators were collected per STA. This will be more clearly defined in the body of the text.

**Comment #7:** *Lower than what? The meaning might be implied, but is not clear.*

**Response:** Lower than the 1996 WCA values. This will be defined more clearly in text.

**Comment #8:** *Continued sampling of alligators from areas where humans will hunt (and consume the meat) is a critical need, especially given the variability in Hg hot spots in the region.*

**Response:** The authors agree. Work has been proposed to further evaluate trends and human health risks from mercury bioaccumulation in Alligators from the WCAs and STAs.

### **Panthers**

**Comment #1:** *highest tissue Hg concentrations because raccoons had THg values 10-100 times higher than deer. Raccoon comprised 70 percent or more of the diets of Shark River Slough panthers, which had highest muscle and liver THg concentrations, while panthers north of Alligator Alley along the western extent of their range had lower overall mercury levels and fed primarily on white tailed deer (*Odocoileus virginianus*) and feral hogs (*Sus scrofa*). Similarly, Roelke et al. (1991) observed declines in panther THg levels during the late 1980s in Fakahatchee Strand in response to changes in diet from one dominated by raccoons to deer after management actions increased deer populations. Line 210: However, if the panthers are eating raccoons, then the levels in raccoons should also be examined (have they declined?)*

**Response:** Porcella et al. (2004), conducted a retrospective study of trends in raccoon Hg levels but results were inconclusive concerning long-term trends. Authors are not aware of current sampling programs testing raccoons for THg within or near the EPA.

**Comment #2:** *Please provide the means and other relevant information, not just the range.*

**Response:** Data included for recent sampling of panther blood and hair were provided to the authors in a summarized format. The specific information requested here is not available at this time as the studies are not yet complete but will be published at a later date. We will pursue this data for inclusion in this or subsequent SFER reports to provide a broader and more descriptive data evaluation.

**Comment #3:** *Is there any indication that they are changing their diets accordingly?*

**Response:** This is unknown. Authors will inquire and make note in the SFER as to findings.

**Comment #4:** *Figure 3B-2: Please provide an explanation for the values of the boxes and whiskers. Are they percentiles, ranges, SDs or SEs? Table 3B-2: Was there one composite from*

*each site. Again, the large range in carcass size makes this difficult to interpret, particularly since the composites contained so many, and the size range was so great?*

**Response:** The figure components will be fully explained in the report. Individual data are summarized and reported for a total of 52 free-ranging panthers collected between 2000 and 2007. Subsequent collections have been conducted but have not yet been finalized.

**Comment #5:** *The increase in Hg concentrations in panthers is disturbing, and suggests that Hg in other components of the food chain in Big Cypress NP need to be examined?*

**Response:** Agree: No current monitoring programs are known.

### ***Burmese pythons***

**Comment #1:** *Does diet differ by age or size?*

**Response:** Publications specific to the Everglades population of Burmese pythons indicate a broad and diverse diet of birds, mammals, and reptiles but no indication of size selectivity is provided. This is likely due to low numbers of study specimens across size ranges. Specific inquiries and further literature review will be made concerning size selective diet and incorporated in the report if appropriate.

### ***Fish***

**Comment #1:** *Using both methods was an excellent idea, and this is not often done in other studies.*

**Response:** Thank you; This is a result of mixing two datasets which can be problematic.

**Comment #2:** *Figure 3B-7: Since points overlap emphasize that plot contains 5281 point (if this is true).*

**Response:** These results are based on annualized regional data. A total of 5,281 fish were analyzed, but by region; therefore, 94 points (annual regional normalized vs. non-normalized means) are compared in this figure. This data could be evaluated in a number of ways including for individual fish; however, the authors reported the data as regional means as the data are reported for considering both spatial and regional trends in the data.

**Comment #3:** *Furthest south, in Shark River Slough in ENP, a total of 539 LMB have been collected yearly for mercury analyses from two sites, L67F1 and ENPNP, since 1989 (Figure 3B-8). Regional*

**Response:** This section will be rewritten for clarity.

**Comment #4:** *Would not be expected to sequester available methylmercury, in the process making it unavailable for bioaccumulation. In fact, bioaccumulation factors (BAF) for mosquitofish were higher in Shark.*

**Response:** This section will be rewritten for clarity.

**Comment #5:** *Drop these two sentences as the following lines demonstrate that there is no seasonal trend.*

**Response:** This discussion was made to consider short-term (annual) variations in largemouth bass THg bioaccumulation. It is important to note that short-term variations occur in spite of a lack of long-term changes in fish mercury levels within Shark Slough of ENP. We will consider re-writing to place statements within the context of the overall lack of long-term trends or dropping sentence if no value is found.

**Comment #6:** *Has Hg been measured in these other species (is it about the same as the bass).*

**Response:** Individual fish tissue analyses have been conducted primarily for the purpose of conducting human health risk assessments. Short-lived and lower trophic level species tend to have lower Hg concentrations than largemouth bass. Snook are transient to the Shark Slough and generally have lower THg concentrations. However, snook collected from Shark Slough are elevated over other areas within ENP and the state.

**Comment #7:** *Table 3B-9: Any indication of why Hg seems to be cycling but not staying at the lower levels?*

**Response:** We do not fully understand the intent of this comment and would appreciate clarification.

**Comment #8:** *Are the consumption advisories effective, or should actual bans be in place?*

**Response:** Fish Consumption Recommendations based on human health risk assessments have been utilized by the state of Florida for advising the angling public. Overall, few advisories recommend “No Consumption” of fish but rather advisories typically recommend “limited consumption” (i.e. 1 six ounce meal per week) of certain species from specific locations. It is an individual’s choice, based on the advice provided through multiple media, to decide the course of action concerning their own health.

**Comment #9:** *Figure 3B-10: The red line representing 0.3 ppm is not at 0.3 ppm.*

**Response:** Noted: This will be fixed.

**Comment #10:** *What would happen, however, if water levels were very low, exposing some of the marsh?*

**Response:** This is an important question that speaks to the overall management of the STAs in general. Periodic dry-downs of varying duration do occur in the STAs, including STA1W. This comment will be further considered and appropriate text provided if necessary.

**Comment #11:** *The effects of drying on methylation and Hg levels in fish should be a high priority (especially given global climate change and potential for serious droughts).*

**Response:** We agree. Proposed changes to the timing, duration, and frequency of water flow in the Everglades are intended to increase the average hydro-period in the northern Everglades. These changes should provide benefit to decreasing the frequency of dry/wet cycles.

**Comment #12:** *Fig 3B-11: A greater understanding of why Hg hasn’t been high in this STA might help overall understanding of trophic dynamics.*

**Response:** Will consider adding discussion points concerning results of mercury bioaccumulation research in the STAs.

**Comment #13:** *\*Has there been any attempt to model Hg concentrations as a function of both physical and biochemical factors in the STAs (or the Everglades generally)? The effect of frequent wet/dry cycles needs to be more fully explored.*

**Response:** The Everglades Mercury Cycling Model (E-MCM) has been used in the past to predict the effect of physical and biogeochemical parameters in the Everglades on mercury bioaccumulation in aquatic biota. We hope that further funding can be made available to update and refine this modeling effort.

**Comment #14:** *0.20 – 0.90; n = 40), a 49 percent decrease (Figure 3B-13). A seasonal Kendall analysis*

**Response:** This section will be rewritten for clarity.

**Comment #15:** *Hg levels in LMB and other large-bodied piscivorous fish remain at or above the USEPA MeHg criterion for the protection of human health throughout the Kissimmee Basin.*

**Response:** This section will be rewritten for clarity.

### ***Sulfur Levels, Sources and Effects***

**Comment #1:** *Evidence that sulfur applications to EAA soils are no longer beneficial in regards improving crop*

**Response:** This from one of the Ye 2010 papers; we may qualify the statement as IFAS intends to sample more EAA soil types.

**Comment #2:** *In the 1980s, Florida state agencies monitoring mercury levels in freshwater fish statewide,*

**Response:** Ware et al. 1990 reports running mercury analyses on largemouth bass from 80 Florida lakes and rivers.

**Comment #3:** *highest reported worldwide for water bodies without direct input of mercury from industrial activity or mining runoff.*

**Response:** Ware et al. 1990; of 80 Florida lakes and rivers sampled in the 1980's, the top 3 sites re mercury in largemouth bass were the 3 Everglades stations; 2.7 ppm Hg in WCA-2 bass. Bowfin averaged 3.2 ppm and ranged to 7 ppm. I have heard of nothing higher in freshwaters. My statement is based on years of reading the literature; I have seen very few values as high or higher than the Everglades. I will make it clear I am referring to fresh waters. As well, I will look for another reference.

**Comment #4:** *While the claim of a 70% reduction in Hg within the ecosystem may have been made previously, the data provided in the mercury section of this chapter dampens this claim and therefore this is overstated here as well as in previous sections.*

**Response:** 60% reduction from the maximum measured is more accurate; this has been corrected.

**Comment #5:** *This is an excellent summary of the problem, but it might be useful to state the objectives for this section overall.*

**Response:** the objective is defined in the Section title: EVERGLADES MERCURY BACKGROUND AND LINK TO SULFUR

**Comment #6:** *In regards to sulfide toxicity to aquatic animals, recent data (from W. Orem, USGS, as below)*

**Response:** Data are reported in the section “Northwestern Water Conservation Area 2A”. I will make this clearer.

### ***Sulfur Sources and Levels***

**Comment #1:** *This is a useful section.*

*\*It is still clear that there needs to be a statement of objectives for this section of the report. There is much background information of sulfur and the sources of sulfur, but no clear statement of objectives or what the report means to communicate in this section.*

**Response:** We will add a statement of objectives.

**Comment #2:** *There have been recent attempts to determine EAA sulfur mass balance; Gabriel (2009)*

**Response:** We will add reference to Gabriel et al. (2010) which has much discussion on recent attempts to determine EAA sulfur mass balance.

### ***Effects of Sulfate Loading***

**Comment #1:** *Where there experiments, what were they, what was the objective?*

**Response:** These are preliminary findings from the USGS and a fuller description of the research will have to wait until next year. The objective is to further elucidate the relationship between MeHg and sulfate, sulfide and DOC.

**Comment #2:** *NW WCA-2A ranged from 5-17 mg/L, but average concentrations since then have averaged between 7 and 8.*

**Response:** These are data prior to and after STA-2 being opened up to WCA-2 NW. We will make the text clearer by comparing averages to averages.

**Comment #3:** *All sites sampled in NW WCA-2A exceeded EPA standards of 2 µg/L free H<sub>2</sub>S*

**Response:** This line will be rewritten for clarity. We will use the term “undissociated H<sub>2</sub>S” (EPA’s term); undissociated H<sub>2</sub>S is the toxic form for aquatic life. EPA’s standard as in the red book is 2 µg/L undissociated H<sub>2</sub>S for protection of aquatic life.

**Comment #4:** *The mean of this paragraph is confusing due to the use of terms “free sulfide” and “free H<sub>2</sub>S”. Are these the same thing, or does “free sulfide” refer to the free S<sup>2-</sup> ion?*

**Response:** We will use the term “undissociated H<sub>2</sub>S” for “free sulfide” and “free H<sub>2</sub>S”.

**Comment #5:** *Was this a transect sampling, away from the canal.*

**Response:** We do not know if this was transect sampling; it was more probably grid sampling that may be amenable to determining trends with distance from the canal. These are preliminary findings from the USGS and a fuller description of the research will have to wait until next year.

**Comment #6:** *sampling efforts were those from the lower C111 canal, which revealed some of the lowest*

**Response:** “where” will be replaced by “were”.

**Comment #7:** *the ENP versus the WCA is not clear. Last, the results from the small fish (we selectively analyzed mosquitofish only) analysis showed a spatial pattern that agrees very closely with the MeHg*

**Response:** We will rewrite this text to make it clearer.

**Comment #8:** *The authors claim that the sulfate concentration triggering inhibition is different in the ENP versus the WCAs, but the trigger point for the WCAs is not provided for comparison. Also, it is probable that there would be an interaction between this trigger value and DOC concentrations. It plausible that higher DOC would increase the inhibition trigger, as higher DOC would further stimulate SRB activity making them more robust against inhibition. It is good to see this is recognized in the research plan (lines 1126-1129).*

**Response:** We hope that ongoing USGS research will better elucidate the relationship between MeHg and sulfate, sulfide and DOC. We will add the “Goldilocks” concentration for the WCAs, most commonly reported as 5-10 ppm sulfate in WCA surface waters.

### ***Elemental Sulfur Use for Sugarcane***

*\*Some of this information should be modeled to provide insights into the total sulfur budget.*

**Comment #1:** *In most cases numbers in chemical formulas are not subscripted*

**Response:** We will correct this.

**Comment #2:** *448 kg/ha or 400 lb/ac) did not increase sugar yield. There may thus be a need for agricultural S application rates greater than 448 kg/ha to overcome the soil’s CaCO<sub>3</sub> buffering capacity, and thus release*

**Response:** This is paraphrased from Ye et al. 2010, and we may need to qualify the statement as IFAS intends to test other EAA soils re S application and pH decrease. As well, we will state that the S application did not lower soil pH.

### ***Information Needs and Recommendations***

*\*An excellent section*

*\* The recommendations are all critical needs, but the over determination of mass balance for both the Everglades generally, and for individual sections (including the STAs) is a very high priority, as is determining the potential effect on Hg levels in fish of sulfur reduction.*

***Comment #1:*** Quantify the sources to, and the sulfur mass balance for, Lake Okeechobee.

***Response:*** This will be changed to “Quantify the sulfur sources to and the sulfur mass balance for Lake Okeechobee.”

**Research Progress**  
**No Effect Level for Fish-eating Birds**

***Comment #1:*** This initial paragraph should have citations. A little more context for why this has been a problem in terms of population declines should be mentioned.

***Response:*** Agreed; will do.

***Comment #2:*** These are extremely important studies and results, but it should also be considered that effects could be less in the field, where there are even more changes for matings and pairings. Without field experimentation, this is difficult to determine, but the possibility should be mentioned. What about foraging effects, particularly in drought years?

***Response:*** These points will be addressed.

**Revise Hg Cycling Model**

***Comment #1:*** This aspect is extremely important for the overall Everglades models.

**Biogeochemical Controls on Mercury Methylation**

***Comment #1:*** This is an excellent choice of study sites

***Comment #2:*** Excellent statement of relationship of research to management goals.

**Statewide Hg TMDL**

***Comment #1:*** How does this relate to other states, or specifically to the SFWMD?

***Response:*** The consent decree is between the USEPA and FDEP; I believe there are such between USEPA and other States. The Florida Statewide mercury TMDL will determine the necessary reduction in anthropogenic mercury sources to the Everglades to achieve < 0.2 ppm mercury in largemouth bass. It is however highly probable that these reductions will dominantly have to be made to global atmospheric Hg sources; hence the interest in sulfur loading to the Everglades as an alternative solution to the mercury problem.

***Comment #2:*** What is the relationship to what will be done in the Everglades, or to the specific hot spots for the Everglades?

***Response:*** This is to be determined.

### ***Hg in Coastal Waters***

*\*This is an important research area.*

**Comment #1:** *Its less clear to me how a regulatory TMDL will work for coastal waters.*

**Response:** We have a Gulf of Mexico mercury TMDL underway - progress reports are available. Florida coastal waters do receive atmospheric mercury sourced from outside of Florida, and waters with mercury sourced from other Gulf States flows into Florida waters.

**Comment #2:** *Another issue to consider is the migratory nature of some fish (who pick up Hg elsewhere)*

**Response:** The MCM, mercury model, will have that capability.

**Comment #3:** *How extensive has the sampling been of Gulf fish for Hg, especially those that are non-migratory.*

**Response:** Quite extensive; Adams et al. 2003; Lowery and Garrett 2005....

### ***Regional Sulfur Mass Balance***

**Comment #1:** *A stated objective is to capture variation in sulfur fluxes due to precipitation. Even though data is reported on an annual basis, it seems highly unlikely that this is possible with monthly or, worse, bimonthly sampling. Perhaps rather than collecting grab samples, ion specific probes or flow weighted samplers could be employed, or at least more detailed sampling with in time frame of individual events could be conducted to better estimate flow weighted sulfur mass fluxes.*

**Response:** We are using previously collected compliance data for the calculations. Ion specific probes area good idea as they would provide more time series information however would require additional funding which is likely not available.

**Comment #2:** *What about the STAs*

**Response:** The objective of this study is to obtain a “30,000 ft. view” of sulfur mass exchange in S. Florida. Even though the STAs are large, they a much smaller in comparison to the other land uses evaluated. In this investigation, they are considered an extension of the EAA. Any sulfur delivery from the EAA to the WCAs is really from EAA by way of the STAs.

**Comment #3:** *Can you tell the difference between short-distance and long-distance atmospheric sources?*

**Response:** No, both are taken into account, cumulatively.

**Comment #4:** *Are any more data available.*

**Response:** Data from samplings prior to 1998 are available.

**STA/WCA Internal Eutrophication Study**

**Comment #1:** *Is Hg going to be integrated at some point in the study?*

**Response:** To my knowledge, no it will not.

**Comment #2:** *Is this results report available?*

**Response:** Yes it is. Contact Stuart Van Horn (svanhorn@sfwmd.gov) for the report.

**Comment #3:** *Was Hg measured in any of these experiments?*

**Response:** No

**Comment #4:** *The difference between the treatments “flooded with unamended water” (line Line 1443) and “unamended overlying water” (line 1446) is not apparent. Please clarify.*

**Response:** Line 1446 just means un-amended water, same as line 1443; clarification will be made.

**Comment #5:** *Figure 3b-18: Credit for the photos in caption needs to be updated.*

**Response:** Change made.

**Comment #6:** *Figure 3B-19: The within-figure captions (within the boxes at the top) are not legible.*

**Response:** Change made.

**Additional Author Responses on Panel Comments**

**Response:** The Panel lists 69 additional detailed questions, most of which will be addressed in the Chapter rewrite.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 3B (ADDENDUM)

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Posted: 10/14/10 at 04:14 PM by S. Ollis

Don Axelrad<sup>6</sup> and William H. Orem<sup>7</sup>

**Level of Panel Review: Technical (primary); Integrative (secondary)**

Reviewers: J. Burger (AA), O. Stein (A)

***Effects of Sulfate Loading***

***Comment #5:*** *Was this a transect sampling, away from the canal.*

**Response:** The Everglades National Park (ENP) sampling is a grid, not dissimilar from that employed by USEPA for R-EMAP. We will attach a map of the ENP sampling sites in the final report. Sulfate and MeHg show trends based on data from a transect composed of the grid sites from the L67 canal discharge. In other words, a subset of the grid sites form a transect from the L67 canal discharge and show the observed trend. Most other sites far from the canals have very low sulfate and MeHg levels.

***Comment #8:*** *The authors claim that the sulfate concentration triggering inhibition is different in the ENP versus the WCAs, but the trigger point for the WCAs is not provided for comparison. Also, it is probable that there would be an interaction between this trigger value and DOC concentrations. It plausible that higher DOC would increase the inhibition trigger, as higher DOC would further stimulate SRB activity making them more robust against inhibition. It is good to see this is recognized in the research plan (lines 1126-1129).*

**Response:** The point of maximum MeHg production in central Water Conservation Areas (WCAs) appears to be in the range of 10-12 mg/L sulfate in surface waters. It may be somewhat lower in the ENP, based on a limited dataset in the ENP to date (we continue to collect data), perhaps in the range of 2-5 mg/L. The reason for this is not known, though certainly DOC levels could be a factor, as the panel suggests, but we have not proven this as yet. Other possibilities are pH differences, and substrate differences (more denuded marl areas in the ENP). As we've stated before, while interesting, the Goldilocks zone of sulfate concentration which promotes maximal rate of mercury methylation can be overhyped. What is really important is that the large amounts of sulfate entering the ecosystem are triggering high production rate of MeHg in the ecosystem as a whole. That is the major concern.

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<sup>6</sup> Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Tallahassee, FL

<sup>7</sup> U.S. Geological Survey, National Center, Reston, VA

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 4

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**Posted:** 10/08/10 at 02:16 PM by J. Madden

Jonathan Madden, Agnes Ramsey and Pam Wade

**Level of Panel Review: Accountability (primary); Technical (secondary)**

Reviewers: V. Novotny (AA), R. Ward (A)

### ACCOUNTABILITY REVIEW

*Does the draft document present a defensible account of data and findings for the areas being addressed that is complete and appropriate?*

*Comments by Robert C. Ward*

**Comment #1:** *Tables 4-13, 4-15, 4-17 etc. indicate considerable variability, among the sub-watersheds, in percentage of 15-year historical average TP loads and percentage of 15-year historical average flow. It is not clear why subregion variation would be so great. What causes the flow and loading variation among the sub-watersheds during one year and from year-to-year?*

**Response #1:** The following response addresses related comment numbers 1, 6, 9, 10, 19, and 20:

Two types of variability are being observed. Differences are apparent between sub-watersheds over the same period as well as variation within a single sub-watershed over time. There is currently not enough data to pinpoint the cause of such variations. The variability could be due to factors including rainfall, basin characteristics, BMP implementation, current and historical land usage, legacy phosphorus in the soils, assimilation differences, and more. In considering land use alone, at over 3.4 million acres, the LOK watershed is expansive and diverse. Even though most sub-watersheds are categorized with a primary land use of agriculture, there is a great deal of variety in specific agricultural land usage types. Chapter 10 provides a more detailed picture of the variation in Figure 10-7, to which a reference will be added in Chapter 4. The Final Report for project entitled “Nutrient Loading Rates, Reduction Factors and Implementation Costs Associated with BMPs and Technologies” prepared for the South Florida Water Management District by Soil and Water Engineering Technology, Inc. dated July 9, 2008, cites Unit P Load factors (lbs/acre/year) for the Caloosahatchee Watershed. Examples include natural areas as 0.11, sugar cane as 0.55, and dairies as 12.94.

The District is currently conducting the rule development process to amend the existing regulatory source control program with plans to incorporate upstream monitoring (within sub-watersheds) for the purpose of identifying areas of water quality concern and contributing factors. Annual variation of load and flow is expected when compared to a 15 year average, and it was not the intent of Chapter 4 authors to give the impression that a “conclusion of success” was made based upon the overall loading of 19% below the historical TP load. With the rule development efforts underway, a baseline period is expected to be established along with a performance methodology to determine future impacts source control program implementation in the LOK sub-watersheds, as was done for the Southern Everglades. Until then, the effectiveness

of implementation cannot be quantified for this region. Chapter 4 will be revised to report only data relative to Water Year 2010 and the period of record for indication of trends. A results comparison to historical periods will not be presented until the pre-BMP base period and performance methodology are established under rule. In future reports, emphasis will be placed on the factors the District is considering in development of collective source control performance measures for the Lake Okeechobee Watershed. Due to the considerable variation that has been observed, it is likely that each sub-watershed will have a unique performance measure.

***Comment #2:*** Chapter 4 discusses water quality monitoring in a number of contexts. For example, lines 769-772 state there is an initiative to ‘define’ a monitoring network. Lines 795-796 note that a main focus of 2010 activities was to conduct monitoring to evaluate effectiveness. Lines 806-807 note another focus for 2010 was to continue to develop performance measures. Lines 808-815 indicates that the technical evaluation of the LOWA has been completed. Lines 831-833 discuss development of a Performance Measure Technical Support Document. The numerous references to past monitoring efforts, current evaluations, and future performance measure development makes it difficult to understand what data was used to develop the current Chapter 4, what changes might be coming for monitoring, and how performance measures might change. There is a need to explain the overall water quality monitoring strategy being employed in nutrient source control programs, including anticipated changes.

**Response #2:** Chapter 4 text will be updated to clarify the status of the monitoring and performance measures.

The District proposes using a two tiered monitoring program within the Lake Okeechobee Watershed. Tier I monitoring consists of sites representing the phosphorus levels discharged from each sub-watershed and will include water quality and water quantity results for the computation of phosphorus loads. It is at this level that pre-BMP base periods and performance measures will be established to determine the effectiveness of implementing the collective source control programs. Tier II will consist of upstream monitoring comprised of fixed and mobile sites used to evaluate phosphorus concentrations and speciation from within each sub-watershed to pinpoint areas of water quality concern and contributing factors. Both Tier I and Tier II monitoring networks utilize existing monitoring stations.

The monitoring discussion in lines 795-796 refers to the evaluation done for Water Year 2010 utilizing both tiers of the monitoring network. While no official performance measure is yet defined, the District is utilizing the data from this monitoring network to highlight areas of concern and to support rule amendments. Tier I monitoring data has been presented in the current Chapter 4 (Tier II, LOWA, monitoring discussed in Appendix 4-1).

*Comments by Vladimir Novotny*

***Comment #3:*** Page 4-2, 4-4 and throughout the entire report the beginning and end of the WY 2010 has not been defined; apparently it is different from calendar year and from hydrological year (October to September).

**Response #3:** Water Year 2010 (WY2010) is defined at the beginning of Chapter 4 on page 4-1 as May 1, 2009 – April 30, 2010.

***Comment #4:*** Page 4-5, Line 152 is the first noticed appearance of mentioning “predicted loads” (see also Table 4-24 and Figures 4-8 and 4-9) but the description of the prediction model was not found. Apparently the model generated estimates of TP loads without BMPs for a comparison

*with the years when BMPs were implemented. Based on this comparison claims were made that, for example, the EAA (Everglades agricultural areas) achieved 41% reduction of TP loads (page 4-6). Similar estimates were made for all other sub-watersheds of the EPA.*

**Response #4:** Rule 40E-63 defines the methods of determining annual compliance for the EAA and C-139 basins. Lines 1115 and 1116 describe “*the predicted load is the pre-BMP baseline period load adjusted for the hydrologic variability associated with rainfall.*” A complete description of the derivation of the “predicted loads” together with the numeric equations is provided in Appendix 4-2. To better convey this information, reference to Appendix 4-2 will be added in the language introducing Table 4-23, which presents the predicted load for WY2010.

**Comment #5:** *Table 4-2 lists characteristics of ECP (Everglades construction projects) areas where only agricultural uses were identified. What are the non-agricultural uses?*

**Response #5:** The primary non-Agricultural land use in these areas is Residential, and the table will be updated to reflect this.

**Comment #6:** *Page 4-10 lines 322 – 333 and page 4-17 mention the BMPs and pollution control load measures in the Lake Okeechobee watershed which exhibited TP reductions of 19%. Chapter 10 describing the same does not report very favorable results, essentially an impression can be made that most of the TP load control measures were not successful (with some exceptions such as hybrid wetlands and 19% reduction is statistically small to make any definite conclusions about the success.*

**Response #6:** Please refer to Response #1, which was consolidated due to the interrelated issues common to several comments.

**Comment #7:** *Nutrients in urban discharges originate primarily from urban lawns. Apparently these loads are to be controlled by a rule establishing maximum applications fertilizers per are of the turf. How is this rule enforced and how successful is it?*

**Response #7:** The following response was provided by Mr. Richard J. Budell, Director, Office of Agricultural Water Policy, Florida Department of Agriculture and Consumer Services:

The rule is enforced in two primary ways: First, all fertilizer products sold in Florida are required by law to be registered by FDACS. That registration process requires that each fertilizer product label be reviewed by staff in Tallahassee to confirm that the labeling is in compliance with the requirements of the Urban Turf Fertilizer Rule; second, FDACS field inspectors are present in the marketplace to assure that the products for sale to consumers are registered with the Department and in compliance with the requirements of the Urban Turf Rule. If products are found in the market-place that are either not registered with the Department or otherwise out of compliance with the requirements of the Rule, those products are put on “Stop-Sale” and embargoes from further sale and distribution. This rule in combination with the model local fertilizer ordinance provides effective control of fertilizer products at the point of sale and their end use in the urban landscape.

**Comment #8:** *Figure 4-6 on page 4-19 shows unit area loads but it does not identify of what. Presumably of TP.*

**Response #8:** “TP” has been added to the title of Figure 4-6 as well as in the report on page 4-17.

***Comment #9:*** *Considering the fact that the unit loads on Figure 4-6 and in Table 4-3 fluctuate widely for apparently similar land uses what is a justification (if any) for these wide fluctuations? Apparently the 19% reduction is within the statistical error.*

**Response #9:** Please refer to Response #1, which was consolidated due to the interrelated issues common to several comments.

***Comment #10:*** *Table 4-5, 4-7, 4-9, 4-11, 4-13, 4-15, 4-17, 4-19 and 4-21 present the comparisons of the annual observed TP loads and flows compared to their historical averages (1991 to 2005 – before BMPs were implemented). By observation of the values in the table it can be noted that the loads are closely correlated to flows. This is typically the case in most hydrological annual observations (e.g., annual sediment loads vs. flow) and the reason is the load is a multiplication of concentration and flow. This sometimes leads to (a) spurious correlations by taking logarithms of these variables, or (b) claims that loads are statistically as good as a constant times flow. But a plot of the annual load and calculated annual flow weighted concentrations vs. flow would be very useful. See also comment by W.C. Ward below.*

**Response #10:** The referenced tables will be updated, as described in Response #1, to remove the annual results comparison to the 15-year historical period. The suggested plots will be evaluated as part of the comprehensive development of source control performance measures within the watershed. Presentation of these in the chapter or appendix will be considered in the future to communicate specific ideas.

Please refer also to Response #1, which was consolidated due to the interrelated issues common to several comments.

***Comment #11:*** *Table 4-26 for C-139 area is similar to the above mentioned Tables 4-5 to 4-17 but it is more explanatory and accompanied by figures.*

**Response #11:** Noted. Currently, the District does not have all of the same information for the Lake Okeechobee Watershed that is provided in the tables cited for the C-139 basin, such as a rainfall adjusted load prediction. The District is conducting the rule development process to amend the source control program rule for LOK so that in the future there will be comparable programs across the Northern and Southern Everglades, including the reporting of similar information.

***Comment #12:*** *The above observation and hydrological facts leads to a question of what is a value of a single annual calculated TP load? Can any conclusions be made regarding the compliance with TMDL? If the year is dry then there is a compliance and if it is wet then it may not be. Hence, the loads and TMDLs must be treated in the same way as the excursions of the water quality standards, i.e., statistically in terms of probabilities.*

**Response #12:** Please refer to Chapter 10 for reporting compliance with the TMDL. The following response has been provided through coordination with Chapter 10 authors.

The developers of the Lake Okeechobee TMDL recognized the variability of annual flow to Lake Okeechobee and its influence on TP loads. Therefore they use a five-year rolling average rather than a single annual calculated TP load to compare against the TMDL. This 5 year average does smooth out the variation rather well. For example, the last 5 year period includes 1 year with hurricanes, 2 drought years, 1 drought year that included a tropical storm and a near normal year,

the 5 year average of 496 is very similar to the “normal” year value (WY2010) of 478. This variation and five year moving average was pointed out in Chapter 10 page 10-53.

***Comment #13:*** *The annual loads must have anomalies. In Florida hurricane Katrina passed over southern Florida. These anomalies could also show on a plot as outliers.*

***Response #13:*** Noted. Anomaly or outlier detection specific to each Lake Okeechobee sub-watershed’s source control performance measure has not been completed. Past and future conditions which may be excluded from the performance measure’s data set will be considered through the rule process. Please refer also to Response #21.

*Is the synthesis of this information presented in a logical manner, consistent with earlier versions of the Report?*

*Comments by Vladimir Novotny*

***Comment #14:*** *Chapter 4 reports and summarizes the results of nutrient controls in the entire Everglades watershed. Chapter 10 describes the same by different authors for the Lake Okeechobee. The finding and conclusions for the same upper portion of the watershed are not always in agreement*

***Response #14:*** The following response has been provided through coordination with Chapter 10 authors.

In the panel’s final comments, please be specific using line numbers regarding which information presented in Chapters 4 and 10 is not in agreement, so that revisions can be made to the final document, as necessary.

*Are findings linked to management goals and objectives?*

*Comments by Robert C. Ward*

***Comment #15:*** *Findings are linked to management goals via a complex mixture of models and data related to an annual percentage of TP load reduction from what might have been expected to occur if BMPs had not been installed. Connection of TP load reduction percentages to reaching compliance with water quality standards, as required in the Long-Term Plan per Chapter 8, is not well developed. Do the models take account of the need to meet water quality standards?*

***Response #15:*** The regulatory models measure the performance of implementing 40E-63, F.A.C. through annual TP load limitations in relation to the WY1980-88 base period proportional to rainfall. The criterion for the Everglades Regulatory Programs specified in the EFA and Rule 40E-63 is a 25% load reduction for the EAA basin and maintaining the base period loading level for the C-139 basin. Rule 40E-63 F.A.C. quantifies what is expected to be reasonable to achieve through BMPs, and regional projects, such as STAs, must be designed based upon these expectations and downstream water quality standards. Analyses to evaluate the overall ability to reach compliance with water quality-derived criteria based on the combined performance of source controls and regional projects are outside the scope of this Chapter.

***Comment #16:*** *Following the above point, is it possible, using existing data, to draw conclusions regarding effectiveness of past collective source water control efforts in the Lake Okeechobee Watershed, realizing that the source control program is always evolving?*

**Response #16:** As part of the development of the baseline period for the performance measures for each sub-watershed the District is examining the source controls previously implemented as well as other factors potentially impacting flow, TP concentration and load. Technical documentation will be prepared in support of the proposed Rule 40E-61 revision, and progress will be summarized in the SFER Chapter 4 in future years. Please also refer to Response #1, which was consolidated due to the interrelated issues common to several comments.

***Comment #17:*** *Will the future performance measures be connected to water quality standard compliance goal achievement?*

**Response #17:** The source control program is only one component that will be implemented to meet the TMDL. The future performance measures will not be designed to measure the TMDL, but rather to measure the performance of the source control program. The relationship between source controls and the overall watershed's water quality goals is outlined in the Phase 2 Technical Plan. Additional details regarding policy level and numeric relationships will be described under a revised Rule 40E-61 and supporting documentation.

*Comments by Vladimir Novotny*

***Comment #18:*** *This chapter cover source controls and somewhat overlaps with Chapter 10 for the Lake Okeechobee controls which showed mixed results. Are there any major differences between the Lake Okeechobee controls and controls in the entire watershed? What makes these controls work in one watershed and failing or inefficient in another one?*

**Response #18:** Please refer to Response #1 as well as the following response provided through coordination with Chapter 10 authors.

Chapter 10 covers the seven elements specified by the Lake Okeechobee Watershed Protection Program (see figure 10-2). One of the elements is the Watershed Phosphorus Source Control Program, described in both Chapters 4 and 10. To be inclusive, Chapters 4 and 10 provide summary information from FDACS and FDEP programs.

## TECHNICAL REVIEW

*Are the findings and conclusions supported by “best available information”, or are there gaps or flaws in the information presented in the document?*

*Comment by Robert C. Ward*

**Comment #19:** *Table 4-1 includes a column of Unit Area Load of TP for sub-watersheds where ‘agriculture’ is the primary land use. The numbers in this column vary widely. Why do these numbers vary so widely when the primary land use is the same? Or is using the generic term ‘agriculture’ not permitting the table to highlight differences in agricultural operations in the different sub-watersheds?*

**Response #19:** The commenter’s assumption is correct that the designation of the primary land use as ‘agriculture’ does not characterize the vast differences between agricultural land uses within sub-watersheds. Please also refer to Response #1, which was consolidated due to the interrelated issues common to several comments.

*Comment by Vladimir Novotny*

**Comment #20:** *Are crops different in the main watersheds of Lake Okeechobee and EPA?*

**Response #20:** Yes. Assuming the EPA reference is to the Everglades Agricultural Area (EAA), which flows primarily to the Everglades Protection Area (EPA), Figure 10-7 indicates that sugarcane is the predominant crop south of the Lake and improved pasture is most prevalent in the remainder of the Lake Okeechobee Watershed. Please also refer to Response #1, which was consolidated due to the interrelated issues common to several comments.

*Are there other interpretations of the data and other available information that should be considered by the authors and presented to decision makers?*

*Comment by Robert C. Ward*

**Comment #21:** *Why are the data summarized in Tables 4-5, 4-7, 4-9, 4-11, 4-13, 4-15, 4-17, etc not presented in plots, such as a time series plot or box-and-whisker plots? Box-and-whisker, especially, would permit a more in-depth understanding of the variation during a single year as well as between years. From the tables it is difficult to observe trends in the data. Are there trends and, if so, why?*

**Response #21:** The data in the tables referenced are plotted in Appendix 4-1. These figures will be updated consistent with Response #1, and additional techniques will be considered for this and future years’ reporting to depict potential trends. While no statistical analysis was performed, variations with load data through time is discussed in Chapter 10 in the paragraph starting on line number 570. In addition, trends were analyzed for each sub-watershed in Table 10-11 and discussed in the section titled Tributary Phosphorus Loading Trends on line 1160. The Chapter 4 text will be revised to direct the reader to available information within this year’s SFER.

**Comment #22:** *When will findings from the C-139 Basin Upstream Synoptic Monitoring effort be available? Could a brief summary of the findings be included in the discussion at lines 1509-1511?*

**Response #22:** Information similar to the following shall be added to Appendix 4-2:

Data from the upstream monitoring within the C-139 basin is stored in the District's database, DBHYDRO, available at [www.sfwmd.gov/dbhydro](http://www.sfwmd.gov/dbhydro). The District will complete a comprehensive evaluation report named *C-139 Basin Phosphorus and Cycling WY09* based upon data from WY2006 through WY2009. The final document is anticipated to be available December 2010 from the website [www.sfwmd.gov](http://www.sfwmd.gov) by searching the Library & Multimedia files.

Due to continued work to improve the upstream flow station data, summarization of upstream data herein focuses on concentration. In characterizing sub-basin contributions to the performance measure, unit area load would be the most applicable measure, but based upon current limited confidence in flow TP load computation results at these sites are not presented. Averaging all concentration data can give a skewed picture of the performance of upstream areas due to concentration data collected during periods of little or no flow being factored equally with high flow periods. Therefore computation of an approximate flow-weighted mean concentration is the best representation currently available for upstream areas. Although flow data is utilized for this calculation, the error associated with using the variation in magnitude at an individual station is considered minor, and the relative calibration or mass balance between structures will not significantly impact the values. A summary of WY2010 flow weighted mean concentration data for the C-139 Basin and four sub-basins is presented in Table 11.

Table 11. C-139 basin and upstream sub-basin WY2010 flow weighted mean concentrations.

<b>C-139 Sub-basin</b>	<b>TP FWMC (ppb)</b>
L1	145
L2	155
DF	341
SM	545
<b>C-139 Basin</b>	<b>171</b>

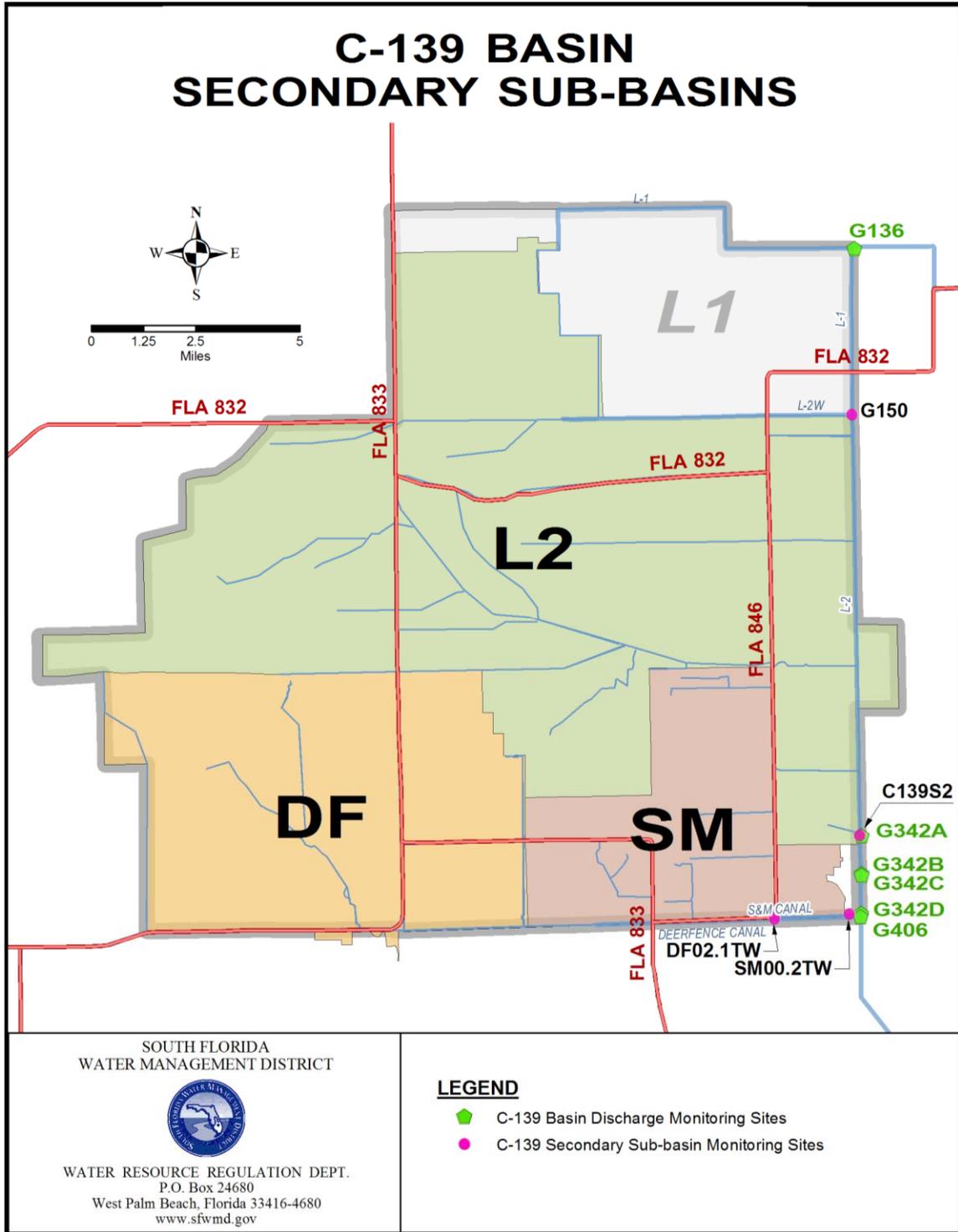


Figure 16. C-139 basin, Secondary sub-basins and associated monitoring stations map.

*Comment by Vladimir Novotny*

**Comment #23:** *The suggestion on page 4-39 lines 766-768 “to establish .....a concentration base performance for collective source control measures... ” is a very good idea instead of or in addition to using only loads that vary widely year to year based on precipitation and, inexplicably, from watershed to watershed.*

**Response #23:** Noted. Concentrations, by nature, tend to be less influenced by hydrologic variations than load. Considerations for the collective source control effort performance measures in the Lake Okeechobee watershed may also include their linkage to the TMDL, which is a load based criteria. Many factors are being considered in development of performance measures for nutrient source controls.

*If so, the panel shall identify specific studies that should be addressed or available data to support alternative findings.*

### **Editorial Comments**

**Comment #24:** *Line 49 - Should there be an ‘of’ in front of adaptive?*

**Response #24:** Yes. The text will be corrected.

**Comment #25:** *Line 1007 – What is an ‘into’ structure? Something missing?*

**Response #25:** The specific term “into” structure is a reference to the non-ECP permit. The use of this term in the SFER is not necessary, and therefore has been updated to “discharge” structure. Further explanation is provided within lines 1024 through 1026.

**Comment #26:** The link on line 1203 was to lead to a document on improved BMP effectiveness, but it could not be located. What clicks are needed to reach the document?

**Response #26:** Multiple publications by the University of Florida IFAS as updates to the original referenced document are posted on the UF EDIS website. The search engine has to be used in order to locate publications on specific topics. The text has been revised to the following:

Updates to documentation for individual BMPs are available at: <http://edis.ifas.ufl.edu> (as of July 2010). Searching this site for “EAA BMP” provides documents which include design criteria for construction, as applicable, operation of BMPs, and farm management applicable to the EAA.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 5

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**Posted:** 10/11/10 at 03:40 PM by Stuart VanHorn

Guy Germain and Kathleen Pietro

**Level of Panel Review: Technical (primary); Accountability (secondary)**

Reviewers: O. Stein (AA), V. Singh (A)

***Comment:** Q2: As mentioned above the District's reputation in advancing the science of larger-scale treatment wetlands and the list of projects completed or currently underway is truly impressive. In some cases the Panel questions some of the many specific interpretations presented in the draft report and these are discussed more specifically in later sections of this review, but in general, the District has done a good job of data interpretation. The impressive list of projects in this chapter demonstrates the diligence of the District in conducting studies to improve and optimize the STA performance. However listed below are a few additional topics the district should consider.*

***Comment #1:** Why are floating tussocks/ tussock islands consistently viewed as a concern, when in stormwater control elsewhere, floating islands are being considered as potentially a valuable best-management –practice for improving water quality through pollutant reduction?*

**Response #1:** Although floating islands may be under consideration elsewhere, in the case of Everglades restoration, the target outflow phosphorus concentrations are extremely low in order to comply with the 10 ppb phosphorus criterion. Floating cattail tussocks in the STAs have been found to be detrimental to achieving these extremely low target outflow phosphorus concentrations. These large floating islands scour the bottom, destroy established vegetation communities, cause sediment re-suspension and increase the internal water column phosphorus concentrations. Future studies are planned to investigate the factors and behaviors specific to cattail tussock formation.

***Comment #2:** Has the potential for the massive areal herbicide applications to adversely affect desirable SAV been evaluated?*

**Response #2:** When the District conducts vegetation conversions (i.e., from cattail to SAV) by herbicide application there is generally no SAV present. Herbicides used to eliminate cattail are effective only when they contact foliage. Any contact with SAV would be impeded by water, in which the herbicide would rapidly dissipate.

***Comment #3:** The difficulty in measuring soil topography and below water surface vegetation is clearly limiting better management decisions. The district should explore many of the newer hyper-spectral remote sensing techniques for making these ground and SAV vegetation studies.*

**Response #3:** Hyper-spectral remote sensing technology has been found to be able to detect and map SAVs under certain conditions. Environmental conditions, such as water clarity and depth, and vegetation coverage can reduce the ability of the sensors to “see” the SAV through the water column. Previous evaluations indicated that topographic surveys via remote sensing do not have

the type of resolution required to capture microtopography in a wetland environment. Similarly, a previous evaluation indicated that remote sensing may be limitedly utilized in the STAs to determine SAV coverage but that the technique was unable to capture the type of information needed to determine SAV composition. However, the District continues to evaluate survey technologies such as those suggested by the reviewers, as we become aware of such.

***Comment #4:*** *In previous reports vegetation die off has been primarily linked to too high or low fluctuations of hydro-period, yet this year's massive die off of Hydrilla and other SAV species was observed even though WY 2010 was not a drought year, and water levels were managed relatively close to optimums. The influence of cold temperatures and wind speed vs. fetch length should be explored and other important factors affecting vegetation health.*

**Response #4:** The District is continuing research on hydrilla. Most importantly, the District is continuing to research other suitable vegetation species or mixes of vegetation and ways to most effectively maintain them in the STAs for sustainable treatment.

***Comment #5:*** *The district should make an assessment of climate change impact on the performance and optimization of STAs.*

**Response #5:** The District is evaluating the effects of climate change and has done preliminary modeling to estimate rise in sea level and changes in rainfall and evapotranspiration. Current efforts do not include STA performance predictions.

***Comment #6:*** *The Chapter 5 draft presents a defensible scientific account of data and findings for the areas addressed. As in last year's version, the chapter describes many ongoing, diligent efforts to track STA performance at P removal, major rehabilitation efforts for the STAs that have declined in efficiency, and an active research program maintained by the District for optimizing and sustaining STA performance. A topic that could be enhanced is the description of how the interim effluent limits of the EFA permits are calculated. Since every STA but 3-4 was out of compliance with this permit, more detail of how it is determined is certainly warranted. Last year the report went to great lengths to explain the technology-based effluent limitation (TBEL) permitting requirement for all STAs except STA-3/4, but TBELs are not even mentioned this year. Is there some linkage between Interim Effluent Limits and TBELs? Overall, the description of the permit requirements is weak.*

**Response #6:** The statement “Since every STA but 3-4 was out of compliance with this permit...” is an incorrect interpretation of the permit compliance status for each STA. In actuality, every STA was “In Compliance with Permits” as noted by a “Yes” in Table 5-1. Several factors must be taken into account, in accordance with the STA permits, when making a determination on the compliance status of an STA with the interim effluent limit. These factors include (1) the operational phase of the STA, (2) rainfall conditions, and (3) rehabilitation or major construction activities (see section titled “Permit Compliance for Phosphorus” in Chapter 5). The operating permits also acknowledge that natural systems undergo maturity changes and, therefore, STA operations are categorized into phases, depending on development and performance. The permits for STA-1E, STA-1W, STA-2, STA-5, and STA-6 describe three phases (listed as “Operational Permit Phase” in Table 5-1) for applying interim limits: Start-up Phase, Stabilization Phase, and Routine Operations Phase. All of these STA’s are in the Stabilization Phase (Table 5-1), and in accordance with the operating permits, excursions to the Interim Effluent Limit are allowed. Additional clarification will be added in the summary section to appropriately specify IEL compliance status with the current STA operating permits. In regards to the question “Is there some linkage between Interim Effluent Limits and TBELs”, the answer is “yes”. Prior to 2008,

interim effluent limits (TBELs in this case) were incorporated into administrative orders accompanying NPDES and EFA permits. In 2003, the EFA was amended to allow discharges above the P criterion provided the District was implementing the Best Available Phosphorus Reduction Technology (which was defined as the additional phosphorus reduction measures as set forth in its Long-Term Plan). In essence, the interim limits corresponded with anticipated TP reductions due to the District's efforts to implement the Long-Term Plan. They were "interim" limits because they did not achieve the P criterion. In 2008, however, a federal court decision in the case *Miccosukee Tribe of Indians et al. v. United States et al.*, Case No. 04-21448-CIV-Gold/McAliley, struck down the 2003 amendments as improper changes in water quality standards. As a result, references to achieving TBELs have been deleted.

***Comment #7:*** *The panel is especially pleased to note that after many years of requests the Report now contains an introductory section defining acronyms and that many of those used in this chapter are in it! Having this section at ones fingertips makes reading of the chapter far easier. However, many of the acronyms used in this chapter are still missing (a work in progress). Specific omissions are not noted below, but an electronic cross referencing to be sure all acronyms are in the listing would be a relatively easy editorial exercise that is yet to be performed.*

**Response #7:** The acronym listing is a work in progress and typically an electronic cross referencing will be done for the final report.

***Comment #8:*** *The answer to this question is a qualitative "yes". The panel believes that the document does a good job of explaining how and why the STAs are operated and how overall operations are varied in response to natural and anthropomorphic changes to keep them in, or close to compliance. The performance and vegetation sections are, in general, directed toward these explanations and are effective. However, much of the document, primarily the Performance Assessment section, but also the Vegetation section, describes completed and continuing research findings and, in general, the descriptions tend to miss the reasons why the specific research programs are being conducted and how the results could be used to meet management goals and objectives. The fix to this is not difficult; a few sentences describing the problem the research addresses and what operations have, or might change based on the results would tie the individual sections to goals and objectives very clearly. This comment was made in last year's review as well which stated, "A sentence or two (or for more important programs a full paragraph) explaining the need for the research at the beginning of each specific research program discussed would provide a much stronger link between anticipated findings and the District's goals. A better job could be done linking the many studies reported here to management objectives."*

**Response #8:** The research problem statements and linkage to management goals and objectives will be added to the Performance Assessment and Vegetation Management sections as suggested.

***Comment #9:*** *The PSTA study. It looks as if the PSTA cells run by the Corps are outperforming even the SAV cells this year; the first year in which flow rate were sufficient to make comparisons. If this trend continues what might the district do with this information?*

**Response #9:** The PSTA Project described in the chapter is located in STA-3/4 and is being run by the District and not the Corps. The Corps PSTA project is in STA-1E. The STA-3/4 PSTA Cell has outperformed the lower SAV Cell and Cell 2B (also considered to be a SAV cell) in each of the last three years and not just last year as is shown in Table 5-13 and described in the text. The District is currently evaluating the PSTA performance and operational data to determine

future phases related to this technology. The results of this evaluation can be included in future SFERs.

***Comment #10:*** *What will all the data being collected from the soils studies be used for? Perhaps these data will help better understand some of the removal mechanisms, but what management decisions could be altered if this mechanism proves important (or unimportant)? Ultimately the District is charged with removing P, not basic scientific inquiry.*

**Response #10:** The section will be revised to include statements on data utility and applications in terms of management decisions. Soil data information have been used for adhoc management decisions and performance troubleshooting. For example, scraping of accrued sediment in specific areas in STA-1W and STA-5 were based on soil data (eg. soil TP content and bulk density). The soil data have been used in making management decisions but have not been used as a predictive indicator. The district is currently reviewing its soil monitoring program for potential modification to gather the right type and amount of information needed in the most cost-effective manner.

***Comment #11:*** *Continuing data seems to suggest that the SAV cells do outperform the EAV cells for P removal, but this is counterbalanced by the obvious need for increased maintenance and tighter operational controls to keep SAV cells operational. Has the District done anything to weigh the costs versus benefits for continuing conversion of EAV to SAV cells? For that matter what is the desired ration of EAV to SAV in the current plan?*

**Response #11:** The District has been maintaining the STAs and performing vegetation conversions pursuant to the recommendations in the Long-Term Plan. The increased cost to maintain SAV cells (compared to EAV cells) is not considered unacceptable given the resulting performance and the required extremely low outflow phosphorus concentrations for these STAs. However, the District is continuing to evaluate the optimal vegetation mix at both mesocosm and field scale, and for both the front-end treatment and back-end treatment. There is no fixed EAV to SAV ratio because each STA has unique characteristics and conditions, but a general ratio of about 40 percent EAV to 60 percent SAV can be assumed.

***Comment #12:*** *What is the goal of the correction of flow measurement anomalies? Is it to replace hydraulic models for estimating flow with observed data. If so, what are the new CFD models being used for?*

**Response #12:** As the chapter text states: “The goal of this project is to address flow estimate uncertainties and to provide high quality flow data at all major flow stations in the STAs. Stream-gauging data are collected in the field for use in calibrating flow equations, and flow rating analysis is conducted to improve computed flows, detect and correct anomalous in flow data, and estimate missing data.” Simply stated, flow volumes at District structures are typically estimated, not measured directly. In order to accurately estimate flows, accurate field data is required. Examples include stage data (eg. headwater and tailwater) and structure data (eg. spillway crest). Additionally, the parameters used in the equations to calculate (estimate) flows need to be reviewed periodically to ensure the best available information is being used. This project is focused on providing these activities for the STA structures.

***Comment #13:*** *293-323: Especially since several of the STAs are deemed to be out of compliance of the interim effluent requirements for P, more information on how these interim requirements are determined should be provided. Clearly the three phases have an impact, but what about factors listed on lines 313-316? This is related to the comment under Q4 above.*

**Response #13:** See response to Comment #6 above regarding compliance status of STAs with interim effluent limits (IELs). The authors will evaluate if additional clarification is needed regarding “...how the interim requirements are determined...”, and will revise the section accordingly.

**Comment #14:** 306-307: *When are operational curve requirements for STA3/4 anticipated?*

**Response #14:** This is unknown. The STA permits are currently being revised by EPA and we do not know when this process will be complete nor if the concept of an operational envelope even will be part of the new permits.

**Comment #15:** 350-365 (and associated Figure 5-6): *More explanation as to how the 12-month rolling outflow TP concentration is calculated is warranted. Presumably the data points represent a 12 month average of TP concentration centered on the month plotted on the x-axis, therefore the labels on the x-axis are very confusing as they should represent individual months. Regardless, a rolling average is designed to smooth out variable data so the sharp breaks shown on all plots are odd, suggesting that the data do not represent the rolling average desired. Additionally, more information on the significance of Figure 5-7.*

**Response #15:** The FWM TP concentration is calculated on 12 month instead of monthly basis. Data points represent flow weighted mean TP concentration for a “rolling 12 month moving summary” i.e., a rolling 12 month total TP loads divided by a rolling 12 month total flow in the period specified on the x-axis.

**Comment #16:** 435: *hydrilla responses.....to what?*

**Response #16:** Studies are being planned to evaluate the management of hydrilla and identify mechanisms affecting population changes. Studies are also under way to evaluate hydrilla eradication methods the results of which can be used to assist in the effort to replace hydrilla with the more desired SAV species (eg. Najas, Potamogeton, etc.)

**Comment #17:** 733-741: *Must these data be reported for each outflow structure to meet compliance criteria? Probably so, but it would be instructive to note the FWM DO concentrations for comparison. This emphasizes that the structures out of compliance are typically low flows and the average effluent concentration is (likely) about the SSAC average concentration, bolstering the argument that the environmental consequences are not extreme.*

**Response #17:** Class III standards do not require flow weighting of DO concentrations. The operating permit does not stipulate the need to flow weight DO, therefore, we don't believe that it is necessary to report DO in this fashion.

**Comment #18:** 756-797: *It would be instructive to put a few introductory sentences (and/or another sub-heading indicating the these statements are an attempt to determine if the gates discharging DO concentrations less than SSAC are having an impact on the DO levels of the receiving waters. The comment above could be moved into this section. Also note the comment for Figure 5-9.*

**Response #18:** This is being addressed in the later portion of the section where transect DOs are compared with discharge concentrations.

***Comment #19:*** 1051-1065 (and Figure 5-12): *It is curious that TP would increase significantly between the outflows of cells 5 and 7 and the inflow to cell 6. This curious condition should be addressed. Error analysis could shed light on this.*

**Response #19:** Paragraph will be revised accordingly.

***Comment #20:*** 1106-1118: *Do not put too much emphasis on transect to transect variation of values, especially for transect I which appears to be the average of just two grab samples. Rather focus on the overall trends which appear reasonably consistent across various flow paths of STAs 1 and 2; specifically an increase in TP at the beginning and then a gradual decrease.*

**Response #20:** Paragraph will be revised accordingly.

***Comment #21:*** 1266-1299: *This entire section on the soil characterization, but especially this opening sub-section, is not as strong as other sections in the chapter. Scientific comments for the whole section are provided in the next paragraph. These comments focus general editing of the entire section and technical comments on these first lines. The entire section could use significant general editing, and several suggestions are made in the editorial comments below. In addition, the entire section is relatively hard to read because the figures and tables are not placed on the next available page after they are introduced in the text. These are easy editorial fixes however. More concerning is that many of the statements are not supported by the evidence presented, or the meaning of what was intended is not clear. For example what is meant by inherent errors? (line 1292), deposition from biomass? (line 1294) and how do the factors listed on lines 1294-1297 influence the discrepancy between soil phosphorous and retained P. In fact it is not at all clear why one would expect a correlation, since soil P represents a pool that includes not only recently sequestered P but historically sequestered P as well. As mentioned the turnover soil P due to plant uptake and subsequent die offs and the mineralization of floc bound P to soil P keep these pools in non-steady condition with various flux rates that will never be easy to quantify. Based on these arguments it seem highly unlikely that a correlation between soil/floc bound P and retained P will be ascertainable. Further the utility of a strong correlation between mass of P stored in the floc and STA size is intuitive (bigger surface has more floc). Now if the mass P per unit area increases or decreases with size, that is a more meaningful result as it indicates rates of P removal vary with size. Currently Figure 5-29 presents the obvious.*

**Response #21:** Section will be revised accordingly.

***Comment #22:*** 1266-1528: *Soil characterization has clearly been a focus of the District's research plan in recent years and this year the Chapter provides more detail on these results. The quantity of collected data is quite impressive and in general the plots and table effectively give an overview of the results. However no real analysis of these data is presented. There is great potential to cross correlate many of the presented data that might well elucidate performance-predictive relationships. Statistical correlations and modeling are probably required. What is the District's plan to correlate these data with performance especially in light of the brief comments made above on the fluxes between storage compartments?*

**Response #22:** More in-depth analysis of all data, including P storage in soil, is done on an adhoc basis, e.g. when performance of a cell is problematic. Further analysis of cell P storage versus performance is also underway for selected cells only. The District will continue to evaluate the utility of these data, however, there is no immediate plan on modeling for performance prediction.

**Comment #23:** 1542: *It is more appropriate to wait until next year's report to present the new topographical data for STA1W, rather than adding new information between the draft and final versions of this year's chapter*

**Response #23:** Agree. Sentence will be revised to indicate that the new topographic data for STA-1W will be presented in next year's report.

**Comment #24:** 1545-1546: *It is understandable to avoid submerged roads and ditches etc when trying to get an overall picture of the general topography. Yet, these features may be some of the most important when trying to assess causes of short circuiting flows, vegetation variation etc, so completely ignore them loses pertinent data. The District should look for alternative topographical and vegetation survey methods to refine the data (see Q4 suggested studies).*

**Response #24:** The District fully recognizes that these remnant features can create inefficient flow patterns and vegetation growth problems. For this reason, the District now specifies the removal of these features in new STA designs. In the existing STAs, where these features were left in place during the original construction phase and are determined to be impacting performance, the District has implemented renovation work opportunistically during very dry periods when cells can be more easily dried out to complete the earthwork (eg. Cell 4 in STA-1W completed in 2007, and STA-5 Cell 1A slough filling in 2009.) The District routinely investigates alternative topographic survey methods for the STAs however, to date, the accuracy of these methods is not as accurate as traditional surveys.

**Comment #25:** 1626-1629: *These two sentences are conflicting; how could there simultaneously be "extreme water level conditions" and "remained around the target stage"?*

**Response #25:** The first sentence will be deleted.

**Comment #26:** 1695-1770: *The description of the vegetation surveys could be better addressed if the presentation is divided into EAV cells then SAV cells. This could still be STA by STA (as currently presented) or better have a gross heading of EAV cells followed by SAV cells then divide by STA. The advantage here that the concerns and need for these studies could be more clearly stated. For example two big concerns appear to EAV invasion into SAV cells and lack of vegetative colonization due to excessive water depth due to topographical variation. However since the current technique cannot distinguish SAV from open water, the second concern really can be addressed in SAV cells. This could be brought to the fore with a restructuring of this section.*

**Response #26:** In the vegetation survey section, the EAV dominated treatment cells are described first followed by descriptions about the SAV dominated cells. Additional verbiage will be added to the section to depict this organization.

**Comment #27:** 2051-2080: *Though it is stated in the Summary section the increase in overall and effective area of the STA when compartment s B and C go on-line would be useful here.*

**Response #27:** The additional effective treatment area that will be provided by Compartment B and Compartment C Buildout will be added to this section, as suggested.

**Comment #28:** Table 5-1, Comment e: *the words "and the" are repeated*

**Response #28:** The repetitive words will be deleted.

**Comment #29:** *Table 5-2, line 2 under STA-1E row: Values should be reported with consistent significant figures i.e. without decimals*

**Response #29:** Values shown will be changed as suggested.

**Comment #30:** *Figure 5-6: See the comments for lines 350-365*

**Response #30:** See response for lines 350-365.

**Comment #31:** *Figure 5-7: What is being plotted here is very difficult to determine. The legend implies load divided by either flow or rainfall, but this probably not the case. Additionally the caption and axis labels should be more descriptive such as "Flow Volume" and "Annual TP Load".*

**Response #31:** The legend will be changed to "Flow vs. TP load" and "Rainfall vs. TP load"

"Annual Load" will be changed to "Annual TP load" as suggested.

**Comment #32:** *Figure 5-9: The shaded regions are so light to virtually illegible. Please identify all components of the box and whisker lines and notches, not just the 95% confidence level. Most importantly the intent of this plot is not clear. Is there some intent to show a spatial relationship of these data. e.g. down a transect? The text associated with this (lines 756-797) is hard to follow.*

**Response #32:** Additional information regarding the components of the box and whisker plots will be added, along with language to clarify the intent of the figure.

**Comment #33:** *Figure 5-10: Identify the sampling locations of figure 5-12 on this figure.*

**Response #33:** Sampling locations will be specified in the figures and captions.

**Comment #34:** *Figure 5-11: The arrow described in the caption is missing in the figure.*

**Response #34:** Figures will be revised accordingly.

**Comment #35:** *Figures 5-16 and 5-18. The captions are missing the description of the arrows found on similar preceding figures, e.g. 5-11.*

**Response #35:** Figures will be revised accordingly.

**Comment #36:** *Figure 5-22: The arrows that should be on panel a (top) are missing.*

**Response #36:** Figures will be revised accordingly.

**Comment #37:** *Figure 5-27: The axis label for panel C is missing.*

**Response #37:** During the editing process, the axis title was inadvertently covered over with the figure legend. The text will be repositioned to show the axis title.

**Comment #38:** *Figure 5-28: Please organize the order of the STA in some logical manner. Presumably the asterisk indicates that data for STA 6 is from 2004 and not 2007. Caption should be consistent.*

**Response #38:** Figures will be revised according to comments.

**Comment #39:** *Figures 5-30, 5-33, 5-35, 5-36, 5-37, 5-38: Apparently the northwest corner of cell 2 was not sampled in 2009 and therefore 2007 data is substituted for all the reported parameters. Considering that there were obvious differences in most of these reported parameters between the two years, how were these data incorporated without introducing bias into the results? It would seem more appropriate to leave these data missing and use only the data collected in 2009. At the least, an explanation of why and how this was done should be included in the text of this section, but no mention is made. Also, the wording of figure captions should be consistent between these figures (Fig. 5-30 is different) and all captions should indicate that data are collected from STA2.*

**Response #39:** Figures will be revised to exclude 2007 data. Captions will be changed to be consistent.

**Comment #40:** *Figure 5-34: see line 1468 editorial changes*

**Response #40:** Caption will be revised accordingly.

**Comment #41:** *Table 5-17: The units on the data are not provided. One assumes it is elevation and therefore a better overall heading is simply "elevation rather than "Survey Points".*

**Response #41:** The table will be revised accordingly.

**Comment #42:** *Figure 5-49: This figure demonstrates the impressive quantity of maintenance required to keep the STA operational. A better description (especially as to the order of operations) would help better demonstrate the process however.*

**Response #42:** An expanded description will be added to the figure legend.

**Comment #43:** *Figure 5-52: It is difficult to distinguish the lines in this figure. Might be better to use color in this one.*

**Response #43:** The map will be revised in color as suggested.

**Posted:** 10/08/10 at 03:47 PM by Guy Germain

Guy Germain and Kathy Pietro

### **Responses to FDEP Comments**

Reviewers: K. Edson, FDEP

**Comment:** *Lines 56-66 – There is no mention of the Avian Protection Plan which could serve to show interagency cooperation on these issues.*

**Response:** The Avian Protection plan will be mentioned in the STA Highlights section, as suggested. The Avian Protection Plan is referred later in the chapter under the Avian Protection section.

**Comment:** *Lines 79-84 – In order to help the reader understand how the flow-weighted mean concentrations and flows are calculated, it would be helpful to reference Appendix 5-2 in the figure caption, so the reader knows where to look for explanatory information.*

**Response:** Will be incorporated in the final report.

**Comment:** *Lines 85-86 – Please consider including a definition of Hydraulic loading rates and phosphorus loading rates somewhere in the chapter or appendices.*

**Response:** The following will be added to the chapter.

Hydraulic loading rate (cm/day) are calculated by average daily inflow volume divided by effective treatment area

Phosphorus Loading Rate PLR = (g/m<sup>2</sup>) are calculated by total annual inflow load divided by effective treatment area

**Comment:** *Line 211 – Consider including reason for supplemental water being delivered (dry-out?)*

**Response:** As suggested, the following text will be added: The supplemental water was delivered to the SAV treatment cells to maintain water depths for the plant communities.

**Comment:** *Line 255 – Consider the use of the word non-native in place of exotic if applicable.*

**Response:** Will be incorporated in the final report.

**Comment:** *Line 256 – This sentence can be interpreted to say that veg mgt (in the STAs) is control of exotic spp only.*

**Response:** Will be incorporated in the final report.

**Comment:** *Line 266 – Used cm for depth which is inconsistent with permit language.*

**Response:** Suggest altering units or providing both.

**Comment:** Line 295 – *This sentence implies that AOs only apply to NPDES permits.*

**Response:** Will be incorporated in the final report.

**Comment:** Line 432 – *Please identify the pilot project.*

**Response:** To clarify, the text will be changed to:

Water depths were lowered in STA-3/4 Cell 1A in late WY2010 to give the cattails a chance to recover from stress caused by recurring deep water conditions.

**Comment:** Line 549 – *Reported outflow of 51 vs. limit of 50 difference is 1 not 2.*

**Response:** Will be incorporated in the final report.

**Comment:** Line 1184 – *The use of cm is inconsistent with permit unit of measure for describing stage levels in the STA.*

**Response:** Will be incorporated in the final report.

**Comment:** Lines 1611 & 1634 – *May consider using the phrase "stage level reduction" vs. dewatering since this has a specific regulatory meaning.*

**Response:** Will be incorporated in the final report.

**Comment:** Line 2061 – *Remove the word originally and consider adding information regarding the issuance of the L-6 mod.*

**Response:** Will be incorporated in the final report.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 6

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**Posted:** 10/07/10 at 3:56 pm by Kathleen Warren

Fred Sklar with Chapter Co-authors

**Level of Panel Review: Technical (primary); Integrative (secondary)**

Reviewers: J. Burkholder (AA), J. Burger (A), P. Dillon (A)

Dear Drs. Burkholder, Burger and Dillon: We are grateful for your thoughtful comments and in-depth review on our SFER Chapter 6: Ecology of the Everglades. The responses to your comments can be found within the following pages. Sincerely, Fred Sklar

*The level of review for Chapter 6 remains primarily technical because its emphasis is on research. The secondary review as integrative is also appropriate, since the ecology of the EPA affects or is affected by many of the other units (Lake Okeechobee and, indirectly, the Kissimmee basin, STAs, some of the Southern Estuaries, etc.). The overall nature of the chapter is not expected to change within the next five to ten years because many basic research questions about the ecology of the Everglades ecosystem remain to be answered.*

### Wildlife Ecology

**Comment #6-1:** *Is sufficient information known yet on breeding of Burmese pythons to develop methods for control?*

**Response #6-1:** A great deal has been learned about the natural history of Burmese pythons in Florida, including reproductive cycles, fecundity, and nesting behavior. This information has been used, in part, to develop survey and control strategies. The author will elaborate on this topic in the final draft and will attempt to highlight critical knowledge gaps in need of further investigation.

### Plant Ecology

*The authors recommend (p.6-36) further analysis of tree island topographic conditions to determine the specific hydrologic conditions that indicate higher risk of Old World climbing fern invasions. The panel supports this recommendation because, as the authors noted, identification of the specific hydrologic conditions that encourage the establishment of this invasive species will be important in guiding Everglades restoration efforts.*

**Comment #6-2:** *Are there plans to consider elevation in further work to substantiate the hypothesis that the spread of Old World climbing fern is encouraged by drier hydrologic conditions on tree islands?*

**Response #6-2:** Yes, in more recent work that will be submitted for publication. Elevations of 76 of the tree islands analyzed for this section have been measured. Both highest elevation and mean elevation of each of these 76 tree islands were incorporated into this analysis [in the ANOVA and in a subsequent partitioning (CART and random Forests)]. In none of these analyses did overall

tree island elevation emerge as a significant discriminating variable. The hydrologic variables here may be a surrogate for soil moisture through peat hydration and perhaps microsite moisture (within 40 cm of the surface of the ground), which appear to not relate directly to elevation. In contrast to mineral soils, peat is known to wick and hold moisture, and this property may better relate to ground surface moisture and microsite moisture than elevation alone. This analysis is being more fully developed at present. This seems to be a very critical aspect of protecting tree islands in the future. Sap flow is being examined as a potential index of tree island health. As the authors stated (p.6-40), the species included in the described study are considered to be relatively flood-tolerant in comparison to upland hummock tree island species.

**Comment #6-3:** *Are there plans to expand this study to other flood-tolerant species, and to abundant upland hummock species?*

**Response #6-3:** It would be a very good idea to expand this study; unfortunately, there are not enough upland hummock species/individuals on tree islands located in the WCA-3A. Nonetheless, there is collaboration with scientists who are working in the ENP where sap flows studies are being conducted on upland hummock species. The subsection, Relevance to Water Management identifies critical data gaps (frequency thresholds for high and low water events, needed to constrain the number and duration of extreme floods and droughts).

**Comment #6-4:** *Are there plans to extend this study in order to obtain that information?*

**Response #6-4:** Concurred. This is a long-term study that has an objective to obtain information relevant to water management, including high and low water events.

## **Ecosystems Ecology**

*The authors point out (p.6-66) that in other systems, charaleans have been found to be a preferred food source for herbivorous wading birds, and that, in comparison to other macrophytes, they support higher abundance of invertebrates.*

**Comment #6-5:** *Are plans being developed to assess the role of charaleans in Everglades nutrient cycling, aquatic food webs, higher trophic levels, and CERP restoration success?*

**Response #6-5:** No. Plans are not being developed because research funding for FY11 was substantially reduced.

## **Landscape Ecology**

**Comment #6-6:** *The authors recommend (p.6-77) further study and analysis to correlate the findings from the mapping study to other metrics such as hydrology and topography. Are such studies/analyses planned?*

**Response #6-6:** Yes. A current evaluation of these data along with topography, hydrology and island specific species composition is underway. In addition, there are plans for a manuscript in 2011. In the ghost tree island study, eight ghost tree islands were compared to one live tree island and one transitional island. It would seem that the study design would have been stronger if more live tree islands and transitional islands had been included.

**Comment #6-7:** *Why was this not done?*

**Response #6-7:** There are two reasons that only one live tree island and one transitional tree island were included in this study. First, the main purpose of this work was to understand the nutrient status and microtopography of the ghost tree islands in WCA-2A. Second, due to funding constraints, only one live island and one transitional island were selected for comparison. The reviewer is correct, however, this study design would have been stronger if additional live tree islands and transitional islands had been included.

**Comment #6-8:** *Are additional or extended studies planned?*

**Response #6-8:** No, there are no additional studies planned in FY11 due to budget cuts. However, additional analyses, including lead-210 and C-14 dating and charcoal analysis on the long cores from each of the 10 tree islands are under way to understand the soil/nutrient accumulation and erosion in associated with environmental changes (water management).

**Comment #6-9:** *The assessment of climate gradients across South Florida included identified additional efforts needed to assist the District in restoration efforts, such as downsizing coarse spatial-scale global circulation models and developing predictive climatic indices across an appropriate range of scales. Are such efforts planned?*

**Response #6-9:** This effort began in FY10 as part of a larger Climate Change Assessment Project in the Modeling Department. However, budget cuts have put this program on hold.

## General Comments

*Chapter 6 has improved greatly over the past three years; it is now much easier to follow, and the projects are much better integrated. The writing generally is excellent in general technical quality. The chapter focuses on four main areas in describing the ecology of the Everglades Protection Area (EPA), as wildlife ecology, plant ecology, ecosystem ecology, and landscape processes. Again, the large research programs addressing the ecology of the EPA were presented so that overall hypotheses and objectives of the described studies were clear, linked to descriptions across the chapter, and clearly linked to management and restoration goals as well. There is an immense amount of technical material outlined in this chapter; in general it is very informative, the research and monitoring is well executed and reasonably interpreted, and the overall program seems comprehensive and thorough.*

*This year's chapter's expanded Summary section provided an excellent synopsis of District progress across a remarkable breadth of activities, including a nice integration of these activities. The chapter, organized by Fred Sklar and his editorial team, was a pleasure to read because it was well written and well-founded in science. Major recommendations in last year's review stressed that Chapter 6 should be more strongly integrated with other District efforts by including more cross-referencing to other chapters, and more internally integrated across the EPA research projects; that the Summary section should briefly convey how the various subsections are being integrated; an overall Conclusions section should be added to integrate major findings and interpret how they will guide future efforts; and, in general, a strengthening of the detail in this chapter sufficient to enable scientific evaluation of the various studies that were described. These recommendations all were carefully considered and addressed by the authors. As another significant improvement that makes this chapter even stronger than last year's, the relevance of each project to District goals is succinctly, clearly described. The authors also added clear recommendations for further efforts where appropriate, such as recommendations for continued research, monitoring, and management efforts regarding 12 identified priority invasive taxa in the Greater Everglades.*

## TECHNICAL REVIEW

*Technical review is appropriate for this chapter because there is a major research component and new data are being analyzed for unique interpretation. The District's guidance on technical review has been that methodological details should continue to be reported along with explanations of new findings, and that the following questions should be considered in the evaluation:*

*Are the findings and conclusions supported by "best available information", or are there gaps or flaws in the information presented? Are there other interpretations of the data and other available information that should be considered by the authors and presented to decision makers? If so, what specific studies should be addressed or what available data support alternative findings? This chapter, as last year's, is generally outstanding in conception, content, and technical merit, but is improved even over last year's excellent effort. The findings and interpretations are sound, and generally supported by the best available information. Whereas last year's chapter suffered in places from writing that was too brief to enable scientific evaluation of the work, this year's Chapter 6 succinctly included sufficient information to enable scientific evaluation of the many studies that were described, including hypotheses where appropriate, clear methods, summarized statistical analyses of the data, and well-founded interpretations.*

**Comment #6-10:** One general suggestion to improve the writing is that, in various places throughout the chapter, it seems that the data are reported with too many significant figures, and should be adjusted. For example (Lines 407-408), technically, stating that the number of wading birds was "approximately 21,426" means that the number was between 21,425.5 and 21,426.5. The number of significant figures used indicates the precision, and should be reported accordingly (21,400? 21,000? - the authors know the specifics of how precisely these counts were made, and the values reported should reflect this, here and throughout the chapter).

**Response #6-10:** The District agrees with the Reviewer's concern regarding significant figures, but reporting them may not be appropriate or even possible in this instance. The nesting population estimates reported are the sum of multiple independent counts conducted by various agencies and universities throughout south Florida, and lack a standardized sampling methodology. The level of precision of the estimates therefore varies among surveys and is largely unknown. Moreover, this approach for reporting nest numbers in south Florida has been employed for decades and for reporting consistency, the author feels it is important to maintain the current format in the report. (The author has many population estimates, but only one approach is used to measure them). However, it will be noted that the totals provided are simply the sum of many independent surveys and that the level of precision is unknown. Readers will be directed to the South Florida Wading Bird report for details on survey methodologies. The District certainly recognizes the limitations of using this estimation approach (see Crozier and Gawlik, 2003), and rather than using the counts as an absolute population measure they are employed as an index of nest numbers to understand long-term, system-wide trends. Moreover, in an effort to improve nest number estimates in the CERP regions, standardized techniques have been developed for the WCAs, ENP and Lake Okeechobee, and issues of detectability are currently being investigated at these key nesting sites. Such work will provide precision estimates for these populations in the near future.

**Comment #6-11:** As another example, the panel questions whether eight significant figures should be attributed to some of the measurements in Table 6-14.

**Response #6-11:** Concurred. The table will be corrected.

**Comment #6-12:** The chapter should be checked throughout to correct this problem.

**Response #6-12:** Concurred. The text will be updated for the final.

## **Hydrologic Patterns**

*As in previous years, this consistently excellent section sets the stage for what happened in the WCAs and Northeast Shark River Slough (especially to wading birds) in WY2010. The figures, complete with red-yellow-green indicators for foraging conditions, provide clear comparative information about tree islands and peat conservation as well as foraging conditions for wading birds. Obviously, the relationship between water level recession rate and wading bird foraging is finely balanced. Inclusion of the previous year's data for comparison was very helpful.*

**Comment #6-13:** *in future SFERs, a brief discussion of the findings compared with longer-term patterns would also be useful.*

**Response #6-13:** Concurred. A longer time-series will be considered for future SFER's. The beginning paragraph was clear, concise, and provided an overall understanding of the precipitation patterns, as did Table 6.2. The use of labels (p.6-9, lines 191214) to indicate relative conditions is extremely important, and is an improvement in providing information that will be readily available to a wide range of stakeholders. The consistent use of this method throughout the writing provides a nice comparison among sites. The panel strongly encourages the study recommended by the authors (p.6-11, lines 244-246) to more closely examine hydro patterns in WCA-2A to strengthen efforts to restore tree islands.

## **Other Comments**

**Comment #6-14:** *P.6-8 - It would be helpful to include a regional map in this first section for those unfamiliar with the geography (and terminology), showing the locations of WCA-1, WCA-2 etc.*

**Response #6-14:** Concurred. A link will be developed to another section or chapter.

**Comment #6-15:** *P.8 etc. - Please check to ensure that metric units are included as well as English units (e.g. acre-feet) here and throughout the chapter.*

**Response #6-15:** Concurred. This will be implemented in the 2012 SFER.

## **Wildlife Ecology**

*This section begins with a helpful synopsis of the major effects of human alterations in the EPA on colonially nesting wading birds, and explains the District's efforts both to document the key factors that influence wading bird reproduction and to develop "practical spatially explicit tools" to predict foraging and nesting response to changing environmental conditions.*

**Comment #6-16:** *Lines 340-348 present a good summary of overall trends, and an important aspect of each subsection. It might be useful to add some dates to the trends description.*

**Response #6-16:** Concurred. Dates will be added.

**Comment #6-17:** *Lines 353-355 describes the District's broad focus in its research on wildlife ecology, and it would seem fitting to highlight the role of temperature among other factors mentioned, since this breeding season was excessively cold.*

**Response #6-17:** While cold temperatures did appear to have an important role on nesting success in 2010, such events are relatively rare and are not an important component of the District's restoration focused research. The description of wading bird populations, the general failure of nesting success in WY2010, and the underlying factors that contributed to this failure is sufficiently detailed and clear.

**Comment #6-18:** *Lines 364-399 provide a good statement of the objectives and goals, but it would be helpful to reference the documents that set these goals.*

**Response #6-18:** Agreed. Appropriate references will be added.

**Comment #6-19:** *In line 404, it was not clear as to whether the authors are considering the cattle egret to be an invasive species, although it arrived naturally(?).*

**Response #6-19:** This report examines current populations of wading birds in relation to historical, pre-drainage populations from a restoration perspective. While cattle egrets are monitored in most surveys (see the South Florida Wading Bird Reports), they are not included in the final counts in the SFER because they were not an original component of the pre-drainage wading bird community of south Florida and do not appear to be having a major impact on nesting effort or success. Ultimately, this species may be a good assessment endpoint.

**Comment #6-20:** *Table 6-4 suggests that snowy egrets are 'in trouble' in a number of locations; this may be a regional rather than Everglades problem.*

**Response #6-20:** The author concurred with this suggestion and recognizes that further research is needed for this species.

**Comment #6-21:** *The subsection beginning on p.6-22 presents interesting data but its title highlights phosphorus cycling, so additional explanation is needed to help readers.*

**Response #6-21:** Concurred. More explanations on why stable nitrogen isotopes are used to explain the sources of phosphorus in tree islands are now provided in the revision.

**Comment #6-22:** *The authors (p.6-22, line 477) state that nitrogen (N) and phosphorus (P) are closely linked in food webs, but this is sometimes not so straightforward. Additional writing is needed to support this premise for tree islands, for example, by including more information about N and P inputs from guano.*

**Response #6-22:** Concurred. The first and second paragraphs are revised to add additional text to support this premise.

**Comment #6-23:** *To help readers, the authors should also more clearly state that the lack of stable isotopes for P prevents a parallel analysis of this nutrient.*

**Response #6-23:** Concurred. The revision will state there is a lack of stable isotopes for P so nitrogen isotopes were used to infer sources of phosphorus.

***Comment #6-24:*** Supporting literature citations should also be added for the information on p.6-22, lines 477-490.

**Response #6-24:** Concurred. Three citations have been added to support several key statements in this section.

This is an extremely important project, as it addresses the mechanisms of how the Everglades habitats can change as a direct result of wading birds and other fauna.

***Comment #6-25:*** The authors should add explanation (lines 526-527) as to how bird (or other animal) use varies on different areas of the tree islands; can more information be provided as to whether the variation in soil del-15N values due to animal excreta or bird excreta? (The authors should also check the reference, McColl and Burger, 1976, American Midland Naturalist 96: 270-280.)

**Response #6-25:** Concurred. The head region of tree island has higher elevations and denser plant communities that offer better habitats for wading bird nesting. As for whether the variation in soil del-15N values due to animal excreta or bird excreta, this issue is discussed in the first paragraph of the Results and Discussion section. McColl and Burger (1976)'s paper is cited in the revision (second paragraph).

The "stable isotope study" subsection concludes with a succinct, nice explanation of the relevance of these findings to water management. The panel supports the authors' recommendation that additional data should be collected to improve understanding about the relative contribution of wading bird guano to P [and N] enrichment on tree islands, and the role of wading birds in maintaining tree island productivity.

***Comment #6-26:*** However, the authors should broaden their scope to track TN concentrations (along with del N values; or both urea and ammonia concentrations) as well as P concentrations.

**Response #6-26:** Soil TN data are available but they are not reported for two reasons. First, since P is the primary nutrient responsible for eutrophication and reduced biodiversity in the Everglades, the analysis is limited to P in this report. Second, TN from wild animals undergoes significant biogeochemical changes after deposit due to its high volatilization as ammonia, TN data are not always consistent with P cycling. Further analysis is needed before soil TN data are reported.

The subsection on invasive nonindigenous species is a well-justified, excellent addition to Chapter 6, complete with strong supporting references, based upon the authors' apt point (p.6-2) that consideration of Everglades wildlife now must include exotic invasive species. Previously, readers largely were referred to Chapter 9 for information on this important topic; this year's Chapter 6 appropriately assessed five invasive plant species (Australian pine, Brazilian pepper, melaleuca, Old World climbing fern, and shoebutton ardisia) and seven invasive animal species (Argentine black and white tegu, Cuban treefrog, Burmese python, island apple snail, Nile monitor, redbay ambrosia beetle, and sacred ibis) because they strongly influence EPA wildlife ecology. The overall approach for the invasive species subsection provides consistency in considerations about each of the species. The inclusion of animals as well as plants accomplishes an ecosystem approach. The individual species accounts are clear and present the problems in a way that is readily understood by the public and policy makers. This subsection includes, for each of 12 priority species, excellent objectives, a very helpful description of the general biology of the species, its distribution and its threat, a prognosis for restoration impacts, and recommendations

to mitigate these impacts. The panel strongly supports the authors' carefully conceived recommendations about these species with respect to continued control actions and research needs. Completion of these recommendations will significantly reduce the threat that these invasive species pose to the District's restoration efforts in the EPA. Some specific comments:

**Comment #6-27:** *Lines 464+ - It would be helpful to define head, near tail, and far tail when these terms are first mentioned.*

**Response #6-27:** Concurred. Description of each tree island region has been provided in this revision (Please see 2<sup>nd</sup> paragraph of the Results and Discussion section).

**Comment #6-28:** *P.24, Table 6-5 - The chemical analyses suggest that at 2 of the 3 sites, the upper 30 cm of "soil" is ~4% P, which is probably comparable to ~pure guano.*

**Response #6-28:** Concurred. This is probably true. These islands might have once served as wading bird rookeries with P source largely from wading bird guano. A sentence was added in this section to point out that the high percentage of P in the soil must have been derived from wading bird guano.

**Comment #6-29:** *Lines 541- 556 - It seems certain that the bird guano and wildlife excreta greatly enrich the tree islands. Whether this is relevant to the overall P budget is another issue, and resolution of this issue would require estimates of tree island area, numbers of wading birds, and the chemical content of guano.*

**Response #6-29:** Concurred. Data were preliminary and cannot be used to estimate overall P budget at this stage. A sentence was added in the section to recognize the limitation of this study and call for further research.

**Comment #6-30:** *Line 597 - Calls for continued funding for systematic control in remaining impacted areas; in support of this recommendation, please add information about the extent of the remaining problem.*

**Response #6-30:** Concurred. The author will include estimated infestation acreages for Casuarina in the Greater Everglades region and discuss the need to achieve maintenance control within the Everglades as well as adjacent developed lands, which remain a significant propagule source for the eastern Everglades.

**Comment #6-31:** *Line 760 - Describes mortality of Burmese pythons related to cold temperatures. Clarify whether the mortality was also age-related.*

**Response #6-31:** Unfortunately, the available data are inconclusive with regard to age-related mortality associated with the 2010 cold event. The data that are available came from telemetered or captive adult pythons, as well as large free-ranging pythons, which are more easily detected than smaller juveniles. Anecdotally, there has been a shift towards smaller size classes of observed pythons since the freeze, leading to speculation that larger snakes were more vulnerable to cold temperatures. The author will include additional information on this topic in the final draft.

**Comment #6-32:** *Line 769 - Describes mortality of nesting birds from predation by giant constrictor snakes. Add information as to whether there are plans to develop methods to reduce this problem (e.g. through habitat modification or other deterrents).*

**Response #6-32:** Concurred. The author will include a brief description of python management options that are being or should be implemented. For example, the use of *Judas snakes*—telemetered animals used to help surveyors locate other pythons—near rookeries may be helpful by removing pythons from areas with high bird densities.

**Comment #6-33:** *Lines 775-776 - Control programs seem to be most important at this point. Clarify whether there is any way to stop northward spread.*

**Response #6-33:** Concurred. The author will include a discussion of the management model currently being implemented. The concept includes 1) develop control tools, 2) establish an effective monitoring program (with an emphasis on the northern expansion boundary), 3) deploy control methods in priority areas (known outlier and expansion boundaries as well as threatened species population locations), 4) long-term management control within the core population area.

**Comment #6-34:** *Line 803 - Suggests that Nile monitors cause problems for alligator nests and eggs. Combined with potential problems from giant constrictor snakes, these animals may present a dual threat to alligators (at least young stages). Please clarify whether this is the case.*

**Response #6-34:** The author agrees that there could be a “dual threat” to alligator and crocodile juveniles. A mention of this potential impact will be included, along with a statement on the need for research to more fully understand the threat of Nile monitors to Florida’s Crocodylia population.

**Comment #6-35:** *Line 841 - Add information about how extensive this species is in number and distribution within the Everglades.*

**Response #6-35:** As indicated on 849-850, there have only been two (unsubstantiated) reports of sacred ibis in Florida since completion of the Everglades CISMA rapid response effort. Monitoring for this species will continue for another year before successful eradication is declared.

### **Plant Ecology**

*This section focused on three studies of tree islands: (i) surveys used to identify early infestations of the invasive species, Old World climbing fern (*Lycopodium microphyllum*); (ii) use of sap flow as an ecophysiological (stress) indicator of woody species responses to changing hydrology on tree islands; and (iii) seedling and sapling recruitment of selected woody tree species as influenced by hydrology and soil nutrients.*

**Comment #6-36:** *The survey of *L. microphyllum* was scientifically sound with appropriate statistical analyses, but that the objectives of this project and analysis need to be more clearly stated in the beginning of this subsection.*

**Response #6-36:** The introduction to the section has been modified to clarify the objectives.  
**Comment #6-37:** *The study is described as simply identifying *Lycopodium*; explanation should also be added about how the findings will be useful for management/restoration. (Remedying the hydrologic problems should contribute significantly to reducing habitat for *Lycopodium* in tree island restoration efforts.)*

**Response #6-37:** Good point. Text has been modified to address this comment. An important finding of this study was that adjacency to other infested areas did not predict the presence of this

invasive species on tree islands in WCA-3A or WCA-3B. Instead, it appears that hydrology controls the spread of this species, so that tree islands in areas with drier conditions are more conducive to its colonization.

In contrast to the description of the *Lycopodium* study, the sap flow study clearly stated the objectives and rationale. It was conducted to improve understanding about optimal hydrologic requirements of dominant woody tree species on tree islands. The study compared seasonal and spatial data from a strong dataset – collected with remarkable frequency (based on data taken at 1-minute intervals for nearly a year) – for three abundant woody tree species (deciduous willow *Salix caroliniana*, semi-deciduous pond apple *Annona glabra*, and evergreen cocoplum *Chrysobalanus icaco*) in different hydrological conditions on a tree island in WCA-3A. The data indicated that sap flow rates are sensitive to water depth and the extent of inundation, so that this variable shows promise for development as an index of tree island health. The third study seemed more preliminary in nature than the others; thus far, sap flow appears to be a useful method for evaluating stress. Thus, the authors' interpretations (p.6-44) were aptly presented with caution, although thus far the data support their hypotheses that survival of woody tree species seedlings and saplings is driven by hydroperiod.

**Comment #6-38:** *This subsection would benefit from additional information and explanation: The authors (lines 1176-1181) should include a summary of the TN concentrations along with the TP concentrations, and they should add brief explanation about the high TP (and TN?) in the head region relative to the tail region of tree island 3AS2.*

**Response #6-38:** Concurred. The text will be change to include additional information associated with TP and TN concentration along with an explanation of their high concentration on the head.

**Comment #6-39:** *They should also explain why the two tree islands selected were so different (one with clear hydrologic differences between head and tail, versus the other with a long hydroperiod throughout).*

**Response #6-39:** Concurred. The text will be modified to explain the hydrological differences between the two tree islands.

**Comment #6-40:** *The Results subsection should provide information about the apparent importance of small elevated sites, which is invoked in the Conclusions.*

**Response #6-40:** Concurred. Text will be modified to include more information on the importance of elevated sites.

### **Other Specific Comments**

**Comment #6-41:** *Lines 930-939 - The authors should add information about the general size (area) of the tree islands included in this survey so that readers can evaluate whether the grid size for the hydrologic data in EDEN (400 m x 400 m) is sufficiently small to enable the detail needed to accurately assess hydrologic conditions.*

**Response #6-41:** The text has been modified to indicate the tree island sizes (small: 0-4 ha, medium: 4-8 ha, and large: 8 ha or larger).

**Comment #6-42:** *Lines 972-988 - These two subsections are excellent and put the preceding text in context (some of this writing would have been helpful earlier).*

**Response #6-42:** The introduction and body of this section have been revised to incorporate these ideas, as suggested. The analysis is ongoing and a journal article is planned.

**Comment #6-43:** *Line 1044 - Clarify whether this diurnal pattern was the same regardless of temperature or seasonality.*

**Response #6-43:** Concurred. Text will include this clarification.

**Comment #6-44:** *Line 1098 - The writing seems to suggest that saplings differ from adult woody species in the pattern of sap flow; if this is so, it should be explained along with the implications.*

**Response #6-44:** Disagree. The study was conducted only on adult trees that have the diameter that fits the length of the probe. Thus, due to their small diameters it is not possible to fit probes on saplings and, therefore, a comparative study between adults and saplings is not feasible. Nonetheless, the text will be modified to address this comment.

**Comment #6-45:** *Line 1117 - Please clarify whether this refers to long hydroperiods or lowwater hydroperiods.*

**Response #6-45:** Concurred. Text will be modified to address this comment.

**Comment #6-46:** *Line 1147 - The previous information showed that sap flow was involved, and that should be mentioned. Dr. Burkholder writes.....My interpretation of what Joanna Burger meant by this comment was that it would be helpful for the authors to mention how this study relates to or builds from the previously discussed study of sap flow, to improve integration between the projects. In the previous study, sap flow was described as “an excellent tool to measure stress of woody plants subjected to long hydroperiods.” In the next study that was described, the authors stated, “It was hypothesized that long hydroperiods restrict the regeneration of the tree island forests by adversely effecting seedling growth and recruitment.”*

**Response #6-46:** Concurred. The text will be modified to address this comment.

**Comment #6-47:** *Lines 1218+ - Should mention whether absolute water level also matters.*

**Response #6-47:** Concurred. Text will be modified to address this comment.

**Comment #6-48:** *Line 1234 - Effects on survival, as well as germination, should also be mentioned.*

**Response #6-48:** Concurred. Text will be modified to address this comment.

### ***Ecosystem Ecology***

*This section focused on two projects that examined mechanisms to accelerate the recovery of cattail-infested marsh, and a third project that assessed the utility of plant fossil seeds to determine historic hydrologic regimes. It described development of a wetland ecosystem model (WEM) and results from simulations of five combinations of hydrologic and seasonal scenarios. Fire is clearly an important ecosystem process within the Everglades, and the focus on this aspect is critical and key. In addition, an update on the Cattail Habitat Improvement Project (CHIP) was provided, emphasizing wildlife and ecosystem functional responses to removal of cattail using herbicides. Finally, the section addressed the important issue of climate change through an*

*analysis of soil cores' geological record from seed macrofossils and charalean oospore microfossils to quantify changes in EPA vegetation at scales ranging from multiple centuries to millennia.*

*The goal of the modeling effort was to identify the best fire scenario to reduce P storage. The Cattail Fire Model or WEM and the simulations from it (methods, objectives, hypotheses, etc.) were described in some of the nicest writing of this chapter. This model is a valuable addition; although fairly complicated (Figure 6-17), adequate data apparently are available to calibrate it. Thus far, the model has enabled evaluation of the effects of single versus multiple fires on phosphorus dynamics, based on data from four years, including two fires, in a highly P-enriched plot versus a moderately P-enriched plot in WCA-2A. The model output was/will be used to improve understanding about the effects of longer-term application of repeated fires on cattail recovery and phosphorus (P) release. The simulations supported the hypothesis that repeated application of prescribed fires, especially in late summer at low water depths (< 10 cm) remove more P from the ecosystem and reduce P storage. This model has the potential to greatly affect management with respect to fire, and additional data will no-doubt refine the model.*

**Comment #6-49:** *One suggestion for this subsection is to clarify, in the results and discussion, measured results versus model simulations.*

**Response #6-49:** All results are model simulation results. Initial model results were calibrated with measured results. A clarifying statement in the methods can be added. The overall goal of the CHIP is to accelerate restoration of P-enriched, emergent macrophyte marshes in the Everglades. In this year's effort, preliminary findings indicate that relative to the control (closed) areas, openings in emergent vegetation that were created by herbicides have higher available light, higher temperatures and wind speed, more submersed aquatic vegetation, more periphyton, less total carbon in the floc layer, and higher dissolved oxygen and pH (especially evident in comparison of diel cycles). The authors' interpretation from these data in combination with previously reported information on foraging wading birds and fish biomass is that wildlife diversity and are sustainable in the short term in the opened areas, and likely can be sustained in the long term with minimal effort and cost. However, actual reductions in surface water P and soil P levels were not observed over the four-year period of data collection, attributed to the fact (line 1574) that the established open regime is "in its infancy."

**Comment #6-50:** *Information should be added about plans to continue to track conditions in these plots.*

**Response #6-50:** Unfortunately, plans for continued monitoring of the plots are currently on hold due to budget cuts. The third study in this section was justified on the basis that a key goal for CERP is the restoration of ecosystem attributes characteristic of the historic ridge-and-slough landscape of the Everglades; that accomplishment of this goal requires accurate information on historic vegetation and, by inference, hydrologic conditions; and that paleoecological studies also provide important information about ecosystem response to climate change, a looming issue for South Florida's ecosystems and the District's restoration efforts. The study is in keeping with classic palynology, and well done, including soundly executed dating techniques. The preliminary findings are nicely supported by the evidence presented: The paleo data thus far from three soil cores taken from ridge-and-slough areas indicate that historic major ecosystem state changes in the EPA were driven by multi-decadal droughts; and that natural climatic changes (specifically, pronounced southward shifts in the Inter-Tropical Convergence Zone) caused a change from ridges and sloughs dominated by sawgrass and water lilies to a fire-controlled system dominated by tree islands and charaleans. The study is well-referenced and, in general, clearly presented. It

is a novel approach, and one that might yield significant results. The authors also nicely describe (p.6- 65) an example of remaining discrepancies, and include a plausible underlying mechanism. The link with fires (p.6-66, line 1757) is both interesting and corroborative.

## **SPECIFIC COMMENTS**

**Comment #6-51:** *Line 1276 - Clarify whether the fauna are being monitored as well.*

**Response #6-51:** Fauna were not monitored. A clarifying statement can be added.

**Comment #6-52:** *Line 1436 - It seems that another objective is to determine the optimal size of the patch; if so, please add.*

**Response #6-52:** Agreed. Patch size is an important attribute. However, this project was not designed with this objective in mind.

**Comment #6-53:** *P.6-53, Methods section - Brief background information about glyphosate and imazpyr should be added (the toxicities of these substances to non-target species, other effects that might result from their application, and work that has been done to assess these issues). This information would remind readers (given that previous SFERs have addressed these issues) that potential adverse effects of the chemicals on non-target species have not been overlooked.*

**Response #6-53:** Agreed. Highlighting the toxicities of these products on non-target species is important. The District uses both glyphosate and imazapyr for routine vegetative management throughout its entire region, and suggests this discussion should be considered at this much broader scale of impact.

**Comment #6-54:** *Line 1551 - Briefly explain whether the shape of the plots influences the development and patch dynamics.*

**Response #6-54:** The shape of the plots was to facilitate management activities. However, because the plots are surrounded by cattail, edge effects on recruitment would be anticipated. These could potentially be assessed from the aerial imagery analysis that is being conducted.

**Comment #6-55:** *Lines 1554-1561 - The authors should mention whether the relative effects of these changes on mercury levels or methylation have been examined.*

**Response #6-55:** No evaluation of mercury was conducted as part of this study.

## ***Landscape Ecology***

*District efforts in WY 2010 focused on five major landscape-scale projects, which are clearly described, scientifically sound, and well-justified, except that for projects i-iii, the “Relevance...” subsections need to be strengthened.*

*i) Characterization of “ghost” tree islands in Water Conservation Area (WCA)-2A – Ghost tree islands are defined (p.6-67) as tree islands that have lost elevation and most of their woody vegetation. They are detected only as scars in aerial photos, and sparse information is available about them. Based on what appears to have been exhaustive work, the ghost tree islands studied were found to have low plant diversity, with vegetation consisting mostly of a few woody species*

*at the heads and sawgrass in the middle and tail regions. The importance of tree islands to the biodiversity of the region is clearly conveyed in this subsection.*

**Comment #6-56:** *However, the overall objectives of this important study and the rationale/links to management need to be more clearly presented. A critical aspect would appear to be the comparison of tree islands with ghost islands and the conditions immediately surrounding both (hydrology etc.), but this is not clear from the writing.*

**Response #6-56:** The comparison of conditions immediately surrounding both (hydrology, etc.) of live tree islands and ghost tree islands is important. Unfortunately, only three live tree islands remain in WCA-2A. The author surveyed one.

**Comment #6-57:** *Finally, it would be helpful for the authors to clarify whether this valuable work will be extended as part of an ongoing monitoring program.*

**Response #6-57:** There is no plan to survey more ghost tree islands in FY11. However, vegetation and soil samples are being analyzed for nutrients and stable isotopes to gain greater insight into the sources of phosphorus that support the tree island ecosystem. The information is provided in the Conclusion section.

ii) Updated maps of tree islands in WCA-3A/3B covering the period from 1996-2004, based on aerial photos -

**Comment #6-58:** *Relevance...” subsections need to be strengthened*

**Response #6-58:** Concurred. Additional text is included in the “Relevance” section. This study will continue to enable evaluation of historic trends and strengthened insights about the main hydrologic characteristics needed for tree island restoration and successful implementation of the Decompartmentalization and Sheet Flow Enhancement Project (DECOMP). The authors describe a disturbing decline in the number and overall area of tree islands in WCA-3A/B. iii) Vegetation changes also indicated from the above mapping effort, based on an analysis of aerial photos taken in 2004 along with appropriate ground truthing - Documented changes were described in vegetation types (sawgrass/ shrub, broadleaf marsh, floating marsh, and a disturbing, rapid cattail expansion).

**Comment #6-59:** *This section (e.g. Line 2050) also needs clearer explanation about the overall function of the mapping and how it will be used to help restoration. In the present writing, the function of this extremely important program is not clear until the Conclusions section.*

**Response #6-59:** Concurred. Additional text was included in the introduction to describe the overall function of vegetation mapping as it relates to restoration. iv) Application of the remote sensing technique, digital area sketch mapping (DASM), to assess the spatial extent and dominance of four priority invasive plant species (Australian pine, Brazilian pepper, melaleuca, and Old World climbing fern) –

**Comment #6-60:** *This section was very useful and informative, and could be better integrated with the invasive species information presented earlier in the chapter.*

**Response #6-60:** The author included estimates of infestation area for the four mapped species in the species summaries earlier in the chapter. In addition, an attempt was made to provide a narrative of regional invasion patterns in that section. The author will improve cross referencing

the two sections by including references to each section where appropriate. The exciting technique, DASM, provides a lot of very useful data at relatively low cost and effort, and should be applicable to other/larger areas. Similar information for the other species will prove valuable in management, control, and public support for these programs. In many ways, invasive species have the potential to dramatically alter any RECOVER programs, and the emphasis on mapping is key. v) Landscape-scale analysis of climate in the EPA using major climate indices - This analysis of climate regimes emphasized surface temperatures and precipitation. As the authors describe, this excellent effort represents a first step to help detect and interpret climatic influences on Everglades hydrology at spatial scales relevant to the District's water management efforts. Just as changes in hydrology over the Everglades are critical, climatic differences are as well, and this type of study will ultimately assist modeling efforts.

## INTEGRATIVE REVIEW

*This level of review should evaluate how well the chapter provides integrated summaries of information, and it can also evaluate cross-cutting themes and the connections between research and water projects. Questions that have been recommended by the District for consideration in integrative review are:*

- *Are large programs presented so that the overall goals are clear and linked systematically to descriptions across the Report?*
- *Is the chapter cross-referenced in a thorough and consistent manner? and,*
- *Can constructive criticism and guidance be contributed for the District's large-scale programs?*

*The information in this chapter relates to several other chapters, including water management, invasive species, and coastal estuarine ecosystems. This year's Chapter 6 has improved integration with other chapters. For example, the focus on invasive species in Chapter 6, and integration of this information with Chapter 9, is excellent, and the main aspects examined are of critical importance to restoration efforts.*

**Comment #6-61:** *For future SFERs, some potential linkages among the various sections could be more clearly explored. As an example, could replacing cattails with submersed vegetation have an effect on nutrient and mercury cycling? This should be considered and examined. In addition, Chapter 6 would be strengthened by more clearly relating the overall ecology of the EPA to the coastal ecosystems.*

**Response #6-61:** Concurred. Elements of Chapter 12 will be referenced in Chapter 6 and vice versa for future SFER's. This draft chapter also has improved integration across sections and projects, accomplished in part by including explanations about the relevance of each project to the District's restoration efforts.

**Comment #6-62:** *Some opportunities for improved integration remain: For example, in the Ecosystems Ecology section (p.6-66), the authors indicate the potential importance of charaleans in Everglades restoration efforts, information that is supported by the findings thus far from a CHIP study described in the previous subsection (e.g. p.658).*

**Response #6-62:** Concurred. A cross-section of references for charophytes will be added. Subsections within each of the major sections generally were well integrated. Invasive species, a major problem that cuts across all of the ecosystem processes and all of the science and

management efforts in which the District is engaged, were appropriately emphasized and integrated throughout the chapter while also recognizing (p.6-25) that this topic is addressed in a separate chapter (Chapter 9 and its Appendix).

Table 6-1 merits separate comments: This table provides an excellent, succinct framework overview of the topics covered, findings, and relevant mandates. Its contents make the important integrative point, reinforced throughout the chapter, that the described research projects are related to various operational mandates that are specifically identified. Table 6-1 also makes it possible for the authors of the other chapters to integrate the general ecological studies with the mandates of their chapters. Tables such as this strengthen the potential for integration across chapters, concepts, and projects.

**Comment #6-63:** *The subsection, Climate Gradients Across South Florida (p.91+) is excellent and very relevant to Everglades ecology, but seems out of place. It belongs within the Landscape Ecology section, but it might make more sense to lead this section – and, perhaps, to relocate this section near the first section on Hydrologic Patterns.*

**Response #6-63:** Concurred. This study will be moved to Hydrologic Patterns.

**Comment #6-64:** *It would be helpful for the chapter to include explanation of linkages between these two sections, rather than having them presented first and last.*

**Response #6-64:** Concurred. This study will be moved to Hydrologic Patterns.

### **Climate Gradients Across South Florida**

*Finally, the Conclusions, newly added this year, is an extremely important section and a valuable addition to integration among the ecological studies, as well as among the chapters. The interpretations are well supported by the evidence presented.*

**Comment #6-65:** *One suggestion is that the effects of invasive species (including cattail) could be further integrated within the topics discussed.*

**Response #6-65:** Concurred. A conclusion associated with the effects of invasive species will be added this year.

**Comment #6-66:** *Further, some indication of the relative completion of different projects, their role in RECOVER, and management implications would be helpful.*

**Response #6-66:** This is a good recommendation. However, these are best added to each project if it is not already there.

### **Editorial / Other Content Changes**

**Comment #6-67:** *P.6-1 - The Summary should be altered to include a synopsis of the Hydrology section, and the main projects of the Ecosystem Ecology section should be more clearly described in the first paragraph.*

**Response #6-67:** Concurred. A synopsis of the Hydrology section will be added to the summary.

**Comment #6-68:** *P.6-1, line 18 - ...direct effects of... P.6-2, line 38 - ...Cuban treefrog...*

**Response #6-68:** The text will be updated.

**Comment #6-69:** P.6-1, line 19 - should mention when the cold weather occurred, and briefly describe the hydrological conditions that resulted in lowered success.

**Response #6-69:** Concurred.

**Comment #6-70:** P.6-1, lines 21+ - it would be helpful to mention how the nutrient enrichment of tree islands affects the wildlife as well.

**Response #6-70:** Concurred.

**Comment #6-71:** P.6-2, line 52 - the only ecophysiological measurement emphasized in this study was sap flow (which is used to estimate transpiration rate); therefore, the writing should be changed to: ...description of an important ecophysiological measurement, sap flow, of tree species...

**Response #6-71:** Concurred.

**Comment #6-72:** P.6-2, line 69 - ...wetland ecosystem model (WEM)... The Summary should include a brief synopsis of the important information on p.6-51 regarding cattail.

**Response #6-72:** Concurred.

**Comment #6-73:** P.6-2, line 71 and P.6-52, line 1422 - conflicts with p.6-47 (five vs. four)

**Response #6-73:** Concurred.

**Comment #6-74:** P.6-2, lines 76+ - the emphasis on mechanisms is important, and appreciated.

**Response #6-74:** Thanks.

**Comment #6-75:** P.6-3, lines 84-85 (“Paleoecological analyses of Everglades soil cores used fossil pollen, diatoms, seeds, and other proxies...” - conflicts with p.6-60, line 1617 (“For the current study, analyses of soil macrofossils (mainly seeds and plant fragments...”)). The Summary should be changed accordingly to emphasize macrofossils and charalean microfossils (oospores), while omitting mention of microfossils such as pollen and diatom frustules which were not addressed.

**Response #6-75:** Concurred.

**Comment #6-76:** P.6-3, Landscape section - the first paragraph should more clearly identify the five projects (it seems more like four projects - suggest that #2 and #3 should be combined). The significance of the findings in #3 should be briefly explained, and the important finding about cattails should be added.

**Response #6-76:** Concurred. This sub-section will be edited.

**Comment #6-77:** P.6-3, line 88 and P.6-66, lines 1759, 1769, 1775, 1778 - change charophyte (charophytes) to charalean (charaleans) (Graham et al. 2009, Algae, 2nd edition, Pearson Benjamin Cummings, San Francisco). There has been a change in the taxonomy; “charophytes”

*now refers to various algae in addition to Chara/Nitella etc., whereas the order Charales specifically refers to Chara and its close relatives.*

**Response #6-77:** Thank you; the text will be changed in the final.

**Comment #6-78:** *P.6-3, line 89 - please clarify (“a conversion that is unprecedented...”); the meaning is not clear as written (Table 6-1, p.6-6, is much clearer on this topic).*

**Response #6-78:** Concurred.

**Comment #6-79:** *P.6-3, lines 91-94 - it would be helpful to mention how these projects are related or lead to overall restoration of the Everglades.*

**Response #6-79:** Concurred.

**Comment #6-80:** *P.6-6, Table 6-1 - the findings from the Cattail Fire Model (WEM) should more closely match those described in the text; in particular, missing from the table is the important overall finding that water depth was the most critical factor influencing the effects of fire on P removal, the post-fire P pulse, and downstream impacts.*

**Response #6-80:** Text in Table 6-1 will be modified to reflect importance of water depth to fire effects.

**Comment #6-81:** *P.6-7, Table 6-1 - the findings about Vegetative Trends do not match the Summary text, which makes no mention of the important finding about cattail cover since 1995. Please change for consistency and to improve readers’ understanding.*

**Response #6-81:** Somewhat Concur – The important findings of cattail expansion was addressed in the Conclusion and Relevance sections. However, some additional text and references to the Conclusion section were added to elucidate why this is an important finding.

**Comment #6-82:** *P.6-8, line 181 - it would be helpful to state how wading birds were affected.*

**Response #6-82:** Concurred.

**Comment #6-83:** *P.6-10, line 218 - ...there were still... P.6-10, line 221 - ...period; this was not...*

**Response #6-83:** Concurred.

**Comment #6-84:** *P.6-10, line 234 - ...season – not an... P.6-11, line 252 - rewrite to clarify meaning*

**Response #6-84:** Concurred.

**Comment #6-85:** *P.6-13, Figure 6-4 - Shouldn’t the December 2009 reversal should be indicated by a red arrow?*

**Response #6-85:** Concurred.

**Comment #6-86:** *P.6-15, Figure 6-6 - it would be helpful to add red arrows showing the numerous reversals.*

**Response #6-86:** Concurred.

**Comment #6-87:** *P.6-17, line 358 - it seems that the authors do not mean recasting the data but, rather, understanding the effects of different stressors(?).*

**Response #6-87:** The authors intended to convey that such data can be used in specifically designed spatially-explicit tools that are capable of predicting real-time and real-space foraging and nesting responses to physical and biological processes. This section will be re-written accordingly.

**Comment #6-88:** *P.6-17, line 362 - should also mention the seven priority invasive animal species.*

**Response #6-88:** Agreed, these will be added.

**Comment #6-89:** *P.6-18, line 402 - ...which include Florida...*

**Response #6-89:** Agreed.

**Comment #6-90:** *P.6-18, lines 404-405 - the reader is referred to a document that unfortunately is only in preparation and, therefore, would not appear to be available. Please alter the wording accordingly.*

**Response #6-90:** Agreed.

**Comment #6-91:** *P.6-19, lines 418-421 - the description of this important overarching goal should be moved to the first page of this section.*

**Response #6-91:** This is not an overarching goal but rather one of a number of related goals. It is already noted in the first page of the section.

**Comment #6-92:** *P.6-19, lines 436+ - please clarify the evidence for weather being the cause of poor nesting success (reference the relevant reports or studies).*

**Response #6-92:** Agreed, the reference will be added.

**Comment #6-93:** *P.6-22, line 468 - Wetzel et al. (2009) is missing from the References list.*

**Response #6-93:** The Reference list will be updated.

**Comment #6-94:** *P.6-22, line 477 - please include supporting references for these studies.*

**Response #6-94:** Supporting references have been provided in this revision.

**Comment #6-95:** *P.6-23, line 513 - ...organic pool. Therefore...*

**Response #6-95:** Concurred. The word “however” is deleted.

**Comment #6-96:** *P.6-23, Figure 6-9 - please add information about N values in the legend; also clarify whether the bars indicate standard errors or standard deviations.*

**Response #6-96:** Concurred. The requested information on Figure 6-9 are now provided.

**Comment #6-97:** P.6-23, line 575 - ...not have led to...

**Response #6-97:** Thank you; the text will be updated in final.

**Comment #6-98:** P.6-23, lines 515-518 - needs supporting references. Can information about herbivore droppings in tree island areas, or bear populations, be added as well?

**Response #6-98:** Table 6-9 was cited here to provide support. The reviewer asked if information about herbivore droppings in tree island areas, or bear populations can be added. Additional studies would be required to provide this information. This study focused on the wading bird contribution of P.

**Comment #6-99:** P.6-23, line 522 - The data reveal a...

**Response #6-99:** Concurred. The change has been made.

**Comment #6-100:** P.6-23, lines 522-531 - should use (parallel) past tense throughout.

**Response #6-100:** Concurred. Past tense will be used for the description of data in the final.

**Comment #6-101:** P.6-25, line 569 - please add the supporting citation.

**Response #6-101:** It is unclear to the author what supporting citation is needed for this section. Lines 568-569 read, “Five invasive plant species and seven invasive animal species were assessed. Biological scientists and land managers familiar with the Everglades evaluated each species for.....”. Please clarify.

*Dr. Burkholder writes....We had thought that it would be good to mention Chapter 9 and Appendix 9-1 “up front” here (considering integration aspects), but the authors did so just a little later in lines 575-579, so it’s fine as is. Sorry – meant to exclude that comment but it slipped past us!*

**Comment #6-102:** P.6-32, lines 862-863 - should include the name of the invasive species.

**Response #6-102:** The invasive species is *Lygodium microphyllum*. This suggestion has been incorporated into the text.

**Comment #6-103:** P.6-32, line 870 - move references to the end of the sentence.

**Response #6-103:** Thank you; the text will be updated in the final.

**Comment #6-104:** P.6-37, line 1022 - ...along the central axis of...

**Response #6-104:** Thank you; the text will be updated in the final.

**Comment #6-105:** Lines 1096, 1264 - Sklar et al. (2010) is not in the References section (assumed to refer to the first section of this draft chapter after the summary?).

**Response #6-105:** Thank you; the text will be updated in the final.

**Comment #6-106:** P.6-44, line 1229 - ...where hydroperiods are

**Response #6-106:** Thank you; the text will be updated in the final.

**Comment #6-107:** *P.6-46, line 1288 and P.6-68, line 1833 - briefly explain why 30 cm as a cutoff.*

**Response #6-107:** An explanation will be added to the sentence.

**Comment #6-108:** *P.6-46, lines 1299-1300 - briefly explain the rationale for this assumption, especially considering that the model was iterated for 50 years (line 1309).*

**Response #6-108:** An explanation will be added to the sentence.

**Comment #6-109:** *P.6-46, line 1321 - please mention what the S3 simulation was, and why it is not presented here.*

**Response #6-109:** An explanation will be added to the sentence.

**Comment #6-110:** *P.6-58, line 1541 - ...the macroalga...*

**Response #6-110:** Thank you; the text will be updated in the final.

**Comment #6-111:** *P.6-58, Figure 6-23 - should include separate information for Chara sp.*

**Response #6-111:** Figure 6-23 will be revised to show the contribution of *Chara* sp.

**Comment #6-112:** *P.6-59, Figure 6-24 - more is needed in the legend to explain the colors/vegetation in the photos.*

**Response #6-112:** The legend will be revised to describe the vegetation in the photographs.

**Comment #6-113:** *P.6-59, lines 1555-1561 - should be moved to the beginning of the CHIP section (p.6-52).*

**Response #6-113:** Lines will be moved to the introduction.

**Comment #6-114:** *P.6-59, line 1573 - ...given that the...*

**Response #6-114:** Thank you; the text will be updated in the final.

**Comment #6-115:** *P.6-60, lines 1602, 1620 - explain “teleconnections” for readers.*

**Response #6-115:** Concurred, text will be changed.

**Comment #6-116:** *P.6-60, line 1612 - ...suggested that broad...*

**Response #6-116:** Concurred, text will be changed.

**Comment #6-117:** *P.6-62, line 1664 - please briefly explain the rationale or basis for this assumption.*

**Response #6-117:** Concurred, text will be changed.

**Comment #6-118:** *P.6-62, lines 1667-1668 - please also briefly explain why a constant rate of supply was assumed.*

**Response #6-118:** Concurred, text will be changed.

**Comment #6-119:** *P.6-62, line 1673 vs. p.6-60, line 1607 (and p.6-66, line 1786, etc.) - conflict; one describes time scales of multiple centuries to millennia, whereas the other describes time scales of multiple decades to millennia*

**Response #6-119:** Concurred, text will be changed.

**Comment #6-120:** *P.6-62, line 1675 - is the first place in the description of this study where soil age models are mentioned; they need to be described in the Methods.*

**Response #6-120:** Concurred, text will be changed.

**Comment #6-121:** *P.6-65, line 1717 - ...suggest that changes...*

**Response #6-121:** Concurred, text will be changed.

**Comment #6-122:** *P.6-67, line 1823 - please briefly describe the size (area) range.*

**Response #6-122:** Concur. The size range (35 x 10<sup>3</sup> m<sup>2</sup> to 1750 x 10<sup>3</sup> m<sup>2</sup>) is now provided.

**Comment #6-123:** *P.6-73, line 1950 - briefly explain how the size dimension of tree islands has changed following human alterations of the Everglades.*

**Response #6-123:** The following sentence (line 1950-1951) explains how much the size dimension of three islands in 2A has changed: “Over 95 percent of the original tree islands in WCA-2A have disappeared.”

**Comment #6-124:** *P.6-73, line 1958 - ....Enhancement Project (DECOMP)....*

**Response #6-124:** Concurred. The text was updated.

**Comment #6-125:** *P.6-74 vs. p.6-77 - there is an abrupt change in the text from use of hectares to use of acres; should be altered for consistency (note: Table 6-12 includes a helpful presentation of data in both units)*

**Response #6-125:** Concurred. The text was updated.

**Comment #6-126:** *P.6-87 - appears to describe findings from traditional ground truthing methods, in conflict with p.6-85, lines 2204-2006.*

**Response #6-126:** Lines 2204-2206 include the rationale for using low altitude observations for “ground” truthing. The author will clarify that the ground truthing results shown on P.6-87 are based on observations from low-flying helicopters.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 7

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**Posted:** 10/8/10 at 2:47 PM by Wanda Simpson

Wanda Simpson

**Level of Panel Review: Accountability (primary); Integrative (secondary)**

Reviewers: R. Ward (AA reviewer) and J. Burkholder (A reviewer)

**General Comment:** Chapter 7 provides a very brief annual update of large programs and initiatives being undertaken to improve water quality, water delivery timing, and water distribution to the Greater Everglades ecosystem. Chapter 7 emphasizes CERP (Comprehensive Everglades Restoration Plan), NEEPP (the Northern Everglades and Estuaries Protection Plan), and RECOVER (Restoration Coordination and Verification). This year's chapter mentions 18 and 20 projects in the Northern and Southern Everglades, respectively (Figures 7-1 and 7-2). There are three brief appendices as well (7-1, CERP Annual Report; 7-2, Northern Everglades Annual Work Plan for FY 2010; and 7-3, RECOVER Activities Update). Because this chapter is so "streamlined" (line 35), readers are referred to the SFER Consolidated Project Report Database website for further information, and to Volume 3 (Annual Permit Reports) of the 2011 SFER for details on permits. Appendix 7-3 also refers readers to the 2009 System Status Report where regional information on ecosystem conditions is made available. Chapter 7 is well organized and well written, and provides insight into the progress of programs and projects associated with restoration of the Greater Everglades area. The addition of web access to detailed project reporting and ecosystem status enhances the amount of information available for review.

**Response:** Thanks for the acknowledgement of the revised organization of the Chapter 7. The noted modifications to chapter content were in part due to prior year peer review comments.

### ACCOUNTABILITY REVIEW

*Does the draft document present a defensible account of data and findings for the areas being addressed that is complete and appropriate? (from SOW)*

**Comment #1:** *The data and findings presented in Chapter 7, as currently written, focus primarily on the progress of environmental restoration projects moving through a project management system – planning, acquisition, design, construction and contract completion (to operations). This information addresses the purpose of the Chapter to describe "...progress of environmental restoration projects and initiatives that occurred during Water Year 2010..." (lines 58-59).*

**Response #1:** The primary focus is in fact to provide enhanced oversight and accountability for the fiscal commitments being made to implement restoration projects. The chapter seeks to identify the pool of restoration projects that the SFWMD has identified and prioritized for implementation.

**Comment #2:** *An important emphasis of Chapter 7, however, is to attempt to describe the District's laudable, holistic approach to ecosystem restoration through advancing the Northern*

*and Southern Everglades initiatives. This is a huge challenge, however, to capture in succinct writing. The authors wrote (lines 62-68) that “the projects and initiatives are designed to work together to benefit the Greater Everglades ecosystem.” It is not possible, in reading this chapter, to get a sense of the main thrust of the projects or how they are meshed. Therefore, in addressing the above questions, this chapter does not seem to achieve a complete or appropriately explained overview of Everglades Restoration. The authors (line 58) note that the chapter aims to describe “progress of environmental restoration projects and initiatives that occurred during WY2010 and FY2010” across the Northern and Southern Everglades. Unfortunately, the writing is so brief in various places that it is difficult to determine whether progress has been made.*

**Response #2:** For the reporting period, a snapshot of key activities and advancements associated with Everglades restoration initiatives – particularly CERP, RECOVER, and NEEPP – are presented in Chapter 7. It is important to note that only related appendices, but not the actual chapter, are statutorily required for annual reporting. As such, this restructured chapter is only intended to be a high-level overview, while more detailed, interrelated restoration work and associated data/results are covered in other Volume I chapters (e.g., Chapters 10, 11 and 12) and supporting appendices. To further streamline agency reporting, many project-specific details and status are also provided in the SFER Consolidated Project Report Database, which will be released as part of the final version. For the final report, authors will revise the chapter *Summary* and *Introduction* sections so that its intent is more clearly defined.

While it is beyond the intent and ability of annual SFER reporting to provide this comprehensive synthesis, there are coordinated efforts and associated documentation on this issue. Specifically, the multiagency, multidisciplinary RECOVER team is required to produce the biannual System Status Report, documenting progress on Everglades restoration and providing an integrative system-wide analysis of environmental benefits (see Volume I, Appendix 7-3 for report highlights; the complete 2009 System Status Report update is available at [http://www.evergladesplan.org/pm/ssr\\_2009/ssr\\_main.aspx](http://www.evergladesplan.org/pm/ssr_2009/ssr_main.aspx)). As complementary reporting, *The Plan for Coordinating Science: A Framework for Strategic Coordination* (South Florida Ecosystem Restoration Task Force, 2008) includes the spotlight indicators for evaluating restoration and provides a management-level summary of the progress and status of Everglades restoration; see [http://www.sfrestore.org/scg/documents/2008\\_Final\\_PCS\\_approved\\_at\\_the\\_Sept\\_08\\_TF\\_meeting.pdf](http://www.sfrestore.org/scg/documents/2008_Final_PCS_approved_at_the_Sept_08_TF_meeting.pdf). Additionally, an independent review of Everglades restoration progress, documented in the *Progress Toward Restoring the Everglades: The Third Biennial Review, 2010* (Committee on Independent Scientific Review of Everglades Restoration Progress, National Research Council of the National Academies) has just been released and is available as a free web-download at <http://www.nap.edu/catalog/12988.html>; this review is required to be done and submitted every two years to the U.S. Congress. Cross-referencing with citations of these latest publications will be added to Chapter 7 in the final version.

**Comment #3:** *To further illustrate, the Chapter’s Introduction contains, in lines 62-68, statements that describe, collectively, why restoration projects are being undertaken – to improve the quantity, quality, timing, and distribution of water in the Everglades ecosystem. The Chapter does not present a summary of data and findings related to status and trends in improvement in these attributes of the Everglades ecosystem. For example, why are no data and findings presented about restoring Greater Everglades flow conditions as a result of programs and projects being completed and becoming operational? There are references to other chapters and websites where scientific data and findings are reported on a regional and project-based basis, but Chapter 7 makes no effort to summarize these findings.*

**Response #3:** Please refer Accountability Review Response #2, above.

***Comment #4:*** Appendix 7-3 introduces the 2009 System Status Report link – a webpage that contains regional summaries of key environmental indicators. Are there plans for the chapter, in the future, to include a brief overview of collective project benefits to the Greater Everglades environment? Or will environmental benefits be measured on a project-by-project or regional basis and reported in other SFER chapters, as is the case now?

***Response #4:*** Both Chapter 7 and Appendix 7-3 contains highlights but not a collective overview of environmental benefits of environmental benefits. RECOVER’s System Status Report webpage provides an integrative system-wide analysis of environmental benefits. Also, see Accountability Review Response #2.

*Is the synthesis of this information presented in a logical manner, consistent with earlier versions of the report?*

***Comment #1:*** The synthesis of information (what there is of it) is presented in a logical manner, but the findings are mostly only vaguely linked to management goals and objectives.

***Response #1:*** Volume 1 COORDINATING SUCCESS 2008: Strategy for Restoration of the South Florida Ecosystem and TRACKING SUCCESS: Biennial Report of the South Florida Ecosystem Restoration Task Force for July 2006 – June 2008, (South Florida Ecosystem Restoration Task Force, 2008), complementary reporting, includes measures for evaluating restoration and provides a management-level summary of the progress and status of Everglades restoration, including a synthesis of environmental goals, objectives and outcomes; see [http://www.sfrestore.org/documents/2006\\_2008\\_strategic\\_plan\\_volume\\_I.pdf](http://www.sfrestore.org/documents/2006_2008_strategic_plan_volume_I.pdf). Also refer to Accountability Review Response #2 for other complementary reports.

***Comment #2:*** The 2011 version of Chapter 7 is better organized than previous versions of the report in that the Chapters 7A and 7B of the past are eliminated in favor of a better organized single chapter.

***Response #2:*** Thanks for the acknowledgement. Modifications to Chapter 7 content were in part due to prior year peer review comments.

***Comment #3:*** The new title of Chapter 7, however, is not descriptive of its content. ‘Everglades Restoration’ could include topics from a number of other chapters, such as Chapters 2 and 3A. Chapter 7 addresses project progress involved in environmental restoration – not environmental restoration in all its dimensions. A more descriptive title for Chapter 7 would help readers approach its content with clear expectations.

***Response #3:*** Chapter 7 Title revised to Everglade Restoration Update, no revisions to chapter referenced are anticipated this time.

*Are findings linked to management goals and objectives?*

***Comment #1:*** The findings presented in Chapter 7 are linked to administrative/contractual accountability goals, but not, in the Chapter itself, to environmental goals. The text notes that scientific environmental findings are presented elsewhere in the report or can be obtained via links to databases. However, it is extremely difficult for readers to gain any understanding from the writing about the environmental benefits so far from the restoration initiatives and programs. Are there plans to incorporate Greater Everglades environmental accountability metrics into Chapter 7 to help future readers gain an overview of “...the cumulative regional environmental

*benefits as projects are implemented ...” to improve the quantity, quality, timing, and distribution of water? (lines 67-68)*

*Along these lines, the last two recommendations listed in Appendix 7-3 (on page App.7-3-5) discuss system performance measures and evaluation methods, but it is unclear if these measures and methods address only administrative benefits or if they include environmental benefits resulting from the projects.*

**Response #1:** Volume 1 COORDINATING SUCCESS 2008: Strategy for Restoration of the South Florida Ecosystem and TRACKING SUCCESS: Biennial Report of the South Florida Ecosystem Restoration Task Force for July 2006 – June 2008, (South Florida Ecosystem Restoration Task Force, 2008), complementary reporting, includes measures for evaluating restoration and provides a management-level summary of the progress and status of Everglades restoration, including a synthesis of environmental goals, objectives and outcomes; see [http://www.sfrestore.org/documents/2006\\_2008\\_strategic\\_plan\\_volume\\_1.pdf](http://www.sfrestore.org/documents/2006_2008_strategic_plan_volume_1.pdf). Also refer to Accountability Review Response #2 for other complementary reports.

RECOVER does not measure administrative performance. RECOVER is responsible for evaluating and assessing the natural and human systems of South Florida in response to CERP implementation. Therefore, all performance measures discussed in Appendix 7-3 address environmental or human system benefits. Human system benefits include water supply and flood protection. The 2015 Band 1 CERPA Update is the currently proposed CERP implementation plan through 2015. RECOVER used performance measures to compare system-wide and regional effects of model-generated conditions resulting from the proposed update. In the context discussed in this section, performance measures are used as forecasting tools.

The scope of the set of RECOVER performance measures goes beyond forecasting. It includes assessing actual environmental and human benefits. In addition, interim goals and targets have been set for the CERP. The development and planned uses of performance measures and interim goals and targets to track achievement of environmental benefits have been discussed in detail in RECOVER contributions to past SFERS. Construction of CERP projects is just beginning, so only baseline information is currently being reported.

To ensure this year’s contribution illustrates the environmental accountability of CERP, interim goals and targets and performance measures, are now mentioned under the 2009 System Status Report section. Links to documentation are provided in footnotes. Also, text has been added to clarify the nature of the evaluation conducted on the 2015 Band 1 CERPA Update modeling results.

**Comment #2:** *Chapter 8 notes, on page 8-8 that until “...projects have been implemented for a sufficient period of time, it is not possible to measure certain responses of the EPA to Long-Term Plan projects.” The way Chapter 7 reads at present (i.e. little mention of environmental accountability), it seems to embed that same assumption regarding environmental accountability. A clarification of this point at the beginning of the chapter would be helpful.*

**Response #2:** As indicated in response to comment #2, the reader should expect to find details (including associated data), about environmental benefits derived from implemented projects in the referenced Chapters 8, 10, 11, 12, and portions of Chapter 4. As noted in Chapter 8, the ability to provide such information will be contingent upon passage of time from when a project is completed and becomes operational.

***Comment #3:*** Chapter 7 would benefit from additional wording to help readers understand the distinctions being made between program/project administrative accountability versus environmental accountability. In addition, explanation is needed about how environmental accountability will be handled in the future, as more and more of the projects are brought online.

***Response #3:*** For CERP, environmental accountability will be addressed by periodic system status reports and reports to U.S. Congress, which are required every five years. These reports will compare the state of the environment to interim goals as well as report on progress towards achieving long-term performance measure goals. Clarifying text will be added to the 2009 System Status Report section of final Volume I, Appendix 7-3.

### **Specific Comments**

*CERP – A total of 93 projects and components (undefined) were described as identified during the reporting period, and 27 of those were “actively being worked.” Table 6 in Appendix 7-1-25, and the information contained on pp. 28-30, are very helpful in clarifying the status of these projects. It should be mentioned, however, that the mention of 93 projects and components seems confusing when compared to Appendix 7-1-13 (nearly 50 major projects and 68 project components); it would be helpful to clarify how many of the 93 projects were “major”? and what constitutes a “major” project?*

*Under “Highlights” (p.7-5), the authors should clarify how many acres of estimated lands were acquired in this reporting period. It would also be helpful to indicate whether the highlighted projects such as Merritt Pump Station construction and Phase II road and logging tram removal are proceeding well. The description of the CERP implementation process (Appendix 7-1-13) was helpful in this regard.*

*NEEPP – Readers are referred (lines 141-142) to Appendix 7-2 for next steps in restoration of the Northern Everglades region, which simply contains lists of construction projects, activities/rules under the Pollution Control Program, and activities/monitoring networks under the Research and Water Quality Monitoring Program without further explanation. Explanation should be added under each of these headings, by watershed, about the status/duration of these projects or, where appropriate, prioritization. Otherwise, it is impossible to tell what actually is to be undertaken or completed in the next reporting period. Highlights in this reporting period included “pilot demonstration projects of new technologies for the improvement of water quality,” but there is no further explanation about what these projects or technologies actually were. Another highlight (lines 156-157) was the initiation of data evaluation in the St. Lucie and Caloosahatchee watersheds, but there is no further description of the available data, how long evaluation is anticipated to take, etc. Appendix 7-2 should be restructured, insofar as possible, to convey information more as in Appendix 7-1.*

*RECOVER – Highlights included the completion of two reports and a guide on adaptive management integration. The first of these was developed as an interactive web page that should be a major help to managers, stakeholders, and scientists in finding information. The second report summarizes system-wide updates of the CERPA modeling conditions. A synopsis of the contents of this important report should be added to the chapter. The Adaptive Management Integration Guide continues the District’s emphasis on this important issue. The term, adaptive management, is defined in accompanying Appendix 7-3-1. The excellent explanation in Appendix 7-3-4 (beginning “RECOVER offers two main...”) to 7-3-5 should be moved to the main chapter. In addition to these three major plans/programs, Chapter 7 briefly summarizes two other important watershed programs - the Coastal Watersheds Program and the Lake Okeechobee*

*Watershed Protection Program. Highlights should have been included for both of these, but were only given for the latter. Those highlights indicated an impressive amount of effort, but the descriptions should be improved as follows:*

*1<sup>st</sup> highlight - please clarify how much of the 12,000 acres were treated for torpedograss versus water hyacinth.*

*3<sup>rd</sup> highlight - The TP load reduced to Lake Okeechobee from the FDACS-sponsored BMP demonstration/ evaluation projects was ~19 tonnes (mt); what percent reduction of the total does this represent?*

*4<sup>th</sup> highlight - The TP load reduction from District-sponsored monitoring and evaluation projects through WY2010 was ~27 tonnes (mt); what percent reduction of the total does this represent? It should be clarified - was this is the total reduction over the entire project durations?*

*5<sup>th</sup> highlight - Simply lists research/assessment activities conducted in WY2010. Brief additional description of progress in each should be added.*

## **Responses to Specific Comments**

CERP – As projects progress through the development cycle, what may have originally been identified as a major project may become multiple projects or a single project with multiple components. In order to correlate the 93 project/components, currently tracked, to the original 50 major projects/ 68 Restudy Component the reader can use the Restudy Component appearing in the first column of Table 6. Explanatory text was added to Chapter.

Chapter 6A will provide requested land acquisition detail.

NEEPP – Appendix 7-2 is the Northern Everglades annual work plan prepared pursuant to the requirements of Section 373.026(8)(b), Florida Statutes (F.S.), which states that prior to the release of state funds for implementation of the Lake Okeechobee Watershed Protection Plan or the River Watershed Protection Plans, the South Florida Water Management District (SFWMD or District) must prepare an annual work plan that is consistent with the goals and objectives of Section 373.4595, F.S., as part of the annual consolidated report. Appendix 7-2, with this limited purpose, provides a compiled list of Northern Everglades projects coordinating agencies have agreed to implement that will either continue or new start in FY2011; few of which will require SOETF funds and FDEP's approval.

In SFER, Volume I, Northern Everglades and its associated projects are captured under several chapters (Chapter 4, Chapter 7, Chapter 10 and Chapter 12) that describe the status of these projects (i.e., Lake Okeechobee Protection Plan projects are included under Chapter 10; St. Lucie and Caloosahatchee River watersheds Protection Plans' projects are captured under Chapter 12 and source control projects are captured under Chapter 4). A footnote will be added to this Appendix 7-2 referring readers to the Chapter 7 for additional information about NEEPP, including appropriate references to related SFER Chapters.

Chapter 7 Other Watershed Plans and Programs – Chapter content will be updated to incorporate other watershed plans and programs under section headers consistent with the SFER chapter structure. The Lake Okeechobee Watershed Protection Programs fall under NEEPP, and the Coastal Watershed Program is covered under Coastal Ecosystems.

Chapter 7 Highlights – Chapter 7 highlights are intended the flag to the reader key outcomes achieved during to reporting cycles, and relies upon referenced chapters to provide further levels of detail, if available. Additionally, in some cases data provided in referenced chapters allow readers to derive additional detail. Note the following references to chapter content provide further details pertaining to the commented highlights, above:

1st highlight - Refer to Figure 10-31, page 10-70

3rd highlight - Table 10-5 estimate of 15 mt, page 10-27. Percent reductions are not calculated in the chapter

4th highlight - Table 10-6, page 10-31 provide annual estimates of reduction. Percent reduction not calculated.

5th highlight - Table 10-8 pages 10-37 to 10-39; and WATERSHED RESEARCH, ASSESSMENT AND MONITORING section pages 10-36 to 10-53

### **Additional Comments about Appendix 7-1**

*Understandably, Appendix 7-1 (Part A, Funds) does not yet have complete FY2010 / FY2011 information, so as a “holder” until that information becomes available, the contents of this appendix refer to FY2009.*

*Table 2 – This interesting table presents what evidently is a complete list of projects/ activities, of which ~39 were funded to some degree in FY2009. The table legend needs to contain more explanation about the table contents (e.g. projects that received major emphasis such as the River of Grass project), and whether the N/A lines (e.g. contributed funding by other local sponsors) will be added to the final 2011 SFER. Information should also be added to the table indicating the status of the many \$0-funded projects/ activities.*

*Figures (maps) – are nicely done and very helpful.*

*Figure 2 – brief descriptions should be added about each of these five feasibility and reconnaissance studies (main objective, status, projected completion).*

*Figure 3 – brief descriptions should be added about each of these seven Critical Restoration projects (as above).*

### **Responses**

Appendix 7-1 Part A & B content will be available October 29, 2010.

Table 2 – Chapter 6A provides detail on the funding priorities for the CERP projects for the 2011 fiscal year and four future years -- a five-year expenditure plan. A reference to Chapter 6A has been added. The 5-year funding projections for a specific project are also available in the SFER project database.

Figure 2 - The general purpose of the feasibility studies has been added along with a link to a website providing requested information specific to each study.

Figure 2 – The timeframe of the C&SF Project Comprehensive Review Study did not permit a thorough investigation of all the regional water resource problems of south Florida. Subsequent to the completion of the feasibility study, a number of new feasibility studies were proposed. These studies will be conducted under the authority of the Water Resources Development Act of 1996, which allows for the continuation of studies and analyses that are necessary to further the Comprehensive Plan. These studies will investigate conceptual designs developed under the C&SF Project Comprehensive Review Study and make regional recommendations for meeting the future needs of agricultural, urban and environmental users. Additional information is available at <http://www.evergladesplan.org/pm/studies/studies.aspx>.

Figure 3 – The general purpose for the Critical Restoration projects has been added along with a more direct link to website providing the requested information specific to each project. In addition to activities outlined in the plan, several non-CERP projects were underway when the plan was written and are necessary precursors for many CERP projects. This precedence relationship was acknowledged when WRDA 2000 required the completion of certain of these projects before appropriations are made for related CERP restoration projects. A map of the CERP Critical Restoration Projects is provided as **Figure 3**. These water quality related projects are essential to the restoration of the Florida Everglades. Further information is available at [http://www.saj.usace.army.mil/Divisions/Planning/Branches/Environmental/Projects\\_Critical.htm](http://www.saj.usace.army.mil/Divisions/Planning/Branches/Environmental/Projects_Critical.htm).

## INTEGRATIVE REVIEW

*Are large programs presented so that the overall goals are clear and linked systematically to descriptions across the report?*

**Comment #1:** *The large programs are presented with clear overall goals, and the programs are linked fairly well to descriptions across the chapter. There is frequent cross-referencing with other chapters throughout Chapter 7, beginning with the Summary which mentions Chapters 8, 10, 11, and 12 as containing supplemental information about other restoration initiatives and programs. Brief description of the Coastal Watersheds Program (p.7-7) refers readers to Chapter 12 for further details. However, some opportunities for integration are missed: for example, on pp. 7-7 to 7-8, a description of the Lake Okeechobee Watershed Protection Program (addressing the lake and downstream waters, especially the Caloosahatchee and St. Lucie River estuaries) fails to direct readers to Chapters 10 or 12.*

*Integration is also strengthened through the District's efforts in formatting the 2009 System Status Report as an interactive web page for managers, scientists, and other end users. This helpful web page contains detailed information about each geographic CERP Monitoring and Assessment Plan (MAP) module, including Lake Okeechobee, the Northern Estuaries, the Greater Everglades, and the Southern Coastal Systems. Importantly from an integrative standpoint, the information is organized thematically as well as geographically.*

**Response #1:** The Lake Okeechobee Protection Program projects have been consolidated under NEEPP, guided by the Lake Okeechobee Watershed Protection Construction Project Phase II, Technical Plan (P2TP). Consistent with this merge; the referenced Chapter 7 LOWPP content will be consolidated under NEEPP. Reference to the Coastal Watershed Program content will be updated under a Coastal Ecosystem section header, providing a sufficient linkage to Chapter 12, similarly named.

Please note that RECOVER is not a District program but an interagency team in which the District is jointly involved along with the U.S. Army Corps of Engineers (USACE) and other key

partners and stakeholders. The development of the interactive web page has been a joint effort between the District and USACE. The content of the report is the culmination of work produced up to 2009 within the CERP MAP. This program is contributed to by many other agencies. The description of RECOVER efforts provided in past SFERs has been added to the chapter.

***Comment #2:*** *With the new means of conveying data and findings (e.g. the 2009 System Status Report), there is a need, in the introduction to Chapter 7, to better explain the mechanisms by which programs and projects are being summarized and presented in the SFER. The three levels of detail appear to be falling out in a program-project-benefit structure. To further illustrate, explain how text in the main report is a brief programmatic overview; with additional program/project detail in the Appendices, followed by an explanation of the websites where specific project and environmental detail can be found. As it currently stands, the websites are introduced throughout the report and it takes the reader time to connect them together and appreciate the reporting structure. If the panel understands the websites correctly, it is now (or soon will be) possible through the SFER Consolidated Project Database and the System Status Report to combine individual project status with associated environmental benefits – thus directly connecting program/ project actions/expenditures with environmental results. Of course there is the qualifier expressed on page 8-8 regarding the need for a ‘sufficient period of time’ for completed projects to operate before expected benefits will materialize. This appears to be a powerful accountability development that needs to be carefully explained and highlighted at the beginning of Chapter 7.*

***Response #2:*** As indicated in Accountability Review Response #2, the reader should expect to find details (including associated data), about environmental benefits derived from implemented projects in the referenced Chapters 8, 10, 11, 12, and portions of Chapter 4. As noted in Chapter 8, the ability to provide such information will be contingent upon passage of time from when a project is completed and becomes operational.

***Comment #3:*** *Also, with respect to terminology, Chapter 7 could benefit from clarification between program/project accounting and environmental accounting, as stated above. For example, the terms Monitoring and Assessment Plan (MAP) and System Status Report appear to be missing critical adjectives, Environmental and Ecosystem, respectively. The Consolidated Project Report Database contains the key work Project.*

***Response #3:*** Chapter 7 relies upon Appendix 7-3 to provide additional details on summary/overview content. The following clarifying text was added:

- CERP Monitoring and Assessment Plan (MAP) (full name)
- RECOVER’s System Status Report (RECOVER reference)

Please note that RECOVER is not a District program but an interagency program in which the District is a joint program manager along with the Corps. The development of the interactive web page has been a joint effort between District staff and Corps contractors. The content of the report is the culmination of work produced up to 2009 within the CERP MAP. This program is contributed to by many other agencies. The description of the RECOVER program provided in past SFER reports has been added to the chapter. Names adopted for these multi-agency initiatives fall outside the purview of this chapter/publication.

***Comment #4:*** *Page App. 7-3-3 describes restoration performance results that are derived from a model (is the model the Master Implementation Sequencing Plan?). the first bullet listed at the*

*bottom of the page states that “Regional groupings of projects provide measurable predicted restoration benefits using RECOVER system-wide performance measures.” Are these project administration benefits or environmental benefits due to better project management? If they are environmental benefits, are they being measured in the field and compared to model results? Clarification is needed.*

**Response #4:** The performance measures are used to measure environmental benefits (natural system). In addition, flood protection and water supply statutory requirements (human system) are taken into consideration. As discussed in this section, the measures are being compared to model output to determine forecasted system-wide effects. Clarifying text has been added to the section.

**Comment #5:** *Appendix 7-3-2’s section, “Adaptive Management Integration Guide and Guidance Memorandum,” nicely describes the District’s overall efforts to use adaptive management to move through the many uncertainties along the way in resolving and refining how to best implement and integrate various projects to achieve Everglades restoration goals and objectives.*

**Response #5:** Note that the Guidance Memorandum was developed by the multiagency RECOVER team. Also see response to Integrative Review Response #1.

**Comment #6:** *Appendix 7-3-3 lists 10 CERP projects as being implemented by 2010 and refers readers to a website for information on the Master Implementation Sequencing Plan and the Integrated Delivery Schedule. Evaluation of the CERP 2015 Band 1 projects listed a number of “important performance results” which need to be better described:*

*1<sup>st</sup> bullet - states that regional groupings of projects provide measurable predicted restoration benefits using RECOVER system-wide performance measures, but includes no further information. Additional description is needed.*

*2<sup>nd</sup> bullet - does not seem to qualify as an “important performance result” and should be combined with the first bullet.*

*3<sup>rd</sup> bullet - states that several opportunities exist for adaptive management, but then simply restates why adaptive management is a valuable approach. More explanation is needed.*

*9<sup>th</sup> bullet - requires clarification about the basis/validity of this assumption.*

**Response #6:** These bullets were taken verbatim from the full report. Additional information and clarification can be found in the Technical Report on System-wide Performance of CERP 2015 Band 1 Projects at [http://www.evergladesplan.org/pm/recover/band\\_1\\_report.aspx](http://www.evergladesplan.org/pm/recover/band_1_report.aspx).

*Is the chapter cross-referenced in a thorough and consistent manner?*

**Comment:** *Chapter 7 would benefit from more clarification of how its project management accountability focus is related to other SFER chapters’ scientific environmental measures and evaluations. Page 7-1 notes that supplemental information regarding other restoration initiatives and programs is contained in other chapters of SFER Volume I, but the list does not mention Chapters 2-6 where environmental measures, such as flows and water quality conditions, are discussed. Given the ecosystem health purposes of CERP, NEEPP, and RECOVER (and the other programs summarized in Chapter 7) reference to environmental outcomes discussed in these earlier chapters is needed. This may involve simply adding these chapters to the list on page 7-1*

*with a sentence of explanation of how these Chapters relate (e.g. environmental measures being developed to track program effectiveness via the System Status Report) to the projects described in Chapter 7.*

*The panel may also provide constructive guidance for the District's large-scale programs, particularly as related to water quality assessment and control across the agency. As an observation, Appendix 7-3 describes an adaptive management approach employed within CERP to address the uncertainties associated with the ability to predict ecological restoration responses (page App. 7-3-2). The panel also notes the need for adaptive management to address the uncertainties associated with the ability to predict human actions that greatly impact the future restoration in the Greater Everglades ecosystem (e.g. development of the River of Grass land acquisition that has the potential to greatly enhance restoration).*

**Response:** Chapter 7 – Accountability Review Response #2 addresses noted matters of environmental measures, evaluations, and outcomes. Also, see Response #1 to findings linked to management goals and objectives.

Appendix 7-3 – The Adaptive Management Integration Guide discusses the need to address the uncertainties associated with human actions, but the tools to address these uncertainties are currently lacking. RECOVER recognizes the need to address human actions and to create the tools necessary to do so.

**Questions:**

- 1. Is there a scientific basis (e.g. model results via MISP) that can be referenced to support the hypothesis stated in lines 67-68?*
- 2. Line 58 notes that the purpose of Chapter 7 is to describe 'progress' in environmental restoration projects and initiatives, not environmental results or improvement. Given the overall goal of improving the cumulative regional environmental benefits, this limitation requires further elaboration in the Introduction. Many of the points above relate to this limitation.*
- 3. Appendix 7-1 should be reference in line 99 – it is the CERP Annual Report. Appendix 7-3 is RECOVER activities update.*
- 4. The Volume I Table of Contents lists the title of Chapter 7 as 'Everglades Restoration Update' but the title used at the beginning of Chapter 7 is simply 'Everglades Restoration'. This discrepancy needs to be resolved.*

**Response:**

- The scientific basis has been well documented in other places. References provided below.
  - USACE and SFWMD. 1999. Central and Southern Florida Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement. United States Army Corps of Engineers, Jacksonville District, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL. [http://www.evergladesplan.org/pub/restudy\\_eis.aspx#mainreport](http://www.evergladesplan.org/pub/restudy_eis.aspx#mainreport).
  - RECOVER. 2010. Technical Report on System-wide Performance of CERP 2015 Band 1 Projects. Restoration Coordination and Verification Program, U.S. Army Corps of Engineers,

Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL. January 28, 2010.

2. Reference Accountability Response #2

3. Publication formatting guidelines was used to establish cross-referencing of content (see lines 20-34).

4. Chapter 7 Title updated to be consistent with Table of Contents- Everglades Restoration Update

***Editorial Suggestions:***

*1. Line 55 – statement that during dry periods, “sufficient water of the right quality is not always available” for the environment and the human population does not accurately describe the serious impacts that are chronically sustained by many of the Southern Estuaries because of altered water supply, timing of delivery, and degraded water quality. Please revise.*

*2. Line 61 – ...7-2 shows the locations of the...*

*3. Line 114 – add the month to be consistent with the format used for the other bullets*

*4. Appendix 7-1, p.2, 3<sup>rd</sup> line from bottom – ...to ensure that resources...*

**Response:**

1. Line 55 – No change.

2. Line 61 – Text revised: Figures 7-1 and 7-2 show the location of selected projects/components within the respective regions.

3. Line 114 – Text revised to May 2010.

4. Appendix 7-1, p.2, 3<sup>rd</sup> line – No change.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 8

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**Posted:** 09/30/2010 at 12:50 PM by Tracey Piccone

Tracey T. Piccone

**Level of Panel Review: Accountability (primary); Integrative (secondary)**

Reviewers: R. Ward (AA), O. Stein (A)

### ACCOUNTABILITY REVIEW

*Does the draft document present a defensible account of data and findings for the areas being addressed that is complete and appropriate? (from SOW)*

**Comment #1:** *Chapter 8 is difficult to review as it is more a listing of projects than a program description followed by a collective assessment of program implementation progress. Much of this difficulty is due to the Chapter being extremely brief - the beginning 'Summary' section is six pages long and the main body of the chapter is four pages. There are no appendices. The purpose of the Chapter is stated on lines 8-9 as follows: "...this chapter presents an update on the progress of the implementation of the Long-Term Plan...". Yet, lines 15-16 state "...updates for many of the Long-Term Plan projects appear in other chapters of this volume." Thus, the project updates, the purpose of the chapter, for the most part, are elsewhere in the SFER. The four pages in the main body of the chapter provide extremely brief updates on 'project-level activities for FY 2010' (one project being updated was completed in FY 2005 and another in FY 2007).*

*By its title, this very brief chapter would seem to describe how the long-term plan is to be implemented. Understandably the implementation of this plan with 48 individual projects (line 98) is done incrementally and progress on many of the specific projects is described in other chapters such as 4, 5 and 7. That said, it is hard to understand what the long term plan is when reading this chapter. There is no succinct statement such as "The long term plan is to ....." The description of the evolution of the plan is equally vague. For example, a chronological description of how the plan was developed is not used in lines 82-97. Better to start in 2003 and work forward in time.*

**Response #1:** As suggested above and in a subsequent comment, in the final report, text will be added to the *Summary* section of the chapter to address this comment.

**Comment #2:** *The significance of the phosphorous rule and the district judge's ruling on the CWA are not clear from these paragraphs.*

**Response #2:** In 2008, in the *Micosukee Tribe v. U.S. Environmental Protection Agency (USEPA)* (Case No. 04-21448-GOLD/MCALILEY), the court determined that portions of the 2003 amendments to the Everglades Forever Act and Florida's Everglades total phosphorus (TP) rule were improper changes in water quality standards and invalid under the Clean Water Act. In general, the court invalidated provisions allowing discharges of TP above the phosphorus criterion if the District was implementing the requirements of its Long-Term Plan. (The District was not a party to that case.) Two years later, in response to a motion for contempt against U.S. Environmental Protection Agency (USEPA), the court further ordered USEPA to establish

effluent limits for the District's permits and a schedule of projects by which those limits could be achieved. As a result, on September 3, 2010, the USEPA issued an "Amended Determination" that contains new National Pollutant Discharge Elimination System and Everglades Forever Act permits for the District, which specify new effluents and a list of new remedies to be built. At this time, that order is under appeal.

Although the Long-Term Plan may no longer be used as a permitting tool, it is still an important District planning document and implementation of the Long-Term Plan is still mandated under State law (until such time as the Everglades Forever Act is amended directing otherwise). In the final report, text will be added to the chapter accordingly.

***Comment #3:*** *An assessment of how the Adaptive Implementation has been working is warranted. If no modifications have been made in the past two years, it would seem that either the plan is working perfectly or an adaptation component is missing.*

***Response #3:*** Adaptive Implementation has been successful even though no modifications were requested in the past two years. Numerous amendments were made in the earlier years of Long-Term Plan implementation (see the 2005–2009 SFRs – Volume I, Chapter 8), resulting in the addition of approximately \$1 billion in additional projects. In the final report, text will be added to the chapter clarifying this issue.

***Comment #4:*** *Based on the above observations, the Panel questions whether Chapter 8 satisfies its purpose of completeness and thoroughness regarding accountability for the Long-Term Plan.*

***Response #4:*** In the final report, improvements will be made to the chapter as described above to address the peer-review comments on completeness and thoroughness.

*Is the synthesis of this information presented in a logical manner, consistent with earlier versions of the Report?*

***Comment #5:*** *There is very little synthesis in Chapter 8. There are no data and findings presented regarding the collective implementation of Long-Term Plan projects, other than lines 28-31, at the beginning of the 'Summary' section noting reductions in TP load. Chapter 8 would benefit greatly from a section summarizing data and findings regarding water quality improvements related to Long-Term Plan project implementation.*

***Response #5:*** In the final report, text will be added to the *Summary* section summarizing findings from Volume I, Chapter 3A about overall Everglades water quality improvements related to the Long-Term Plan implementation. Additional references will also be added to Volume I, Chapters 4 and 5 for detailed data and findings on individual Long-Term Plan projects such as Best Management Practices (BMPs) and Stormwater Treatment Areas (STAs).

***Comment #6:*** *Given the brevity of Chapter 8, the Panel sought additional information regarding the implementation of the Long-Term Plan. The only readily available additional sources of information cited in the text are four live links. In the 2010 SFR there were links in several of the project-level activity descriptions to provide additional detail, but it was not clear how to click to the relevant information. Rather than add information about the clicks required, the 2011 SFR removes the links and notes that relevant documents can be obtained by contacting the District/modeler. Removing ready access to additional information is counter to other SFR Chapters that are adding additional links to more information (e.g. Chapter 7).*

**Response #6:** Agreed, however, the District's website was substantially reorganized in 2010 and, as a result, some of the chapter web links unfortunately have been removed.

**Comment #7:** *The four links provided in the 2011 SFER Chapter 8 include a link to the District's Strategic Plan which confirms that the Long-Term Plan is a 'Strategic Priority'. The River of Grass land acquisition opportunity is mentioned on line 167 and in the District's Strategic Plan, but the implications of this opportunity on the Long-Term Plan are not discussed other than to note delay in the Inflow Volumes and Loads Project.*

**Response #7:** For the final report, text will be added to the *Revisions to the Long-Term Plan* section of the chapter discussing the proposed United States Sugar Corporation initial acquisition (River of Grass land acquisition) and the potential for assisting the existing STAs in improving water quality of discharges to the Everglades; however, because that effort is not final, it is currently not known what, if any, impact the pending River of Grass land acquisition would have on the Long-Term Plan. Once this information is available, or future projects are added to the Long-Term Plan, it can be included in future SFER chapters, as appropriate.

**Comment #8:** *The link to the Long-Term Plan provides a more complete introduction to the Long-Term Plan and the Panel suggests this type of information would be useful at the beginning of Chapter 8. For example, the Plan could be introduced in a more comprehensive manner with such wording as:*

*The Long-Term Plan is a comprehensive set of water quality improvement measures designed to ensure that all waters entering the Everglades Protection Area (EPA) achieve compliance with water quality standards. These measures include enhancements to the existing Stormwater Treatment Areas (STAs), expanded best management practices, and integration with the Comprehensive Everglades Restoration Plan (CERP) projects. In addition the Plan continues the strong science-based and adaptive implementation philosophy to allow continuous improvement until the long term water quality goal is achieved.*

*The Long-Term Plan was developed in response to the 1994 Everglades Forever Act (F.S.373.4592) requirement that the District submit to the Florida Department of Environmental Protection (FDEP) a plan by December 31, 2003, for achieving compliance with the phosphorus, and other state water quality standards in the EPA, and to include the estimated costs, funding mechanisms and implementation schedules associated with the plan. In response to this requirement, the Long-Term Plan for Achieving Water Quality Goals (The Long-Term Plan) was developed.*

**Response #8:** Comment appreciated. For the final report, text similar to the above will be added to the *Summary* section of the chapter.

**Comment #9:** *The link to DMSTA gets into operational details of the model without describing how it is actually used in implementing the Long-Term Plan. There was a paragraph describing how DMSTA is used in implementing the Long-Term Plan in the 2010 SFER but it has been removed in the 2011 SFER.*

**Response #9:** For the final report, text will be added to describe generally how the model has been used in implementing the Long-Term Plan.

***Comment #10:*** The last link, in the Revisions section of the Chapter, led to a webpage where the additional clicks needed to acquire the referenced information were not clear.

***Response #10:*** The District's website was reorganized substantially this year, resulting in the removal of the Long-Term Plan website. In the final report, text will be added to the chapter referring the reader to previous years' SFER chapters that summarize Long-Term Plan revisions.

***Comment #11:*** *Thus, for reasons noted above, the Panel questions whether the synthesis of information presented in Chapter 8 is complete and improving from year-to-year.*

***Response #11:*** Revisions have been made to the chapter as described above to address the peer-review comments on completeness and improvements from year to year.

*Are findings linked to management goals and objectives?*

***Comment #12:*** *Management's goals for the Long-Term Plan are to ensure that all waters entering the Everglades Protection Area (EPA) achieve compliance with water quality standards. There is no attempt in Chapter 8 to develop findings or insight regarding progress in achieving compliance with water quality standards. Instead, it is noted that "...until the Long-Term Plan projects have been implemented for a sufficient period of time, it is not possible to measure certain responses of the EPA to the Long-Term Plan projects." No discussion is provided regarding when the measurement of water quality improvements related to the Long-Term Plan will begin. What is the definition of 'a sufficient period of time'? What are does the term 'certain responses' mean?*

*It is noted on page 8-8 that Chapter 3A provides information on the status of water quality conditions within the EPA and that there is a measurable reduction in the TP levels in discharges from the Everglades Construction Project basins (no Chapter number is cited). After seven years of formal implementation of the Long-Term Plan, there needs to be more synthesis on its collective implementation status and of its impact on water quality conditions related to management goals and objectives. For example, is the Long-Term Plan 50% implemented; 70%; 90%? Chapter 3A, alone, provides considerable data and findings that can be synthesized regarding progress of the Long-Term Plan in meeting management's water quality standard compliance goals and objectives.*

***Response #12:*** The success of the Long-Term Plan is not simply measured by the percent of the plan implemented. Instead, success is measured by the completion of major projects and ongoing results from activities such as the BMP program intended to improve the treatment performance of the STAs, and by the positive trends observed in water quality in the Everglades downstream of the STAs. And while it is not possible to directly relate the effects of a single project to the overall improvements in Everglades water quality, the projects in combination have shown measurable success. In the final report, text will be added to the *Summary* section summarizing findings from Volume I, Chapter 3A about overall Everglades water quality improvements related to the Long-Term Plan implementation. Cross-references to Volume I, Chapters 4 and 5 will also be included for detailed data and findings on individual Long-Term Plan projects and activities such as the BMPs and STAs. Text indicating "...until the Long-Term Plan projects have been implemented for a sufficient period of time, it is not possible to measure certain responses of the EPA to the Long-Term Plan projects" will be removed.

## INTEGRATIVE REVIEW

*Are large programs presented so that the overall goals are clear and linked systematically to descriptions across the Report?*

**Comment #13:** *Project names and SFER Chapter references of individual Long-Term Plan projects are noted in Table 8-1. Without more collective synthesis of Long-Term Plan projects, it is difficult to conclude that the Long-Term Plan is presented with overall goals that are clear and linked systematically to other descriptions across the SFER. A simple table listing Chapter numbers with individual projects is not sufficient to answer the above question in the affirmative.*

**Response #13:** In the final report, text will be added to the chapter summarizing findings from Volume I, Chapter 3A about overall Everglades water quality improvements related to the Long-Term Plan implementation as well as to the achievement of the plan's goals.

*Is the chapter cross-referenced in a thorough and consistent manner?*

**Comment #14:** *Beyond Tables 8-1 and 8-2, there is very little mention of Chapter cross-referencing. Again, without more synthesis of collective program goals in Chapter 8, there is little basis for chapter cross-referencing.*

**Response #14:** For the final report, additional cross-referencing to other chapters of the SFER will be added, as appropriate.

*The panel may also provide constructive criticism and guidance for the District's large-scale programs, as appropriate.*

**Comment #15:** *It would seem that this chapter is the one place in the document that should attempt to integrate all of the various Long-Term Projects the district is undertaking and demonstrate how they relate to the Long-Term Plan's goals and objectives. Thus a golden opportunity to present a succinct overview of the district's goals and how projects relate to the Plan has been missed.*

*It should be possible to identify a set of monitoring sites from those assessed in Chapter 3A to create an indication of progress of the Long-Term Plan in meeting its management goals and objectives. Such an assessment could be an sub-activity extension of the Chapter 3A assessment each year, using the previous year's Chapter 3A's data and findings (to give time to prepare an assessment).*

**Response #15:** In the final report, text will be added to the *Summary* section summarizing findings from Volume I, Chapter 3A about overall Everglades water quality improvements related to the Long-Term Plan implementation, which is an indication of the plan's progress in meeting its goals.

**Comment #16:** *From an integrative perspective, the briefness of Chapter 8 makes it difficult for the Panel to fully understand connections of the Long-Term Plan to the Comprehensive Everglades Restoration Plan and RECOVER program (Chapter 7). Given the common large program update objectives of Chapters 7 and 8 and the need to understand the relationships between the three major initiatives being discussed, would it be possible to combine the three large program implementation updates into one Chapter with one over-arching introduction to the relationships involved?*

**Response #16:** Comment appreciated. This suggestion has merit and may be considered for implementation in future SFERs.

***On the more technical side:***

**Comment #17:** *The chapter claims (lines 28-31) that 3500 metric tons of P that would otherwise have gone into the Everglades has been prevented from entering. Presumably a mass balance of P in the STAs could back up part of that claim, but how has the effect of BMPs source reduction been quantified? Is there a reference or SFER Chapter that can be cited?*

**Response #17:** Of the 3,500 metric tons removed, the STAs were responsible for removing approximately 1,400 metric tons (as reported in Volume I, Chapter 5) and the BMPs were responsible for removing approximately 2,100 metric tons (as reported in Volume I, Chapter 4). For the final report, text will be added to the chapter accordingly.

**Comment #18:** *What is the four-part P test and how does that relate to the plan and modifications to the plan? (Lines 90-91).*

**Response #18:** The four-part TP test is a reference to the Everglades phosphorus criterion rule's compliance test. Further details on the test can be found in the rule (Section 62-302.540, Florida Administrative Code) and in Volume I, Chapter 3A. While the unimpacted areas are in compliance with the TP criterion (and the four-part test) (refer to Chapter 3A), modifications to the Long-Term Plan are being adaptively implemented until compliance with the four-part test is achieved for the impacted areas of the Water Conservation Areas.

**Comment #19:** *Is four percent of the STA inflow to the STAs considered "significant" or "insignificant"? (lines 174-175) How do the lake inflows to STA affect the plan?*

**Response #19:** Four percent as a long-term average annual can be considered insignificant, however in years when high volumes of Lake Okeechobee releases are delivered to an STA, the impacts to performance can be significant especially if TP concentrations in the Lake Okeechobee releases are elevated. The District closely monitors STA inflows and through extensive efforts seeks to ensure that the STAs are not overloaded from a hydraulic and nutrient loading perspective.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 9

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**Posted:** 10/7/10 at 12:24 PM by LeRoy Rodgers

LeRoy Rodgers

**Level of Panel Review: Integrative (primary); Technical (secondary)**

Reviewers: J. Burger (AA reviewer) and J. Burkholder (A reviewer)

***Comment #1:** Moreover, the Table summary is useful, but it would be helpful to identify in one place the species found in all modules since this indicates a greater threat (this information is in the table, but it would be helpful to have it in one place).*

**Response #1:** Acknowledged. In the interest of space the authors feel like yet another table highlighting the most widely distributed species would be redundant and contradicts instructions to minimize page count in the report. Also, the authors are not necessarily in agreement that a species' distribution is correlated to degree of threat. Some species may never expand to all modules due to habitat or climate factors, but could inflict overwhelming impacts in localized areas.

***Comment #2:** The key issues section rightly identifies most of the key issues, and the inclusion of the tools for control of both plants and animals is both necessary and informative. Some additional mention should be made of the commercial aspects of the nonindigenous species problem (garden shops, landscapers, pet stores). That is, sometimes nurseries are selling plants that are (or will become) invasive species problems. While this generally does not affect the priority species, it could affect the species that could become major problems in the future.*

**Response #2:** Concur; ornamental plant and pet commerce is indeed a major driver in the rate of biological invasions worldwide. The authors will attempt to include discussion on this important issue within the space constraints of the report. This content may be better presented in the introductory section, however.

***Comment #3:** The section on nonindigenous species in the restoration context is important, and acknowledges the key importance of these species to RECOVER efforts. It would be helpful to provide additional information on how failure to respond (mainly because of funding constraints) is projected to impact South Florida ecosystems.*

**Response #3:** Concur; the authors will include additional discussion on this point. For example, it is important that decision makers understand the permanency of many biological invasions. Despite huge successes in managing melaleuca regionally, this plant will not be eradicated from Florida and failure to maintain funding for sustained maintenance control could lead to re-establishment and a loss in the investment to contain the species. Examples of the threats from emerging invasive animal species will also be included.

***Comment #4:** The District and associated partners may need to convene a workshop specifically to consider how to identify emerging invasive species before they present any problem. While this is a daunting task, it is essential, especially for the Everglades with their unique environment.*

**Response #4:** Acknowledged. This issue has been raised with the South Florida Ecosystem Restoration Task Force and other coordinating bodies. The authors fully support such an endeavor.

**Comment #5:** *Overall, the descriptions of priority nonindigenous species are excellent, and include a short history, effects, and where it occurs, the control measures. Where possible, some quantification of both the problem and its solution would be useful. While some of this information (e.g. extent of occurrence of an invasive species in the Everglades overall) is presented in other chapters (e.g. 6), it bears repeating in this chapter. Thus, quantitative indications of severity and management success would be useful.*

**Response #5:** Acknowledged; the authors have included available data which quantify the extent of the problem for priority species. Unfortunately, there is very little information for most of these species. The authors will review the information included in the one-page synopses to verify that the all pertinent data is summarized.

**Comment #6:** *It might be useful to develop of table that lists the key invasive species for each RECOVER module, which might suggest and illustrate whether groups of species are particular problems in each module, and require a coordinated effort for species groups. Such a table might indicate where the greatest invasive species problems occur.*

**Response #6:** Acknowledged. The authors feel that species groups are unlikely to be evident from the suggested table, in large part because all modules have a broad array of invasive species life forms. However, a summary table of RECOVER modules with numbers of priority invasive species (by major taxonomic group) may provide a useful synopsis to illustrate the diversity of threats each module faces. The authors will explore this recommendation further and include in the final report if space allows.

**Comment #7:** *Conclusion Section--The emphasis on risk assessment is interesting, but requires a few more details, since a strict risk assessment paradigm may not be possible given the limited information on both. Therefore they must be using a slightly different assessment strategy, which would be informative to present.*

**Response #7:** Concur; an overview of the risk assessment approaches and their limitations will be added to this section.

**Comment #8:** *Providing information on successes (e.g. Melaleuca) is an excellent tool for engaging both the public and managers. It is a model of success, and the lessons learned from this program could be described in a little more detail in the body of the chapter.*

**Response #8:** Acknowledged; the authors will attempt to elaborate on the factors contributing to the success of this program.

**Comment #9:** *Since the issue of non-indigenous snakes has been so prominent in the news, some indication of success (not just how many have been removed) would be useful. The potential for other constrictors (and lizards) to become a problem suggests the need for more aggressive control and higher funding levels.*

**Response #9:** Acknowledged; unfortunately, there is little objective data available that would allow us to gauge the success of efforts to date. In addition to numbers removed, the authors have reported on progress in developing an integrated management approach for giant constrictors.

**Comment #10:** *Line 168: It would be helpful to add some information about what the major effects might be (while examples are given later, a summary of the types of effects here would help).*

**Response #10:** Concur—additional information on the expected or demonstrated impacts to restoration will be included in this paragraph.

**Comment #11:** *Line 189: Please add a supporting reference(s) for this statement.*

**Response #11:** Acknowledged—supporting references will be included.

**Comment #12:** *Line 218 and following: For each of the major methods, it might be useful to provide an example for each.*

**Response #12:** Concur—examples of each method will be included.

**Comment #13:** *Line 243: again, provide an example of each.*

**Response #13:** Concur—examples of each method will be included.

**Comment #14:** *Line 285: Who decides what species are monitored, and how are new “emerging” species identified before they become a problem.*

**Response #14:** The District and partner agencies work collaboratively to determine which established species are monitored. Generally, Category I invasive plant species (as determined by the Florida Exotic Pest Plant Council) are considered priorities for monitoring. However, current funding availability limits our ability to monitor all these species on a regional scale. Aerial mapping methods are cost-efficient but only for easily observed species (e.g., melaleuca). Small plants or plants that occur beneath canopies are generally not monitored in a systematic manner. Non-indigenous animals are more difficult to prioritize (and monitor) as there is no formal ranking system in place for the region. As discussed on page 9-19, inter-agency early detection programs are under development. For example, the Everglades and Treasure Coast CISMA’s have identified early detection priority species, which are incorporated into their early detection/rapid response plans. Unfortunately, such plans are severely limited due to inadequate or no funding. The section on Early Detection/Rapid Response section includes an overview of this process. The authors will provide additional information to clarify prioritization.

**Comment #15:** *Table 9-1: This is an excellent table. It would be helpful to cite at the end of each Outcomes/ Findings section any chapters that specifically discuss each one (for example, Chapter 6 discusses many of these species in terms of control).*

**Response #15:** This information is provided in the table under “Project.”

**Comment #16:** *Line 343: This section is an excellent update of regulations*

**Response #16:** Acknowledged and appreciated

**Comment #17:** *Line 326: Presumably the fate of this bill will be update before the final report.*

**Response #17:** Did this comment refer to HR669 on line 362? All referenced legislation will be updated just prior to finalizing the 2011 report.

**Comment #18:** *Line 378: This update is excellent, and should be repeated in future reports.*

**Response #18:** Acknowledged and appreciated

**Comment #19:** *Line 388: Are there any other working groups for other species. This seems to be in excellent mechanism.*

**Response #19:** There are a number of technical teams focused on varied non-indigenous taxa within the state. These include the Florida Exotic Pest Plant Council's Plant List Committee, the Florida Department of Agriculture and Consumer Service's Laurel Wilt Working Group. Additional technical teams for other priority species would be highly beneficial, but staffing and financial resources limit involvement by agencies and academia.

**Comment #20:** *Table 9-2: Should be provided as soon as possible*

**Response #20:** The District's fiscal year ended on September 31. These figures will be available in once final expenditures are entered in the WEEDDAR database.

**Comment #21:** *Line 515: As in various other locations throughout the chapter, progress in controlling non-indigenous species is being severely impeded by funding constraints. It would be helpful to add a short section on efforts and plans being undertaken to address the serious funding issues.*

**Response #21:** Acknowledged. The authors will include details on the District's attempts to secure additional funding. In addition, mention will be made of upcoming recommendations to the South Florida Ecosystem Restoration Task Force on the need for a cross cut budget analysis (federal, state, and local), which will be an important first step toward identifying budget needs and recommendations for strategic reallocations of funds towards regional priorities.

**Comment #22:** *Line 579: Please clarify whether these "dog" methods have been successful elsewhere, or with other snakes (include supporting reference).*

**Response #22:** Acknowledged. Dogs have been successfully integrated into the brown tree snake management program in Guam. Mention of other programs (with citations) will be included in the final version of the chapter.

**Comment #23:** *Lines 584-585: Add brief explanation of why trapping techniques for the Nile monitor are working in Southwest Florida, but not in Southeast Florida.*

**Response #23:** Acknowledged. We do not have a complete understanding of the discrepancy in trapping results. However, the authors will discuss this further with local experts involved with Nile monitor trapping and identify leading hypotheses to explain these discrepancies.

**Comment #24:** *Line 697: Explain efforts that are being undertaken to make sure there are high enough populations of the moth.*

**Response #24:** Acknowledged. The authors will briefly explain the existing monitoring program for *Neomusotima* and discuss the most recent efforts to increase release rates regionally. Since the CERP Mass Rearing facility is not yet constructed, there is a production bottleneck for this agent. A new strategy involving the transport of established insects (on harvested lygodium biomass) to new locations is being evaluated.

***Comment #25:*** Lines 709-716: Briefly explain why another attempt is planned to use white lygodium moths against lygodium, despite the fact that it appears that this potential biocontrol agent is neutralized by predatory ants.

**Response #25:** Concur; USDA researchers are working under the assumption that previous failures to establish may be attributed to a weakened colony in the quarantine facility. The initial colony was imported soon after federal approval to bring into quarantine, but final approval to release in the US was delayed by many months. Researchers hypothesize that the protracted period of rearing of this initial colony in quarantine may have reduced the population's vigor under field conditions. Additional explanation will be included in the final report.

***Comment #26:*** Line 729: Explain the effect on SAV in these waters.

**Response #26:** Concur; the authors will include a brief explanation of FAV impacts on SAV productivity.

***Comment #27:*** Lines 744-753: It would be helpful to briefly explain the process involved in developing biocontrol agents.

**Response #27:** Concur; the authors will include a brief (in the interest of space) explanation of the biological control agent development process. The authors prefer to include this in the introductory paragraph of this section at Line 601

***Comment #28:*** Line 754-772: This is an excellent source for interested scientists and the public. Explanation should be added about how very new "emerging" species are identified (including the agency or agencies involved).

**Response #28:** Concur; the authors will include additional information on early detection aspects of regional monitoring in this section and will also reference the later section which provided additional details early detection in the region.

***Comment #29:*** Line 788: It seems that the aerial monitoring is also not good for animal invasive species; discussion of this point should be added.

**Response #29:** Concur; the authors will include this point in the final report.

***Comment #30:*** Line 820: While rating scales are important, absolute numbers should also be provided to evaluate the extent of the problem (where possible).

**Response #30:** Acknowledged. Unfortunately, there are few taxa of non-indigenous animals for which absolute numbers are available or which could be obtained without significant funding allocation. With sufficient funding, population estimation studies could be conducted for some species. The author will augment the statement to include the need for population estimates where feasible.

***Comment #31:*** Line 826: Common protocols are a necessary and laudable first step.

**Response #31:** Acknowledged and appreciated

***Comment #32:*** Line 865: The authors should explain whether there are ways to control this species on private lands, and whether there is an education outreach effort to help in this issue.

**Response #32:** Concur; the authors will include a brief mention of state-wide private lands initiatives and public outreach efforts.

**Comment #33:** *Line 891: Positive information is also useful.*

**Response #33:** Agreed. It is important to identify successes when they occur.

**Comment #34:** *Lines 894-896: Add explanation as to where the sacred ibis was eradicated.*

**Response #34:** Concur; the authors will include details on the known areas where this species has been observed. Very recent news on the status of this eradication effort will also be included.

**Comment #35:** *Line 909: This is extremely useful information.*

**Response #35:** Acknowledged and appreciated

**Comment #36:** *Lines 919-949: Should mention the number of plants and animals covered in this section as priority species.*

**Response #36:** Concur; the authors will include this information.

**Comment #37:** *Line 934+: This is an excellent statement of process.*

**Response #37:** *Acknowledged and appreciated*

**Comment #38:** *Line 950: The use of black and white symbols, in addition to color, is extremely useful.*

**Response #38:** *Acknowledged and appreciated*

**Comment #39:** *Line 966: Appendix 9-1 is extremely valuable, and a wonderful addition to the chapter. It might help to add some indication of severity to this table. \*The overall information provided on the individual species is excellent, as are the stoplight codes – a consistently great feature of this chapter.*

**Response #39:** Compiling this information would be a major undertaking and, as noted in previous responses, such data is lacking for most species in Appendix 9-1. The authors explored the feasibility of compiling the available information for each species, but determined that there are insufficient staffing resources to complete this task.

**Comment #40:** *Line 1018 (as for line 865): The authors should explain the educational programs that exist for the public and private lands. This might be a useful tool for this species.*

**Response #40:** Acknowledged; Education and public outreach is a critical component of South Florida's invasive species management strategy, and the reviewers make excellent points in this regard. The District is one of many agencies who participate in outreach efforts. Several other agencies have identified invasive species education as a primary goal and have rightly taken the lead on this subject. To address this and similar comments from the reviewers, the authors will include a Education and Outreach section under "Updates" in this report. The focus will be to briefly describe the various education programs and highlight major accomplishments for this reporting period.

***Comment #41:*** Line 1050: *It seems that there is a need to develop educational plans and outreach to condominium and senior citizen housing complexes – this might eliminate a lot of the problem.*

**Response #41:** Acknowledged; also see Response #40.

***Comment #42:*** Line 1089: *What efforts are made to reach the corridors, for this and other species? This may be a problem for other species.*

**Response #42:** The invasive plant branch of the FWC has worked closely with Florida's Department of Transportation to improve management coordination and early detection efforts in recent years.

***Comment #43:*** Line 1123: *Is it is so designated, can it be sold in nurseries? Is there a possibility of producing information brochures on the invasive plants to have available at nurseries?*

**Response #43:** Acknowledged. It is not legal to sell this species in nurseries. Numerous invasive plant publications have been produced by FDEP, University of Florida, and other entities. Importantly, the Florida Exotic Plant Council actively engages the ornamental plant industry in Florida and has made great strides in educating the industry on invasive plant species, especially FLEPPC Category 1 invasive plants not also designated as Florida or Federal Noxious Weeds. The Association of Florida Native Plant Nurseries has also improved outreach with industry and the public.

***Comment #44:*** Line 1162: *The panel agrees that a biological control is necessary.*

**Response #44:** Acknowledged

***Comment #45:*** Line 1183: *Clarify whether an extensive educational program and stakeholder group program been initiated with all of the invasive plants. More generally (e.g. lines 865, 1018, 1050, 1183, 1474, etc.), it would be very helpful to add an education outreach update to this chapter.*

**Response #45:** Concur; see Response #40 above.

***Comment #46:*** Line 1205: *Add information about how far north in Florida this species can survive.*

**Response #46:** Concur; this information will be provided.

***Comment #47:*** Line 1232: *For almost all of the invasive plants, a major part of the problem is private lands. The authors should add information about whether a group (task force etc.) is in place or planned to address the problem of invasive species with private land owners.*

**Response #47:** Concur; See Response 32 above

***Comment #48:*** Line 1268: *Comment on whether experiments are planned to find another herbicide mixture for this species.*

**Response #48:** Concur; this information will be provided.

***Comment #49:*** Line 1366: Clarify which agency coordinates development of biological control (for this and other plant species).

***Response #49:*** Concur; the authors will include this information in the biological control section under “Updates.”

***Comment #50:*** Line 1474: Additional educational campaigns in the pet trade may be essential to help curb the sale of these. The authors should add information about public education efforts in this regard.

***Response #50:*** Concur; see Response #40 above.

***Comment #51:*** Lines 1586+: Developing regulations for this and other species is extremely important, as eels can become an important, underground fishery, both for local and international consumption. For example, eels have become a lucrative, illegal trade for sale in Japan.

***Response #51:*** The authors strongly agree with the reviewers’ assessment. Underground fisheries are a likely cause of many aquatic invasions and improved preventative regulations of commerce and public education are the only tools that will effectively curtail this vulnerability to new invasions.

***Comment #52:*** Lines 1625: The fisheries and pet trade implications should be carefully explored; otherwise, control will be difficult. The authors should explain whether this being done.

***Response #52:*** Concur; the authors will include some information on this aspect of lionfish management. Note that space is very limited on the one-page species synopses, so this information will be necessarily brief.

***Comment #53:*** Line 1658: Please explain why the Cuban treefrog is a problem only in Big Cypress - this seems to suggest that it may become more critical elsewhere.

***Response #53:*** Acknowledged; the authors agree that the synopsis, as written, is unclear on this point. Additional information will be provided in the summary to clarify the stop light scoring for this species.

***Comment #54:*** Line 1709+: Brief explanation should be added about what happened to the trapped Sacred Ibises.

***Response #54:*** The trapped ibises were humanely euthanized in accordance with established protocols of the American Veterinary Medical Association.

***Comment #55:*** Line 1728: Add information about whether the state has protection of native species, and allowing free control of non-native species. Also add information on the estimated number of ibises, if available, the origin of their introduction (releases, pet trade, zoos?), and whether there are problems with this species in other southern states.

***Response #55:*** Concur; the authors will elaborate on these points as space allows.

***Comment #56:*** Line 1734: Please add the maximum size.

**Response #56:** Concur; this information will be included in the final report.

**Comment #57:** *Line 1754: Briefly address whether there are state regulations against having them as pets.*

**Response #57:** This information is provided in the Regulatory Tools section on lines 1763-1768.

**Comment #58:** *Line 1801: The authors recommend that a research advisory panel should be formally established to facilitate prioritization and coordination of efforts to control the Burmese python, considering the present/chronic constraints of limited resources and tools. It may be that there should be an advisory group for each of the major reptile pests; such a group could consist of academics, conservationists, pet trade people, and agency scientists to specifically deal with each species.*

**Response #58:** The authors agree with this assessment. To some degree, this type of prioritization and coordination already occurs for a limited number of species through the coordination efforts of Everglades CISMA as well as ad hoc technical groups developed by FWC, FDACS, and other agencies. However, there remain many species for which coordinated efforts are lacking. More importantly, the ability to act on recommendations and coordination efforts of these groups is severely limited.

**Comment #59:** *Line 1878: This is a very important section, and will provide useful information to NGOs and other organizations wishing to get a head start on control of potential problems.*

**Response #59:** Acknowledged and appreciated

**Comment #60:** *Line 1884: Clarify whether there an established working group to consider new emerging threats, and the possibilities before they become real problems?*

**Response #60:** Acknowledged. As stated elsewhere in the chapter, there are numerous entities, many of which are inter-agency groups, that evaluate new emerging threats. However, many of these efforts lack a well-defined framework for assessing new threats, and many taxa are not actively monitored or assessed.

**Comment #61:** *Line 1938: The numbers (=19) is very useful, because it describes the extent of the current problem. Please add information, as well, to address the following questions: What other species use the melaleuca slash piles, and will their removal be hurting some native species? What happens to the removed snakes? (is there a possibility they will end up being released at some future time?).*

**Response #61:** Concur; the authors will clarify the fate of captured pythons. Note that many of the animals are necessarily euthanized onsite when live capture represents a safety risk to the snake hunters.

**Comment #62:** *Line 1970: While it is true that the number of invasive animal species is very large, the approach of prioritizing – that is, of targeting the primary or most important ones by the SFWMD – is an excellent one.*

**Response #62:** Acknowledged and appreciated.

**Comment #63:** *Line 1977-79: This sentence is confusing, and its meaning is unclear. Please restructure.*

**Response #63:** Concur; the Authors will restructure.

**Comment #64:** *Line 1996: The earlier section on tools available is very important; perhaps a special workshop should address other tools and innovative approaches.*

**Response #64:** Agreed--An inter-agency group of invasive species biologists (Everglades CISMA) recently presented to the Science Coordination Group of the South Florida Ecosystem Restoration Task Force on recommended next steps for regional invasive species management. Developing risk assessment tools, for both regulatory prevention through commerce and rapid assessments of newly identified invasions, was identified as a top priority moving forward. A recommendation to promote research in this area will be presented at the next Task Force meeting. It is hoped that an early outcome of this recommendation will be a workshop similar to what the reviewers propose.

**Comment #65:** *Lines 2013-2025: The interagency team's efforts represent a very important process that should continue periodically. Among the team's key recommendations was increased research focus on risk assessment models to support prevention initiatives, and more details on the risk assessment paradigm for invasive species would be helpful in future reports. The panel also hopes to see major progress described on the other four key recommendations in future SFERs.*

**Response #65:** Concur; Also see Response #64 above.

**Comment #66:** *Entire chapter: Has a problem with skipping spaces within words, which makes it difficult to read. Please correct.*

**Response #66:** Acknowledged; the authors will coordinate with the editor to address this issue.

**Comment #67:** *Line 34: ...aquatic plants such as hydrilla*

**Response #67:** Acknowledged

**Comment #68:** *Line 676: Clarify "flies"*

**Response #68:** Concur; the authors will reword to make it clear that "flies" refers to the midge being discussed in this paragraph.

**Comment #69:** *Line 759: Should define FNAI (it is defined instead on the next page)*

**Response #69:** Concur; the authors will revise location of definition.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 10

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**Posted:** 10/04/10 at 08:16 AM by Tom James

R. Thomas James and Joyce Zhang

**Level of Panel Review: Technical (primary); Accountability (secondary)**

Reviewers: P. Dillon (AA), V. Novotny (A)

**Comment #1:** *For the new reader, a table of acronyms would be very helpful immediately before or after the summary.*

**Response #1:** Acronym lists are provided separately at the beginning of Volume I of the Report (No changes made)

**Comment #2:** *p. 3 - The report uses “mt” for metric tons. In the metric system mt would mean “milliton” which is a kilogram. Also the hectare-meter (10,000 m<sup>3</sup>) unit does not exist. One hectare is 10,000 m<sup>2</sup> which is a legitimate unit of area.*

**Response #2:** mt was defined as metric ton and has been used as such throughout the South Florida Environmental Report (no change)

Changed use of hectare meter to millions of cubic meters

**Comment #3:** *p. 6 – Fig. 10-1 would be more useful if it showed the sub-watersheds’ boundaries*

**Response #3:** Fig. 10-1 shows the hydrologic features and Fig. 10-6 show and drainage basins/sub-watersheds’ boundaries. (No changes made)

**Comment #4:** *p. 6 – a fundamental parameter useful in understanding lakes is the lake’s water replenishment time, i.e. how long it takes for the volume of water in the lake to be replaced by its total inflows (assuming complete mixing). This can be calculated from the lake volume and the total inflow (or outflow), and should be reported here along with the basic morphometry.*

**Response #4:** Sentences added

**Comment #5:** *The need for control of exotics, both plants and animals, is clear. If control of aquatic plants is carried out by chemical means, two adverse effects can occur. Significant amounts of toxic chemicals are introduced into the system; these may affect non-target species and may also persist and bio-accumulate. What pesticides have been used and at what rates have they been applied?*

**Response #5:** Only two herbicides registered for use in aquatic environments by the Federal Government—Imazopyr and Glyphosate—have been used to control exotic vegetation in Lake Okeechobee. The impacts these herbicides may have on non-target organisms have been evaluated by the manufacturer during a multi-year / multi-million dollar product testing and

registration period. All herbicides registered for use in aquatic habitats have a relatively short half-life (days) and low toxicity to non-plant organisms. Thus we believe that the benefit of reducing exotic plant coverage and protecting native habitats that are being threatened by the invasion of exotic species is worth the short term risk of impacting non-target organisms.

The Exotic Vegetation Control section was rewritten to include the above information

Additionally, we are conducting a study to determine if marsh soil treated in 2009 (1X) and soils treated in 2008 AND 2009 (2X) contains residual imazapyr. If the soil does contain imazapyr we will determine if the concentration is high enough to affect plant growth. We will consider including this information in next year's Chapter.

***Comment #6:*** *In the past, in some lakes, algicides included arsenic or copper that now represent legacy pollution have been used.*

**Response #6:** No algicides have been used on the lake. (no changes)

***Comment #7:*** *Secondly, a large quantity of nutrients is re-released into the water. There are no details about this work in this chapter but I would like to see a brief paragraph mentioning the consideration that has been given to these adverse effects.*

**Response #7:** This concern was evaluated in the Phosphorus Dynamics Study by Dierberg, F.E. 1992. The littoral zone of Lake Okeechobee as a source of phosphorus after drawdown. Environmental Management 16: 371-380. He suggests inconsequential effects of SAV desiccation and P release to the water column to the lake in all but localized events. He also indicated that emergent aquatic vegetation is not an important source of nutrient to the open water column

Our recommended method for treating torpedograss includes the following; During periods of low lake stage, conduct prescribed burns to remove most of the above ground torpedograss biomass and stress the plants underground rhizomes. New plants that emerge rapidly from thick underground rhizomes should be treated while they are small (20 – 30 cm) and actively growing. Using this management approach there is comparatively very little dead biomass remaining after treatment and the release of nutrients should be relatively small.

The Exotic Vegetation Control section was rewritten to include this information

***Comment #8:*** *And I would like to see an estimate of the potential for nutrient removal from the system by mechanical harvesting, e.g. what amount of P would be removed by harvesting 20,000 acres of torpedo grass?*

**Response #8:** Removing torpedograss using some type of harvester would be extremely cost prohibitive (estimated to cost thousands of dollars / acre) because of the plants location (sometimes miles from shore and in shallow to moderate depth water). Harvesting the plant would remove only the above ground biomass (similar to mowing a lawn) and within weeks the area would again be covered by torpedograss. There would be no real benefit to harvesting torpedograss unless the harvested material could be used for cattle feed or some other industry. However, we do not want to support any activity that will encourage the spread of torpedograss to other areas inside or outside of the lake.

No changes were made to Exotic Vegetation Control section in response to this comment

**Comment #9:** *The lanthanum acts as a chelator, making the inorganic P unavailable to the biota. This is likely prohibitively expensive. My best suggestion is to use an iron compound – commercially available, relatively cheap, and less side effects than alum.*

**Response #9:** In 2008 we did perform some bench scale tests comparing Fe, Ca, and Alum. While Fe proved very effective, it is already at levels above Class I/III standards in lake and is contributing toward maintaining a relatively low diffusion rate in the lake. Added a paragraph on this study by Goldman Associates.

**Comment #10:** *Basically, the report dismisses the feasibility of managing the nutrient content of the sediments too quickly. It is true that these measures would be temporary until the P load to the lake is dramatically (by about 65%) reduced and the water concentrations are reduced to the TMDL level of 40 µg/L (still eutrophic conditions). If the sediment concentration of nutrients is not reduced at the same time as the TMDL measures are being implemented, the impact of nutrient reduction will be minimal. For example, in the Lake Delavan (WI) restoration effort in 1980 the worst algal bloom occurred two years after the major source of phosphorus (a fertilizer plant) was eliminated. It is obvious that the problem of sediment remediation will be much larger than that for the (much) smaller Lake Delavan. More discussion and more data on sediment contamination with nutrients and their accumulation in the sediment are needed.*

**Response #10:** The multi-year study by BBL completed in 2003 was reported in previous years of this report. The major conclusion of that study was that it would be more cost effective to manage the P runoff from the watershed than to try and manage the internal sediment load (Blasland Bouck and Lee Inc. 2003). Note that based on tropical lakes 40 ug/L is considered mesotrophic (Salas and Martino 1991). For shallow lakes, load reductions have worked resulting in new equilibrium within 15 years (Jeppesen et al. 2005, Jeppesen et al. 2007)

No additional changes were made, will consider for next year as more information is available

**Comment #11:** *p. 8 –water quality standards to be achieved by the LOPP plan are mentioned. Florida has narrative nutrient standards. Numeric standards were not specified in the report. Is the TMDL load of 140 metric tons of TP a standard?*

**Response #11:** Replaced “standard” with “goal”

**Comment #12:** *p. 15 – where did the numeric goal of 40 ug/L come from and what was the required margin of safety?*

**Response #12:** Included in the TMDL document. The goal was described in Havens and James (1997) and Havens and Walker (2002),

Added these references

**Comment #13:** *p. 27 – there is a statement that effluents from septic systems are the source of TP from urban areas. It is known that excessive nitrate pollution can be attributed to septic tanks but not TP, unless the septic tanks are failing or are in sandy soils. Is there any information on failures of septic tanks in the vicinity of Lake Okeechobee and its tributaries? There are household-size treatment options for septic systems on the market – is there any study of this or consideration of the potential benefits?*

**Response #13:** The soils in the Lake Okeechobee watershed consist primarily of sandy Spodosols. Septic-tank regulation is typically done by the Florida Department of Health (DOH). Typically, they are permitted by the counties, who are the likely entity to have information related to number of failures in the county. As to your question about research, we are doing collaborative research with UF-IFAS and DOH on more efficient removal of nutrients by septic systems. These studies are ongoing.(no changes)

**Comment #14:** *The phosphorus and nitrogen inputs are estimated from continuous flow data and chemical measurements made bi-weekly or monthly. The chemical measurements should be made more frequently given the importance of these loading estimates to the overall protection program. Key hydrologic events that may account for a significant part of the annual flux can be missed entirely when sampling with this frequency. Furthermore, the additional costs would be minuscule compared with many of the other costs of this program. I recommend that sampling occur at least weekly, and that event-based sampling be conducted on all major inflows, possibly using auto-sample collectors.*

**Response #14:** The frequency of collection has been researched over the years and this level of coverage has been found to be adequate for the level of reporting needed in the watershed. This frequency is also stipulated in the Lake Okeechobee Operations Permit issued by FDEP. There are several autosamplers installed at the critical lake structures, but we have found that grab samples match almost identical to autosamplers in this high nutrient system when yearly loads are calculated. There are also weekly load sites (flow + flow triggered autosamplers) collected under contract with USGS that are sampled weekly during the wet season. The additional costs of going to weekly sampling for such a large network would not be minuscule and the staffing to support such an effort would also need to be increased. We also have had enough water quality data to support a myriad of modeling efforts, which is another indication that this frequency is adequate. (no changes)

**Comment #15:** *The scale of the problem is made very clear here. Even with extensive and expensive efforts to reduce P loading, the input are still about 3 times the sustainable load. And the internal sources may very well contribute for decades. It is very hard to see how the goal of 140 tons can be met in 4 years.*

**Response #15:** We agree. This is the main objective for updating the Lake Okeechobee Protection Plan, which is updated every three year and the next releasing date will be in early 2011. (no changes)

**Comment #16:** *Where did the number for the contribution of precipitation to the P budget of 35 tons come from? Based on experience in the north, I guessed that the number should be higher. However, the best information I can find in the literature is probably Pollman et al. (2002, Atmos. Environ. 2309-2318). Their figure of 7.5 mg/m<sup>2</sup>/yr for southern Florida would translate into about 15 tons/yr rather than 35 tons/yr. I presume the relatively low value results because most of the precipitation is of marine origin. If 15 tons is used instead of 35, the reduction needed is 20 tons less than anticipated.*

**Response #16:** The atmospheric deposition value was determined by a technical advisory panel for the TMDL and was included in the TMDL document (Florida Department of Environmental Protection (FDEP) 2001). Dr. Pollman was a part of that panel. The value chosen 35 metric 2011 South Florida Environmental Report Peer Review Chapter 10 RTCs 5 10/01/10 tons/yr equates to approximately 19 mg/m<sup>2</sup>/yr which was mid range between the pristine 7.5 mg/m<sup>2</sup>/year and 32

mg/m<sup>2</sup>/yr estimated by Walker (1992). Until we have a newer value that is included within the TMDL, we will use the 35 metric ton value estimate. (no changes)

***Comment #17:*** *Lake Okeechobee resembles very closely Lake Taihu in southeast China which is also in a subtropical warm climate, is shallow, has high nutrient loads and has reached hypertrophic conditions evidenced by dense blooms of cyanobacteria. Cyanobacteria are also present in Okeechobee, and algal blooms are occurring but the algal population is apparently still dominated by diatoms (2.6/1 ratio) and transparency is still generally good to fair, most likely because the N/P ratio is relatively high. Cyanobacteria blooms are extremely noxious, often leading to high levels of toxins such as microcystins, and the managers and stakeholders should be aware of this and prepare some plans and measures to prevent this.*

***Response #17:*** We have been involved in a number of the comparisons between lakes Taihu and Okeechobee (James et al. 2009, McCarthy et al. 2009). Lake Taihu receives much higher amounts of nitrogen than discharged to Lake Okeechobee, resulting in much higher TN/TP ratios in Taihu. We have maintained a regular monitoring of algal blooms, microcystin toxin and algal biomass since 2005 (or before). This information has been reported in previous years of this report. Because there were few algal blooms on the lake this year and no significant amounts of microcystin detected, this program effort was not included explicitly in this year's report.(no changes)

***Comment #18:*** *It is obvious from the nutrient budget and the reported maximum allowable P load that water treatment methodologies alone will be inadequate and that every possible measure has to be used to reduce the P load. The BMPs on agricultural land will have to play a key role. It is good to see not only such positive steps being taken but that the follow-up work to assess their benefits is routinely done. The 19 ton reduction in P input reported here is significant. It would be very useful to know what the maximum P load reduction that could be anticipated is if BMPs were applied to all of the agricultural land areas in the watershed. It is not clear what the relationship between the FDACS and the FDEP programs are. Is there a separate estimate of the load reductions that the FDEP programs have resulted in?*

***Response #18:*** The load reductions under different management practices are documented in the Lake Okeechobee Protection Plan which is updated every three years. (no changes)

***Comment #19:*** *The isolated wetland restoration projects have been less successful. The monitoring data, although sparse, indicate that the estimated P load reductions have not occurred; the suggestion that oxidation of organic matter during dry periods and subsequent release of P is the cause is very plausible, in fact, almost predictable. There are considerable data in the literature suggesting that wetlands are not really great P (and N) sinks in the long-term. They accumulate nutrients in the growing season but release most of them during periods where the vegetation decomposes (either from drought or cold). Before additional resources are expended on this control methodology, I recommend that, a) the plan for collection of better data to determine how well the existing project sites are working be initiated on a year-round basis, and b) that a thorough review of similar work done elsewhere be initiated.*

***Response #19:*** We agree with the reviewer's comments. At the time that the isolated wetland projects were conceived, the primary consideration was that these wetlands would reduce nutrient loads to receiving bodies by holding water during storm events and allowing it to evaporate or enter the water table. However, the longer term cycling of nutrients within the wetlands and the frequency with which they might flush during flow events that exceeded their total retention capacity was probably not adequately factored into their design. As a consequence of our

analyses of the available data and the increasing knowledge in this field, we are not currently planning any expansions of this or similar programs. When resources are available, we will consider a plan to identify a subset of these wetlands and, as you suggest, develop and implement a more complete monitoring program to gain a better understanding of how they actually function. In addition, a number of these wetlands are clearly in rapid succession from upland to wetland habitat and we are interested to see whether as they become more mature the potential to sequester nutrients improves. (no changes)

**Comment #20:** *Re former dairy remediation, I can't reconcile the data in Table 10-6 with that in Table 10-7. This should be made clearer.*

**Response #20:** The value in Table 10-6 is the same values listed in the 4th column in Table 10-7, but in different units lbs vs metric tons (no changes)

**Comment #21:** *The BAT projects undertaken on the dairy farms seem promising. Again, what is the potential overall P load reduction if these technologies were implemented throughout the entire watershed?*

**Response #21:** Further implementation of this technology does not seem likely at this time. The lack of regulatory requirements driving participation is one of our largest hurdles.(no changes)

**Comment #22:** *The FRESP program also seems promising but an estimate of the overall potential for P load reductions would be very useful here.*

**Response #22:** The load reduction estimates were not available when drafting this Chapter. However, this information will be included in the Lake Okeechobee Protection Plan Update, which will be released in early 2011. (no changes)

**Comment #23:** *In summary, this section provides a very good update on projects that are directed toward reducing P loading to the lake. What is missing is a discussion of how much of the required load reductions, projects of this nature could accomplish towards the ultimate reduction goal if implemented on a watershed-wide basis. This might make the massive reductions needed seem less daunting.*

**Response #23:** Again, the Lake Okeechobee Protection Plan Update will provide a phased, comprehensive assessment. (no changes)

**Comment #24:** *p. 20 – Far too many significant figures are used in parts of this report, e.g. Table 10-1. The data cannot be accurate to 7 significant figures.*

**Response #24:** The land use data are generated from a land use database using GIS. Because these data are used throughout the document and are rather precise and consistent among years, we will not adjust the numbers at this time. We will consider for future reports (no changes).

**Comment #25:** *Research and assessment – This section of the report discusses 11 projects that were designed to remove P. Table 10-8 provides a very good summary.*

**Response #25:** Thank you

**Comment #26:** *The algal turf scrubber facility has been a failure, apparently because of toxicity of the influent waters to green algae. Surfactants in pesticides/herbicides are sometimes more*

*toxic to biota than the active chemical constituent, e.g. the surfactant nonyl phenol is the most toxic ingredient in several formulations. Could this problem be alleviated using rooted macrophytes rather than algae?*

**Response #26:** Detailed analysis of the source water using both positive and negative electrospray ionization and matrix-assisted laser desorption ionization mass spectrometry revealed a number of surfactant type organic compounds of varying molecular weights, some of which overlapped with masses of common anionic sulfonate-alkyl chain surfactants (8-10 carbons). Complementary to efforts associated with the identification of the toxin, we evaluated several pre-treatment systems that can be used to attenuate or eliminate the deleterious impacts of the toxin(s). We found positive results with the use of activated carbon and treatment of water through a water hyacinth scrubber designed for a two-day detention period. These were included in the description (no changes)

**Comment #27:** *The MIKE SHE/MIKE 11 model appears to work well and should be useful in projecting both future load scenarios for the specific projects that it was calibrated with but also in predicting potential benefits of proposed new projects. Will it be used this way?*

**Response #27:** Yes. It has been used for evaluating the effectiveness of BMPs and other P reduction projects on TP reduction potential. (no changes)

**Comment #28:** *The nutrient budget analysis for the watershed as a whole is very useful; these estimates should be done annually to track trends. With respect to fertilizer use on agricultural lands, one option is to regulate its use based on need as determined by soil analysis; where I carry out research, fertilizer is often used needlessly as “insurance” that yields will be high even though analyses show that it is a wasted expense. There are plans under consideration to regulate these applications in a large basin in southern Ontario that has an important lake stressed by high P loads.*

*Urban land uses represent a disproportionate import of P. In the same location in Ontario, fertilizers containing P are likely to be banned in the urban environment for use on lawns.*

**Response #28:** The nutrient budget analysis is tedious work and the annual update to track trends may not be suitable and necessary due to our budget constraints. We agree with the reviewers on recommendations of fertilizer usage and regulation.(no changes)

**Comment #29:** *The hybrid wetland treatment technology worked very well. Four sites were studied with 3 additional sites started or about to be started. What are the long-term plans with respect to implementing this technology on a watershed-wide basis?*

**Response #29:** This technology is still under investigation for cost effectiveness at this time. It would be premature to plan to implement this technology on a watershed-wide basis at this time.(no changes)

**Comment #30:** *The BMPs related to livestock management show promise. The ditch fencing reduced P loads and is probably one of the least expensive BMPs that can be undertaken. Again, it would be useful to address this in a broader perspective – how many km of waterway could be fenced, and what is the potential benefit? The wetland water retention results are less decisive, because of changing hydrology before and after the treatment. What do P concentrations instead of loads demonstrate?*

**Response #30:** The results summarized in the 2011 SFER report do not include data collected during the last year of the project. A final project report is being prepared that will include analysis and interpretation of all data collected during the 6-year study period. We are hoping that with the inclusion of the additional data from last year's that we will be able to make definitive conclusions about the effectiveness of the two BMPs at a farm scale. We evaluated the effectiveness of both BMPs by using nutrient load not concentration data. (no changes)

**Comment #31:** *Water quality monitoring - The monitoring of nutrient levels seems quite extensive with a large number of sampling stations as part of the routine program. The number of sampling dates, however, is not particularly high, with many sites sampled on average (Table 10-10) only every 2 weeks. The amount of data collected is adequate for assessing loading trends. At 5 of 8 sites there were no significant trends over the sampling period. However, the trends that were found were in the right direction (decreasing P load and/or concentration), and there were several other near-significant trends of declining P. It is important to look at both load and concentration in these studies because of the important role of hydrology.*

*The conclusion that more aggressive nutrient control measures are needed to reach the 140 ton limit is the key finding of this report. Furthermore, the 140 tons will reduce the lake P only to 40 ug/L, a level that still represents a eutrophic system.*

**Response #31:** No changes required. Also see comment 10.

**Comment #32:** *The statements about the changes in TN, TP and the TN/TP ratio are not consistent. If TP drops proportionately more than TN, then the ratio must go up, not down as the report states.*

**Response #32:** Values and text were corrected (thanks for catching this)

**Comment #33:** *p. 53 – "...the current 5-year average is more than two times...". It is actually three and a half times higher.*

**Response #33:** Changed

**Comment #34:** *p. 53 – when discussing TN/TP ratios it is necessary to clarify whether the reported ratios are by weight or by mole. Weights are used throughout this report when concentrations are reported, but when considering N/P ratios, Redfield ratios are always in the back of the mind of the reader and these are molar, not weight, ratios.*

**Response #34:** Changed to state that these are weight ratios

**Comment #35:** *Hydrology – Water level management goals for the most part were met. In the case of future droughts and high rainfall years, is a plan in place to deal with these situations?*

**Response #35:** Yes this is included in U. S. Army Corps of Engineers. 2007. Final Supplemental Environmental Impact Statement Lake Okeechobee Regulation Schedule Study, Lake Okeechobee Florida, Pages 821. Jacksonville, F. L., U.S. Army Corps of Engineers.

U.S. Army Corps of Engineers [USACE]. 2008. Central and Southern Florida Project - Water Control Plan for Lake Okeechobee and the Everglades Agricultural Area, Pages 56. Jacksonville, FL., U.S. Army Corps of Engineers.

Added a sentence and the second reference

***Comment #36:*** *It should probably be mentioned that the definition of water year used throughout the report (May to April) is not the standard, which is usually October to September.*

**Response #36:** A statement to this effect has been included in the Hydrology Chapter of the SFER

***Comment #37:*** *Nutrient budgets – As mentioned earlier, the source of information on the input of P via precipitation is unclear; the number may be too high.*

**Response #37:** The atmospheric deposition value was determined by a technical advisory panel for the TMDL and was included in the TMDL document (Florida Department of Environmental Protection (FDEP) 2001). Until we have a newer value that is included within the TMDL, we will use the 35 metric ton value estimate.

Added FDEP reference where we specify atmospheric deposition

***Comment #38:*** *A lot of detail is given here about the sedimentation coefficient  $\sigma$ ; although the presentation is accurate, the simpler term, retention ( $R_p$ ), gets the same information across, is easier to grasp and is more appropriate to a report not intended for the scientific literature. I suggest reporting the P (and N) retention coefficients (the fraction of the input that is not lost via outflow or increase in water column concentrations).*

**Response #38:** Because of the highly variable nature of loads and in lake mass (due to hydrological variation)  $R_p$  does not produce the similar results to sedimentation coefficient. The year to year retention coefficients are much more variable than  $\sigma$ . The sedimentation coefficient is valuable in showing the retention of the material. We will consider using retention next year.(no changes)

***Comment #39:*** *Fig. 10-21 is important because it shows that although there are decreases in P in the past 5 years, particularly since the hurricane years, the levels in 2010 are still not back to the levels of a few decades ago when P averaged about 50 ug/L. Apparently in 2005 a hurricane mixed the sediment with the water column and TP was released which then slowly declined by sedimentation in the lake.*

**Response #39:** No change required

***Comment #40:*** *Submerged aquatic vegetation – The SAV biomass data need to be clarified. Are the areal figures based on calculations using the whole-lake area, the shoreline or littoral area, or just the area that containing SAV? The increase in areal coverage is good, although it is in part due to invasive species.*

**Response #40:** Biomass is determined on monthly surveys of stations located along 16 fixed transects encompassing the Lake's north, south and west shoreline. This covers a region where SAV beds historically have occurred. Triplicate samples are collected at sites along each transect, starting at the shoreline and progressing lake ward until a site is reached with no plants. Plants are sampled using a tool constructed of two standard garden rakes bolted together at midpoint to create a tonglike device. The degree of opening is constrained by placing a chain between the two handles, such that three replicate samplings with the device removes ~1 m<sup>2</sup> of bottom cover. The

harvested material is sorted by species, stripped of epiphyton, dried, weighed and dry mass (grams dry weight m<sup>2</sup>) is calculated. (added to paragraph)

***Comment #41:*** *Periphyton – The periphyton studies are comprehensive. What is their overall objective?*

**Response #41:** The objective of this study was to examine periphyton biovolume, biomass, community structure and nutrient storage dynamics under highly variable lake conditions that occurred during the study period. Periphyton abundance (as both biovolume and biomass) and nutrient storage were hypothesized to be inversely associated with water level and positively associated with the amount of available colonizable substrate. This hypothesis was tested by monitoring periphyton abundance, taxonomic composition and N, P and total carbon (C) storage in periphyton on host plant and sediment substrates in the nearshore region of the lake. Analyses were conducted to better understand how these abiotic and biotic factors influenced primary production rates of periphyton and associated nutrient storage capacity in this lake.

Added a paragraph regarding the objectives

***Comment #42:*** *Is periphyton anticipated to be a critical part of the food web here?*

**Response #42:** Periphyton has been hypothesized to be an important part of the food web in the littoral zone (Havens et al. 1996, Steinman et al. 1997) and may be important in the nearshore region if SAV becomes abundant under lower lake stages (e.g. summer of 2004 prior to the hurricanes). Carrick and Steinman (2001) state that “herbivorous invertebrates and fishes are present in the lake and cannot be ruled out as active consumers of the periphyton”. Added a sentence about the food web importance

***Comment #43:*** *Periphyton levels were lower in the period 2002-2006 than in prior years and a number of explanations are given for this. Is it also possible that toxicity of surfactants in agricultural runoff and in the chemicals used for SAV and emergent treatment are also a factor?*

**Response #43:** No studies have examined ag runoff surfactants nor the chemicals used to treat SAV and emergents, so we cannot address the last question except to say that spraying is supposed to target specific plant taxa and the chemicals are supposed to biodegrade quickly, so peri on Val or Potamogeton, for example, should generally have been impacted by targeted spraying.

While a potential occurrence of toxins, which may have inhibited periphyton growth, was investigated on the Algal Turf Scrubber (ATS), periphyton was observed just downstream of the ATS in the Taylor Creek Stormwater Treatment Area facility. In this instance it is likely any chemical would be diluted out by the time it reached the lake (no changes).

***Comment #44:*** *There are a number of periphyton indices, mostly based on diatom composition, that are used as indicators of water quality. It might be useful to calculate and track these indices, i.e. add one to the performance measures.*

**Response #44:** The dominant diatom taxa during the study period were those indicative of moderate to high levels of disturbance and also were taxa found in a wide-range of environments and water quality conditions, so they were not very useful strictly as indicators of water quality. Rodusky initially tried to classify some of these taxa this way, but a reviewer of the first draft of the paper took exception to the classifications, since some of these taxa are fairly ubiquitous.

Carrick and Steinman (2001) classified the periphyton communities in the lake in terms of algal guilds along environmental gradients and found that functional groups could be classified based on their response to changing resources and disturbance. Some guilds reflected local N and P inputs, but this study was conducted during a year of high lake stage (1995) and under relatively stable conditions, much more so than what we observed during 2002-06.(no changes)

***Comment #45:*** *An earlier study demonstrated that dredging would be ineffective in terms of controlling internal P loads. What has been investigated in terms of chemical treatment? Is there a report on the potential for chemical treatment?*

**Response #45:** Included the chemical treatment study in the Internal Phosphorus Management Program section

***Comment #46:*** *Although not explicitly stated, the conclusions recognize clearly that reduction of the P load to 140 tons by 2014 is not possible. There are positive signs in terms of the lake's recovery, and there are positive results in terms of many kinds of remedial activities, but many of these are still in the experimental stage and cannot be implemented on a broad basis in time to achieve the target load. In addition, the internal storage of P may counteract many of the reductions in external input for many years.*

**Response #46:** No changes required

***Comment #47:*** *The major piece that I would like to see in this report is an estimate of what could potentially be achieved by each of these approaches if they were widely implemented. Could this ultimately lead to 140 tons?*

**Response #47:** Handled in the Lake Okeechobee Protection Plan which is a separate report that comes out every three years.(no changes)

***Comment #48:*** *The issue of the accumulation of phosphorus in sediments that in the future could become a serious threat needs to be addressed more thoroughly in future reports. Similarly, a detailed plan describing how the various management steps can lead to meeting the target load is needed.*

**Response #48:** No additional changes were made, will consider for next year as more information is available.

Meeting the target load is handled in the Lake Okeechobee Protection Plan which is a separate report that comes out every three years. (no changes)

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 11

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**Posted:** 10/01/10 at 03:15 PM by Brad Jones

Bradley L. Jones

**Level of Panel Review: Technical (primary); Integrative (secondary)**

Reviewers: V. Singh (AA), P. Dillon (A)

***Comment #1:*** *The title does not reflect the contents in the chapter. Therefore, I suggest that the title of the chapter should be changed to more accurately reflect its contents. (Singh)*

***Response #1:*** We are proposing a more descriptive title – “Ecological Restoration and Water Resource Management in the Kissimmee Basin”.

***Comment #2:*** *I think a short abstract will be useful. The summary as such is too long. (Singh)*

***Response #2:*** The summary is currently four pages long. In comparison, other draft SFER chapters have summaries of up to 12 pages, and some of these summaries include tables and graphs. We will review our summary to make sure it is as succinct as possible without sacrificing important information. Although we are not providing an abstract, the summary already concludes with a short list of bullets highlighting the most significant accomplishments and results.

***Comment #3:*** *It will be desirable to have a section on basin morphology, since it has a direct impact on surface flows and water management. This section may also include a discussion of the vadose zone or it may be included in the section on lithology proposed below. (Singh)*

***Response #3:*** This is useful background information on the Kissimmee Basin, but the chapter is focused on activities and results obtained during WY2010 and the authors have decided that a section on basin morphology would not be highly pertinent to the chapter topics. Basin morphology is discussed in other documents that will be released in late 2010 for the Kissimmee Chain of Lakes Long-Term Management Plan and the Kissimmee Basin Modeling and Operations Study.

***Comment #4:*** *It will also be desirable to have a section on basin lithology, since it directly impacts groundwater flow, recharge and pumping, amongst other things. (Singh)*

***Response #4:*** See Response #3.

***Comment #5:*** *The chapter organization needs be changed a little bit, for example, on page 11-5, third paragraph, the chapter organization is outlined but thereafter the text does not follow this organization. (Singh)*

***Response #5:*** We do not understand the reason for this comment. The outline presented on page 11-5 describes the content of the chapter’s four main sections exactly.

***Comment #6:*** *I find that sections, in general, are long. It may be helpful to divide the sections into sub-sections. (Singh)*

**Response #6:** We will go through the chapter and see if any sections should be sub-divided. We do not expect many changes, if any.

**Comment #7:** *The section on Kissimmee Basin Hydrological Conditions doesn't fit well the overall chapter structure. (Dillon)*

**Response #7:** This section discusses hydrologic conditions during WY2010. It is descriptive and provides background information for the next section on project updates.

**Comment #8:** *The scale of the construction project undertaken here is immense, basically the re-creation of an entire landscape. There are data presented subsequently and some discussion of the interim results of this overall project, but it would be useful in the Introduction to give an overview of what both the benefits and the downside of this construction work might be. The overall general objective is clear, and the 25 performance measures mentioned here are probably clearly described in other reports (some, but not all, are discussed in a later portion of the chapter), but I would like to see an overview of the expected benefits with a timeline, and more importantly, an overview of the potential negative effects and what is being done to evaluate them. For example, is there a possibility that construction will result in increased flux of pesticides/herbicides from the canal/river beds? Will phosphorus be mobilized resulting in a short-term increase in flux downstream? (Dillon)*

**Response #8:** The general benefits of the Kissimmee River Restoration Project are described on page 11-8. Benefits to particular ecosystem components are covered by the restoration expectations in Table 11-5. A timeline for the expected benefits will be considered for next year's report.

Regarding possible impacts from restoration construction, the KRRP will not jeopardize current levels of flood control, as mentioned on page 11-8. Water quality impacts from restoration construction have been minimized through construction methods designed to protect downstream water quality (mentioned on page 11-68). Threatened and endangered species in the restoration area that might be impacted by construction include the caracara, gopher tortoise, and indigo snake. We will consider inclusion of a discussion of threatened and endangered species in a future report.

Pesticides and herbicides were not included in the river restoration evaluation program, although the SFWMD has previously monitored them in the canal upstream and downstream of the restoration area. This monitoring did not indicate any abnormal levels. Aquatic herbicides have been used in the remnant river channels to control plant growth, but these chemicals degrade. The surrounding land use is mostly pasture, so high amounts of pesticide/herbicide runoff have not been considered to be a significant concern.

Regarding the possibility of phosphorus mobilization as a result of diverting flow to remnant river channel segments, this did occur briefly during Phase I backfilling, primarily due to construction disturbance and erosion of old river channel that had become filled in with vegetation and detritus. However, construction methods have been developed to minimize downstream impacts on water quality, as stated on page 11-68. During canal backfilling, the construction contractor produces a daily report of turbidity levels upstream and downstream from the active construction area as required by FDEP permit. If downstream turbidity exceeds ambient levels by a specified amount, construction activity must stop until turbidity declines. This did happen occasionally during the Phase IVB backfilling conducted in Water Year 2010. We will consider adding a section on turbidity in next year's report to document ambient turbidity fluctuations since

restoration work began. Long-term, we do not consider phosphorus mobilization in the river channel to be a significant component of phosphorus transport through the system, but we are planning to sample P concentrations in river channel sediment in 2011 as part of our nutrient dynamics study.

***Comment #9:*** *On p. 8, I have a small issue with the units. Usually (but not always, e.g. 1 252) this chapter reports in both metric and imperial units. I would rather see only metric but if this is not acceptable, then include both units with all numbers, not just some of them. On p. 9, change hectare-m to m<sup>3</sup>.*

***Response #9:*** Most of the quantitative measures on p. 8 are reported in both metric and imperial units. However, it is onerous to do this throughout the chapter, and in many cases we report in imperial units only. Most of our readers, including water managers, commonly work with measurements given in acre-feet or inches, for example, but not the equivalent metric units. We will discuss the issue with our SFER editor, but do not anticipate significant changes. We will change hectare-m to m<sup>3</sup> on p. 9.

***Comment #10:*** *Although there is discussion of improved trapping of P in the floodplain and the riverbed once the construction phases are complete, there is no clear indication of how much reduction in P flux can be expected. I don't think that it is realistic to expect anything close to 70% reduction; I'm sure that this is not anticipated and that the many other remedial actions (BMPs, STAs) taken will contribute, but I would like to see an estimate of what can be achieved through this major alteration. (Dillon)*

***Response #10:*** As reported in the Lake Okeechobee Phase II Technical Plan, the overall estimate of phosphorus loading reduction in the Kissimmee Basin resulting from BMPs, STAs, etc. is 25 percent. We have also estimated that loading reduction from river restoration will be 25 percent based on previous experimental work and some crude modeling. However, that estimate, which was not published, was based on a small amount of data and a set of tenuous assumptions. Because of the large uncertainty surrounding this estimate and the lack of technical work to support it, we did not formulate a restoration expectation for phosphorus load reduction. However, as described on page 11-47, we are undertaking additional investigations in FY2011 to develop technical support for better estimates.

***Comment #11:*** *p. 16 – It would be helpful to quote the P flux or export figures in more standard units – mg/m<sup>2</sup>/yr – for comparison with the scientific literature. (Dillon)*

***Response #11:*** Our response is similar to Response #9. Although metric units are the standard for scientific literature, our primary readers are more familiar with the imperial unit shown (pounds per acre).

***Comment #12:*** *In the title for Kissimmee Basin Hydrologic Conditions, should it not be Water Year 2010? This section is straightforward although I'm not sure why it is here. Could these data not be included as part of the Project Updates, or is this general background material. (Dillon)*

***Response #12:*** Yes, the title should be changed. As stated in Response #7, this section discusses the status of hydrologic conditions during WY2010 and provides background information for the subsequent section on project updates.

***Comment #13:*** *The updates from the Phase I Monitoring Studies are very useful. The first portion, on hydrology, is particularly well-presented with reference back to the specific*

*expectations. I would prefer to see the whole section in this format because of the ease in following progress. (Dillon)*

**Response #13:** We are reformatting the other Phase I monitoring updates so that all of them highlight their respective expectations (if they exist) and include a short, clear statement on whether or not the metric is meeting its expectation.

**Comment #14:** *There is considerable focus placed on the new floodplain attenuating phosphorus; if soil data are available for the region that will be flooded, then perhaps P adsorption capacity could be calculated and the P retention capacity of the new floodplain crudely estimated and reported here. In terms of P retention by biological reactions (e.g. plant growth), followed by sediment accumulation, this is not an effective P sink in north-temperate regions. Wetlands accumulate P in the growing seasonal but where there are cold winters and plant mortality, almost all of the P (and N) retained in the growing season is flushed out of the system in the winter and spring following decay of the plant material. In Florida with no cold winter, this may be otherwise, but it would be useful to see some documentation relating to the possible success of this pathway in controlling P fluxes. (Dillon)*

**Response #14:** As explained on page 11-47 in the Total Phosphorus section (and perhaps already noted by the reviewer), we are planning to collect soil P data in 2011 for the purpose of evaluating P retention capacity in the floodplain. Future work is planned to include biological accumulation of phosphorus by floodplain vegetation.

**Comment #15:** *Floodplain vegetation – Again, the improvements are positive. Is there any prospect of reducing the P in the system by mechanical harvesting of the non-desirable types of plant communities? This has been done in other jurisdictions as a P control measure. With estimates of biomass and P content, this should be easy. (Dillon)*

**Response #15:** The SFWMD will continue to rely on hydrologic and chemical means to control areas of invasive, exotic vegetation in the floodplain. Mechanical harvesting has not been considered due to the remoteness of the restoration area (no roads in the floodplain), difficult access under wet conditions, cost of removal, and physical disturbance. The disturbance accompanying mechanical harvesting might actually mobilize more phosphorus and leave large barren areas that could be re-colonized by exotic vegetation.

**Comment #16:** *Aquatic invertebrates – Again, results to date are promising, although I would like to see more comprehensive data that don't focus so heavily on mollusks. (Dillon)*

**Response #16:** As indicated in Table 11-5, more aquatic invertebrate data are being collected and will be presented in future reports. The Aquatic Invertebrates section will be re-titled to indicate that only bivalves are being discussed in this year's report.

**Comment #17:** *Phase II/III Restoration Evaluation – The proposals for additional monitoring are sound although I expected a more comprehensive suite of chemical parameters including nitrogen, suspended sediments, metals and trace organics (Dillon)*

**Response #17:** We will revise the section on page 11-68 to state that we will monitor nitrogen, total suspended solids, phytoplankton chlorophyll, and other parameters in addition to total phosphorus, but not metals or organics because there is not much reason to analyze for these (land use in the floodplain was pasture).

***Comment #18:*** *Kissimmee Basin Modeling and Operations Study – This section is too sketchy to be able to evaluate what is going to be done. (Dillon)*

**Response #18:** We believe this section adequately describes the purpose and objectives of this study for our intended audience. Further details are too lengthy to be included in this section, but they are described in another report called the Alternative Plan Selection Document. We have added a sentence referring the reader to this document. We also added a definition of “alternative plan”.

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## RESPONSES TO COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 12

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**Posted:** 10/08/10 at 08:44 AM by Rick Alleman

Richard Alleman, Christopher Madden, Zhiqiang Chen,  
Chris Buzzelli, Fawen Zheng, Patricia Goodman, Rebecca  
Robbins, Marion Hedgepeth and Peter Doering

### **Level of Panel Review: Technical (primary); Integrative (secondary)**

Reviewers: J. Burkholder (AA), J. Burger (A)

### **General Comments**

**Comment:** *Has an evaluation been completed to assess how the Arthur R. Marshall Loxahatchee National Wildlife Refuge will be affected by routing urban runoff into it? (p.12-62).*

**Response:** As indicated, urban runoff is not routed directly into the Arthur R. Marshall Loxahatchee National Wildlife Refuge. As this is not a coastal resource, please check Chapter 5 for these results.

**Comment:** *Similarly, has an evaluation been completed to assess how the receiving wetlands in the Biscayne Bay Coastal Wetlands Project will be affected by the canal water inputs? (p.12-78).*

**Response:** Yes. A pilot project was conducted from 1997 through 2003 that examined the effects of canal discharges on the coastal wetlands. Results were summarized in a 2003 report by Michael Ross *et al.* We will add an explanation to the text with the citation.

**Comment:** *What is known about the freshwater macroalgal consortium in the Florida Bay system? The primary focus of the MFL rule and of recent research in Florida Bay includes this consortium (p.12-106), so it clearly is important to restoration efforts in that ecosystem and inclusion of summary information about it would be helpful.*

**Response:** Concur. We will add short text describing the ongoing studies focusing on the freshwater algae. We will consider adding additional information on the results of these studies in the 2012 report.

**Comment:** *The winter cold snap in Florida Bay was described to have adversely affected roseate spoonbills (lines 2175+), but were other colonial breeding species also affected? Why didn't crocodiles escape the lower temperatures (lines 2168+)? – And, did individuals of a certain size or age mostly die from the cold stress?*

**Response:** Concur. We have anecdotal and photographic evidence that higher trophics were affected but no quantitative study. We can include brief additional information.

**Comment:** *The subsection on Naples Bay (p.12-127) stated that stratification problems are believed to have increased in the upper bay, and that the Golden Gate Weir 3 Improvements project should improve that situation. Are there plans to assess stratification in this system?*

**Response:** The District does not currently have plans to examine stratification in Naples Bay, although we do have a project to refine a hydrodynamic model. We will add some information in the Future Activities section about it. Should this kind of information become available in the future, we will describe it in the SFER.

**Comment:** *Only one activity – provision of six water quality and flow monitoring stations in the Ten Thousand Islands – is mentioned in plans for future Western Estuary activities (p.12-127). Is this the only activity being planned? As examples, what about continued efforts to evaluate Eastern oysters as a VEC in the Western Estuaries, or monitoring efforts to assess restoration success in the bullets mentioned on p.12-119?*

**Response:** Since our draft was completed, the District has approved additional activities for estuaries in the western region in FY11. We will add these to the section.

**Comment:** *The Coastal Ecosystem Division's Science Plan, which the panel was requested to review as part of the 2008 SFER, was not mentioned. It originally was described as the overarching approach being used to guide the research, management, and restoration of the District's coastal systems. What is the present status of this plan?*

**Response:** The most well-developed science plans are the Research and Water Quality Monitoring Programs for the Caloosahatchee River and St. Lucie River Estuaries, and a science plan for the Loxahatchee River Estuary. Since the District now has more emphasis on projects and project results, science planning is being reevaluated to be better aligned.

**Comment:** *While some chapters of the 2011 SFER (e.g. Chapters 6 and 9) contain excellent Summary sections that provide a clear understanding of what was accomplished in WY2011, Chapter 12's Summary is weak. It does not adequately convey the District's efforts and accomplishments in each of the four regions.*

**Response:** Concur. As stated in the introduction, the emphasis of Chapter 12 this year is to report on the status and results in the coastal ecosystems where the District has focused its efforts through regulatory tools or restoration projects, rather than the status of monitoring or research projects. However, since few projects were well enough along to produce detectable results, we may supplement the summary with information about some of the monitoring and research activities.

**Comment:** *It also seems remarkable, given the regional restructuring of the chapter, that no comparative information is provided about estuaries across the regions – general status by region, major issues, etc. Such an overall, integrative synthesis is needed as an ending section to this chapter, and its major points should be briefly presented in the Summary.*

**Response:** It was not the intent to provide comprehensive information for each region or estuary, but rather to summarize pertinent information about the effects of key projects within each region. Therefore, some areas were not represented making a comparison between regions impossible. In addition, most projects that affect coastal areas have not yet become operable, so project effects in one area cannot yet be compared to other areas.

**Comment:** *It would also be helpful, as Chapter 6 has nicely done, to include a section about nonindigenous invasive species in the four regions – Chapter 12 would be a great place to pull together information known about how these species are affecting the estuaries.*

**Response:** Concur in part. We have not detected serious issues with non-indigenous species within the District's estuaries. In addition, unlike our terrestrial vegetation management program, the District has no jurisdiction or capability to counter estuarine non-indigenous invasive species. However, where we do have some information about invasive species within project-area wetlands adjoining the estuaries such as the St. Lucie and Loxahatchee River Floodplains, and Biscayne Bay Coastal Wetlands Project, we will include it in future reports.

**Comment:** *Finally, the subsection, Future Activities, is very important and should be strengthened in most of the regional sections (exception, Northern Estuaries). The present writing does not do the District justice because it does not capture [even] the major activities that the District will both be initiating and continuing to conduct toward its goal of restoring the Coastal Ecosystems.*

**Response:** Concur in part. We will take a look at what else could be added to the Future Activities sections, because we admit to missing some items. However, we can only include projects or studies that have been approved in the current or upcoming fiscal year budgets. The reviewers should note that the District does not have a goal to restore all of the coastal systems. In the report, we want to stay focused on those estuaries or parts of estuaries where major projects are funded. Also, rather than reiterate ongoing activities that have been described in previous reports, we want include only those activities that may be new or different.

## Northern Estuaries

**Comment:** *The Integrated Modeling Framework information for the St. Lucie Estuary (p.12-11) listed tasks but should also provide information about the approach (bullets 2-4) and outcomes of those tasks in order to enable technical evaluation.*

**Response:** Concur. We will consider including this information in next year's annual report, as it will be a three-year update.

**Comment:** *It is impressive that the recalibrated CH3D salinity/hydrodynamic model is now capable of simulating a 41-year period of record, but it would be helpful to add more information about the simulations.*

**Response:** Concur. We will consider including this information in next year's annual report, as it will be a three-year update.

**Comment:** *The preliminary findings from the Low Salinity Zone project (pp.12-11 to 12-12) are interesting and of potential value to restoration efforts. Information should be added about the projected date for completion of the data analyses.*

**Response:** Concur. We will add information about when the analyses will be completed.

**Comment:** *P.12-4, lines 115-116 (nutrient enrichment is believed to cause phytoplankton blooms, which impact submersed aquatic vegetation) - The problems with this writing are that (i) nutrient enrichment has been shown to cause phytoplankton blooms in tidal freshwaters and estuaries worldwide, including Florida waters (e.g. see p.12-75); and (ii) phytoplankton blooms have an array of impacts, not only adverse effects on SAV. Please restructure this writing and add supporting references.*

**Response:** Concur. We will clarify the text.

***Comment:*** P.12-8, line 263 - more information on the Gopher tortoise relocation program should be provided or referred to (numbers, locations, success).

***Response:*** We do not have this specific information.

***Comment:*** P.12-10, lines 356-360 - It is not clear as to why this study was reported, considering that it was conducted in WY2009 and the major findings were summarized in last year's SFER.

***Response:*** This is just to remind the reader of the current status of the project since this is a required annual report to the State.

***Comment:*** P.12-11, lines 391-394 - Please clarify when the data analysis will be completed [for the DO dynamics project].

***Response:*** Concur. We will add this information to the text.

***Comment:*** P.12-11, lines 399+ - Please briefly explain what consideration is being given to making upstream movement possible so that these populations are not restricted.

***Response:*** Concur. There are no current plans to modify water control structure S-79 to facilitate the movement of fish, as this would also compromise salinity control for the basin. We will add clarification.

***Comment:*** P.12-12, lines 424-425 - This statement is inaccurate because nutrient load reduction also can influence total organic carbon which, in turn, can influence light availability.

***Response:*** Concur. We will clarify the text.

***Comment:*** P.12-14, line 474 - Some reference to the past oyster research would be helpful here.

***Response:*** Concur. We will include citations of previous oyster research.

***Comment:*** P.12-15, Table 12-1 - Please clarify; the panel assumes that data are not yet available for TN and TP loadings from Lake Okeechobee, but will be provided?

***Response:*** Correct. We will add the loading information to the table.

***Comment:*** P.12-17, lines 542-545 - Additional explanation is needed about the differences between the TN and TP loads relative to flow.

***Response:*** Concur. We will add the additional explanation about loads and flows.

***Comment:*** P.12-17, lines 546-553 - Much more information is needed to enable technical evaluation: the authors should explain why only one station was "chosen" to represent conditions in WY2009, WY2010, and mean conditions during the period of record from WY1997 - WY2008. They should also explain the basis of that selection, and how they determined that the station selected was "representative" of the others.

***Response:*** Concur. We will add more information about the selection of the results.

***Comment:*** P.12-17, lines 557-558 - Please add information about the maximum chlorophyll a concentration of this bloom and, if available, the dominant taxa involved.

**Response:** Concur in part. We will add more information about the chlorophyll a concentration, but we do not have information about the taxa.

**Comment:** P.12-18 - Annual nutrient loads are described as “clearly lower” in WY2010 than WY2009, and overall nutrient and chla concentrations as low in comparison to both WY2009 and the long-term average. However, no statistical analyses supporting these statements are indicated. It would be helpful to add such information (e.g. p values) in Table 12-2 (p.12-19). If such analyses have not been done, then the authors should clarify that point.

**Response:** Concur. We will add this information.

**Comment:** P.12-22, lines 587-588 – This statement, “SAV can also include benthic macroalgae” must be omitted, and the combining of seagrasses and macroalgae as SAV in this section and in the section on the Southern Estuaries (specifically, the subsection on Florida Bay) must be changed, for three reasons: (i) SAV refers to submersed vascular plants, not macroalgae, in nearly all of the published literature (the correct term is submersed, not submerged – see Wetzel (2001, Limnology). (ii) The “lumping together” of seagrasses and macroalgae in presenting SAV information conveys serious misinformation because the marine macroalgae mentioned are not indicators of good ecosystem health. Instead, macroalgae commonly are indicators of excessive nutrient pollution (e.g. see p.12-81 and Biber 2002), and under such conditions they typically overgrow and kill seagrass meadows. (iii) Seagrasses – not seagrasses+macroalgae – are an important VEC in evaluating the District’s restoration efforts. Therefore, seagrasses must be considered separately from macroalgae in any analysis of SAV. If the information reported from aerial photos (“lagoon-wide SAV mapping, line 606) also considered macroalgae, it is not scientifically valid to report it as “seagrass acreage” (line 614) and this text (and Figure 12-9 legend; Figure 12-10 SAV segments vs. seagrass management segments) must be adjusted accordingly.

**Response:** Concur in part. We agree that the text needs to clearly distinguish between seagrass and macroalgal results. This was our intent. We will revise the text to eliminate confusion. We believe, however, that while the possibility exists for macroalgae to become problematic, it is a normal and important part of a healthy benthic community within the District’s estuaries. Figures 12-9 and 12-10 and the acreages given about seagrass cover in the Southern Indian River Lagoon are accurate.

**Comment:** P.12-25, Figure 12-11 - This figure contains no data. Also, please clarify that the data, when added, are for seagrasses (i.e. that SAV means seagrasses and not seagrasses + macroalgae).

**Response:** Concur. We will revise the figure results, and the legend to clarify that the results are for seagrasses.

**Comment:** P.12-25, line 643+ - The relationship among the three seagrasses seems critical to overall system health; was consideration also given to the associated fauna involved (or their effects)?

**Response:** We are not clear exactly what information the reviewers desire. Anecdotal faunal observations are recorded, but associated fauna are not sampled quantitatively.

**Comment:** P.12-25, line 644 - Please clarify whether the various methods have been intercalibrated.

**Response:** Concur. We will add information about intercalibration.

**Comment:** *P.12-28, line 669+ - Briefly indicate where recruitment might be coming from, given that at some points there appears (from the graph) to be few live oysters.*

**Response:** We have insufficient information about the source of larvae, so we cannot offer additional information about recruitment.

**Comment:** *P.12-28, lines 672-673 - Oysters have also declined in South Florida estuaries because of water quality degradation; please clarify.*

**Response:** Concur. The statement only mentioned salinity, but we will clarify the relationship between observed salinity and oyster abundance.

**Comment:** *P.12-28, lines 679-680 - The statistical analysis supporting this statement needs to be added or, if statistics were not performed, then that should be clarified and the writing should be altered accordingly.*

**Response:** Concur. We will clarify that the statement was based on qualitative results.

**Comment:** *P.12-29, line 694 - The authors should define a “pre-taxonomic survey.”*

**Response:** Concur. We will add a definition.

**Comment:** *P.12-29, line 698 - The basis for defining “facultative wet” and “obligate taxa should be added, with supporting reference.*

**Response:** Concur. We will add definitions and citations.

**Comment:** *P.12-30, Table 12-3 - Should add summary information for invasive species.*

**Response:** Concur, but we do not yet have enough information. We will add it in future reports.

**Comment:** *P.12-31, line 767 - ...1998). A MFL... P.12-31, line 775 - ...2009)...*

**Response:** We assume this comment is editorial and directed at correcting typographical errors in the text. We will correct them.

**Comment:** *P.12-37, line 863 - This is very high TN, and the spike appeared to coincide with a major TP spike as well (Figure 12-22). Please add explanation.*

**Response:** We do not know what caused the spike in TN concentration, and prefer not to speculate.

**Comment:** *Figures 12-22, 12-23 - Clarify whether statistical analyses have been conducted to examine relationships between TN, TP, and chlorophyll a; if so, please include the summary information.*

**Response:** Concur. We will consider including a summary of the results of any analyses that examined the relationship between nutrient loads and concentrations and chlorophyll a concentrations in next year’s report.

**Comment:** P.12-41, line 897 - Explain more clearly 1-100 m.

**Response:** Concur. We will clarify the sampling methodology, and provide a citation where the methods are described.

## Eastern Estuaries

**Comment:** P.12-55, Figure 12-35 legend, or p.12-53 - For technical evaluation, explanation should be added about how the two methods used to track seagrass cover (transect vs. patch-quad) compare, and whether the methods have been cross-calibrated. Note: Figure 12-35 is nicely designed, and SEs are helpful in interpreting the data.

**Response:** Concur. We will add additional explanation about methods.

**Comment:** P.12-56, line 1158 - Using the same form for the figures throughout is helpful. There seems to be less variation in the live oysters than in the northern estuaries - any explanation/comment?

**Response:** At this point, we cannot offer definitive information about the differences in live oyster density variation among estuaries.

**Comment:** P.12-57, Floodplain Vegetation section - Please explain the expected results of this change in canopy, and the prognosis.

**Response:** Concur. We will add additional information.

**Comment:** P.12-57, lines 1167-1168 - Is a very interesting observation. Information should be added about nonindigenous species, with cross-reference to Chapter 9.

**Response:** Concur. We will add some additional information and a cross-reference Chapter 9.

**Comment:** P.12-57, lines 1180-1189 - These percent changes seem too small to be significant, except perhaps for mangroves. Have the data been statistically analyzed? - clarification of this point is needed.

**Response:** Concur. Since these data have not been fully analyzed, we should have some statistical results in next year's report.

**Comment:** P.12-58, Table 12-8 footnotes - The basis for defining facultative wet, obligate etc. should be added, with supporting reference.

**Response:** This information is given at the bottom of Table 12-8.

**Comment:** P.12-59, Table 12-9 legend - The amount of area surveyed and the general locations (systems) should be added.

**Response:** Concur. We will add additional information.

**Comment:** P.12-60, Lake Worth Lagoon - Conspicuously missing from the description of this system is the extensive urbanization of the watershed; please include information about this (e.g. percentages of watershed in high-density / low density development considering each of the three segments shown in Figure 12-38). Clearly this information is available (e.g. p.12-61, line 1225).

**Response:** Concur in part. Rather than reiterate this information as was done in previous reports, we will cite a reference where it can be found.

**Comment:** P.12-62, lines 1226-1233 - *These data should be shown (e.g. TKN concentrations, annual loads from each canal). Data on suspended solids and/or turbidity should also be shown (lines 1234-1235; concentrations, as well as loading ranges that are shown in Table 12-10 and Figure 12-43 – thus far, no data have been shown for this important parameter in WY2010), and the differences in macroinvertebrate community structure should be described (lines 1236-1238). Also (line 1238), is it the velocity, or also the amount and timing (seasonally)?*

**Response:** Concur. We will clarify the text about flows from the C-51 canal, and also consider adding suspended solids loading results (if available) in future reports. For detailed loading information, a reference was cited.

**Comment:** P.12-62, lines 1245-1252 - *There is no mention of toxic substances, which surely must be affecting this ecosystem that is receiving inputs from a heavily urbanized watershed. Toxic substances should be included in this writing; readers should be informed about their general significance and about the availability of data, if any, on this important group of parameters in Lake Worth Lagoon (sediments etc.).*

**Response:** The District is not currently tracking the accumulation of toxic substances in Lake Worth Lagoon, and has no restoration projects to specifically control these substances

**Comment:** P.12-65, line 1288 - *Explain how the Lake Worth Lagoon water quality monitoring program was revamped. Lines 1288-1293 and accompanying figures - Please clarify whether TKN is being measured and, if so, add information about this important parameter.*

**Response:** Concur. We will add some information about the new monitoring program, and consider adding information about TKN.

**Comment:** P.12-66 - *As important information needed to interpret the writing (and Figures 12-45 and 12-46), the authors should describe how these seagrass species differ in their general response to light, nutrients and salinity, with supporting references.*

**Response:** Concur. We will add additional information.

**Comment:** P.12-70 - *Add more information to describe the oyster monitoring program (number of sites? Statistical analysis of oysters vs. salinity? sampled once in the wet season and once in the dry season each year since 2005? etc.).*

**Response:** Concur. We will add some additional information about the oyster monitoring program..

**Comment:** P.12-71 - *Explanation is needed about why the North Fork of the New River Estuary is important in District restoration efforts.*

**Response:** A description of the issues and solutions were given in the introduction.

**Comment:** *State the years encompassing the county's monitoring program, and the number of sites (information is provided for only one site, site 16 - why was only that site highlighted?).*

**Response:** Concur in part. The monitoring period of record is explained in the text. We will add an explanation about the use of results from station 16.

*Line 1401 - Has statistical trend analysis been conducted? Please clarify. If not, the writing should be altered: ...may be continuing an apparent trend downward.*

**Response:** Concur. We will clarify how we arrived at the conclusion of a trend. We agree that statistical results can lend support for such a conclusion, but, statistical analysis does not necessarily make a trend any more or less valid.

**Comment:** *P.12-74, lines 1422-1431 - Please clarify whether there are there statistical analyses to support any of this discussion. Where low-frequency data are described (e.g. quarterly or twice per year), medians should also be discussed.*

**Response:** Concur. We will clarify the text.

**Comment:** *P.12-74, lines 1452-1452 - Phase 2 of the Acme Basin B Discharge Project should be described so that readers understand its purpose in the restoration effort - what it is intended to accomplish.*

**Response:** Concur. We will add more explanation.

## **Southern Estuaries**

**Comment:** *P.12-75, line 1476 - Should state what these three success indicators are, and the restoration goals.*

**Response:** The success indicators are described in detail along with results within the water body sections. The District does not have restoration goals for these estuaries per se, but works with stakeholders through programs such as RECOVER to collaborate on various performance measures. These are advisory only, and not adopted policy.

**Comment:** *P.12-76, line 1492 - List the main agricultural practices.*

**Response:** Concur. We will add a brief list.

**Comment:** *P.12-76, line 1502 - Is salinity still increasing? Please clarify.*

**Response:** Concur. We will clarify the text. Salinity increased in the past, but it is not clear that it is still increasing.

**Comment:** *P.12-76, last paragraph - Please explain where the water will be diverted to (line 1527), and whether projected impacts on the receiving area have been evaluated.*

**Response:** Concur. We will add some additional description about the location of wetlands, and cite a reference for more information.

**Comment:** *P.12-77, Figure 12-50 legend - Please add information about who maintains these stations / parameters monitored/ frequency.*

**Response:** Concur. We will add this information either to the legend or in the text.

**Comment:** *P.12-78, line 1536 - Briefly state what the success indicators are.*

**Response:** It is explained in lines 1537-1550.

**Comment:** *P.12-78, lines 1565-1566 - Is this statement supported by statistical analysis? Please clarify and, if so, add the statistical information.*

**Response:** Concur. We will clarify that the statements are qualitative, and based on the accompanying plots.

**Comment:** *P.12-78, lines 1569-1570 versus Figure 12-52 legend - Are in conflict; which is correct?*

**Response:** The text and figures are correct, but we will clarify in the legend that TIN is shown only for station BB53 as indicated by the title.

**Comment:** *P.12-78, line 1574 - Clarify which two canals.*

**Response:** Concur. We will include the canal names.

**Comment:** *P.12-78, lines 1575-1576 - Briefly explain why the data are missing.*

**Response:** Concur. We will try to determine why some results are missing, and explain in the text.

**Comment:** *P.12-81 - Include brief explanation about the apparent decline of macroalgae shown in Figure 12-81.*

**Response:** The plot does not suggest a long term decline in macroalgae cover since 2003.

**Comment:** *P.12-81, Figure 12-81 legend - Change to: Mean percentage of cover of macroalgae and seagrasses [for macroalgae and SAV]...*

**Response:** Concur. Although the authors of the cited reference refer to both seagrasses and macroalgae as SAV, we will list both separately.

**Comment:** *P.12-82, line 1621 - It might be useful to include some numbers for live/dead oysters for those areas surveyed, rather than using terms like "small numbers."*

**Response:** Concur. We will provide some examples.

**Comment:** *P.12-83, 1st paragraph - also needs to mention increased nutrients as an important factor (as reported, for example, in the 2006 SFER).*

**Response:** Concur. We will add text accordingly.

**Comment:** *P.12-83, line 1666 - Change to: covered mostly by seagrasses along with some macroalgae. The seagrasses provide beneficial habitat...*

**Response:** Concur. We will change the text accordingly.

***Comment:*** P.12-93, 1st paragraph - Should include a brief description of the CERP performance measures for Florida Bay and the other southern coastal ecosystems. While it is true that information on the status and trends of water quality in Florida Bay can be found in previous SFERs, a brief synopsis of that information should also be included here.

***Response:*** Concur. We will add text on CERP performance measures.

***Comment:*** P.12-93, lines 1894-1895 - Is there any explanation for the exceptionally high ammonium peak? Please clarify.

***Response:*** We cannot definitively explain that particular ammonium spike.

***Comment:*** P.12-97, line 1944+ - The authors should more clearly state the factors that have been linked to causing the bloom.

***Response:*** Concur. The bloom is more extensively discussed elsewhere but can be expanded on here as well to give context to the discussion on Lake Surprise.

***Comment:*** Pp.12-98 to 12-103 – Understanding changes in seagrasses and macroalgae, and effects on higher trophic levels, is laudable and key to bay assessment. However, this writing is a major problem in describing SAV and macrophytes as including macroalgae and seagrasses, considered collectively. SAV and macrophytes are terms that should be reserved for seagrasses (submersed vascular plants) for the reasons stated above (see pp.3-4 of these comments). Seagrasses, not seagrasses+macroalgae, are a VEC in District restoration efforts. Thus, the authors misstate (p.12-102, lines 2064-2065) that “The status of SAV habitat is the central performance measure for Florida Bay assessment and restoration (Rudnick et al. 2005),” and they misquote the reference cited: Importantly, the Rudnick et al. assessment dealt exclusively with seagrasses, just as the VEC for SAV is exclusive to seagrasses (also see Madden et al. 2009 - seagrass indicator metrics, mentioned on p.12-114) - it does not, and should not, include macroalgae. It is important that the writing throughout these pages is altered accordingly.

***Response:*** We will vet the text of the section and clarify these distinctions where necessary.

***Comment:*** P.12-101, line 2050+ - The authors erroneously state that “SAV is recruiting well on the cap footprint” because most of the recruitment is from macroalgae, not seagrasses, and seagrasses are the beneficial species that will need to be transplanted. The authors’ description of “at least one species present in 97.3% of observed quadrats,” coupled with their observation that macroalgae were more frequent and in higher density than seagrass, indicate the opposite of what they assert: Seagrasses are not recruiting well and seagrass transplanting will clearly be needed. This writing illustrates the serious problem created by “combining” macroalgae as “beneficial SAV.” It is important that the writing is altered, accordingly.

***Response:*** We will review this assertion and change the text accordingly.

***Comment:*** P.2104, line 2158+ - Please clarify whether the invasive species appear to be recovering faster than the native species.

***Response:*** Will review and revise text if information is available.

***Comment:*** P.12-106, lines 2223-2224; and p.12-107, line - *Ruppia* is not a freshwater species (e.g. see p.12-108, lines 2260-2261); please alter this wording.

**Response:** We will revise the text to better reflect *Ruppia*'s salinity range.

**Comment:** P.12-110 - Please add information about the sampling frequency and parameters involved in the C-111 Spreader Canal Western Project, which clearly has produced some exciting, high-frequency data (e.g. Figure 12-77).

**Response:** Concur. We will add information on this component of the monitoring study.

**Comment:** Pp.12-114- 12-115 - The use of these indicators is excellent, both in terms of continuous monitoring and for public/policy use. Please check to ensure that SAV here refers to seagrasses and not seagrasses+ macroalgae. A data summary (figure or table) for the important Target Species Index information described here should be included.

**Response:** Concur. We will review and change the text where warranted.

## Western Estuaries

**Comment:** The areas mentioned in the introductory paragraph (p.12-118) need to be shown in an accompanying map.

**Response:** Concur. We will include a map with the geographic features identified.

**Comment:** The second paragraph (lines 2511-2518) should be expanded to provide more description of water quality degradation and habitat decline/loss in the Fakahatchee Estuary.

**Response:** Some of this is described in the following section about the Fakahatchee Estuary. Historical information about the estuary is very limited.

**Comment:** An expanded description for Naples Bay (p.12-124) is also needed, including a brief synopsis of the data available for this system.

**Response:** We will add citations where this information can be found.

**Comment:** P.12-119, lines 2554-2566 - This list is very useful (and other sections of the chapters could use this approach).

**Response:** Concur. While the expected outcome of District projects is described in every case, we will look to see if it makes sense to describe them in a bulleted list.

**Comment:** P.12-122, lines 2602-2603 - Please explain the large range in flows for the Faka Union Canal Water Reservation.

**Response:** Concur. We will cite the document that explains the relationships between inflows and salinity.

**Comment:** P.12-123, lines 2646-2667 - Were statistical analyses conducted to assess whether the described differences were significant? Please clarify and add the statistical information if available (as nicely done on p.12-124).

**Response:** Concur. Since the data are limited, statistical analysis was not appropriate. We will clarify the text.

***Comment:*** P.12-125, Figure 12-84 legend - Include information about the two stations shown (why in this location? depth of Naples Bay in this location? monitored for what? how frequently? by whom?).

**Response:** Concur. We will add more information about the monitoring sites.

## INTEGRATIVE REVIEW

***Comment:*** Chapter 12 falls short on integration among the sections; unfortunately, there is little integration throughout the writing, even within sections (i.e. within a region). The overall purpose of some of the studies described was unclear, and no attempts were made to integrate them in most sections, the Florida Bay subsection being the notable exception.

**Response:** It was not our intent to attempt to integrate results across estuaries since District rules and projects affect a limited number of specific areas. Other documents, most notably RECOVER's System Status Reports fulfill this objective. Our primary goal was to report on environmental performance in relation to District activities. We agree that overall performance could be summarized, but the impacts of projects have not yet occurred since most of them have not been constructed.

***Comment:*** The chapter also minimally cross-references other chapters. Figure 12-2 does provide a nice overview directing readers to chapters containing information about the NEEPP. Other chapters are also mentioned elsewhere but very infrequently (pp.12-7, 12-76, 12-119 - Chapter 7). Many opportunities for integration with other chapters are missed (e.g. p.12-5, no mention of Chapter 7; p.12-29, 23 invasive species mentioned that were 14% of the total transect flora, but no reference to Chapter 9; pp.12-34 and 12-45, Lake Okeechobee regulation schedule, but no reference to Chapter 10; p.12-57, lines 1167-1168, about invasive species, without cross-reference to Chapter 9).

**Response:** Concur. We will include more cross-referencing to other chapters.

***Comment:*** Chapter 12 should be strengthened by adding a section that provides some integration among the four regions by assessing overall patterns in VECs (e.g. seagrasses, oysters), freshwater flows, nonindigenous invasive species, and water quality, explaining how they tie together. Improved integration of this chapter with others – since, after all, the coastal estuaries are the downstream endpoint of District restoration activities – should also be done because it will significantly improve not only this chapter, but also the overall SFER.

**Response:** Since District projects are intended to improve a limited number of estuarine areas, patterns of VECs, invasive species and water quality in these specific areas are not representative of overall patterns. RECOVER's System Status Reports are more likely to do this type of integration.

## Editorial/Other Content Changes

***Comment:*** Throughout - The chapter varies in reporting of means versus medians (e.g. nice information on pp.12-93 and 12-94). Both are helpful (with SEs included for means), and both should be provided consistently where possible.

**Response:** Concur. Our goal is to display information as consistently as possible among the different sections within the limitations of the data.

***Comment:*** Throughout the chapter - The authors should consider omitting units for salinity; practical salinity is the ratio of two electrical conductivities and is dimensionless.

***Response:*** As explained previously, while we agree that salinity estimated by the practical salinity method has no units, including psu after a salinity value serves to alert the reader as to the method of estimation. It is common to see this in literature, and universally accepted among scientists in South Florida.

***Comment:*** P.1, line 31 - ...and Eastern oyster...

***Response:*** Concur.

***Comment:*** P.1, lines 33-34 - Explain why this is a significant highlight.

***Response:*** Concur.

***Comment:*** P.2, line 60 - ...Valued Ecosystem Components)...

***Response:*** Concur.

***Comment:*** Pp.12-20 to 12-21, Figures 12-7 and 12-8 - the keys are very difficult to read or cannot be read without a magnifying glass. The wording should be enlarged.

***Response:*** Concur.

***Comment:*** P.12-30, line 728 - ...These data indicate [or suggest] that...

***Response:*** Concur.

***Comment:*** P.12-34, lines 816-817 - Mention is made of changes that will occur when C-43 is constructed; please add information on when completion is projected, here and throughout the writing (e.g. p.12-37, line 875; p.12-42, line 931).

***Response:*** Concur. We will provide a cross-reference to Chapter 7.

***Comment:*** P.12-36, Table 12-6 - Percentages should be added.

***Response:*** This would require that the loads at S-79 be indicated at 100 percent. We do not want to give the impression that all of the nutrient loads to the estuary come through the S-79 structure. We may display the results graphically so the reader can more easily see the proportions.

***Comment:*** P.12-36, Figure 12-20 - Additional information is needed in the legend (e.g. number of samples taken per year / sampling frequency).

***Response:*** Concur. We will include this information either in this year's or next year's report.

***Comment:*** Figures 12-22, 12-23 - Both figures need a key.

***Response:*** Concur. Actually, figures 21 and 22 do not have keys. We will add them.

***Comment:*** P.12-44, line 945 vs. P.12-45, line 973 - five stations or six stations?

**Response:** Concur. We will clarify that one site was just recently added, and data were not available.

**Comment:** *P.12-50, lines 1090-1091; p.12-53, line 11129 - Add information about the projected date (year) when the L-8 Reservoir will become operational.*

**Response:** Concur.

**Comment:** *P.12-50, lines 1095-1104 - The River Keeper monitoring network seems impressive and valuable in the data it is contributing. Please add information about when the River Keeper monitoring network was initiated.*

**Response:** Concur.

**Comment:** *P.12-53, lines 1121-1130 - This description is very “broad-brush;” it would be helpful to add interpretations, and to provide the wet-season and dry-season means + 1 SE and the medians. It is encouraging that the concentrations were comparable to the interim water quality targets for the Loxahatchee River and Northwest Fork.*

**Response:** We cannot necessarily explain small variations in water quality. The intent is to indicate effects as a result of District projects rather than general status. Since key projects have not yet been constructed, we can only offer some general information at this point. Only two years of monthly results were available (as indicated), so we did not calculate statistics.

**Comment:** *P.12-53, lines 1134-1135 - The median salinity of the upstream and downstream sites should be added.*

**Response:** We will consider add a table with statistical results in the future when sufficient data become available.

**Comment:** *P.12-63, Figures 12-39, 12-40, 12-41 - Add information in the legends about the number of stations upon which these monthly means are based, and show standard errors (SEs).*

**Response:** Concur in part. We will add information about the number of stations, and indicate standard errors.

**Comment:** *Pp. 12-73 and 12-74 - Should be switched in order.*

**Response:** Concur.

**Comment:** *P.12-73, Table 12-11 - N values for each parameter in each of these time groupings should be added.*

**Response:** Concur.

**Comment:** *P.12-73, Figure 12-49 - Bar graphs should be depicted rather than lines, and SEs should be added with means.*

**Response:** Concur. We will reconsider how the results are displayed in this plot.

**Comment:** *P.12-75, line 1467 - ...Historically (i.e.*

**Response:** Concur.

**Comment:** P.12-75, line 1468 - ...nearshore areas is believed...

**Response:** Concur.

**Comment:** P.12-81, line 1601 - ...Shoal grass outcompetes...

**Response:** Concur.

**Comment:** P.12-82, 1st paragraph - Include the projected completion date for the Biscayne Bay Coastal Wetlands Project.

**Response:** Concur.

**Comment:** P.12-88, Figure 12-57 - Has a problem in conveying water years; change WY0 to WY09 and WY1 to WY10 throughout.

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-91, last paragraph - Should include a brief description of the MFL rule.

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-92, Figure 12-61 - Add SEs, and legend should include N values.

**Response:** We will review the legend to ensure it is consistent with the graphic and with other figures in the section. The blue shaded areas represent standard deviation and that should be sufficient to reflect variance.

**Comment:** P.12-93, line 1872 - ...and the other southern...

**Response:** Concur. We will change the text accordingly.

**Comment:** Pp.12-94 and 12-96, Figures 12-63 and 12-65 - Need to fix the WY designations (change to WY09 and WY10 as appropriate).

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-97, lines 1944, 1966, 1968 - change algae to algal.

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-101, line 2054 - ...macroalgae were observed...

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-106, line 2224 - ...macroalgal consortium...

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-108, line 2258 - ...in the mesocosm...

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-113, line 2388, “outbreaks of diatoms” - it is doubtful that these were harmful species, so it would be helpful to alter this wording.

**Response:** Concur. We will change the text accordingly.

**Comment:** P.12-120, Figure 12-82 legend - Include explanation of the station colors, and a brief synopsis of sampling duration and frequency at the stations shown.

**Response:** Concur.

**Comment:** P.12-120, line 2573 - Include the number of sites in Pumpkin Bay and Faka Union Bay (difficult to tell from Figure 12-82).

**Response:** Concur.

**Comment:** P.12-121, Figure 12-83 - Include SEs for these means.

**Response:** We would like to, but only have access to the mean results. In general, we will try to include variance statistics whenever possible.

**Comment:** P.12-123, line 2659 - ...in both estuaries....

**Response:** Concur.

**Comment:** P.12-100, Figure 12-68 legend - ...macroalgal density...

**Response:** Concur.