Appendix 1-5: Final Report of the Peer-Review Panel for the Draft *2011 South Florida Environmental Report – Volume I*

In October 2010, these final comments of the peer-review panel, comprising the final report, were provided publicly on the District's SFER WebBoard (www.sfwmd.gov/webboards). The information was prepared under Purchase Order to the South Florida Water Management District. 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.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 2

Level of Panel Review: Accountability (primary); Integrative (secondary)
Reviewers: O. Stein (AA), V. Novotny (A)

Posted: 10/22/10 at 2:59 PM by O. Stein

Conclusions:

1. This chapter continues to be a keystone of the SFER reports because the hydrology of South Florida and the management of water is one of the District's primary missions, and the presence and movement of water influences water quality and ecological resources throughout the District's jurisdiction. Thus, all other chapters of the report relate to some aspect of this Hydrology chapter. As indicted by the stated purposes of the chapter, review at the accountability level is warranted and the chapter successfully presents a defensible account of data and findings that is complete and appropriate.
2. The panel appreciates the District's thoughtful and detailed responses to review comments and with two exceptions noted below, concurs with those responses.
3. The panel notes that authors of this chapter have been particularly responsive to panel comments made to previous annual reports and the Chapter is much more readable as a result.
4. The authors are commended for their seminal analysis of the dependence of the South Florida hydrology on the ENSO (El Niño Southern Oscillation) and their diligence to disseminate this work, not only in this Report, but also in the peer-reviewed literature.

Recommendations:

1. The panel appreciates the new Acronyms and Abbreviations section at the front of the Report and was not suggesting a separate one for this Chapter. However, we note that several acronyms and abbreviations used in Chapter 2 are not included in this section. While this is clearly an editorial issue, the panel wishes to emphasize the need to include all used acronyms in the list and encourages the authors to work with the editorial staff to insure this happens.
2. The proposed edits to better explain the concept of a Standard Project Flood and Standard Project Storm do not offer much improvement from the original wording. This paragraph requires additional editing, but perhaps the most direct way to present this type of information would be to re-interpret the magnitude of the SPS and resulting SPF as a new frequency, i.e. a storm with a depth of 125% of the 100 yr storm is in reality an xxx year storm. Better still offer the public a direct estimate of the frequency of occurrence for channel overtopping rather than as a percentage of the SPF. Also it is becoming standard practice in hydrologic engineering to replace the use of the term "return interval" with the actual frequency of occurrence. Therefore a "100 year storm" becomes "a storm with a 1% chance of occurrence in any year". Of course that is the same thing, but the belief is that the new wording portrays the risk in a clearer way to the lay person.

Governing Board Bullet Points:

1. Chapter 2 Hydrology is a keystone chapter of the SFER as the population and environmental health of South Florida, and virtually all functions of the District, are dependent on the quantity and movement of water. These parameters vary both within the year and from year to year and this chapter effectively summarizes the main natural and human factors influencing this year's movement and use of water on a district-wide scale. Thus the chapter allows for "one-stop-shopping" of key hydrologic data summaries for both the public and internal district use.
2. The authors have been responsive to comments and criticisms of previous Reports and the chapter shows marked improvement over the last several years.
3. District staff focused on the hydrology of South Florida continue to effectively manage a highly complex system to meet competing goals. In the process they are expanding the scientific knowledge base by publishing their analyses of the effects on El Nino/La Nina variations on the South Florida hydrology in the scientific literature.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 3A

Level of Panel Review: Accountability (primary); Integrative (secondary)
Reviewers: V. Novotny (AA), R. Ward (A)

Posted: 10/22/10 at 6:00 PM by V. Novotny

Additional Comments

The Panel my also provide constructive guidance for the District's large-scale programs, particularly as related to water quality assessment and control across the agency.

The Panel has raised issues and pointed out possible problems with the Site Specific Alternate Criteria for Dissolved Oxygen for the Everglades Protection Area (Comments and Responses # 4 to #5). The panel recognizes the uniqueness of the Environmental Protection Area and the need for SSAC but questions the lower SSAC acceptable range that is potentially lethal for fish. Fish kills have been reported in the Everglades Protection Area as early as late 1970s by the fish surveys of NOAA and as recent as July 2009 and January 2010. The Panel, due to the limitation imposed by the deadline and resources for this review, cannot identify the reasons for frequent fish kills and the extent of the upsets. However, the Clean Water Act clearly specifies that the integrity of the nation's waters must be attained and this is even more highlighted for the Outstanding National Resource Waters which the Everglades Protection Area is and should be. Accepting the current status essentially means that the current water quality resulting in frequent fish kills cannot support the statutory designated use and can only support an unidentified lesser use wherein migrating or indigenous fish cannot survive. The review panelists could not, in this short time, find any reference to a Use Attainability Analysis (UAA) that would justify the downgrade of the use to a lesser use that would not be protective of fish and possibly of other biota. It was confirmed by the authors that no such studies were submitted. Statement by authors such as "the SSAC protect natural biological communities" may reflect the present status of unbalanced fish biota threatened frequently by conditions resulting in fish kills, which cannot be accepted without a scientific UAA. If the natural status does not provide protection for a well balanced biota the designated use should be downgraded.

The US Environmental Protection Agency administrative approval of the SSAC quoted in Response #5, in lieu of an UAA, clearly states that the ENP "*remains classified as 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".* In this administrative act the US EPA may not have intended to approve a lesser use expressed and protected by SSAC.

The authors' response to the Panel's comments for Chapter 3A and Chapter 4 (quoted below) also resulted in a question regarding assessment of compliance in two of the District's large-scale programs. The question arises from the use of models in the regulatory actions described in the SFER. The Panel recognizes there is a difference between statistically-based and physical/chemical-based model data-generation, but both types of models should be included in the regulatory toolbox. Why are the results of one type of model used in assessing compliance for the nutrient control program (Chapter 4) when it is deemed 'severely problematic' to use model results in assessing water quality standards in Chapter 3A? Also, compliance with the dissolved oxygen standard requires a model. Is there a policy that accepts one type of model to the exclusion of other types?

> Chapter 4 quote: "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.*"
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> Chapter 3A quote: "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."

In the spirit of suggesting ways to integrate water quality assessment and control across the agency, the Panel suggested, in this initial 2011 SFER review, that Chapter 8 is the one place in the document that should attempt to integrate all the various Long-Term Projects and demonstrate how the results of these projects, collectively, are achieving the Long-Term Plan's Everglades Protection Area water quality standard compliance goals and objectives – which Chapter 3A is addressing. Since no such assessment is provided in Chapter 8, the Panel concluded that a golden opportunity to present a succinct overview of the district's Long-Term Plan programs and progress toward goals (the subject of Chapter 3A) had been missed.

The panel further suggested that 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 a Long-Term Plan assessment of progress in improving water quality conditions in the EPA).

Chapter 3A's authors' response to the Panel's suggestions noted that providing such an assessment was beyond the scope of their Chapter. Quoting:

> "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."

Are the authors of the SFER chapters encouraged to seek ways to integrate water quality assessment and control across the agency, as the Panel is asked to provide in the SOW via the question asked under the integrative review (page 4)?

The Panel realizes that the above suggestions involve new resources and work assignments regarding development of the SFER report, but once the data extraction from DBHYDRO, data analysis and reporting are standardized (as they are becoming with each SFER) and implemented via software, it should be possible to reduce resources devoted to data extraction, data analysis and reporting. In other words, the maturity of the SFER reporting process is reaching the point where it should be possible to automate the more routine portions via software and internet reporting while gaining a more integrated water quality assessment and reporting strategy.

Conclusions

1. The maturity of the SFER reporting process has reached the point where a more integrated approach to water quality monitoring and assessment is needed. This fact is particularly evident in Chapter 3A where the authors, over the years, have done an outstanding job of creating a consistent, peer reviewed, approach for assessing water quality in the EPA, and where the findings can assist other chapters in accounting for progress in meeting their goals and objectives (particularly Chapter 8). The current SFER report organizes its chapters via programs and legal requirements – not an integrated, collective, overview of water quality and ecological restoration goals and objectives. Yet, the SOW requests the Panel to provide constructive guidance for the District's large-scale programs, particularly as related to water quality assessment and control *across the agency.*
2. The Panel also realizes that the issues of SSAC, UAAs and designated uses may not be the author's responsibility. These issues, ambiguity and a lack of clarity regarding the designated use and inadequacy of the SSACs to maintain a balanced fish population are a responsibility of FDEP and US Environmental Protection Agency.
3. The Panel also realizes that the study authors must follow standing state water quality standards and not newer federal criteria which were not adopted by the state.

Recommendations

1. The Panel recommends that the District seek new ways to utilize *existing* monitoring resources to provide collective accounting for water quality and ecosystem restoration progress across the agency. The place to begin might be with the Everglades Protection Area (EPA) water quality monitoring activities (reported in Chapter 3A), which have the potential, in particular, to highlight progress in meeting the Long-Term Plan's goals and objectives (needed in Chapter 8). There is also a potential, via use of software development, to establish such assessments whereby the need for large staff time commitments each year could be reduced, perhaps considerably. The key factor in the Panel making this recommendation is the opportunity to take advantage of the past efforts of Chapter 3A authors in developing a consistent and peer reviewed assessment methodology which lends itself to software development.
2. The Panel recommends that SFWMD petitions and cooperate with the FDEP and US Environmental Protection Agency to resolve the ambiguity of SSAS for DO and other pertinent pollutants that may be a threat to Everglades Protection Area and for which the standing federal criteria are not state standards. Such standards should be three dimensional, i.e., expressed in terms of magnitude, and duration and frequency of allowable excursions. The current excursions derived from the CWA Section 305 reports may not be applicable to problematic pollutants such as DO.
3. The panel also recommends that in the future, sediment surveys are also periodically but not necessarily annually conducted and historic trends developed.

Governing Board Highlights

1. The District is to be complimented in allowing the SFER reporting process to mature to a point where a more automated and integrated overview of progress toward achieving water quality and ecological restoration goals and objectives is feasible within a large and complex ecosystem. However, the current SFER reporting process will need to redirect some of its efforts toward integration and automation since it was originally established to meet legal reporting requirements, law-by-law, as current chapters note in each of their introductions. In other words, there is a need to focus on additional integration of accounting for collective environmental restoration progress across South Florida, in addition to the individual chapters describing individual programs and legal reporting requirements.
2. Because the Everglades Protection Area waters are *de facto and/or de jure* Outstanding National Resource Waters, the SFWMD, FDEP, and US Environmental Protection Agency must revisit and work together to develop better site specific alternate standards protective of a balanced fish life in the Everglades system.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 3B

Level of Panel Review: Accountability (primary); Integrative (secondary)
Reviewers: J. Burger (AA), O. Stein (A)

Posted: 10/18/10 at 9:45 AM by J. Burger

Conclusions

1. This chapter 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.
2. Mercury and sulfur issues cross-cut several chapters, and this years 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.
3. 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 bass mercury with time, as only two of the five sites show a statistically relevant decrease.
4. They have effectively used bass as bioindicators of mercury exposure, and these 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.
5. The inclusion of data on mercury in Florida Panther and the Burmese Python are 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.

Recommendations

1. Continue developing an understanding of the relationship between mercury and sulfur, including appropriate models and simulations.

2. Determine what causes the general north south increase in mercury

3. Examine more clearly the data from STA-1 to determine why levels are lower, and determine if the mechanisms could work in other STAs

4. Determine if annual concentrations variations correlate with annual variations in hydrology.

5. Continue the use of the standard bioindicators (including egrets) while new ones are added.

6. Develop models that use information on methylation, mercury levels, and sulfur levels from the same location. This will require additional data on sulfur levels.

7. Correct the lack of statistical analysis of some key issues. A statistical analysis (such as repeated measures ANOVA) could be used to test for time trends in the data all sites simultaneously.

8. Concentrate on filling data gaps in the preliminary mass balance results (e.g soil oxidation by hydroperiod).

9. Develop a better estimate of the quantity of sulfur removed by crop harvest.

10. Develop methods to normalize fish lengths for all mercury analyses.

Governing Board Bullet Point

1. Chapter 3B is an important chapter because mercury and sulfur present some of the most challenging issues to restoration of the Everglades and to RECOVER goals.

2. This chapter offers the SFWMD and the state of Florida the opportunity to work together to understand mercury cycling, and the factors that contribute to spatial and temporal differences in mercury in different components of the trophic structure of the Everglades.

3. Mercury cycling remains problematic as mercury remains high in some areas, and in some STAs, despite extensive study, and these differences allow for experimentation and observations designed in an adaptive management strategy.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 4

Level of Panel Review: Accountability (primary); Technical (secondary)
Reviewers: V. Novotny (AA), R. Ward (A)

Posted: 10/22/10 at 06:13 PM by V. Novotny

Additional Comments

1. In Responses #1 and #2 the authors attempted to explain the variability among the watersheds. The Panel agrees that the District should implement and expand the program of monitoring homogenous land uses that were identified as hazardous lands (areas of water quality concerns) such as urban residential low density (fertilizer inputs), dairies, sugar cane, etc. with a more detailed differentiation among the land uses. It was found that the P load ranged from 0.11 lbs/acre-year for natural areas, which is a base line, up to 12 lbs/acre-year for dairies. Subsequently the best management practices that would fit best for each type of hazardous land should be identified and their effects expeditiously studied and determined. It is unfortunate that the evaluation of some standard BMPs in Chapter 10 showed low success, ranging from a negative effect of wetlands to higher efficiency hybrid systems which, unfortunately, cannot be used on a large scale. Considering changing some highly hazardous land uses to a less polluting land should not be omitted. The ongoing monitoring of heterogeneous large watersheds could then be linked by modeling with the unit loads from the homogenous land use segments to get a better picture of the effects of remedial measures on the total loads. The authors response indicates that this might be the approach to improve the current rather low reductions of 19% of the total P load.

2. The authors' response to the Panel's comments for Chapter 4 and Chapter 3A (quoted below) resulted in a question regarding assessment of compliance in two of the District's large-scale programs. The question arises regarding the use of models in the SFER. The Panel recognizes there are different types of models, such as statistically-based and physically-based. Each, with its own set of limitations, can be used to support environmental management decision making. In all cases, model results are predictions. Why are the results of one category of model viewed as 'severely problematic' in assessing water quality standards in Chapter 3A? Is there a policy that accepts one type of model to the exclusion of other types?

   Chapter 4 quote: "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.*"

   Chapter 3A quote: "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."

3. In the response to Comment #7 the authors explained the control of high nutrient loads from urban lawns. It was reported in the SFER that urban areas exhibit very high P loads, most likely attributed to overuse of fertilizers on home lawns. The response addressed the controls of composition and labeling of fertilizers on the market at the point of sale but not how the limiting application rates are restricted and regulated on the homeowner sites at the point of use.

4. Comment # 14 asked for unification of the coordination of nutrient control measures presented in Chapters 4 and 10. Chapter 10 is more detailed but, unfortunately, many common BMPs for reduction of nutrient loads, as reported throughout Chapter 10 for the Lake Okeechobee watershed, have failed and should not be used. This is especially disappointing for wetlands that showed negative effects, ditch and fencing, experimental pond and wetland in Taylor Creek, etc. It also appears that the nutrient controls from urban residential lands have yet to show a significant impact. Consequently, Chapter 2 should make a reference to these findings, for example, in a summary table provided by the authors of Chapter 10. Such summary table on the results of BMP monitoring is also missing in Chapter 10.

Conclusion

Over the years, nutrient source controls in South Florida have been steadily evolving due to legal developments, regulatory revisions, and new science findings. This constant change makes it difficult to measure improvements in South Florida's environmental health which can be attributed to nutrient source controls *in a collective sense*. As a result, Chapter 4 focuses on reporting reductions of individual source control efforts. Thus, there is not a clear connection, presented in the SFER, between the nutrient source control program results and achieving compliance with water quality standards, such as those expressed in the Long-Term Plan (presented in Chapter 8) and also reported in Chapter 10.

Recommendations

1. Chapter 4 authors note, in their response to the Panel's review, development of "collective source control performance measures for the Lake Okeechobee Watershed" to be used in future reports. The Panel encourages such development as soon as possible to support a strong accountability statement and suggests that similar efforts need to be undertaken in all portions of South Florida (as divided by the SFER chapters).

2. After years of monitoring nutrient loads from watersheds, the program may need some retooling, i.e., focusing not only on monitoring nutrient loads and calculating mean nutrient concentrations (event mean or annual) but also on researching the unit loads from a variety of homogenous (smaller) land segments or pilot watersheds with contemporaneous assessment of "fit for purpose" BMPs. The Panel recommends the teams working on Chapter 4 and 10 topics cooperate.

Governing Board Highlights

1. The nutrient source control programs (described in Chapter 4) have reached a level of maturity capable of, collectively, impacting achievement of Long-Term Plan water quality standard compliance goals (presented in Chapter 8). This impact needs to be measured in a scientifically sound manner and included in the SFER to assist in documenting success of the nutrient source control program, as well as other programs, in achieving the District's broader environmental goals.
2. The success so far of nutrient reducing measures and best management practices has been mixed and several key BMPs have shown to be ineffective or even having a negative effect. The program should be partially retooled and accelerated in order to achieve the TMDL goals reasonably soon.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 5

Level of Panel Review: Technical (primary); Accountability (secondary)
Reviewer: O. Stein (AA)

Posted: 10/21/10 at 5:56 PM by O. Stein

Review primarily on a technical basis and secondarily on an accountability basis is appropriate because Chapter 5 reports on many ongoing scientific studies to optimize STA performance, but also reports on compliance of the STA with operational permits for which the District must remain accountable. Overall, the authors have made a good-faith effort to respond to the panels' comments and indicate that the final version will incorporate the suggestions or alternatively the authors have provided better clarification or explanation for a differing interpretation. However, there are a few points on both the technical and accountability reviews that the panel continues to take issue with the authors' responses and/or anticipates better explanation in the final report. These are highlighted in the sections below.

Conclusions (Technical Review)

1. The panel encourages the District to re-evaluate the potential use of remote sensing for underwater topography and vegetation assessments. Several new methods in this rapidly advancing science appear to have the ability to "see" through the water column to distinguish at least the ground surface and quite possibly differences in SAV species density, at least in a monoculture. If it has been a few years since the district has explored options, it is time to re-evaluate.
2. In regard to the comments on correction of flow anomalies (Comment #12), the panel recognizes the need to periodically recalibrate stage-discharge relationships and other routine flow measurement data requirements. The main point of the original comment was requesting a better explanation of what the extensive CFD models being developed will be used for. There is at least the potential for these to be used in lieu of traditional flow measurement calibrations, but this was not the main point of the comment. Rather, these models are very expensive to develop and the panel was requesting that more information on their intended use.
3. The panel does not understand the authors' response as to how the 12 point rolling average TP concentrations in Figure 5.6 are calculated (Comment #15). The data in the figure certainly appears to be inconsistent with the text description in the draft report which is merely repeated in the response. Large gaps as seen for the data for STA5 and STA6 are not consistent with a rolling average calculation, suggesting something is in error.
4. The panels' intent regarding flow weighting of DO measurements (Comment #17) was that flow weighting would better represent the actual mass of oxygen transported out of the STAs. Since the structures with the lowest flow are typically those with the lowest DO, *not* using a flow weighted mean underestimates the success of the STAs for DO enhancement and therefore may not be in the District's best interest. Reporting data as a FWM also emphasizes the points made in the accompanying text.

Conclusions (Accountability Review)

1. The need for a better explanation for how the STAs are deemed in or out of compliance is glaringly obvious since the panel interpreted this section as indicating that the all STAs except STA3-4 were out of compliance. Table 1 may have a row indicating "Yes" they are in compliance, but one need only look at the data in Figure 5.5 to conclude exactly the opposite; every STA except 3-4 has a TP concentration higher that the reported interim limit in WY2010. If there is no a contradiction between these information sources, the Chapter inadequately indicates why. Since reporting the performance for this water year is a fundamental goal of this Chapter, something is amiss when readers cannot make a self determination of data compliance compared to the statutory effluent limits.
2. The District clearly spends and enormous amount of time and money to optimize performance of the STAs and, in general, does so quite effectively. Many scientific studies have been, and continue to be, conducted to better understand factors influencing performance and the results have often led to improved performance. Many of the current studies have the promise to be similarly useful. However, the panel questions the balance between the suspected costs of certain studies in relation to the utility of the anticipated results. For example, interpretation of the soil data presented in this year's report seems to be used only on an "ad hoc basis, e.g. when performance of a cell is problematic." The District misses an opportunity to further STA optimization with such limited use of the results. Alternatively, if this limited goal is all the District requires from these studies it appears that it could be achieved with a significantly scaled back study design. Therefore the District could move in either direction; better use of the collected data for more comprehensive performance evaluation (this appears to be possible in the current soils study using the presented experimental design) or fall back and use a more limited (and less expensive) sampling protocol focused on a more limited operational optimization for when performance is problematic. As presented, this study's effort seems to be incongruent with the utilization of the collected data. Note that the panel uses this study only as an illustration: other studies likely have a utility that is not in balance with the effort. Therefore a comprehensive evaluation of studies should be done on a periodic basis to determine which should be scaled up and which should be scaled down.

Recommendations

1. The authors provided very helpful responses to the panel's comments on the draft chapter. The revised chapter should include all of this explanation and information, and the editorial suggestions should be incorporated as well.
2. The District should review new technologies for more rapid evaluation of STA topography and especially dominant vegetation communities. Cheaper and more rapid assessments would lead to more rapid responses to undesirable shifts in community structure and better long term performance.
3. The District needs to a better job of explaining how the STAs comply with the operating regulations. The current version of the Report present data which appears to be in conflict with the stated compliance criteria. Correction of this inconsistency and a better explanation of the requirements is necessary.
4. The District should develop a formal set of review criteria to evaluate the utility of the many scientific studies conduct in a effort to optimize STA performance. In some cases the effort may be too much or too little for the expected utility of the results. In general, the panel believes that the District tends to underutilize the volumes of data that are

collected. Better and more complete analysis would make better use of the expense and effort put forth in the collection of the data.

5. Review of this Chapter benefits greatly when the team includes both an engineer and a biologist/ecologist. This balance is missing on this year's team as the ecologist perspective is clearly lacking. Therefore a biologist should be included as part of review next year's review team.

Governing Board Bullet Points

1. Chapter 5 STA Performance, Compliance and Optimization is one of the more unique chapters of the SFER in that contains important reporting of water quality performance and compliance results but also contains a description of the scientific and technical challenges the District faces in efforts to optimize the STAs. This year's chapter attempts to summarize the performance and compliance components for this water year and focuses technical aspects on a few key scientific studies that are ongoing, making only minor reference to others. The latter is in positive response to recommendations made to previous reports.
2. Adequate explanation of recent changes to the regulatory requirements has not been successfully incorporated into regulatory compliance sections. In fact, the panel apparently misinterpreted the conclusion regarding compliance of the total phosphorus load criteria, believing that all but one of the STA's were out of compliance when in fact they are all in compliance. The regulatory requirements are complex and ever-changing, but comparison of the measured data to the regulatory requirements is arguably the most important function of this Chapter and the draft report misses the mark.
3. Optimization of what is the largest-scale constructed wetlands project in the world is a continuing scientific and technical challenge for the District. In many instances the District's efforts are one-of-a-kind with no previous examples to emulate and the overall success of the STAs in improving water quality, especially in phosphorous removal, is commendable. However, the District should develop a more formal review process of specific studies to better assess whether they are meeting performance optimization objectives.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 6

Level of Panel Review: Technical (primary); Integrative (secondary)
Reviewers: J. Burkholder (AA), J. Burger (A), P. Dillon (A)

Posted: 10/22/10 at 2:09 PM by J. Burkholder

Chapter 6 is generally excellent in both technical and integrative 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. 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. The research and monitoring are clearly described and soundly interpreted, and the overall program seems comprehensive and thorough. The chapter authors carefully considered and addressed each of the panel's comments, and provided explanations backed by sound rationale in response to the panel's questions. The only comment that requires additional consideration by the chapter authors is to more clearly present the overall objectives of the "ghost tree islands characterization study in Water Conservation Area 2A, and the rationale/links to management.

Recommendations

- In future District efforts, address the carefully conceived recommendations developed by the authors of Chapter 6 about continued control actions and research needs for priority nonindigenous invasive species. Completion of these recommendations will significantly reduce the threat that these species pose to the District's restoration efforts in the Everglades Protection Area, and to RECOVER goals.
- Conduct further analysis of tree island topographic conditions to determine the specific hydrologic conditions that indicate higher risk of Old World climbing fern invasions. Identification of the specific hydrologic conditions that encourage the establishment of this invasive species will be important in guiding Everglades's restoration efforts.
- Develop plans to assess the role of charaleans in Everglades nutrient cycling, aquatic food webs, higher trophic levels, and CERP restoration success as soon as possible.
- In recognition of the fact that the level of precision is unknown for estimates of nesting wading bird populations, continue to assess how to improve estimates of precision for these populations. In the interim, round the data in order to limit, as appropriate, the number of significant figures reported.
- More closely examine hydropatterns in WCA-2A in order to provide important information needed to improve efforts to restore tree islands.
- Conduct further work to improve understanding about the relative contribution of wading bird guano to phosphorus and nitrogen enrichment on tree islands, and the role of wading birds in maintaining tree island productivity.
- Continue the important work in the CHIP to continue to track conditions in the established plots. These data will be extremely important in helping to guide the District's restoration efforts.
- Complete additional efforts needed to assess the climate gradients across South Florida, such as downsizing coarse spatial-scale global circulation models and developing predictive climatic indices across an appropriate range of scales. This effort will be

extremely important to help the District appropriately adjust its restoration efforts to account for the effects of climate change.

- In future SFERs, more clearly relate the overall ecology of the Everglades Protection Area to the Coastal Ecosystems in order to strengthen the integrative quality of Chapter 6.

Overall Highlights

- Chapter 6 is excellent in both technical and integrative quality. The overall program seems comprehensive and thorough.
- The expanded emphasis on noninvasive exotic species further strengthens the chapter. The authors' sound recommendations should be carried out regarding continued control actions and research needs to mitigate the impacts of priority nonindigenous invasive species.
- The integrative quality of the chapter will be even more improved by more clearly relating the overall ecology of the Everglades Protection Area to the Coastal Ecosystems.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 7

Level of Panel Review: Accountability (primary); Integrative (secondary)
Reviewers: R. Ward (AA) and J. Burkholder (A)

Posted: 10/18/10 at 5:10 PM by R. Ward

The Panel my also provide constructive guidance for the District's large-scale programs, particularly as related to water quality assessment and control across the agency.

Chapter 7, entitled Everglades *Restoration Update*, of the South Florida *Environmental Report* (*italics* added) does not provide an update of environmental progress resulting from restoration programs and projects. Rather, it provides an update of annual *work plans and activities* (or 'fiscal commitments') for the Comprehensive Everglades Restoration Plan (CERP), the Northern Everglades and Estuaries Protection Program (NEEPP), Restoration Coordination and Verification (RECOVER), and related watershed plans and programs. The chapter authors' response to the panel's comments states that this chapter is only intended to be a "high-level overview." If so, then the chapter misses the goal of its title. More importantly, the chapter fails to inform readers about integrated progress in Everglades environmental restoration. Environmental progress is provided in "pieces" within other SFER chapters and District reports, referenced in the text. Given that Chapter 7 does not, itself, update the reader on Everglades environmental restoration progress, but rather administrative work plans, its title is misleading. In addition, nowhere in the SFER is an actual integrated summary on progress in Everglades restoration.

There seem to be two options for addressing this disconnect. One, the title of the chapter could incorporate more appropriate wording, such as: "Everglades Restoration Work Plan and Activities Update". Or, two, the chapter could incorporate highly synthesized environmental information that informs readers of the environmental impact of the large-scale programs. To further elaborate on this second suggestion, Chapters 2, 3, 4, 5, 6, 10, 11, and 12 present detailed environmental information on specific projects or about collective projects in specific regions. Chapters 7 and 8 present rather broad descriptions of large-scale programs and associated project work plans and activities.

Whether either of these options is followed, the important point remains that there is no attempt in the SFER to synthesize environmental results from the many projects and programs into a form that can be correlated with the work plans and activities of the large-scale programs. Thus, it is difficult to connect the work plan and activities updates of Chapters 7 and 8 with the resulting environmental impact of the large-scale programs.

In summary, the environmental restoration efforts of the SFWMD have reached a maturity and level of success, *individually*, that now beg to be *collectively* documented in restoring the water quality and ecological health of the entire ecosystem of South Florida.

The authors' (from more than just Chapters 7 and 8) responses to such comments indicate that the Panel's suggestions to cross-reference chapters (e.g. synthesize environmental data to correlate with environmental restoration progress of large-scale programs), as the Panel is asked to comment on in the SOW, are beyond the scope of Chapters 7 and 8, and/or difficult to accomplish. In responding to panel comments, the authors of Chapter 7 indicated that "RECOVER is responsible for evaluating and assessing the natural and human systems of South Florida in response to CERP implementation; RECOVER is an interagency team, rather than a District program; and "it is beyond the intent and ability of annual SFER reporting to provide [a]

comprehensive synthesis." Yet the important point remains that the SFER suffers from the lack of an integrated summary about how efforts *during this year* advanced environmental progress in Everglades restoration. In fact, as the panel noted earlier, the writing in Chapter 7 is so brief that, countering the chapter title, it is difficult for readers to determine whether progress has been made.

Key Conclusions, Recommendations and Governing Board Highlights

Conclusions

1. Chapter 7 strives to describe a large and complex set of programs and projects designed to restore the Everglades. Via the use of live links, appendices, and references to other SFER chapters, the chapter provides insights about the ongoing administration of restoration plans and activities.

2. The chapter title, however, misinforms readers that this chapter will provide an integrated update of Everglades environmental restoration progress. There is no summary or overview of such progress in the chapter. Rather, readers are referred to other chapters and reports for such insights in a piecemeal fashion, and therefore are unable to readily correlate work plan progress with environmental restoration progress. Without this connection, readers of Chapter 7 are left with no basis – throughout the SFER – to understand how the work plans and activities are leading to environmental restoration, per the management goal (line 5 of Chapter 7) to '…restore, preserve, and protect the Greater Everglades ecosystem.' The National Research Council, in its 2010 draft report *Progress Toward Restoring the Everglades*, states the dilemma as follows: "To ensure stronger coupling of engineering design and operations with ecosystem assessment, project monitoring should be well integrated with systemwide monitoring and assessment.' Chapter 7 of the SFER is where this coupling *should* be explained and summarized.

3. Chapter 8 notes the existence of a Long-Term Plan to restore water quality in the Everglade Protection Area, to the point where it complies with standards. Since both Chapters 7 and 8 strive to describe the work plans and activities of large-scale programs - attempting to accomplish the same goal - the chapters should be either better integrated in format and content or combined into one integrated description of restoration programs that also explains the reasons for the different programs and how they compliment each other. Both chapters, or a combined chapter, would significantly benefit from inclusion of an overview of restoration progress similar to that contained in the above noted draft 2010 NRC report on pages 3-7. More importantly, the SFER needs such a synthesis of progress in environmental restoration of the Everglades.

Recommendations

1. During preparation of the 2012 SFER, serious consideration should be given to a synthesis of existing water quality, flow, and ecosystem health data to accompany Chapter 7's update of work plans and activities. If not in Chapter 7, then as an addition to Chapter 1, the SFER should include a synthesis of progress accomplished toward environmental restoration of the Everglades.

2. Consider organizing Chapters 7 and 8 into 'work plan and activities update' and 'environmental restoration update' themes, respectively. Chapter 7 could combine the current contents of the two chapters while a new Chapter 8 delves into the need to update readers of the SFER about system-wide improvements in environmental conditions that are beginning to emerge *as a result of implementation of the large-scale program work plans and activities*.

Governing Board Highlight

Updates of large-scale restoration program progress (which, according to its title, was the goal of Chapter 7) need to connect work plans and activities with system-wide monitoring feedback. Everglades restoration efforts are maturing to the point where updates of work plans and activities should routinely be accompanied by related data and information about trends in water quality and ecosystem health improvements, or lack thereof.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 8

Level of Panel Review: Accountability (primary); Integrative (secondary)
Reviewers: R. Ward (AA), O. Stein (A)

Posted: 10/20/10 at 7:31 PM by R. Ward

The Chapter 8 author's response indicates some of the minor changes recommended by the Panel will be made; however, there are larger (e.g., chapter purpose, structure and content suggestions) that are not being adequately addressed. In the spirit of the SOW review question, noted below, the Panel further elaborates on its chapter purpose, structure and content concerns in hopes that the 2012 SFER will reflect a more complete response to the Panel's Chapter 8 (and Chapter 7) suggestions.

The Panel my also provide constructive guidance for the District's large-scale programs, particularly as related to water quality assessment and control across the agency.

Chapter 8, entitled "*Implementation* of the Long-Term Plan for *Achieving Water Quality Goals* in the Everglades Protection Area", of the "South Florida *Environmental Report"* (*italics* added) does not provide an update of water quality progress resulting from implementation of Long-Term Plan projects. Rather, it provides a list of projects and, in general, directs the reader to other parts of the SFER for current information about specific projects. Current and past compliance with water quality standards in the Environmental Protection Area (EPA) is described, in detail, in Chapter 3A, but Chapter 8 does not synthesize this information to give the Chapter 8 reader insight into how Long-Term Plan project implementation is helping achieve water quality standard compliance. Given that Chapter 8 does not, itself, provide a broad overview of Everglades Protection Area water quality status, an opportunity to connect improving water quality conditions to Long-Term Plan implementation is lost.

Chapters 7 and 8 describe large-scale programs aimed to restore environmental health of the Everglades. Neither synthesizes environmental data and information about the program's progress in meeting environmental goals. Chapters 2, 3, 4, 5, 6, 10, 11, and 12 present detailed environmental information on specific projects or about collective projects in specific regions. Chapters 7 and 8 present rather broad generalizations about large-scale programs and associated project work plans and activities. Chapters 7 and 8 make no attempt to synthesize environmental results from the many projects and programs into a form that can be readily correlated with the work plans and activities of the large-scale programs. Thus, it is difficult to connect the work plan and activities updates of Chapters 7 and 8 with the resulting environmental impact of the large-scale programs.

The environmental restoration efforts of the SFWMD have reached a maturity and level of success, *individually*, that now beg to be *collectively* documented in restoring the water quality and ecological health of the entire ecosystem of South Florida. Separate SFER Chapters provide insight into the environmental improvement of specific projects but there is no short summary of systemwide conditions similar to the National Research Council, in its 2010 draft report *Progress Toward Restoring the Everglades*, pages 3-7. Thus, Chapters 7 and 8 lack an overall environmental accounting of their collective progress in meeting their goals and objectives.

Key Conclusions, Recommendations and Governing Board Highlights

Conclusions

1. The title of Chapter 8 implies, to the Panel, that the Long-Term Plan is being implemented to achieve water quality goals. Yet the contents of the chapter do not address water quality goal achievement.

2. The 10-page long Chapter 8 consists, mainly, of a table listing projects that are part of the Long-Term Plan to bring water quality conditions in the EPA into compliance with applicable standards. With the vast majority of the projects' implementation status described in other chapters, it is difficult to understand how *Chapter 8* meets its purpose of presenting *"…an update on the progress of the implementation of the Long-Term Plan…"*. As it currently stands, Chapter 8's purpose appears to be presenting a listing of projects that constitute the Long-Term Plan.

3. The Long-Term Plan is one of the major large-scale programs currently operating in South Florida to restore the Everglades while continuing to meet human water needs. The other large programs (e.g. CERP, NEEPP, and RECOVER) are presented and updated in Chapter 7. It is not clear why all the large-scale programs are not presented in one chapter where the ways in which they compliment each other can be presented in an integrated manner.

Recommendations

1. There is a need to connect monitoring results from Chapter 3A to an assessment of progress in meeting the water quality standard compliance goals of the Long-Term Plan, as described in the title to Chapter 8. Such an assessment could be a sub-activity extension of the Chapter 3A assessment each year, using the previous year's Chapter 3A data and findings (to give time to prepare an assessment).

2. Very brief descriptions of three large-scale programs to restore the Everglades are presented in Chapter 7 and a table listing of another large-scale program is presented in Chapter 8. Chapter 7 makes good use of live links and appendices to assist the reader in gaining insight into the programs' progress. Chapter 8 should also make better use of live links and appendices, where appropriate, to inform readers how the Long-Term Plan is being implemented to restore water quality conditions in the EPA.

3. Consider organizing Chapters 7 and 8 into large-scale program 'work plan and activities update' and 'environmental restoration update' themes, respectively. Chapter 7 could combine the current contents of the two chapters while a new Chapter 8 delves into the need to update readers of the South Florida Environmental Report of the systemwide environmental condition improvements that are beginning to emerge *as a result implementation of the large-scale programs*.

Governing Board Highlight

The SFER describes at least four major, large-scale, programs to restore the Everglades (three in Chapter 7 and one in Chapter 8). Neither chapter, however, synthesizes systemwide water quality, flow, or ecosystem data for the purpose of updating SFER readers about the environmental achievements of the large-scale programs. The large-scale environmental restoration efforts of the SFWMD have reached a maturity and level of success, *individually*, that now beg to be *collectively* documented in restoring the water quality, water flows, and ecological health of the entire South Florida ecosystem. The 2012 SFER needs to address what, and how, large-scale program information is presented in Chapters 7 and 8 via a comprehensive reorganization of this portion of the annual *environmental report* for South Florida.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 9

Level of Panel Review: Integrative (primary); Technical (secondary)
Reviewers: J. Burger (AA) and J. Burkholder (A)

Posted: 10/18/10 at 9:47 AM by J. Burger

Conclusions

1. Overall Chapter 9 is excellent, and will be even more strengthened by the additional information that, as the chapter authors indicated, will be added to the chapter in response to the panel's comments, all of which have been carefully considered and thoughtfully addressed.
2. In its integrated efforts with various other agencies, the District's ongoing work and accomplishments in addressing the critically important issue of nonindigenous species in South Florida are impressive and expanding, including its aquatic plant management program which is the largest such program in the nation.
3. A key feature of the District's approach lies in its prioritization of the plants and, in more recent efforts, the animals that present the greatest threat to restoration efforts.

Recommendations FOR 2011 REPORT

1. Integrate the presence and effects of non-indigenous species into the overall research plans, for the relevant RECOVER modules.
2. Continue coordination with the authors of other chapters to more fully integrate invasive species management.
3. Relate nonindigenous species management and control to specific recovery goals, which relates to a management strategy and evaluation of the overall critical species to control.
4. Maintain a website that contains the latest species accounts (with stoplight information) for all species that have so far been examined.
5. Consider developing a permanent document that has the stoplight approach for all invasive and non-indigenous species.
6. Develop a plan for performance measures for success or management of non-indigenous species.
7. Add a "critical needs" section to each species account.
8. Include more information on "underground fisheries" in the 2012 SFER.
9. Consider having a short section for each species that explains why it is of such high importance to the RECOVER modules.
10. Add explanation (or perhaps a table) to inform readers about working groups that exist for various non-indigenous taxa in South Florida. Suggest additional technical teams that would help for other priority species, and explain that thus far this goal has not been addressed because of staffing/financial constraints.
11. Convene a workshop of experts to consider how to identify potentially high risk non-indigenous species that should be examined now, and how to identify species that have the potential to be hazardous to RECOVER goals.

12. Convene a workshop to address other risk assessment tools and innovative approaches for assessment and control of nonindigenous species.
13. Establish a research advisory panel to facilitate prioritization and coordination of efforts to control the Burmese python and other major reptile pests. Such a group could consist of academics, conservationists, pet trade people, and appropriate agency scientists.

Governing Board Bullet Points

1. As the chapter authors recommended, the panel strongly supports prioritization of animal-related threats across regulatory agencies, as has been done for nonindigenous plants.
2. It would be helpful to perform an analysis describing how failure to undertake efforts to control certain nonindigenous species because of funding constraints is projected to impact South Florida ecosystems. Such an analysis would underscore the critical importance of continued and strengthened efforts to control nonindigenous species.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 10

Level of Panel Review: Technical (primary); Accountability (secondary)
Reviewers: P. Dillon (AA), V. Novotny (A)

Posted: 10/21/10 at 07:26 AM by P. Dillon

General Comments

Lake Okeechobee is one the largest freshwater lakes in the USA and a significant multi-purpose resource. It is also a very vulnerable lake with respect to water quality. It is therefore important that the SFER answers fully the major concerns with the current water quality status that result from the nutrient loadings.

A considerable number of technical comments and a number of suggestions regarding additional information that could be useful in the chapter were raised by the reviewers. The authors have addressed most of the concerns adequately in their reply. The authors responded to a number of the reviewers' concerns by pointing out that relevant information is housed in other documents rather than this chapter. For example, the Lake Okeechobee Watershed Protection Plan (LOWPP), in particular, when updated in 2011 will address many of the issues raised by the reviewers. Nevertheless, this leaves the reader with many unanswered questions. The TMDL study for the lake is the key tool for the abatement of nutrient pollution loads from agricultural, urban and other sources. The TMDL established the goal of 140 metric tons input of phosphorus to achieve the goal of the average phosphorus concentration in the lake of 40 μg P/L, a level consistent with adequate oxygen concentrations and overall acceptable (although still much poorer than ideal) water quality. The current 5-year mean load is much higher and would essentially have to be reduced by about 70% to achieve this goal. The report did not address a meaningful plan that would achieve this goal but focused on current water quality conditions and the success of various technologies taken to reduce phosphorus inputs. The extent of the work is impressive; however, the technologies employed have had varied success. Progress towards phosphorus load reductions has not been rapid and the challenges appear to be almost insurmountable.

Technical Review: In general, the technical aspects of this chapter are sound. The extent of the work is impressive and, while many of the technologies tested and employed have been unsuccessful or only marginally successful, the work carried out and the interpretation of the results appears to be technically sound. The conclusions drawn are consistent with the data collected and reported. Gaps exist in the document but they are or will be addressed in other documents (e.g. the 2011 LOWPP).

Accountability Review: The draft document presents a defensible account of data and findings for the areas being addressed. The synthesis of this information presented in a logical manner, consistent with earlier versions of the report. However, the findings are not well-linked to the overall management goals and objectives for the Okeechobee Basin. Future versions of the SFER should include at least a synopsis of relevant material from the LOWPP, specifically how much can be accomplished by the technologies and best management practices towards achieving the phosphorus load reduction goal. In addition, the target phosphorus loading and target phosphorus concentration need to be re-visited regularly to take into account scientific advances in our understanding of nutrient-water quality relationships. The 140 ton loading and 40 μg/L concentration should be considered interim targets.

Key Findings and Recommendations

1. Watershed construction projects undertaken in Phase I for the purpose of reducing phosphorus loads have had very mixed success. The sediment removal pilot project failed to remove phosphorus and the constructed storm water treatment areas have had very limited success. These do not seem like fruitful areas to pursue in future.

2. Application of best management practices in portions of the watershed used for agriculture have had some significant impacts in terms of reducing phosphorus loads; these practices are possibly the means of implementing further reductions that will be most successful and should be given high priority on a whole watershed scale.

3. Submerged aquatic vegetation has been restored in some areas, providing more suitable habitat for some groups of animals including benthos. Control of exotic vegetation by chemical means has been reasonably successful and should continue.

4. There have been some studies concerning means to control sediment release of phosphorus in this shallow lake because internal loading may contribute greatly even after external loads are reduced. More work needs to be done on the development of methodologies to minimize the internal phosphorus loading.

5. Even with extensive and expensive efforts to reduce P loading, the input is still at least 3 times the sustainable load. 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. The next LOWPP is critical in that a clear path to reducing the phosphorus loading needs to reconciled with the work done to date and reported in this Chapter on methods of reducing the loading.

6. Although many of the efforts to reduce phosphorus loading have not been effective, some of the water quality monitoring trends were in the right direction (decreasing P load and/or concentration. It is important to look at both load and concentration in these studies because of the important role of hydrology in this system. The conclusion that more aggressive nutrient control measures are needed to reach the 140 ton limit is the key finding of this report.

7. Of 11 performance measures indicative of lake status, only 2 have been met; this is expected because the P load is much greater than the sustainable level of 140 tons. Nevertheless, most signs are positive. The nutrient concentrations declined in both the open water and the nearshore water. Clarity increased and submerged aquatic vegetation increased.

8. Future versions of this Chapter should be much more closely integrated with the LOWPP. The Lake Okeechobee state of the lake and watershed chapter in the SFER should include an estimate of the potential load reduction that could be achieved by each of the approaches to load reduction investigated if the methods were widely implemented.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 11

Level of Panel Review: Technical (primary); Integrative (secondary)
Reviewer: P. Dillon (AA)

Posted: 10/21/10 at 07:28 AM by P. Dillon

General Comments

The work reported here is primarily technical in nature; however, the integrative aspects are also important. The overall goals of the work carried out in the Kissimmee Basin are clearly described and the work summarized in this chapter is, for the most part, clearly linked to these goals. In general, this chapter is clear, concise and well-written. Although a considerable number of technical comments and a few suggestions regarding organization of the chapter were raised by the reviewers, the authors have addressed all concerns adequately. Some of the comments were a result of the reviewers' lack of familiarity with the total picture concerning the many aspects of the work done and summarized in the SFER; the authors were able to point out where additional information and data that are relevant to this chapter are available in the complete report. The Summary and Introduction and Background sections are particularly well done and helpful to the reader who is not familiar with the overall program.

Technical review: In summary, the technical interpretations are sound and there are no places where the reviewers question the authors' interpretation of the existing data. The findings and conclusions are supported by best available information. The ongoing studies will be augmented in subsequent years by additional studies that will improve understanding of the recovery process in the Kissimmee Basin.

Integrative Review: This is an impressively large and ambitious program but it is presented in such a way that the overall goals are clear and linked to other portions of the complete report. The chapter is suitably cross-referenced.

Key Findings and Recommendations

1. The Kissimmee River Restoration Project is proceeding on schedule and resulting in some of the desired and predicted improvements in water quality in the river. The construction projects should continue as planned in the coming years as should the supporting scientific monitoring efforts.

2. The ecological integrity of the Kissimmee system has improved as evidenced by satisfactory oxygen levels in the river at most times, re-establishment of wetland plant communities excluding some important broadleaf species, and improved abundance of wading birds.

3. The phosphorus levels in the river have shown promising declines but remain above pre-Phase I levels. Since the input of phosphorus to downstream Lake Okeechobee represents almost a third of the total input to that lake, it is essential to reduce the phosphorus levels in the Kissimmee system further.

4. The abundance of native bivalves has not improved, possibly because of over-abundance and competition from an introduced exotic species of Asian clam. Biological monitoring should be broadened to include other groups of organisms as indicator species in addition to molluscs.

5. Wading bird breeding has not improved, likely because of inadequate food resources and high water levels.

6. Continued rapid population growth will result in the sustainable level of water withdrawal within the Basin being reached by 2013. Rule development for the reservation of the water needed for protection of fish and wildlife in the Kissimmee River and its floodplain has been initiated and will need to be put into effect very soon.

7. Results to date clearly indicate the major effects on the water quality in the Basin of large-scale events such as hurricanes. It is essential that there be a commitment to long-term monitoring to assess and separate the effects of these events from the effects of the restoration activities.

FINAL PEER-REVIEW PANEL COMMENTS ON THE DRAFT 2011 SFER – VOLUME I, CHAPTER 12

Level of Panel Review: Technical (primary); Integrative (secondary)
Reviewers: J. Burkholder (AA), J. Burger (A)

Posted: 10/22/10 at 02:03 PM by J. Burkholder

General Comments

This year's Chapter 12 was completely restructured in comparison to previous years, to achieve clearer focus on the coastal ecosystems the have been emphasized in District efforts, and to emphasize the monitoring/research activities related to the Caloosahatchee River Watershed Protection Plan and the St. Lucie River Watershed Protection Plan. The panel strongly supports this restructuring and feels that the chapter is greatly improved as a result. The basis for the District's approach in efforts to improve protection of some of the coastal ecosystems is also nicely explained.

Technical Evaluation

Technical review is appropriate for this chapter because there is a major research component and new data are being analyzed for unique interpretation. Chapter 12 describes many excellent efforts by the District, and contains a wealth of valuable information about selected important coastal ecosystems. Throughout the chapter, the maps are excellent and helpful and, in general, the chapter's organization and writing are greatly improved over last year's version, although the quality of the technical content and its presentation differs markedly in the discussions of these four regions. The authors' response to the panel's comments indicated that various concerns to improve the technical quality of the chapter would be addressed to strengthen the technical quality. These improvements will make the technical quality of the chapter generally excellent across the sections. Some concerns remain, as follows:

In response to panel comments, the authors of Chapter 12 stated that "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." Chapter 12 would be strengthened by an up-front inclusion and further explanation of this statement. Various VECs have been described in this and previous SFERs in writing which strongly suggests that the District has restoration goals for some of the Coastal Ecosystems. The hydrographic conditions of the Coastal Estuaries are the tacit "endpoint," after all, for evaluating the success of many District restoration activities in upstream watersheds.

The authors' response to the panel's first question in its comments was confusing, and seems inconsistent with the chapter text: The authors stated that the Arthur R. Marshall Loxahatchee National Wildlife Refuge is not a coastal resource, and that if the panel wants information about "results" for this Refuge, the panel should consult Chapter 5. Yet the question arose directly from material contained in Chapter 12 (p.12-78, last para.). The authors also stated that urban runoff is not routed directly into this Refuge; but the panel's question referred to the authors' writing, which described *indirect* routing of urban runoff into the Refuge, after passage through STA-1E. Perhaps the panel's intent was not sufficiently clear: the panel requested clarification as to whether an evaluation has been completed to assess how this Refuge is being affected by the treated urban runoff. Such clarification should be added to the final chapter.

The panel also found the authors' response confusing about the need for a clear, strengthened Summary for this chapter. The authors stated that the emphasis for Chapter 12 this year was "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;" and that "few projects were well enough along to produce detectable results." Regardless of the authors' emphasis, the panel reiterates that the efforts and accomplishments directed at that emphasis need to be clearly described in a strong Summary section. The panel suggested that since the chapter has been restructured into consideration of the Coastal Ecosystems as four regions, comparative information should be provided about estuaries across these regions – general status by region, major issues, etc. The authors' response was a disconnect: They stated that it was not their intent to provide "comprehensive information for each region or estuary," which was not what the panel had suggested.

Another apparent "disconnect" was the authors' response to the panel's suggestion to include a section about nonindigenous invasive species in the four Coastal Estuaries regions: Despite the fact that, for example, in previous SFERs eastern oysters – a valued ecosystem component (VEC) upon which some important performance measures for assessment of the success of District restoration efforts in upstream watersheds – have been described as threatened by the spread of green mussels; and despite the fact that Chapter 9 identifies green mussels as among the most important nonindigenous invasive species in South Florida – the Chapter 12 authors responded to the panel's suggestion by stating that serious issues with nonindigenous species within the District's estuaries have not been detected. The authors' response seems in contradiction with Chapter 9. The need remains for Chapter 12 to include information that addresses the known as well as the potential importance of nonindigenous invasive species in the coastal ecosystems.

The panel recognizes that the District does not have a specific goal of restoring *all* of the Coastal Ecosystems, and that the District is only one partner agency with numerous others involved in management of the Coastal Ecosystems. Nevertheless, the District has expended considerable effort toward improving some of the Coastal Ecosystems. Thus, the panel evaluated the subsection "Future Activities" for each of the four coastal estuarine regions as very important and in need of strengthening because the writing in the draft chapter does not do the District justice in capturing even the major activities that the District plans to initiate and to continue to conduct toward its goal of restoring some of the coastal ecosystems through successful restoration of upstream watersheds. The authors' response to this comment indicated, in part, their intent to focus on those estuaries where major projects are funded. That is a laudable approach but it needs to be adequately described to capture the District's hard work. The authors also described their intent not to [even] mention ongoing activities that have been described in previous reports. However, this information is important for readers' understanding since "future activities" include, and logically should include, ongoing projects.

In the interest of brevity, Chapter 12 sometimes omitted very basic information that could have been addressed with brief wording. For example, the description of Lake Worth Lagoon (p.12-60) included nothing about the fundamental, major characteristic of extensive urbanization in the sub-watersheds of the three lagoon segments. There was no mention of toxic substances, which are known to be important in affecting this coastal ecosystem, based on previous work by the District. The authors justified not mentioning this important impact on the ecosystem because the District presently is not tracking toxic substances, and has no restoration projects to specifically control toxic substances. The point remains that the District knows, in part through its previous efforts, that toxic substances are important in this ecosystem and, therefore, toxic substances merit mention to present a realistic description of Lake Worth Lagoon. Moreover, District upstream restoration activities that affect the Worth Lagoon.

Regarding the North Fork of the New River Estuary, the draft chapter stated, "Nutrient concentrations at site 16 from 2000–2010 have generally been lower since the 1974-1997 period, and salinity and TP 1400 concentrations, in particular, may be continuing to trend downward." The panel requested clarification about whether statistical trend analysis has been conducted; if not, the panel called for the writing to be altered to "*an apparent* trend downward." In response, the authors asserted that "statistical results can lend support for such a conclusion, but statistical analysis does not necessarily make a trend any more or less valid." That statement unfortunately

suggests lack of understanding about the importance of statistics in science for testing whether an apparent trend is, in fact, a statistically significant trend. Statistical significance *does* make an apparent trend scientifically valid. If a trend is not statistically significant, or has not been tested for statistical significance, then it should be described as an apparent or "qualitative" trend.

The panel remains concerned about use of the term submersed [submerged] aquatic vegetation (SAV) to include both macroalgae and seagrasses. Seagrasses, not seagrasses + macroalgae, are a VEC identified by the District in evaluating the success of its upstream restoration efforts. The draft Chapter 12 writing inadvertently included an excellent illustration of the importance of distinguishing between seagrasses (SAV) versus macroalgae: On p.12-101 the authors described an investigation of the Lake Surprise causeway cap (over the footprint of the original causeway) "to document the status of SAV recruitment" since completion of an excavation and filling project by FDOT. A two-year duration was to be allowed for SAV to naturally recruit into the cap area in order to determine whether transplanting efforts (of seagrasses, not macroalgae) would be necessary. The authors misstated that "SAV is recruiting well on the cap footprint" because most of the recruitment was described to have been by 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 asserted: 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." While some macroalgae can be beneficial, macroalgal overgrowth is a known, common cause of seagrass decline and failure to reestablish in disturbed areas. It is important that the writing of this year's Chapter 12 be altered accordingly.

Integration Evaluation

Chapter 12 would be greatly strengthened by improving its integrative character. The draft writing contained little integration, even within a region; the overall purpose of some of the studies described was unclear; and attempts were not made to integrate the studies that were described, except for the Florida Bay subsection. The authors' responses to the panel's suggestions for improving integration were troubling, because their basic stance seemed to be that integration of this chapter is not their job: "It was not our intent to attempt to integrate results….Other documents, most notably RECOVER's System Status Reports, fulfills this objective….Our primary goal was to report on environmental performance in relation to District activities." In that response the authors missed two fundamental points:

First, *the District charged the panel to evaluate this chapter on the strength of its integrative character.* The authors indicated, in response to all of the panel's comments and suggestions about integration, only that cross-referencing to other chapters would be improved. Much more is needed to improve the integrative quality of this chapter.

Second, the authors missed the point that *improved integration of this chapter with others is critically important because the coastal ecosystems represent the downstream endpoint of District restoration activities in upstream watersheds.* Thus, improving the integrative character of this chapter will strengthen the overall SFER. The panel had suggested that 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. In response, the chapter authors stated that District projects will only improve a "limited number" of estuarine areas, and that the authors have no intention of attempting to strengthen the chapter through addressing the panel's suggestions. Correcting the authors' assertion, it is exactly this sort of integration that has been needed, and has been requested repeatedly by the panel over a number of years, to strengthen Chapter 12. The South Florida Water Management District's restoration efforts stand to influence major estuarine ecosystems, as well as various minor estuarine ecosystems, across

South Florida. Therefore, District's upstream watershed activities toward restoration are enormously important to these estuaries. The authors should be strongly encouraged to work toward strengthening the integrative quality of this chapter.

Recommendations

- Describe the District's re-evaluation of the Science Plan for the Coastal Ecosystem Division in future SFERs, reflecting RECOVER goals and the District's more recent emphasis on projects and project results for the Coastal Ecosystems.
- Restructure the introductory Summary section to provide a clear understanding of the District's efforts and accomplishments in each of the four regions during WY2011.
- Address nonindigenous invasive species in the Coastal Ecosystems by adding a section about them, including explanation about jurisdiction of this issue in the Coastal Estuaries; what is known about the impacts of species identified as most potentially influential in affecting the District's selected VECs; and explanation about how the impacts of nonindigenous species are being considered or planned to be considered in RECOVER efforts for the Coastal Ecosystems.
- Strengthen the Future Activities section for each of the four regions in order to adequately capture the District's planned and ongoing efforts to restore coastal ecosystems. Summarize projected ongoing efforts in a well-designed table, and then emphasize projects and other activities that the District plans to initiate.
- Separate seagrasses (submersed aquatic vegetation, SAV) from macroalgae in all analyses and reporting of data, to ensure unambiguous evaluation of the effectiveness of District restoration efforts in upstream watersheds. Reserve the term "submersed [submerged] aquatic vegetation" (SAV) for seagrasses in recognition of the District's use of seagrasses, rather than seagrasses + macroalgae, as VECs.
- Throughout the chapter, clearly indicate whether interpretations about the data are based on appropriate statistical analyses, and temper interpretations accordingly.
- Include information about the freshwater macroalgal consortium in the Florida Bay system in Chapter 12 of future SFERs, given that the primary focus of the MFL rule and of recent research in Florida Bay includes this consortium, underscoring its importance in restoration efforts.
- To assist technical evaluation, add information requested by the panel to next year's Chapter 12, including:

  ✓ The approach used for the Integrated Modeling Framework for the St. Lucie Estuary, and outcomes of the listed tasks;

  ✓ Further information about the recalibrated CH3D salinity/hydrodynamic model and its simulations of a 41-year period of record for the Caloosahatchee Tidal Basin;

  ✓ Statistical analyses that examine the relationship between nutrient loads and phytoplankton chlorophyll *a*, and between nutrient concentrations and phytoplankton chlorophyll *a* (Caloosahatchee River Estuary);

  ✓ Total Kjeldahl nitrogen concentrations (Lake Worth Lagoon); and

  ✓ Explanation about the apparent decline in macroalgae shown on p.12-81, Figure 12-53 (Biscayne Bay).

- Strengthen the integrative quality of this chapter not only by cross-listing with other chapters, but also by providing comparative information about the four regions that the District has defined as encompassing the Coastal Ecosystems. Inform readers about similarities and differences of the coastal systems emphasized in District efforts in these four regions; major similarities and differences about the general status of impacts to the estuaries in each region, the general status of restoration, hydrologic rebalance, etc. Assess overall patterns in VECs, freshwater flows, nonindigenous invasive species, and water quality including mercury.

Overall Highlights

- The Science Plan for the Coastal Ecosystems, having been re-evaluated to reflect the District's recent emphasis on selected coastal systems that are the focus of its main efforts, should be described as an update in future SFERs.
- Chapter 12 should include information about nonindigenous invasive species in the selected Coastal Ecosystems that are mainly influenced by District restoration efforts in upstream watersheds, including explanation about jurisdiction of this issue in the Coastal Estuaries, and what is known about the impacts of major species of concern as most influential in affecting VECs.
- In recognition of the fact that the coastal ecosystems represent the downstream endpoint of District restoration activities, the District should be strongly encouraged to strengthen the integrative quality of this chapter.