

# TECHNICAL PEER REVIEW OF MINIMUM RECOMMENDED LEVELS: LAKE HAMPTON, FLORIDA

PREPARED FOR



PREPARED BY

**DSV**

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CONSULTING, LLC

HELPING CLIENTS MEET THEIR WATER RESOURCE NEEDS

**BFA** Environmental Consultants  
*Barnes, Ferland and Associates, Inc.*

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## EXECUTIVE SUMMARY

The Suwannee River Water Management District (District) has included Lake Hampton, located in Bradford County, on its current priority list and schedule for the establishment of minimum flows and levels (MFLs). based on the provisions of Subsection 373.802, Florida Statutes (F.S.). Also, based on the provisions of this Subsection, SRWMD has identified Lake Hampton as a water body for which the District will undertake independent scientific peer review.

The District staff has developed recommended MFLs for Lake Hampton. These recommended MFLs are described in a document titled *Minimum Recommended Lake Levels: Lake Hampton, Florida. Draft Report October 2016*. In support of development of these recommended MFLs, the District contracted with the consulting firm of Environmental Consulting & Technology, Inc. (ECT) for performance of water budget modeling. The work performed by ECT is described in a document titled *Lake Hampton Water Budget Modeling-Phase B Technical Report-Draft*, dated August 2016.

The District has engaged the services of two experts with collective expertise in the fields of hydrology, limnology, and biology. to serve as a peer review panel (panel) to review and evaluate information used for development of recommended MFLs for Lake Hampton. These panel members are from the water resources consulting firm of Dunn, Salsano & Vergara Consulting, LLC (DSV), which is acting as a sub consultant to the environmental consulting firm of Barnes, Ferland and Associates, Inc. These panel members include

- Donthamsetti Rao, Ph.D., P.E.,
- Bill Dunn, Ph.D.

These two panel members have worked extensively together in matters concerning the development, peer review, and implementation of MFLs in Florida for more than 25 years and have collective professional experience that exceeds 75 years in Florida

This report utilizes a tabular template for each of the peer reviewers to address the District's peer review requirements. Included as appendices are two sets of summary tables to capture the key elements of each technical review. The first set of tables, the review comments tables, summarizes each panel member's individual general and specific review comments along with any recommended actions (Appendix Tables 1-1 and 1-2). Each comment is treated as a separate row in these tables. The second set of tables, the peer review assessment criteria tables, includes each panel member's comments concerning the District's peer review assessment criteria, (Appendix Tables 2-1 and 2-2).

The peer reviewers find that most, but not all, of the conclusions in the two MFL reports are supported by the analyses presented. The reviewers generally concur with data and information collected, the data collection methods, the methods used for analysis and interpretation, and the two minimum levels recommended.

The reviewers strongly agree with the report's authors that whenever possible MFLs should be based on statistically defined protective hydrological events composed of: 1) a magnitude (flow and/or level), 2) continuous duration for the specific inundation or drying period, and 3) with a return interval.

Reviewers find that the Lake Hampton system has already been significantly affected by reduction in high flood stages due to the presence of the outlet canal. They point out that it seems contradictory that there are clear signs of old hydrologic alterations and subsidence of organic soils, yet the MFLs are being met. They question whether this means that a new equilibrium has been established?

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The interpreted results of hydrologic indicators greatly help to define the magnitude of soils subsidence. The hydrologic indicator analysis helps greatly to characterize the magnitude of the drainage effect of the outlet canal. The discrepancy between the current flood regime in the forested wetlands and its historic indicators is significant, and should be investigated further in the future. The peer reviewers conclude that the report should give greater emphasis to the changed conditions induced by the outlet canal.

Dr. Rao raises a few significant issues with the ECT modeling procedures and results. He finds the numbers shown on its Figure 4-10 (Figure 1 in this report), Water Budgets of SWMM Simulation (2005-2014), rather puzzling. Evaporation from water/lakes is shown as a low of 9.7 in/yr and infiltration from land area a high of 33.3in/yr. He concludes that both values are unacceptable. Earlier, in its report, page 4-3, quoting Robison (2014), ECT states,

*average evaporation for shallow lakes in the SJRWMD varies from 45 to 48 inches.*

Dr. Rao thinks it should reasonably be about the same for SRWMD lakes. Dr. Rao finds that ECT correctly listed various components of the water budget found in the categories of runoff quantity, groundwater, and flow routing (ECT Report Page 4-14). To resolve the puzzling results found on its Figure 4-10 and to give the reader a feel for what the water budgets are in terms of magnitude, Dr. Rao suggests that ECT prepare a water budget table summarizing the average values for the calibration period. The summary table should include sub-basins (Column 1, Table 4-2 of the ECT Report) and aquifers (Column 1, Table 4-3 of the ECT Report).

In drawing MFLs frequency graphs, Dr. Rao suggests that a statistical fit like Pearson Type III distribution not be shown on the graph and draws attention to the procedure used by SJRWMD. For MFLs compliance analysis, based on SJRWMD methods, Robison (2014) states:

*If any pertinent event lies within the shaded box the minimum level is being met. Otherwise, a best-fit line is drawn by inspection.*

On ECT's comparison of the observed and simulated stages for the period 1983-2014, Dr. Rao concludes that the trend of the observed and simulated stages closely agreed, which is an indication that the model performed very satisfactorily. However, large differences are seen between the observed and simulated stages (over a foot) for many days from 1988 through 2004. He requests that an intuitive explanation as to why these discrepancies could have occurred be sought. If any reasonable explanation is discovered, then the modeling should be repeated considering this information.

Finally, concerning the ECT model results and model calibration, Dr. Rao indicates that the acceptability of the model calibration should be determined only after the suggested additional results are produced. Until such time, Dr. Rao suggests treating all the model-based results as tentative (i.e., MFLs compliance results, freeboard in Upper Floridan aquifer, etc.).

The reviewers recommend two issues for addition to the document. The two issues are intimately linked; they are the management of uncertainty and the adoption of an explicit adaptive management approach to using the minimum levels to manage the health of the Lake Hampton ecosystem.

However, managing uncertainty, which should be part of every MFLs setting process, is not addressed in an explicit and integrated approach in the District's report. Dr. Dunn believes the management of uncertainty is best accomplished as an adaptive management (AM) process and suggests that a comprehensive assessment of major sources of uncertainty and the magnitude of each source should be addressed in an explicit plan to manage the effects of uncertainty and reduce its impacts in the future using an AM approach.

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On the topic of AM, Dr. Dunn points out that by their very nature MFLs are adaptive strategies for management of the District's critically important water bodies. Each adopted MFL, as well as the District's entire MFLs program define an adaptive, learn as you go, management strategy. The District would benefit from an explicit adaptive management approach that is based on identifying and addressing elements of uncertainty.

A specific source of uncertainty in reviewing the recommended minimum levels for Lake Hampton is the inability to check and validate most of the statistical analyses relied upon for summary and/or analysis of field data collected for ground elevation, vegetative communities, and soils. The lack of validation leaves the presented results open to question, and thus is a significant source of uncertainty. This omission should be corrected. The Lake Hampton minimum levels report would be aided by a thorough review to assure that all statistical results presented can be verified by material in the main body of the report, or an appendix. In the bigger picture, verification of statistical results is also a quality assurance need that should be covered.

Dr. Rao drew attention to the Atlantic Multidecadal Oscillation (AMO), which is regarded as indicative of the cyclical patterns of south and central Florida rainfall. AMO has warm and cool phases, the warm phase indicating generally higher rainfall and the cool phase lower rainfall. He describes the study conducted by Kelly and Gore (2008) of SWFWMD, which presents an evaluation of the effects of AMO on peninsular Florida river flows and rainfall in the context of MFLs. Based on their study, Kelly and Gore emphasize the importance of selecting an appropriate baseline flow period (for MFLs analysis) and suggest that it may be appropriate to have at least two baseline periods; one based on a wet period and one based on a dry period. Dr. Rao finds that the long-term simulation period, 1983-2014, SRWMD selected for evaluating the MFLs compliance coincided with warm phase of AMO, indicating thereby it is generally a wet period. Dr. Rao suggests that SRWMD calculate the mean annual rainfall values for 1983-2014 for the nearby stations (Gainesville, Starke, and Lake City) and for the period 1951-1982, and compare the two values. If the rainfall patterns followed AMO, 1951-1982 would be relatively a dry phase. At SJRWMD, Dr. Rao himself conducted an in-depth study of AMO and found that there is a strong qualitative resemblance between AMO and the rainfall and streamflow patterns of Northeast Florida (Rao 2008 Draft). To illustrate this finding, four figures from Dr. Rao's report comparing AMO with rainfall patterns of Gainesville and streamflow flow patterns of the St. Johns River near Christmas are presented in this report.

# INTRODUCTION

## OVERVIEW

The Suwannee River Water Management District (District) has contracted with a panel of two experts to provide a technical peer review of its proposed minimum flows and levels (MFLs) for Lake Hampton in Bradford County, Florida.

These proposed MFLs for Lake Hampton are described by the District in a document titled *Minimum Recommended Lake Levels: Lake Hampton, Florida. Draft Report October 2016*. The documentation also included a separate volume titled *Lake Hampton Water Budget Modeling-Phase B Technical Report-Draft*, dated August 2016. The latter document was authored by Environmental Consulting & Technology, Inc. (ECT).

District staff developed multiple recommended minimum levels for Lake Hampton using methods developed and refined by the St. Johns River Water Management District (SJRWMD). These methods were supported by methods developed by the Southwest Florida Water Management District (SWFWMD). The District proposes two minimum levels for Lake Hampton.

District staff developed multiple recommended levels to protect critical water resources over the full, dynamic range of the lake's hydrologic regime. Data collection covered time series of water levels, vegetation, soils, topography, and delineation of wetland to upland break. A baseline lake level record was developed for Lake Hampton. Critical resources identified for protection included floodplain inundation, habitats for fish and invertebrates, and maintenance of hydric soils.

SJRWMD methods define MFLs as hydrologic events defined by three components: a magnitude (in this case water depth), a continuous duration (days), and an annual return interval. For Lake Hampton staff proposed two minimum levels a minimum frequent high (FH) and minimum frequent low (FL) as follows:

- The recommended FH is stage elevation of 128.90 feet (ft) NAVD88, a duration of 30 days, and return interval of 2 years.
- The recommended FL is a stage elevation of 126.24 feet (ft) NAVD88, a duration of 120 days and a return interval of 5 years.

In support of MFLs development SRWMD contracted with the firm ECT to develop a water budget model for Lake Hampton. ECT utilized the Storm Water Management Model (SWMM) Version 5.1 to develop the water budget model for Lake Hampton. Model development, calibration, and use of model for long term simulation are described in the ECT report. As already noted this report was one of the two primary documents reviewed.

The District is committed to the independent scientific peer review of all data, methodologies, and models used in the establishment of MFLs. Accordingly, the District voluntarily engaged the services of two independent experts with collective expertise in the fields of hydrology, limnology, and biology. These experts served as a peer review panel (panel) to evaluate and review information used for development of recommended MFLs for Lake Hampton.

These expert reviewers are from the water resources consulting firm of Dunn, Salsano & Vergara Consulting, LLC (DSV), which is acting as a sub consultant to the environmental consulting firm of Barnes, Ferland and Associates, Inc., and include:

- Donthamsetti Rao, Ph.D., P.E.,
- Bill Dunn, Ph.D.

## PEER REVIEW PANEL'S SCOPE OF WORK

This document provides a summary of the panel's completion of its contracted scope of work, covering the following three major tasks.

Task 1—Participate in project kick-off meeting, and attend a field inspection trip of data collection sites on and adjacent to Lake Hampton.

Task 2—Review of Relevant Documents and Publications

Task 3—Develop a single final peer review panel report for submission to District.

With the submittal of this document, the panel's final report, Tasks 1 through 3 of the panel's work effort is complete. The Task 1 kickoff meeting was completed on November 15, 2016, as a net-meeting hosted by District staff. The net-meeting provided the peer reviewers with an overview of the District's approach to setting MFLs, data collection and data analysis methods, results, and recommended minimum levels. The Task 1 field inspection took place on November 20, 2016. The field inspection included an extensive tour of the lake by boat conducted by District staff who developed the recommended minimum levels and in authoring the District's draft report. The field inspection allowed reviewers direct observation of aquatic, wetland, and upland communities; vegetation and soil sampling transects; and other monitoring locations. The inspection trip also allowed reviewers the opportunity to ask questions of staff regarding: methods of data collection and analysis, rationale for selection of sampling locations, types and nature of uncertainty, and any needs for additional data collection that could be useful for implementing the minimum levels and assessing compliance in future.

## PEER REVIEW APPROACH

Section 373.042, Florida Statutes (F.S.), provides that minimum flows for a given watercourse represent the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area and the minimum water level is the level of groundwater in an aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources or ecology of the area.

Section 373.042, F.S., also provides that MFLs shall be calculated using the best information available, that the Governing Board shall consider and may provide for non-consumptive uses in the establishment of MFLs, and when appropriate, MFLs may be calculated to reflect seasonal variation. The law also requires that when establishing MFLs, changes and structural alterations to watersheds, surface waters, and aquifers shall also be considered (Section 373.0421, F.S.). The State Water Resource Implementation Rule (Chapter 62-40, Florida Administrative Code) includes additional guidance for the establishment of MFLs, providing that:

“...consideration shall be given to the protection of water resources, natural seasonal fluctuations in water flows or levels, and environmental values associated with coastal, estuarine, aquatic, and wetlands ecology, including:

- a. Recreation, in and on the water;
- b. Fish and wildlife habitats and the passage of fish;
- c. Estuarine resources;
- d. Transfer of detrital material;
- e. Maintenance of freshwater storage and supply;
- f. Aesthetic and scenic attributes;
- g. Filtration and absorption of nutrients and other pollutants;
- h. Sediment loads;

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- i. Water quality; and
- j. Navigation.”

Section 373.042, F.S., also addresses independent scientific peer review of MFLs, specifying the review of all scientific or technical data, methodologies, and models including all scientific and technical assumptions employed in each model used to establish a minimum flow or minimum water level. In addition, the law requires that the Florida Department of Environmental Protection (FDEP) or the governing board shall give significant weight to the final peer review panel report when establishing the minimum flow or minimum water level.

This report utilizes a tabular template for each of the peer reviewers to meet the District's peer review requirements. Included as appendices are two sets of summary tables to capture the key elements of each technical review. The first set of tables, the review comments tables, summarize each panel member's individual general and specific review comments along with any recommended actions (Appendix Tables 1-1 and 1-2). Each comment is treated as a separate row in these tables. The second set of tables, the peer review assessment criteria tables, include each panel member's comments concerning the District's peer review assessment criteria (Appendix Tables 2-1 and 2-2).

The District's peer review assessment criteria, addressed by each panel member in the second set of appended tables are as follows:

- (A) Determine whether the conclusions in the District's Lake Hampton MFLs report are supported by the analyses presented.
  - 1. Supporting Data and Information: Review the relevant data and information that support the conclusions made in the report to determine if:
    - (a) The data and information used was properly collected;
    - (b) Reasonable quality assurance assessments were performed on the data and information;
    - (c) Exclusion of available data from analyses was justified; and
    - (d) The data used was the best information available.

**Note:** The peer review panelists are not expected to provide independent review of standard procedures used as part of institutional programs that have been established for collecting data, such as the USGS and District hydrologic monitoring networks.
  - 2. Technical Assumptions: Review the technical assumptions inherent to the analysis used in the District's Lake Hampton MFLs report to determine whether:
    - a. The assumptions are clearly stated, reasonable and consistent with the best information available;
    - b. Assumptions were eliminated, to the extent possible, based on available information; and
    - c. Other analyses that would require fewer assumptions but provide comparable or better results are available.
  - 3. Procedures and Analyses: Review the procedures and analyses used in the District's Lake Hampton MFLs report to determine whether:
    - a. The procedures and analyses were appropriate and reasonable, based on the best information available.

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- b. The procedures and analyses incorporate all necessary factors;
  - c. The procedures and analyses were correctly applied;
  - d. Limitations and imprecisions in the information were reasonably handled;
  - e. The procedures and analyses are repeatable; and
  - f. Conclusions based on the procedures and analyses are supported by the data.
- (B) If a proposed method used in the District's Lake Hampton MFLs report is not scientifically reasonable, the Peer Reviewers shall:
1. List and describe scientific deficiencies and, if possible, evaluate the error associated with the deficiencies.
  2. Determine if the identified deficiencies can be remedied.
  3. If the identified deficiencies can be remedied, then describe the necessary remedies and an estimate of time and effort required to develop and implement each remedy.
  4. If the identified deficiencies cannot be remedied, then, if possible, identify one or more alternative methods that are scientifically reasonable. If an alternative method is identified, provide a qualitative assessment of the relative strengths and weaknesses of the alternative method(s) and the effort required to collect data necessary for implementation of the alternative methods.
- (C) If a given method or analyses used in the District's Lake Hampton MFLs report is scientifically reasonable, but an alternative method is preferable, the Peer Reviewers shall:
1. List and describe the alternative scientifically reasonable method(s), and include a qualitative assessment of the effort required to collect data necessary for implementation of the alternative method(s).

# SUMMARY OF REVIEW PANEL COMMENTS/ QUESTIONS

As described, each reviewer's detailed comments are included in appendices as a set of two summary tables that capture the two key elements of each technical review. The first set of tables (the review comments tables) summarizes each reviewer's individual general and specific review comments on the reviewed documents along with any recommended actions (Appendix Tables 1-1 and 1-2). Each comment is treated as a separate row in these tables. The second set of tables provide each panel member's conclusions for each of the District's peer review assessment criteria (Appendix Tables 2-1 and 2-2).

## SUMMARY OF COMMENTS/QUESTIONS SUBMITTED BY DR. BILL DUNN

Dr. Dunn's review indicates that the District has done a commendable job in developing the proposed minimum flows. He agrees with basic assumptions, methods of data collection, much of the data analysis and presentation, and the development and selection of two minimum levels.

Dr. Dunn strongly agrees with the report's authors that whenever possible MFLs should be based on statistically defined protective hydrological events composed of 1) a magnitude (flow and/or level), 2) continuous duration for the specific inundation or drying period, and 3) with a return interval.

Dr. Dunn finds that the Lake Hampton system has already been significantly affected by reductions in high flood stages due to the presence of the outlet canal. He considers that it seems contradictory that there are clear signs historical hydrologic alterations and subsidence of organic soils, yet the MFLs are being met. He questions whether this means that a new equilibrium has been established.

The interpreted results of hydrologic indicators greatly help interpret the magnitude of effect of soils subsidence. The hydrologic indicator analysis helps greatly to characterize the magnitude of the drainage effect of the outlet canal. The discrepancy between current flood regime in the forested wetlands and its historic indicators is significant and should be investigated further in the future. He indicates that it is important that the report give greater emphasis to the changed conditions induced by outlet.

However, managing uncertainty, which should be part of every MFLs setting process, is not addressed in an explicit and integrated approach in the District's report. Dr. Dunn believes the management of uncertainty is best accomplished as an adaptive management (AM) process and suggests that a comprehensive assessment of major sources of uncertainty and the magnitude of each source should be addressed in an explicit plan to manage the effects of uncertainty and reduce its impacts in the future using an AM approach.

A specific source of uncertainty in reviewing the recommended minimum levels for Lake Hampton is the inability to check and validate most of the statistical analyses relied upon for summary and/or analysis of field data collected for ground elevation, vegetative communities, and soils. The lack of validation leaves the results presented open to question, and thus is a significant source of uncertainty. This omission should be corrected. The District's Lake Hampton minimum levels report should include sufficient

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background information to assure that all statistical results presented can be verified by material in the main body of the report, or an appendix. In the bigger picture, verification of statistical results is also a quality assurance need that should be covered.

One of the District's peer review assessment criteria, Item A.1.b in Appendices C and D asks the reviewers whether reasonable quality assurance assessments were performed on data and analyses. Dr. Dunn finds that the ECT report and the District's report lack comprehensive quality assurance (QA) components. Since QA is specifically addressed in Item A.1.b., then Dr. Dunn recommends that a QA assessment be added to the ECT and District reports. QA assessments could be integrated into a section of the report covering evaluation, characterization and management of sources of uncertainty.

On the topic of AM, Dr. Dunn points out that by their very nature MFLs are adaptive strategies for management of the District's critically important water bodies. Each adopted MFL, as well as the District's entire MFLs program define an adaptive, learn as you go, management strategy. The District would benefit from an explicit adaptive management approach that is based on identifying and addressing elements of uncertainty.

The field of AM has been developed over the last several decades specifically to deal with the effects of uncertainty in making and implementing resource management decisions, such as the management of water resources through MFLs. The basic tenets of AM are:

- All resource management decisions and resource management plans have elements of uncertainty; yet, management decisions must be made.
- Decisions should be made based on the best science, knowledge, and information available, while clearly identifying sources of uncertainty and accounting for their range of impact on predicted outcomes.
- Uncertainty can be characterized, its effects can be described, and it can be managed; thus allowing prudent water resource decisions using the best available information.
- Monitoring of the condition of the resource of concern and its response to change is necessary to make better-informed future management decisions.

AM frameworks have become embedded in large ecosystem management and restoration programs for the Florida Everglades, Colorado River, California Bay-Delta program, Delaware River estuarine fisheries, and many other water resource management programs across North America. The framework for AM is a goal-seeking, six-step, adaptive feedback process as follows.

1. Assess the problem.
2. Design a solution.
3. Implement the solution's management plan (e.g. the minimum flows).
4. Monitor the resources of concern.
5. Evaluate resource health/condition, and develop resource management adjustments as needed.
6. Implement adjustments to the minimum flow regime.

As an example, an AM approach integrated into the minimum flow regime for Lake Hampton would include:

- Use the proposed minimum flows as the initial condition, representing distillation of the best available information and analysis.

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- Understand, describe, and quantify the sources of uncertainty affecting development of the minimum flows.
- Implement specific monitoring and compliance requirements that will reduce the effect of uncertainty and improve management decisions in the future.
- Collect and analyze monitoring data.
- Use data, analytical tools, and models to evaluate responses of resource values being tracked.
- Assess whether minimum levels are being met. If not, then revise relevant portions of the minimum flows.
- Implement changes to minimum flows as needed.

This AM approach can also encompass the District's MFLs compliance assessments done as part of both water use permitting decisions and the District's five-year water supply planning process. For MFLs, the congruence between the development of protective flows and levels for water bodies and the classic AM approach provides a framework for prudent use and protection of water resources while also providing goal seeking, adaptive strategies for dealing with uncertainty.

## SUMMARY OF COMMENTS/QUESTIONS SUBMITTED BY DR. DON RAO

Dr. Rao reviewed the two reports: *Minimum Recommended Lake Levels: Lake Hampton, Florida. Draft Report October 2016*, prepared by the District and *Lake Hampton Water Budget Modeling-Phase B Technical Report-Draft*, prepared by ECT (August 2016). He concludes that the reports are well organized and contain a comprehensive presentation of all the pertinent information. Dr. Rao, however, finds several editorial type shortcomings in both reports and some concerns in the modeling methods and modeling results. Corrections and inclusion of additional information are suggested.

Dr. Rao raises several significant issues with the ECT modeling procedures and results. He finds the numbers shown on its Figure 4-10 (Figure 1 in this report), Water Budgets of SWMM Simulation (2005-2014), rather puzzling. Evaporation from water/lakes is shown as a low of 9.7 in/yr and infiltration from land area a high of 33.3in/yr, both values are unacceptable. Earlier, on its report Page 4-3, quoting Robison (2014), ECT states:

*average evaporation for shallow lakes in the SJRWMD varies from 45 to 48 inches.*

Dr. Rao asks:

*Will it not be about the same for SRWMD lakes?*

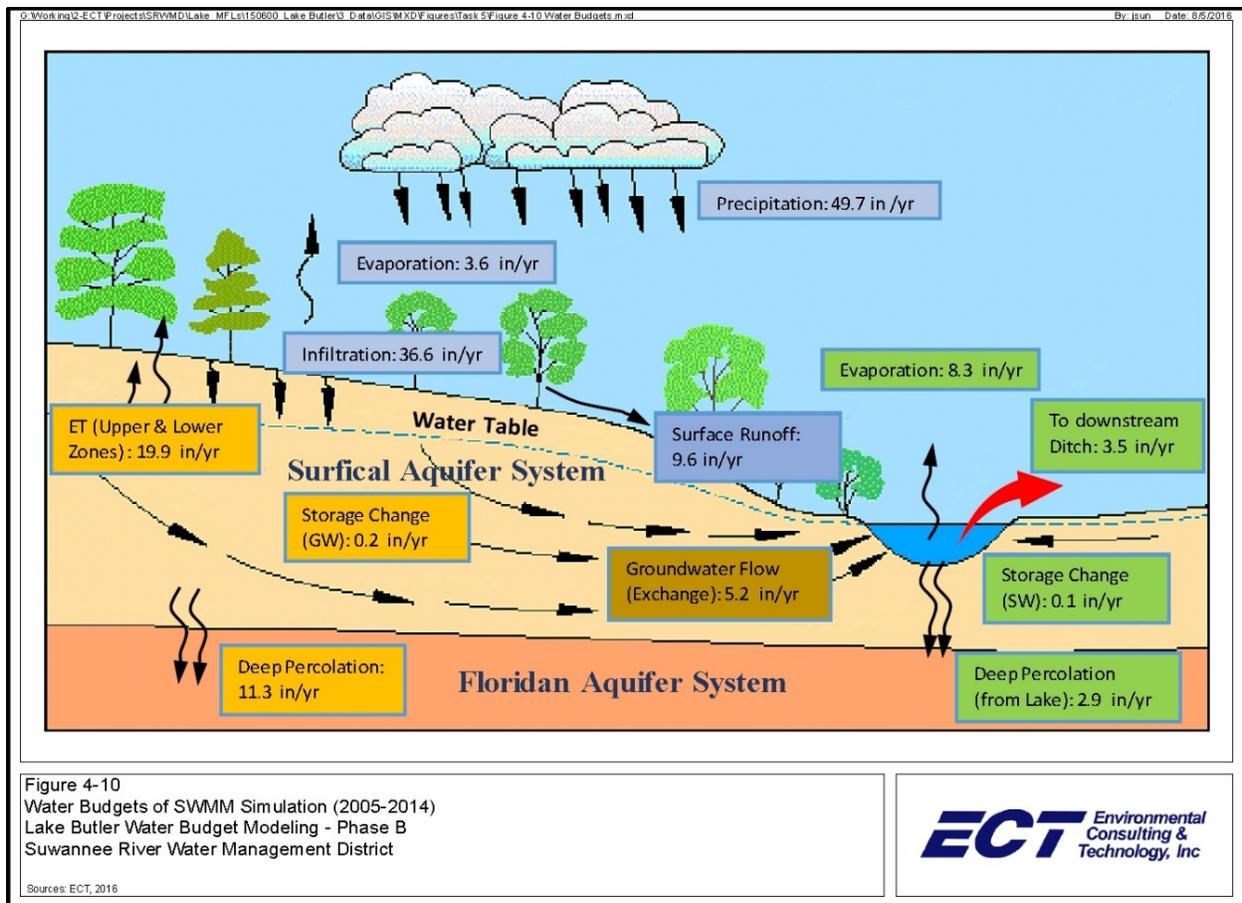
Dr. Rao finds that ECT correctly listed various components of water budget found in the categories of runoff quantity, groundwater, and flow routing (ECT Report Page 4-14). To resolve the puzzling results found on Figure 4-10 (Figure 1 in this report) and to give the reader a feel for what the water budgets are in terms of magnitude, Dr. Rao suggests that ECT prepare a water budget table summarizing the average values for the calibration period. The summary table should include sub-basins (Column 1, Table 4-2 of the ECT Report) and aquifers (Column 1, Table 4-3 of the ECT Report).

Dr. Rao notes that the ECT modelers say,

*Because SWMM can only model one Evapotranspiration (ET) time series data source, area-weighted daily PET (Potential ET) data was developed for the entire Lake Hampton watershed, using the daily PET data at each of the pixels intersected with the watershed boundary.*

Dr. Rao suggests that ECT's procedure be illustrated by numerical values and suggests that ECT describe in detail how the series is applied in modeling.

Dr. Rao notes that another important model parameter is percent impervious area of a basin; this parameter determines the amount of runoff produced on a sub-basin and the infiltration that would take place. Dr. Rao suggests the use of caution in selecting the values of this parameter because reducing impervious area uniformly for all years may give biased results for some years (e.g., may increase infiltration).



**Figure 1—ECT 2016 Figure 4-10**

In drawing MFLs frequency graphs, Dr. Rao suggests not showing a statistical fit like Pearson Type III distribution on the graph and draws attention to the procedure used by SJRWMD. For MFLs compliance analysis, as per SJRWMD methods, Robison (2014) states:

*If any pertinent event lies within the shaded box the minimum level is being met. Otherwise, a best-fit line is drawn by inspection (Robison 2014).*

Finally, concerning the ECT model results and model calibration, Dr. Rao notes that the acceptability of model calibration not be determined until after the suggested additional results are produced. Until these issues are resolved, Dr. Rao suggests that all the model-based results produced to date should be considered tentative (i.e., MFLs compliance results, freeboard in Floridan aquifer, etc.).

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Dr. Rao asks, in developing its MFLs, what kind of support SRWMD derived from the SWFWMD methods while it primarily used the methodology developed by SJRWMD and suggests adding a paragraph in Section 4.0 MFLs Methodology to explain.

Dr. Rao finds that the daily interpolated historic stage data that was used in developing the historic stage-duration curve (Figure 6-3, Page 23) would be of great help in performing further analyses. He strongly suggests performing MFLs compliance analysis using this historic stage data similar to the analyses he performed for the 107 SJRWMD MFLS lakes for compliance of MFLs (Rao 2005 Draft). The results will provide crucial information as to where the modeled results stand compared to the results given by the historic stage data.

Dr. Rao draws attention also to the Atlantic Multidecadal Oscillation (AMO), which is regarded as indicative of the cyclical patterns of south and central Florida rainfall. AMO has warm and cool phases, the warm phase indicating generally higher rainfall and the cool phase lower rainfall (Enfield et al. 2001). The graphic presented in Figure 2 shows the historic phases of the AMO. AMO represents 10-year moving averages of North Atlantic Sea Surface Temperature. Thus, the last point on the graph is the midpoint of the current decade, 2011.

Kelly and Gore (2008) of SWFWMD studied the effects of AMO on peninsular Florida river flows and rainfall in the context of MFLs. They emphasize the importance of selecting an appropriate baseline flow period (for MFLs analysis) and suggest that it may be appropriate to have at least two baseline periods; one based on a wet period and one based on a dry period.' They also state,

*These results have important implications not only for the establishment of ecological flows, but also for water supply planning and development, flood control and stream ecology in general, since there are considerable differences in the magnitude of flows that should naturally be expected between multidecadal periods. Relatively large decreases and increases in flow are attributable to rainfall differences between multidecadal periods.*

SRWMD's entire long term simulation period (1983-2014) falls in a warm phase (Figure 2), indicating thereby it is generally a wet phase. Dr. Rao suggests calculating the mean annual rainfall values for 1983-2014 for the nearby stations (Gainesville, Starke, and Lake City) and for the period 1951-1982, and comparing the two values. If the rainfall patterns followed AMO, 1951-1982 would be relatively a dry phase. At SJRWMD, Dr. Rao completed a comprehensive report on AMO and found that there is a strong qualitative resemblance between AMO and the rainfall and streamflow patterns of Northeast Florida (Rao 2008 Draft). To illustrate this finding, four figures from Dr. Rao's report comparing AMO with rainfall patterns of Gainesville and streamflow flow patterns of the St. Johns River near Christmas are presented as Figures 3 through 6. In these figures, NAWR represents North Atlantic Warm Region (see Figure 7), a region where most of the North Atlantic hurricanes occurred, and Dr. Rao developed a separate Multidecadal Oscillation (MO) for this region.

## Atlantic Multi-Decadal Oscillation: 1870-2011

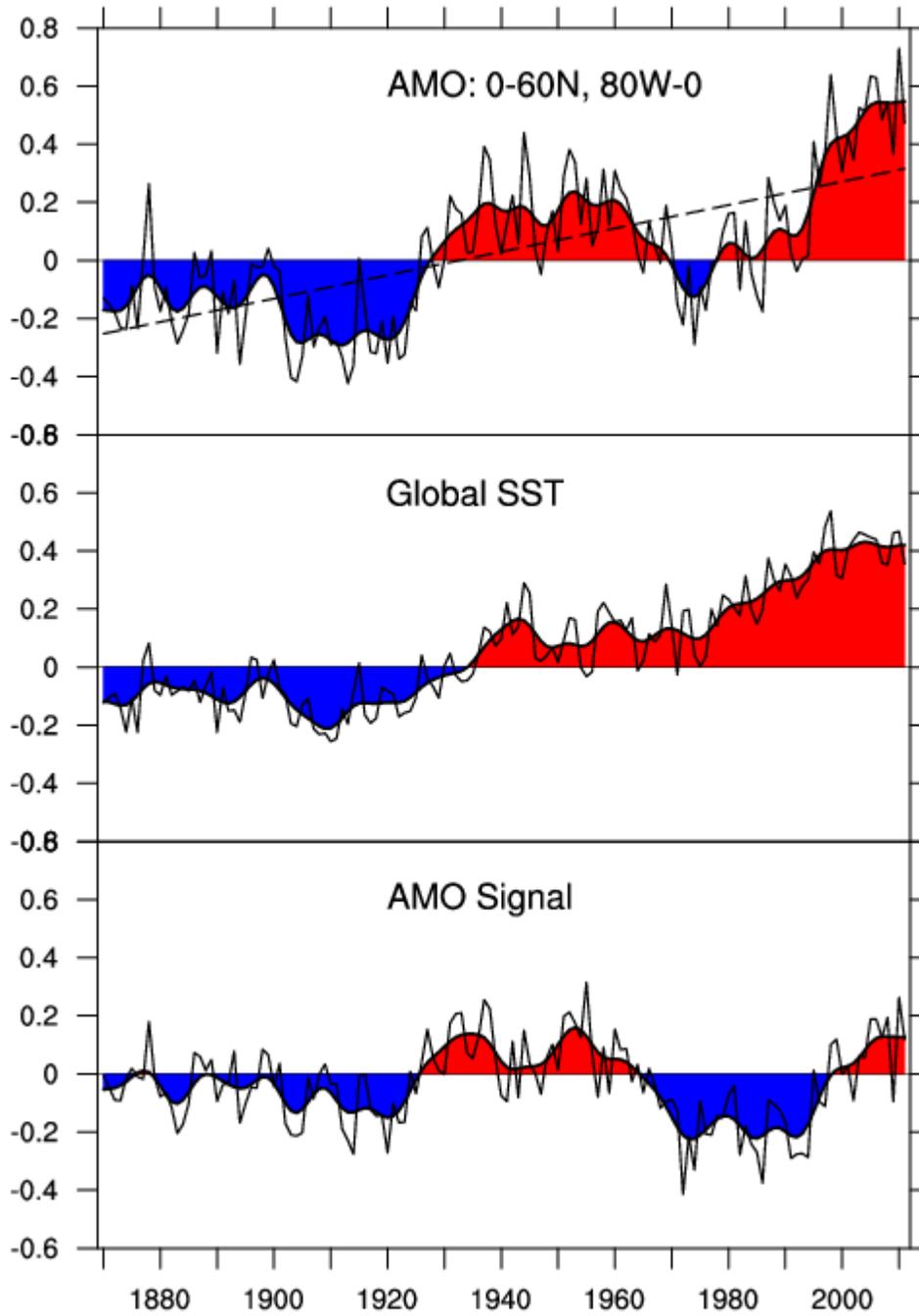


Figure 2—Atlantic Multidecadal Oscillation

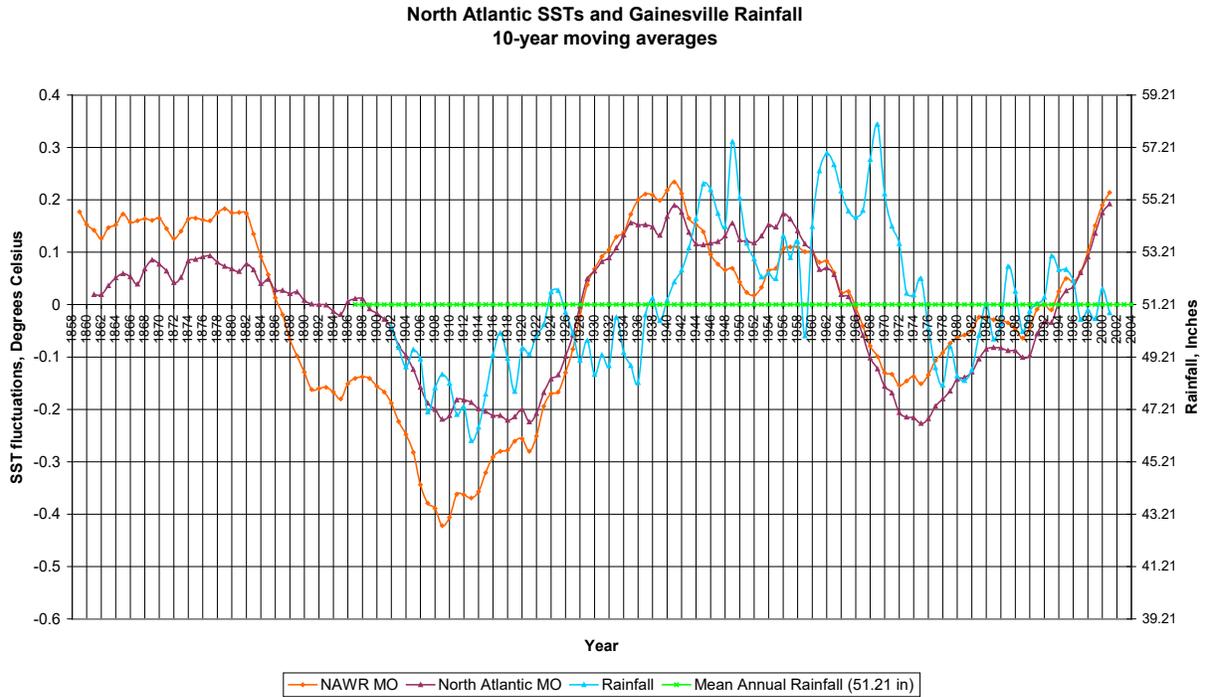


Figure 3—Gainesville 10-Year Moving Average

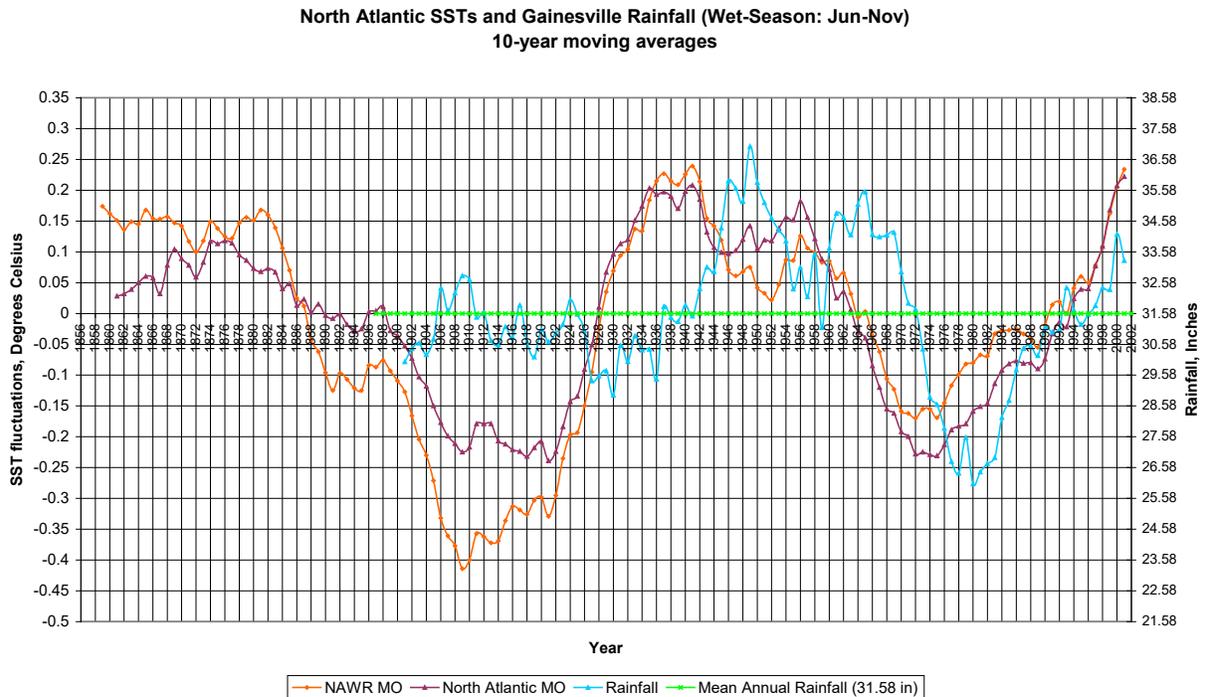
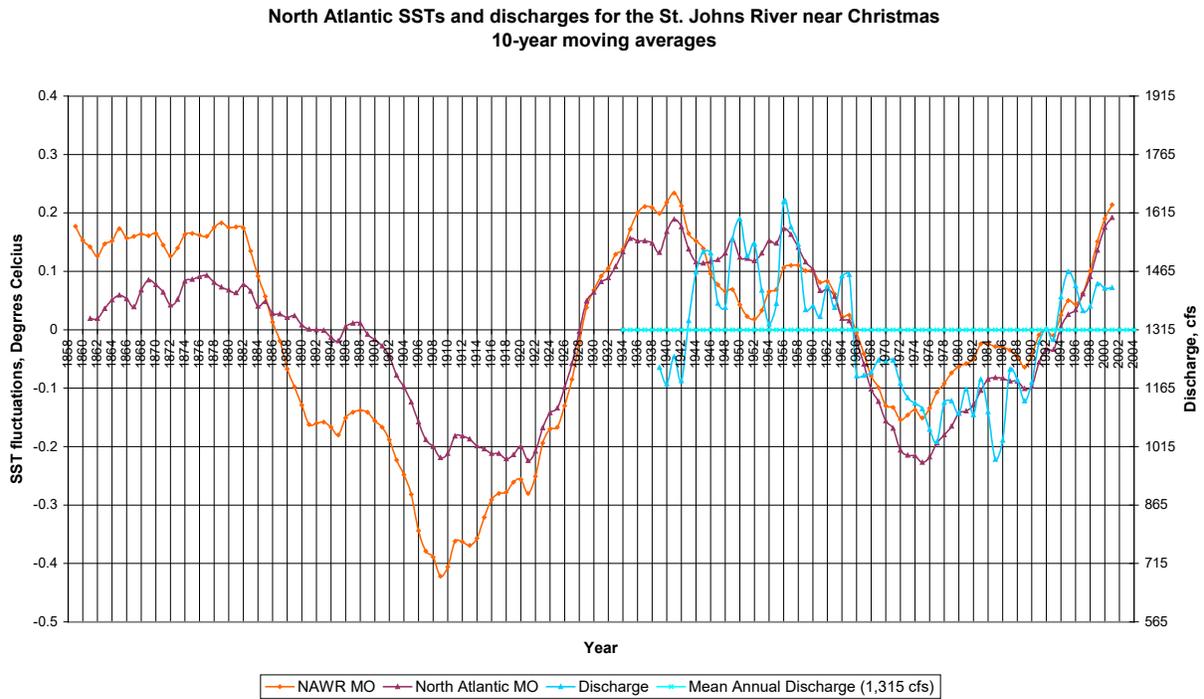
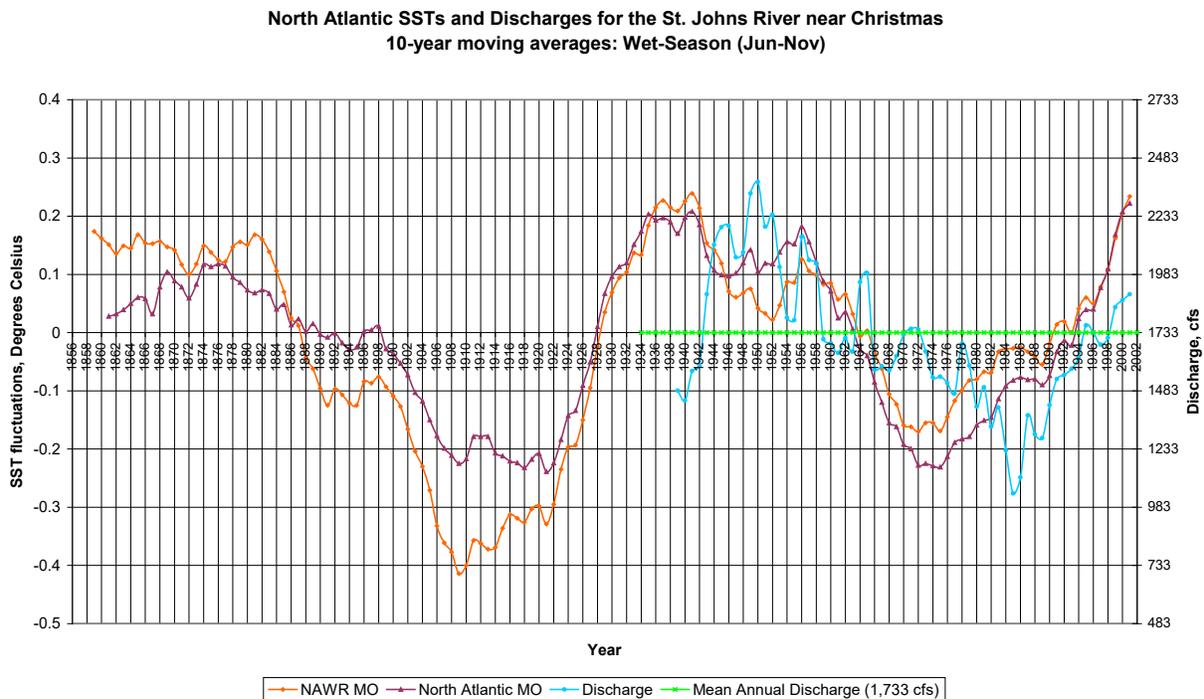


Figure 4—Gainesville Wet Season 10-Year Moving Average



**Figure 5—St. Johns River Near Christmas 10-Year Moving Average**



**Figure 6—St. Johns River Near Christmas Wet Season 10-Year Moving Average**

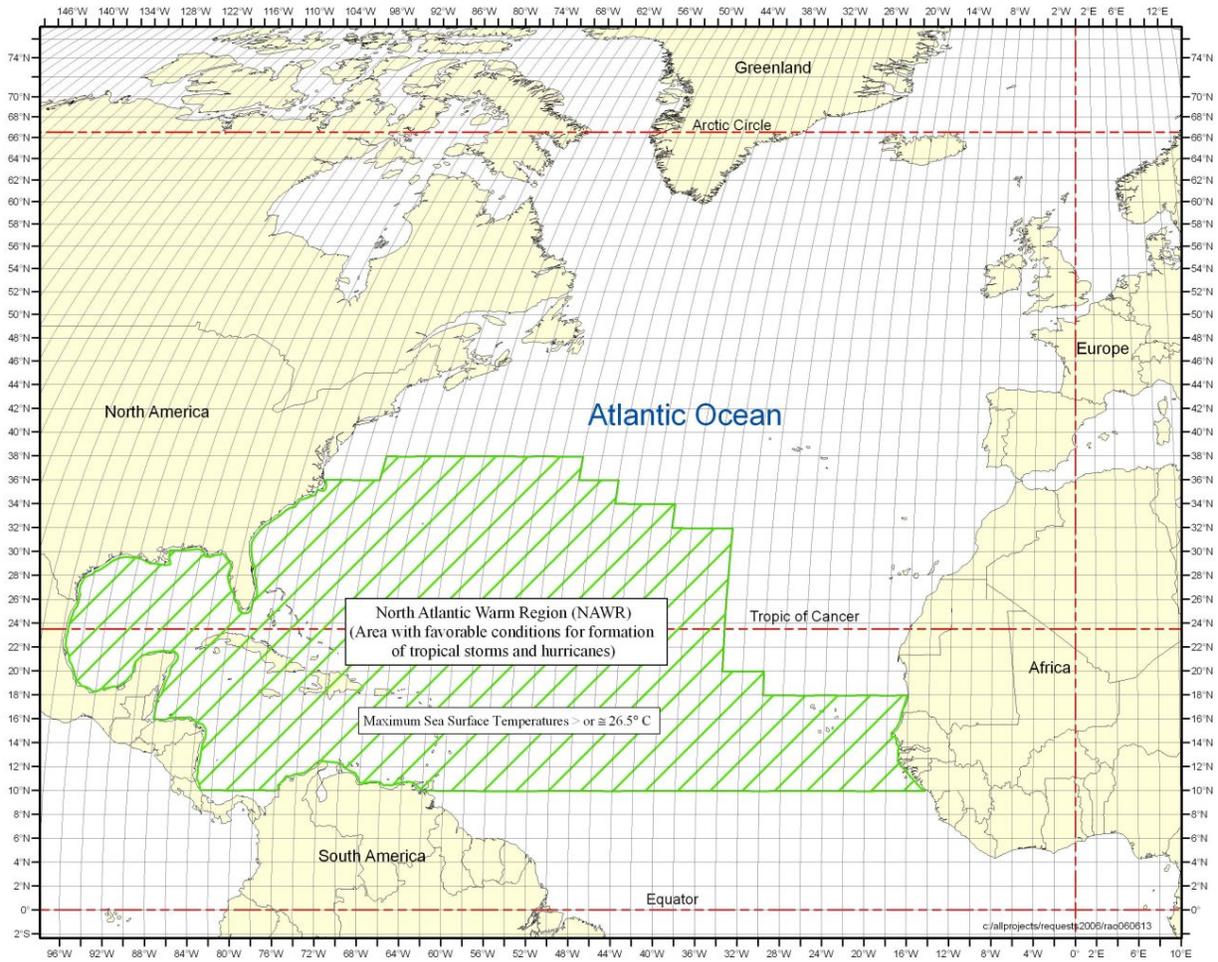


Figure 7—North Atlantic Warm Region

## COMBINED SUMMARY OF MAJOR PEER REVIEW COMMENTS

The peer reviewers find that most, but not all, of the conclusions in the two MFL reports are supported by the analyses presented. The reviewers generally concur with data and information collected, the data collection methods, the methods used for analysis and interpretation, and the two minimum levels recommended.

The reviewers strongly agree with the District report's authors that whenever possible MFLs should be based on statistically defined protective hydrological events composed of: 1) a magnitude (flow and/or level), 2) continuous duration for the specific inundation or drying period, and 3) with a return interval.

Reviewers find that the Lake Hampton system has already been significantly affected by reduction in high flood stages due to the presence of the outlet canal. They point out that it seems contradictory that there are clear signs of old hydrologic alterations and subsidence of organic soils, yet the MFLs are being met. They question whether this means that a new equilibrium has been established?

The interpreted results of hydrologic indicators greatly help to define the magnitude of soils subsidence. The hydrologic indicator analysis helps greatly to characterize the magnitude of the drainage effect of the outlet canal. The discrepancy between the current flood regime in the forested wetlands and its historic indicators is significant, and should be investigated further in the future. The peer reviewers conclude that the report should give greater emphasis to the changed conditions induced by outlet.

Dr. Rao raises a few significant issues with the ECT modeling procedures and results. He finds the numbers shown on its Figure 4-10 (Figure 1), Water Budgets of SWMM Simulation (2005-2014), rather puzzling. Evaporation from water/lakes is shown as a low of 9.7 in/yr and infiltration from land area a high of 33.3in/yr. He concludes that both values are unacceptable. Earlier, in its report, page 4-3, quoting Robison (2014), ECT states,

*average evaporation for shallow lakes in the SJRWMD varies from 45 to 48 inches.*

Dr. Rao thinks it should reasonably be about the same for SRWMD lakes. Dr. Rao finds that ECT correctly listed various components of water budget found in the categories of runoff quantity, groundwater, and flow routing (ECT Report Page 4-14). To resolve the puzzling results found on its Figure 4-10 (Figure 1) and to give the reader a feel for what the water budgets are in terms of magnitude, Dr. Rao suggests that ECT prepare a water budget table summarizing the average values for the calibration period. The summary table should include sub-basins (Column 1, Table 4-2 of the ECT Report) and aquifers (Column 1, Table 4-3 of the ECT Report).

In drawing MFLs frequency graphs, Dr. Rao suggests that a statistical fit like Pearson Type III distribution not be shown on the graph and draws attention to the procedure used by SJRWMD. For MFLs compliance analysis, based on SJRWMD methods, Robison (2014) states:

*If any pertinent event lies within the shaded box the minimum level is being met. Otherwise, a best-fit line is drawn by inspection.*

## Report

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On ECT's comparison of the observed and simulated stages for the period 1983-2014, Dr. Rao concludes that the trend of the observed and simulated stages closely agreed, which is an indication that the model performed very satisfactorily. However, large differences are seen between the observed and simulated stages (over a foot) for many days from 1988 through 2004. He recommends that an intuitive explanation as to why these discrepancies could have occurred be sought. If any reasonable explanation is discovered, then the modeling should be repeated considering this information.

Finally, concerning the ECT model results and model calibration, Dr. Rao indicates that the acceptability of the model calibration should be determined only after the suggested additional results are produced. Until such time, Dr. Rao suggests treating all the model-based results as tentative (i.e., MFLs compliance results, freeboard in Floridan aquifer, etc.).

The reviewers recommend that two issues be added to the document. The two issues are intimately linked; they are the management of uncertainty and the adoption of an explicit adaptive management approach to using the minimum levels to manage the health of the Lake Hampton ecosystem. However, managing uncertainty, which should be part of every MFLs setting process, is not addressed in an explicit and integrated approach in the District's report. Dr. Dunn believes the management of uncertainty is best accomplished as an adaptive management (AM) process and suggests that a comprehensive assessment of major sources of uncertainty and the magnitude of each source should be developed. Then staff should develop an action plan to minimize the effect of uncertainty and reduce its impacts in the future.

On the topic of AM, Dr. Dunn points out that by their very nature MFLs are adaptive strategies for management of the District's critically important water bodies. Each adopted MFL, as well as the District's entire MFLs program define an adaptive, learn as you go, management strategy. The District would benefit from an explicit adaptive management approach that is based on identifying and addressing elements of uncertainty.

Dr. Rao drew attention to the Atlantic Multidecadal Oscillation (AMO), which is regarded as indicative of the cyclical patterns of south and central Florida rainfall. AMO has warm and cool phases, the warm phase indicating generally higher rainfall and the cool phase lower rainfall. He describes the study conducted by Kelly and Gore of SWFWMD evaluating the effects of AMO on peninsular Florida river flows and rainfall in the context of MFLs. Based on their study, Kelly and Gore emphasize the importance of selecting an appropriate baseline flow period (for MFLs analysis) and suggest that it may be appropriate to have at least two baseline periods; one based on a wet period and one based on a dry period. Dr. Rao finds that the long-term simulation period, 1983-2014, SRWMD selected for evaluating the MFLs compliance coincided with warm phase of AMO, indicating thereby it is generally a wet period. Dr. Rao suggests to SRWMD to calculate the mean annual rainfall values for 1983-2014 for the nearby stations (Gainesville, Starke, and Lake City) and for the period 1951-1982, and comparing the two values. If the rainfall patterns followed AMO, 1951-1982 would be relatively a dry phase. At SJRWMD, Dr. Rao himself conducted an in-depth study of AMO and found that there is a strong qualitative resemblance between AMO and the rainfall and streamflow patterns of Northeast Florida. To illustrate this finding, four figures from Dr. Rao's report comparing AMO with rainfall patterns of Gainesville and streamflow flow patterns of the St. Johns River near Christmas are presented in this report (Figures 3-6).

## REFERENCES

Enfield, D.B., A.M. Mestas-Nunez, and P.J. Trimble, 2001: *The Atlantic Multidecadal Oscillation and its relationship to rainfall and river flows in the continental U.S.* *Geophysical Research Letters*, 28: 2077-2080.

Kelly, Martin H., James A. Gore (2008). *Florida River Flow Patterns and the Atlantic Multidecadal Oscillation.* *River Research and Applications*, 24:598-616 (2008). Published online in Wiley Interscience ([www.interscience.wiley.com](http://www.interscience.wiley.com)) DOI: 10.1002/rra.1139

Rao, D. V., 2005 Draft. *Verification of Minimum Surface Water Levels for Lakes in the Minimum Flows and Levels Program of the St. Johns River Water Management District.* Palatka, Fla.: St. Johns River Water Management District.

Rao, D. V., 2008 Draft. *North Atlantic Sea Surface Temperatures and Rainfall/ Streamflow Occurrences in NE Florida.* Palatka, Fla.: St. Johns River Water Management District.

Riggs, H. C. 1972. *Low-Flow Investigations, Techniques of Water-Resources Investigations of the United States Geological Survey*, Chapter B1, Book 4 Hydrologic Analysis and Interpretation. Washington D.C.: U.S. Government Printing Office.

Robison, C.P. 2014. *Indian Lake System Minimum Flows and Levels Hydrologic Methods Report.* Technical Publication SJ2014-2. Palatka, Fla.: St. Johns River Water Management District.



**Appendix A**

**Table 1-1. Dunn Review Comments on MFL Documents**

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**TABLE 1-1. DUNN REVIEW COMMENTS ON MFL DOCUMENTS**

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
1	General comment	Yes	Document will benefit from an integrated treatment of uncertainty	Add a discussion on the effect of sources of uncertainty on the development of the recommended minimum levels.	
2	General comment	No	Report should have a concise assessment of how each of the relevant water resource and human use criteria (from statute) are addressed by the recommended minimum levels.	Add a discussion. This topic can be handled best in a tabular format. SJRWMD typically include a summary table in their MFL documents.	Insertion/deletions follow similar revisions made to the Lake Butler document. A tabular screening summary was not conducted to determine relevance of individual WRVs to the resource (See section 1.2, Minimum Flows and Levels for the Aucilla River, Wacissa River and Priority Springs, <a href="http://www.srwmd.state.fl.us/DocumentCenter/View/11360">http://www.srwmd.state.fl.us/DocumentCenter/View/11360</a> ), although the lack of relevance is implicit for a few of the values. Detailed descriptions have been added to the WRVs in this document, as is the statement of WRV choice for Lake Hampton.
3	General comment	Yes	Statistical analyses are not covered in sufficient detail. For the most part results are given in the report, but the details of the analysis are not provided. Therefore, the results of any statistical analysis is only assumed to be valid.	The District's Lake Hampton MFLs report would be aided by a thorough review to assure that all statistical results presented can be verified by material in the main body of the report, or an appendix.  In the bigger picture, verification of statistical results is also a quality assurance need that should be covered. Finally, the lack of verification makes the statistical results a specific source of uncertainty.	Statistics presented in this report are predominantly univariate statistics performed upon elevation data. Their methods will be cited completely, as will those used to determine community metrics (e.g., point-centered quarter method).  <i>Reserve for discussion of data sources, if relevant.</i>

Appendices

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
4	General comment	No	Mix of SJRWMD & SWFWMD methods is a good idea. The report should however provide a more detailed comparison of how the two methods agree, and disagree.	Please provide a more detailed comparison of the two methods.	Please see Section 4.0 MFLS METHODOLOGY. Changes follow those made in the Lake Butler document and suggestions by Dr. Rao.
5	General comment	No	Adaptive management theme should be added.	Adaptive management theme can be introduced in the analysis of uncertainty as covered in Comment 1.	Reserve for discussion with MFL Project Team
6	Executive Summary, page 1	No	Reviewer concurs with the use of the MFLs methods developed by SJRWMD, supplemented by lake MFLs methods developed by SWFWMD.	No further action required.	
7	Executive Summary, page 1	Maybe	I note that staff recommend two levels, and do not include a minimum average (MA). The SJRWMD often sets three minimum lake levels: FH, MA, and FL. Are staff confident that all water resource and human use values will be protected with just FH and FL levels?	Please elaborate.	According to listings in 40C-8.031, F.A.C., a MA was set for 105 of 107 SJRWMD lakes. The two lakes without a MA were either an <i>astatic</i> sandhill lake or one spending <i>little time at an elevation range relevant to the minimum average... on account of drainage canals that have created a cyclical hydrologic regime of rapid rise during storm events followed by rapid decline</i> . Staff is confident the resources upon which the FH and FL were based will be protected. Reserve the remainder of this response to discussion regarding re-evaluation considering soils, and surficial hydrology and community boundaries (see Comment #31 and add discussion of fire in wet flatwoods).
8	Executive Summary, page 2	Maybe	Staff and consultants chose the SWMM model as the tool for developing a water budget model. I defer to Dr. Rao's comments on this selection.	Reviewer defers to Dr. Rao's review comments regarding the ECT's water budget model.	

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
9	Section 2.1, page 2, Statutory framework	No	Reviewer agrees with the mission as defined.	No further action required.	
10	Section 2.2 Pages 2-3, Water Resource Values	No	Concluding sections of this report should include a summary as to how these criteria are protected. This could be presented as a tabular summary, similar to that used by SJRWMD.	Add appropriate summary in conclusions section.	Please see response to Comment #2
11	Section 2.4 Management Concerns, page 4	No	Staff highlight this concern, but do not give the reader a clear picture as to the relevance of this particular MFL to the water supply planning process.	Staff should expand on the importance of the NFRWSP? Please add appropriate text to this paragraph.	An insertion has been made in Section 2.4 to address this comment.
12	Page 6, Figure 3-1	No	Please correct the scale on this figure. It is incorrect	Revise Figure 3-1.	Correction inserted into document.
13	Page 7, Section 3.1 Background stage data	No	Reviewer finds the resampling technique to be a standard technique.	No further action required.	
14	Page 7-Table 3-1	No	Would values be affected by the resampling method? Was this tested?	Provide a response.	Yes, without resampling, the data extending from the beginning of record (11/09/1988) to the end of WY2014 (09/30/2104), n=3585, resulted in a median value of 129.74, a P10 of 130.54, and a P90 of 127.30 (NAVD88). <i>The resampled median was lower by 0.95 feet; while the P10 and P90 were lower by 0.81 and 0.96 feet, respectively.</i>  <i>Reserve for further comment in the context of stage exceedance probability chart (Figure 6-3) and discussion with Project Team members.</i>

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15	Scale on figures 3-2, 3-3, and 4-1.	No	Please make sure that scales used on these figures are correct.	Revise figures as needed.	Scale has been revised in all figures.
16	Page 9, Figure 3-2	No	Figure's legend is difficult to use, since the reader has to jump back and forth from the wetland type descriptions on page 8 and the NWI designations in the legend.	Add more a descriptive legend	Legend was modified to user-friendly descriptions of vegetation type and hydrologic regime.
17	Page 13, Section 4.0 MFL Methodology	Maybe	Is the SJRWMD 2006, the best, most current version of the SJR's MFLs methods manual? I believe there is a more current version.	Revise text as needed.	Revisions were made to the text and reference to specify this version of the manual is a draft. It has not been revised/finalized.
18	Page 13, Section 4.1 Site Selection	No	Reviewer finds that two transects are minimally sufficient.	Add at least one more vegetation transect in future.	SRWMD agrees with this statement. This peer review has provided many comments that may not materially affect the conclusion of the report; but if they were completely addressed, additional data collection would be necessary, particularly in regards to soil hydrology.
19	Page 15, Section 4.3 Vegetation Sampling procedures	No	Reviewer concurs that sampling methods used are professionally accepted methods for characterizing vegetative communities.	No further action required.	
20	Page 15, Section 4.4 Soil Sampling Procedures	No	Reviewer concurs that sampling methods used are professionally accepted methods for characterizing soil horizons, and hydric conditions.	No further action required	
21	Pages 16-17, Section 4.5 Hydrologic Indicator Sampling	No	Reviewer concurs that sampling methods used are standard for characterizing hydrologic indicators.	No further action required.	

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
23	Page 17, Section 5.1 Data Analysis	No	Reviewer concurs that authors used best available methods for analysis of vegetation, soils, and hydrologic indicator data.	No further action required.	
24	Pages 17-18, Section 5.2 Consideration of Basin Alterations	Maybe	Effect of outlet canal appears to be a dramatic reduction in frequency of higher water-level events. Did District estimate the magnitude of the invert reduction? When did this outlet become operational?	Please respond to the questions posed, and add additional text to report to cover the issues.	SRWMD agrees that the effect of outlet canal appears to be a dramatic reduction in lake stage elevation, according to the indicators of normal pool that were identified per methods described in Section 4.5 and Appendix E. However, a reduction in the <i>frequency</i> of higher water-level events may be difficult to ascertain without pre outlet canal stage records.  <i>SRWMD recognizes the importance of the peer-reviewer's concerns and reserves addressing them in the results and discussion (Section 6.3), and Appendix E (Section X) of the final report.</i>

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25	Page 18, Section 5.2	Maybe	Can the model be used to explore the historical changes pre and post canal? Defining the magnitude of change in hydrologic conditions and the time frame of change is important for a reader's understanding of the current and historic conditions in these wetlands.	Please respond to the questions posed, and add additional text to report to cover the issues.	<p>The model cannot be used to explore the historical changes pre- and post-canal. The following language has been removed from Section 5.2:</p> <p><i>SRWMD develops hydrologic models, which address existing structural features, and uses these models to consider the effects these changes have had on the long-term hydrology of water bodies for which recommended MFLs are being developed.</i></p> <p><b>Discuss with Project members the responsibility and limitations of using the model to explore the historical changes pre- and post-canal.</b></p>
26	Page 18, Section 5.3 MFLs Compliance Assessment	Maybe	Reviewer concurs that use of a water budget model is a common method for compliance assessment. He notes, however, as does Dr. Rao, that the historic water level time series can also be used.	Consider using the historic lake level time series in the compliance analysis.	<b>SRWMD MFL project members have discussed using the historic water level time series data in the SWMM. Results will be summarized in this record and field.</b>
27	Page 19, Section 6.1 Vegetation	No	Reviewer concurs with the authors decision to focus on the cypress swamp and deep marsh for setting minimum levels for Lake Hampton.	No further action required.	

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28	Page 19, Section 6.1 Vegetation	No	Reviewer concurs with the magnitude, duration and return interval defining the frequent high and frequent low. We do note, however, that the SJRWMD often also defines a minimum average level for lakes.	Please respond to need for a minimum average level.	<p>This comment is partially addressed in response to Comment #7, and changes were made to the MFLs methodology section (4.0), per Dr. Rao's recommended language.</p> <p><i>The following statements were inserted into the Section 7.0 - Conclusions and Recommendations:</i></p> <p>Multiple MFLs are developed and recommended in order to address the need to protect the entire range of the flow (Neubauer et al. 2008). There remains a need to determine a MA for Lake Hampton in order to protect those biotic communities, or structural components of the system, most likely affected by low stage elevations of long duration (e.g., 6 months) with short return intervals (e.g., 1.5 years).</p>
29	Page 19, Section 6.1 Vegetation	Maybe	On Issue of overlapping species gradients, text in second paragraph of Section 6.1 (after Table 6-1) does not present a strong argument.	Further discussion of the likely factors contributing to species overlap is needed.	<p>The results and discussion are limited to overlap between <i>elevations</i> of respective vegetative communities, but SRWMD understands that species overlap affects the determination of community boundaries.</p> <p>Additional text, with citations, has been added to this section suggesting that methods for community delineation may be improved with additional vegetation/boundary sampling and analysis.</p>

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31	Page 19, Section 6.1 Vegetation, last full paragraph on page	Maybe	Authors briefly mention the typical hydrologic setting for baygall communities is on saturated organic soils fed by lateral seepage from adjacent uplands.	Is there evidence to support that this baygall community is, in part, maintained by seepage?	No, there is no evidence supporting this citation for the Lake Hampton baygall community. However, SRWMD has made insertion into Section 6.2 (LAKE HAMPTON SOILS) that outlines an evolutionary process for investigating soil hydrology in the vegetation communities in order to elucidate the processes of seepage or inundation in maintenance of deep organics.
32	Page 20 second paragraph.	Yes	Results of statistical evaluations are given, but the reader must assume that statistical analyses were done correctly, since steps in analysis cannot be verified. The details cannot be checked	Details of statistical analysis cannot be checked. The reader should be able to verify that results presented were done correctly. Add details of statistical analysis.	SRWMD has addressed this specific comment with an insertion citing statistical evaluations detailed in Appendix C. <i>SRWMD does, however, understand this concern and will provide all supporting SAS procedural scripts and data upon request.</i>
33	Page 20, third paragraph	Yes	Reviewer concurs with the hypothesis stated that setting and validating the minimum levels can be improved by additional field work. This paragraph does a very good job describing the confounding effects of long term soil subsidence.	I conclude that this is best dealt with as a future effort. The report has identified a source of historic impact. This can be addressed in an integrated analysis of uncertainty, and as a key component in adaptive management plan for Lake Hampton MFLs	SRWMD will outline an adaptive management plan in support of this peer review.

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34	Page 20, third paragraph	Yes	<p>Very strong evidence of significant subsidence/oxidation of organic soil horizons prompts a number of questions:</p> <ul style="list-style-type: none"> <li>• If soils have oxidized then the IFH, FH, MA, and FL would be affected.</li> <li>• Can we use the SWMM model to recreate a pre-canal hydrology?</li> <li>• Is there a post-canal equilibrium?</li> <li>• How should we look at SJR soil criteria for MA and FL?</li> </ul>	<p>Please respond to the questions posed, and add additional text to report to cover the issues.</p>	<ul style="list-style-type: none"> <li>• <i>SRWMD is considering the responsibility and limitations of using the model to recreate pre-canal hydrology.</i></li> <li>• Further investigation is necessary in determining post-canal equilibrium of vegetation and soil components. Such equilibria may be partly addressed through re-evaluation and monitoring by methods inserted into the document in response to comments #29 and #31. Hydrologic equilibrium is assumed, because the invert of the drainage canal is relatively stable with minimal change due to scour, and sedimentation and organic accretion.</li> <li>• Text has been added to Section 6.2 to address using the SJRWMD soil criteria for the MA and FL, particularly in the context of MFL re-evaluation.</li> </ul>

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35	Page 21, Figure 6-1	Maybe	Reviewer does not completely understand the purpose of this graphic. He did not find it to be adequately explained in the text.	Please clarify.	<p>This figure is cited in the paragraph identified in Comment #33: <i>Lack of symmetry is demonstrated in the elevation-distribution of the cypress community, per results of vegetation data analyses outlined in Appendix C (Figure 7).</i></p> <p>Lack of symmetry is illustrated by the left-skewed histogram in the figure. A dataset that is normally-distributed about a mean of 128.9 NAVD88 would follow the curve indicated by the blue line. It is merely conjecture, but the probable cause of the skewness was stated in text: <i>It is possible the elevations centering on 129.5 and 130 NAVD88 may represent relict soil surfaces and not those currently influenced by seasonal flooding.</i></p>
36	Page 22, Section 6.2 Soils	Yes	Soils subsidence is a significant issue for condition of the wetland systems bordering the lake. Did the field effort attempt to quantify the soil loss? If not, then that would be useful to do in the future.	This can be addressed in an integrated uncertainty/AM plan for future work by the District.	<p>Response to Comment #24 cites section 6.3 (LAKE HAMPTON HYDROLOGIC INDICATORS), where said indicators were used to estimate a reduction in the P50 elevation of 2.85 feet, per SWFWMD Rule 40D-8.624(8), F.A.C.</p> <p>SRWMD did not attempt to quantify the reduction in soil loss. An estimate may be possible using existing ground shot elevations and nearby historic soil lines (see Appendix E). SRWMD agrees that this estimate may be improved through a targeted elevation survey of these two benchmarks in MFL re-evaluation.</p>

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37	Page 22, Section 6.2 Soils	Yes	Are these soils maintained in part by lateral seepage, like classic bayhead, or baygall community?	Please clarify.	Text was added to Section 6.2 while addressing earlier comments (#31 and #34). SRWMD believes those responses should satisfy this comment.
38	Pages 22-24, Section 6.3 Hydrologic indicators	Yes	This analysis helps interpret the effects of soils subsidence. The hydrologic indicator analysis helps greatly to characterize the magnitude of the drainage effect of the outlet canal.	The discrepancy between the current flood regime in the forested wetlands, and its historic indicators is significant, and should be investigated further.	SRWMD agrees that history must be more thoroughly reviewed, particularly to address man-made alterations to lake drainage for which history is scant; and concerns such as those raised in Comment #34, regarding post-canal equilibrium, cannot be addressed without a clear understanding of this history.
39	Page 22, Section 6.2 Soils	Yes	Reviewer concurs with decision to exclude recommendation of minimum average (MA) level based on hydric soils. But I caution that the act of excluding this level is based on the effects of a significant alteration to the lakes hydrologic regime.	The discrepancy between the current flood regime in the forested wetlands, and its historic indicators is significant, and should be investigated further.	Text has been added in this section to address potential methods for investigating soil hydrology.
40	Page 23, first full paragraph	Maybe	<b>Uncertainty issues are highlighted.</b>	The discrepancy between current flood regime in the forested wetlands, and its historic indicators is significant, and should be investigated further.	The magnitude of the discrepancy was enumerated in this paragraph.

Appendices

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
41	Page 23, Figure 6-3	Maybe	<p>This is a very useful summary graphic showing:</p> <ul style="list-style-type: none"> <li>Discrepancy in results using SJR vs SWF criteria to estimate P10 and P50.</li> <li>Begs question as to what is the correct period of record to evaluate? <ul style="list-style-type: none"> <li>Should a corrected POR be developed?</li> <li>Difference between SWF P50 vs SJR P50 is 2.42 feet.</li> <li>Does this imply 2 or more feet of organic soil subsidence?</li> </ul> </li> </ul>	<p>The discrepancy between the current flood regime in the forested wetlands, and its historic indicators is significant, and should be investigated further. Please respond to the questions posed, and add additional text to report to cover the issues.</p>	<ul style="list-style-type: none"> <li>SRWMD wishes to utilize the entire POR and believes the resampled data fairly represents an evenly distributed lake stage throughout the POR. SRWMD does recognize that using non-resampled data results in lower percentile rankings, per response to Comment #14</li> <li>SRWMD may have created confusion in presenting estimates of P50 by SWFWMD methods, and minor insertions have been made to show that this <i>estimated</i> P50 is equal to the elevation of the High Normal Pool (HNP) minus 1.8 feet, which is actually a difference of 2.85 feet.</li> <li>Please see the response to Comment #36 regarding the <i>implied</i> soil loss. Soil loss rates must still be investigated, and SRWMD does not wish for the difference between the <i>SJR</i> P50 and that estimated from the HNP to be an implied estimate of subsidence.</li> </ul>
42	Page 23, second to last paragraph	Maybe	<p>Reviewer strongly agrees with the statement that vegetative communities surrounding the lake have been dewatered by construction of the outlet canal.</p>	<p>A fuller discussion of the effects of dewatering is warranted. In particular an expanded comparison of the current and historic indicators of hydrology would be very helpful.</p>	<p>Additional discussion was added to provide some perspective regarding the relative <i>age</i> of the various hydrologic indicators surveyed in this MFL.</p>

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
43	Page 23, last paragraph	No	This is a good discussion that should be expanded.	A fuller discussion of the effects of dewatering is warranted. In particular an expanded comparison of the current and historic indicators of hydrology would be very helpful.	Additional discussion was added to provide some perspective regarding the relative age of the various hydrologic indicators surveyed in this MFL.
44	Page 24, Table 6-2	No	Good summary, these indicators help to characterize both current and historic (pre-canal) hydrology.	A fuller discussion of the effects of dewatering is warranted. In particular an expanded comparison of the current and historic indicators of hydrology would be very helpful.	There are variable rates of response between species in adventitious root formation, and rates of establishment between morphologically different lichens.
45	Page 24, first paragraph below Table 6-2	Maybe	Reviewer finds that the content of this paragraph adds weight to the argument that the hydrology of the Lake Hampton system has been significantly altered by the presence of the outlet canal. This finding needs to be carried into the conclusion, section 7 of the report.	Add a summary paragraph on water level reduction and induced loss of organic soil to the Section 7.0 Conclusions and Recommendations.	
46	Page 24. Section 6.4 Compliance Assessment	Maybe	Reviewer concurs with the selection and use of the water budget model as a typical means to assess compliance with the recommended minimum levels. Reviewer notes however, as does Dr. Rao, that the historic lake level time series can also be used for compliance analysis. Reviewer also concurs with the use of the year 2006 as a baseline condition, acknowledging that 2006 reflects the effects of historic dewatering.	Please respond to Dr. Rao's comment in Table 1-2 in Appendix B with recommendations for running the compliance analysis using the historic lake level time series.	Per response to Comment #26: SRWMD MFL project members have discussed using the historic water level time series data in the SWMM. Results will be summarized in this record and field.

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
47	Pages 24 to 25, Section 7 Conclusions & Recommendations, and Table 7-1	Maybe	Reviewer agrees with the recommended levels as defined in Table 7-1, and described in text. To this concurrence I add the caveat that this concurrence is subject to resolution of questions raised in my review, and any other issues of significance raised by Dr. Rao in his review.	Before I sign-off on the compliance analysis done by ECT, I must check with Dr. Rao's assessment on this.	<i>SRWMD understands the conditional nature of this comment.</i>

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
48	Pages 24-25, Section 7 Conclusions & Recommendations	Maybe	Consider that it seems contradictory: That there are clear signs historical hydrologic alterations, and subsidence of organic soils, yet the MFLs are being met. Does this mean that a new equilibrium has been established?	The discrepancy between current flood regime in the forested wetlands and its historic indicators is significant and should be investigated further in the future. It is important that the report give greater emphasis to the changed conditions induced by the outlet.	<p>The following indicate that an equilibrium has been established that may be supported by the evidence presented: The vegetative communities chosen for this MFL correspond reasonably to their anticipated, respective elevations along the exceedance probability chart (Figure 6-3) constructed using resampled hydrologic record from 11/9/1988 to 12/31/2014. The analyses presented with the hydrologic model (ECT 2016) support the occurrence of these communities according to defining hydrologic criteria presented in Table 7-1.</p> <p>However, SRWMD does recognize the need to provide a more complete history of the changes that have occurred due to outfall canal construction, as mentioned in response to Comment #38. There is also much more work that may be conducted in the wetland and flatwoods communities adjacent the lake to understand soil hydrology, as mentioned in response to comments #29, 31, and 34. The effects of flooding and dewatering upon hydrologic indicators may also be examined more closely during re-evaluation (i.e., See response to Comment #44).</p>
49	Page 25, first paragraph	Maybe	In general reviewer agrees with the two recommended levels.	No further action required.	
50	Page 25, second paragraph	Maybe	Reviewer agrees that the recommended levels are met under 2006 hydrologic conditions.	No further action required.	

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
51	Page 25, third paragraph	Maybe	The reviewer concurs with selection and use of EPA SWMM model for simulation of compliance conditions. The reviewer notes, however, that Dr. Rao has made several recommendations covering the model set up and parameterization.	Address Dr. Rao's specific review comments covering set up and use of the water budget model.	<i>MFL Project team will address this comment. Results will be summarized in this record and field.</i>
52	Page 25, last paragraph	Maybe	Reviewer agrees with recommendations for reducing sources of uncertainty. The reviewer agrees with the two recommended actions: improved modeling predictions by using an integrated groundwater-surface water model, and recalibrating the model as additional data becomes available.	This paragraph is a perfect segue to final paragraph addressing the development of an integrated analysis of sources of uncertainty affecting the establishment of the recommended levels, and those sources affecting methods used for compliance assessments.	<i>Reserve for an outline regarding an adaptive management approach to address the development of an integrated analysis of sources of uncertainty affecting the establishment of the recommended levels, and those sources affecting methods used for compliance assessments.</i>
53	Pages 28-29, Appendix A: Water Budget Modeling	Maybe	Reviewer defers to Dr. Rao's review of the content of Appendix A of the MFL document, and the water budget modeling work done by ECT.	Address Dr. Rao's specific review comments covering set up and use of the water budget model.	<i>MFL Project team will address this comment. Results will be summarized in this record and field.</i>
54	Pages 30-32, Appendix B: Site Survey	No	Reviewer found the information presented in Appendix B to be clearly presented and easy to follow.	No further action required.	

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-1, Dunn		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
55	Pages 33-43, Appendix C: Vegetation Sampling Methods, Analysis and Results	Maybe	<p>Reviewer agrees with the plant community sampling methods selected and applied, and those used for analysis.</p> <p>Reviewer notes however, that statistical analyses relied upon are not fully presented in Appendix C. Because of this not all of results presented can be verified independently by the reader.</p>	<p>The Lake Hampton minimum levels report would be aided by a thorough review to assure that all statistical results presented can be verified by material in the main body of the report, or an appendix.</p> <p>In the bigger picture, verification of statistical results is also a quality assurance need that should be covered. Finally, the lack of verification make the statistical results a specific source of uncertainty.</p>	<p>SRWMD asserts that the statistical analyses and corresponding results were thoroughly presented but agrees that the reviewers cannot verify the results because they were not provided the data.</p> <p>If there is further issue, or if the reviewers wish to be provided the data and scripts used in the analyses, SRWMD staff is prepared to assist.</p>
56	Pages 44-48, Appendix D: Soil Sampling Methods, Analyses and Results	No	Reviewer found the information presented in Appendix D to be clearly presented and easy to follow.	No further action required.	
57	Pages 49-50, Appendix E: Hydrologic Indicator Sampling, Analysis, and Results	No	Reviewer found the information presented in Appendix E to be clearly presented and easy to follow.	No further action required.	
58	Lake Hampton Water Budget Modeling-Phase B	No	Reviewer defers to the review of the ECT document by Dr. Don Rao.	See Dr. Rao's review of this document	

**Appendix B**

**Table 1-2. Rao Review Comments on MFL Documents**

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**TABLE 1-2. RAO REVIEW COMMENTS ON MFL DOCUMENTS**

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
1	General comment	Maybe yes	The two reports, <i>Minimum Recommended Lake Levels: Lake Hampton, Florida. Draft Report 2016</i> by SRWMD and <i>Lake Hampton Water Budget Modeling – Phase B by ECT</i> are well organized and all the pertinent information was comprehensively presented. This reviewer, however, found several editorial type shortcomings in both reports and some concerns in the modeling methods and modeling results. Corrections are suggested and additional information requested.	Implement reviewer's recommended editorial corrections as described in subsequent comments. Request additional modeling results as suggested in subsequent comments.	
2	General comment	No	There are too many acronyms in the report, need a table of acronyms.	<i>Before the Executive Summary</i> provide a list of acronyms	<i>Pending</i>
3	Executive Summary, page 1	No	The table in the Executive Summary is referred to as Table 1 in the text.	Correct table title as: Table 1. Recommended ...	<i>Corrected.</i>
4	Page 1, Paragraph 2	No	The reference SJRWMD 2006 appears to be not yet a published report, it cannot be found on the SJRWMD website.	Show it as, SJRWMD 2006 (Draft) <i>at all places in the report where you showed it as SJRWMD 2006.</i>	<i>The reference has been corrected to indicate this document is in draft form.</i>

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
5	Page 1, Paragraph 3	No	<p>The statement: The minimum frequent high stage for a seasonally flooded hydroperiod represents the mean of the surface elevations surveyed in the cypress (<i>Taxodium</i> spp.) communities adjacent to the lake. This statement is not clear, explain.</p> <p>Look at the definition of FH in Table 1. It is a seasonally flooded elevation for a duration of 30 days, once in two years on the average. You want to tie it to the mean of the surface elevations surveyed in the cypress (<i>Taxodium</i> spp.) communities adjacent the lake. On what theory and basis?</p>	<p>Explain why the mean of the surface elevations surveyed in the cypress (<i>Taxodium</i> spp.) communities adjacent the lake represents FH.</p>	<p>Text has been inserted into the paragraph for reference of theory and basis for using the mean elevation of the cypress community as a benchmark for seasonally flooded hydrologic criteria.</p>
6	Page 1, Paragraph 4	No	<p>Explain why FL represents the average elevation of the landward extent of the deep marsh community adjacent the lake shoreline.</p> <p>Or, explain why the average elevation of the landward extent of the deep marsh community adjacent the lake shoreline represents FL.</p>	<p>Add explanation</p>	<p>SRWMD is reserved in providing additional detail, in addition to literature cited, designating FL according to the landward extent of the deep marsh community, the peer review team has brought to our attention that pertinent information regarding use of the deep marsh was lacking in section 4.3. Text has been added to that section of the report.</p>

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
7	Page3, Section 2.3 Hydrologic Regime	No	Hydrologic Regime section describes the MFLs methodologies of the SJRWMD and SWFWMD and in the introduction, it was stated that SRWMD developed its MFLs based on the methodologies of these two districts. Since SRWMD borders these two districts, its hydrology may not be different from these two districts; therefore, SRWMD developing its own MFLs based on the neighboring District's methodologies is justified.	No action needed	
8	Page3, Section 2.3 Hydrologic Regime	No	The reference (SJRWMD 2009a). This reference is not found in the References list (Pages 26 – 27). But Table 2-1 is from SJRWMD 2006 Draft.	Revise SJRWMD 2009a as SJRWMD 2006 Draft	<i>This revision has been made along with other changes to the same paragraph.</i>
9	Page3, Section 2.3 Hydrologic Regime	No	Fourth line from bottom: Table 2. Tables and figures are referred to by the serial numbers in the text, but designated by Section number on their titles. In this instance, Table 2-1 is written as Table 2 in the text.	Correct all Table and Figure numbers in the text to match the numbers given in the Table and Figure titles.	<i>Although Table 2-1 has been removed, SRWMD has noted this shortcoming in citation of various tables in the text and will screen the remainder of the document for detection and correction of similar instances.</i>

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
10	Page 4, Table 2-1	No	Table 2-1 information may not be current. Current information is available in Chapter 40C-8 F.A.C. (January 31, 2016). I checked for "Permanently flooded" category. It is defined as: "Permanently flooded" means a hydroperiod category where water covers the land surface throughout the year in all years. Vegetation, if present, is composed of aquatic macrophytes. The above definition means: Frequency every year, and duration 'year long.'	SRWMD staff should check Chapter 40C-8 F.A.C. (January 31, 2016), and find out the values of frequency and duration for Table 2-1. or make a comment: Table 2-1 frequency and duration description/values may not be current, current information may be found in Chapter 40C-8 F.A.C. (January 31, 2016).	SRWMD extracted this table directly from the SJRWMD methods manual where there was a more complete discussion in text regarding the types of events (e.g., flooding vs. drying) referenced in the table.
11	Page 4, second paragraph	No	This paragraph gives a general description of how MFLs are applied. If a proposed consumptive use leads to violation of the adopted MFLs, will the permit application be denied? Can you give instances of when and why it would be necessary to review and revise the established MFLs?	Add appropriate text here.	SRWMD is not certain that additional detail may be provided concisely, regarding the application of MFLs to CUP. SRWMD wishes to leave this discussion intact.
12	Page 4, Management Concerns	No	The importance of the NFRWSP to the proposed MFLs is not clear?	Add explanation of the importance.	Additional discussion has been inserted into Section 2.4 to address this comment.
13	Page 4, Section 3.0, Setting and Description	No	Second line: (US301 and CR18, respectively)	Revise it as: (US301 and CR18, respectively, Figure 3-1)	This reference has been corrected.

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
14	Page 4, Section 3.0, Setting and Description	No	Second sentence: The lake occupies approximately 823 acres (Mattson 1999, with a median water surface elevation of 128.79 feet (NAVD88, Figure 1, Table 3) from the available record. There are several errors in this sentence, corrections are shown in the next column.	Revise it as follows: The lake has an area of approximately 823 acres (Mattson 1999), with a median water surface elevation of 128.79 feet NAVD88 (Figure 3-1, Table 3-1 P50) from the available record.	Recommended changes have been made to the document.
15	Page 5, last line	No	Correct Figure 1 as Figure 3-1	Make recommended correction	Corrected.
16	Page 7, Background stage data	No	The majority of data (1988 to present) were recorded on a weekly basis. For this reason, ECT resamples all data to weekly stage data, which is acceptable.	No action necessary	
17	Page 7, Background stage data	No	Paragraph 1, third line from bottom, correct Table 1 as Table 3-1	Make correction as mentioned	
18	Page 7, Table 3-1	No	Are the stages P10, P50, and P90 shown in the table in anyway related to the recommended Lake Hampton MFLs?	Address this question	SRWMD believes this question is answered implicitly in the affirmative in the opening statement of the section. Since these percentile rankings were not used in setting the MFLs, rather in providing comparison with the MFLs the in context of exceedance probabilities (Figure 6-3), SRWMD wishes to reserve for discussion of the latter.  <i>Recommended changes to MFLs methodology (Section 4.0)</i>

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
19	Scale on figures 3-2, 3-3, and 4-1.	No	Please make sure that scales used on these figures are correct.	Make changes as appropriate	Corrected
20	Page 8, Wetlands	No	Figure 2 occurs at three places, correct it as Figure 3-2	Make correction as mentioned	Corrected
21	Page 10, Section 3.3 Soils	No	First line: Figure 3. Correct it as Figure 3-3	Make correction as mentioned	Corrected
22	Page 13, Section 4.0 MFLs Methodology	No	<p>In the Executive Summary and Introduction (Pages 1 and 2), it is stated, SRWMD established its MFLs using the methodology developed by the St Johns River Water Management District (SJRWMD) and supported by methods developed by the Southwest Florida Water Management District (SWFWMD).</p> <p>Nowhere in the report it is there an explanation of how SRWMD used/was supported by the SWFWMD methods. After the first paragraph, a summary paragraph describing what was done by the SRWMD should be added. My understanding is as follows.</p> <p>SJRWMD established three MFLs for most of its water bodies, and four or five for a few. SWFWMD developed only two MFLs. SRWMD also developed only two MFLs. Explain why SRWMD also developed only two MFLs. SRWMD should give its own reasoning for choosing only two MFLs.</p>	<p>End the first paragraph with the sentence: The following is a summary.</p> <p>I am giving the following text for using in the next (new) paragraph, it may be modified as needed.</p> <p>SJRWMD defines five MFLs: <i>Minimum Infrequent High (MIH), Minimum Frequent High (MFH), Minimum Average (MA), Minimum Frequent Low (MFL), and Minimum Infrequent Low (MIH)</i> flows and/or water levels. It established three MFLs for most of its water bodies (MFH, MA, and MFL), and four or five for a few (see Chapter 40C-8 F.A.C., January 31, 2016 for the names of the water bodies and the established values of MFLs). SWFWMD established two MFLs (give explanation for SWFWMD choosing only two MFLs). SRWMD established two MFLs (expand text giving explanation for choosing only two MFLs). describe how SRWMD used/ was supported by the SWFWMD methods.</p>	Recommended changes have been inserted and additional text added.

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
23	Page 13, Section 4.1 Site selection	No	This section describes transect sites selection, so revise the title. The four criteria used for selection comprehensively cover the necessary background for selection.	Revise the title as: TRANSECT SITES SELECTION	Title has been revised
24	Page 13, Section 4.1 Site selection	No	Figure 4 occurs at two places in the last paragraph. Correct it as Figure 4-1	Make correction as mentioned	Corrected
25	Page 15, Section 4.2 Site Survey	No	The information collected as described under site survey should provide the necessary data for this project's completion.	Reviewer agrees with the survey methods	
26	Page 15, Section 4.3 Vegetation sampling procedures	No	This section describes vegetation sampling procedures done to collect data to set minimum frequent high (FH) and minimum frequent low (FL) by the SJRWMD methods.	Reviewer agrees with the vegetation sampling procedures	
27	Page 15, Section 4.4 Soil sampling procedure	Maybe	Describe how soil sampling is related to FL setting. Last line: Correct Figure 5 as Figure 4-2	Add text as appropriate	Text has been inserted into this section
28	Page 16, Section 4.5 Hydrologic Indicator Sampling procedures	No	Correct Figure 6 to Figure 4-3	Make correction as mentioned	Corrected
29	Pages 17-18 Section 6.0 Consideration of Basin Alterations	No	Reviewer agrees with the description and analysis given regarding the effects of basin alterations.	No action necessary	

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
30	Page 18, Section 5.3 MFLs Compliance Assessment	No	Procedures used for MFLs compliance assessment are acceptable and standard methods. A hydrologic model was calibrated for the period of 2005 – 2014 using the land use, water use, and ground water levels of the year 2006 because there were no significant changes in the basin since then, and long-term simulated data were generated using the calibrated model, which is acceptable.	No change recommended	
31	Page 19, Section 6.1 Vegetation	No	Correct Table 4 as Table 6-1	Make correction as mentioned	Corrected
32	Page 19, Section 6.1 Vegetation	No	The paragraph below Table 6-1, the statement: Since the frequency of fire is more important in maintenance of the wet flatwoods community (FNAI 2010), these two communities should be separated on the landscape, as demonstrated by the results of this study. Which two communities should be separated? What demonstrated by the results of this study?	Add text as necessary.	The statement has been removed but re-stated with language inserted near the end of the section in discussion regarding improvements in delineating the boundaries of the vegetation communities. The discussion was warranted in response to Dr. Dunn's Comment #29.
33	Page 20	No	Correct Figure 7 as Figure 6-1, Figure 8 as Figure 6-2, and Figure 4 as Figure 4-1	Make corrections as mentioned	Specified corrections have been made

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action (Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)	C. Action to be Taken in Response to Comment
34	Page 22, Section 6.2 Soils	No	<p>The statement: The hydrologic regime protected by the MA relates to soils that experience dewatering for a maximum duration of 120 days and a maximum recurrence interval of 1.7 years. The SRWMD decided that it would be prudent to exclude recommendation of a MA due to the extreme extension of these soils into the wet flatwoods.</p> <p>Explain further the effects of 'extreme extension of these soils into the wet flatwoods.' Is this the only reason for excluding MA from consideration?</p>	Add text as necessary.	<p>This statement was amended to indicate that hydrologic drivers other than seasonal flooding (i.e., saturation, downslope seepage, etc.) may influence these soils.</p> <p>Text was inserted to address Dr. Dunn's related Comment #37, outlining an evolutionary process in determining hydrologic pathways in vegetative communities studied in this MFL.</p>
35	Pages 22-23, Section 6.3 Hydrologic Indicators	No	<p>Hydrologic Indicators section briefly discusses the principles of setting up MFLs. For the benefit of the readers, please explain the <i>Cypress Standard</i> that was mentioned in Appendix A.</p> <p>On pages 23-24, correct Figure 9 as Figure 6-3 and Table 5 as Table 7-1.</p> <p>Figure 6-3 is normally known as 'Stage-Duration Curve.' Revise the title as 'Figure 6-3 Stage-Duration Curve, ...'</p> <p>The data compiled to draw Figure 6-3 would be very useful to perform important additional analyses. At SJRWMD, the first step in MFLs compliance analysis is to develop MFLs frequency graphs based on the available historic stage data, and filling the gaps by linear interpolation, if necessary (Rao 2005 Draft). This data may not be homogeneous, but the results</p>	Add the clarifications requested	<p>Minor insertions and deletions were performed in order to briefly summarize the Cypress Standard and to remove reference to guidance levels that are moot and may require further explanation.</p> <p>Recommended editorial revisions have been made to figure and table citations, captions, and titles.</p> <p>Figure 6-3 was constructed using data from the hydrologic period of record, as specified in text and the caption of the figure. This data set was filled and provided to SRWMD by ECT under Task 3, 2016.01.07, WO14.15-050.04  <a href="\\POSEIDON\Water Use Research\MFLs\MFL_Establishment\300.0_Lakes\10.0_Butler_and_Hampton_Combined\Hampton_Only\Work_Order_Deliverables\WO14.15-050.04">\\POSEIDON\Water Use Research\MFLs\MFL_Establishment\300.0_Lakes\10.0_Butler_and_Hampton_Combined\Hampton_Only\Work_Order_Deliverables\WO14.15-050.04</a></p>

Appendices

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			<p>will give an indication as to whether the established MFLs are being met or not.</p> <p>Develop interpolated historic daily stage data for the POR (January 1988 to December 2015). Using this data,</p> <ul style="list-style-type: none"> <li>a. Draw a daily stage hydrograph for POR to illustrate the historic stage variation.</li> <li>b. Develop MFLs frequency graphs similar to those in Figures 5-7 and 5-8 of ECT (2016).</li> </ul>		<p><a href="#">ECT\Task 3\2016.01.07</a>). SRWMD understands that this data is interpolated and MFL Project staff will discuss the suggested use of the data and provide response in this record and column.</p>
36	Page 24. Section 6.4 Compliance Assessment	Maybe yes	<p>Based on the ECT modeling results this section states that there is a freeboard of 10 feet in the Floridan aquifer, that is, the established MFLs may be violated if the Floridan aquifer recedes by 10 feet from the 2006 hydrologic conditions. This reviewer, however, noted some puzzling numbers in ECT Figure 4-10, Water Budgets of SWMM Simulation (2005-2014). This figure shows evaporation from open water as 9.7 inches/yr and infiltration from land surfaces as 33.33 inches/yr, both values are unacceptable. This reviewer suggested that the District review detailed water budget results and seek clarification on some modeling procedures. The conclusion given in this section should be regarded as tentative until clarification is received from ECT.</p>	<p>Treat the conclusion shown as tentative until the modeling results and other modeling issues are resolved.</p>	<p>Revisions subject to clarification of model results.</p>

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
37	Pages 24-25, Section 7.0 Conclusions & Recommendations	No	The last paragraph of Page 24 and the first paragraph of Page 25 state that SRWMD developed MFLs for Lake Hampton using the methods of SJRWMD and describe the significance of the two MFLs recommended, the minimum frequent high (FH) and the minimum frequent low (FL). I agree with the methods used and the description given.	No action needed.	
38	Page 25, second paragraph	No	Use of the year 2006 as baseline condition is justified because there were no significant changes in the basin since then.	No action needed.	
39	Page 25, second paragraph	Maybe yes	Based on the model results, SRWMD concludes that the established MFLs are being met and there is a freeboard of 10 ft in Floridan aquifer (i.e., Floridan aquifer can recede by 10 feet from the 2006 levels without violating the established MFLs). As explained under my Comment No. 36, and presented later in the comments on ECT modeling, this reviewer suggests that the District seek clarification on some modeling procedures and requested for request and consider detailed water budget results.	Treat the conclusions shown in this section as tentative until the modeling results and other modeling issues are resolved	<i>Revisions subject to clarification of model results.</i>
40	Page 26, References	No	First Reference, last line: Lake and Reserv. Manage. 18(1): 1-9.	Expand: Reserv. Manage.	Corrected
41	Page 26, References	No	Reference by Kinser, P.D. second line Suwannee River Water Management District, Palatka, FL.	Revise it as: St. Johns River Water Management District, Palatka, FL.	Corrected

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42	Page 26, References	No	Third reference from bottom, second line: Minimum flows and levels method of the St. Johns River Water Management District, Florida	Revise it as: Minimum flows and levels method of the St. Johns River Water Management District, Palatka, Florida	Corrected.  As recommended for the Lake Butler MFL, the References section will be moved to the end of the document, since there are citations listed in the appendices.
	Lake Hampton Water Budget Modeling—Phase B		The following comments relate to Lake Hampton Water Budget Modeling by ECT	No action needed.	
43	Page 1-1 Executive Summary	No	SRWMD and ECT selected EPA's Storm Water Management Model (SWMM) to assess long-term hydrologic changes at Lake Hampton. The model emphasis is on storm water and water quality assessment, but it is essentially a general hydrology model and is capable of meeting the present needs. Other well-known models such as, HSPF and SWAT, also serve the same purpose, therefore, I agree with selection of SWMM for the present modeling work.	No change recommended	Comment Noted.
44	Page 1-1	No	Explain why ECT chose to describe the present model as a water budget model instead of a hydrologic simulation model.	Add explanatory text as appropriate	It was determined in the project work order after discussion with the District.

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45	Page 1-2 Model calibration	No	ECT calibrated the model for the period 2005-2014 for the 2006 hydrologic conditions, which did not show major variation through 2014. It performed long-term simulation for the period 1983-2014 using the calibrated model because model input data (e.g., rainfall) were available for this period. Use of similar procedures is common in hydrologic model studies, and I agree with these methods.	No change recommended	Comment Noted.
46	Page 1-2 Model calibration, Para 2	No	The sentence: The primary <b>criteria</b> for acceptable model calibration is 0.5 foot or less. root mean square error. Incorrect use of criteria, revise it as criterion	Change the word criteria to criterion.	Change made in the text.
47	Page 1-2, Task 3. Long-term model simulation. Para 1, last sentence	No	The sentence - The historical groundwater well records were evaluated through a double-mass curve analysis to determine whether significant historical drawdowns might be detected - should be clarified.	Revise it as: The historical groundwater well records were evaluated through a double-mass curve analysis <b>to study historical ground water level fluctuations.</b>	Change made in the text.

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48	Page 1-2, Task 3. Long-term model simulation	Maybe yes	<p>The statement - Both the recommended minimum frequent high and minimum frequent low levels are being met under 2006 hydrologic conditions.</p> <p>This reviewer, however, noted some puzzling numbers in Figure 4-10, Water Budgets of SWMM Simulation (2005-2014). This figure shows evaporation from open water as 9.7 inches/yr and infiltration from land surfaces as 33.33 inches/yr, both values are unacceptable. In later comments, this reviewer suggested that detailed water budget results for sub-basins and aquifers be requested and reviewed, and sought clarification on some modeling procedures.</p> <p>The conclusion given in this section should be regarded as tentative until clarification is received from ECT and the matter is resolved.</p>	Treat the conclusion shown as tentative until the modeling results and other modeling issues are resolved	<a href="#">See responses for Comment No. 82.</a>

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49	Page 1-2, last paragraph, first sentence	No	<p>The sentence: The water budget model was also used to assess the hydrologic effects of the upper FAS drawdowns in the context of the recommended MFLs.</p> <p>Drawdowns may not be the correct word in the present scenarios context. Here, simulations were performed assuming the Floridan aquifer potentiometric elevation (FAPE) to be lower than the 2006 FAPE. Simulations were continued gradually lowering the FAPE value until the recommended MFLs were tripped (i.e., no longer complied). When you pump water from a well, a cone of depression forms in the aquifer along the center of the well. You may call it a drawdown, but it is local, not across the board (i.e., the fall in water table will not occur over the entire aquifer). In the case of surface water reservoirs, on the other hand, when you release water through sluice gates or over spillways, the fall in the reservoir level is across the board and instantaneous (There is a hydrodynamic explanation for this occurrence). A true drawdown in the case of an aquifer is not achievable like in a surface water reservoir. Please revise the text as suggested in the next column.</p>	<p>Revise the text as: The water budget model was also used to determine the limit of the Upper FAS elevation at which the recommended MFLs will no longer be complied. For this, simulations were performed assuming the Floridan Aquifer potentiometric elevation (FAPE) to be lower than the 2006 FAPE. Simulations were continued gradually lowering the FAPE value until the recommended MFLs were tripped (i.e., exceeded).</p>	<p>Change made in the text.</p>
50	Page 1-2, last paragraph, last sentence	Maybe yes	<p>Based on the model results, the recommended MFLs would be met with a maximum drawdown of 10.0 ft beyond 2006 hydrologic conditions. See my comments under Comment No. 48.</p>	<p>Treat this conclusion as tentative until the modeling results and other modeling issues are resolved</p>	<p>See responses for Comment Nos. 82.</p>

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51	Page 2-1, General description	No	The Lake occupies approximately 830 acres is an awkward statement.	Rewrite it as: The Lake has an area of approximately 830 acres	Change made in the text.
52	Page 2-1 Section 2.2 Climate, Paragraph 2	No	Average annual rainfall is given as 54.2 inches. Which stations, what is the period? Mention which rainfall stations are closer to Lake Hampton. Instead of stating, 'These rains can be heavy and of long duration. As much as several inches of rain can fall in a 24-hour period,' give examples of recorded values for the closest rainfall station.	Make appropriate revisions to text.	The average annual rainfall of 54.2 inches is for Bradford County, as stated in Soil Survey of Bradford County, Florida (USDA, 1991). The text was revised to specify this value is for the entire County, not this particular lake. The referenced document was mentioned at the end of this paragraph.
53	Page 2-1 Section 2.2 Climate	No	Atlantic Multidecadal Oscillation (AMO) is regarded as indicative of the cyclical patterns of south and central Florida rainfall. AMO has warm and cool phases, the warm phase indicating generally higher rainfall and the cool phase lower rainfall (Enfield, Mestas-Nunez, and Trimble 2001). Kelly and Gore (2008) of SWFWMD studied the effects of AMO on peninsular Florida river flows and rainfall in the context of MFLs. They emphasize the importance of selecting an appropriate baseline flow period (for MFLs analysis) and suggest 'it may be appropriate to have at least two baseline periods; one based on a wet period and one based on a dry period.' They also state, 'These results have important implications not only for the establishment of ecological flows, but also for water supply planning and development, flood control and	Revise text as appropriate	Language has been added to address the AMO.

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			stream ecology in general, since there are considerable differences in the magnitude of flows that should naturally be expected between multidecadal periods. Relatively large decreases and increases in flow are attributable to rainfall differences between multidecadal periods.' As per the AMO figure presented, SRWMD's entire long term simulation period (1983-2014) falls in a warm phase, indicating that it is generally a wet period. Rao suggests that the mean annual rainfall values for 1983-2014 for the nearby stations (Gainesville, Starke, and Lake City) and for the period 1951-1982, be calculated and that the two values be compared. If the rainfall patterns followed AMO, 1951-1982 would be a relatively dry period. At SJRWMD, Dr. Rao also completed a comprehensive report on AMO and found that there is a strong qualitative resemblance between AMO and the rainfall and streamflow patterns of Northeast Florida (Rao 2008 Draft).		
54	Page 2-2 Section 2.3 Topography	No	In addition to Figure 2-2, a regular contour map would be useful	Suggest adding a regular contour map or one developed using Figure 2-2	A new topography map, named as Figure 2-2B, is provided with regular topographic contours. Figure 2-2 was renamed as Figure 2-2A.
55	Page 2-2 Section 2.4. Soils	No	This section describes soils in the study area by Hydrologic Soil Groups (HSG). A description of how the HSG information was used in modeling would be helpful.	Add description of how the HSG information was used in modeling.	The HSG information was eliminated from this section, as the HSG values were not explicitly used in the Green-Ampt method in SWMM. Instead, the soils were grouped into three "soil texture class". The text in this section, Table 2-1, and Figure 2-3 were modified accordingly.

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
56	Page 2-4 Section 2.6 Major Conveyance System	No	Un-surveyed culverts: Were the un-surveyed culverts addressed in the modeling? In what way?	Add explanation as necessary	See the revised Section 3.3.2.
57	Page 3-1 Section 3.11 Model Selection	No	SWMM model selection: SWMM is one of the most widely used hydrologic models in the nation, and we support its selection.	No changes recommended	Comment Noted.
58	Pages 3-2 to 3-8 Section 3.2 Hydrologic Modeling	No	ECT mentions that it extracted much of the modeling information from SWMM user's manual. But some description should be given about the sources of tables 3-1, 3-2, and 3-3.	Add text as appropriate	Additional explanations were added in the text.
59	Page 3-2, Subbasin delineation	No	Describe the convention used in designating the subbasins, B, AB, NB etc. in Figures 3-1, 3-2, 3-3	Add text as appropriate	A new sub-section was added in Section 3.4 to describe the naming convention for subbasin, aquifer, node, and reach.
60	Page 3-3, Paragraph 2	No	Table 3-1 look up table. Is there a reference to this table?	Add reference as appropriate	Change made in the text.
61	Page 3-3, Rainfall	No	(ORNL) (1/1/1880 to 12/31/2014) - I checked ORNL data availability, I think it is from 1/1/1980 not 1/1/1880	Revise as appropriate	Change made in the text.
62	Page 3-5, first paragraph	No	(ET) can occur <b>for</b> standing water needs revision	Revise: (ET) can occur <b>from</b> standing water	Change made in the text.
63	Page 3-5, first paragraph	No	Water <b>travelling</b> through includes a misspelling	Revise travelling to <b>traveling</b>	Change made in the text.
64	Page 3-6	No	Please prepare a table of monthly ET values as used in the final long-term simulation.	Prepare and add a table of monthly ET values as used in the final long-term simulation	The final monthly ET coefficients were provided in Table 4-5 of the updated report.

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65	Page 3-6, the sentence above Table 3-2	No	Lake Hampton was excluded -----.	This sentence is not clear, explain.	Change made in the text.
66	Page 3-6, last sentence	No	Showing the Green-Ampt equation would be helpful	Add equation	Equations were added in the text.
67	Pages 3-8 to 3-12 Section 3.3 Hydraulic Modeling	Maybe yes	Sections 3.3.1 through 3.3.9 describe hydraulic modeling features, which are quite standard procedures. But, LiDAR-based DEM data are exclusively used throughout. Is this data cross-checked, for example in deriving depth-area relationships, which are quite critical for modeling?	Address question	LiDAR-based DEM were created by USGS and provided by SRWMD for use in the modeling. The LiDAR data has been QA/QCed through ground truthing, prior to being published by USGS.  LiDAR-based DEM data has been widely used in the H&H modeling efforts as part of SWFMWD's watershed management program.
68	Pages 3-12 to 3-15 Section 3.4 Preliminary Model Development & Simulation	No	Section 3.4 describes parameterization of hydrologic and hydraulic model parameters and preliminary model simulation for two years. Describe the results of the preliminary model simulation.	Add description as necessary	Change made in the text. Figure 3-5 was added to present the node depth hydrographs comparison.
69	Page 3-12 last paragraph	No	Word <b>frictional</b> occurs at two places, but is incorrect	Correct it to: fictional	Change made in the text.
70	Page 3-13, Section 3.4.2 and 3.4.3	No	The nomenclature used in Figures 3-3 and 3-4 needs explanation	Add explanation of nomenclature	A new sub-section was added in Section 3.4 to describe the naming convention for subbasin, aquifer, node, and reach.

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71	Page 4-1, Section 4.1 Model Calibration Period	No	This simulation span includes a variety of hydrologic conditions, including a significant high (2014) and two significant low periods (2006-2008 and 2011-2012).  In what respect are these periods 'significant high (2014)' and 'significant low periods (2006-2008 and 2011-2012)?'	Add text as appropriate	Change made in the text.
72	Page 4-1, second paragraph	No	In addition, the changes in land use/land cover and consumptive water withdrawals during this simulation period <b>is</b> considered insignificant; therefore, the water budget model developed using the 2006 land use/land cover data and other best available data sources <b>appears</b> to be suitable .....  Use of the words <b>is</b> and <b>appears</b> incorrect grammar. Revise <u>is to are</u> and <u>appears to appear</u>	Correct the text as shown below:  In addition, the changes in land use/land cover and consumptive water withdrawals during this simulation period <b>are</b> considered insignificant; therefore, the water budget model developed using the 2006 land use/land cover data and other best available data sources <b>appear</b> to be suitable .....	Change made in the text.
73	Page 4-2, first paragraph	No	(SJRWMD, 2014)	Revise it as: (Robison, 2014)	Change made in the text.
74	Pages 4 -2 to 4-13 Section 4.3 Model Calibration Approach	No	In these pages the modelers make several adjustments to model parameters and in modeling assumptions. These are common approaches in modeling, but I have specific questions/suggestions on some of them as follows.		Comment Noted.

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75	Pages 4-2 and 4-3, Section 4.3.1.2, Evapotranspiration	Maybe yes	<p>Description of area-weighted daily PET data is not clear. Please answer the following.</p> <p>c. Figure 4-1 gives the Rainfall/ET pixels. There are ten pixels covering the basin. Pixels 1148691 and 148217 cover Lake Hampton. For a typical month/year, by what amount did other pixels' PET differ from Lake Hampton? Is Figure 4-2 the area -weighted daily PET for the entire Lake Hampton basin? Are these values computed by ECT (Suggest providing an example of calculation for a typical day)? Based on this data, please prepare a monthly PET table. Are these values used for all the sub-basins without any correction?</p> <p>d. Paragraph 3 states, 'The average annual PET value was estimated at 47.6 inches per year for the Lake, based on the area-weighted daily PET data of 1996 through 2014. What about other sub-basins, is it not the same? Why would Lake Hampton be different?</p> <p>As per the opening sentence of this section (Page 4-2), the PET data you get from the USGS for each pixel represents various land cover types of Florida; that means it is applicable to just that pixel. The area-weighted daily PET for the Lake Hampton basin, that you calculate, is a mix of all land uses of the basin and should not be used (uniquely) in any way in the present modeling. Please clarify how you used this data.</p> <p>The point the reviewer would like to bring out is, you have ET coefficients (Table 3-2) to take care of the ET based on land use, all that you need is daily ET values for the basin (you have to find a nearby long term ET station), which will be one time series and it can be used in SWMM.</p>	Address comments, provide answers, and adjust text as appropriate	<p>Response to Question (c):</p> <p>For the 13 pixels covering the basin (Figure 4-1), the average annual PET values from 6/1/1995 to 12/31/2014) varied from 47.49 to 47.74 inches, including 47.57 and 47.49 inches for Pixels 148691 and 148217 that cover most of the Lake area. The variance between pixels is insignificant, which appears reasonable as the PET values are not related to land use/cover type.</p> <p>Figure 4-2 represent the area-weighted daily PET data for the entire lake watershed, estimated from the daily PET data from the 13 pixels by ECT. For a given day, the PET values from all thirteen pixels will first multiple a factor or percentage of the area that a given pixel intersects the watershed, and then sum up the products for all pixels.</p> <p>Table 4-1 was created to summarize the average monthly and annual PET data for the entire lake watershed (1996-2014).</p> <p>The estimated daily PET data for the entire lake watershed was used for all aquifers that may link to one or more sub-basins, after applying a monthly ET pattern, see Section 3.2.4. The monthly ET pattern for each aquifer was developed based on the land use/cover type, by using area-weighted method.</p> <p>Response to Question (d):</p>
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					Continued...  Changed "the Lake" to "the lake watershed" in the text.  The opening sentence of this section was reworded to clarify that it is the 15 data collection sites representing various land cover types. The USGS PET data could be used for any land use/cover type after applying a monthly ET pattern. This is why a lookup table (Table 3-2) was created for monthly ET coefficients to take care of various land use types and their seasonal changes in leaf coverage.  Method of how to develop the monthly ET pattern for each aquifer has been discussed above and in Section 3.2.4 of the report.
76	Page 4-3	No	The average annual PET value was estimated at 47.6 inches <b>per year. The use of per year is incorrect.</b>	Correct it as: The average annual PET value was estimated at 47.6 inches.	Change made in the text.
77	Page 4-3	No	average annual evaporation for shallow lakes in the SJRWMD vary from 45 to 48 inches <b>per year. The use of vary and per year incorrect.</b>	Correct it as: average annual evaporation for shallow lakes in the SJRWMD varies from 45 to 48 inches.	Change made in the text.
78	Page 4-4, Lake stages	No	It is stated that observed (aperiodic) stage data are available from 1988. A stage hydrograph of the available data should be drawn and included.	Draw hydrograph and include it in the document.	Figure 4-6A was created to illustrate the entire lake stage records.

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
79	Pages 4-4 and 4-5, Impervious percentages	Maybe yes	Reducing impervious area uniformly for all years may give biased results for some years (e.g., may increase infiltration). Is there a provision in the model to vary it by years? For example, you may use lower impervious area during low rainfall years, and keep higher during other years.	Address question and revise text as necessary.	<p>SWMM is only capable of modeling a uniformed impervious area for each subbasin for a single simulation. This is one of the limitations of SWMM and other similar models.</p> <p>Please also note that the impervious area may not vary as dramatic as lakes, mostly due to its less permeable bottom that helps to hold water above ground.</p> <p>It is possible to manually break a long-term simulation span into many small short-term runs with different impervious area values; however, it is very difficult to modify and maintain so many mini models during a long-term model calibration/ simulations.</p> <p>No text change necessary in the report.</p>
80	Page 4-12, Paragraph above Section 4.3.3.3	No	The final coefficient A was set at 0.03, by applying a factor 1500 to the initial value. Please explain.	Explain and adjust text as necessary.	Change made in the text to identify the initial value.
81	Pages 4-13 to 4-15 Section 4.4 Model Calibration Results	Maybe yes	Model calibration results summarized show that the calibration goals are met. However, I have previously expressed my concern, asking was it accurately and successfully applied? I have additional concerns on the water budget results as described next.	Address concern and revise document as necessary.	See responses for Comment Nos. 67, 75, and 79.

Appendices

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
82	Page 4-14, Water Budget Results, Section 4.4.3	Maybe yes	<p>Various components of the water budget included in the categories of runoff quantity, groundwater and flow routing are correctly listed. However, to give the reader a feel for what they are in terms of magnitude, suggest preparing a water budget table summarizing the average values of the calibration period. The summary table should include sub-basins (Column 1, Table 4-2 and aquifers Column 1, Table 4-3).</p> <p>For the 10-year calibration simulation, the last paragraph summarizes the values of some of the water budget components (e.g., precipitation, ET, deep percolation, etc.). The water budget results also are shown on Figure 4-10, but some values in the figure are rather puzzling. Why is the ET from water/lakes a low of 8.3 in/yr. and infiltration from land area a high of 36.6 in/yr.? On Page 4-3, quoting Robison (2014) it is stated that, "average annual evaporation for shallow lakes in the SJRWMD varies from 45 to 48 inches." Will it not be about the same for SRWMD lakes?</p> <p>A water budget table such as I suggested should provide the answers.</p>	Address questions/concerns and revise document as necessary.	<p>Table 4-7 summarizes the water budget results. The water budget results of the 10-year calibration simulation were provided in the model output report file. All the in/yr values were derived from the "Total Volume" over the entire lake watershed. If you divide the "Total Volume" in acre-ft (Column 2 in Table 4-7) by the total watershed area and then time 12 in/ft, you can get the "Total Depth" value with unit of inch (Column 3 in Table 4-7). The average depth in inch/year can be estimated by dividing the "Total Depth" by 10 year (2005-2014). The average depth evaporation in column 3 of Table 4-7 applies to the entire lake watershed. For the evaporation at the Lake, you need to multiply it by the entire area of the lake watershed divided by the area of the Lake.</p> <p>The results of the model calibration simulation indicate that the Lake has, on average, precipitation of 47.7 in/yr, evaporation (from land surface and conveyance system) and ET of 32.6 in/yr, deep percolation of 12.0 in/yr, outflow to the downstream canal of 3.1 in/yr, and storage change in aquifers and conveyance system of 0.1 in/yr in the 10-year simulation period of 2005 through 2014 (Table 4-7).</p>
83	Page 4-15	No	Page number is incorrect.	Correct Page 4-2 as 4-15	Change made in the text.

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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
84	Page 4-15, Summary of model calibration	Maybe yes	Statement: Lake Hampton water budget model has been successfully calibrated. I cannot concur with this statement without seeing and reviewing the information I suggested be acquired.	Provide information to reviewer and consider his future comments based on that data	Pending on reviewer's checking comments on the responses above.
85	Page 5-1 Section 5.1 Introduction, second paragraph	No	Is availability of groundwater data for 1/1/1983 – 12/31/2014 the reason for choosing this period for long-term simulation?	Address question and revise text as necessary	Yes. Availability of the groundwater data limits the long-term simulation span. Change made in the text.
86	Page 5-2 Table 5-1	No	ORNL = Oak Ridge National Laboratory, include it in the table or text. Because long-term rainfall and ET data are from two sources perform a double mass analysis and verify whether they are compatible.	Revise text as appropriate and perform double mass analysis as suggested.	ORNL were spell out in the table.  In general, the best available data, e.g., NEXRAD rainfall data and USGS PET data, should have a higher priority to be used in modeling analysis.
87	Page 5-3, Paragraph 1	No	PET data is not synthesized, it is estimated from NOAA data.	Adjust text as necessary	Change made in the text.
88	Page 5-4 Section 5.3 Draft Recommended MFLs	No	Section 5.3 Draft Recommended MFLs describes the MFLs for Lake Hampton recommended by the SRWMD, and the event definitions provided by SJRWMD. I agree with the information given.	No changes recommended	Comment Noted.
89	Page 5-4 and 5-5 Section 5.4 Long-term Simulations and MFLs	Maybe yes	I raised some concerns on the use of the area-weighted PET and on the results of the 10-year calibration simulation. If these issues are not satisfactorily resolved, modeling may have to be re-done using some agreed upon procedures.	Address these concerns with reviewer	See responses to Comment Nos. 75 and 82, regarding PET and model calibration results.

Appendices

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
90	Page 5-4 Section 5.4 Long-term Simulations and MFLs	Maybe yes	In Figure 5-5, the trend of the observed and simulated stages closely agreed, which is an indication that the model performed very satisfactorily. However, large differences are seen between the observed and simulated stages (over a foot) for many days from 1988 through 2004. Can you give any intuitive explanation as to why these discrepancies could have occurred? Can you find any correctible reasons and repeat modeling?	Address these concerns as described.	<p>The most likely cause is the poor quality of the ORNL Daymet rainfall data used prior to 2001. Unlike NEXRAD rainfall data, ORNL Daymet data was developed by interpolating the available rainfall gage data. This may not be able to capture the spatial distribution for a typical storm event in Florida.</p> <p>The second reason may be related to the control elevation of the outfall canal, which varied depending on the historic maintenance conditions. Unfortunately, the canal dredging or cleaning activities were not documented by Bradford County or the District to be used in our modeling work.</p> <p>The third one may be related to any unknown significant water withdrawals from the Lake directly or from the adjacent water supply wells during an extremely dry year, e.g., 2002, assuming the NEXRAD rainfall data in 2002 was well QCed.</p>
91	Page 6-1 Section 6.1 Introduction	No	The two assumptions described in the introduction to assess hypothetical water resource development may be regarded as valid.	No changes recommended	Comment Noted.

Appendices

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action (Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)	C. Action to be Taken in Response to Comment
92	Pages 6-1 and 6-2 Section 6.2 Assessment of Hypothetical Allowable Floridan Aquifer Drawdowns	Maybe yes	The method of analysis used in the Assessment of Hypothetical Allowable Floridan Aquifer Drawdowns may be regarded as valid and acceptable. However, since this reviewer has expressed some concerns on model calibration results and modeling procedures, the result shown in this section should be regarded as tentative.	Address concerns with reviewer.	See responses to Comment Nos. 75 and 82, regarding PET and model calibration results.
93	Pages 7-1 to 7-3 Section 7.0 Conclusions and Limitations	Maybe yes	This section summarizes the procedures used in modeling and the results produced. Page 7-1, Paragraph 3, Whether the model was well calibrated will be determined after the additional information that I suggested is produced and reviewed. Page 7-1, Paragraph 4: The result that the MFLs are being met should be regarded as tentative until the modeling issues are resolved. Page 7-1, Paragraph 5. The result produced under hypothetical FAS drawdowns should be regarded as tentative until the modeling issues are resolved.	Address comments with reviewer	See responses to Comment Nos. 75 and 82, regarding PET and model calibration results.
94	Pages 7-2 and 7-3 Section 7.0	No	The six principal modeling assumptions made in developing the water budget model should be regarded as applicable and valid.	No recommended changes	Comment Noted.
95	Page 8-1, last reference	No	Second line from bottom: Johns River Water Management District. Correct it as: St. Johns River Water Management District.	Please make this correction.	Change made in the text.

Appendices

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s) Table 1-2, Rao		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action <i>(Comments in red are in response to District's responses in column C (Action to be Taken in Response to Comment) of this table)</i>	C. Action to be Taken in Response to Comment
96	Figures 5-7, 5-8, 6-1 and 6-2	No	Use of a statistical fit is not recommended for low flow frequency analysis unless it is a close fit of data (Riggs 1972). For MFLs compliance analysis, as per SJRWMD methods, 'if any pertinent event lies within the shaded box the minimum level is being met.' Otherwise, a best-fit line is drawn by inspection (Robison 2014). See also Figure 5 in Riggs (1972) as an example. Therefore, do not add a Pearson Type III fit in these graphs. You can draw your conclusions by the positions of the pertinent events or drawing a best fit line by visual inspection if the events do not fall in the shaded box.	Address reviewer's concerns	A best fit line was fit to the data using a polynomial regression to allow for replication. The data show that events do lie in the shaded boxes, indicating the proposed MFLs are currently being met.

**Table 2-1. Dunn Replies to SRWMD's Peer Review Assessment Requirements**

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**TABLE 2-1. DUNN REPLIES TO SRWMD’S PEER REVIEW ASSESSMENT REQUIREMENTS**

Task	Subtask	Sub-subtask	Reviewer’s Specific Comments Table 2-1, Dunn
A. Determine whether the conclusions in the Lake Hampton minimum levels report are supported by the analyses presented	1. Supporting Data and Information: review the relevant data and information that supports the conclusion in the report to determine:	a. Data and information used was properly collected.	Reviewer concurs that the data and information used in the District’s MFLs report and ECT report was properly collected. This includes data and information collected for vegetation, soils, topography and ground surface elevation, lake surface level time series, wetland hydrologic indicator elevations, precipitation, and evapotranspiration.
		b. Reasonable quality assurance assessments were performed on the data and information.	A complete, integrated picture of quality assurance (QA) is not provided in either the MFLs or ECT reports. There is however, a good deal of QA provided in both reports. Regarding statistical analyses, the results are stated in reports, but supporting statistical information is often not given. As such the reviewer, cannot confirm or verify the result presented. I suggest that an integrated summary of important QA elements could be addressed in an analysis of uncertainty. The uncertainty analysis should include recommendations for how the District can improve its management and protection of Lake Hampton ecosystem.
		c. Exclusion of available data was justified.	No instances are found where available data was excluded either by SRWMD or ECT
		d. The data used was the best information available.	Yes, reviewer found this to be true; recognizing that often tradeoffs have to be made in selecting the best available source of data depending on the analytical method, tool, or model used.
	2. Technical assumptions: review the technical assumptions inherent to the analysis used in the report to determine whether:	a. The assumptions are clearly stated, reasonable and consistent with the best available information	Yes, the reviewer found this to be true.
		b. The assumptions were eliminated to the extent possible, based on the available information.	Yes, the two reports and supporting material in the respective appendices had many, many assumptions, which I generally found to be clear and reasonable. In the few cases where assumptions and/or logic were not clear, I posed questions to staff (see Table 1-1 Appendix A).

**Appendices**

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-1, Dunn
		c. Other analyses that would require fewer assumptions but provide comparable or better results are available.	I found that the analyses used and presented were good choices. I did not identify any analysis for which I would recommend a different method.
	3. Procedures and analyses: review the procedures and analyses used in the report to determine whether:	a. The procedures and analyses were appropriate and reasonable based on the best information available.	Yes, reviewer found this to be true. The reviewer and Dr. Rao do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		b. The procedures and analyses incorporate all necessary factors.	Yes, reviewer found this to be true. The reviewer and Dr. Rao do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		c. The procedures and analyses were correctly applied.	Yes, reviewer found this to be true. The reviewer and Dr. Rao do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		d. Limitations and imprecisions in the information were reasonably handled.	Yes, reviewer found this to be true. The reviewer and Dr. Rao do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		e. The procedures and analyses are repeatable.	Yes, reviewer found this to be true. The reviewer and Dr. Rao do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		f. Conclusions based on the procedures and analyses are supported by the data.	Yes, reviewer found this to be true. The reviewer and Dr. Rao do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
B. If a proposed method used in the report is not scientifically reasonable, then please provide:	1. List and describe scientific deficiencies and, if possible, evaluate the error associated with the deficiencies.		In Table 1-1 in Appendix A reviewer notes several specific remedies to manage uncertainty.

**Appendices**

<b>Task</b>	<b>Subtask</b>	<b>Sub-subtask</b>	<b>Reviewer's Specific Comments Table 2-1, Dunn</b>
	2. Determine if the identified deficiencies can be remedied.		Yes, an integrated management plan for handling key sources of uncertainty should be developed. Specific recommendations as to how to do this using adaptive management approach are provided in my summary comments in Discussion section of this report, and in specific comments in Appendix A Table 1-1.
	3. If the identified deficiencies can be remedied, then please describe the necessary remedies and an estimate of the time and effort required to develop and implement each remedy.		I did not identify any major deficiencies. I do, however, make several recommended improvements to the reports; these are given in the conclusions & recommendation section of this report, and in Appendix A Table 1-1.
	4. If the identified deficiencies cannot be remedied, then if possible, identify one of more alternative methods that are scientifically reasonable		It is expected that sources of uncertainty can be controlled to the extent that the District uses the best available information and best available analytical tools to develop MFLs. Specific recommendations as to how to do this using an adaptive management approach are provided in my summary comments in the Discussion section of this report.
C. If a given method or analysis in the report is scientifically reasonable, but an alternative method(s) is preferable, then:	1. List and describe the alternative reasonable scientific method(s) and include a qualitative assessment of the effort required to collect data necessary for implementation of the alternative method(s).		For each of the principle components of uncertainty an approach to reduce the effect of uncertainty would be helpful for this stage of setting MFLs and for future compliance assessments.

**Table 2-2. RAO Replies to SRWMD's Peer Review Assessment Requirements**

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**TABLE 2-2. RAO REPLIES TO SRWMD’S PEER REVIEW ASSESSMENT REQUIREMENTS**

Task	Subtask	Sub-subtask	Reviewer’s Specific Comments Table 2-2, Rao
A. Determine whether the conclusions in the Lake Hampton MFLs report are supported by the analyses presented	1. Supporting Data and Information: review the relevant data and information that supports the conclusion in the report to determine:	a. Data and information used was properly collected.	Reviewer agrees that the data and information used in the District’s MFLs report and the ECT report was properly collected. This includes data and information collected for vegetation, soils, topography and ground surface elevation, lake surface level time series, wetland hydrologic indicator elevations, precipitation, and evapotranspiration
		b. Reasonable quality assurance assessments were performed on the data and information.	No much information is included in either report concerning quality assurance methods used. Therefore, this reviewer cannot comment on this issue.
		c. Exclusion of available data was justified.	No instances are found where available data was excluded either by SRWMD or ECT
		d. The data used was the best information available.	Yes, reviewer agrees with this; recognizing that often tradeoffs have to be made in selecting the best available source of data depending on the analytical method, tool, or model used.
	2. Technical assumptions: review the technical assumptions inherent to the analysis used in the report to determine whether:	a. The assumptions are clearly stated, reasonable and consistent with the best available information	Yes, reviewer found this to be true.
		b. The assumptions were eliminated to the extent possible, based on the available information.	Yes, the two reports and supporting material in the respective appendices had many assumptions, which I generally found to be clear and reasonable. In the few cases where assumptions and/or logic were not clear, I requested for clarification or additional results.
		c. Other analyses that would require fewer assumptions but provide comparable or better results are available.	I found that the analyses used and presented were good choices. I do not identify alternatives.

**Appendices**

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-2, Rao
	3. Procedures and analyses: review the procedures and analyses used in the report to determine whether:	a. The procedures and analyses were appropriate and reasonable based on the best information available.	Yes, reviewer found this to be true. The reviewer and Dr. Dunn do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		b. The procedures and analyses incorporate all necessary factors.	Yes, reviewer found this to be true. The reviewer and Dr. Dunn do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		c. The procedures and analyses were correctly applied.	Yes, reviewer found this to be true. The reviewer and Dr. Dunn do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		d. Limitations and imprecisions in the information were reasonably handled.	Yes, reviewer found this to be true. The reviewer and Dr. Dunn do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		e. The procedures and analyses are repeatable.	Yes, reviewer found this to be true. The reviewer and Dr. Dunn do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
		f. Conclusions based on the procedures and analyses are supported by the data.	Yes, reviewer found this to be true. The reviewer and Dr. Dunn do, however, make recommendations for improving the strength of the underlying technical support of the recommended levels. This is especially true regarding the management of the primary sources of uncertainty.
B. If a proposed method used in the report is not scientifically reasonable, then please provide:	1. List and describe scientific deficiencies and, if possible, evaluate the error associated with the deficiencies.		This reviewer found some puzzling results in ECT Figure 4-10, Water Budgets of SWMM Simulation (2005-2014). To resolve the issue this reviewer suggested that a detailed presentation of results be provided and reviewed.
	2. Determine if the identified deficiencies can be remedied.		The deficiencies can be remedied by either properly documenting the results or repeating the modeling steps if any deficiencies are discovered in model input data or other modeling methods.

**Appendices**

<b>Task</b>	<b>Subtask</b>	<b>Sub-subtask</b>	<b>Reviewer's Specific Comments Table 2-2, Rao</b>
	3. If the identified deficiencies can be remedied, then please describe the necessary remedies and an estimate of the time and effort required to develop and implement each remedy.		ECT should address this comment.
	4. If the identified deficiencies cannot be remedied, then if possible, identify one of more alternative methods that are scientifically reasonable		There is no specific alternative to rectify the identified deficiencies, the present methods are not deficient. Only the calculations (i.e., the modeling process) will have to be repeated.
C. If a given method or analysis in the report is scientifically reasonable, but an alternative method(s) is preferable, then:	1. List and describe the alternative reasonable scientific method(s) and include a qualitative assessment of the effort required to collect data necessary for implementation of the alternative method(s).		This reviewer does not see any concrete alternatives to the methods used in the present MFLs effort.