Pithlachascotee River MFLs Peer Review

PREPARED FOR

Southwest Florida Water Management District

WATERMATTERS.ORG · 1-800-423-1476

Southwest Florida Water Management District

PREPARED BY

DSV
DUNN, SALSANO & VERGARA CONSULTING, LLC
HELPING CLIENTS MEET THEIR WATER RESOURCE NEEDS

BFA Environmental Consultants
Barnes, Ferland and Associates, Inc.

sdii GLOBAL

WEST Consultants, Inc.

NOVEMBER 30, 2016

TABLE OF CONTENTS

INTRODUCTION

OVERVIEW

The Southwest Florida Water Management District (District) has contracted with a panel of three experts to provide a technical peer review of its proposed minimum flows and levels (MFLs) for the Pithlachascotee River in Pasco County, Florida.

These proposed MFLs for the Pithlachascotee River are described by the District in a document titled *Proposed Minimum Flows for the Pithlachascotee River-Revised Draft Report for Peer Review*, August 29 2016, with a separate volume of appendices, also dated August 29, 2016. These MFLs include only minimum flows for the river.

The report is an updated version of an earlier draft produced by the District in 2014. The current draft addresses review comments provided by the Florida Department of Environmental Protection (FDEP), the Florida Fish and Wildlife Conservation Commission (FFWCC), and Tampa Bay Water (TBW). Those agency comments and the District staff's responses to those comments are included as appendices.

The District proposes two sets of minimum flows one for the upper freshwater section of the system and another for the lower, tidally influenced, estuarine section. The proposed minimum flows were developed using a percent-of-flow (POF) approach for three seasonal blocks, and with specific low and high flow thresholds.

A baseline flow record for the river was developed for the U. S. Geological Survey (USGS) gage site - Pithlachascotee River Near New Port Richey. The existing flow record was corrected for existing withdrawal impacts. The corrected baseline was then used to develop minimum flow recommendations using a POF approach. Using this POF approach, potential changes to critical environmental values, such as habitat, associated with baseline flow reductions were assessed to identify minimum flow recommendations. Other thresholds were developed in similar fashion including minimum low flow (MLF) and minimum high flow (MHF) designed specifically to address environmental features of the river's flow regime. Critical resources identified for the upper freshwater section of the river included fish passage, instream habitats for fish and invertebrates, and floodplain inundation. For the estuarine section resource evaluations were focused on potential changes to salinity distributions for surface/shoreline, bottom and water column habitats.

The District's proposed minimum flows for the upper freshwater segment of the river allow for withdrawal reductions of up to 18% of daily flow for the spring dry season (Block 1), 17% of daily flow in the fall and winter moderate flow season (Block 2), and up to 16% for the summer wet season (Block 3). In addition, to maintain sufficient inundation of the floodplain system in the upper river when daily flows in Block 3 are greater than a MHF threshold of 50 cfs, the allowable flow reduction is limited to 9% of the daily flow. A MLFs threshold of 25 cfs is applicable to potential surface water withdrawals in all seasonal blocks.

Minimum flows for the lower estuarine section of the river include withdrawal related reductions of up to 25% of daily flow in all seasonal blocks up to the MHF threshold of 60 cfs. Flow reductions of up to 35% would be allowed when the four-day average of the daily flow exceeds the MHF threshold of 60 cfs.

The District concludes that this minimum flow regime for the upper and lower sections are protective of all relevant environmental values required to be considered when establishing MFLs.

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 three independent experts with collective expertise in the fields of hydrology, hydrogeology, limnology, and biology. These experts served as a peer review panel (panel) to evaluate and review information used for development of recommended MFLs for the Pithlachascotee River.

The panel includes

- Raymond Walton, Ph.D., P.E. D.WRE, WEST Consultants
- Sam Upchurch, Ph.D., P.G., Sdii Global Corporation
- Bill Dunn, Ph.D., DSV Consulting

Dr. Bill Dunn served as the panel's chair.

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 five major tasks.

Task 1—Complete conflict of interest forms.

Task 2—Review draft District MFL documents on proposed minimum flows for the Pithlachascotee River, and review relevant supporting documents.

Task 3-1—Participate in publicly noticed project kick-off meeting at District Headquarters (DHQ) in Brooksville, and a publicly noticed field trip to sites on the Pithlachascotee River.

Task 3-2—Participate in a publicly noticed panel meeting at DHQ in Brooksville.

Task 3-3—Participate in three publicly noticed teleconferences facilitated by the District to support peer review panel discussions and work efforts

Task 4—Post written review comments on District's Web Board, and collaboratively develop a single final peer review panel report for submission to District.

Task 5—Post meeting agenda, summaries and other relevant comments to the Web Board.

With the submittal of this document, the panel's final report, Tasks 1 through 5 of the panel's work effort is complete. Tasks 2, 3-1, and 3-2 were accomplished on Friday October 21, 2016. Three publicly noticed teleconferences hosted by District staff took place on October 28, November 14 and November 28. For each meeting an agenda and meeting summary are posted on the Web Board.

PEER REVIEW PANEL'S 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;
> 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 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 three 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, summarizes each panel member's individual general and specific review comments along with any recommended actions (Appendix Tables 1-1, 1-2, and 1-3). 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, which are described in the following outline (Appendix Tables 2-1, 2-2, and 2-3).

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 Pithlachascotee River 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:

   (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 Pithlachascotee River MFLs report to determine whether:

   a. the assumptions are clearly stated, reasonable and consistent with the best information available;

   b. the 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 Pithlachascotee River MFLs report to determine whether:

   a. the procedures and analyses were appropriate and reasonable, based on the best information available.

   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 Pithlachascotee River 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 Pithlachascotee River 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 panelist's detailed review 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, summarize each panel member's individual general and specific review comments on the MFL document along with any recommended actions (Appendix Tables 1-1, 1-2, and 1-3). 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, 2-2, and 2-3).

As the three panelists conducted their individual reviews of the subject MFLs report and appendices, sets of questions/comments from each panelist were posted to the Web Board. District staff posted responses to these questions/comments as soon as they could be developed. The panelists' questions/comments as well as District staff responses are included on the appropriate tables included in the Appendix.

The three panelists are in general agreement that District staff has developed MFLs recommendations based on best available data. The three panelists also agree with the report's basic assumptions, methods of data collection, analysis and presentation, development and selection of minimum flows, and conclusions as presented in the MFLs report. The three, however, also collectively expressed concerns for the effect of uncertainty of these data (and subsequent analyses) on conclusions regarding the proposed minimum flows. Characterizing the sources of uncertainty, the magnitude of each, and their individual and collective effect on conclusions should be part of every MFLs setting process. Such analysis of uncertainty is not addressed in an explicit and integrated approach in the District's report. Panelists agree that a critical part of the MFLs process should be the development and implementation of a comprehensive adaptive management plan that, among other things, would reduce data uncertainty in the future. The panelists are particularly concerned with the uncertainty in method for estimating the fish passage criterion for the upper section of the river. For this Dr. Walton has made some very specific recommendations for reducing the uncertainty in this estimate. Finally, the panelists are also in agreement that some sections of the District's MFLs report do not flow as well as it should to be easily understandable by all readers. On this point the detailed comments in Appendix Tables 1-1, 1-2, and 1-3 highlight specific sections of the report in need of clarification.

Following is a summary of the most significant concerns expressed by each panelist. Of the three panelists, only Dr. Walton has reviewed and addressed the District staff comments.

SUMMARY OF COMMENTS/QUESTIONS SUBMITTED BY DR. SAM UPCHURCH

Dr. Upchurch recognizes that setting minimum flows and levels (MFLs) for a low-flow stream such as the Pithlachascotee River is difficult because of several confounding factors. These include:

1. The river is a low-flow stream for most of its reach;
2. Regional wellfields are known to have impacted flows, beginning prior to systematic hydrologic data collection; therefore, pre-development hydrologic data are unavailable;
3. The available hydrologic data are poor to good with data gaps and possible uncertainties resulting in concerns for creating an adequate time series;
4. Non-tidal reaches of the river experience periods of zero to minimal flow while the tidal reaches of the river are subject to tidal stresses, storm surges and other maritime events;
5. Modeling techniques commonly utilized to synthesize and/or characterize hydrologic data are likely not robust when representing hydrologic extremes, such as extreme low and high flows; and
6. Implementation of the Pithlachascotee River MFLs involves characterizing hydrologic regimes for processes that operate on different time scales: (1) rainfall-runoff events that function on the time scale of hours to weeks and (2) groundwater discharge to the river that varies on a time scale of moths to years.

Dr. Upchurch's review of the MFLs report focuses on the quality of the hydrologic data, methods used to characterize the data, and MFLs development. The review included study of the primary MFLs document entitled "Proposed Minimum Flows for the Pithlachascotee River – Revised Draft Report for Peer Review" dated August 29, 2016, and developed by the Southwest Florida Water Management District (District). In addition, relevant appendices included in "Appendices for Proposed Minimum Flows for the Pithlachascotee River – Revised Draft Report for Peer Review" were reviewed.

Dr. Upchurch asserts that any document that sets the MFLs for a water body should be easily understood by lay stake holders as well as scientists, engineers, and other water managers affected by the MFLs. To this end, the report should either present or reference all relevant data, techniques utilized to develop the MFLs, and supporting investigations and reports. The actual data can be presented in appendices, as was done in this MFLs report, or in easily accessed publications. The report, however, should (1) lay out the sources, quality, and uncertainties concerning all data, (2) explain the reasoning and assumptions used in MFL development, and (3) present all conclusions in a simple fashion. Transitions between topics should flow seamlessly, and there should be no unexplained leaps in logic. Finally, the process of MFLs implementation should be explained so that lay persons and entities subject to the MFLs clearly understand the intent of the MFLs and management considerations that will be utilized.

Dr. Upchurch's comments indicate that the District's MFLs report is well written and use of appendices is appropriate. However, he has identified the following concerns that apply to the entire document.

1. There are logic gaps and transitions, which are noted in the tables, that need to be closed. These gaps are most pronounced in the early portions of the report where the measurement data and use of the Integrated Flow Model (IFM) are presented.

2. The District needs to build a case early in the report as to what constitutes “best available data” as defined in Chapter 373 F.S. There should be a thorough discussion of the quality of the measurement data and the uncertainties that result from use of these data. Building the case for use of the IFM as a data source constitutes a logic jump because the quality of the measured, as opposed to synthesized, data remains unclear.

3. The report begins with a discussion of the entire Pithlachascotee River basin, including Crews Lake and the drainage upstream from the lake. It then rightly limits the MFLs to the river downstream from Crews Lake and the Fivay Junction gage. There needs to be an explanation as to why the Crews Lake reach of the river is excluded, including noting (and referencing) the separate MFLs being developed for Crews Lake. It should also be noted that the Crews Lake reach of the river is within an internally drained area from which groundwater typically goes to coast rather than the river. Therefore, there is a basis for managing the lake and its tributaries separately from the river reach.

   This comment is a segue to a broader discussion that should be included in the report. With implementation of the MFLs for Crews Lake and the Pithlachascotee River and the permit conditions for the wellfields that are likely to affect flows in the river, few water bodies in Florida are as so highly managed and constrained. While all of these water-management instruments are written to stand alone, they overlap in their effects on the river. A section describing the effects of these water-management tools on water availability in the river should go a long way towards (1) mitigating concerns about river flows and the environment and (2) data uncertainties.

4. Finally, the report should set up a final chapter explaining how the District will implement MFLs that deal with natural low and high flows, surface-water withdrawals that operate on short time scales, and groundwater withdrawals that operate on the time scale of months to years. This discussion is a great place to present the constraints on groundwater extraction and cooperation with Tampa Bay Water.

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, data analysis and presentation, development and selection of minimum flows, and conclusions as presented in the MFLs report. 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.

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, but 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 in order to make better-informed future management decisions.

AM framework has 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 the Pithlachascotee Rivers would include:

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

- 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 SWFWMD'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.

Dr. Dunn also strongly recommends that the District strengthen the technical basis for MFLs beyond its reliance on a 15 percent allowable change in each habitat condition. Dr. Dunn acknowledges that the 15 percent change metric has much merit, has been strongly and justifiably supported in many peer reviews, and has been successfully applied to many riverine MFLs in the District. The method is, however, based on a general presumption that a 15 percent change in the given habitat condition will not result in harm to the water resource, ecological, and human use values of the riverine system. Dr. Dunn notes that specific data-based protective criteria have been developed by other Florida water management districts. He also highlights that the District has also applied this approach in developing some minimum flows for riverine systems, such as the MLF for fish passage for the Pithlachascotee River. Dr. Dunn strongly recommends 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. He points out that the St. Johns River Water Management District has defined such hydrologic event criteria for most of the water resource values of concern that the District focused on for the upper and lower sections of the Pithlachascotee River. Thus, Dr. Dunn points out that there exists a great deal of peer reviewed research, and application of event based MFLs that the District can build upon.

SUMMARY OF COMMENTS/QUESTIONS SUBMITTED BY DR. RAYMOND WALTON

Overall, Dr. Walton felt that best available data were used for the hydrologic and hydraulic analyses, and that generally appropriate evaluation analyses were performed. His concerns are summarized in the next paragraphs and in the Tables 1-3 and 2-3 in the appendices.

Dr. Walton's comments 2 through 7 in Appendix Table 1-3 address questions regarding the isohaline regression analysis that is used by the District to develop minimum flows for the lower, estuarine section of the river. Overall, the District used best available data and appropriate methods, except as presented in Appendix Table 1-3 below. As such, the resolution of the questions/comments raised by Dr. Walton can affect the conclusions of the District report, specifically the minimum flows proposed for the lower Pithlachascotee River. We note, however, that resolving this uncertainty is far less important than resolving the uncertainty in the hydraulic modeling of the upper river as the lower river minimum flows are much larger than the minimum flows in the upper river.

Dr. Walton's comments 8 through 12 in Appendix Table 1-3 raise important questions regarding the HEC-RAS modeling analysis, which is critical to the development of the minimum flow regime for the upper, freshwater section of the river. Again, best available data and appropriate methods were used. However, he is concerned about the level of uncertainty in the minimum flow resulting from the hydraulic model analyses, including the systematic bias seen in the calibration of the HEC-RAS hydraulic model. Dr. Walton particularly notes potential effects on the fish passage criterion, which defines the recommended MLF. Resolving the HEC-RAS issues raised by Dr. Walton is most critical because the minimum flows proposed for the upper river appear to be more sensitive, and thus critical for river system management, than the minimum flows for the lower river.

The concern is whether the HEC-RAS hydraulic model is sufficiently accurate to determine that a minimum flow of 25 cfs achieves the minimum depth of 0.6 feet throughout the upper river. We recommend that the hydraulic model be revisited to reduce the level of uncertainty in the fish passage analysis by:

- Measuring 4-6 water surface profiles along the upper reach for a range of flows between 10-50 cfs.
- Consider whether additional cross sections are needed to improve the accuracy and adequacy of the model's geometry
- Re-calibrate and validate the hydraulic model using the new information, specifically to remove the systematic bias seen in the current model calibration.
- Re-do the minimum flow analyses for the upper river, and incorporate into the MFL report and appendices.

REFERENCES

Geurink, J. S. and R. Basso. 2013. Development, calibration, and evaluation of the Integrated Northern Tampa Bay Hydrologic Model. Report prepared for Tampa Bay Water, Clearwater, Florida, and the Southwest Florida Water Management District, Brooksville, Florida.

Munson, A. B. and Delfino, J.J. 2007. Minimum wet-season flows and levels in southwest Florida. Journal of the American Water Resources Association 43: 522-532.

SWFWMD 2016 a. Proposed Minimum Flows for the Pithlachascotee River—Revise Draft Report for Peer Review. Southwest Florida Water Management District, Brooksville, Florida

SWFWMD 2016b. Appendices for Proposed Minimum Flows for the Pithlachascotee River—Revise Draft Report for Peer Review. Southwest Florida Water Management District, Brooksville, Florida

APPENDICES

Appendix A
Table 1-1. Upchurch Review Comments on MFL Documents

TABLE 1-1. UPCHURCH 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, Upchurch		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
1	General comment	No	The District and its consultants have created a succinct and useful MFL basis report. I like the use of appendices to present the results details. This style makes review much easier. There are editorial issues that need to be corrected, and the maps that utilize the aerial photograph as a background are very hard to read. There are also graphs where the se lection of background and line colors makes them unreadable.	I suggest that the photograph be omitted and a few important landmarks (i.e., Rowan Road) be provided on a blank background for the maps.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. Editorial comments and formatting suggestions provided by the panel will be considered by staff during the report revision process.
2	General comment	No	Recognizing that Chapter 373 F.S. allows for use of "best available data" for MFLs development, the case for use of the integrated model as a source of data has not been completely addressed as "best available data." The raw discharge data are not adequately addressed in the report or appendices. It is understood that use of the integrated model to simulate pre-development flow in the river is the best source of pre-development information. However, if the simulation of flow within the 10-year interval (a short time frame for MFLs development) that was modeled is problematic, then the flow simulated by eliminating the groundwater pumpage component in the model will also be problematic.	The raw discharge data should be presented with an analysis of outliers, data gaps, and indications of cyclicity (season al, AMO related, etc.). It should be made clear where these data have been utilized, including 1) relationship of the modeled, predevelopment discharge and current discharge to these data, 2) use of the physical data to verify the integrated model, including analyses of residuals and goodness of fit, and 3) comparison of the modeled data to the physical data showing relationship of the modeled data to hydrologic cycles, etc. The modeled data should be compared to the actual data, outliers and residuals should be analyzed, and the context of the modeled data	Response: Ron Basso, Chief Hydrogeologist, SWFWMD. Tampa Bay Water and SWFWMD have collaborated on the calibration and use of the INTB model which was successfully peer reviewed in 2013 by a three-member panel of model experts with one member of the model peer review panel (Ray Walton) currently serving as a panelist for the Pithlachascotee MFLs peer review. We began this collaboration in the late-1990s as a result of litigation between the agencies over wellfield impacts and the partnership plan between the two agencies that reduced the 11 central system facility withdrawals from 150 mgd to a maximum of 90 mgd. Both SWFWMD and TBW agreed to work together to develop one model to assess the hydrologic conditions in the Tampa Bay wellfield area.

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, Upchurch		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
				relative to seasonal and long-term hydrologic cycles should be explicitly provided. Finally, explain to the reader what portions of the physical data and modeled flows constitute "best available data" and why. Explain why a 10-year time series is suitable for MFLs development. Response Ron Basso Comment: I realize that this is the case. My issue is that none of the data is presented or evaluated in this report. I'm not suggesting that the fine work done by the District and TBW be repeated or even critiqued. I am suggesting that the report should stand alone and not require the reader to review the work previously completed.	A complete assessment of the calibration and verification of the model from 1989-2006 is contained with Geurink and Basso (2013). We can make this report available for the Panel's review if requested. We can also provide the peer review report on the INTB application that was completed by Ray Walton, EJ Wexler, and Norm Crawford in 2013. Based on this information, we (TBW and SWFWMD) believe that the INTB model is a part of the "best available information" discussed in the statute. We recognize the difficulties in numerical model prediction results for a predevelopment (pumps off) condition. In fact, TBW has a proposed study with the University of South Florida to examine the INTB "pumps off" simulation to note any deficiencies with that approach. No predevelopment calibration was performed with the INTB model as this would be difficult due to lack of observed data prior to the 1930s in the area. Withdrawals were initiated at the Cosme-Odessa wellfield in the 1930s. The flows recorded by the USGS at the NPR gage only go back to the 1960sand Eldridge-Wilde and the Section 21 wellfields were already pumping by that time. One of the limitations discussed in the response to questions posed by Ray Walton is the rainfall that actually fell during the simulation period from 1996-2006 –which was drier than average. Hundreds of rainfall realizations conducted by

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, Upchurch		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
					TBW using the INTB model for the same period based on the historical range of rainfall in the area suggest that predicted impact to flow can vary by 0.6 cfs depending upon the climatic conditions of the period. The climatic variability, uncertainty in the "pumps off" simulation, model error, and varying pumping distributions all play a role in predicted impacts to the system. These factors are why staff did not exclusively rely on model results but determined that the minimum flows were being met with supplemental data as measured in the field over the last 5-6 years. Flow observations and aquifer water levels in the area both show that they are similar to background conditions during the last 5 to 6 years. We think the 10-year time period used for MFLs development is suitable because it to incorporated extremes in the climatic record, including the 2000 drought and the 2004 rainfall associated with multiple hurricanes that serve as surrogate for variation expected over a much longer time-frame. Due to the complexities previously discussed, it represented a suitable period to conduct the MFLs analysis, given the long history of wellfield withdrawals in the area and limitations of predevelopment data.
3	General comment	No	The multiple linear regression analyses used to simulate flow need to be better explained and analyzed. For example, one of the two regression equations presented in the report	Explain what data were used in the regressions, model-derived or actual? I may have missed it, but please be sure explanation is provided and that residuals analyses are provided.	Response: Doug Leeper, MFLs Program Lead, SWFWMD Staff is in the process of discussing the panelist's questions with the consulting firm, Janicki

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, Upchurch		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**
			and appendix utilizes 150-day lagged pumpage from regional wellfields as a variable. How was this term identified? Did you use stepwise multiple regression? What were the variables that were eliminated? Use of a 150-day lagged term suggests that the signal from a pumping event arrives at the river in 150 days. While this lag may well be reasonable, it suggests a management problem. The MFL is written is such a way as to allow for management of surface water withdrawals over short time intervals. The groundwater component with a 150-day delay suggests a different management process. The report should, but does not, address each of these management issues and how they will be implemented.	If it takes 150 days for actions at the nearby wellfields to be manifested in river flow, describe how this delay will be anticipated? Finally, how will these management issues be considered vis a vis low flow during droughts? Response to Doug Leeper: Provide a short paragraph explaining to the reader, how you got there.	Environmental, Inc., that developed a regression for predicting baseline flows. Interim responses to the questions are provided below; development of additional responses is ongoing. The 150-day lagged term for withdrawals from the Starkey-North Pasco wellfield was used for developing Equation 1 in the draft minimum flows report was based on consideration of various lag term, including 7-day, 14-day, 30-day, 60-day, 90-day, 120-day, 150-day and 180-day moving average pumping values for individual wellfields in the area. Wellfield pumping values for the various lag-times and wellfield combinations (Cross Bar-Cypress Creek, Eldridge-Wilde, South Pasco, Section 21 and Cosme-Odessa) that did not exhibit statistical significance were excluded from model development. Staff notes that as explained in the draft report, elimination of the lagged-term for combined withdrawals from the Starkey and North Pasco wellfields (see Equation 2 in the draft report) yielded predicted baseline flows that were similar to those predicted using Equation 1. For development of both regression equations, modeled values derived from INTB model simulations were used for baseline and impacted flows. For the lagged-pumpage term in Equation 1, measured pumpage data were used. For predicting of baseline flows, measured (i.e., reported or observed) flows at the NPR gage were substituted for INTB-modeled impacted flows in Equation 1 and were used along with

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, Upchurch		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
					reported lagged-pumpage values to predict baseline flows. Very low baseline flows, specifically those less than 1.6 cfs were, however, predicted using values derived from the INTB model simulation. Minimum flow rules are developed to specify daily withdrawal rates that can be used for short-term surface water withdrawal management and associated water use permit conditions. In contrast, based on the more diffuse and temporally variable effects of groundwater withdrawals on streamflow, evaluations for requested groundwater withdrawals and for assessment regarding whether minimum flows are being met are conducted on a long-term basis. That is, they are typically conducted using long-term mean and/or median flows predicted with numerical or other models with supporting evidence provided by monitoring data. Drought conditions are expected to be incorporated into analyses supporting minimum flow development, and as noted in response to item 1 above, this was the case for the analyses supporting development of proposed minimum flows for the Pithlachascotee River. In addition, District rules include provisions for management actions that can be implemented during water shortages that may occur as a result of drought or other factors.
4	General comment	No	The MFL is being developed for the Pithlachascotee downstream from Crews Lake. Crews Lake, the Mazaryktown Canal, Jumping Gully and portions of the Cross Bar Ranch	Add a discussion of the reason for exclusion of the basin upstream of the Crews Lake outfall from this MFL. The Crews Lake MFL should be cited, and I think it would be helpful to the reader	Response: Ron Basso, Chief Hydrogeologist and Doug Leeper, MFLs Program Lead, SWFWMD. There is some ambiguity in reference to the actual drainage basin delineation, as some

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, Upchurch		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
			Wellfield are within the river basin (Figure 2-2). There should be a discussion of the reason for exclusion of the basin upstream of the Crews Lake outfall from this MFL. The Crews Lake MFL should be cited, and I think it would be helpful to the reader to explain that the basin upstream from the Crews Lake outfall is part of a second groundwater basin with internal drainage that flows to the coast, not the river.	to explain that the basin upstream from the Crews Lake outfall is part of a second groundwater basin with internal drainage that flows to the coast, not the river. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	reference sources terminate the drainage basin Prior to Crews Lake (see figure below). Much of the system becomes internally drained under deep water table conditions near Crews Lake and areas surrounding the lake. This transition area becomes a mostly unconfined Floridan aquifer, deep water table, highly karst-dominated, and high recharge environment near the boundary of the Central and Northern Groundwater Basins which is represented well in the INTB model. Regardless of the drainage basin delineation, the INTB model covers a 4,000 square mile area. Groundwater impact scenarios were simulated by zeroing out all withdrawals in the Central Groundwater Basin (included all of Cross Bar wellfield withdrawals even though northern portion of the wellfield is outside the basin). We can add the discussion to the report regarding groundwater basin boundaries and the change in the system going from a shallow water table, leaky Upper Floridan aquifer (UFA) to a deep water table largely unconfined UFA. The District is in the process of establishing minimum levels for Crews Lake and reference to these MFLs or their ongoing development will be incorporated into revisions of the draft report addressing minimum flows development for the Pithlachascotee River. Other established MFLs located in the basin upstream of Crews Lake, including those adopted for several lakes and a few isolated wetlands in the southern portion of the Cross Bar

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, Upchurch		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**
					Ranch wellfield will also be identified in the revised document.
5	10, P 2	No	There should be a comma after river in first sentence.	Insert comma	
6	10, P 4	No	Bay is misspelled	Change Bat to Bay	
7	15, P 4	No	The 15 percent change criterion should be referenced.	Reference Section 1.4.6. Consider moving this section up to immediately deal with the 15 percent criterion when first mentioned.	
8	16, P 1	No	I like this discussion of conditions. However, subsequent sections do not adequately discuss the AMO, etc. in the context of the measured or modeled data. This lack of discussion cuts to my concerns about extreme flows and cycles in the data sets.	Need to discuss the measured and modeled time-series data in terms of adequacy and representation as best available data. There is a need for a discussion of extreme conditions and patterns in the measured and modeled data.	
9	17, S 1.4.6	No	This is the discussion of the 15 percent criterion that should have been presented on page 15. The last paragraph is good in that it allows for groundwater withdrawals.	See above.	
10	18, P 3	No	"…continuing to us the 15…. Use is misspelled.	Change us to use.	
11	20, S 2.2	No	This section is a good discussion of the entire Pithlachascotee basin. The section tends to mislead the reader later on, however. There should be a discussion of the hydrologic reasons why the Crews Lake reach is not considered in the MFL here. See general comments.	Add discussion.	
12	21ff, S 2.3	Yes	The only rainfall data presented is a graph showing the average monthly rainfall. The reader	Add discussion.	

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, Upchurch		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
			is not told what gage data are included and how close the gage(s) is to the Pithlachascotee. Also, there is no discussion of long-term rainfall, trends in rainfall over time, the AMO, data quality, etc.		
13	22, P. 2	No	The physiographic province discussion is fine. However, there should be a discussion of karst in the basin, especially as relates to the exclusion of the Crews Lake reach from the MFL.	Add discussion	
14	22, P 2	No	Stratigraphic nomenclature has long since been changed. The Bone Valley is now a member of the Peace River Formation and the Alachua is no longer recognized. Neither is recognized as a formation.	Read Arthur, et al., 2008. Hydrogeologic Framework of the Southwest Florida Water Management District. Florida Geological Survey Bulletin 68 and revise report accordingly.	
15	22, P 2	No	The Bone Valley and Alachua are mentioned here, but neither is of any importance in the basin. What about the strata that form the surficial aquifer (SAS), where present, and the Floridan strata (Ocala, Suwannee, Avon Park)?	Add discussion.	
16	23, P 1	No	The SAS, intermediate aquifer and confining unit (IAS) and UFA are mentioned here. There is controversy as to whether the SAS exists in much of the basin because the clay residuum from the IAS is often missing (as suggested in this paragraph). There is essentially no discussion of the UFA, which is important when dealing with the groundwater component of the MFLs.	Add discussions.	

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, Upchurch		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
17	24, F 2-4	No	These maps should be in chronological order. Also, they are too small to study. Strongly suggest that a boundary between the Crews Lake reach and MFL reach be shown.	Modify maps. Consider omitting the Crews Lake reach from the maps to allow for magnification of the view.	
18	27, P 1	No	The recovery strategy is important to the MFL. This is a good place to discuss the effects of implementation of the recovery plan on groundwater levels and surface water flows.	Add discussion.	
19	30, S 2.8.1	No	Prior to discussion of flow rates and river hydrology and while groundwater is still the topic of concern, suggest that recharge be discussed, including a map. With the changes in land use just discussed, recharge patterns have changes and will have impacts of river hydrology. This assist in discussions of river hydrology in this section.	Add discussions.	
20	30, S 2.8.1	Yes	This report does a poor job of discussing the measured flows in the MFL basin.	Add discussions of measured flow data, data gaps, data uncertainties, periods of record, records of extreme events (low and high flow, droughts, etc.), absence of baseline data and why, District's ability to utilize data for MFL development, etc.	
21	30, S 2.8.1	Possibly	I am a fan of use of unit discharge (Q/drainage basin area). However, with the karst in the area, unit discharge measurements can be deceiving. Are the basin areas all tributary to the river or are some internally drained? How are the Crews Lake reach and basin treated, are they include in the areas, or they ignored?	Add discussion.	
22	30, F 2-8	Yes	The flow duration curve (FDC) needs to be backed up by presentation of the data. The	Add discussion.	

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, Upchurch		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**
			reader needs to see the times of no flow and extreme flow in order to understand the FDC.		
23	30, P 3	No	This discussion of the unusually low runoff rates is important. However, the recharge map mentioned in Comment 15 is important here. Also, some of Cobie's conclusions deal with the deep sands and low water table in the Crews Lake reach, not in the MFL basin. In much of the MFL basin, the depths to the water table are very similar to those in the Anclote, especially as one approaches the Gulf.	Rewrite and expand paragraph.	
24	31, S 2.8.2	Possibly	The discussion of seasonality is important in order to define the blocks used for MFL development. However, it is not supported by a good discussion of the raw rainfall data.	Add discussion.	
25	32, P 1	No	Use of has is incorrect in 3rd line.	Change has to have. Wellfields is plural.	
26	32, F 2-10	No	This is an important graph. The reader needs to be informed about the data, particularly the semi-diurnal nature of the tide cycle, location of the head of tides in the river, extreme events, etc. This will help explain the changes in the tidal river when the gage location was changed (Figures 2-10 and 2-11).	Add discussion.	
27	36, S 2.9.2	No	After reviewing the model-development reports, most of my concerns about the model were answered. Please be sure to reference these reports often to steer the reader to these discussions.	Add references.	
28	36, P 3-5	Yes	The model-development reports present some of the data required for presentation in this MFL report, the MFL report is in serious need of	Assuming that the measured flow data have been previously discussed, add graphs comparing the model-derived data and	

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, Upchurch		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
			improvement in order to establish that model-derived data constitute best available data.	measured flow data, discuss ability to fit the raw data, patterns in residuals, and completeness of the record.	
29	36, P 3-5	Yes	The defense for use of the "pumps off" scenario results as background data needs strengthening.	I agree that these data are the best available, but there should be a separate section here presenting the case in clear terms, including the facts that development in the basin and of local wellfields pre-date streamflow data collection.	
30	36, P 4	Yes	The statements about predicted flows might be clearer if graphs can be used here.	Consider adding a graph showing predicted reductions in flow with different wellfield extraction scenarios.	
31	36, P 5	No	2014 is repeated in line 3.	Delete repeat.	
32	39, F 2-14	Probably not	The bottom graph suggests that a regression equation was fit to the top graph. Please discuss; why is this important?	Add the regression, equation, and coefficient of determination to top graph or text. Move bottom graph to middle position and discuss residuals.	
33	39, P 1	No	The assumption that dissolved phosphate and o-PO4 are the same is functionally correct.	No action needed.	
34	40, P 1	No	The assumption that NO3 and NO3+NO2 are the same is probably safe, but they are not the same. NO2 is relatively unstable in an oxygenated environment, so it is probably de minimus.	No action required.	
35	40, P 3	No	Define NOx for the reader. Chemically NOx is functionally NO3+NO2.	Define.	
36	41, F 2-15	No	See comment 28 and apply to phosphorus graphs here. The graphs suggest that there were varying detection limits in the data and that they were treated as measurements. If this is true, it should be discussed.	See comment 28. Discuss role of detection limits in these graphs.	
37	42, F 2-16	No	See comment 32.	See comment 32.	

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, Upchurch		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
38	43, P 4	No	The statement that DO is negatively correlated with flow appears to disagree with the middle graph in Figure 2-14. Also, use of correlations required that the line (I assume it is linear), equation, and coefficient of determination be presented in either the graph or a separate table.	Address as indicated.	
39	45, F 3-1 and forward	No	The maps that utilize an aerial photograph for background are all very hard to read and the background is distracting.	Suggest use of a plain background with a few landmarks (gage locations; roads, esp. Rowan Rd. & US 19; or other landmarks for reference.	
40	46, S 3.2	No	Glad to see a discussion of tides here. To complete the discussion, suggest addition of spring and neap tides and storm surges.	Address as necessary.	
41	46, P 3	No	Suggest a map comparing the head of tides versus extent of saline water.	Consider adding this. Not critical.	
42	47, F 3-3	No	Horizontal lines representing the medians are not visible.	Change background color in boxes.	
43	48, F 3-4	No	As mentioned above, the dark aerial photograph background makes this figure unreadable, especially in the stream segment upgradient from the bay.	Remove the background and add a few landmarks. Bathymetry in the riverine segment will still be unreadable. The figure could be broken in a series of panels that would make the riverine part more easily read. Also, consider including a long profile of the river so that one can get a sense of the bathymetry of the river reaches.	
44	49, F 3-5	No	Label for horizontal axis misrepresents data.	Change to Area, Volume. As written the title suggests a fraction rather than two different metrics.	
45	52, F 3-7	No	See comments on maps with aerial photo backgrounds.	See above.	
46	60, P 3 61, F 4-1	No	This paragraph says that Crews Lake and Five Mile Creek were also evaluated. They are not included in descriptions in Section 3.	Reconcile Sections 3 and 4 relative to what data are included and what are excluded.	

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, Upchurch		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
			Figure 4-1 does not show or suggest evaluation of Crews Lake, etc.		
47	61, P 3	Yes	Last sentence in bottom paragraph states that the measured and modeled data fit "fairly well" and that there were "short-term differences."	These terms suggest problematic uncertainty. It is critical that these differences be documented as suggested in Comment 16 and elsewhere, it is important (1) to present and discuss the measured data, including data gaps, extreme events, etc., and (2) to compare the modeled and measured data, especially with respect to residuals and how extreme events are modeled. Finally, (3) the uncertainties represented in the measured data and in the modeled data must be discussed. Much of this can be in Appendix 4B, and if the data are presented in other documents in such a way as to deal directly with the Pithlachascotee MFL, references can be used. Referenced data should deal specifically with the river downstream from the Fivay Junction gage.	
48	62, P 1	Yes	As noted above, a graph comparing the measured and modeled time series and showing the residuals should be included and discussed here.	Add graphs and discussion.	
49	61, S 4.2	Yes	This is the last location in the report where, in my opinion, the justification for use of modeled data as opposed to measured can be made.	Please insure that this argument is included prior to this section.	
50	62, Eq. 1	Yes	The 1.15 constant in the equation suggests a systematic difference in modeled baseline and modeled impacted flow. Is this the long-term impact of groundwater extraction or a short-term difference related to climatic cycles?	Discuss meaning of the constant and implications to the MFL.	

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, Upchurch		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**
51	62, Eq. 1	No	Units for use in the equation (I assume they are daily estimated cfs) should be added.	Add units.	
52	62, Eq. 1	Yes	The use of the 150-day <u>average</u> term causes confusion for several reasons. 1. Are Q_{base} and Q_{imp} daily calculated values? 2. Is $Q_{pump150}$ a moving average with 1 one-day time step? 3. How was the 150 average term withdrawal identified? Stepwise multiple regression? If so, what variables were dropped and what did they contribute to the coefficients of determination?	Address questions posted in Column A.	
53	62, P 4	Yes	There is a need for a graph showing the Q_{base} data, regression line, and coefficient of determination.	Add graph and discuss as necessary.	
54	62, Eq. 2	Yes	1. Units for use in the equation (I assume they are daily estimated cfs) should be added. 2. Are Q_{base} and Q_{imp} daily calculated values?	Add graph and discussion.	
55	63, P 2	Possibly	Last sentence says that staff considered use of gaged flows to incorporate short-term flow variation into the baseline record. This is a problematic statement. What does it mean? Explain? Does the modeled Q_{base} not include short-term variability? Define short-term variability. This is very important to understanding what the MFL is representing. If short-term variability is not included in Q_{base} and Q_{imp}, how do you deal with it? Why is it not significant?	Answer questions in a thorough discussion of the meaning of this sentence.	

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, Upchurch		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
56	63, P 3	Yes	In this paragraph, good agreement between gaged and modeled flows is asserted. This statement needs to be backed up with data.	Insert graph showing time series for gage data, Q_{imp} and residuals. Discuss correspondence and residuals.	
57	63, P 3	Possibly	Use of the flow duration curves to compare data is fine once the data are validated. FDCs should not be used to assert that two data populations in time series agree because individual values may not correspond.	See Comment 52 and couch this discussion on comparison of the FDCs on the populations of data, not correspondence of day-to-day variability, which is implied herein.	
58	64, last P	Yes	In this paragraph the period of record (POR) for Q_{base} and Q_{imp} is said to have been moderately dry with high groundwater withdrawals. Is it appropriate to develop a MFL on a POR that does not include extreme climatic events, such as severe droughts and high rainfall events? Why?	As noted in several comments above, the context of the modeled PORs, esp. Q_{imp}, must be established. Questions should be addressed.	
59	65, S 4.3	No	Use of the flow blocks concept is useful and well explained herein.	No action required.	
60	66, F 4-4	Yes	In block 2, the modeled flow is systematically less than measured flow, why? During block 3 the measured flow is often less than modeled. In one period near the end of the block 3 period, the measured is significantly higher than modeled. Please explain. This figure suggests that the modeled data (Qimp) do not always adequately capture high-flow events.	Explain the differences in Q_{imp} and measured flow and how these differences affect the MFL.	
61	69, F 4-5	No	See previous comments about readability of maps using aerial photographs as background.	See previous comments.	
62	73, F 4-6	No	Comment about the background of figure and low visibility of the transect locations apply. Labels of Veg transects should be related to the floodplain "study sites" in caption.	Change background, etc. State in caption what Veg 1, etc. represent. This is evident, but not good style.	

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, Upchurch		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
63	83, Eq. 3	Possibly	As with equations 1 and 2, the regression is presented without a discussion of how it was derived and the uncertainties associated with it.	See comments on Equations 1 and 2 for recommended issues to be addressed. It is important to explain how the t+3 time lag was identified and why measured stage data and modeled stage are mixed in the equation. Goodness of fit should be discussed. Some of this information is in Appendix 4E, but it also should be included in the main report.	
64	115, F 6-2	No	The pumps off hydrograph is illegible.	Revise graph background or line color and weight.	
65	116, F 6-3	No	See above.	See above.	
66	123, F 6-7 & 6-8	No	See above.	See above.	
67	124, F 6-9 & 6-10	No	See above.	See above	
68	128. P 1 & F 6-14	Possibly	Fitting polynomials to time series is tricky and usually ends up with artifacts of the data behavior at the beginning and end of the time series. Such is the case here. There is an upward trend in the data from mid-2009 forward, but the polynomial appears to be "over fitting" it.	The graph and discussion would be better if a simple moving median is calculated. This should fit only the data and be insensitive to the tails of the time series. The patter looks like a climatic cycle with a change in the late 1980s.	
69	Section 6	Possibly	The presentation in Section 6 is excellent for the most part. I especially appreciate the discussion on sea-level rise. As mentioned in our teleconferences, I believe there should be a subsection at the end of this section discussing how the MFLs will be managed. This section clearly sets the stage for dual criteria; one for groundwater withdrawals which operate on a time scale of moths to years	Add a subsection to function as a conclusion on how this complex MFL will be managed.	

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, Upchurch		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**
			and the other for surface water which operates on a time scale of days to months. The stakeholders should have this dichotomy in MFL implementation carefully explained. The data are in this section; just pull it together in a summary.		
Comments on Appendix 4A					
1	General	Yes	Appendix 4A is well written and provides important background information concerning quality and use of measured and modeled data. However, it does not provide the comprehensive evaluation and analysis of the measured flows in the Pithlachascotee basin. For example, there are at least seven historical stream flow gages in the basin. Data from many are of little use for MFL development because of short periods of record. Others are mentioned in the main report but not dealt with in this appendix. For example, the main report uses the Fivay Junction gage as the upper end of the MFL reach of the river. I had hoped that presentations and evaluations of the gage data would be in the appendix since they were not in the main report. Unfortunately, this appendix also falls short for measured data evaluation and building a case for use of the modeled data as being "best available."	Somewhere, main report of here, the discussion about measured data quality and utility must be included in order to bolster use of the modeled data as being best available.	
2	General	No	Inclusion of the Brooker Creek analysis is distracting since this appendix is being proffered to support the Pithlachascotee MFL.	It is probably too late to change this.	
3	2-1, P 1	Unknown	The first sentence mentions that the data have been "altered." How? Why?	Insert explanation.	

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, Upchurch		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**
4	2-1, P 2	Possibly	The report is limited to analysis of the data from the Pithlachascotee River near New Port Richey FL (02310300) gage. What about the other gages on the river?	Insert explanation as to why this analysis is limited to one gage.	
5	2-1, P 3	No	Third sentence gives the drainage basin area as 182 $mi.^2$. Does this area include or exclude the Crews Lake reach of the river?	Annotate sentence.	
6	2-1, P 4 ff	No	I like the analysis of flows using FDCs. However, the raw data must also be presented so the reader can see how the flow patterns changed. Are changes systematic or random, for example.	Add analysis of raw data.	
7	2-1, P 4	Possibly	"…changes are more pronounced at the lower end of the curves…." This statement indicates that low-flow conditions have changed. How? Why?	Add clarification. Table 2-1 can be used to explain.	
8	2-5, S 2.2.2	Possibly	Last paragraph on page suggests that the cloud of data around the 1:1 line in cross plots shows that the modeled data area a "reasonable fit." Figure 2-5 indicates that at flows below 100 cfs, the uncertainty of modeled flow can be almost 100%. This much uncertainty is hardly a reasonable fit. This statement must be defended.	Add defense of the reasonable fit argument. Use plots of the measured and modeled time series and explain the behaviors of the residuals. FDCs do not provide this information.	
9	2-6, F 2-4 & 2-5	No	The conventional way of plotting measured versus derived data even when regression is not invoked is to plot the measured data on the horizontal axis to indicate that these data are assumed to be more-or-less error free and that the modeled data (vertical axis) contain any uncertainty. In these graphs, the implication is that the modeled data are correct and the measured data contain the error.	Reverse axes and replot.	

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, Upchurch		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**
10	3-2, S 3.1	Yes	See comments about these regressions in the main report.	See above.	
11	3.3, F 3-1 & 3-2	Possibly	The fact that the INTB modeled data and the regressed data fit better than the INTB data versus the measured data suggests that the regression is removing some of the natural variability in the measured data. In other words, the regression is not reproducing the raw data. This is problematic, at least.	Include time series graphs to compare measured data, INTB modeled data, and regressed data. Also, plot the residuals and discuss any patterns, uncertainties, or outliers.	
12	4-1, F	Yes	1. Again, use of FDCs hides uncertainties in time-series data because the FDCs mask relationships of synchronous data. 2. This graph shows a substantial difference between the measured data and both forms of modeled data. Taken at face value, I would assume that neither set of modeled data fit the actual measured data. The time series analysis or another approach is needed to validate the modeled data. Unlike the statements concerning the coefficients of determination (R^2s), this graph does not support statements about the good quality of the data!	Add time-series data analyses and uncertainties analyses as suggested above. Then, if the uncertainties are minimal and one can assume that data points on each FCD are synchronous, the FDCs can be used to compare the raw and modeled data. These analyses are a must. Then, include a thorough discussion as to why the District used the modeled data and why it is the best available data.	
13	Graphs following conclusions	Possibly	There are graphs of residuals and FDCs attached to the report. They are unlabeled as to which creek they apply and there is no analysis of content. These are useless.	Label and discuss graphs in their appropriate locations in text.	

Appendix B
Table 1-2. Dunn Review Comments on MFL Documents

TABLE 1-2. 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 1-2, Dunn		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
1	General comment	Yes, possibly	Report should have an explicit, integrated treatment of sources of uncertainty with evaluation of magnitude of each source, effect on the proposed minimum flows, and recommendations for how to reduce effect of each source in the future.	Consider developing an overarching adaptive management approach and narrative for this MFL, and the District's MFL program itself. A detailed recommendation as to how this can be accomplished is provided in Dr. Dunn's summary comments in Discussion section of this report.	
2	General comment	Yes, possibly	The percent of flow method has many inherent assumptions. Whenever possible the District should develop specific event based criteria with defined magnitude (flow or level), continuous duration (inundation or drying), and return interval.	Consider using an event based statistical approach for some criteria. Also, consider a comparative analysis. A detailed recommendation as to how this can be accomplished is provided in Dr. Dunn's summary comments in Discussion section of this report.	
3	General comment	No	In several parts of the document the authors state that all the relevant water resource, ecological, and human use values are protected by a given minimum flow. It is hard for a reader to reach this conclusion on their own	Include a summary table that gives a short explanation as to how each water resource criteria is explicitly, or implicitly covered.	
4	Section 1.4 Overview of Methods and Assumptions, pages 14-18	No	Material is clearly stated, and I concur with assumptions made.	No further action required.	
5	1.4.1 Fundamental Assumptions, page 15	No	Material is clearly stated, and I concur with assumptions made.	No further action required.	
6	1.4.3 Baseline flows and	No	Material is clearly stated, and I concur with assumptions made.	No further action required.	

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, Dunn		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
	conditions, page 16				
7	1.4.4 Building Block Approach, pages 16-18	No	Material is clearly stated, and I concur with assumptions made.	No further action required.	
8	1.4.6 Percent-of-Flow Method and 15% Change Criteria, pages 17-18	No	Material is clearly stated, and I concur with assumptions made.	No further action required.	
9	Section 2.10 Water Quality, pages36-44.	No	Material is clearly stated, and I concur with assumptions made.	No further action required.	
10	Section 4.4 Resources of Concern for Upper River, pages 66-68	No	Material is clearly stated, and I concur with choice of critical resources.	No further action required.	
11	Section 4.4.2 Methods for the Upper River, pages 68-79	No	Material is clearly stated, and I concur with choice of critical resources.	No further action required.	
12	Section 4.5 Resources of Concern for the lower River, pages 79-81	No	Material is clearly stated, and I concur with choice of critical resources.	No further action required.	
13	Section 4.5.2 Methods for the Lower River, pages 81-87	No	Material is clearly stated, and I concur with choice of methods.	No further action required.	

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, Dunn		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**
14	Section 5.2.1 Minimum Low Flow Threshold, pages 88-90	No	I concur with the selection of the fish passage as the defining criterion. The plot in Figure 5-1 (page 89) very clearly demonstrates this.	No further action required.	
15	Section 5.2.2 Instream PHABSIM Results, pages 90-	No	District's MFL team have used PHABSIM for other MFLs. The use of PHABSIM as a best available aquatic habitat assessment tool has also been accepted by previous peer reviews. Was the PHABSIM application for the Pithlachascotee River done in standardized approach, comparable to how it has been applied to other river systems in the District? Were there any significant variations from the District's standard PHABSIM data collection, or analysis?	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response:** Doug Leeper, MFLs Program Lead, SWFWMD. The approach used for application of PHABSIM analyses for the Pithlachascotee River was comparable to previous use of the model suite for determining minimum flows for flowing freshwater systems within the District. There were no significant variations from previous PHABSIM data collection or analysis activities. Staff notes, however, that the District has used differing approaches for summarization and use of PHABSIM results supporting minimum flow development.
16	Section 4.4.2.3 covering PHABSIM methods, pages 71-75.	No	Have previous MFL peer reviews assessed the suite of embedded PHASIM tools (i.e., hydraulic model, TSLIB, etc.)? If so, have the models been deemed appropriate for use with rivers in the District? Were any cautions or limitations highlighted by other peer reviewers?	Response provided by This paragraph, with a few modifications, inserted in the report, would suffice to address my comment. Doug Leeper adequately addresses the question.	**Response:** Doug Leeper, MFLs Program Lead, SWFWMD. All peer reviews conducted for the District to date have supported the use of PHABSIM analyses as a component of the District's development of minimum flows. Some review panel reports have identified Draft, Page 9 weakness associated with the PHABSIM tools and recommended that enhanced hydraulic modeling tools (e.g., 2-D models or hydrodynamic models) could be considered to improve habitat-based assessments.
17	Table 5-1, page 92	No	Overall results of the PHABSIM analyses are summarized in Table 5-1 (page 92) of the report. It is not clear how the summary in Table 5-1 are	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a	**Response:** Doug Leeper, MFLs Program Lead, SWFWMD.

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, Dunn		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**
			derived from the plots in Appendix 5B. Please provide a step wise description.	few modifications, inserted in the report, would suffice to address my comment.	Plots of WUA (weighted usable area per 1,000 linear feet) as a function of flow are presented for each taxon/life history stage/guild in Appendix 5-B. This information was used in the PHABSIM analyses to calculate site-specific habitat availability gains/losses relative to baseline condition by month for various flow reduction scenarios (10%, 20%, 30% and 40%), using WUA values for each taxon/life history stage/guild. These "gain/loss" results are presented as the bar charts included in the appendix. stage/guild. These "gain/loss" results are presented as the bar charts included in the appendix. The summary results presented in Table 5-1 are based on changes in WUA for the study reach that were developed using composited WUA values for the three assessed PHABSIM sites. The process used for the analysis and reporting included: a. Identifying the WUA by month for each taxon/life history stage/guild for each PHABSIM site for the baseline and four flow reduction simulations. b. Compositing (adding together) the WUA values for the three PHABSIM sites to develop taxon/life history stage/guild WUA values for the study reach for the baseline and flow reduction scenarios.

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, Dunn		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
					c. Determining percent changes from the composited, baseline WUA values for each flow reduction scenario by month. d. Identifying flow reductions associated with a 15% decrease in the WUA values, typically through linear interpolation of results for the 10%, 20%, 30% and 40% flow reduction scenarios. e. Identifying monthly flow reductions associated with the 15% decrease in WUA values by Block (May and June results for Block 1 and October through April results for Block 2) and identifying the most restrictive, blocks-specific monthly value for each taxon/life history stage/guild. f. Summarizing (in Table 5-1) block-specific responses associated with 15% habitat availability changes that were less than the maximum 40% flow reduction scenario.
18	Table 5-1, page 92	No	Table 5-1 indicated and the supporting text in report say that the PHABSIM analyses were done separately for flow regime Blocks 1 & 2. I did not see comparative plots for Blocks I and 2 by taxon in Appendix 5. How can I verify the summary values for Blocks 1 & 2 in Table 5-1?	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response:** Doug Leeper, MFLs Program Lead, SWFWMD. Draft, Page 10 The habitat gain/loss plots included in Appendix 5-B illustrate how monthly PHABSIM results can be represented graphically. As noted in the response to question 4 above, determination of block-specific allowable percent-of-flow reductions simply involves identification of the most sensitive monthly response for each block. However, as also noted in the previous response, the plots shown in Appendix 5-B depict site-specific results and the summary information presented

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, Dunn		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
					in Table 5-1 is based on composited, study-reach results. It may be useful to prepare habitat gain/loss plots similar to those included in the appendix to show gains/losses associated with the composted WUA values. Alternatively, this information could be presented in tabular format.
19	Table 5-1, page 92	No	For the critical values in Table 5-1---can the threshold be exceeded by a single month's excursion. Please explain.	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response:** Doug Leeper, MFLs Program Lead, SWFWMD. As noted in the response to questions 4 and 5 above, the allowable, block-specific percent-of-flow reductions identified in Table 5-1 were developed based on the most sensitive monthly response within each block, i.e., within Block 1 and within Block 2.
20	Table 5-1, page 92	No	I understand that maximum allowable percent flow reductions presented in Table 5-1 were calculated using mean monthly value for river flows for baseline versus incremental percent flow reductions. Mean monthly flow values were in turn used to estimate mean monthly habitat values, and percent change from baseline. The explanation for this analysis in Appendix 4C was unclear. Please provide a step-wise description as to how the final maximum allowable flow reductions values in Table 5-1 were calculated.	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response:** Doug Leeper, MFLs Program Lead, SWFWMD. Please see the process description provided above in response to question 4.
21		No	District's MFL team have used a criterion for floodplain inundation for other MFLs. The use of floodplain has also been accepted by previous peer reviews. Was the floodplain inundation for	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. The approach used for the floodplain inundation criterion is a standard approach that has been used for nearly all of the minimum flow

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, Dunn		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
			the Pithlachascotee River done in standardized approach, comparable to how it has been applied to other river systems in the District? Were there any significant variations from the District's standard or typical floodplain inundation analysis, or data collection?		recommendations developed for freshwater river segments within the District. The minimum flows developed for the Gum Slough Spring Run provide the exception to our use of the approach. Data limitations precluded use of floodplain inundation criteria in the Gum Slough Spring Run analyses. The approach used for the Pithlachascotee River did not include any significant variations from previous applications of the approach that have been used to set other minimum flows.
22	Section 5.2.4.3 Floodplain Inundation Results and Proposed Minimum High Flow Threshold for the Upper River, pages 99-102	No	Analyses use mean elevation of the various floodplain features. Did staff consider using a more conservative, more protective elevation value like the 80th percentile, or higher? Has the use of mean elevations of flood indicators been evaluated in other peer reviews for riverine system MFLs?	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. Consideration of mean vs. other elevations associated with floodplain features has not been previously addressed by panel's reviewing proposed minimum flows for District rivers/streams, although the panel that reviewed minimum levels proposed for the middle segment of the Peace River suggested it may be reasonable to consider flow-related inundation patterns associated with target elevations that include specified water depths for particular floodplain features. Staff believes that by assessing potential changes in the inundation of a variety of floodplain features which occur across the range of floodplain elevations (e.g. refer to features listed in Table 5-4 in the minimum flows report), the allowable, Block-3 percent-of-flow reductions included in the proposed minimum flows are protective of all

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, Dunn		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
					environmental values associated with the "higher-end" of the flow regime.
23	Page 99	No	In paragraph 2 of page 99 the report states that analysis sought to identify the percent of flow reduction that could occur without reducing the number of days of inundation of the respective features and habitats at each cross-section by 15 percent or more. Please provide an explanation as to how the change in days of inundation were determined. For instance, was this done by summing the number of daily exceedances over the complete time series (period of record)?	Response provided by Doug Leeper adequately addresses the question. Please add this description to the document. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. The total number of days of inundation of the specified floodplain elevations was calculated by summing the number of daily exceedances of flows associated with inundation of the feature elevations for the entire period of record used for the minimum flow analyses.
24		No	Regarding the floodplain inundation analysis, the report focuses on a simple duration of inundation, defined as number of days, presumably over the time series. In contrast the SJRWMD MFLs team's methods use magnitude of inundation, plus continuous inundation periods of critical duration (days) and return intervals (years) to define minimum events that they have determined are required to maintain the floodplain feature. The method used in this report is simply limits allowable change in number of days of inundation over the time series. As such it does not address two important components of hydrologic events—critical periods of continuous inundation with defined return intervals. Please answer whether	Response provided by Doug Leeper raises other approaches that could be used to set minimum flows or levels for floodplain systems. So, it appears that the methodologies may evolve in future applications.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. Staff believes the exceedance-dependent criterion is protective of floodplain habitats and associated processes as have peer-review panels that have previously considered the District's use of the criterion for minimum flows development. Recently staff have begun exploring inundation of floodplain habitat on a spatial-temporal basis by coupling water level (i.e., stage) predictions from hydraulic models with topographic GIS data layers to create daily time-series of inundated floodplain habitat area. Changes in area associated with flow reductions can then be evaluated to identify changes in inundated habitat on spatial basis. As an example, this approach has been used to

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, Dunn		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
			the floodplain protection criterion used provides reasonable protection of floodplain resources, despite not also quantifying periods of continuous inundation and return intervals. Is it possible in the future for staff define critical maintenance hydrologic events in terms of magnitude (flow and/ or stage), duration of continuous inundation, and with a return interval?		support development of currently proposed minimum flows for the Rainbow River System. Interestingly Munson and Delfino (2007) have shown that that temporal-based criterion may yield more conservative results than those based on flow-related spatial habitat reductions.
25	Section 5.2.4.3 pages 99-101	No	A key part of the method is setting a minimum high flow threshold. Setting this threshold is covered in Section 5.2.4.3 on pages 99-101. The explanation of the values used to set the high flow threshold is given in the third paragraph on page 99. This paragraph is difficult to follow. Two points need to be explained more clearly. First, staff state that values "tended to stabilize around 9 percent for moderate to high flows (Figure 5-10)." Does this mean that a regression was line was fit? How was the 9 percent value arrived at? Next, the report states in sentence 2 of that paragraph "an additional allowable percent of flow reduction that may be applicable…. for Block 3, was developed. Based on the 25th percentile exceedance." It is not at all clear to me how and why the 25th percentile value is deemed appropriate. Please provide a more complete explanation.	Response provided by Doug Leeper still makes it sound like the selection of the 25th percentile is a professional judgement call.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. Draft, Page 14 The 9% allowable flow reduction for higher flows in Block 3 is the mean of the allowable flow reduction percentages calculated for target floodplain elevations that are inundated with flows greater than the Minimum High Flow Threshold of 50 cfs, which is defined for the Pithlachascotee River near New Port Richey gage. The 50 cfs Minimum High Flow Threshold was established based on identification of this flow as the out-of-bank flow associated with the gage site. As noted in the minimum flows report, staff identified a second allowable flow reduction for periods when flows during Block 3 are less than the Minimum High Flow Threshold. This second allowable percent-of-flow reduction was established at the 25th percentile of the allowable flow reduction identified for targeting floodplain features in association with flows of

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, Dunn 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)	To be completed by Report Author(s) C. Action to be Taken in Response to Comment
					less than 50 cfs at the near New Port Richey gage. The 25th percentile was selected as a reasonable, allowable flow reduction that is comparable to the allowable flow reductions associated with the lower flow Blocks 1 and 2. It is considered protective of relevant environmental values during periods of lower flows that may occur during Block 3.
26		No	Table 5-4 (p. 100) lists 16 floodplain features that were measured in the field across the 15 cross-sectional transects. Are all 16 features considered equally important? Or are there one of more that the District finds more useful for this type of analysis.	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. We have found all of these floodplain features to be useful for characterization of target elevations associated with floodplain habitat. We believe that assessing how inundation of a range of floodplain target elevations may change as a function of flow reductions and limiting the magnitude of this change is a reasonable means to promote persistence of floodplain structure and function and prevent significant harm.
27	Figure 5-10, page 101	No	In Figure 5-10 (p. 101) the data points plotted appear to represent multiple types of floodplain features. Since Table 5-4 on the previous page lists 16 different features, I ask is it correct to assume that all features have equal value, and therefore there is no need to differential them in this plot? Intuitively I suspect that all 16 features should not get equal weight. Please respond.	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. Please see the response to the several questions above, which describe our focus on protecting habitats and representative features across the range of floodplain elevations. We further note that for some previous minimum flow determinations we have also examined potential allowable percent-of-flow reductions for the range of flows that may be expected, selecting a suite of percentiles or some other array of flows for the assessment. That approach is equivalent to assessing changes in inundation of the full

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, Dunn		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
					range of elevations that can be associated with floodplain features, including specific features such as wetland plant assemblage distributions and ecotones, and more generally, ground elevations across the floodplain from the top of bank to the upper edge of the floodplain. We believe this perspective furthers our support for assessing potential change in inundation of the all relevant floodplain habitats.
28	Figure 5-10, page 101	No	On Figure 5-10, two red lines are added one at 16% for flows less than 50cfs, and the other at 9% for flows greater than 50 cfs. Please describe how these lines were determined. Also, would it be useful to also include confidence intervals, such as 90% or 95%, for each line? Some measure of statistical significance would be helpful.	Response provided by Doug Leeper adequately addresses the question. This paragraph, with a few modifications, inserted in the report, would suffice to address my comment.	**Response**: Doug Leeper, MFLs Program Lead, SWFWMD. Draft, Page 15 Derivation of the allowable 9% and 16% flow reductions for periods when flows during Block 3 are, respectively, above or below the Minimum High Flow Threshold of 50 cfs is described above in response to question 5. The 9% allowable reduction for periods of higher flows was based on a mean value. The standard deviation for the 91 percentage values used to determine the mean allowable 9% flow reduction is 3.5%. The 16% allowable flow reduction for periods of low flows during Block 3 was set at a 25th percentile value for the 81 allowable flow reductions calculate for the lower Block 3 flows that, as illustrated in Figure 5-10 within the minimum flows report, ranged from 13% to 40%. For regulatory application of minimum flows, staff believes it is appropriate to identify block and/or flow-specific allowable percent-of-flow reductions rather than a range of flow reductions bounded

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, Dunn		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**
					by a confidence or prediction interval or some other variance/range descriptor.
29	Section 5.3 Summary of Proposed Minimum Flows for the Upper River, page 101	No	I agree with the summary, add detail	No further action required.	
30	Section 5.4 page 103	No	Text states that all relevant water resource and human use values for the upper river are protected. It may be more persuasive to the reader if a tabular summary was provided.	Provide a summary table listing each of the criteria, and a statement as to how that criterion is protected, or is not relevant to the upper of lower segments of the Pithlachascotee River.	
31	Section 5.5 Results for the Lower River, pages 104-110	No	Ray Walton has reviewed the salinity regressions and posed questions for staff.	Staff will respond to questions posed by Dr. Ray Walton.	
32	Section 5.5.2 page 109	No	It is not clear from the text how the 60 cfs flow threshold was determined. How can the reader review and verify?	Please provide clarification.	
33	Table 5-5, page 102	No	This is a very helpful tabular summary. I agree with the three identified criteria for the upper river: fish passage for all seasonal blocks, PHABSIM for Blocks 1 and 2, and floodplain inundation for Block 3.	No further action required.	
34	Section 5.6 paragraph 2, page 110	No	I concur with the conclusion that the approach used is a conservative one.	No further action required.	
35	Table 5-10 page 110	No	I concur with the summary of evaluated and selected criteria for the lower, estuarine segment of the river.	No further action required.	
36	Section 5.6 Summary of	No	I concur.	No further action required.	

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, Dunn		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**
	Proposed Minimum Flows for the Lower River, pages 110-112				
37	Section 5.7 page 112	No	Text states that all relevant water resource and human use values for the upper river are protected. It may be more persuasive to the reader if a tabular summary was provided.	Provide a summary table listing each of the criteria, and a statement as to how that criterion is protected, or is not relevant to the upper of lower segments of the Pithlachascotee River.	
38	Table 6-1, Page 115	No	Good point, summarizing the relative effect of individual wellfields	No further action required.	
39	Table 6-2, Page 116	No	Good point, summarizing the relative effect of individual wellfields for the current pumping @ 74.3 mgd versus 90 mgd	No further action required.	
40	Figure 6-3, page 116	No	Figure clearly shows that there is little difference in monthly streamflow impact to the river at 74.3 mgd compared to 90 mgd.	No further action required.	
41	Table 6-3, page 177	No	Comparison of mean and median flows in PR shows relatively small differences between the current and MFL flows for the upper river. Indicates that either the MFL is just being met, or that it may only be slightly above or slightly below the proposed minimum flows.	Enhance the point that the upper river's flow regime appears to be close to its minima.	
42	Table 6-4, page 118	No	Same comment as immediately above.	Same action as immediately above.	
43	Figure 6-4 and 6-5 (page 119) and supporting text, pages 118-119.	No	This is a very helpful coverage of statistical confidence.	As above, enhance the point that the upper river's flow regime appears to be close to its minima.	
44	Section 6.2.3 INTB model	No	Uncertainty is a major issue in this report, and in general for the process of setting MFLs.	Consider developing a comprehensive management plan for uncertainty.	

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, Dunn		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
	uncertainty, page 120				
45	6.3 Other supporting information	No	Additional information was very helpful in covering related water management activities in the watershed, especially those addressing the response of surface and groundwater resources to reduced pumping from adjacent and nearby wellfields.	No further action required.	
46	6.3 Other supporting information, pages 120-130	No	Range of topics covered added solid supporting evidence: changes to PR flow (6.3.1), aquifer levels (6.3.2), INTB model drawdown (6.3.3), PR flow changes and rainfall (6.3.4), and Area MFLs status and wetland recovery near Starkey Wellfield (6.3.5).	No further action required.	
47	6.3.6 consideration of sea level rise, pages 130-135.	No	Sea level rise must be considered in water use and water resource management decisions for coastal systems, such as the PR. Section 6.3.6 does a good job of covering recent trends u=in sea level rise along the northern Gulf Coast of the District.	No further action required.	
48	Section 6.3.6.5 Sea Level Rise Analysis Discussion, pages 134-135	No	Based on the analysis presented in Section 6.3, I concur with the conclusion in Section 6.3.6.5 that sea level rise will have a negligible effect on amplifying the consequences of flow reduction on salinity based habitats.	No further action is required.	
49		No			
50	6.4 Summary of MFLs Status, page 135	No	Report concludes that the MFLs proposed for the upper and lower segments of the PR are currently being met and are 0065pected to be met during the coming 20-year planning period. While I generally agree with this, I think it	Consider stating that there while the MFLs are being met, there are also clear signs that there is little freeboard in the river's flow regime.	

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, Dunn		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**
			prudent to note that the compliance assessments show that the MFLs are close to being exceeded.		

Appendix C
Table 1-3. Walton Review Comments on MFL Documents

TABLE 1-3. WALTON 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 1-3, Walton		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
1	App. 4E	No	It would be useful to include data used for statistical analyses in this appendix.	Add data as a table Response acceptable if table added	Response: Doug Leeper, MFLs Program Lead, SWFWMD. Staff will consider including the tabular data in the appendix.
2	App. 4F	Yes	How was 4-day average of flow arrived at? Why not look at travel times to determine averaging period?	Response did not answer question. Higher flows will have shorter travel times. There is no information in the report how 4 days was arrived at.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. The four-day mean flows were developed and used for model construction to account for recent flow history of the river.
3	App. 4F	Yes	Why not use predicted tides and add residually (observed-predicted) from a nearby gauge? Approach used misses storm surge effects which might be important.	There is no way to know unless this is tested. As noted, the approach could miss tidal surges, which could influence the analysis.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. Staff acknowledges this could be done, but believes the regression models are sufficient for assessing long-term salinity trends.
4	App. 4F	Yes	Why is sqrt(flow) used as "flow" variable? Why not flow, or log(flow), etc.? Suggest that you plot flow versus isohaline position and fit functions to determine "best" function. I know that this ignores tidal effects, but they are added back to the statistical analyses.	Need to show analysis that shows sqrt(flow) is better than other flow variable. Response does not answer the question.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. The regression models were developed to produce the best available information for the District's minimum flow analyses.
5	App. 4F	Yes	Why did you develop synthetic tide at Main Street rather than use observations from New Port Richey directly? Why is Main Street the focus of the tide and not another location?	Response accepted.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. Synthetic tide stage data at the Pithlachascotee River at Main Street were developed and used in conjunction with measured tide stage at the gage site so that tide stage from a single, consistent location could be used to develop regression models for predicting isohaline location.

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 1-3, Walton		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
					The isohaline regressions were constructed using salinity profile data collected from March 1985 to April 1987 and from May 2008 to September 2009. Although tide stage records for the earlier data collection period were available for the Pithlachascotee River at New Port Richey gage, 15-minute data did not become available for the site until October 1987. Similarly, tide stage data were not available for the Pithlachascotee River at Main Street site for the early data collection period, although they were available for the more recent salinity-data collection period. To promote a consistent tide stage record for regression model development, staff worked with HDR Engineering, Inc. to first, create synthetic tide stage records for the Pithlachascotee River at New Port Richey gage for the period from January 1, 1985 through August 31, 2010. The regression model presented as Equation 3 in the minimum flows report was developed to predict tide stage at the Pithlachascotee River at Main Street site using the data synthesized for the at New Port Richey site. As discussed during a recent Panel teleconference, Equation 3 in the draft minimum flows report erroneously refers to the Pithlachascotee River near New Port Richey gage, rather than the Pithlachascotee River at New Port Richey gage – this error will be corrected when the report is revised. For isohaline regression model development,

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 1-3, Walton		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
					measured tide stage values at the Main Street site for the 2008-2009 salinity-sampling period were combined with predicted missing values for the site derived using Equation 3. For the 1985-1987 salinity-sampling period, Equation 3 was used to predict all tide stage values at the Main Street gage. The Main Street Site was selected based on its historical and recent implementation and general utility for developing isohaline regressions.
6	App. 4F	Yes	Explain the 45-minute lag used for tides. Based on water depths, I think that the wave speed between these two locations would be faster (therefore shorter lag time).	Response does not answer the question.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. Draft, Page 12 Again, staff notes the regression models were developed to produce the best available information for the District's minimum flow analyses.
7	Eq. 3, main report	Yes	The equation feels wrong. Generally, one would expect the offset at high tide to be smaller (flatter water surface) than the offset nearer low tide. If the tidal prism extends farther upstream than both stations, then the water surface would be generally quite flat when the tidal range is small (e.g., 3 feet) and wave travel times much faster than the tidal half period (about 6 hours).	Response does not answer the question.	Response: Doug Leeper, MFLs Program Lead, SWFWMD. Please see response to question 4 above for discussion of the error in Equation 3.

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 1-3, Walton		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
8	App. 4B	Yes	What were the final calibration values of Manning's n (channel and overbank) at each cross section?	The channel values seem high at larger flows. The model should be re-calibrated to remove the systematic bias. As it stands, there is little way to know if Q=25 cfs is a "good" flow to give 0.6 feet of depth for fish passage. Also, it is not clear why there is variation in Mannings *n* with lower values upstream and lager values downstream. Generally, it is the other way around.	Response: Jiangtao (J.T.) Sun, P.E., Project Manager, Environmental Consulting & Technology, Inc. and Yonas Ghile, Senior Environmental Scientist, SWFWMD. The final Manning's n values vary at each cross section as summarized in Table (not included here)
9	App. 4B	Yes	What sensitivity analyses were performed to demonstrate that this was the "best" calibration?	A sensitivity analysis should be done. Specifically, the District needs to know (1) what is the acceptable accuracy of the model (accurate to xx feet), (2) what parameters will change the results?	Response: Jiangtao (J.T.) Sun, P.E., Project Manager, Environmental Consulting & Technology, Inc. Per the original project scope of work, no sensitivity analyses were included in the model calibration task.
10	App. 4B	Yes	Table 3.1 (in Appendix 4B) shows a 1-ft range for the "calibration targets" but a 1.5-ft range for the model results. This "error" is systematic (low at low flows, and high at high flows). Could this model "bias" influence the conclusions drawn from the various uses of the HEC-RAS model results, especially estimating the minimum flows needed for fish passage?	The model should be re-calibrated to remove the systematic bias. As it stands, there is little way to know if Q=25 cfs is a "good" flow to give 0.6 feet of depth for fish passage. There is only one location for model calibration, and the results here are used for fish passage depths throughout the reach. Recommend that additional data be collected to measurement water surface elevations along the reach for a range of flows, and then re-calibrate the RAS model to these observations to ensure that the model is working everywhere and can give more confidence that fish passage depths can be	Response: Jiangtao (J.T.) Sun, P.E., Project Manager, Environmental Consulting & Technology, Inc. The model calibration targets were derived from a polynomial regression curve, which was developed on the basis of the USGS flow measurement data (since USGS stage-flow rating curve is unavailable at this location). The model calibration targets and calibration results may vary depending on the regression curve selected and future flow measurement data available for the analysis, particularly for the low flow conditions. Since the differences between the simulated stages and calibration targets fall within the calibration criteria of +/- 0.5 foot and the simulated model

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 1-3, Walton		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
				achieved throughout the reach based on the hydraulic model.	results fall in the historic USGS gage data, the HEC-RAS model was considered to be well calibrated and could be used as a useful tool for the subsequent ecological study.
11	App. 4B	Yes	Is the model sensitive to the number and placement of cross sections (part of sensitivity analyses)?	A sensitivity analysis should be done, and focus on whether the RAS model can achieve sufficient accuracy to model fish passage depths along this reach. At a minimum, we should understand how certain we are that Q=25 cfs is a good value.	Response: Jiangtao (J.T.) Sun, P.E., Project Manager, Environmental Consulting & Technology, Inc. Per the original project scope of work, no sensitivity analyses were included in the model calibration task. Please note that the cross section data were provided by the District, including a stormwater model created for the Baker Creek and Pithlachascotee River Watershed Management Plan project and the vegetation transects survey by the District. No new cross section survey data was collected during the HEC-RAS modeling project.
12	App. 4B	Yes	Did the modeling group consider using a downstream "normal depth" boundary condition to allow comparison of the observed and modeled downstream rating curve through model calibration (rather than model specification)?	I suggest that this be tried as it could provide a second calibration location. It might help identify the vertical range of Mannings *n* values needed to remove the system bias in the results.	Response: Jiangtao (J.T.) Sun, P.E., Project Manager, Environmental Consulting & Technology, Inc. No. Per the original project scope of work and discussions with the District, the boundary conditions should use a flow-stage rating curve. This approach has been previously used in other HEC-RAS modeling projects by the District.
13	Fig 4-3	No	Did District consider the number of days of flow deficits, rather than just comparison to mean and median flows? The gauge record shows that more than 70% of "natural" flows are less than	Given that the lag time is generally long, it is probable that using the "long-term average and median flow changes" is OK. However, it would be useful to provide consistency with this assumption. However, if "compliance" is assessed based on the previous day or the	Response: Ron Basso, Chief Hydrogeologist, SWFWMD As briefly discussed during the initial peer review panel meeting, impacts to streamflow are primarily determined based on long-term average and median flow changes using

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 1-3, Walton		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
			25 cfs (see Figure 4-3 in main report, for example)?	previous 4-days, then the results should run through this filter. While I agree that this filter is probably not physically realistic for groundwater response, one should be consistent with the other.	numerical models – this is essentially done for all assessments of groundwater impacts to streamflow in the District since the time scale of impact is often several years due to a long-term lowering of the water table. For the Pithlachascotee River, the mean and median flow change over an 11-year period from 1996-2006 between non-pumping and pumping conditions was simulated using the INTB (results reported at the U.S. Geological Survey Pithlachascotee River near New Port Richey gage, i.e., at the NPR gage). Roughly 46 percent of the simulated stream flow record is less than 5 cfs for this period. As I noted during our initial peer review panel meeting, we did not attempt to calibrate to flow values less than 5 cfs for the Pithlachascotee River or other low-flow rivers in the INTB application. Staff at Tampa Bay Water (TBW) and the District recognize the limitations of using the sub-regional INTB model at these very low river flow rates and therefore did not want to exceed the limitations of the model.
14	p. 61	No	Does the District have plots of IHM model results versus observations at the Cotee River gauges? Useful plots would include time histories and scatter plots.	A plot of the results (such as a scatter plot) would reinforce this.	Response: Ron Basso, Chief Hydrogeologist, SWFWMD The calibration and verification statistics from 1989-2006 between simulated flows and observed values are included in Geurink and Basso (2013). A plot of the average monthly streamflow at the NPR gage between non-pumping and pumping conditions is shown in the draft minimum flows report with mean and

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 1-3, Walton A. Reviewer's Specific Comments	To be completed by Reviewer(s) Table 1-3, Walton 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)	To be completed by Report Author(s) C. Action to be Taken in Response to Comment
					median flow change for the 11-year simulation period. A plot of the P5-P95 range of daily flow impact is also shown in the report. Staff can provide the daily time series of simulated values and observations from the NPR gage for the period of interest. As a reminder, the INTB model is being run in scenario mode based on a well-calibrated model. TBW wellfield quantities are adjusted for a particular scenario with all other users pumping from 1996-2006 – therefore there is no direct apples-to-apples comparison of measured streamflow as simulated for the scenario runs.
15	Section 6.2.2	No	Can the District shed light on why groundwater abstractions of 74.3 mgd cause a deficit of 0.7 feet and abstractions of 90 mgd cause a deficit of 0.8 feet? What groundwater abstraction would cause zero deficit?	I did mean "cfs" and not "feet". Response is accepted.	Response: Ron Basso, Chief Hydrogeologist, SWFWMD I believe you meant 0.7 cfs and 0.8 cfs median flow change from the INTB model as simulated at the NPR gage for those two specific pumping scenarios – those are the projected deficits between the median flow rate under non-pumping conditions with adjustments for allowable decline due to the proposed minimum flows and the current pumping scenario. The largest flow change is associated with the Starkey wellfield that is withdrawing approximately 4 mgd. Previous simulations with the INTB model that isolated individual wellfield impact has shown the greatest impact to Pithlachascotee River flows are from wellfields closest to or within the river basin with much less to essentially zero flow impacts from more

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 1-3, Walton		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
					distant wellfields. The reason that the impact only changes by 0.1 cfs between TBW pumping at 90 mgd versus 74 mgd is that Starkey and the North Pasco wellfields are pumping about the same for both scenarios. We're not sure what groundwater withdrawals would be predicted to cause zero deficit. The location and magnitude of withdrawals would play a large factor in that determination. Staff did run one scenario where one mgd was redistributed from the northwest corner of Starkey wellfield to the eastern side. The results reduced the predicted deficit by 0.5 cfs. The rainfall that actually fell during the 1996-2006 period was also a factor in the predictions. Tampa Bay Water has conducted hundreds of rainfall realizations during the 1996-2006 period using the INTB model. That analysis indicated predicted withdrawal impact can vary up 0.6 cfs based on the range of historical climate conditions in the area.
16	Chapter 6	No	What is the lag time between groundwater withdrawals and the time streamflow deficits are felt? And how is this "lag" consistent with criteria that use either the previous day or an average of the previous 4 days to define streamflow targets?	Note: Question 1 is Basso response is Question 13 in this document. I still think that is a useful thing to know because it points out the conflict between the regulation (as applied to groundwater) and physics.	Response: Ron Basso, Chief Hydrogeologist, SWFWMD See my response to question 1. It's important not to be confused over the stated flow criteria at the gage site with the status assessment of the minimum flows and levels (MFLs) or assessment of groundwater impacts. The flow-based criteria would come into play with a direct surface water withdrawal as those would be instantaneous and

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 1-3, Walton		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
					could be managed on a daily basis. On the groundwater side, we essentially use a numerical model and monitoring data to make an assessment of current groundwater withdrawal impacts over a long-term basis.

Appendix D
Table 2-1. UPCHURCH Replies to SWFWMD's Peer Review Assessment Requirements

TABLE 2-1. UPCHURCH REPLIES TO SWFWMD'S PEER REVIEW ASSESSMENT REQUIREMENTS

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-1, Upchurch
A. Determine whether the conclusions in the Pithlachascotee River 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.	Hydrologic data were collected and evaluated by the USGS. Proper collection and verification must be assumed.
		b. Reasonable quality assurance assessments were performed on the data and information.	Evaluations of temporal patterns in the raw flow data have not been adequately done. Uncertainties in raw data have not been evaluated.
		c. Exclusion of available data was justified.	The only evident data exclusions are (1) reliance on a subset of available gage data without explaining that other gage data hove an insufficient period of record or other limitations. At least on gage (Fivay Junction gage) is mentioned in the list of gages on the river but not discussed.
		d. The data used was the best information available.	This case has not been made. Use of regression and INTB modeled data is emphasized over measured data. The INTB modeled data are the best available data for background flows because the river was impacted when gaging began. However, this argument and lack of use of measured data to characterize impacted flows are not well presented.
	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	While it is evident that the data upon which the District relied are likely the best available data, the assumption that this is true has not been well defended.
		b. The assumptions were eliminated to the extent possible, based on the available information.	(Applies to hydrologic data) Elimination of assumptions requires a list of possible assumptions and detailed discussions of each and why it is rejected. This has not been done, but may not be necessary. A thorough defense of the assumption to use the modeled data should suffice.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-1, Upchurch
		c. Other analyses that would require fewer assumptions but provide comparable or better results are available.	Analysis using the raw, measured data is a more traditional approach to MFL development. However, this low-flow stream with historically impacted flow may not be amenable to such an analysis. The case for not using this analysis method and assumption that modeled data are better has not been adequately made.
	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.	I believe that this is true but the argument that this conclusion is valid has not been adequately made.
		b. The procedures and analyses incorporate all necessary factors.	(Applies to hydrologic data) This task has been met.
		c. The procedures and analyses were correctly applied.	This is correct, but conditions and results are not well presented.
		d. Limitations and imprecisions in the information were reasonably handled.	Uncertainties have not been adequately addressed.
		e. The procedures and analyses are repeatable.	This requirement has apparently been met.
		f. Conclusions based on the procedures and analyses are supported by the data.	This requirement has apparently been met.
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.		Methods are scientifically reasonable and appropriate. However, results need to be better presented. Time-series and residuals analyses are lacking, and discussions of uncertainties have not been presented. The decade-long time series modeled may be too short for incorporation of long-term extreme flows and establishment of a representative flow regime. Choice of the modeled period of record and its brevity may not be a problem. The issue has not been properly discussed and the modeled period of record has not been compared to the historical, measured flow regime.
	2. Determine if the identified deficiencies can be remedied.		Yes, these deficiencies can be remediated with revisions to reports.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-1, Upchurch
	3. If the identified deficiencies can be remedied, then please describe the necessary remedies and an estimate of the time and effort re4quired to develop and implement each remedy.		Assuming no unidentified uncertainties or errors in the measured data or methods of calculating the modeled data, revisions to the reports will require approximately 1 to 2 man-months. Since much of the work was done by consultants, incorporation of revisions by them will likely complicate the time line.
	4. If the identified deficiencies cannot be remedied, then if possible, identify one of more alternative methods that are scientifically reasonable		Deficiencies in the hydrologic data can be remedied.
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).		From a hydrologic data perspective, the approaches used were reasonable and alternative approaches are unlikely because of the need to model baseline flows.

Appendix E
Table 2-2. Dunn Replies to SWFWMD's Peer Review Assessment Requirements

TABLE 2-2. DUNN REPLIES TO SWFWMD'S PEER REVIEW ASSESSMENT REQUIREMENTS

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-2, Dunn
A. Determine whether the conclusions in the Pithlachascotee River 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.	I concur that the data and information used was properly collected. This finding is based on the reports available. Data collection methods were sound.
		b. Reasonable quality assurance assessments were performed on the data and information.	Yes, quality reviews appear to have been done at many levels, including extensive reviews of draft report by three key agencies: FDEP, FWC, and TBW. Dr. Ray Walton has noted that for some components of the HEC-RAS analyses quality assurance should be improved.
		c. Exclusion of available data was justified.	Yes, I found this to be true.
		d. The data used was the best information available.	Yes, I found this to be true. Tradeoffs had to be made in determining what was the best available data depending on analytical method, tool, or model selected.
	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 full report and supporting materials in 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.
		b. The assumptions were eliminated to the extent possible, based on the available information.	Yes, I did not find that the report was filled with unwarranted assumptions.
		c. Other analyses that would require fewer assumptions but provide comparable or better results are available.	Yes, I found this to be true.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-2, Dunn
	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, I found this to be true.
		b. The procedures and analyses incorporate all necessary factors.	Yes, I found this to be true.
		c. The procedures and analyses were correctly applied.	Yes, I found this to be true.
		d. Limitations and imprecisions in the information were reasonably handled.	Yes, but the report lacks an integrated comprehensive treatment sources of uncertainty, and an explicit plan as to how manage uncertainty.
		e. The procedures and analyses are repeatable.	Yes, I found this to be true.
		f. Conclusions based on the procedures and analyses are supported by the data.	Yes, I found this to be true.
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.		I found no explicit deficiencies, but did identify the important issue of how to best manage the multiple components of uncertainty.
	2. Determine if the identified deficiencies can be remedied.		A management plan for uncertainty should be developed. Specific recommendations as to how do this using and adaptive management approach are provided in my summary comments in the Discussion section of this report.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-2, Dunn
	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.		Yes, the deficiencies identified by the three panelists can be remedied.
	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 do this using and 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 will be helpful for this stage of setting MFLs and for future compliance assessments.

Appendix F
Table 2-3. Walton Replies to SWFWMD's Peer Review Assessment Requirements

TABLE 2-3. WALTON REPLIES TO SWFWMD'S PEER REVIEW ASSESSMENT REQUIREMENTS

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-3, Walton
A. Determine whether the conclusions in the Pithlachascotee River 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.	Need to improve the HEC-RAS hydraulic model. I suggest that a number of water surface elevations (say, 4-6) be measured along the reach for a range of low flows (say, 10-50 cfs), and the model re-calibrated.
		b. Reasonable quality assurance assessments were performed on the data and information.	Cannot see where this was done. The RAS modelers themselves suggest that cross sections were poor. Recommend considering whether additional cross sections would improve model accuracy.
		c. Exclusion of available data was justified.	Given that HEC-RAS was calibrated to a single location, it would be useful to try and use a normal depth downstream boundary conditions to determine in roughness values are reasonable in the lower portions of the upstream reach. If additional water surface profiles are collected, this becomes less important.
		d. The data used was the best information available.	Yes, but not good enough for hydraulic model.
	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
		b. The assumptions were eliminated to the extent possible, based on the available information.	The synthetic tidal record at the Main Street gauge location could have been better developed to include storm surges in the available record. This could change the salinity regression analysis a little.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-3, Walton
		c. Other analyses that would require fewer assumptions but provide comparable or better results are available.	The synthetic tidal record at the Main Street gauge location could have been better developed to include storm surges in the available record. This could change the salinity regression analysis a little.
	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.	The methods were OK.
		b. The procedures and analyses incorporate all necessary factors.	Yes.
		c. The procedures and analyses were correctly applied.	The procedures were lacking in two areas: 1. The calibration of the HEC-RAS model needs to be improved (1) through better data and (2) to remove the clear systematic bias in the calibration. 2. The synthetic tidal recorded should look at observed storm surges (as tidal residuals) to see if the different synthetic record would change the regression analyses and the criteria in the downstream reach. The use of the HEC-RAS model is far more crucial as it goes to the critical criterion of 0.6 feet of depth being achieved by 25 cfs of flow. This criterion drives the upper reach and is significantly more crucial than the development of a criterion with a much larger flow in the downstream reach.
		d. Limitations and imprecisions in the information were reasonably handled.	Not always (see previous responses).
		e. The procedures and analyses are repeatable.	Yes
		f. Conclusions based on the procedures and analyses are supported by the data.	Yes

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-3, Walton
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.		1. HEC-RAS could use better observations along the reach. 2. The distribution of Mannings *n* roughness values used was not presented or supported in the report. For example, why was the channel roughness variable when only one location was used for calibration. 3. The systematic bias in the HEC-RAS model results needs to be addressed and removed. 4. Questions about groundwater lag and its regulatory interpretation should be addressed. 5. The synthetic tide for the salinity regression analysis should be revisited to see if it makes a significant difference in the regressions obtained.
	2. Determine if the identified deficiencies can be remedied.		They can be, with data, budget, and re-analysis.
	3. If the identified deficiencies can be remedied, then please describe the necessary remedies and an estimate of the time and effort re4quired to develop and implement each remedy.		1. Collect stage observations along the upper reach for a range of flows from 10-100 cfs. 2. Collect some additional cross sections to improve the geometry of the hydraulic model 3. Recalibrate HEC-RAS to better fit observations, remove bias, and reduce model uncertainty. 4. Redevelop the synthetic tidal at the salinity regression station and redo the analysis. This could be accomplished within 3-6 months.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-3, Walton
	4. If the identified deficiencies cannot be remedied, then if possible, identify one of more alternative methods that are scientifically reasonable		If no additional data are collected then: 1. The existing HEC-RAS model should be recalibrated to remove the systematic bias and to use a different downstream boundary to assess the adequacy of downstream roughness values. This is by far the most important thing. 2. Re-develop the synthetic tide to include residual tidal effects (storm surges) and see if this significant changes the salinity regression equations. 3. For all analyses, the revised report should justified all the assumptions and statistical statements made (lag times, sqrt(flow), etc.). The reader needs to know why every statement and assumption was made.
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).		Methods are generally OK. They just need to be better explained, assumptions supported, and applied.

Minor General Comments			1. In general, the report needs an editorial review. There are a number of spelling and grammatical mistakes. 2. Page 9, 1st papa. "…purposes…" should be plural. 3. Page 9, 3rd papa. Need to explain is the "9 percent" of total of excess flow. 4. Page 10, 1st papa. Need to discuss is flow deficits need a proposed action or is this OK by permit. 5. Page 11, near bottom. Be consistent about "minimum flows" or "minimum flows and levels". 6. Page 20, 2nd papa. Need to add "square miles" after "kilometers". 7. Page 25, 3rd papa. Need to state where are the surface water withdrawals and that it is minor. 8. Figure 2-5. Highlight Cotee River (make bold to stand out). 9. Page 28, 3rd papa and Figure 2-7. Is 57.1 mgd the new "normal"? Elsewhere, the report says 74 mgd. 10. Page 29, 1st papa. Where is gauge #02310288 on Figure 2-2? 11. Figure 2-8. Add gauge number to caption. Also, figure shows that about 75% of time flow is less than 25 cfs. Need to discuss this as Q=25 cfs needed for fish passage. 12. Figure 2-11. Need to explain why moving gauge 1.1 miles upstream is critical for number of zero flow days. 13. Page 36, 4th papa. Need to edit "20142014". 14. Figure 2-14. Last plot needs x-axis title to be fixed. 15. Page 58, 1st papa. Last sentence says "…were greater at the upstream stations." Table 3-2 doesn't seem to support this while Figure 3-14 does Station kilometer 4.2 is greatest). 16. Page 61, last papa. Show scatter plot to reinforce "fairly well". 17. Page 62, 1st papa. Edit " was it was…" 18. Page 62, 2nd papa. Need figure to help show "…greater than 1.6 cfs" 19. Page 65, 2nd papa. Explain why "flow records used for identification" considered only the one gauge and not others. 20. Page 65. Why are "blocks" not in order? 21. Table 4-2. Numbers look wrong in 4th column. 22. Page 68, last full papa. "USOCOE" should be "USCOE". 23. Page 78, 3rd papa. ".. model **to** determine…" 24. Table 4-3. Fix "5psu". Needs a space.

Task	Subtask	Sub-subtask	Reviewer's Specific Comments Table 2-3, Walton
			25. Figure 5-1. Show actual river miles. Also, there is a real mixture of SI and English units throughout report. 26. Figure 5-10. What percent of time are flows in the "16%" range (red line to left) less than 16% line? 27. Figure 5-11. Need, somewhere in report, to explain why groundwater pumping is OK even though flows in days 120-180 are very small, and likely very influenced by groundwater pumping. 28. Page 120, 2nd papa. Is uncertainty in rainfall variation associated with temporal or spatial variability? 29. Page 130, 1st papa. Make numbers consistent in "…up to six and 3 feet increases."
CONCLUSION			Need to improve the HEC-RAS hydraulic model. I suggest that a number of water surface elevations be measured along the reach for a range of flows, and the model re-calibrated. This goes to the major hydraulic uncertainty in the study "is 0.6 feet of depth in the upper reach consistent with a flow of 25 cfs?" The HEC-RAS model needs to be improved to be more certain of this important conclusion, which is perhaps the major criterion of this MFL. Finally, I believe that Sid Flannery's comments need to be addressed in full. There are many points I agree with, but I choose not to duplicate them here.