

**Lake Hiawassee, Orange County
Proposed Peer Review Resolution Document: Shaw, Wilson, Upchurch, and PB Americas, Inc
May 18, 2010**

Reviewer	Peer Review Comments	Resolution
Peer Review Comments – April 2009		
Shaw	1. Page 1, Introduction – It would be helpful to include here any particular reasons why Lake Hiawassee was placed on the priority list for MFL development.	Edited to provide more explanation.
Shaw	2. Pages 1-2, Factors to be Considered When Determining MFLs and Pages 24-26, Consideration of Environmental Values Identified in Rule 62-40.473, <i>F.A.C.</i> – it would be helpful to indicate here which factors were considered in the development of the Lake Hiawassee MFLs. Also, for riverine MFLs, the District typically contracts or conducts a water resource values (WRV) assessment in addition to preparing an MFL determination study. Because it is not mentioned in the Lake Hiawassee MFL Report, I am assuming a separate WRV assessment will not be conducted for this MFL. However, it would be helpful if this were clarified in the MFL Report.	Report text was included to clarify that a separate WRV assessment was not completed as with riverine systems. Additionally, this report section was expanded to clarify which Environmental Values were considered in the development of the Lake Hiawassee MFLs and why they are considered protected by the recommended MFLs.
Shaw	3. Page 15, Figure 7 – the apparent missing lake level data between about 1984 and 1993 should be shown on the graph as a data gap, rather than an interpolated straight line.	Edited.
Shaw	4. Page 43, Structural Alterations and Other Changes -- Note that impervious cover in the Lake Hiawassee watershed is 34%, greatly exceeding published thresholds for urbanized watersheds and associated degradation of water quality, biotic integrity and hydrologic regime.	Comment noted.
Shaw	5. Pages 44-45, Minimum Levels for Lake Hiawassee -- The discussion of sandhill lake hydrology and the decision to focus MFL determination on FH and FL and not recommend a minimum average is reasonable and appropriate.	No response necessary

Shaw	<p>6. Pages 45-51, Minimum Frequent High (FH) Level and Minimum Frequent Low (FL) Level – The discussion of the rationale and supporting evidence for setting these minimum levels is excellent and provides a very clear discussion of the relationships between the recommended levels and return intervals and the surface water inundation and dewatering signatures (SWIDS) from similar communities at other sites. Likewise, the SWIDS curves for wet prairie and shallow marsh shown in Figs 28-29 (Pages 78-79) are well annotated and exhibit much less spread between the wettest and driest sites than similar curves for other lake MFL reports. Comparing the wet prairie SWIDS curves from the Lake Hiawassee MFL Report with wet prairie curves from the Lake Avalon Report, it is apparent that the graphs are the same, except that the wettest and driest sites shown in the Lake Avalon graphs have been omitted from the Lake Hiawassee graphs. This may indeed be appropriate, as those extreme wet and dry sites may represent distinctly different hydrologic regimes or statistical outliers. However, it would be helpful to include some explanation in the text about why those sites were omitted from Figure 14 and the procedure used, if any, for identifying them as outliers.</p>	<p>All other reports utilizing SWIDS were edited to include the discussion of the SWIDS approach in the Methods section contained in the Sylvan Lake report.</p> <p>Lentic systems were evaluated using SWIDS and compared to Lake Hiawassee communities. After reassessment, all known disturbed areas and lotic systems were excluded from SWIDS analyses. [annotated in report]. The current SWIDS dataset was re-evaluated to “cull-out” any systems that were not considered “healthy”, to the extent possible. Also, it was determined that Geneva, as a ‘classic’ sandhill lake, likely does not exhibit long-term stable communities, and was excluded from analyses as well.</p>
Shaw	<p>7. Recommendation: Improve Lake Hiawassee MFL Report by addressing the editorial comments 1-6 above.</p>	<p>Comments 1-3, & 6 addressed. Comments 4 & 5 did not need a response.</p>
Shaw	<p>8. Finding: Based on my review of the Lake Hiawassee MFL and Hydrology Reports and field inspection of transects, I feel that the environmental data data from the site and the data collection procedures used to support this MFL determination are appropriate, repeatable and scientifically sound. The District has done a commendable job through research and modeling to gain an understanding of how sandhill lakes such as Johns Lake function hydrologically. That knowledge is appropriately incorporated into this MFL determination.</p>	<p>No response necessary</p>
Shaw	<p>9. Finding: Similarly, the methods and procedures for data analysis, including selection, parameterization and calibration of the hydrologic model for Lake Hiawassee are valid and appropriate, and the assumptions used in data analysis and MFL determination are reasonable and justified by the District’s previous experience and literature citations.</p>	<p>No response necessary</p>
Shaw	<p>10. Finding: The data interpretation and analyses, which build on the District’s extensive previous experience setting MFLs for rivers, lakes and wetlands, is scientifically sound and supports the recommended minimum levels. The decision to focus MFL determination on FH and FL and not recommend a minimum average is reasonable and appropriate.</p>	<p>No response necessary</p>

	Peer Review Comments: Dr. Lee Wilson	
		Responses for Wilson Comments 1-47 were universal for all MFL reports.
Wilson	1. As I have stated before, it is my opinion that the SJRWMD MFL program is scientifically sound and at the forefront of the application of ecological principles to protection of instream flows. The six lake reports are professionally done and in conformance to the District's MFL guidance.	No response required. Comment supports District approach.
Wilson	2. The fact that my comments are critical of certain aspects of the reports is a reflection of my assignment, which is to identify issues and find possible problems, and should be read in that spirit. Many of the comments are at the nit-picking level and others are aimed more at suggesting improvements to future reports rather than changes that need to be made in these drafts. Many comments reflect the fact that different authors addressed a given issue in different ways, which may not matter. Put another way, I don't expect all comments to be responded to.	No response required. Comment supports District approach.

Wilson	<p>3. There are two areas of substantive comments that I do need think to be addressed. One is that these reports all deal with sandhill lakes where hydrology is not as straightforward as SJR floodplains and lakes, but extremely important to how the MFLs were approached. Each report would benefit from an extended discussion of hydrology and its relation to soils and vegetation (see detailed comments below). Moreover, based on our field visits I expected similarities in MFL approach and results. However, the reports differ in this regard as much or more as they are similar. Each author needs to stand back and feel comfortable that his/her results are consistent with the sandhill lake literature.</p>	<p>The District recently developed a lake classification procedure (Epting et al. 2008) based upon statistical measures of exceedence and level change analyzed with principal component analysis. Stage range and stage rise/fall symmetry accounted for 88% of the variance of six original hydrologic variables. These indicators of hydrologic regime classified 135 lakes into eight lake classes. The generally close correspondence of the lake classes to geomorphic and landscape classification lends strong support to the utility of this classification approach.</p> <p>Each report now includes a discussion of the assigned lake class and more details regarding the geomorphic, landscape, and the relationship between hydrology and the observed patterns of soils and vegetation. While a number of the lakes are assigned to the same lake class, some difference in approach and results is clearly expected. For example, Sylvan Lake is very unusual for this lake class in that it has extensive areas of deep organics. As a result, a minimum average level was set focusing on protection of these soils. Also, different management practices at each lake may result in differences in the type of plant communities found a the lake “rim,” where the Frequent High levels were set. Mowing and cattle grazing would be expected to result in different plant communities than fire or the absence of any management scheme.</p>
Wilson	<p>4. The second substantive area is that the MFLs, and especially the FH, recommend a fairly large increase in “permanent drought” hydrology. I didn’t find the justifications for this to be sufficiently rigorous or entirely satisfactory. Again, there is more detail below.</p>	<p>More explanation was included in the reports Results and Discussion sections to clarify the justifications. See response to Wilson Comment No. 40.</p>
Wilson	<p>5. From this and other reports reviewed in the same timeframe, it appears that SJRWMD has gone a long way toward settling on a consistent outline for its MFL reports, but is not yet quite to the point of complete consistency. I encourage the District’s continued efforts toward settling on a “best” organization.</p>	<p>The report format and outline will be re-evaluated to achieve consistency across reports to the extent possible and within reason.</p>
Wilson	<p>6. One specific example where organization is not consistent is that in the section called “General Information” or “Background Information” (neither one a great title), wetlands are sometimes presented before soils, sometimes after. As the soils are the foundation, but dependent on hydrology, I suggest soils go before wetlands.</p>	<p>Comment is addressed in each report re-write.</p>

Wilson	7. Some reports provide a lot of detail on published soils maps and descriptions; others ignore this almost entirely. Since MFLs are based on field soils data, cutting out the details in this background section would help shorten some reports. A citation to the published soils survey, a map and perhaps a table would provide good routine content; or just the citation.	An effort was made to provide consistency between reports..
Wilson	8. Land use maps are in some reports and probably should be in all.	Comment was addressed in the current reports.
Wilson	9. Sylvan has a section on morphometry which was helpful, and I suggest something similar be in all future reports.	More lake morphometry information will be added to future reports, depending on data availability.
Wilson	10. There is quite a variation in Executive Summary content, detail and organization. It might be useful to develop a standard template that ensures that the essential information, and nothing more, appears at the beginning of the report. If there is already guidance to this effect, then please consider how best to ensure the guidance is followed in future reports.	Format and content will be standardized for future reports. Some effort has been applied to rectify this issue in the current reports.
Wilson	11. The Executive Summaries differ most dramatically in that some have extended discussions of each MFL, others simply contain the summary table. I think one paragraph on each MFL, plus the table, is about right.	Comment noted. Some effort has been applied to rectify this issue in the current reports.
Wilson	12. Another difference in the Executive Summaries is that some discuss methodologies (including SWIDs) and/or the hydrologic model; others don't really do much with that; and those that do have such discussions say different things. I think at least one somewhat consistent paragraph on the method and on the hydrologic compliance analysis is worth having, though it isn't essential in the current drafts.	Comment will be applied in all future reports.
Wilson	13. Two statements appear in some reports and probably should be in all. One is the "intended to support" (e.g. Avalon) paragraph and the other is the "not effective until" and "reassessment" text (e.g. Johns).	Reports updated to include similar language to address these issues.
Wilson	14. Of all the Executive Summaries, I thought Sylvan came closest to having the necessary material without too much else. I suggest it be reworked per specific comments and shared as an example for others to at least consider in future reports.	No response necessary.
Wilson	15. There are report sections that are effectively boilerplate, such as the description of the MFL program, but the language still varies a bit from report to report. Making this true boilerplate, where each author copies from a master, is probably advisable for future reports.	Comment will be applied in all future reports.
Wilson	16. All the reports have a location map early on (except Indian Lake). But they are too large in scale to allow most folks to know exactly where the lake is. I recommend a more regional location map. This is something for consideration in future reports, though it wouldn't hurt if it could be addressed now.	More regional location maps were added to the existing reports and will be added to future reports.

Wilson	17. Note that many of the color graphics are hard to read when printed or copied in black and white. Something to keep in mind as future graphics are prepared.	Staff believes that color figures provide more clarity for presenting data. Reports are made available to the public as digital copies on the District website or on cds from the District library.
Wilson	18. The next comments all relate to the fact that the reports use a large amount of verbiage to describe various aspects of MFLs in general and the MFLs of each particular lake. For future reports, the more this information could be captured in text tables, and the text shortened, the better. By text table I mean something that is used where the same kinds of things are said repeatedly about different subjects -- in this case, for example, the text on each different MFL has the same pattern and is well suited for a table.	Comment will be applied in all future reports.
Wilson	19. Three examples of text tables could be: what each MFL level is intended to protect and what they typically represent as to frequency and duration; the field transect results (all transects on one table); how the MFLs relate to observed vegetation, observed soils and modeled hydrology.	Comment will be applied in all future reports.
Wilson	20. It is not clear how the District intends to address the 10 factors. In these reports they are typically noted as part of the introduction and there is an expanded listing a bit later. But there is no standalone section that then discusses the role of the factors in setting MFLs, or the effect of the MFLs on the factors. At most there are mentions of individual factors somewhere in the body of the report. In other words, the factors are highlighted, but their application is buried. I suggest there be a section on the factors "as applied" near the end of each MFL report. This would state whatever is to be stated on this subject, even if it was judged that none of the factors required any in-depth study. This would be useful in the existing reports as well as future ones.	Reports updated to include language to address the issues regarding the assessment of the WRVs and clarify the reviewer's comments.
Wilson	21. The essence of MFLs is the relationship between hydrology and soils/vegetation. Indeed MFLs are as much about hydrology as anything else. The reports present some information on hydrology (mostly stage data) without any analysis. I suggest there is a need to do more, and in particular to demonstrate an understanding of essential hydrologic relationships for each lake as a predicate for defending each MFL determination.	Each report was updated to include an expanded section on hydrology and to demonstrate an understanding of essential hydrologic relationships for each lake summarized in Wilson comment No. 22. However, staff believe the details regarding hydrologic modeling and compliance are more appropriately presented in the hydrologic modeling reports for each lake and the hydrologic compliance appendix in each report. These will be more extensively referenced in the MFLs determination reports.

Wilson	22. Specifically, each report should explain what it is that controls the hydrology (that then controls the ecology), and how the controls may have changed (or not changed) over time. For these lakes that discussion will consider runoff, surface precipitation/evaporation, outlets, and seepage. Since there are model reports for each lake, it might be possible to cut and paste at least some of this in-depth hydrology into the existing reports.	See response to Wilson comment No. 21.
Wilson	23. I understand most if not all the lakes are sandhill lakes. The characteristics of sandhill lakes receive extensive attention in some reports (e.g. Avalon, see pp. 19-21) and are barely mentioned in others (Indian Lake). The fact of sandhill lakes is justified as a reason for no MA in some lakes, making it unclear why MA is defined in others.	See response to Wilson Comment No. 3. A justification was added in each report to clarify why or why not a MA was determined.
Wilson	24. An issue that reflects sandhill lake hydrology is that one might expect the exceedence graphs to be similar and to not show the mean as representing a particularly common condition, i.e. (per CH2M-Hill 2005) “because they appear to lack a mean around which the system is organized”, and this is used to justify no MA. In fact, several of the hydrographs suggest that conditions near the mean are common enough that they would impact vegetation but there is no MA (example Johns Lake) while others show the mean to be just another number in a highly variable system, but there is an MA (example Indian Lake).	See responses to Wilson comments No. 3 and 23.
Wilson	25. Suggest putting the MFLs on the curves showing stage history (as done for Hiawasse).	Figures were updated to include MFLs labels.
Wilson	26. One particularly important aspect of hydrology is the compliance analysis. The use of MFLs to impose pumping limits creates impacts on the regulated community and offers opportunity for controversy and legal challenge. Therefore I think it is particularly important that the compliance analysis be as transparent as it can be. Rather than rewrite the compliance appendices, I suggest an expanded discussion in the text.	The compliance section of each report was expanded to clarify how MFLs constrain the regulated public. The interaction of the Floridan aquifer and lake levels was described and drawdown limits were referenced in each report.
Wilson	27. One specific element in this discussion would to summarize the causality relationships determined in the hydrologic model and in particular to present something that shows that aquifer levels predict lake levels.	See response to Wilson Comment No. 26.
Wilson	28. Only Indian Lake contains a statement as to the result of the compliance analysis. I recommend the aquifer drawdown limit be stated explicitly, with whatever caveats are needed. It should be clear that the value is a limit on the long-term average, i.e. it doesn't mean that the hydrograph can't decline more than the indicated level during droughts.	See response to Wilson Comment No. 26.

Wilson	29. The compliance analysis appears to assume constancy in other controls of lake levels, when the available information does not make that a certainty. Is this covered by the “reassessment” language?	See response to Wilson Comment No. 26.
Wilson	30. The bottom line results of the compliance analysis should be given a higher profile in the report, show up in the Table of Contents, and be stated in the Executive Summary. It might properly be the last item in the main body of the report.	See response to Wilson Comment No. 26.
Wilson	31. I’m not sure I understand how the District uses SWIDs. In some reports (Johns) it looks like a SWIDs graph was used to determine an appropriate duration-frequency and the MFL selected accordingly. In others the MFL was determined by vegetation and “supported” by the SWIDs.	More explanation of SWIDs was included in the methods section of each report. The SWIDs data are used as supporting evidence and not as the primary criterion. The reports were edited to reflect this more clearly.
Wilson	32. Whichever way, there seems to be a pattern in which it is considered appropriate for the MFL to allow future conditions to be in the “dry” part of a SWIDs. This is necessary for there to be allowable drawdowns, and I recall it reflects some prior peer review suggestions. Somewhere the approach needs to have rigorous justification and in particular the existing “dry” SWIDs need to be for healthy communities where the hydrology is comparable to the lake being assessed.	See response to Wilson Comment No. 31. The current SWIDs dataset was re-evaluated to “cull-out” any systems that were not considered “healthy,” to the extent possible. SJRWMD intends to refine the SWIDs analysis by expanding data collection by lake class in an effort to reduce data variability and uncertainty regarding SWIDs application.
Wilson	33. The shrub swamp SWIDs in Johns Lake and Prevatt are different.	The shrub swamp SWIDs graphs should be different for these lakes. The Prevatt report references the <u>maximum</u> elevation of the shrub swamp, while the Johns lake report references the <u>mean</u> elevation.
Wilson	34. The Sylvan Lake report shows the effects of the proposed MFL compared to existing conditions on each SWIDs graph. I thought this was excellent and recommend it be used universally.	Reports containing SWIDs analysis graphs were updated to compare existing and MFL conditions as done in the Sylvan Lake report.
Wilson	35. For some lakes, sandhill lake stage indicators were evaluated, but this was not done at all lakes. Will the District be able to defend the absence of this approach in some reports?	Examination of the findings from the sandhill lake soils indicator method produced inconsistent results for these particular lakes. A decision was made to remove any reference to the approach from all reports.
Wilson	36. The discussions of sandhill lake indicators make it sound like these were used as the basis of the MFLs, but when the MFLs are actually presented, they are based on vegetation, with soils observations “supporting” the MFL determination. Perhaps there could be a clarifying sentence or two when the soil indicators are introduced that makes their role in the process more clear.	See response to Wilson comment No. 35.

Wilson	37. The soils sampling sections should probably all either have a “we looked for these indicators” description (Avalon is an example where this is done).	The sandhill lake soil indicators were not examined during routine field data collection efforts at each lake. See response to Wilson comment No. 35.
Wilson	38. Some reports discuss calculations of TWSV, others don't. For those that do, it may help to indicate why this was done and how the results were used. For the others, perhaps the file needs to have a note as to why.	The TWSA analysis was only completed for the Sylvan Lake report. Results from the TWSA analysis can sometimes be spurious due to the occurrence of opportunistic plant species in communities where they do not typically occur, due to hydrologic excursions (high or low water levels) of various durations / frequencies. In attempt to make the report analyses / format consistent, the TWSA analysis was removed from reports were it occurred.
Wilson	39. For the vegetation sampling in particular, it seems as though there should be a standard methods reference that could be cited, so that the report could focus on the transect results.	The MFLs Methods Manual is referenced in each report and contains more information on vegetation sampling. The discussion of vegetation and other sampling in the methods section of each report is designed to orient the reader. The methods section will be stream-lined in future reports, where possible.
Wilson	40. I will repeat here my general concern that the MFLs seem to reflect a basic assumption that each and every ecosystem can sustained even if it receives substantially less inundation. Is this supportable?	Yes, we do believe that this assumption is supportable. A key assumption of the SJRWMD method (Neubauer et al. 2008) is that steady state or dynamic equilibrium conditions do not exist between the hydrology and the ecology of a system. That is, not all measurable changes to system hydrology result in subsequent changes to the ecology or the water resources of a system. Thus, defining hydrologic thresholds of events (i.e., MFL return interval components) is more important than developing response curves that describe relationships between flow alteration and ecological responses, habitat-flow curves that define habitat availability at a given flow, or species-discharge relationships that predict numbers of fish species from mean annual discharge. Steady state/equilibrium conditions and the importance of relatively short time scales are assumptions made when developing and using such curves. For the SJRWMD

		method, a threshold is the return interval of an event beyond which an effect begins to be produced.
Wilson	41. Each report contains (usually as Figure 1) a “Hypothetical percentage exceedence curve”. I strongly recommend that a “real” curve be developed which compares the existing versus MFL defined condition for each lake. This should be done for the current drafts.	An actual exceedence curve is available in each report. See the corresponding hydrologic modeling report for a more accurate exceedence curve based upon long-term modeled hydrology and the MFLs.
Wilson	42. The FH indicators vary considerably between the lakes - two shrub swamps, two wet prairies, one hardwood swamp, one transitional swamp. For future reports it might be of value to cite local edaphic or other factors that explain why a particular community is found at the dry end of transects on a particular lake.	Comment will be addressed in future reports.
Wilson	43. The return interval for the 30-day duration MFH ranges from 2 to 5 years. This seems like a large variation and the 5 year return (Sylvan) seems especially long.	Comment noted. See response to Wilson Comment No. 44.
Wilson	44. The changes in terms of percentage of years when the 30-day level will be reached also seem large - for Sylvan the frequency is cut in half, and for most others the change is one-third.	Sylvan has a unique hydrologic condition caused by a rather large increase in DCIA and concomitant rise in lake stage to produce a new hydrologic regime. Therefore, Sylvan Lake is an outlier when compared with the other lakes. The Sylvan Lake report was updated to clarify what changes occurred in the hydrologic regime due to increased basin runoff (~200% increase in DCIA) and why the MFLs statistics seem abnormal. The report text was expanded to try to clarify the reasons for these large changes in return intervals.
Wilson	45. I would judge the wet prairie analysis (Avalon, Hiawasee) is about as far as the District should go in using SWIDs to justify increased withdrawals.	We understand and agree with the reviewers’ concerns regarding uncertainty with the SWIDS analysis.
Wilson	46. See comment on astatic nature of sandhill lakes with respect to the MA MFL.	No response necessary.
Wilson	47. The return interval for the 120-day duration MFL ranges from 3 to 5 years. This seems like a large variation.	See response to Wilson Comment No. 44.
	Wilson Comments specific to Lake Hiawasee report	

Wilson	48. The dates on the title page may need to be changed.	Should be updated prior to publishing
Wilson	49. The executive summary is far longer than in most other reports and should be trimmed to the essentials.	Edited and updated.
Wilson	50. It would be helpful to have page numbers for figures and tables, even in drafts.	An aspect of SJRWMD editing, not controlled by MFL staff
Wilson	51. The reports where figures and tables immediately follow the first citation come across as more reader friendly.	An aspect of SJRWMD editing, not controlled by MFL staff
Wilson	52. P. 11. Figure 3 would work better when the actual transects are introduced. Figures 4 and 5 are not needed.	Comment noted and considered when editing/updating draft.
Wilson	53. P. 14. Figure 6 could be omitted, and the reference simply cited in the report. Do the hydro. model results fall within the range shown on the map?	See Robison (2008) for more details on the hydrologic modeling.
Wilson	54. P. 16. The reason for the two exceedence curves being different needs to be discussed in the text; or only one curve shown on Figure 8. If the difference reflects a period of record, and the overlapping data are consistent, then that should be said. If the overlapping data are not consistent, that should be explained.	The short period of record (SJRWMD) was removed from the exceedence curve, and more detail was described to explain that this curve is not accurate because it was created with actual data, and not interpolated data. The modeled exceedence curve is more accurate, having been calibrated with the stage data and nearby wells.
Wilson	55. P. 29. The copy I downloaded did not have the typical transect profiles, which made review of the transect discussions difficult.	The profiles should have been at the back of the document. All landscape graphs were located at the back. This is due to SJRWMD editing and is out of my control. I have inserted the landscape figures in the edited draft for your convenience.
Wilson	56. Also thought reports that had photos of field work in progress were more interesting.	No response necessary
Wilson	57. The FH value a much smaller return interval than the 20% rule of thumb.	The exceedence curve is biased. See Response to comment 54..
Wilson	58. P. 49. Not sure the recommended FL would “result” in a change in the return interval, but rather “allow” a change.	Edited.
Wilson	59. Some figures were missing in the copy I downloaded.	Those figures were likely included at the end of the document. This is an aspect of SJRWMD editing not

		controlled by MFL staff. I have inserted the landscape figures in the edited draft (and kept them at the end for ease of SJRWMD editing later)
Wilson	60. P. 106. Does Figure A9 show that the FL has an adequate margin of safety?	SJRWMD MFLs strive to define events and thresholds based on long-term hydrology and area ecology, not buffered thresholds. Although a ‘margin of safety’ is purposefully not calculated, the levels set for Hiawassee are set conservatively because 4 transects were investigated at higher water levels, making the FL elevation derived from these transects conservative in relation to the area hydrology because there were no other vegetation communities operating as boundaries or constrictions on the shallow marsh habitat from open water (as Transect 5 was by having deep marsh located between shallow marsh and open water).
Wilson	61. Other reports don’t have a soils appendix.	Removed.
	Peer Review Comments: Dr. Sam Upchurch	
Upchurch	1. The report mentions that the stage data for the lake had a long period of record (1960 – 2007), but the stage measurements were “random” in early years (1960 – 1993). Later, the data were collected monthly (1993 – 2004) and then daily (2006 - present). No stage data were collected from 2004 to 2006. As a result, stage data were apparently synthesized to extend the period of record (p. 5) using SSARR. The Appendix A does not describe SSARR or the results of the model. There is a need to present the results of the SSARR modeling, including how the model works and validation of any synthesized stage data.	See Robison 2008 for more explanation. SSARR model graphs were incorporated in the MFL text.
Upchurch	2. Comparison of the pre-1990 stage data with post-1990 data in Figure 7 suggests that the pre-1990 data may not have been random. It appears there may be a bias toward low stages even though several extremely wet years occurred during that interval.	The stage data is biased for that time period. This is mediated in the model be being correlated with area well data to construct the modeled hydrology.

Upchurch	3. Appendix A by Robison presents an excellent discussion of the Weibul distribution and how to use a stage duration curve. It also mentions how the groundwater flow model was used to determine the effects of groundwater withdrawals on lake levels. There is a need to present more about the results of the groundwater model, including current modeled drawdowns and sample effects of projected withdrawals on Floridan and surficial (?) aquifer levels. What is level of discitization of the model and sensitivity of the model to lake levels and vice versa? What does model say the water budget is at/near the lake?	See Robison 2008 for more explanation.
Upchurch	4. The interactions of the lake with the Floridan are not discussed in the report. Appendix A and several locations in the report suggest that there is an interaction of the lake and the Floridan. How so?	See Robison 2008 for more explanation.
Upchurch	5. The description of a sandhill lake quoted from CH2MHILL on page vii is used to justify not establishing a Minimum Average MFL. If the stage duration curve is nearly linear from the FH to FL, the MFLs with recurrence intervals fixes the average, as well. However, I think reliance on the “astatic” argument is not well justified.	Argument for lack of MA clarified to emphasize lack of consolidated organic soils associated with a wetland community has been edited.
Upchurch	6. The statement that sandhill lakes are “astatic” suggests that there is little or no connection of the lake with the Floridan aquifer. Otherwise, levels in the Floridan should ameliorate variations in lake levels. The report refers to interactions with the Florida, and the recharge rates from Boniol’s report suggest that Floridan recharge is greater under the sandhill than the lake. Can these differences be explained? There is a need for a well-developed hydrogeological discussion.	The text has been edited to exclude ‘astatic’. See Robison (2008) for more modeling details about lake connectivity to the aquifer.
Upchurch	<p>7. This brings up a lack of adequate background information. I think the following should be addressed in the report.</p> <p>A. Hydrological setting of the lake (is the lake a flow-through lake, are there connections with the Floridan aquifer, is the lake perched, etc.)</p> <p>B. What is the water budget? This should be available from the groundwater flow model.</p> <p>C. Is is possible to present a reconstructed stage hydrograph that shows synthesized data. What is/are the range of stages, population metrics, any historical shift related to rainfall or land-use changes, etc.</p> <p>D. How quickly does stage change during major rainfall events (an indicator of aquifer interactions and drainage basin size/characteristics)</p> <p>E. Details of the CUPs for any nearby wellfields and stress patterns</p>	<p>A. Hydrological setting added (classification of Epting et al. 2008)</p> <p>B. Water budget is available in groundwater model and Robison (2008)</p> <p>C. Modeled hydrograph is available in full Hiawassee model report: Robison (2008)</p> <p>D-I. See Robison (2008) for more details regarding these topics.</p>

	<p>F. Behavior of surficial (?) and Floridan aquifer water levels near the lake, including monitoring facilities and groundwater level data evaluation</p> <p>G. Aquifer potentials relative to lake levels</p> <p>H. Importance of seepage from shallow soils and the surficial aquifer to lake levels</p> <p>I. While not critical, a brief description of the stratigraphy in the vicinity would be helpful to understand the relationship of the lake bottom to the top of the Floridan aquifer</p>	
Upchurch	8. A description of a sandhill lake and how it functions would be useful.	Noted.
Upchurch	9. How are/were lake levels monitored (staff gage or automated gage)? How are these data handled?	Edited for clarity.
Upchurch	10. The term “dewatering” is used in several locations related to the proposed MFLs. This term needs to be defined; it may be misinterpreted. To me, dewatering implies human actions. Don’t you just mean low stage, regardless of cause?	‘Dewatering’ has been edited to ‘low water events’ wherever appropriate in the text in an attempt to disassociate with negative connotations of ‘dewatering’.
	Peer Review Comments: PB Americas, Inc	
PB Americas, Inc.	<p>1. Assess adequacy of environmental data in terms of quality and length of record. Are there any deficiencies and/or errors regarding data availability?</p> <p>Response: The elevation data for all transect points are not included in the report; therefore, it was not possible to determine the accuracy of the mean elevations determined.</p>	No response necessary.
PB Americas, Inc.	<p>2. Evaluate the validity and appropriateness of the environmental assumptions used in the development of the MFLs analysis. Are the assumptions stated clearly?</p> <p>Response: The minimum frequent high (FH) level for Lake Hiawassee was determined as the average of the mean elevations for transects in the wet prairie community. Minimum level determinations for other lake systems reviewed have used either the average of the mean elevations of the upper wetland community or the mean maximum elevation for this community to determine FHs. Minimum frequent lows (FLs) were consistently determined utilizing the mean minimum elevations of the shallow marsh</p>	The rationale for the MFLs has been expanded in the report. Also, the wet prairie is the upper wetland community for Lake Hiawassee transects.

	<p>communities. However, the reports do not give the rationale used as to why a certain criterion was selected for a particular project. During a telephone conversation with Cliff Neubauer (SJRWMD), it was agreed that a recommendation be made that each report contain an explanation and rationale for the criterion used to determine the FH and FL for each project, to be included in the appendices.</p>	
PB Americas, Inc.	<p>3. Evaluate the validity and appropriateness of the environmental assumptions used in the development of the MFLs analysis. Are there deficiencies and/or errors in the environmental assessments or application of findings? If so, describe each deficiency and/or error. If the identified deficiencies can be remedied, then enumerate and describe each necessary remedy, including the precision, accuracy, and an estimate of time and effort required to develop and implement each remedy. If the identified deficiencies cannot be remedied, then identify one or more alternative methodologies that are scientifically defensible given the available data. If the reviewer identifies an alternative methodology, the reviewer will also describe the precision, accuracy, and estimate the time and effort required to develop and implement that methodology. If the identified deficiencies cannot be remedied without additional data, then identify what additional data is needed and provide recommendations for capturing such data.</p> <p>Response: The FL determined for Lake Hiawassee is an average of the lowest elevations recorded for the shallow marsh communities on all transects. However, Transect 5 is atypical of all other transects monitored on this lake. The low elevation for the shallow marsh community is > 2.0 feet lower than the low elevations for the other four transects established on Lake Hiawassee.</p>	<p>Yes. The original 4 Transects were investigated at higher water levels than transect 5, but do not have a deep marsh community before open water. It is expected that these communities would run downslope as water levels recede. These 4 transects were not reassessed when Transect 5 was established because some were not recoverable. Transect 5, although lower in elevation, was investigated because it had a deep marsh before the open water of the lake. This deep marsh constrains the shallow marsh of Transect 5, limiting how far it can shift downslope and how quickly. Also, in addition, transition zones were designated between wetland communities along this transect. Due to this, we feel that Transect 5 may be a more accurate assessment of the lake. However, Transects 1-4 were included in the calculations, with their replication and investigation at higher water levels making the final MFL elevation conservative.</p>
PB Americas, Inc.	<p>4. If the minimum elevation from Transect 5 is included to determine the mean low elevation, it results in an average elevation of 0.42 feet lower than the average determine using only the four 'typical' transects.</p>	<p>See response for comment 3.</p>
PB Americas, Inc.	<p>5. If the FL is determined using the data from all five transects, the resulting FL ranges from 0.3 to 0.5 feet lower than the lowest elevations for the shallow marsh community on Transects 1 through 4. Therefore, this FL would be too low to adequately support the wetland vegetative communities.</p>	<p>See comment for 3. The MFLs do not exclude different elevations flooding for different durations and return intervals. Higher and lower elevations may flood or dewater for as long or longer durations at different return intervals.</p>
PB Americas, Inc.	<p>6. It is possible that the break between the shallow marsh and deep marsh communities was incorrectly determined at the time of monitoring, perhaps due to very low water levels present at the time of the original survey (as evidenced by photographs included in the report). Either the community break needs to be re-determined, along with the corresponding ground elevations, or the data for this transect needs to be discarded as significantly deviant. Conversely, the median of the wet prairie elevations for Transect</p>	<p>This was reevaluated in 2009. The communities, due to the inclusion of transition zones during the original evaluation, did not appreciably shift. The most conservative values were used in calculations, but these</p>

	5 is approximately 2.5 feet lower than the medians for the other four transects of this community type.	new calculations did not change the MFL elevations.
PB Americas, Inc.	7. In addition, if the data for Transect 5 is included in the determination, the FH is 0.5 foot lower (76.4 feet) than that determined using only the data for the first four transects (76.9 feet). Either the communities and associated elevations for Transect 5 need to be re-determined in the field, or the data needs to be discarded as significantly deviant. The upland/wet prairie break on Transect 5 is an artificial break (fill berm); therefore, the elevation at this point may not be an accurate elevation to use in determining the mean and the FH for this lake.	See response for comments 3, 5, & 6.
PB Americas, Inc.	8. Determine if the environmental data, analyses, and interpretation of results support the recommended MFLs. Response: Data for vegetative communities and elevations for Transect 5 may result in incorrect MFLs (see response for 3(f)). It is recommended that either the vegetative communities and associated elevations for Transect 5 be re-determined in the field under current conditions or the data for Transect 5 be discarded as significantly deviant.	See response for comments 3, 5, & 6.
PB Americas, Inc.	9. Page 30, paragraph 2: Beggar-ticks, recorded as the dominant species in the upland habitat, is listed as <i>Bidens mitis</i> , an obligate wetland species. During the site review it was observed that the species of beggar-ticks occurring in the upland habitat on this and other transect on Lake Hiawassee had been misidentified and should be changed to <i>Bidens alba</i> . This is the currently accepted name for this species, with <i>B. pilosa</i> in synonymy. The Florida Wetlands Delineation Manual (FWDM) codes from Chapter 62-340.450, F.A.C. list <i>B. pilosa</i> as a facultative species. Therefore, the species in the report should be changed to <i>B. alba</i> with a FAC code.	The species in the report was changed to <i>Bidens sp.</i>
PB Americas, Inc.	10. Page 30, paragraph 2: Elephant ear tree is listed as <i>Enterlobium cyclocarpum</i> . The genus is misspelled and should be <i>Enterolobium</i> . In addition, the species epithet of <i>cyclocarpum</i> was misapplied to Florida material in Long & Lakela (1980). <i>Enterolobium cyclocarpum</i> does not occur in Florida. The correct name for this species in Florida is <i>Enterolobium contortisiliquum</i> ; however, the FWDM code of UPL is correct.	Corrected.
PB Americas, Inc.	11. Page 56, Table 4: The scientific names for beggar-ticks and elephant ear tree should be changed as noted above, in addition to the FWDM code for beggar-ticks.	See response for comments 9 & 10.
PB Americas, Inc.	12. Page 57, Table 5: The scientific name and FWDM code for beggar-ticks should be changed as noted above.	See response for comment 9.
PB Americas, Inc.	13. Page 59, Table 7: The scientific name and FWDM code for beggar-ticks should be changed as noted above.	See response for comment 9.
PB Americas, Inc.	14. The water quality and rare and endangered flora and fauna aspects of Lake Hiawassee were not provided in the report. Therefore, these scope items could not be reviewed by EMD as required by the scope of work.	Water quality data is available online, though is sparse. There were no known lists of flora or fauna for Lake Hiawassee beyond what was observed during MFL

		fieldwork.
PB Americas, Inc.	15. EMD reserves the right to continue their review of the minimum levels evaluation for Lake Hiawassee and provide comments to the St. Johns River Water Management District until the evaluation report has been finalized.	Comment noted.
Peer Review Comments – August 2009		
Upchurch	No additional comments received.	
Shaw	I have read and reviewed the edited MFL reports for the above referenced lakes, as well as the peer review resolution documents for each. I believe the District has done a great job addressing both the spirit and the letter of my previous peer review comments on the original draft documents from April 2009. I particularly appreciate the additional explanation of how the SWIDS technique was used and additional assessment on the SWIDS data that was done in response to my and other peer reviewers comments. I also found the responses to other peer reviewers comments helpful and resulting changes added much to the readability of the latest drafts and the confidence in the results.	No response required.
Wilson	SJRWMD staff has done a good job in responding to my prior comments. For most instances where I might prefer a bit more be done, I don't see it necessary or appropriate that additional changes to the reports be made at this time. I have limited my comments to a few substantive issues, mostly for the record for the next round of reports, and to a few editorial matters specific to the Sylvan Lake report. I do not anticipate any need for further review on my part and believe that once editorial changes are finished, the reports are ready to go public.	No response required.
Wilson	1. By far the most important aspect of the MFL reports is the need to give further thought to the issue of how much change should be allowed. There is a systematic outcome of these MFLs which will allow significantly less inundation, especially for the FH. The response to my concern about the "less inundation is okay" underpinning of the MFLs was interesting and one I hope we will have a chance to discuss at some future time. In particular, while I agree with the response that the system is not steady state, that doesn't mean that systemic changes can be dismissed. We need some field data on modified systems to really figure this out.	Comments noted.
Wilson	2. The rewrites generally responded well to my request that the reports demonstrate an understanding of essential cause-effect hydrologic relationships for each lake. For Avalon, while the discussion of lake hydrology is improved, it is not as effective as (say) the revised Sylvan report, and the relationship to soils and vegetation is still not explained as well as it might. I also would have liked more discussion of aquifer relationships in Avalon.	Comments noted.

Wilson	3. Regarding my general comment on the need to explain how sand hill lake hydrology relates to soils and vegetation, the response documents indicate that the reports have been substantially changed. However, the changes in the Lake Avalon report seemed mostly aimed at deleting text related to the sandhill lake concept while other reports aimed more at making the concept relevant. Also, the specific Avalon response cites Sylvan Lake.	Comment noted.
Wilson	4. Over and above the issue in No. 1, there is a need for the reports to explain the logic of what is being proposed, i.e. to justify the changes (even if I don't agree with them!). Avalon is improved but could have more (Sylvan Lake is perhaps the best model in this regard).	Comments noted.
Wilson	5. Regarding my comment on the inconsistent organization of reports, the new versions are better but still show a fair amount of variation. There were many responses that attribute this problem (and other editorial issues) to an outside force. I'm not sure what your peer reviewers can do to help staff in this regard, but feel free to offer me up as an advocate for common sense and good practice, if that would help.	Comments noted.
Wilson	6. The reports generally did well in improving the executive summaries, the discussions of soils and land use, and more. I also appreciate the commitment to further improvements on future reports.	Comments noted.
Wilson	7. For future reference, it appears my comment regarding Figure 1 was not clear, as the response was not what I expected. My recommendation is that the hypothetical relationship in Figure 1 be made real in a separate figure, in which the actual exceedence curve is compared to one that has the frequency characteristics allowed by the proposed MFLs.	Comments noted.
Wilson	8. I was quite astonished (and very pleased) with the amount of information now presented on the 10 factors.	Comments noted.
Wilson	9. Some general comments on the 10 factors are as follows. First, I suggest some sort of continuation title for multi-page tables. Second, the District may want to reconsider whether it wants to conclude that recreation water depths are adequate for "safe operation" given the lack of substantive analysis. Third, I'm not sure "navigation" shouldn't be NA given all the issues are covered under recreation.	Comments noted.
Wilson	10. I appreciate the new compliance discussion. I still am concerned that the current approach is not sufficiently clear in explaining the extent to which pumping controls lake water levels, and not sufficiently transparent in revealing the implications of the MFLs to the regulatory community.	Comments noted. This will be expanded in future reports.
Wilson	11. With respect to SWIDs, the general response indicated that more explanations	No response required.

	were included in the methods section of each report. Avalon was reasonable in this respect.	
Wilson	12. My comments that were specific to Lake Avalon all seem to have been addressed sufficiently for now.	No response required.
Wilson	13. I didn't find the language on "not effective until", and that might be worth adding.	Text will be added to final report.
Wilson	14. As a general comment, I thought the approach whereby the peer review was done as a team effort accomplished effective interactions that benefitted the final product. [I'm not endorsing the requirements to fit our comments into a pre-fab matrix, but rather that we were required to develop a consensus.] Perhaps the review process has matured to the point of no longer needing that approach, but this time around I thought working in isolation wasn't as effective.	Comments noted.
PB Americas, Inc.	No comments.	No response required.