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## MFL PEER REVIEW REPORT

**Subject:** Technical peer review, minimum flows and levels (MFL) evaluation, Johns Lake, Lake and Orange Counties, Florida

**For:** St. Johns River Water Management District (SJRWMD or “District”)

**Reviewer:** Douglas T. Shaw, Ph.D., The Nature Conservancy

**Date:** August 30, 2010

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This letter report comprises my final peer review of proposed Minimum Flows and Levels (MFLs) for Johns Lake, Lake and Orange Counties, Florida, based on review of the most recent draft document:

***Technical Publication SJ2010-XX, Minimum Levels for Johns Lake, Lake and Orange Counties, Florida*** by Clifford P. Neubauer, Ph.D., St. Johns River Water Management District, Palatka, Florida, August 2, 2010 (“Johns Lake MFL Report”)

On April 3, 2009, I provided comments on an initial draft of the Johns Lake MFL Report (dated 2008), including an assessment of data, methods and assumptions. District staff then prepared a revised version of the report that substantially modified the approach and addressed review comments made by me and other peer reviewers. On December 10, 2009, I prepared a second round of written comments on the revised report. Staff subsequently prepared a second revised report addressing additional peer review comments and convened a teleconference with the peer review panel to discuss any remaining concerns. Following this discussion, I provided a brief e-mail comment on February 19, 2010 stating that the District had largely addressed to my satisfaction the issues raised in my December, 2009 comments, but additional justification was still needed to support the determination of Infrequent High and Infrequent Low levels for this lake in lieu of the minimum levels used for other East Central Florida lakes. Subsequently, I provided comments on April 4, 2010, again on the second draft, and on May 20, 2010 on a third draft incorporating changes made in response to previous peer review comments. Discussion of the Johns Lake MFL also occurred during a public meeting held in Palatka on June 3, 2010 with the entire peer review panel present.

The present comments build on and update written comments previously submitted in this format on April 4, 2010 and incorporate my review of the fourth and latest draft of the Johns Lake MFL Report dated August 2, 2010. This peer

review report represents my final comments on the Johns Lake MFL determination.

1. Assess adequacy of environmental data in terms of quality and length of record.

Based on my review of the Johns Lake MFL Report, including three previous drafts, and field inspection of transects, I feel that the environmental data from the site and the data collection procedures used to support this MFL determination are appropriate, repeatable and scientifically sound.

- a. *Are there any deficiencies and/or errors regarding data availability?* No.
- b. *Were appropriate analytical methods and procedures used for data collection?* Yes.
- c. *Were reasonable quality assurance assessments performed on the data?* Yes, data quality assurance was reasonable for the type of analysis and setting. Resurveying two transects at this site several years after the initial surveys provided valuable insight that contributed to the decision to re-formulate the approach for setting the MFLs at Johns Lake. Because of the observed instability of wetland communities and ecotones at this lake, I recommend that the District develop a plan for periodically re-surveying transects here to better understand the long-term variability and its impacts on the MFL.
- d. *Was relevant data available but discarded without appropriate justification? Would use of discarded information significantly affect the development of the MFLs?* Some transects were discarded, but this decision was adequately explained and justified in earlier drafts.
- e. *Was "best information available" utilized in developing the MFLs?* Yes, I believe that best available data from the site and information from the literature was used to develop the MFLs. Concerns I previously had with the extent and quality of data supporting setting the IL at 96.3 ft in the original draft were addressed in earlier revisions; this decision is now well documented with data, photographs of field conditions and explanations of differences between modeled and actual conditions. SWIDS information is used appropriately for setting the Minimum Frequent Low elevation based on the ecotone between shallow and deep marsh communities.

2. Assess methods and procedures for data analysis, including, where appropriate, performing appropriate statistical analyses of data to ensure that each is statistically valid and is used appropriately.

The methods and procedures for data analysis, including selection, parameterization and calibration of the hydrologic model for Johns Lake are valid

and appropriate. 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 District has been very responsive to peer review recommendations on previous drafts of this MFL Report and has produced an excellent report and methodology that addresses shortcomings seen in previous iterations.

- a. *Are there any deficiencies and/or errors in analytical methods and procedures?*  
No, there are no deficiencies in the analytical methods used for this MFL determination.
- b. *Were appropriate analytical methods and procedures used for data analysis?*  
Yes, all analytical methods used in the MFL determination are appropriate for the data and setting.
- c. *Were the analytical methods and procedures appropriate given the "best information available"?* Yes, all analytical methods and procedures are appropriate.
- d. *Do the analyses include all necessary factors?* Yes, all necessary factors are included in the analyses. Unlike some MFL determinations for major lakes or segments of the St. Johns River, a separate assessment of Water Resource Values (WRV) was not conducted for Johns Lake. However, quantitative data for many of these WRVs are lacking for smaller, isolated lakes such as Johns Lake, so the decision to forego a comprehensive WRV assessment here is understandable and reasonable.
- e. *Were the analyses correctly applied?* Yes, all analyses are correctly applied. In my original comments on the Johns Lake MFL Report, I expressed concern that the driest SWIDS signatures for a given wetland community type were used to set the allowable drawdown for this and other water bodies, especially when the drawdown curves from these driest sites differ considerably from the others. The second and third drafts did not make direct use of SWIDS. The latest draft uses SWIDS appropriately for determining the Frequent Low. In this case drawdown curves on the dry side of the median are used in lieu of the driest curves. This decision is responsive to previous peer review, is protective of the resource and is an appropriate means of dealing with variability inherent in the SWIDS data from other sites.
- f. *Were any limitations and imprecisions in the information handled appropriately?*  
Yes, limitations and imprecisions in the information and data are handled appropriately in the methods used for determining MFLs.
- g. *Are the analyses repeatable?* The methods employed in this MFL determination are repeatable.  
Previous concerns I had with the determination of the IH and IL levels have been largely addressed through the determination of a Frequent

Low to supplement the IL and IH and the inclusion of an excellent rationale and discussion, summarized in Figures 1 and 2 and detailed in Appendix C, for deciding which levels to determine at Johns and other lakes. This added material is a great improvement over previous drafts. The addition of the FL is responsive to previous peer review, bolsters confidence in the conclusions and provides an additional “safety net” for a system that has exhibited a substantial amount of recent instability. As noted above, long-term monitoring and periodic reassessment will be needed to determine whether additional wetland community changes are occurring over time.

3. Evaluate the validity and appropriateness of all assumptions used in the development of the MFLs analysis and water resource assessments.

The assumptions used in data analysis and MFL determination are reasonable and justified by the District’s previous experience and literature citations.

- a. *Are the assumptions reasonable and consistent given the “best information available”?* Yes, assumptions are reasonable and consistent with best available information
- b. *Is there information available that could have been used to eliminate any of the assumption? Would the use of this additional information substantially change the development of the MFLs?* No, I am not aware of any additional information that could have been used to eliminate assumptions.
- c. *Are the assumptions stated clearly?* Yes, the assumptions are very clearly stated in the report, especially in later drafts.
- d. *What, if any, assumptions are implied or inherent in the methodologies?* All assumptions are now stated explicitly in the draft.
- e. *Are other analytical methods or procedures available that would require fewer assumptions but could provide comparable or better results? Are adequate data available to support using these alternative methods or procedures?* No, I am not aware of any alternative methods requiring fewer assumptions.
- f. *Are there deficiencies and/or errors in the MFLs or water resource assessments or application of findings?* No, I found no deficiencies in the proposed MFLs or application of findings.
- g. *Identify all sources of uncertainty and assess their impact on developing MFLs that will prevent significant harm to water resources or ecology of the area.* Uncertainty is inherent to this kind of analysis and was appropriately handled and controlled through choice of data and methods; see also my comments under items 2e and 2g above. The most significant improvements in the handling of uncertainty in the latest draft are the inclusion of a Frequent Low level and the use of SWIDS curves slightly

drier than the median to support that determination. This is a significant development that satisfies previous concerns I had with the use of IH and IL alone for a system with inherent instability.

4. Determine if the data, analyses, and interpretation of results support the recommended MFLs.

The data interpretation and analyses, which build on the District's extensive previous experience setting MFLs for rivers, lakes and wetlands, is responsive to previous peer review, is scientifically sound and supports the recommended minimum levels. Rationale for selecting MFL criteria is now well explained and justified, and including an FL to supplement the previously determined IL and IH significantly improves the approach.

Long-term monitoring of changes in hydrology and wetland plant communities and their causes is critical to ensuring that adopted MFLs continue to protect resource values and that a greater understanding of relationships between hydrology and plant communities is obtained.