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## MFL PEER REVIEW REPORT

**Subject:** Technical peer review, minimum flows and levels (MFL) determination, Lake Hiwassee, Orange County, Florida (Contract #SK376F0, Work Order #3)

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

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

**Date:** April 3, 2009

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### Introduction and Scope of Review

This letter report comprises my peer review of the District’s minimum level re-evaluation for Lake Hiwassee in Orange Co., Florida, one of six lake MFL evaluations reviewed as part of this contract. The evaluation and proposed minimum levels are documented in the draft SJRWMD technical report ***Minimum Levels Determination: Lake Hiwassee, Orange County, Florida*** by J.B. Slater, BCI Engineers and Scientists, Inc., 2008 (“Lake Hiwassee MFL Report” or “MFL Report”). My report is based on review of the draft technical report, documentation provided during our field visits to the six lakes August 27-29, 2008, as well as the following supplemental documents:

1. *Minimum Flows and Levels Method of the St. Johns River Water Management District, Florida, USA* by C.P. Neubauer, G.B. Hall, E.F. Lowe, C.P. Robison, R.B. Hupalo and L.W. Keenan, *Environmental Management* 42(6):1101-1114, 2008.
2. *A Quantitative Method for Determining Surface Water Inundation/ Dewatering Signatures for Riparian Plant Communities*, Draft manuscript by C.P. Neubauer, C.P. Robison, T.C. Richardson, P. Valentine-Darby and G.B. Hall, *Ecological Engineering*, 2008.
3. *Hydrology of Central Florida Lakes – A Primer* by D.M. Schiffer, U.S. Geological Survey, Circular 1137, 1998.
4. *Lake Hiwassee Minimum Flows and Levels Hydrologic Methods Report* by C.P. Robison, St. Johns River Water Management District, Palatka, Florida, 2008.

Detailed comments below are confined to the Lake Hiwassee MFL Report.

The scope of the review includes the following:

- Assessment of the adequacy of the environmental data used in the MFL evaluation in terms of quality and length of record
- Assessment of the methods and procedures for data analysis, including statistical analyses where appropriate
- Evaluation of the validity and appropriateness of all assumptions used in the development of MFLs
- Determination if the data, analyses, and interpretation of results support the recommended MFLs.

**Review Comments** (Page citations refer to Lake Hiawassee MFL Report unless otherwise noted)

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.
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, *F.A.C.*– 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.
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.
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.
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.
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.

### **Findings and Recommendations**

1. **Recommendation:** Improve Lake Hiawassee MFL Report by addressing the editorial comments 1-6 above.
2. **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.
3. **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.
4. **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.