
MFL PEER REVIEW REPORT

Subject: Technical peer review, minimum flows and levels (MFL) re-evaluation, Prevatt Lake, 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

Introduction and Scope of Review

This letter report comprises my peer review of the District’s minimum level re-evaluation for Prevatt Lake 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 Reevaluation for Prevatt Lake, Orange County, Florida*** by C. Ware, St. Johns River Water Management District, Palatka, Florida, 2008 (“Prevatt Lake 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. *Hydrologic Model Development for MFL Evaluation of Prevatt Lake, Orange County*, Report, CDM, Inc., October 2004.

Detailed comments below are confined to the Prevatt Lake 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 Prevatt Lake MFL Report unless otherwise noted)

1. Page v, Exec Summary, Page 1, Introduction and Page 39, Conclusions and Recommendations – it would be helpful to document any general criteria that are used by the District to trigger a re-evaluation and the specific reasons for re-evaluating Prevatt Lake. Also, in the introduction please include the reasons why Prevatt Lake was originally placed on the MFL priority list.
2. Pages 1-2, Factors to be Considered When Determining MFLs and Pages 18-20, 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 Prevatt Lake 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 Prevatt Lake 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 4, Hydrology – Given the uncertainty about the hydrology of the north lobe of the lake and whether it tracks well with the south or main lobe where MFL field work was conducted, it may be prudent to confine the recommended minimum levels to the latter, much as was done for the Lake Avalon MFLs, at least until additional hydrologic data is collected and analyzed from the north lobe.
4. Page 10, Figure 5 and Page 28, Structural Alterations and Other Changes – The figure and discussion suggest that lake stage levels have been much more variable since about 1980, largely due to the fact that low levels have been lower and more frequent than they were during the period 1961-1980 when the watershed was much less developed. It is unclear whether this is caused by climate or the combined effects of increased groundwater use and amounts of impervious cover in the watershed. Nevertheless, this observed hydrologic behavior raises the question of the stability of the plant communities used for setting MFLs at Lake Prevatt and the baseline used for significant harm. This issue of possible long-term changes in vegetation needs more discussion in the text and the baseline should be explicitly identified if possible. This is particularly

important because this effort is a re-evaluation of a previously adopted MFL and recommended levels are lower than the adopted levels.

5. Page 15, Field Transect Site Selection – general information regarding the site history survey indicates that occurrence records of rare and endangered flora and fauna, yet I can find nowhere in the report where such records, if any are documented. Please add a brief discussion of any rare or endangered species that were found on the Lake Prevatt site.
6. Pages 29-37, Minimum Frequent-High (FH) Level and Minimum Frequent-Low (FL) Level – The method used for determining FH and FL relies on locations of existing wetland plant communities and SWIDS information from other similar sites, and is a conceptually sound approach. However, the SWIDS data for shrub swamp shown in Figure 13 (page 35) and for shallow marsh shown in Figure 15 (page 37) displays a wide range of variability that needs better explanation. Based solely on visual inspection of the graph in Fig. 13, it appears that the shrub swamp data may include several sites that are hydrologically quite different from the others. Given this variation in the SWIDS for the same communities from different locations, should we always be using the driest of these signatures to define allowable hydrologic shifts when that signature could be, statistically, an outlier or represent a different population of sites? This outlier question becomes especially significant for communities like “shrub swamp” that are not always “natural” communities, but instead are often a successional stage indicative of an altered fire or hydrologic regime in another wetland community, like emergent marsh. So choosing the driest shrub swamp could in fact be starting from a baseline that is already disturbed (possibly over-drained), perhaps even “significantly harmed.” These concerns could be addressed in several ways: (1) more careful statistical treatment of the SWIDS reference curves to minimize the possibility that any of the curves used to set the FH (or other minimum levels) are statistical outliers, (2) more detailed explanation of how the SWIDS reference sites were selected to ensure that no outliers or already-harmed sites are included. Also, in the legends of the figures, it would be helpful to indicate which of the reference sites are sandhill lakes and which are not.

Findings and Recommendations

1. **Recommendation:** Improve Prevatt Lake MFL Report by addressing the editorial comments 1-6 above.
2. **Finding:** Based on my review of the Prevatt Lake 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 over the long term. That knowledge is appropriately incorporated into this MFL determination. As noted above, additional explanation of the observed variability of SWIDS data should be better explained to ensure that this method is applied and interpreted appropriately in this and subsequent MFL assessments.

3. **Finding:** Similarly, the methods and procedures for data analysis, including selection, parameterization and calibration of the hydrologic model for Prevatt Lake 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 and Recommendation:** 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. The Prevatt Lake MFL determination relies on the natural inundation characteristics of vegetation communities and soils on site to set minimum frequent low and frequent high, with SWIDS data used to estimate an allowable hydrologic shift due to future consumptive use. However, as noted above in the comments, more attention should be focused on the selection of particular SWIDS curves from reference sites to ensure that no statistical outliers or already-harmed sites are used to set MFLs and explaining the apparent variability in SWIDS data.
5. **Recommendation:** Because this is a re-evaluation of a previously adopted MFL, I recommend that the District include a section (or perhaps a table) in the report that more directly compares the currently adopted and recommended minimum levels, documents the reasons why re-evaluation was warranted, explicitly identifies the baseline for the recommended MFLs and identifies any benefits to the resource of the new (recommended) levels. This is particularly important to avoid the erroneous impression that the District is merely changing the baseline for the minimum levels.