

DRAFT

-- Peer Review --

Minimum Levels Reevaluation: Indian Lake, Volusia County, Florida

By

Sam B. Upchurch, Ph.D., P.G.

April 5, 2009

Overall Impressions

The MFL reevaluation document for Indian Lake, prepared by Jane Mace, is generally well written and develops the ecological criteria for MFLs at Indian Lake well. Descriptions of soils and plant-communities are thorough. The discussion of MFL-development procedures using soils and plant communities are generally excellent, but the lay reader may get lost.

I found no reasons for questioning these soils and plant community data and means for relating these to the stage-regime for MFL revisions.

I do have concerns that some critical steps have been referenced, but omitted from the report, however. These largely deal with general hydrologic conditions, development and implementation of the model developed by Robison, and role of the Volusia groundwater flow model in MFL development and sensitivity analysis.

General Issues

It is my belief that a document, such as this MFL report, should stand alone to the extent possible. As a result, there are some content issues that should be addressed. These are listed below.

1. The report mentions that the stage data for the lake had a limited period of record (weekly data, March 1988 to present). As a result, stage data were apparently synthesized to extend the period of record (Figure 5 states that SSRR simulations were run for 1976 to present). Robison (2007, unpublished) is cited in several locations, apparently to refer the reader to the simulation modeling. This reference should be included in the report as an appendix. As an unpublished document, this reference will not be available to the average reader, so a very critical piece of the MFL-development process is not available.¹

¹ I have since received a copy of the Robison report. It will be evaluated quickly in the context of Indian Lake. Quick perusal suggests that it contains a description of the model used and evidence of model verification.

DRAFT

2. Similarly, Appendix C by Robison discusses how to use a stage duration curve and 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 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?
3. Also, the interactions of the lake with the Floridan are not discussed in the report. This brings up a lack of adequate background information, including the following.
 - a. Hydrological setting of the lake (flow through lake, connections with the Floridan aquifer, perched, sandhill lake, etc.)
 - b. Water budget
 - c. Reconstructed stage hydrograph (range of stages, population metrics, any historical shift related to rainfall or land-use changes, etc.)
 - d. How quickly does stage change during major rainfall events (an indicator of aquifer interactions)
 - e. Details of the CUPs for nearby wellfields and stress patterns
 - f. Behavior of surficial and Floridan aquifer water levels near the lake, including monitoring facilities and data evaluation
 - g. Aquifer potentials relative to lake levels
 - h. Importance of seepage from shallow soils and the surficial aquifer to lake levels
 - 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 would be enlightening
4. Statement is made that there are no inflows or outflows; what about overland flow along the apparent strand from Coon Pond and Scoggin Lake?
5. A description of a sandhill lake and how it functions would be useful.
6. How are lake levels monitored? What happens when the staff gage is out of the water? How are these data handled?

MFL-Related Concerns

There is a need for more positive (definitive) statements about the consequences of revising the MFLs. The text implies that there is a reduction in return intervals for the

DRAFT

proposed MFLs. I understand that this is to bring the MFLs in line with reality and improved data. However, readers may not understand this and be concerned that there is a relaxation in MFLs standards or significant harm criteria. I suggest that these issues be attacked head-on in the conclusions.

The term “drawdown” is used in several locations related to the proposed MFLs (see, for example,, this use on page 53). This term needs to be defined; it may be misinterpreted.

Page 12 indicates that the model is steady state. Any data suggesting that the plant communities are steady state, too. What is the rate of change of the communities relative to changes in hydrologic conditions, lake levels, etc.?

Editorial comments have been made on the manuscript. These will be transmitted to the District for the author’s use.