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-- Peer Review --

Minimum Levels Determination: Lake Avalon, Orange County, Florida

By

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Overall Impressions

The MFL document for Lake Avalon, prepared by Chris Ware, is well written and develops the ecological criteria for MFLs at Lake Avalon well. Descriptions of soils and plant-communities are thorough and understandable. The application of the SWIDS approach is well documented, and the discussion of MFL-development procedures using soils and plant communities are generally excellent. Basing the MFLs on the SWIDS data is appropriate and defensible. I found no reasons for questioning the 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 when they should have been better developed in the report, however. These largely deal with modeling and data development issues. Also, there is a need to provide some additional geologic and hydrologic context, as discussed below.

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 Executive Summary begins with CH2M Hill's rather strange description of water level fluctuations in a sandhill lake. What they are saying is that sandhill lake levels fluctuate greatly and are either platykurtic or, in some cases, almost bimodal. The quote implies that they lack a mean, which is not true. Their distributions are certainly not the classic "bell-shaped" distribution, but they do have a mean and a distribution.

I wouldn't start the reader off with this expectation for uncertainty in the stage data, since you rely upon stage duration curves. For one thing, Figures 5 and 6 do not match the CH2M Hill quote. The data appear to have a unimodal distribution and would have a well-defined mean and other population metrics. I would start the report (and Exec. Summary) off with a statement that the lake is a sandhill lake and that water levels can vary greatly.

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2. The report mentions Robison's hydrologic model for the lake many times. There is a need to develop the basis for the model and some of its results within this MFL document. My suggestion is that Robison's model report be included as an Appendix. If not, then the salient points of the model should be included at a minimum. Some issues that should be included are:
 - a. The function of the model (is it a mass balance, water budget model or some other form?)
 - b. Calibration methods and evaluation (residuals analysis, etc.)
 - c. Results of the model, including water budget for the lake, modeled interactions with the surficial and Floridan aquifers; seepage components; evaporation, etc.
 - d. Evaluation of what the model tells you about the lake (sensitivity to a particular water budget component, function of a sandhill lake (why are water levels so "flashy" for example), etc.)
3. Price Robison's Appendix (B) deals with stage duration curves and how they are constructed. It also presents a nice discussion of how the stage duration curves are applied to water resource planning and evaluating the effects of pumpage, etc. on lake levels. It does not detail what is modeled or how the model was used. This is an excellent presentation, but does not suffice for the description of the lake model.
4. The introductory remarks do mention that the lake is a sandhill lake, it is a sinkhole lake, it loses water to the Floridan, and other geologic/hydrologic details. However, there is a need to develop the geologic and hydrologic setting more and perhaps in a better organized fashion. For example, brief paragraphs on hydrogeology (aquifers, etc.), stratigraphy (geologic formations in play), physiography, and sinkhole and karst would provide organization and set the stage for water level discussions to follow.

There are some other issues of concern, as well. What is the extent of the lake drainage basin (it must be very small, which means the source of water and lake level variation may be controlled by groundwater or some other process - explain)? How is the lake connected to the Floridan and/or surficial aquifers? Presumably there are sinkholes in the bottom of the lake. What do we know about them? Is there a lake bathymetric map? Withdrawals from the lake and irrigation within the basin?

5. I found no significant information on rainfall, evaporation, and other water-related information. This should be included. I would characterize the data for each and then used the lake model water budget to summarize sources, sinks, and interactions of the lake.