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To: Sonny Hall, St. Johns River Water Management District [SJRWMD]
From: Lee Wilson, Ph.D.
Date: June 19, 2013
Re: Minimum Levels Reevaluation for Lake Geneva, Bradford and Clay Counties,
Florida

This document reflects my ongoing assignment from SJRWMD to review reports related to MFLs development for water bodies within the District. The subject report, for Lake Geneva, was authored by Cliff Neubauer. Dr. Neubauer adopted an approach he considers suitable for lakes that lack stable relationships between plant communities, topography, soils and hydrology. My review considers overall methodology, data, methods and assumptions used by the author, the resulting recommended MFLs, and the overall organization and presentation of the report.

The fact that my comments are critical of certain aspects of this and other reports is a reflection of my assignment, which is to identify issues and find possible problems, and should be read in that spirit. I have been particularly exacting for Lake Geneva because the current condition of

the lake seems especially dire, and a challenge to adoption of the MFLs (or at least bad press) seems more possible than the norm.

I consider the Lake Geneva report to be professionally done and in conformance to the District's MFL guidance. The explication of MFL logic is more completely addressed here than in many reports, and is more understandable as well. The report does a good job of advancing the discussion of Lake Geneva. However it doesn't have the strong scientific link between MFLs and significant harm that I am used to seeing. I understand this may result from the difficulty in assessing the ecology at this lake, but nonetheless suggest we are an iteration or two away from having this lake done. In effect, while I understand that uncertainty is not a bar to adoption of MFLs, reducing uncertainty is important to MFL defense and there is more to do.

In this instance, the fact that I conclude that the recommended MFLs are not yet appropriate for adoption does not detract from my endorsement of the District's MFL program, nor does it reflect adversely on the draft report. Rather, this lake is evidence for the value of the District's adaptive approach, whereby the MFL methodology is continually refined to better accommodate the natural variability of hydrologic and ecologic systems in the District.

Primary comments

1. This is the first report I can recall in which there was no effort to discuss how much hydrologic change would be allowed by the MFLs. I understand the hydrology-MFL linkage may be discussed separately in Price Robison's Etonia report, but believe it would be appropriate for this report to include the traditional discussion of future hydrology as it relates to ecology.
2. The lake hydrograph shows a large and continued drying of the lake. It will be argued that the effects of changing climate are being manifested through drought and other hydrologic conditions. This is not just a stationary versus non-stationary statistical issue, but an example of something those interested will readily observe and expect to see addressed. Setting MFLs without even acknowledging effects of future climate will not be easily defended.
3. I have previously advised against using a "no net loss" principle for lake MFLs, but may not have explained myself well. Any MFL which allows increased consumptive use will allow a shift in the stage duration curve such that there will be some type of reduction in lake area and depth. If no permanent net loss were to be the standard for measuring

significant harm, then the historic return interval for an MFL stage or flow would have to be maintained without change, and every lake would be fully appropriated. SWIDs would be irrelevant. In sum, defending MFLs that rely only on no net loss will not be easy.

4. I recognize the difficulty in finding ecological indicators on which to base an MFL for this lake. Nonetheless, I don't see enough logic to the saw palmetto concept to justify the MIH. For one thing, the biological value of the MIH seems to require that the flooding events be spaced fairly evenly, which history does not suggest is realistic (the "four per century" all occurred in a 20 year period). By the logic of the MFL, we should have substantial encroachment occurring now; but there is no evidence of this presented in the report. If the argument is that the goal is flooding sufficient to prevent "permanent" encroachment, wouldn't even one good flood per century accomplish that? And given the argument that there are no wetlands here to justify an MFH, MA or MFL, exactly what ecological benefit derives from the MIH, and what significant harm results if it is not achieved?
5. The MIL is an example of an MFL which does allow loss of lake area, but it seems no more defensible than the MIH. The value of the fishery being protected isn't well demonstrated; the mechanisms of harm from one particular lake level versus another are not really established; and "significant harm" from lower levels is not convincingly shown.
6. Aesthetics and recreation are discounted as critical WRVs, but would seem to be hugely important to the people who most care about this lake even if, as the report suggests, a full lake is rare. The prior Lake Geneva report used lobe-interconnections to set MFLs. Why is this no longer valid? Lobe interconnections and/or dock access may be among the best ways to determine MFLs for Lake Geneva. If MFLs are not adopted to protect these WRVs, then at least the report should explicitly discuss how lake aesthetics and recreation will change with the increased consumptive use that the recommended MFLs will allow (and this should be done with and without climate change). The fact that a periodic MIH results in a real lake is not unimportant.
7. Many of the issues associated with Lake Geneva are similar to those at Lake Cowpen, which I commented on in 2011. I will shortly be commenting on Lake Brooklyn. All three MFL reports for these lakes need to be consistent.
8. For me the bottom line is evidenced by looking at the 2013 Google earth photo of Lake Geneva. The lake is mostly gone. I anticipate serious credibility issues (in court, at public meetings, in the press) when the District tries to defend "it is okay to adopt MFLs that will allow this lake to dry up even more", especially as the existing MFLs (the one being abandoned) are not met under 2008 land use conditions, and the drop in stage resulting from the new MFLs could approach 1 foot.

Editorial comments

9. For the most part I have not commented on text material that is addressed above.

10. Executive summary and intro could indicate that there are already MFLs for this lake.
11. P. iii and elsewhere. Referring to Lake Geneva as “large” will generate push back given how puny the lake is at the moment. If you must use this word, please explain it.
12. P. v. Note unused NAVD column in Table ES-1? Other reports have used a footnote to explain that in time the MFLs will be restated in NAVD.
13. P. 1. I suggest Dr. Neubauer consider Jodi Slater’s 2013 Lake Norris MFLs report for the best explanation I have seen as to how MFLs are intended to manage inundation and drying duration and frequency. As my comments on that report indicate, the concept that there can be too much and too little water for a wetland is not intuitive for most folks, and when reference is made to (for example) a 30-day duration event, at least some readers understand that to be the exact length of the event, not “at least” that long. Overall I continue to be pleased with the District’s improved explanation of the MFLs concept; my comments on Norris have suggestions for even further improvement.
14. P. 3. The “fundamental assumption” that ecology depends on hydrology is very well explained, but in the report is not demonstrated to be strongly indicated by this system. There needs to be some important ecological shrinkage tied to a changed flooding regime in order to justify “significant harm” from too much change.
15. P. 3. The first full paragraph is an example of a fundamental discussion that probably needs to be earlier.
16. P. 5. Is it possible to compare a photo of Transect 1 from 1994 to one that is recent?
17. P. 5. All maps and air photos of this lake make it obvious that the lobe structure is a critical characteristic. The report provides relatively little discussion of the lobes, was a bit confusing on nomenclature, and most important did not discuss how and when the lobes connect, and why that is or isn’t important. All in all, I’m not exactly sure what “Lake Geneva” actually means.
18. P. 6. I’m not sure the discussion of Crater Lake adds much. Referring to a “deepest point is located in a southwest lobe” is an example of a lobe nomenclature problem (i.e. it is imprecise).
19. P. 7. I think of “fluctuations” as the amplitude between high and low cycles, not the amplitude of the lake level change after multiple cycles. For this lake, fluctuations as I think of them are typically less than 10 feet.
20. P. 8. Line 9 uses the word “might” and similar wording (“may”, “can” etc.) is used extensively in this report. It is probably correct to do so, but it does flag to the reader that this MFL report is not on as solid ground as most.
21. P. 8. If I understand the soils discussion, the presence of hydric soils is pretty much meaningless for MFLs, but the absence of deep organic soils is dispositive. Not sure the nuances of this distinction come across. In any case, I don’t agree with the decision to

leave out the results of the field soil sampling. Those results need to be presented to allow independent review. I recommend at least an appendix with the results.

22. P. 10. From the fishery paragraph I understand that “Lake Geneva is one of the most productive fishing lakes” in the area yet the bass fishery has “relatively low production for a Florida lake because the system has a nutrient poor tropic state”. Which is it?
23. P. 14. Lobes are different from map to map.
24. P. 15. Interesting that a lake that permanently seeps has lower recharge than uplands that get periodic rainfall. Is this relationship strongly supported?
25. P. 17. I was confused by the arrows on Figure 6.
26. P. 18. Figure 7 is hard to interpret. The absence of labels for the contour lines is one issue, but more striking is how some deep water is mapped as occurring in locations where land is visible.
27. P. 19. Arrows would be useful on Figure 8.
28. P. 21. Figure 10. Replace the X axis with year and you would have almost the same graph. I.e. the frequency distribution is essentially a time distribution. It will be argued that the distribution is non-stationary and cannot be used in a stochastic based assessment.
29. P. 24. The reasons for not using transects should be stated, e.g. refer to the earlier discussion under general information.
30. P. 25. I don’t follow the logic in “soils sampling procedures”. It reads like a Catch 22: no deep soils to support something other than an MIH or MIL were found because no soils were sampled because no soils were expected because only an MIH and MIL were considered because something other than an MIH and MIL was not supported. Need to state clearly your basis for certainty that there are no organic soils.
31. P. 25. Cowpen report did quite well with no discussion of SWIDs. Not sure they really matter in a lake like this.
32. P. 28. I didn’t find anything in the body of the report that made real use of the “basin alterations” background. The subsequent discussion of Structural Alterations pretty much stands on its own.
33. P. 30. Here and elsewhere there is yellow highlighting on my copy.
34. P. 32. Recreation is excluded from consideration because water levels can be low for decades. Does that same logic not impact the chosen WRV?
35. P. 33. Providing fish refugia is a justifiable basis for an MFL. I didn’t see anything in the document that tied fish survival (not population) to the MIL.
36. P. 36. In Table 1, I’m not clear how this (and other) matrices identify “most limiting” rather than “most important”. Also, there are several “2” ratings in the first column, even though this lake apparently has no meaningful wetland functions.

37. P. 37. The section on Minimum Levels Determination begins by stating the importance of the “natural flooding and drying regime”. Unlike other lakes, the cyclical flooding/drying at Geneva is a secondary pattern within the long-term drying trend. The District should expect an argument that this long-term drying trend needs to be more fully taken into account in setting the MFL.
38. P. 38. “That is, withdrawals should not cause a net downhill shift in uplands and result in a loss of lake area”. Why, exactly? How does loss of lake area establish “significant harm”?
39. In the same paragraph, mention is made of the value of the MIH to connections with other lake lobes. I suggest this could be a much stronger basis for support of an MIH than the one now proposed. Many of the other listed benefits are not documented as important at this lake.
40. P. 39. Don’t understand how the water table can be near the land surface at elevations far higher than the water surface, when the lake itself is described as perched over the water table. Perhaps this is referring to surficial aquifer, but if so that should be made clear. I am skeptical that the true water table is ever near the soil surface in the locations described unless the lake level is also high.
41. P. 39. I can’t get my mind around setting an MFL frequency duration based on an event that last occurred 40 years ago. Also, I recall that for Cowpen the same logic was used but the duration was only 30 days, not 120.
42. In same discussion, the statement is made that “this species does not migrate downslope during long (i.e. 25 years) dry periods. Does the reference provide such a specific return interval? Is this the basis for the 25 years in the MIH? Is there a duration in the reference? It has been more than 30 years since the MIH was reached, so why do we not see a change in the upland ecotone location?
43. P. 39. Setting an MFL based on n=3 is pretty gutsy.
44. P. 40 (the long narrative after Table 2) doesn’t answer the most critical question -- what is the significant harm to fish and wildlife if this MIH is not met as specified?
45. P. 41. See primary comments.
46. P. 42. The MIL is argued as having a benefit of exposing the lake bed so it becomes available to upland species. Isn’t this a direct contradiction of the MIH logic?
47. P. 42. The causation analysis for fisheries impacts seems very tenuous -- lower levels “might” result in DO issues for example. Expect to be asked to demonstrate an oxygen or temperature problem that becomes critical below the MIL.
48. P. 42. Unless the MIL events are evenly spaced, they will not allow bass grow-out to trophy size six times per century. Preventing the lake from drying to cause fish kills would seem a better basis for an MFL.

49. P. 43. Not sure the statistical analysis makes sense when the current levels are already so low. As is the MIL would seem to be occurring much more often going forward than if one looks back to the entire period of record.
50. P. 45. Everything in this table assumes that the long-term downward trend in stage will be reversed and the highs observed 40 years ago will recur at the same statistical frequency as seen in the entire record. You can expect this assumption to be challenged.
51. Table 4. The “discussion” column for “most limiting” WRV#2 relates mostly to protection of vegetation and soils, both of which were rejected as the basis for WRV selection. Likewise the text emphasizes the need for flooding and low flow events, but the report suggests such events have few of the normal ecological benefits. Most interesting, lobe interconnections are judged important, but were not a factor in the MFL development.
52. Table 4, aesthetics. At any proceeding where these MFLs are contested, you can expect to be shown a picture of the lake in its driest mode, and asked: so this is the aesthetics you are protecting? Not saying that is a fair question, but you do need to be prepared to answer.
53. Table 4, aesthetics. Has the District confirmed that the Hoyer report is sound? 20-90% seems like more lake fluctuation than a typical lake user would be “willing to accept”. But if it is, a regime that will capture that would be a more defensible basis for an MFL than the ones now relied upon.
54. Table 4, Filtration. Another WRV which is essentially ignored in the report, such that I’m not sure how it will be argued as protected.
55. Table 4. The logic given for water quality didn’t really seem to demonstrate how the value would be addressed by the adopted MFLs. I think you are saying” minimal problems in the past, minimal changes in the future, so ok”.
56. P. 49. I would have welcomed at least a summary of Price’s results.
57. P. 49. In the conclusions, it may be useful to indicate the extent to which the previously-established MFLs will be reached under the new MFLs. This not intended as a regulatory evaluation, but a practical one - the prior levels all had a duration and frequency component. Will those levels and durations now be met more or less frequently? In short, how much change in hydrology is reflected in the new MFLs versus the old?
58. P. 51. Literature citations. Not entirely in alphabetical order.
59. P. 57. Be sure to check appendices for correct headers and figure numbers. It’s clear some old appendices got dropped, but labeling did not get updated.
60. I enjoyed Appendix A but am not sure why it is part of this report, rather than reference or a linked document.

61. Note that I have not been asked to review the hydrologic model for this system. I do note that the amount of change in seepage between the 2008 and MFLs conditions is small, and you can expect challenges as to whether it is within the error margins of the models.