

PEER REVIEW FORM
SUWANNEE RIVER WATER MANAGEMENT DISTRICT



Project or Report Name: Technical Report – *Minimum Flows and Minimum Water Levels Re-evaluation for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs*

Name and Affiliation of Reviewer: Adam Munson, PhD PE University of Florida

Discipline specialty/specialties covered by this review: MFL Development, Statistical Methods, Use of Hydrologic/Biologic Models for MFL Development. Riverine Ecology.

This document is for the use of project Peer Review Chair retained by the Suwannee River Water Management District (District) for the purpose of providing a technical peer review of a District report, including manuscripts prepared by District staff and consultants.

REVIEW REQUIRED BY THE DISTRICT:

1. Determine whether the methods used for establishing the minimum flows are scientifically reasonable.

A. Supporting Data and Information: Review the data and information that supports the method and the proposed minimum flows, as appropriate. The reviewer shall assume the following:

1. The data and information used were properly collected;
2. Reasonable quality assurance assessments were performed on the data and information;

Note: The reviewers are not expected to provide independent review of standard procedures used as part of institutional programs that have been established for the purpose of collecting data, such as the USGS and SRWMD hydrologic monitoring networks.

B. Technical Assumptions: Review the technical assumptions inherent in the methodology and determine:

1. If the assumptions are clearly stated, reasonable and consistent with the best information available; and
2. Assumptions were eliminated to the extent possible, based on available information.

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C. Procedures and Analyses: Review the procedures and analyses used in developing quantitative measures and determine qualitatively whether:

1. The procedures and analyses were appropriate and reasonable, based on the best information available;
2. The procedures and analyses incorporate appropriate factors;
3. The procedures and analyses were correctly applied;
4. Limitations and imprecision in the information were reasonably handled;
5. The procedures and analyses are repeatable;
6. Conclusions based on the procedures and analyses are supported by the data.

2. If a proposed method used in the MFL report is not scientifically reasonable, the CONTRACTOR shall:

- A. Deficiencies: List and describe scientific deficiencies;
- B. Remedies: Determine if the identified deficiencies can be remedied and provide suggested remedies;
- C. If the identified deficiencies can be remedied, then describe the necessary corrections and, if possible provide an estimate of time and effort required to develop and implement; and
- D. If the identified deficiencies cannot be remedied, then, if possible, identify one or more alternative methods that are scientifically reasonable, based on published literature to the extent feasible.

REVIEW CONSTRAINTS

CONTRACTOR and Peer Review Chair shall acknowledge the statutory constraints and conditions (Sections 373.042 and 373.0421, Florida Statutes) affecting the DISTRICT's development of MFLs. CONTRACTOR and Peer Review Chair shall also acknowledge that review of certain assumptions, conditions, and established legal and policy interpretations of the Governing Board (hereinafter referred to as "givens") is not included in the scope of work. These givens include:

1. The selection of waterbodies or aquifers for which minimum flow and/or levels have initially been set;

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2. The consideration given to changes and structural alterations to watersheds, surface waters, and aquifers, and the effects and constrains that such changes or alterations have had or placed on the hydrology of a given watershed, surface water, or aquifer;
3. The method(s) used for establishing MFLs for other waterbodies and aquifers; and
4. Standard procedures used as part of institutional programs that have been established for the purpose of collecting data, such as the USGS and SRWMD hydrologic monitoring networks.

Instructions:

1. The results of this review are for the use of the District and they are not to be revealed to others without the express permission of the District.
2. By signing this form, the reviewer certifies that the peer review was conducted according to the guidelines listed above and that the opinions and recommendations included in the review constitute an independent review per Chapter 373.042(5), in the discipline noted above.
3. The reviewer also certifies that the review was conducted according to the Scope and Conditions specified above.

Signature of Reviewer:	Date of Peer Review: Commenced January 2020
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Responders Certification: The comments and criticisms provided by the Peer Review Chair have been addressed as noted in column C in a separate response document, which is attached, and in the report.

Name and Affiliation of Responder to Peer Review Comments:	
Signature of Responder:	Date of Response:

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			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action	C. Action to be Taken in Response to Comment
1	P5, P8 Figure 4	No	Page 5 refers to the use of the “best available elevation data” and the cited table refers to the “surveyed cross sections” for the creation of the thalweg. This is a re-eval and there is interest in what information has changed between the 2013 and 2019 reports.	It would be useful to define the origins cross-sections either directly or through reference so the reader knows if any new data is included in this graphic. It looks like the same graph as the 2013 report so I assume no underlying changes to the data? But the HC cross sections did undergo some changes?	
2	P9	Not Likely	WY 1933-2015 was selected as the POR “based on the flow data available”. Table 1 suggest that the Ft. White Gage data	The report might benefit from discussion on the omission of WY1932 from	

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			goes back to 1927 while the US441 and HWY27 gage go back only 1992 and 2002, respectively. The longest concurrent data (Worthington Springs and Ft. White) data date back to WY 1932. The report does not specify why WY 1932 was omitted.	the POR which is defined in the second paragraph of page 8 as WY 1933-2015.	
3	P 11	No	The report states that “for all LOESS curves presented in this report, a smoothing value of 0.33 was used”. The smoothing value represents the proportion of the data that is used. Essentially controlling the number of points used. Because .33 is a proportion of the size of the data set when the POR changes the span in time that influences local smoothing changes and in fact the number of points	The authors should consider how many points (years) should be considered when smoothing PORs rather than applying a constant proportion to records of varying length.	

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			considered changes. The net effect is that longer PORs are smoothed to a greater extent than shorter PORs which will be more heavily influenced by a small number of points temporally closer to the smoothed point. This effect is visible in Figure 13 where the two smoothed curves show different levels of response to near term changes in water level.		
4	P 12	Yes	A MLR was used to infill a few months of missing data from 2000 and 2001 in the flow record of the US441 gage. It was also used to extend the 441 back to WY 33 (the POR). This seems a critical step in the formation of the RFT and it is treated fairly casually in the report. It would be useful	This seems like an important component of the MFL and would benefit from greater discussion and documentation.	

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			to present information beyond the R-squared. t-stats and p-values for the two coefficients as well as a scatter plots to establish the appropriateness of the linear relationships. Residual plots might also be insightful. This data is important since it is an MFL. The infilling of the Hildreth gage has been reviewed prior to this re-evaluation.		
5	Page 12, 1 st Paragraph	Yes	"A truncated dataset" was used to omit flows at or below zero and above 3500 cfs from the regression. I assume this is due to non-linearity observed above the flow or at least excessive heteroskedasticity of the residuals but no reason is given in the text.	Please explain the rational for the truncated dataset and weather the resulting equation is ever used to predict values outside of the regression bounds. The nature of multiple WRVs rely	

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				on high or low flow conditions so extremes can be important in MFL development (especially low flows)	
6	P14 section 2.3.4	Yes	The reports sites Kelly 2004 noting that the AMO patterns are not displayed at the Ft White or Worthington Springs Gage. But Kelly's works noted that rivers between the northern flow pattern and southern flow patter might exhibit a bi-modal pattern with influences from both the norther and southern rain flow patterns. In the initial 2013 document Figure 2-31 clearly shows the bi-model pattern Kelly identified. By using annual flow duration curves this nuance is	Look at intra-annual flows between the two periods to assess if the timing of flow events has changed. It is likely that through discussions with Kelly you have already considered this but the document would be improved with a discussion of any rational involved in dismissing the AMO as relevant to the	

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			obfuscated. It is possible that while the annual flows are unchanged between the two AMO cycles the timing of flows has changed between early and late year peaks. This may have meaningful effect on seasonal evaluations such as for specific life stage analysis in the SEFA methods.	development of the historic record.	
7	P14 Section 2.3.5	Yes	The last sentence on the page note that the annual rainfall averaged the same in the "wet" and "dry" periods identified by Kelly. My comment is the same as above. On the boundary you might expect a shift in timing as you move from a northern to a southern dominated pattern resulting in a long term bi-model hydrograph which		

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			will show alternating dominate peaks when examined over the two periods.		
8	P 24, P=Last Paragraph	No	Published data was used “where available” and by estimating water use based on population where not available. What % of the land area “counties” were from data and what percent was estimated based on population and what per capita use rate was used. I think this is meant to be details in Appendix B. If so please cite appendix B here.	I think this is somewhat detailed in Appendix B. If so please cite appendix B here. Given the importance of the RTF this section might benefit from some expansion in the body of the report.	
9	Page 25 Figure 19	Yes	The table estimates water use through time but only goes back to 1965. Figure 2 in appendix B suggest a longer estimate (hindcast) was developed back to 1900 and the water use estimates were used to	Extend graph to show estimates back to WY 1933 (or 1930 if 5-year blocks are used or even 1900 if that is the entire period estimated) or	

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			recreate the RTF back to WY 1933 so why does the graph not show the estimated back to at least WY 1933?	explain why the graph only goes back to 1965.	
10	Page 25 and Appendix C	Unknown	The RTF development is referenced here in the second paragraph and the reader is directed to Appendix C. Appendix C does a reasonable job of outlining the logic of the RTF creation but is devoid of number or graphs or examples. I will defer to the opinion of the groundwater experts on the Panel but I at least feel some sample values or summary values would be beneficial to the discussion in Appendix C given the importance of the RTF in measuring compliance with the MFL.	No action requested other than consideration of additional information/examples.	

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11	P 106 Section 6.6.2	No	Recalling Figure 21 – It might be nice section 6.6.2 to add a graph similar to Figure 21 and impose the suggested MFLs. It would show clearly and quickly the relationship of the proposed MFLs with the estimated impacts over time.	Add a graphic	
12	P 48	No	The report cites the Warm Water Task Force 2004. This citation is a draft report. Presumably, since the draft was 2004, there is a final report available in which the FFWCC would have confirmed their draft assessment?	If a final report is available please cite the final version of the report in support of the 68 degree threshold. If the report was never finalized perhaps cite (Laist and Reynolds, Coastal Management 33:279-295, 2005; Irving, Biological Conservation 25:314-334	

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				1983; or Bossart, Handbook of Marine Medicine, 2001)	
13	P 48	No	It is commendable that the District continues to improving modeling as new data is available. The HEC-RAS model has evolved allot since 2002.	No Action	
14	P 76, Second paragraph	No	32 NGVD is cited as being recommended for paddling. The last sentence states "if river levels are below 31.5" at US 441 paddlers may encounter some shallow spots. This seems like a random statement that play no other roll in the discussion. Why is 31.5 ft of interest? It seems only the 32 ft NGVD guidance is used so the	Suggest either removing the sentence with 31.5 ft or explaining why it is mentioned.	

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			mention of the 31.5 ft clutters the discussion.		
15	P 72 Table 16	No	It would be helpful to have easily available the periods of time for which each of the 42 habit curves were evaluate. I have found in the text where it state that fry were evaluated for April through July. It would be helpful if in Table 16 you could list the period ofthe year for which each curve was evacuated in SEFA	Append table 16	
16	P 83	No	It is reported that flows above 3,200 cfs were not used in the SEFA evaluations. Traditionally in stream habitat modeling has been used for low flows and only	A discussion of why flow were limited to 3,200 cfs and not some other flow might benefit the reader. Also the text might benefit from a discussion of which months	

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			evaluated seasonally so a cutoff probably makes sense.	were evaluated for which life stages or were all but the spawning evaluated annually?	
17	P 84 Third Paragraph	Yes	For apportionment the “reach methodology” was used. This is stated to be because the SEFA sites are all downstream of the US441 gage. Therefore the “sensitivity to the flow reductions of instream habitat upstream from US441 gage was evaluated implicitly.” This seems more a policy assumption than an assessment of instream habitat sensitivity. Especially when the report notes that 75% of the downstream (of US441) weight is based on	Consider the wording to not overstate the representative nature of the assumption.	

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			cross sections dissimilar to the one at and the next closest to the 441 gage.		
18	Page 84	Yes	<p>Apportionment</p> <ol style="list-style-type: none"> 1) Both times Jacobs and Romesser (2006) is cite there is a hedge saying this application is “similar” and that it is “largely consistent”. Please explain differences. 2) At seems Good and Mattson (2004) proposed, and Jacobs and Romesser (2006) tested the reach methodology for apportioning withdrawals within a stream based on ecologically derived limitations at a downstream gage to guarantee greater restriction at an 	<p>Additional discussion of the appropriateness of apportionment for setting an MFL in this case.</p>	

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			<p>upstream gage to assure compliance above the reach (Nash 2007).</p> <p>3) However, we have POFR and CFR standards developed at US441 (figure 61.) They include a SEFA site which is basically at the US441 gage. The downstream river is quite different than the upstream.</p>		
19	Appendix C		Seems data and graphs might be useful.		
20	Section 7	No	The conclusion that “ an appropriate was to afford protection from significant harm at this time is to treat the Priority Springs collectively for a defined reach” is reasonable and consistent with other		

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			adopted MFLs. The districts on ongoing efforts listed in section 7.3.2 are commendable and reflective of their commitment to improving spring protection.		