

Report

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s)		To be completed by Report Author(s)
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			appears that LOESS is included for Ft White, but this is not labeled, or otherwise indicated.		
2.9	Pages 14-15, discussion of AMO	No	2.3.4 Atlantic Multidecadal Oscillation—authors conclude that AMO is not observed in time series. Do I agree? Maybe, I am not certain. Page 15—Figures 8 and 9. Fig. 8 is AMO surface temperature sequence. Figure 9 is flow exceedances for AMO warm vs cool periods for SFR at Ft White and Worthington Springs. Appears to be no apparent AMO effect.	Please confirm that District staff agree with authors conclusion that the AMO cycle is not a strong signal in the data. Beyond the AMO issues the authors do need to also address the potential effect of climate change on the health of the LSFR and IR, and their associated artesian springs. This is covered in comment G16.	
2.10	Page 14, Section 2.3.5 Rainfall and Air Temperature	No	2.3.5 Rainfall and Air Temperature—first paragraph—agree with use of PRISM? Yes	No further action required.	
2.12	Page 18	No	2.3.6 Groundwater Level—do I agree with choices for GW monitor wells? Yes, I do, but I am interested response by Dr. Motz my fellow panel member and a groundwater modeling expert.	No further action required.	

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2.13	Pages 22, Section 2.5 Surface Water Quality	No	<p>Surface water quality: Page 22—Figure 16 in part. Fig. 16 Nitrate levels in LSFR, cited source as Florida Springs Institute (2012). Question—any data more recent than what appears to be 2010?</p> <p>Next, two locations plotted High Springs and Ft White-both trend lines appear to be declining over period 1987 to 2010.</p> <p>Also, concentrations at FW look to be twice that at High Springs. Please discuss.</p> <p>2.5—Surface Water Quality—text covers nitrate issues and</p>	Please provide answers to questions.	
2.14	Page 23	No	<p>TMDLs, and the FDEP threshold of 0.35 mg/L.</p> <p>Figure 17. Nitrate levels in LSFR springs, source cited as Florida Springs Institute (2012). Question—any data more recent than what appears to be 2010? Data from Seven springs: some trendlines declining others rising. trend lines appear to be declining over period 1990 to 2010. Agree?</p> <p>Also, concentrations at Blue and Ginnie look to be 2-4X that at the remaining</p>	Please provide answers to questions.	

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			5...agree? So, looks like Blue and Ginnie are not in compliance with the 0.35 mg/L standard. Agree?		
2.15	Page 23, Section 2.6 Groundwater Use	No	Content of this section is very important feed into this exercise. For this review however none of it can be verified from what is in the report. That includes the single paragraph of text and supporting Figures 19 and 20. Secondly, it seems that this section should be referencing Appendix B: Water Use Hindcasting.	Add text to reference Appendix B	
2.16	Pages 24-28, Section 2.7 Reference Timeframe Flow	No	Content of this section is very important feed into this exercise. For this review however none of it can be verified from what is in the report. That includes the single paragraph of text and supporting Figure 21.	No further action required	
2.17	Pages 24 and 26, Section 2.7 Reference Timeframe flow	No	Text for intro to 2.7 Reference Timeframe Flow (RTF). I concur with approach to generate the RTF. It appears to be reasonable approach. See the remaining pages in this section and supporting material in Appendix B and C.	No further action required	

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2.18	Page 25, Section 2.7.1 Flow Characteristics	No	Figures 19 and 20. Breakout of water use in planning area. Both figures look reasonable.	No further action required	
2.19	Page 27, Figures 22 and 23	No	Figures 22 and 23. Fig 22—flow exceedances for Ft. White and US441. Fig 23 flow exceedances for IR at HWY 27. Plots show that the RTF vs measured flows differ very little. Can hardly see differences.	No further action required	
2.20	Page 28, Figure 24	No	Figure 24--Temporal change in relative difference between RTF and measured flow at FW, US441, and Hwy27. Plots by gage have data overlying each other, so this is difficult figure to interpret. May help to drill down on residuals.	Can clarity of figure be improved?	
	3.0 Biology: pages 29-55				
3.1	Page 29	Yes	3.1 intro to the Conceptual Ecological model. This CES is a simple linear flow diagram of cascading influences. It is an effective visual for this introduction Text for introductory paragraph list of six effects of flow alteration on ecosystems.	Introduction covering the conceptual ecological model in text on pages 29 and 30 and including Figure 25 are acceptable. Consider updating this conceptual overview following	

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			Text in section 3.1 references Poff et al. 1997, this reference is foundational to the field, but it is a bit old. Suggest that the science update can carry over to the conceptual framing of the biological communities.	the update the science. A more detailed recommendation on how to move this forward is included as comment G8.	
3.2	Page 31	No	Page 31—Figure 26 in part, Conceptual trophic model. This a another very simple trophic pyramid but highlights the major taxonomic groups of aquatic insects the Ephemeroptera, Plecoptera, and Trichoptera (EPS). Arrows in the figure are not labeled, so it not clear what the transfers represent.	Please annotate the figure or legend to make it clear what the arrow flows represent.	
3.3	Pages 37-38	Yes	Table 4, Effects of hydrologic factors on floodplain vegetation. Neither table nor text cover the dewatering and stays-dry end of the full hydrologic regime. This is an oversight that needs to be corrected.	Please revise Table 25 and supporting text to cover the critical need for dewatering events. There are very good review articles covering this topic in detail.	
3.4	Page 39	No	Text 3.4.1 SAV—details of SAV coverage are given, but these are not directly verified. Historic SAV survey covered in reports by FDEP and others.	Can summary acreage value be added to figure?	

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			Figure 33, two maps showing extent of LSFR floodplain wetlands, and 10-year flood zone. Legend shows emergent wetlands, but I do not see that in either of the two figures It would help to know the acreage area values for the different vegetation types displayed.		
3.5	Page 40	No	Figure 34. Extent of IR floodplain wetlands, and Flood Zone A It would help to know the acreage area values for the different vegetation types displayed.	Can summary acreage value be added to figure?	
3.6	Page 41	No	Table 5 in part. List of SAV species identified during a 2017 survey of LSFR (Morris et al 2017). Text following highlights SAV. Notes effect of recreational use on SAV, by the tubers. Table 4--Check scientific name for Chara. The name scientific name provided appears to be an error. Species lists on page 41 lists look good and as complete as needed. Lists are acceptable but cannot be independently	Please check the Latin name for species, the specific epithet, of Chara. Please an answer the question about long-term drought and potential effects of climate change.	

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			<p>verified. Lists comport with my knowledge of these habitats, the rivers and springs of the SR district, and observation from the two field trips in May 2019 covering the IR and LSJR respectively.</p> <p>Final para comments on impacts of recreational use, especially during long-term drought conditions. This begs the question...do the MFLs address this? Do they protect from impact during long-term drought? What about climate change?</p>		
3.7	Page 42	No	<p>Figure 35, Location of SAV transects on IR. Visited a couple of these transects. Number and spatial distribution appear to be a good plan to characterize the habitats in the IR. I visited a number of these transects during field inspection. This page is fine as is.</p>	No further action required.	
3.8	Page 43	No	<p>Figure 36 in part, Upper IR SAV transect summary, from FSI 2016. Figure is a good visual time series summary of SAV dynamics. Shows that species change occurs through time. Note the demise of Chara from 1998 to 2004. Is this</p>	Please provide answers to questions.	

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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
			<p>significant? Are SAV species interchangeable? Is some better habitat?</p> <p>Several paragraphs of new text covering factors that affect SAV. Last paragraph of page mentions research by Hensley and Cohen 2017 on effect of flow reversals, that is there may be negative effects on algal consumers. This argument may need to be carried forward as explanatory, or exploratory. Authors certainly suggest causal relationship that should be explored further.</p>		
3.9	Page 44	No	Table 6 starts at bottom of page. List of species of fish found in the SFR 1972-2018. There are 50+ species. Table is fine as is.	No further action required.	
3.10	Page 44	No	Begins text on Aquatic Macroinvertebrates 3.4.2. First sentence states these populations in the LSFR are healthy based on water quality and community sampling, the work done by others. Cannot verify by what is in report, I assume that these studies are interpreted correctly for the LSFR and IR	No further action required.	

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3.11	Pages 45-46	No	<p>Begin text, 3.4.3 Fish. Basic descriptions of fish sampling on SFR and IR. Table 6 continued listing fish species found in the SFR.</p> <p>Also, Table 7 in part, Fish species in IR. Some text, 3.4.4 intro to T&E Species. Table 7 is fine as is.</p>	No further action required.	
3.12	Page 47	No	<p>Section 3.4.4 Threatened and Endangered Species. The content of this is fine</p> <p>Table 8. Species deemed likely to be at risk from LSJR/IR flow and water level reductions. Also, paragraph on T&E species. Both Table 8 and text coverage are fine as is, and therefore acceptable.</p>	No further action required.	
3.13	Pages 48-49	No	<p>Lower page begin text on manatee, 3.4.5. Frames manatee habitat as for thermal refuge.</p> <p>Question--should thermal refuge be an event-based criterion, such as SJRWMD does for Volusia Blue Springs?</p> <p>Figure 37 mostly, Comparison of water temps in 2017 and 2018 at Blue Hole, The IR, and LSFR. What should we</p>	Pleas provide responses to questions.	

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			<p>conclude from these data time series summaries?</p> <p>Both figures in Figure 37 look to be fine/acceptable. Cannot independently validate.</p>		
3.14	Pages 50-51	No	<p>Tables 9 and 10. Table 9 manatee counts in LSFR (2005-2018). Table 10 Counts in IR (1992-2018). Cannot independently verify manatee sighting records. Tables are thus acceptable.</p> <p>Table 8 continued in part. Text 3.4.6 on silt snail. Text covers protective criteria for thermal refuge. I agree.</p>	No further action is required.	
3.15	Page 52	No	<p>Text begins, 2.4.6 Ichetucknee silt snail. Biology of species and habitat preference are covered. Cannot independently verify silt snail information. Text is therefore presumed to be accurate, and thus acceptable.</p> <p>Based on observations of Coffee Spring, concur that habitat is quite small. Species designated as species of greatest conservation need by FF&WCC.</p>	No further action is required.	

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			It is not clear that the species is at risk, but since it is included in this report, then yes, the concern is stated. And I concur		
3.16	Page 53	No	Text on Oval pigtoe mussel, Gulf sturgeon, Suwannee bass continues. Text covers the basic threat to these species. I concur with these threat assessments. For Suwannee bass, the basic research cited is 35 years old. Is that OK? Content of page is fine as is.	Please answer question about Suwannee bass.	
3.17	Page 54	No	Figure 40 Extent of gulf sturgeon critical habitat. Figure 40 is a bit confusing as it is reproduced from and references other reports.	Is there a better figure to use in place of this one?	
3.18	Page 55	Yes	Table 11. Seasonality of fish spawning for select species. Brief text on seasonality in section 3.4.10. Figure shows spawning seasons for six major fish species. Should all this seasonal info be captured in the protective events? I say yes.	Please respond to question.	

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	4.0 Approach to Setting MFLs: pages 56-74				
4.1	Page 56	Yes	<p>Text 4.0 Approach to setting MFLs, two paragraphs. Last sentence in second paragraph mentions flow duration curves as the organizing idea for assessing hydrologic change. I disagree, as already noted this is too simplistic to protect the flow regime in these rivers and springs, and I know where this leads in the rest of the document. So, this is an opportunity emphasize the hydrologic regime.</p> <p>I do however concur with this basic coverage of the ten WRVs and the breakout to the 14 WRV elements in Table 12.</p>		
4.2	Page 56	No	<p>Text: 4.0 Intro, two short paragraphs that describe approach. First is mention of the RTFs, and key assumptions: RTFs are protective of the systems and WRVs, and that some amount of water is available within the RTF regime. Do I agree? Mostly yes. This is the basis of most MFLs for rivers, springs, lakes and wetlands.</p>	<p>This MFL setting process must be re-evaluated and updated. At a minimum this should include significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in Recommendations section of this report.</p>	

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			Second paragraph has a few more key assumptions in how to identify the most relevant WVs. I concur with the approach. Final sentence mentions flow duration curve, which may be a subtle warning		
4.3	Page 57	Yes	Section 4.1.8, WRV 8 sediment loads—report notes that there is lack of data regarding sediment loads for these rivers. This is uncertainty issue. Do they eventually make recommendations for reducing uncertainty? Does the uncertainty make this WRV less valuable? Less Reliable?	Please provide answers to questions.	
4.4	Page 58	No	Section 4.2, Indicators and response functions. I generally agree with the examples they have listed. And these carry over to the details in Table 12.	No further action required.	
4.5	Pages 60-61	Yes	Table 12 Selected indicators, response functions, and MFLs assessment metrics for WRVs Table 12 Table is the creation of each indicator for each WRV selected. I concur with the content of the first two columns, the indicators, and their	This MFL setting process must be re-evaluated and updated. At a minimum this should include significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in	

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			<p>relevance. The next two columns become more problematic: the WRV's response function, and its metric. Authors choose an across the board percent change approach to response functions and metric for all 14 proposed protective metrics. I strongly disagree with the % change approach.</p>	<p>Recommendations section of this report.</p>	
4.6	Pages 62-63	No	<p>Section 4.3 HEC-RAS Modeling: I agree with choice of HEC_RAS model. I have no sound technical reason to reject the choice.</p> <p>Text, 4.3.1 HEC-RAS Modeling. See also Appendix D</p> <p>Text, 4.3.1.1 Model development—I accept the choices and assumptions made for selection of HEC-RAS model, model development, and model revisions from the version used for the previous MFL.</p>	<p>No further action required.</p>	
4.7	Page 64	No	<p>Text, coverage of calculating values of model fit, based on Nash & Sutcliffe (1970). I agree with the method.</p>	<p>No further action required.</p>	

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4.8	Page 65	No	<p>HEC-RAS model Second paragraph, I do agree with premise laid out on ranking and acceptance of efficiency coefficient values.</p> <p>I find that Section 4.3 for the report is general summary of the more extensive coverage of the HEC_RAS model in Appendix D. I do not identify any inconsistencies between this text and Appendices D and D1.</p>	No further action required.	
4.9	Page 65	No	<p>It appears that the HEC-RAS used for the initial MFLs is revised here. If so, then does the update address the issues raised by Graham et al. (2013)? Is uncertainty being addressed in the model revision process?</p>	Please answer the questions.	
4.10	Page 66	No	<p>I find that text in report agrees with information that is presented in more detail in Appendix D.</p> <p>Table 13 presents the Final Transient Model Results. I have no reason to doubt the veracity of results presented</p>	No further action required.	

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4.11	Page 67	No	<p>Table 14: Nash Sutcliff coefficient of model fit efficiency for streamflow gages on LSFR and IR. Table 15 Proportion of all simulated value daily water depths values within 10, 15 and 20% of the measured values of Nash-Sutcliff coefficients.</p> <p>Content of both tables is acceptable as is.</p> <p>For Table 15 what problems and/or uncertainties arise from the two gages rated as unsatisfactory?</p>	Please answer the question.	
4.12	Page 68	No	<p>Section 4.3.1.3 HEC-RAS Steady State Model Development and predictive simulations: I agree with use of the steady state model to generate the flow profiles that follow in Figure 43.</p>	No further action required.	
4.13	Page 69	No	<p>Figure 43, two-part plot of flow profiles for select non-exceedance frequencies for LSFR and IR, respectively. Cannot independently verify, so I accept as</p>	No further action required.	
4.14	Page 70	No	<p>Figures 44 and 45. Figure 44, steady state water profiles for select flow non-exceedance for LSFR. Figure 45, steady</p>	No further action required.	

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			state water profiles for select flow non-exceedance for IR. Cannot independently verify, so I accept as valid representations.		
4.15	Page 71-73	Yes	As a general comment on SEFA I support the use of this habitat analysis method. SEFA is a good choice. SEFA is much highlighted in the Horne et al. 2017 review volume. Next, I found that the SFA analyses presented are scientifically reasonable, and reproducible, for: 1) taxa-species-life stage used 2) transect locations, and 3) data inputs from the HEC_RAS model	In general, the use and application of SEFA is acceptable. If habitat relevant WRVs must be reevaluated, then SEFA analyses will likely have to be re-done too. Findings, outcomes and recommendations may change as result.	
4.16	Pages 73-74	Yes	Text, 4.4 MFLs Assessment Methods. I have significant disagreement on methods used. Beginning in third paragraph, the adoption of the % change method is invoked. The final sentence in the paragraph claims that this is an event-based approach, citing Neubauer et al. 2008. I find this misleading. The two methods are quite different. I explain this in detail elsewhere.	This MFL setting process must be re-evaluated and updated. At a minimum this should include significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in both the Recommendations section of this report, and in General comments 1 through 18 above.	

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			<p>Text continues MFLs Assessment Method. I have significant disagreement on methods used. Significant disagreement in choice made to use only frequency change criteria for WRV indicators. And adoption of SWFWMD's 15% allowable change. Authors make no mention of other approaches, such as event based. In fact, text on the event-based method that was included in the April draft document has been deleted.</p> <p>In addition, Graham et al. 2013 included a major recommendation for change to approach for setting metrics for a group of the WRVs. Their recommendation was not acted on then, and so remains relevant still.</p> <p>Finally, in Poff et al. 2017 review of the state of science in setting environmental flows shows that frequency change measures are much earlier generation of hydrologic change method. The simple frequency change method has shortcomings that are better addressed by event-based methods that can address more detailed aspects of the hydrologic regime.</p>		

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	5.0 Evaluation of WRVs, Section 5, pages 75-98				
5.1	Page 75	Yes	<p>Figure 47 Threshold flow translation between Ft White and US441 (percent of time that flow is exceeded). It is helpful to see all the threshold flows for both rivers arrayed on FDCs from their respective RTFs. So, the figure itself is an illustrative visual. But where did the threshold values come from? The threshold values were not directly presented in Table 12.</p> <p>I agree with assumption regarding level of protection WRVs provide to the river and spring systems state in the first paragraph.</p> <p>Second paragraph: I accept the method used for the translation of threshold flows from US441 to Ft. White gage.</p> <p>Text indicates the emphasis of the percent change approach using flow duration curves (FDCs). I do not agree with the reliance upon this approach for</p>	<p>This MFL setting process must be re-evaluated and updated. At a minimum this should include significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in both the Recommendations section of this report, and in General comments 1 through 18 above.</p>	

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			all WRVs. This is a major problem with this how the WRV indicators and measurement metrics are developed for this set of MFLs.		
5.2	Page 76	Yes	<p>Text for Section 5.1 Recreation In and On the Water. This is where HSW's approach becomes problematic. Authors assume that the % change approach is best method, and that the threshold for significant harm can be defined using the SWFWMD's 15% allowable change.</p> <p>This is the first WRV covered, but the same format is carried through the other WRVs/indicators selected in Section 4 and detailed in Table 12.</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in both the Recommendations section of this report, and General comments G1 though 18, above.</p>	
5.3	Page 76	Yes	<p>Text on page includes 5 paragraphs on WRV1 for the LSFR. Several assumptions are given with which I agree:</p> <ul style="list-style-type: none"> • Paragraph 1—general guidance available from paddlers guides • Paragraph 2—allowable change defined by change in time, that is amount of time the activity is precluded. As an application of the 	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	

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			<p>%change method, then this sounds like a standard application.</p> <ul style="list-style-type: none"> Paragraph 3—define passage for paddling, boating and tubing. 		
5.4	Page 77	Yes	<p>Report section addressing the IR: Text on IR notes that impacts to SAV beds are most worrisome and have been since early work by Charlie Dutoit in 1979. Tubing season is Memorial Day to Labor Day. Paragraph 2 notes critical concern over extreme low water conditions—does this warrant an extreme low water protective regime?</p>	Please answer the question.	
5.5	Page 78	Yes	<p>Table 17. Flow reductions associated with 15% decrease in exceedance for paddling/boating/tubing. Key assumptions in this analysis is problematic. And it does not seem that the Threshold for tubing on the IR covers the seasonality of use. Shouldn't it? Should it be an MDR event? Text, top one third of page. Second paragraph covers the threshold estimates under RTF conditions. Do I agree? Yes.</p>	<p>Please answer the questions.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	

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5.6	Sequence of Ten Tables on various pages	Yes	Ten tables covering the WRVs are or may be problematic. Included are: Table 17, page 78 Table 19, page 80 Table 20, page 81 Table 23, page 86 Table 24, page 87 Table 25, page 88 Table 26, page 90 Table 27, page 91 Table 28, page 92 Table 29, page 94	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.7	Page 79	Yes	Figure 49, RTF flow duration curve depicting threshold flows protective of paddling on the LSFR at FW. Content of this figure is acceptable if the % change method is appropriate metric here for flows protective of paddling.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.8	Page 80	Yes	Text, 5.2 Fish passage, 5.2.1 Fish Passage. Paragraph 2 defines fish passage conditions. I concur with depth and width recommendation. Table 19—Flow reductions associated with 15% decrease in time that threshold	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	

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			stages for fish passage on LSFR and IR were exceeded. If %change metric is valid, then this presentation is acceptable. I cannot verify that values in table were entered properly, but values look correct based on the array of threshold plotted for LSFR and IR in Figure 47, page 75.		
5.9	Pages 80-81	Yes	Text, 5.2.2 Gulf Sturgeon Passage covers two paragraphs. First paragraph covers recommended channel depth and width for sturgeon passage. I concur with these habitat values. Question—what do sturgeon do between the two spawning periods? Does the downriver movement of juveniles require protection? Other life stages? Spawning habitat?	Please answer the questions regarding spawning. This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.	
5.10	Pages 80-81	Yes	Question—in general how should seasonality issue be handled? Seasonality adds another component of seasonal occurrence and duration. So, using an MDR event makes a lot of sense. Also, if this were being done by the SJRWMD, then the event would be	Please answer the questions.	

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			defined. I am sure that SJR District has many examples from established MFLs.		
5.11	Pages 80- 81	Yes	<p>Last para estimates the critical flow threshold associated with criterion for LSJR at FW and US441 gages. I accept these values as estimated.</p> <p>Table 20 Flow reductions associated with 15% decrease in time that threshold stages for Gulf sturgeon passage on LSFR and IR were exceeded. Since an MDR event may be useful here, I note that the %change approach collapses a lot of detail that may be important. Spawning season is two part and must be captured. Also begs the question as to need for protection of other life stages of the Gulf sturgeon, and quantity and quality of spawning habitat. When do young move down to estuary or coast?</p>	<p>Please answer the questions.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	
5.12	Page 81	No	Text bottom of page, 5.2.3 Instream Habitat, this is the SEFA habitat modeling and assessment step. I agree with choice of SEFA as the habitat analysis tool. SEFA is also a broadly supported habitat analysis tool by series of authors in Horne et al. 2017. The	No further action required.	

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			<p>multiple authors in this volume are enthusiastic supporters and users of SEFA and its historical evolution from PHABSIM.</p> <p>Six sites selected SEFA modeling, four on LSFR and two on IR. Site selection is acceptable</p>		
5.13	Pages 83	Yes	<p>Table 21 General characteristics of LSFR SEFA Sites. Table is acceptable as is.</p> <p>SEFA Site Characteristics—basic descriptions of LSFR SEFA sites. Text acceptable, no problems.</p> <p>Two paragraphs on SEFA sites are acceptable</p> <p>Text, Flow Reduction Assessment, one paragraph. Assessment method explained. I question the %change approach on this. Need to drill down on this some more, Big point is that an MDR, or other approach was not considered. So, is the %change method appropriate for this use?</p>	<p>Please answer the questions.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	

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5.14	Page 84	Yes	<p>Text covers six paragraphs on SEFA. SEFA analysis gets boiled down to allowable 15% reduction average weighted score (AWS) for each species and life stage at each SEFA site. I find this approach to be problematic.</p> <p>Beyond the problematic application of the % change method, the remaining summary on how the mechanics of the SEFA modeling and analysis was performed is acceptable.</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	
5.15	Page 84	Yes	<p>Section 5.2.4 Woody Habitat begins at bottom of page. First paragraph provides summary of the importance of woody habitats in these flowing water systems. I concur with this summary.</p> <p>Question—can this be developed as an event-based MDR metric?</p>	<p>Please answer the question.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	
5.16	Page 85	Yes	<p>Table 22, Basis for SEFA based hydrologic shifts for LSFR at FW and US441 gages. Table has a seasonal window of April to July in reference to SEFA analyses, why is that? Also, table has five footnotes detailing how values were estimated. All five are individually</p>	<p>Please answer the question.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in</p>	

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			and collectively logical in this use. If any step is called into question, then the value of these estimates must be reviewed.	Recommendations section of this report, and General comments G1 though 18, above.	
5.17	Page 85	Yes	<p>Text has three paragraphs on woody habitat quality evaluation.</p> <p>Paragraph 1—this paragraph lays out why this WRV should be an assessed using an MDR metric I agree with arguments for importance of magnitude of inundation + duration + seasonality issues. All these critical components however are not addressed by the % change method. By contrast MDR metrics will capture these components of the hydrologic regime.</p> <p>Paragraph 2—more detail on the ecological functions provided by woody habitats, such as submergent and emergent woody habitats. Again, this difference can be accomplished with an MDR metric.</p> <p>Paragraph 3—agree that data for three locations were reviewed. The 15% change is problematic. So, I do not agree that the threshold values applied are the</p>	<p>Please comment on the recommended action.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	

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			<p>best available for the protection of woody habitat.</p> <p>The choice of method and metric may be problematic. This choice should be re-evaluated. Specifically, the authors should use a metric that addresses magnitude, duration, seasonality and return interval.</p>		
5.18	Page 86	Yes	<p>Table 23 Flow reductions associated with 15% decrease in time that threshold stages for woody habitat sustainability on LSFR and IR were exceeded. The 15% presumption method is problematic. Thresholds are problematic.</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	
5.19	Pages 86	Yes	<p>Text, 5.2.5 Manatee Thermal Refuge, text covers two short paragraphs:</p> <p>Paragraph 1—temperature data used. But again, it seems that this manatee protection metric needs to be an MDR metric that addresses seasonality and return. The return interval is likely annual, but that can be verified by manatee experts. See also the SJRWMD work on manatee protection for Volusia Blue Springs, that will be event based.</p>	<p>Please comment on the recommended action.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	

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			Paragraph 2—15% change is problematic. So, I do not agree with the thresholds developed. Strongly recommend that authors consider using the manatee thermal refuge event developed by SJRWMD for the Blue Spring in Volusia County.		
5.20	Page 87	Yes	Table 24 Flow reductions associated with 15% decrease in exceedance corresponding to manatee thermal threshold flow on IR. 15% change is problematic. So, I do not agree with the thresholds developed. Strongly recommend that authors consider using the manatee thermal refuge event developed by SJRWMD for the Blue Spring in Volusia County.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.21	Page 88	Yes	Section 5.2.6 Floodplain Habitat—Based on my own experience strongly recommend that the two critical structural features of floodplain habitat, the vegetative communities and hydric soils should be protected by MDR metrics.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	

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5.22	Page 88	Yes	Table 25, Threshold flows for four predominant vegetative types in LSFR floodplain. The %change method used is particularly problematic for the floodplain system. The MDR criteria from SJRWMD should be applied for each relevant community type, and cover the typically relevant MFLs for infrequent high (IH), frequent high (FH), minimum average (MA, and frequent low (FL), etc.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.23	Page 88	Yes	Text, floodplain, two paragraphs—I strongly disagree with 15%change method. Bottom of page, text on 5.2.7 Hydric soils. Absolutely disagree with method used and request MDR following SJRWMD methods. Many examples exist covering application to floodplain hydric soils on rivers and springs throughout north and central Florida.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.24	Page 89	No	Figures 52 and 53. Figures are explanatory and are fine as is.	No further action required.	
5.25	Pages 90	Yes	Table 26, Flow reductions associated with 15% reduction in time of threshold flows for the four predominant vegetation	This MFL setting process must be re-evaluated and updated. The sequence of steps	

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			types in the LSFR floodplain at FT. White and US441. I strongly disagree with this analysis. Do the MDR following SJRWMD methods, then compare.	necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.26	Page 91	Yes	Table 27 in part, Flow reductions associated...threshold flows for hydric soils in LSFR and IR floodplains I strongly disagree with this analysis. Do the MDR following SJRWMD methods, then compare.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.27	Page 91	Yes	Text for Section 5.2.8 SAV. Three paragraphs on SAV communities in IR. I strongly disagree with this analysis.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
5.28	Page 92	Yes	Table 28, I strongly disagree with this SAV analysis. Please apply the MDR events following SJRWMD methods, then compare.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this	

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				report, and General comments G1 through 18, above.	
5.29	Pages 93	Yes	<p>Sediment and load classification categories (FISRWG 1998). Figure is acceptable, looks to be from a standard reference, cited as FISRWG 1998.</p> <p>Text includes two paragraphs on sediment loads. Para 2—describes the 15% change threshold applied to bankfull discharges. I am not sure that I agree with this choice. And so, I ask if an MDR event-based approach is better? I recall the SJRWMD using a mass sediment balance method on the Silver River. To that end I ask Is a mass balance approach needed for long term sustainability? What other approaches have been used by the district's for sediment dynamics?</p>	<p>Please answer the questions.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	
5.30	Page 93	Yes	<p>Text, 5.4 Water Quality. Water quality is addressed in two short intro paragraphs.</p> <p>Water quality remains a significant issue of concern in both rivers and all artesian springs. Document side steps this issue for the most part. The relegation of water</p>	<p>Please consider addressing water quality impairments and their known relation to the flow regime of these rivers and spring runs. Impairments and flow reductions are both threats to the</p>	

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			quality issues to the realm of TMDLs and BMAPs does not benefit the LSFR and IR, and their associated springs.	sustainability of these spring and river systems. There is then an opportunity to do this comprehensive assessment of relationship between flow regime and water quality.	
5.31	Page 94	Yes	<p>Figure 55 and Table 29. Figure 59, Lane's diagram of balance of dynamic river forces effects on sediment load. Figure acceptable, it is illustrative one from Rosgen 1996</p> <p>Table 29 Flow reductions associated with 15% decrease in time that viable bankfull flows in LSFR and IR are exceeded. As with similar comments on several previous WRV metrics, these thresholds were developed using the 15%change metric. If that is valid, then all of this is OK. But I ask if the sediment issues are best handled with an MDR metric, or something else? It seems that the sediment load issue is addressed on many flowing water MFLs (SR, SWF, and SJR WMDs) so it would be helpful to check/survey those.</p>	<p>Please answer the questions.</p> <p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	

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5.32	Page 95	Yes	Text page, 5.5 Resources Upstream from US441. First of two full pages of text covering the topic. Four paragraphs on this page. I agree with rational and detail provided in support of protection of resources upstream from US441.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.	
5.33	Page 97	Yes	Text page includes five paragraphs on resources upstream of US441. Method described for proportioning flows seems reasonable and logical.	Recommend that WRV metrics selected to protect the upstream resources be appropriately chosen. This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.	
	6.0 River MFLs Development, Section 6, pages 99-107				
6.1	General comment	Yes	For the numerous reasons already enumerated in comments on sections 4 and 5 of the report I cannot approve of	This MFL setting process must be re-evaluated and updated. At a minimum this should include	

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			<p>the approach chosen to define most of WRV metrics used in the critical sensitivity analysis. Because of this, then I cannot approve of the respective MFLs developed.</p> <p>If my recommendations are followed then many key WRV metrics for both rivers will be redefined as MDR events, following the SJRWMD method, and possibly some other forms too. District has applied these event metrics to floodplain communities and hydric soils on lake MFLs.</p> <p>Analysis by Graham et al. 2013 clearly show that we get strikingly different results for floodplain wetland communities and their associated hydric soils using proposed 15% change versus MDR metrics. They point out that in their test case, the MDR metrics were much more sensitive to flow reductions compared to the proposed 15% change metric</p> <p>So, at this stage of the peer review process I find that I cannot support the proposed MFLs as being protective of</p>	<p>significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	

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			<p>the LSFR and IR and their associated springs and providing strong assurance that the thresholds for significant harm for all WRVs will be scientifically sound.</p> <p>I am very confident however that a re-evaluation of this re-evaluation can address the shortcomings found. My full list of recommendations is given elsewhere.</p> <p>My remaining comments on Section 6 follow below, all with the caveat that if WRV analysis is redone as recommended then results are likely to be different.</p>		
6.2	Page 99	Yes	<p>Section 6.0 River MFLs Development, 6.1 Introduction: Four paragraphs provide summary of the sensitivity of MFL metrics, and the most limiting one. This is distillation of results from Section 5. Text cites Tables 30, 31, and 32, and Figures 57, 58, 59.</p> <p>I don't concur with this since I do not approve of the approach chosen to define most of WRV metrics used in the sensitivity analysis.</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	

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			I am confident however that a re-evaluation of this re-evaluation can address the shortcomings found.		
6.4	Page 99	Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the revised MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report.</p> <p>Document states that woody habitat and hydric soils are the most conservative WRVs with hydrologic shifts of 10cfs at the Hwy 27 gage.</p> <p>I don't concur with this since I do not approve of the approach chosen to define most of WRV metrics used in the sensitivity analysis.</p> <p>As noted, if my recommendations are followed then many key WRV metrics for both rivers will be redefined as MDR events, and maybe some other forms too.</p>	<p>This MFL setting process must be re-evaluated and updated. At a minimum this should include significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	

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			<p>So, at this stage of the peer review process I find that I cannot support the proposed MFLs as being protective of the LSFR and IR and their associated springs and providing strong assurance that the thresholds for significant harm for all WRVs will be scientifically sound.</p> <p>I am confident however that a re-evaluation of this re-evaluation can address the shortcomings found.</p>		
6.5	Page 100	Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the revised MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</p> <p>Page 100—Table 30 in part, Summary of WRV metrics and hydrological shifts for the LSFR at Ft. White gage. Table 30 is a good summary for 15% change metric, but I strongly disagree with HSW's choice to apply across the board for All WRV metrics. There are 13 WRV metrics listed in Table 30: 1) paddling, 2) boating,</p>	<p>This MFL setting process must be re-evaluated and updated. At a minimum this should include significant revision to Sections 4, 5, 6 and 7 of HSW's report. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	

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			<p>3) sturgeon spring and fall spawns, 4) general fish passage and general instream habitat, % time, and 5) SEFA, 6) woody habitat, 7) woody habitat snags, 8) hardwood swamp, 9) cypress swamp, 10) hardwood cypress, 11) hydric hammock, 12) hydric soils, and 13) sediment loads. All thirteen can be and have been developed and applied as MDR metrics. All should be evaluated as candidates for an MDR metric. I feel very strongly that the five floodplain habitat elements/components, covering the four dominant vegetative communities and hydric soils, should be MDR metrics. Previous comments have noted that SJRWMD has applied MDR metrics to all 13. This re-evaluation is critically needed.</p> <p>For Table 30 the smallest, therefore most conservative hydrologic shifts are for general fish passage at 103-115 cfs, but cypress swamp is not far off at 110 cfs. See hydrologic shifts plotted by WRVs in Figure 60. This indicates that recasting WRV criteria as MDR may have an impact.</p>		

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6.7	Page 101	Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</p> <p>Table 31, Summary of WRV metrics and hydrologic shifts for the LSFR at US441 gage. This table, like the previous one Table 30, is deeply problematic for the same reasons as noted above in comments for page 100, above.</p> <p>For Table 31 the smallest, therefore most conservative hydrologic shifts are for general fish passage at 53 cfs, but cypress swamp is not far off at 110 cfs. See WRVs plotted with hydrologic shift on Figure 61. This may indicate that recasting WRV criteria as MDR may have an impact.</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.</p>	
6.8	Page 102	Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the</p>	<p>Please answer question regarding omission of wetland plant communities.</p>	

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			<p><i>following evaluation of this section of the report:</i></p> <p>Table 32 and Figure 57. Table 32, Summary of WRV metrics....IR at Hwy 27 gage. For Table 32 there are four WRV metrics with low hydrologic shifts in range of 10-15 cfs, these are woody habitat, hydric soils sediment loads and SAV. See hydrologic shifts plotted by WRVs in Figure 62. This indicates that recasting WRV criteria as MDR may have an impact.</p> <p>Table 32 does not include WRV metrics for floodplain vegetation. And subsequently these are not included in plot on Figure 62. The IR flood plain does indeed support these wetland plant communities. Why are the wetland community types not included?</p> <p>Figure 57, Flow duration curves and WRV metrics determined for LSFR at Ft. White gage. For reasons enumerated already above, I do not concur with the all the content of either table or figure. The placement of the WRV metrics on the FDC is helpful. It</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	

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			provides a means of comparison with other river and springs in the Florida, across the SR, SWF and SJR districts.		
6.9	Page 103	Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</p> <p>Page 103—Figures 58 and 59. Flow duration curves and WRV metrics for LSFR at US441, and IR at Hwy 27 gages, respectively For reasons enumerated already above, I do not concur with the all the content of either figure.</p>	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.	
6.10	Page 104	Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</p>	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.	

Report

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s)		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action	C. Action to be Taken in Response to Comment
			<p>Page 104—Figures 60 and 61. WRV hydrologic shifts at the Ft. White and US441 gages, respectively. These figures plot hydrologic shifts provided in Tables 30 and 31, respectively. Visual picture given is useful, but I don't agree with much of the basis.</p> <p>Again, for reasons enumerated already above, I do not concur with the all the content of either figure.</p>		
6.11	Page 105	Yes	<p><i>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</i></p> <p>Page 105—Figure 62 and Table 33. Figure 62, WRV hydrologic shifts at the Hwy 27 gage.</p> <p>Table 33, RTF and MFL flow values at the medians for the LSFR and IR. Based on the % change metric which I do not support. Also, there is no discussion on the relevance/significance of the 10 cfs limit for IR. Within the range of error, this</p>	<p>This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 though 18, above.</p>	

Report

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s)		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action	C. Action to be Taken in Response to Comment
			<p>may mean that the MFL is at its threshold.</p> <p>MFLs for IR are problematic for a number of concerns: 1) wrong assessment metric applied to some WRVs, 2) floodplain vegetative communities left out of list of relevant WRVs, but they are included for both LSFR MFL sites, Ft White and US441, and 3) no discussion the significance of the 10 cfs estimate of available water. If the estimate is this close to limit, what is the uncertainty? Does this imply that the UFA is at its limit? What if WRV metrics that are recast as MDR are found to be exceeded? That could trigger a recovery plan.</p> <p>Text begin 6.2.1 Summary. Highlights the 15% change metric, which I do not support.</p>		
6.13		Yes	<p><i>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</i></p>	Expand future considerations into part of a more comprehensive analysis of uncertainty with recommendations for reducing effects in future.	

Report

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s)		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action	C. Action to be Taken in Response to Comment
			Section 6.2.3 Future Considerations. Provide four bulleted examples of ongoing work. This is a big opportunity to give the AM uncertainty reduction efforts. But that is not what this is. I would expand this considerably.	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	
6.15		Yes	<p>Note: It is my expectation that once the WRV analyses are redone, then the recommended MFLs for the LSFR and IR will be quite different. As part of this next level review I include the following evaluation of this section of the report:</p> <p>Section 6:3 Future Considerations Overall, I conclude that MFLs development for the LSFR and IR watersheds, including the priority springs, is incomplete. Specific recommendations are made to address the concerns raised. Many comments made throughout the document, but very strong recommendations for further work on the WRV metrics. Until this re-evaluation is completed, I cannot endorse the MFLs as proposed. I expect that this will result in some changes to the metrics, and therefore with an array of other</p>	This MFL setting process must be re-evaluated and updated. The sequence of steps necessary to do this is covered in Recommendations section of this report, and General comments G1 through 18, above.	

Appendices

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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
21	p. 108, last line in text and Table 34	No	The average measured flow of the Santa Fe River Rise is "about 553 cfs" in the text and its "mean flow" is "552 cfs" in Table 34.	There should be only one value for these flows.	
22	pp. 108-113, Section 7. Priority Springs Assessment and MFLS Development	Yes	Equations of rating curves developed for 11 of the 17 priority springs are in Table 36, but the plots of the rating curves are not included.	The plots of the rating curves developed for 11 of the 17 priority springs should be included in the text or in an appendix.	
23	p. 108, Table 34	No	"Ten of the 17 Priority Springs on the LSFR and IR are classified as historical first-magnitude springs...." First-, second-, and third magnitude springs are not identified in Table 34.	Add a column to Table 34 identifying first, second, and third magnitude springs.	
24	p. 111, Section 7.3 Springs MFLs Development, two paragraphs	Yes	"While it is desirable to designate spring-specific MFLs, it is Impractical to do so at this time." and "These relative uncertainties are substantially greater than the corresponding flow reductions associated with the proposed LSFR and IR MFLs...." These conclusions are not supported by any results.	One or more examples of the results of calculating spring-specific MFL's should be included in the text or an appendix to illustrate and substantiate this conclusion.	

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25	p. 113. Table 37, heading for third column	No	Typo: "Flow Rating...from Table 37 (cfs)" should be Table 36 .	Make correction.	
26	p. 113, Section 7.3.2 Future Considerations to Support Spring-Specific MFLs, last paragraph.	Yes	"...an appropriate way to afford protection from significant harm at this time is to treat the Priority Springs collectively for a defined river reach...." This conclusion is not supported by any results.	See comment 24 above. One or more examples of the results of calculating spring specific MFL's should be included in the text to illustrate and substantiate this conclusion, i.e., that it is necessary to treat the priority springs collectively for a defined river reach.	
27	Appendix B – Water Use Hindcasting and Injection Well Hindcasting	No	Pages in Appendix B – Water Use Hindcasting and Injection Well Hindcasting are not numbered.	Number the pages in Appendix B – Water Use hindcasting and Injection Well Hindcasting.	
28	Appendix B – Water Use Hindcasting, p. 1	Yes	Groundwater in Appendix B is developed for the NFSEG model area, but groundwater use in the report is illustrated for the North Florida Regional Water Supply Planning Area.	Consider replacing the pumpage for the North Florida Regional Water Supply Planning Area shown in the text in Figures 19 and 20 with the pumpage for the NFSEG model area described in Appendix B. For consistency, the NFSEG	

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				pumpage should be described in the report and in Appendix B (and also in Appendix C).	
29	Appendix B – Water Use Hindcasting, p. 11 Moving Average Calculation	Yes	“Results...were then merged into one dataset.” Where are these results?	The dataset for the 5-year moving average pumpage “for each state, county, and use-type combination in the model domain” should be made available, perhaps on a web site.	
30	Appendix B – Water Use Hindcasting, p. 11 Moving Average Calculation	Yes	Where are the quantitative results for pumpage?	The groundwater with-drawals through time and ground-water use by category for a current year such as 2015 should be represented in the report in figures similar to the bar graph and pie chart shown in Figures 19 and 20 or preferably in a line graph illustrating the pumpage versus time for the various water-use categories and total pumpage. It would be more consistent with appendices B and C if the pumpage for the NFSEG model area were represented in Figures 19 and 20 instead of the pumpage for the planning area (see comment 28 above).	

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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
31	Appendix B – Water Use Hindcasting, p. 11 Moving Average Calculation	Yes	Are the pumpage results in the dataset in agreement with the pumpage in the NFSEG model (Durden et al., 2019, Table 5-1)?	Compare pumpage results in the dataset to pumpage in NFSEG model (Durden et al., 2019, Table 5-1).	
32	Appendix B – Water Use Hindcasting	Yes	How were well locations determined in previous years when no detailed water use records and well locations were kept?	Explain how individual well locations were determined in previous years.	
33	Appendix B – Water Use Hindcasting, pp. 12-13 References	No	Is each reference listed in this section also indicated in the text where it is used?	Make sure that each reference listed in this section is also indicated in the text where it is used.	
34	Appendix B – Injection Well Hindcasting	Yes	Where are the quantitative results for the injection rates?	The 5-year moving average injection rates for the NFSEG model area versus time should be plotted and discussed.	
35	Appendix B – Injection Well Hindcasting	Yes	Are the injection rates in the dataset in agreement with the injection rates in the NFSEG model (Durden et al., 2019, Table 5-1)?	Compare injection rates in the dataset to pumpage in NFSEG model (Durden et al., 2019, Table 5-1).	
36	Appendix C	Yes	Is “reference timeframe” a concept developed for this project or has it been used before?	Discuss the origin of the reference timeframe process, including references in published reports and peer-reviewed	

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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
				papers and previous water resource investigations that involve setting minimum flows and levels (MFL's).	
37	Appendix C, p.1, 1.Introduction, first two paragraphs.	Yes	<p>“This reference time series process incorporated data from two versions of the North Florida Southeast Groundwater Model...” i.e., NFSEGV1.1 (007h) and NFSEGV1.1 (007h1) (first paragraph), and “The response of the groundwater system...was evaluated through application of the NFSEG v1.1 groundwater model...” (second paragraph). Why were two different versions of the NFSEG model used? This suggests that there may be two different results based on whichever version of the NFSEG model is used to develop reference timeframe flows and groundwater heads.</p>	<p>The text in Section 1. Introduction should more clearly explain how two versions of the NFSEG model were used to produce the results described in this appendix.</p>	
38	Appendix C, p.1, 1.Introduction, second paragraph.	Yes	<p>“The response of the groundwater system to changes in groundwater use was evaluated through application of the NFSEG v1.1 groundwater model in a manner that did not require development of a transient version of the model.”</p>	<p>This is a major assumption that requires further explanation. See comment 40 below.</p>	

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39	Appendix C, p.1, 2. General Approach, first paragraph.	Yes	<p>"Changes in ...flows at an MFL site of interest in response to changes in groundwater withdrawals were estimated on a yearly basis from 1933 through 2015." How were changes in surface-water flows calculated using the NFSEG model, which is a groundwater model?</p>	<p>Provide more explanation concerning how changes in river flows were determined using results from the NFSEG model.</p>	
40	Appendix C, p. 4, 2.4 Development of Reference Time-frame Flow or Head Time-Series	Yes	<p>"Thus, the historical groundwater withdrawals time-series used to develop the reference timeframe time-series was smoothed using a five-year moving average."</p> <p>This is a major assumption that does appear to be reasonable. However, the validity of this assumption needs to be demonstrated.</p>	<p>Provide the graphical results of an analysis that demonstrates whether using a five-year moving average is sufficient to smooth variations in pumpage from 1933 through 2015.</p>	
41	Appendix C	Yes	<p>Appendix C describes a very detailed, somewhat confusing process that includes "...estimating historical impacts from groundwater withdrawals..." (p. 1), determining "...flow and head sensitivities..." (p. 2), and developing "...sensitivity maps for each model layer and waterbody of interest." (p. 2).</p> <p>The process by which impacts on river flows are determined using the NFSEG groundwater model needs further</p>	<p>This process should be more clearly explained in Appendix C, particularly illustrating how impacts on river flows at the three river gages (Santa Fe River near Ft. White and at US HWY 41 and the Ichetucknee River at HWY 27 in Figures 22 and 23, pp. 26-27 were determined from changes in heads and flows in the NFSEG groundwater model. The</p>	

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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
			explanation as well as the purpose and use of the sensitivity maps.	purpose and use of the sensitivity maps also requires further explanation.	

Comment 42 for Appendices B and C

A major part of the MFL report (Section 6 River MFLS Development) describes using Reference Timeframe (RTF) flows at three river gages (Santa Fe River near Ft. White and at US HWY 41 and the Ichetucknee River at HWY 27 in Figures 22 and 23, pp. 26-27) to determine recommended minimum flows at these gages (p. 106, Section 6.2.2 Proposed MFL Language). The RTF flows are estimates of historical flows from which the impacts of historical groundwater withdrawals have been removed. The historical influence of groundwater withdrawals over time was evaluated using estimates of groundwater usage in the North Florida Southeast Georgia (NFSEG) groundwater model area (Section 2.7 Reference Timeframe Flow, p. 24). Appendix B documents the data and methods used to establish the historical groundwater use throughout the NFSEG groundwater model area by hindcasting groundwater pumpage and injection rates from as far back as 1900 to 2015. Appendix C outlines the process used to develop an RTF flow and/or groundwater-head time-series at groundwater monitoring locations, springs, and/or stream gage locations (Appendix C, p. 1, first paragraph) using modeled data and the estimated time series of historical groundwater withdrawals that are described in Appendix B. In the process to determine RTF flows, increases in river flows in response to decreases in groundwater withdrawals were estimated on a yearly basis from 1933 through 2015, and the resulting estimates were added to observed hydrographs of

river flows to obtain hypothetical hydrographs representing the variation in river flows in the absence of groundwater withdrawals during the period from 1933 to 2015 (from Appendix C, p. 1, third paragraph). As discussed below, the historical groundwater withdrawals in the NFSEG model area need to be quantified and plotted in Appendix B and in Figures 19 and 20 (2.7 Reference Timeframe Flow, p. 25). Also, the description of the process used to determine the RTF flows in Appendix C needs to be more focused on describing the development of the RTF flows at the three river gages.

Appendix B

A detailed procedure for determining historical groundwater use in the NFSEG model area based on data sources, water-use types, counties, states (Florida, Georgia, and South Carolina), and injection sites is described in Appendix B along with the use of a five-year moving average to smooth variations in year-to-year pumping rates from 1930 to 2015. The results of this determination of historical groundwater use in the NFSEG model area should be described quantitatively in Appendix B with numerical values for pumping rates over time and by plotting pumpage versus time for the various groundwater uses and total pumpage in a bar graph or (preferably) in a line graph and in a pie chart illustrating groundwater use for a selected year such as 2015. The historical groundwater use in the NFSEG model area also should be plotted in Figures 19 and 20 (2.6 Groundwater Use, p. 25) instead of the pumpage illustrated for the North Florida Regional Water Supply Planning Area, because the NFSEG pumpage is used in the development of the RTF flows described in Section 2.7 Reference Timeframe Flow. Also, any historical trends in groundwater pumpage, particularly recent trends, in the NFSEG model area should be noted and discussed in Appendix B and in Section 2.6 Groundwater Use.

Appendix C

The description in Appendix C of the process used to determine the RTF flows should be more focused on describing and illustrating the development of the RTF flows at the Santa Fe River gages near Ft. White and at US HWY 41 and the Ichetucknee River gage at HWY 27, including details of the calculations used to determine the RTF flows. Determining how “Changes in ...flows at an MFL site of interest in response to changes in groundwater withdrawals were estimated on a yearly basis from 1933 through 2015...” (Appendix C, p. 1, 2. General Approach, first paragraph) involves a major, but unstated, relation between groundwater heads and flows and river flows, i.e., that the increased river flows resulting from decreased groundwater withdrawals represent increases in *base flows* into the rivers. This relation should be explicitly and clearly stated. Also, additional explanation is needed to describe how increases in flows at individual cells in the NFSEG groundwater model in response to decreases in groundwater withdrawals were summed to estimate increased base flows at the three river gages. For each of the three river gages, the locations of the cells in the NFSEG model that represent the reach of the part of the river into which increased base flow occurs should be identified. The cells (i.e., river and drain cells and any other cells) in the NFSEG groundwater model used to calculate the increased base flows should be identified. An additional figure (in plan view) that overlays the locations of the model cells used to represent the river reaches above each river gage onto a map of the Santa Fe and Ichetucknee rivers that supports this additional explanation should be added to Appendix C. The details of the process, including numerical results that illustrate how the Reference Timeframe (RTF) flows (Figures 22 and 23, pp. 26-27) were determined at each of the three river gages, should be included in Appendix C. Figures 22 and 23, pp. 26-27, should be included in Appendix C as well as in Section 2.7.1.

The determination of “flow or head sensitivities” and the use of the “sensitivity maps” described in Appendix C (Section 2.1, p. 2) also needs further explanation. Were the RTF flows for the Santa Fe and Ichetucknee River gages determined

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using this method? If so, a detailed explanation illustrating how this method was used should be added to Appendix C. Also, were any RTF groundwater heads or spring flows determined for this MFL report? If so, detailed explanations of these determinations should be added to Appendix C as well.

ATTACHMENT C

Peer Review Forms: Report from Adam Munson, Ph.D., P.E.

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.

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 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;
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.

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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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Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of Report? (Yes/No)	To be completed by Reviewer(s)		To be completed by report author(s)
			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 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 report might benefit from discussion on the omission of WY1932 from 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	The authors should consider how many points (years) should be considered when smoothing PORs rather than applying a	

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			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 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.	constant proportion to records of varying length.	
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 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	This seems like an important component of the MFL and would benefit from greater discussion and documentation.	

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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
19	Appendix C		Seems data and graphs might be useful.		
20	Section 7	No	The conclusion that “ an appropriate way 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 adopted MFLs. The districts on ongoing efforts listed in section 7.3.2 are commendable and reflective of their commitment to improving spring protection.		