

**The Minimum Flows and Levels for
The Lower Santa Fe and Ichetucknee
Rivers and Priority Springs
Peer Review and Public Comment
Resolution Document**



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EXECUTIVE SUMMARY

The Suwannee River Water Management District (the District) initiated Peer Review of the draft technical report, “Minimum Flows and Levels for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs,” in July of 2013. During the peer review period the District also solicited comments from stakeholders. Both the Peer Review Report (UF, 2013) and the various stakeholder submissions are on file at the District. The District received many constructive comments, recommendations and suggestions which, to the extent possible, were incorporated into the final technical report (the MFL Report).

The primary purpose of this Resolution document is to provide the District’s response to the Peer Review Report (the PR Report). As required by Florida Statute 373.042(4)(b), significant weight was given to the recommendations of the Final Peer Review Panel report. Additionally, as the stakeholder comments were received a decision was made to incorporate those comments as well. To facilitate the response a tabular format is used; when the response is lengthy, an appendix is referenced. The combined comments from the Peer Review Panel and stakeholders were grouped into categories and a response to each of the grouped comments is included. Many of the responses from the District point to the section of the Report Appendix (labeled numerically) in which the comment has been addressed. This Resolution Document includes appendices as well (labeled alphabetically). The District attempted to incorporate all of the comments into the MFL Report or appropriate appendix. When a comment recommended editorial changes for clarity, the report was changed to make the section more easily understood. Where this occurred, no notation is provided in this Resolution Document. When comments led the District to better data, the District obtained and used that data for analyses. The District used the best information available as directed by Florida Statute 373.042(1)(b).

Chapter 373 F.S. and 62-40 F.A.C. provide the policy framework and authority for the District to set MFLs. Some comments were outside the scope of authority for MFL establishment. The District must consider all to the comments in that context. While all comments were considered, some comments were unable to be incorporated because of budgetary or time constraints. The District is committed to developing scientifically sound Minimum Flows and Levels, and protecting the water resources of its citizens and appreciates all public interest in developing these Minimum Flows and Levels.

Group	#	Party	Comment	Response
A	1	Peer Review	Conduct an analysis to evaluate the sensitivity of the baseline model parameters, predictions and residuals to the rainfall data used to develop them (e.g. Lake City, Gainesville, average of Lake City and Gainesville, or other stations in the region with long-term data). In particular, consider the use of the Lake City rainfall alone for the Ichetucknee baseline model. Include an analysis of the High Springs rainfall and other relevant rainfall data from the region in the discussion of historical rainfall conditions.	As recommended by the Final Report of the Peer Review Panel, the District used an existing spatially distributed rainfall dataset, the PRISM data, as an alternative to averaging the Lake City and Gainesville Rainfall Gages. All analyses were completed using the PRISM data. (see section 2.4 of final MFL report) In addition, as recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel.
	2	Jones Edmunds	There is a significant difference between the Lake City gage and the Gainesville gage that happens near the departure point being predicted as the time when all anthropogenic impacts started to affect the groundwater systems feeding the springs.	
	3	Bradford Soil and Water Conservation District	The assumption that Rainfall measured at Lake City and Gainesville is indicative of the rainfall in the Santa Fe basin is unsupported.	
B	4	Peer Review	To prevent significant harm MFLs should include considerations of duration and return interval of both low-flow and high-flow events in addition to cumulative frequency, which was considered in the report. The panel recommends a multi-metric approach that considers more comprehensive temporal and spatial hydrologic drivers of a WRV with the realization that all metrics are not equally protective.	This comment has been addressed by the District electing to continue using the cumulative frequency approach; the revised MFL has been cross-checked with the event-based hydrologic methods used by the SJRWMD and the results were found to be comparable.
C	5	Peer Review	Use a physically-based groundwater model to evaluate whether groundwater contributions to streamflow predicted by the empirical baseline model are consistent with the physically-based model, in order to increase the weight of evidence supporting the selected baseline flow regime. Presuming only steady-state runs are currently possible, a suite of steady-state scenarios could be run with all possible combinations of warm-AMO/cold-AMO phase climate, El Nino/La Nina phase climate, and no pumping/post-1990 pumping. Groundwater flow contributions to streamflow under each regime could be evaluated to determine the relative magnitude of changes in groundwater contributions to streamflow expected due to changes in climate versus changes in pumping.	As recommended by the Final Report of the Peer Review Panel, the District used groundwater modeling to increase the weight of evidence. Appendix 6-2 describes the groundwater modeling that was completed. The groundwater modeling was utilized as part of the weight of evidence to determine the current status of both the Santa Fe and Ichetucknee rivers. The current basin status is described in the Final MFL Report Section 6.6.

Group	#	Party	Comment	Response
D	6	Ichetucknee Alliance	Concerned that climate change has not been taken into consideration. Trends show greater extremes in drought; even with current withdrawals we are seeing decreases in flows.	The baseline period of 1933-1990 contains large portions of a dry and wet AMO cycle. Consequently the District believes climate and multi-decadal changes to the climate, to the extent it can be discerned from the data record, has been accounted for to the extent practicable. MFLs are intended to be reviewed periodically and as such can be adjusted in the future in response to additional knowledge and data.
E	7	Peer Review	Include a geologic cross section across the basin to clarify the hydrogeologic characteristics of the stratigraphic units in the basin. Because of the close relationship between groundwater and surface water, the presentation of the characteristics of the aquifer, and how its karst characteristics may affect flow, needs to be improved.	As recommended in the Final Report of the Peer Review Panel, Table 2-1 was included in the Final MFL Report.
F	8	Peer Review	Add an introductory paragraph to Section 4.2 explaining the overall purpose of the HEC-RAS modeling and the various ways the model was used.	As recommended in the Final Report of the Peer Review Panel, section 4.3 was included in the Final MFL Report.
G	9	Peer Review	Add a table which summarizes how the HEC-RAS steady-state models were used for each water resource value.	As an alternative to the table recommended in the Final Report of the Peer Review Panel, Figure 4-18 was created to explain this process.
H	10	Peer Review	Clarify whether the input flow and downstream boundary condition percentiles used to run HEC-RAS were taken from the full historic record or the 2002-2011 transient model time period.	As recommend in the Final Report of the Peer Review Panel, section 4.3 was modified in the Final MFL Report.
I	11	Peer Review	More clearly justify the use of the 20th percentile downstream stage boundary condition when HEC-RAS was used to determine the critical flows for the various water resource values.	As recommended in the Final Report of the Peer Review Panel, section 4.3 was modified in the Final MFL Report.
J	12	Peer Review	The panel strongly recommends that the MFL be adopted to protect the most vulnerable water resource values (WRVs), and not the “average” WRVs as is currently the case.	As recommended by the Final Report of the Peer Review Panel, the approach in the draft MFL document was replaced by a method that will be protective of all WRVs. This approach is outlined in section 6.4 of the final MFL report.
	13	ACEPD	The ACEPD strongly recommends adoption of MFLs that protect the most vulnerable water resource value (WRV), the proposed average WRV being less protective.	

Group	#	Party	Comment	Response
J	14	FPS	In a public presentation some time ago, DRP staff pointed out an issue that was also noted by the Peer Review Committee. Several relevant water resource values were analyzed and were aggregated in a “best-fit” approach. The result of the approach is that some water resource values would be exceeded before the MFL was exceeded. While averaging may be an appropriate statistic in some applications, Ch. 62-40(4)(a) F.A.C. states that water resources and environmental values are to be protected by MFLs. Consequently, we assert that the most vulnerable water resource value should be protected.	As recommended by the Final Report of the Peer Review Panel, the approach in the draft MFL document was replaced by a method that will be protective of all WRVs. This approach is outlined in section 6.4 of the final MFL report
	15	Springs Institute / Wetland Solutions	Provide detailed evaluations of the sensitivity of all ten of the human use and water resource values required by Florida law in the establishment of MFLs and pick the most sensitive water resource value metric to serve as the benchmark for the recommended MFLs	
	16	Wetland Solutions	The District does not follow standard MFL practice in Florida of providing protection for the most sensitive water resource value metrics, and as a result the proposed MFLs are not sufficiently protective to account for scientific uncertainties and do not meet the dictates of the Precautionary Principle	
K	17	Peer Review	The panel recommends that the 15% threshold of change be more fully justified as it applies specifically to the Santa Fe and Ichetucknee Rivers.	The District reviewed the reduction in habitat percentage used on other rivers with similar characteristics and was unable to find any indication that a shift from the standard and generally accepted 15% was called for in this case. The statutory standard for setting MFLs is the limit at which further water withdrawals would be <i>significantly harmful</i> to the water resources or ecology of an area. These comments suggest applying a separate standard outside of the Districts’ statutory authority. The use of 15% threshold of change is supported in section 3.3.
	18	ACEPD	Although 15% allowable reduction in habitat has been used for other MFLs, it may not adequately protect the Santa Fe River, Ichetucknee River and Priority Springs. While the 15% may be a starting place for MFL development, OFWs are worthy of special protection because of their natural attributes and this allowable reduction may not adequately protect the ecosystem components from significant harm.	
	19	Lesley Gamble, PhD	15% habitat reduction in these water bodies is unacceptable	

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L	20	Peer Review	After an improved model (with lower residual variance and less correlated residuals) is developed, use a block bootstrapping procedure (if necessary based on serial correlation in the model residuals) to estimate model uncertainty using a variety of block lengths (longer than the new model residual correlation time) to evaluate effect of block size on uncertainty estimates.	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. In addition, as recommended by the Final Report of the Peer Review Panel, the District used groundwater modeling to determine the current basin status as described in the Final MFL Report Section 6.6. Appendix 6-2 describes the groundwater modeling that was completed. The groundwater modeling was utilized as part of the weight of evidence to determine the current status of both the Santa Fe and Ichetucknee rivers. As a result the uncertainty analysis is no longer a part of the report.
	21	Peer Review	After uncertainty analysis of the improved model using well-justified block sizes is conducted, revisit the assumption that the 10th percentile of the 10th percentile prediction of the end-of-record flow target is appropriate.	
	22	FGS	A more realistic confidence interval (50%) should be used in the generation of the baseline flow and that flow in both systems has already declined more than 15% from what they would be without human impacts and that both systems need to be in recovery.	
M	23	Peer Review	Water quality is a WRV of substantial importance in the development of MFLs. Apparent visual trends in some water quality parameters in relation to flow are evident in Appendix 5-3, and recent research findings on the spring-fed rivers in question (Heffernan et al 2010a), suggest there are relationships between flow and commonly measured water quality parameters (e.g. dissolved oxygen, iron, nitrate). Therefore, the panel recommends that a further assessment of possible changes in water quality in relation to flow be evaluated to ensure that the proposed MFL will not cause a violation of any relevant water quality standard.	As recommended by the Final Report of the Peer Review Panel, the analysis and discussion of water quality was expanded in section 5.2.2 to further address these comments.
	24	FGS	The impact of the nutrient load to the Suwannee River's estuary from the Santa Fe River needs to be considered in the Water Resource Values in the development of the MFL.	

Group	#	Party	Comment	Response
M	25	Our Santa Fe River	The SRWMD does not consider State water quality standards when developing MFLs. The Santa Fe River has been "significantly harmed" in quantity and quality ways.	As recommended by the Final Report of the Peer Review Panel, the analysis and discussion of water quality was expanded in section 5.2.2 to further address these comments.
	26	ACEPD	Pages 5-41 through 5-44, section 5.2.2.1 The discussion of water quality is limited to data availability. A brief interpretation of the data (in particular nitrogen) should be included for the rivers and springs, specifically, the relationship between flow and water quality.	
N	27	Peer Review	The panel expects that the most critical periods for the rivers will be during drought periods when antecedent recharge is low and demand for groundwater is high. Modeling consumptive use impacts during these periods seems integral to the implementation process. The panel recommends that a suite of steady-state models be run with a range of climate, boundary and pumping conditions to explore the impacts of various climate and pumping regimes on baseflow. This suite of models would be particularly important for the priority springs, where a fractional decline in flow is the MFL approach, rather than a constant flow reduction, is adopted for the two rivers.	As an alternative to the recommendations in the Final Report of the Peer Review Panel, the District continues to work toward improved regional model(s) that will meet the needs expressed here. The District is currently assisting in developing the Northeast Florida Southeast Georgia (NFSEG) Groundwater Flow Model. While this topic (in a general sense) has been explored using the existing model(s), it is not directly a part of establishing MFLs; rather, and as noted by the Panel, it falls into the category of MFL implementation. The current model (NFM v1.03) was used in a weight-of-evidence analysis for assessing the current status of these systems. See the final report, Section 6.6. After incorporating recommendations in determining the basin status, the District's estimate of 135 cfs of impact at the Ft. White gage is in line with the estimate from the NFUCG of 127 cfs.
	28	NFUCG	Best available groundwater modeling tools developed by SRWMD and the Georgia Environmental Protection Division (EPD) demonstrate that the amount of impact due to groundwater withdrawals is significantly less than 190 CFS. Based on conservative modeling assumptions, the greatest impact from withdrawals since pre-development conditions on the LSFR is estimated at 127 CFS. Furthermore, 40% - 60% of the impacts is likely from groundwater withdrawals in Georgia.	

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N	29	FGS	The ecological community changes expected to occur at various level regimes is not clearly outlined. Water withdrawals are presumed to be the primary cause of the declining flow in the river/springs systems but the report does not clearly explain the influence of water withdrawals. The report mentions groundwater pumping east and north of the district as having possible effects on the springs discharge but this is not clearly explained. Permitted pumping within the topographic basin for the Lower Santa Fe River basin is given but its local effects are not defined. The local and regional impacts of withdrawals on the Lower Santa Fe and Ichetucknee rivers and their spring groundwater basins need to be addressed.	As an alternative to the recommendations in the Final Report of the Peer Review Panel, the District continues to work toward improved regional model(s) that will meet the needs expressed here. The District is currently assisting in developing the North Florida Southeast Georgia (NFSEG) Groundwater Flow Model. While this topic (in a general sense) has been explored using the existing model(s), it is not directly a part of establishing MFLs; rather, and as noted by the Panel, it falls into the category of MFL implementation. The current model (NFM v1.03) was used in a weight-of-evidence analysis for assessing the current status of these systems. See the final report, Section 6.6. After incorporating recommendations in determining the basin status, the District's estimate of 135 cfs of impact at the Ft. White gage is in line with the estimate from the NFUCG of 127 cfs.
O	30	Peer Review	Provide the additional details and justifications requested for the data manipulation and modification procedures (e.g., baseflow estimation and trend analyses) and consolidate their presentation into Chapter 4. Consolidating all of the data analysis method into one section should improve the flow of the text and simplify the descriptions of these analyses.	As recommended in the Final Report of the Peer Review Panel, sections 2 and 4 were modified in the Final MFL Report.
P	31	Springs Institute / Wetland Solutions	Revise the baseflow analysis and increase estimates of the current un-impacted flows	It is important to recognize that there is no direct way to measure baseflow and that all calculations of baseflow are therefore estimates. (As a quality check an alternative low-pass filter was used and produced similar overall results as the 120 day minimum average.) Also, in the revised methodology, baseflow was not used to establish MFLs. However, in a step separate from MFL establishment, a regression of rainfall and baseflow (original estimate) was used as part of a weight-of-evidence approach to estimate current basin status for both rivers.

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P	32	NFUCG	The Surficial Aquifer Systems (SAS) and the Upper Floridan Aquifer (UFA) contribute baseflow to the Santa Fe River. However, the baseflow separation method used to develop the MFL for the LSFR is not appropriate because the method does not have the ability to separate the baseflow contribution from the UFA from the baseflow contribution from the SAS which introduces additional uncertainty in estimating groundwater withdrawal impacts to the MFL water bodies.	It is important to recognize that there is no direct way to measure baseflow and that all calculations of baseflow are therefore estimates. (As a quality check an alternative low-pass filter was used and produced similar overall results as the 120 day minimum average.) Also, in the revised methodology, baseflow was not used to establish MFLs. However, in a step separate from MFL establishment, a regression of rainfall and baseflow (original estimate) was used as part of a weight-of-evidence approach to estimate current basin status for both rivers.
	33	NFUCG	To remove the bias from SRWMD's trend analysis, which SRWMD used to estimate an un-impacted baseline condition for the LSFR, we recommend that SRWMD re-run the trend analysis using the baseflow estimated based on the USGS chemical tracer analysis in the LSFR. We believe that this is more appropriate than the uncorroborated low-pass filter approach described in SRWMD's draft MFL report because the baseflow estimates based on the USGS chemical tracer study have the advantage of being more physically based and corroborated with a field investigations specific to the LSFR and provide the ability to estimate the amount of baseflow coming from the UFA.	
	34	Bradford Soil and Water Conservation District	The methods used for determining the baseflow and the relationship of rain to base flow and total flow in the Lower Santa Fe MFL draft appear to have significant problems that must be addressed.	
	35	Wetland Solutions	The District relies on a 120-day low-pass filter technique to estimate base flows, but independent analysis using standard U.S. Geological Survey baseflow methods indicates that the District underestimates baseflow by about 150 cfs.	

Group	#	Party	Comment	Response
P	36	Wetland Solutions	This under estimation of base flows results in the District's similar under estimation of recent (post-1970s) baseline flows, and of the amount of flow reduction in the Santa Fe River due to current groundwater pumping.	It is important to recognize that there is no direct way to measure baseflow and that all calculations of baseflow are therefore estimates. (As a quality check an alternative low-pass filter was used and produced similar overall results as the 120 day minimum average.) Also, in the revised methodology, baseflow was not used to establish MFLs. However, in a step separate from MFL establishment, a regression of rainfall and baseflow (original estimate) was used as part of a weight-of-evidence approach to estimate current basin status for both rivers.
	37	Bradford Soil and Water Conservation District	While river baseflow is by definition from groundwater, the overall flow in the Santa Fe is not from groundwater. A significant proportion of the river flow is from surface water. If the river is brown you are seeing surface water.	
	38	Four Rivers Audubon	The chemistry of groundwater and surface water is significantly different. Both contribute to the volume of a river system. When one is reduced that the other would contribute a greater percentage of water to the total flow. This would obviously change the chemistry and resulting ecological balance of the river system.	
Q	39	Bradford Soil and Water Conservation District	The proposed method of establishing the MFLs for the priority springs is clearly not acceptable because it is based on the premise that the flow in the Lower Santa Fe River is predominantly groundwater. It has not been demonstrated that the Lower Santa Fe River flow is predominantly ground water.	Multiple estimates by the District indicate baseflow is on the order of 70-75% of total flow at the Fort White gage.

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R	40	Peer Review	In the absence of key supporting data, the panel urges the District to adopt an adaptive management approach allowing decisions based on limited data to be reinforced or modified as new research and monitoring information becomes available.	The District considered the recommendation of the Final Report of the Peer Review Panel. Considering Florida Statutes section 373.042(1)(b) directs MFLs to be calculated using the best information available, the establishment of Lower Santa Fe and Ichetucknee MFLs used scientifically sound methods based on the best information available. The "Planning" portion of the Recovery Strategy further discusses adaptive management.
	41	Annette Long	I would beg you to use the precautionary principle when setting the MFL's for the Ichetucknee and Santa Fe Rivers.	
	42	Four Rivers Audubon	The Ichetucknee Springs State Park's recreational opportunities are a huge economic driver for the community. Therefore, we need to err on the side of caution so as to not further compromise or degrade the system.	
S	43	Peer Review	Explore alternative assumptions regarding the timing of anthropogenic influences	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. The final baseline results in 1990 as the departure date (section 4.4 of MFL document).
	44	Jones Edmunds	Given the significant recharge features that occur in Alachua County and Southeast Clay County, we have concerns with the conclusion that 1970 is the general time at which man made impacts started impacting the groundwater systems. This coincidence in timing is likely resulting in a multi-linear regression relationship that is under predicting the influence of climate and over predicting the influence of anthropogenic impacts.	
	45	Jack Ewel	Concern regarding basis for selection of baseline flow	
	46	Wetland Solutions	The District's assessment of historic (pre-1970s) Baseline Flows does not utilize the full record of flow data from the Santa Fe River prior to modern water resource development in North Florida; however, the error in historic (pre-1970s) Baseline Flow estimation is likely less than 2% (about 25 cfs)	

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T	47	Peer Review	With regard to RALPH plots, the panel suggests providing two scales on the y-axis for these plots; one showing the cumulative number of days during the period of record that the critical Q flow was exceeded (present axis), the other showing the number of days critical Q would be exceeded in an average year (present axis divided by the number of years in the period of record).	The District considered the recommendation of the Final Report of the Peer Review Panel. A secondary axis was not added to the Ralph plots in an effort to not make the plots too confusing. This has not affected the resulting MFL.
U	48	Peer Review	Explore alternative non-linear and/or seasonal models to better account for antecedent moisture conditions in the baseflow model predictions.	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. ET was calculated using both the Blaney-Criddle and Hargreaves equation for the Santa Fe and Ichetucknee River Basins. The creation of an effective rainfall term was implemented by subtracting ET from precipitation (P). Further statistical models were fit using either P-ET or P and ET as separate explanatory variables in the equation. Another approach to calculating effective rainfall is presented in Appendix 4-2 and was used to account for not only ET but other losses as well. Appendix B provides a description of the statistical modeling completed in response to the Peer Review comments.
	49	FGS	Rainfall totals do not directly correlate with groundwater recharge amounts/discharge. Techniques that account for antecedent conditions and ET may provide a more accurate correlation between rainfall and discharge. Another means to estimate recharge is to correlate rainfall with water level responses in wells having long-term potentiometric elevation data.	
	50	NFUCG	A significant portion of the departure between predicted and observed river flows is due to the fact that the model over-predicts flows during drought, and the fact that there was a much greater occurrence of drought during 1990-2010 period than in the baseline period.	

Group	#	Party	Comment	Response
V	51	Peer Review	The panel believes that the current methodology for determining the status of the water body with regard to the MFL, based on the departure of the observed end of record flow from the predicted baseline flow (for the Lower Santa Fe), or the linear future projection of the departure of observed flow from the predicted baseline flow (for Ichetucknee), puts more confidence than is warranted in the predictions of the baseline model. The panel recommends that alternative methodologies be explored to determine the current status of these rivers in order to increase the weight of evidence supporting the classification of their status.	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. Furthermore, alternative methodologies have been explored and are discussed in Section 6.6 of the Final Report, Appendices 4-2, 6-2, and B.
W	52	Peer Review	The panel recommends that further justification and clarification of the criteria used to determine in-stream habitat and fish passage criteria be provided.	As recommended by the Final Report of the Peer Review Panel, final Report Section 5.2.2 provides citations for the fish passage depth and habitat suitability. The species selected for use in habitat suitability provided meaningful relationships between flow and available preferred habitat. Many species used in habitat suitability analyses resulted in poor relationships between flow and available preferred habitat. Appendix 5-9 contains the results of all the species used in the habitat suitability analyses.
X	53	FPS	We also recommend against the proposed approach of grouping all priority springs in the Ichetucknee River into two groups, Blue Hole and the Ichetucknee Group. We recommend that Ichetucknee Head Spring, Blue Hole Spring, Devil's Eye Spring, Mission Spring, Grassy Flats Spring, Mill Pond Spring, and Coffee Spring all be listed as priority springs and be assigned a specific MFL. A table format similar to Table 6-6 would be beneficial.	All 1st and 2nd magnitude springs now have a specific MFL (section 6-5). 3rd magnitude springs (Coffee) will not have specific MFL established. Restoring groundwater levels to increase flow in neighboring springs will clearly benefit 3 rd magnitude springs.

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X	54	FPS	The discussion of priority springs of the Ichetucknee River is in Section 6 (p. 6-12) of the draft document. We recognize that long-term discharge data is unavailable; however, we believe it is very important for the protection of individual spring flows to generate a “specific” numerical MFL for each spring. We recommend against the approach that provides percent “allowable reductions” for priority springs.	All 1st and 2nd magnitude springs now have a specific MFL (section 6-5). 3rd magnitude springs (Coffee) will not have specific MFL established. Restoring groundwater levels to increase flow in neighboring springs will clearly benefit 3 rd magnitude springs.
	55	FPS	We request that Coffee Spring be added to the priority spring list. We are encouraged by the thorough habitat assessment of the imperiled Ichetucknee silt snail and are pleased with the recognition of its fragile singular occurrence at 3rd magnitude Coffee Spring. This assessment should be used to provide MFL protection for continuous flows in the spring. Protecting flows in larger springs elsewhere on the river may not be effective, especially because dye trace evidence suggests that Coffee may be disconnected from the other springs. The smallest springs will predictably be the first to disappear as groundwater withdrawals increase.	
	56	Jean Wonser	What will be done to restore flow on dry springs	
	57	Our Santa Fe River	The Santa Fe River Springs need more attention and reportage in this MFL.	
	58	Wetland Solutions	The District’s MFL report lists only eight of these springs and one spring group, with an estimated combined flow of about 694 cfs without including the three river resurgences listed (Treehouse, Columbia, and Siphon Creek Rise). However, the District’s MFL analysis does not evaluate the human use or environmental WRVs for any of these springs and other karst features.	

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Y	59	FWC	The FWC recommends that SRWMD consider using the habitat suitability curves for the Suwannee bass and spotted sucker as part of their Water Resource Values assessments.	These species were added to the analysis and are included in Appendix 5-6.
Z	60	Our Santa Fe River	The Upper Santa Fe River adopted MFL needs to be combined in this MFL.	While the regional connectedness of these two systems is well documented, the Lower Santa Fe and Ichetucknee River was kept separate in the development of MFLs. A review of the Upper Santa Fe MFL (perhaps jointly with a review of the Lower Santa Fe MFL) can be completed after other priority waterbodies have been set. Also, the rivers (upper and lower) are disconnected by a land bridge.
	61	ACEPD	The Upper Santa Fe River MFL was adopted in May 2007, over five years ago, and at the time the Upper Santa Fe River was not found to be in Prevention or Recovery Status. ACEPD requests that the Upper Santa Fe River MFLs be reviewed, taking into consideration the Peer Review Panel recommendations for the draft Lower Santa Fe River, Ichetucknee River and Priority Springs MFLs.	
	62	Bradford Soil and Water Conservation District	We urge the Suwannee River Water Management District to consider drafting a single MFLs document for the entire Santa Fe River rather than having one document to address the Upper Santa Fe River (already adopted) and a second document for the Lower Santa Fe River (to be adopted).	
AA	63	Springs Institute / Wetland Solutions	Clarify and provide examples of how the MFLs will be implemented and used in making informed and environmentally-protective water management decisions.	A Recovery Strategy will be adopted in concert with the adoption of the Lower Santa Fe and Ichetucknee rivers MFL as required by 62-40.473, Florida Administrative Code. In addition, Water Use Permitting rules govern the evaluation and issuance of permits (see 40B-2 F.A.C.); while MFLs are a part of this evaluation process they are not the sole evaluation metric.
	64	Springs Institute / Wetland Solutions	Provide an ample public education campaign and public comment period for the revised draft MFLs and subject them to a more thorough peer review that fully evaluates their likely effectiveness for protecting the resources of the LSFR/IR aquatic ecosystem.	
	65	ACEPD	The large contribution of spring flow to the rivers and the springs themselves make it imperative to reduce impacts attributable to Floridan aquifer ground water pumping by fully implementing the Recovery and Prevention Strategies.	

Group	#	Party	Comment	Response
AA	66	ACEPD	If necessary, the ACEPD encourages the District to consider the implementation of interim Recovery and Preventions strategies while the development of the MFLs are completed.	A Recovery Strategy will be adopted in concert with the adoption of the Lower Santa Fe and Ichetucknee rivers MFL as required by 62-40.473, Florida Administrative Code. In addition, Water Use Permitting rules govern the evaluation and issuance of permits (see 40B-2 F.A.C.); while MFLs are a part of this evaluation process they are not the sole evaluation metric.
	67	Our Santa Fe River	"Recovery" restoration of the loss of 30 MGD could be achieved by conservation and limitation on issuances of large CUP's and WUP's (over 100,000 GD) in the watershed of the Santa Fe River and Ichetucknee River.	
	68	Annette Long	By viewing the science and using common sense it is clear that all of our rivers have been in trouble for some time. Strict adherence to the recovery process needs to be swift and sure. I would argue that the economics of having flowing, clean recreational waters exceeds that of any new industry or water user that might apply for more water to be drawn from these two important waters. Groundwater health is the single most important factor with these two water bodies.	
	69	Annette Long	I know it's critical that the Santa Fe River and the Ichetucknee River must flood to maintain a healthy ecosystem in the floodplain and on the banks. Part of the recovery plan should not include eliminating floods by capturing them artificially.	
	70	Wetland Solutions	The District's proposed LSFR MFL report does not elaborate on how they plan to use the proposed 137 cfs MFL in determining flow recovery or compliance. For this independent technical analysis it is assumed that the District will either use the long-term LOESS flow time series updated temporally (Figure 26) or the Flow Duration Curves for the Baseline Flows and for the MFL flows (Figure 27) and periodically update one or the other of these curves.	

Group	#	Party	Comment	Response
BB	71	Wetland Solutions	The District does not describe how the proposed MFLs will be interpreted and evaluated for compliance purposes and for making critical decisions on issuance of Consumptive Use Permits; the proposed LSFR MFLs are not complete and cannot be fully evaluated without a clear description of how they will be implemented and assessed over time.	Consumptive use permits are assessed based on Florida Administrative Code rule 40B-2. MFLs are a part of the assessment process, but CUPs are issued based on rule 40B-2. The Recovery Strategy establishes a framework for consideration of consumptive use permits. The Recovery Strategy will be adopted, concurrent with the MFL, by DEP.
	72	Carolyn Baker	Please stop issuing CUP's and issue conservation orders along with MFL's that make sense and will be effective immediately. And, I'm not talking about 6" for fish passage.	
	73	Annette Long	No more water should be permitted from its watershed.	
CC	74	FPS	SRWMD has publically stated that endangered species protection is paramount. We have shared with SRWMD a list of manatee observations in the Ichetucknee, the majority of which are during the winter months. However, when the Santa Fe is at a low level, manatees may not be able to move over the limestone sill near the river mouth. We have sent SRWMD a photo of four manatees squeezing into tiny Mella Spring on the Santa Fe, demonstrating their desire for winter refuge in the system. FWC has suggested that the manatee sightings seem to occur in the Ichetucknee when the river stage is higher and seem to occur in the Santa Fe when the stages are lower, suggesting that depth is an effective barrier. An MFL that allows the discharge to be further lowered would likely restrict access on more days than at present, resulting in the loss of habitat for an endangered species. We request a calculation or estimate of how many additional days during the traditional manatee winter season the proposed MFL would restrict manatee access.	A more thorough analysis and explanation of the Manatee was included in the "other considerations" portion of Section 5.2.2.

Group	#	Party	Comment	Response
CC	75	FWC	The FWC recommends that SRWMD, the Florida Department of Environmental Protection-State Parks, and the FWC develop a plan to collect additional manatee sighting information and river stage, water flow, and temperature data. This information will assist in augmenting the recovery plan for the Santa Fe River, as well as provide a better understanding of existing and potential manatee use of the Santa Fe and Ichetucknee river systems for future evaluations of these MFLs.	A more thorough analysis and explanation of the Manatee was included in the "other considerations" portion of Section 5.2.2.
	76	FWC	The FWC recommends that as part of the recovery planning for the Santa Fe River, the SRWMD determines how water recovery to this system may affect manatee access of the Ichetucknee River and other springs of the Santa Fe River.	
	77	FWC	The FWC recommends that prior to moving forward with the proposed MFL for the Ichetucknee River, existing river stage and manatee sighting data be evaluated to determine if a correlation exists between Ichetucknee River water levels and manatee access to the Ichetucknee River.	

Group	#	Party	Comment	Response
CC	78	Jim Stevenson	I believe one of the consultants stated yesterday that there is no evidence that manatees are using the Ichetucknee as a warm water refuge. The park biologist has a list of over 200 manatee observations in the Ichetucknee over a 10 year period, the majority of which are during the winter months. There would be significantly more observations if the manatees could enter the river year round. As you know, when the Santa Fe is at a low level, manatees cannot enter the Ichetucknee because of the limerock sill that blocks access at such low levels. This means that manatee habitat is not accessible to this endangered species. An MFL that allows the discharge to be lowered further would necessarily result in the loss of warm water refugia habitat because access would be restricted on more days than at present. The SRWMD has stated unequivocally that endangered species protection was paramount and that determining some acceptable loss of endangered species habitat was inappropriate. How many additional days in the winter under the proposed MFL would the space for manatees to cross the sill be eliminated?	A more thorough analysis and explanation of the Manatee was included in the "other considerations" portion of Section 5.2.2.
	79	Jim Stevenson	How much more can their flow be reduced before they will no longer support the survival of manatees? It seems that the manatee issue deserves closer study since the "Allowable Reduction is driven by the biological system."	
	80	Jim Stevenson	Also, in the attached photo, you will note four manatees crammed into the tiny spring run of 3rd magnitude Mella Spring, on the Gilchrist shoreline of the Santa Fe 800 feet upstream of the confluence of the Ichetucknee because they couldn't enter the Ichetucknee. It is clear that these springs are necessary warm water refuges.	

Group	#	Party	Comment	Response
DD	81	Our Santa Fe River	All federally endangered species (manatee, gulf sturgeon, oval pigtoe mussel) should be included in the MFL report	The USGS does not have any known Gulf sturgeon spawning areas in the Ichetucknee or Santa Fe River. Oval pigtoe are discussed in section 5.2.2, but due to the lack of available data they were not used to develop the MFL.
	82	ACEPD	Page 5-87 (labeled in the report at page 6-87), There is discussion of the endangered Oval Pigtoe Mussel; however, it does not provide any detailed information on occurrence or habitat requirements.	
EE	83	Springs Institute / Wetland Solutions	Follow all of the recommendations of the peer review panel to improve the underlying science and technical foundation for the MFLs.	All peer review comments were considered. To the extent feasible, given available data, many of them were incorporated into the MFL document.
	84	ACEPD	The recommendations of the peer review panel are comprehensive and specific. These recommendations should be used to guide finalizing the draft MFLs prior to adoption. There are many uncertainties and limitations of these MFLs that should be thoroughly presented in the MFL document. The "no degradation in water quality" requirement for an OFW is important to consider for these MFLs.	
FF	85	FGS	Consumptive use including its location, timing and actual amounts have to be accurately monitored and compiled for the Upper Floridan Aquifer System. The impacts of withdrawals on the potentiometric surface needs to be quantified to the extent possible. The correlation between the aquifer stage and discharge needs to be established.	MFLs were set using best available data. Future data needs will be assessed and prioritized by the Hydrologic Resource Monitoring Program.
GG	86	FGS	The Santa Fe historically was tannin colored only at high flow. There may be ecological effects if the ground water component is reduced to the point that color increases in duration and intensity.	There is a relationship between flow and color in the Santa Fe River. The allowed flow reductions by the proposed MFL are anticipated to have minimal effect on the flow vs. color relationship.

Group	#	Party	Comment	Response
HH	87	FGS	The relationship between aquifer levels on spring discharge and river level are not addressed. Given the Ichetucknee and Lower Santa Fe rivers are groundwater dominated systems it would seem the MFL would establish minimum aquifer levels within the groundwater contributing area for these rivers and their springs. If aquifer levels adjacent to the river corridor are not maintained at a level where discharge is occurring, portions of the river will be losing water to the aquifer and this could significantly affect river levels relative to flow.	Section 2 in the Final Report discusses the hydrology and relationships between river flow and groundwater levels. The District agrees that aquifer levels need to be protected to maintain the flow in the rivers. The groundwater model is one tool used for assessing the impacts that groundwater withdrawals have on the flow in the river.
II	88	FPS	Table 6-3 summarizes water resource values and concluded that depth is not a limiting factor because the MFL maintains fishing and boating opportunities by virtue of having at least 0.60 ft. passage at all times. Neither motorboats nor fishing is allowed in the park.	The content of this comment is in error. 0.8 ft. over 25% of the channel was deemed the necessary depth for <i>fish passage</i> ; 0.6 ft. depth was not used in this report. Fishing was not considered in the MFL development process. Motorboats were not directly used for any final MFL values.
JJ	89	FPS	We have commented before to SRWMD that the issue of enough depth to float tubes or kayaks is not a concern. Rather, the concern is that in low water flows, there is increased trampling as tubers are increasingly prone to get out of their tubes and trample the vegetated bottom. Turbidity in the clear flow also increases, affecting the aesthetic experience of all visitors. The off-season recovery of trampled eelgrass was the purpose of the unique carrying capacity that was determined for the river. A drop in river levels because of consumptive use will logically increase the number of days when trampling occurs, making it less likely to recover in the off-season. The park is hesitant to endorse any loss of discharge and would like to see a recovery of historic levels.	The goal of the tubing depth criteria was the protection of tubing as a recreational WRV on the Ichetucknee River. The tubing depth is based on the ability to float over SAV.

Group	#	Party	Comment	Response
JJ	90	Jim Stevenson	As I mentioned during the workshop, tuber damage is not caused by their butts while sitting in the tube. The damage is caused by wading/trampling in shallow reaches of the river. The lower the water level the more river bottom is trampled causing damage to the SAV. Furthermore, turbidity and sedimentation is caused by tuber wading which impacts the aesthetic value of water clarity the length of the river on busy tubing days. There are likely ecological impacts as well that we do not yet understand. The Ichetucknee Springs Report Card of 2008 identifies clarity as an issue. Turbidity and sedimentation is caused by tuber wading which impacts the aesthetic value of water clarity the length of the river during tubing days. It is disturbing to watch the clear, blue water turn cloudy as it precedes the first group of tubers of the morning wading down river. There are likely ecological impacts as well that we do not yet understand. The Florida Springs Institute's Ichetucknee Springs Report Card of 2008 identifies clarity as an issue.	The goal of the tubing depth criteria was the protection of tubing as a recreational WRV on the Ichetucknee River. The tubing depth is based on the ability to float over SAV.

Group	#	Party	Comment	Response
KK	91	FPS	Ichetucknee Springs is an iconic Florida spring, and other than the few large springs that were developed into sophisticated tourist attractions, perhaps the best loved in the state due to its tubing tradition. Seven million visitors have enjoyed Ichetucknee Springs since it became a state park. The MFL statute clearly states that MFLs may be determined by best available information, and the water management districts exclusively base the MFLs on some example of significant harm that will occur with too much withdrawal. However, the MFL statute also clearly provides an alternative strategy: “The department and governing board shall also consider, and at their discretion may provide for, the protection of nonconsumptive uses in the establishment of minimum flows and levels”. This discretion was intended for use when an iconic water body had special value. Preserving the historic flow of an unusually emblematic and popular spring is a proper use of this statutory option, and we ask that DEP consider the option carefully. The fact that DEP is the manager of Ichetucknee Springs State Park, as well as the agency lead on the MFL for the state park, makes this an ideal opportunity to exercise the more protective option.	SRWMD recognizes the significance of Ichetucknee State Park, for recreational, aesthetic & economic opportunities. The MFL has been developed with best information available for this spring and river system.
LL	92	FPS	We have previously commented and provided a John Moran photograph to SRWMD of the iconic boil of Millpond Spring. Does SRWMD conclude that the height of this boil will be unaffected by withdrawals that would be allowed by the proposed MFL?	Minimum flows and levels are based on best available information. The District is not aware of measurements of the height or frequency of spring boils.

Group	#	Party	Comment	Response
LL	93	Jim Stevenson	Spring boils have become rare. In 1774, William Bartram wrote that (Volusia) Blue Spring “boiled up with great force.” Today it is hardly a ripple. Where can a Floridian see a spring boil today? The best, and perhaps one of the last, is Ichetucknee’s Millpond Spring boil. When the proposed MFL is reached will this aesthetic gem remain or like so much of natural Florida will it only be found in a photograph? See John Moran’s attached photo. The loss of any of the prominent boils constitutes a “significant harm” even though it cannot be quantified. Yellowstone’s Old Faithful is an appropriate analogy. The loss of any of its height would be a significant harm whether any hot pool critter suffered or not.	Minimum flows and levels are based on best available information. The District is not aware of measurements of the height or frequency of spring boils.
MM	94	NFUCG	To remove the bias from the adjusted historical flows, we recommend evaluating the use of stages rather than flows in MFL development. Using stages removes the uncertainty associated with the changing stage-discharge relationship. If stages cannot be used in developing MFLs, we recommend developing a rating curve (or obtaining one from USGS, if possible) for the model correlation period (pre-1970 condition) and using it to adjust post-1970 discharges. The amount of change in discharge resulting from the change in the stage-discharge relationship can be determined from 1970 to present using the rate curves and the gage height measurements. The adjusted historical flow should be corrected to account for the changing stage-discharge relationship. The corrected adjusted historical flow departure from 1970 to present can be checked against available groundwater models and estimated water withdrawal data to establish the amount of departure attributable to groundwater withdrawals.	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. 1. The baseline was replaced with a flow record that uses observed flow data (section 4.4). 2. The calibrated HEC-RAS model was used to find rating curves for all cross sections of the river (section 4.3 & Appendix 4-1). It is appropriate to set minimum flows in river systems. 3. The USGS periodically maintains rating curves at their gages and this data is considered the “best information available.”

Group	#	Party	Comment	Response
MM	95	Bradford Soil and Water Conservation District	The MFLs are expressed as flows but the metrics (plant communities, fish passage, bank full, fish habitat etc.) that form the basis for the MFLs are for the most part determined by water levels not flows. For any given level in the river or in a spring pool there can be many different flows. Springs can even reverse flow during periods of high water levels. MFLs should be based on water levels for the river and groundwater levels for the springs.	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. 1. The baseline was replaced with a flow record that uses observed flow data (section 4.4). 2. The calibrated HEC-RAS model was used to find rating curves for all cross sections of the river (section 4.3 & Appendix 4-1). It is appropriate to set minimum flows in river systems. 3. The USGS periodically maintains rating curves at their gages and this data is considered the “best information available.”
NN	96	NFUCG	The Analysis supporting the draft MFL assumes that the entire man-made impact to the river is from groundwater pumping and that there have been no structural alterations to the watersheds, surface waters, or aquifers contributing to the MFL waterbodies since a baseline condition of 1970. However, the USGS stage-discharge measurements at the Ft. White gage clearly demonstrate that there have been alterations to the Lower Santa Fe River (LSFR) after 1970 that are not related to groundwater withdrawals.	Land use changes can certainly affect the rainfall runoff relationship. Section 2.3 of the Final Report describes the land use of the basin over time and presumed effects. Both statistical and groundwater modeling performed support the estimated level of reduction in flow in the rivers (see section 6 of the MFL report).
	97	Bradford Soil and Water Conservation District	The assumption that reduced river flows and spring flows are caused by groundwater withdrawals is not supported.	
OO	98	FGS	The Lower Santa Fe River, below the river rise, is approximately 30 miles in length. The Ft. White gage is 15.8 miles above the confluence with the Suwannee River. In effect, more than half of the Lower Santa Fe River and a significant inflow of groundwater (25 springs) are not being covered by the proposed MFL.	The Ft. White gage is the best long term gage for use in setting an MFL on the Lower Santa Fe River. The MFL at the Ft. White gage protects flows possibly impacted by groundwater withdrawals downstream by implementation of the groundwater model. The groundwater withdrawals downstream from a gage's affects can be analyzed with the groundwater model.

Group	#	Party	Comment	Response
OO	99	Bradford Soil and Water Conservation District	The assumption that plant communities below Fort White result from flow conditions at Fort White is unsupported.	The Ft. White gage is the best long term gage for use in setting an MFL on the Lower Santa Fe River. The MFL at the Ft. White gage protects flows possibly impacted by groundwater withdrawals downstream by implementation of the groundwater model. The groundwater withdrawals downstream from a gage's affects can be analyzed with the groundwater model.
PP	100	FGS	The established stages for given flows at the USGS gage sites may no longer be accurate. Unrestricted power boat traffic has significantly altered and eroded the banks and in filled the river on this reach of the Santa Fe River. This will affect the level and extent of inundation at various river stages including those induced by Suwannee backwater effects.	Published USGS gage data is considered the "best available data."
QQ	101	Lars Anderson	Please look beyond the politics of the day and act on larger principles as you set the MFLs for Lower Santa Fe and Ichetucknee Rivers.	MFLs are set using best available data, and subjected to voluntary, independent peer review to ensure a scientifically-sound approach.
	102	Annette Long	It didn't take these technical measurements and scientific observation to see that the Upper and Lower Santa Fe Rivers were in trouble during the drought. Watching the river and looking at the record low river and groundwater levels made it obvious there was a problem.	
	103	Annette Long	I hope that you will not bend to the utility lobbyists who spent so much time complaining about the MFL's at the public workshop. I would argue that the economics of recreation are equal in our rural area to their concerns about supplying water to urban and industrial users as cheaply as possible. There are costs to everything and the urban users should have to bear their share rather than stealing it from rural uses.	
	104	Steve Earl	I have been a student of the health of Florida's springs for 30 years, and in that time seen a dramatic decline in their health and vitality, due primarily to the over pumping of ground water and introduction of nitrates to the aquifer. Please do the correct and right thing for our most precious resource and don't buckle to big business.	

Group	#	Party	Comment	Response
QQ	105	Catherine Howes	Not sure about the section and appendix but I do want to comment on the water being taken from the springs. The whole ecosystem is affected and has suffered. The waters are not flowing properly; the contamination has risen because of this. This one reason alone should be enough to put an end to the continual degradation of Florida's most precious resource, our drinking water. Enough already! Being a 5th generation Floridian, I can no longer depend on our elected officials to protect Florida's resources. Please be part of the solution and not part of the problem. It's too critical to just let this happen.	MFLs are set using best available data, and subjected to voluntary, independent peer review to ensure a scientifically-sound approach.
RR	106	Wetland Solutions	Independent analysis indicates that a better estimate of the current flow reduction in the Lower Santa Fe River due to human activities is about 340 cfs or about 26% of historic flows and about 150 cfs more than the District has estimated.	As recommended by the Final Report of the Peer Review Panel, the District conducted additional baseline modeling and determined that analysis of observed flow data to develop the baseline best resolved the issues raised by the Peer Review Panel. See section 6.6 of the final MFL report for a description of the approach to determine the current basin status.
SS	107	Lesley Gamble, PhD	Please set MFLs for the Ichetucknee River at no less than 350 cubic feet per second (cfs), the river's historical average flow as identified in the restoration plan prepared by scientists at the Howard T. Odum Florida Springs Institute.	The Lower Santa Fe and Ichetucknee rivers and springs MFL were established using the best available data using best scientific practices that were subjected to voluntary, independent peer review. These MFLs coupled with the Recovery Strategy will protect the Lower Santa Fe and Ichetucknee rivers and priority springs from significant harm.

Group	#	Party	Comment	Response
SS	108	Four Rivers Audubon	The Ichetucknee system was historically an ecologically balanced system. Maximum potential ecosystem metabolism is set by external forcing functions (sunlight, velocity, water quality, nutrient inputs, etc.) This potential is only met after a long period of adaptation where the optimal number of consumers are present as a combination of bottom-up and top-down controls to achieve the optimal plant community and maximum primary productivity. Changes in flow affect chemistry of the system, creating a domino effect that gradually changes the biota of the system. Example: Cattails, an indicator of modified nutrient levels, have populated 3 sites on the river for the first time in the past 3 years.	The Lower Santa Fe and Ichetucknee rivers and springs MFL were established using the best available data using best scientific practices that were subjected to voluntary, independent peer review. These MFLs coupled with the Recovery Strategy will protect the Lower Santa Fe and Ichetucknee rivers and priority springs from significant harm.
	109	Collete Jacano	In- channel vegetation survey should be included in analysis towards determination of MFL, especially since the district cannot say when MFL will be reassessed.	
	110	Our Santa Fe River	Recreation on the Santa Fe River should be included in the MFL approach	
	111	Wetland Solutions	This MFL is overly reliant on WRV metrics that assess fish and floodplain wetland resources. It largely ignores the evaluation of effects of flow changes on human use metrics such as recreation and aesthetics, water quality metrics such as exceedances of water quality standards, pollutant assimilation, and sediment and detrital dynamics, and other effects on the ecological community of plants and wildlife, including threatened and endangered species. These omissions negate the relative importance of spring-dominated aquatic ecosystem structures and functions.	

Group	#	Party	Comment	Response
TT	112	ACEPD	Page 5-58, The Chironomidae genera Tvetenia was chosen as described since it reportedly displayed “a maximum weighted usable area (WUA) with decreasing WUA with decreasing flows.” No discussion was presented of the rational or an evaluation of other perhaps more sensitive species, or group of species, frequently found in the rivers that would serve as good indicators. This is particularly important due to the availability of woody habitats (snags and roots).	Maintenance of inundation of woody habitat was used as a WRV for both rivers. A relationship between flow and available preferential habitat is needed to use a particular species for MFL development.
UU	113	Bradford Soil and Water Conservation District	The assumption that The priority springs can be protected by setting an MFL based on flow in the Santa Fe River is unsupported.	Section 2 of the Final Report discusses the integration of surface water and groundwater on the rivers. Providing a MFL for the river in turn provides for protection of the springs by ensuring UFA levels are raised. Individual spring runs on the Lower Santa Fe River are typically short or nonexistent. Therefore the only detailed spring run that was studied was the Ichetucknee River. The springs along the Santa Fe River contribute groundwater flow to the Santa Fe River. Once additional data is available at the priority springs more detailed analyses can be completed.
	114	ACEPD	Pages 6-12 and 6-13, section 6.5, How would the percent reduction for spring flow be assessed to determine compliance with the MFLs given the lack of historical data for flow (discharge) for most springs? Springs discharge (flow) measurements will be essential to determine the continuing prevention or recovery status of each spring. A program to collect additional flow data will be required and a plan for MFL implementation for the springs and rivers should be provided in this report.	

Group	#	Party	Comment	Response
UU	115	Bradford Soil and Water Conservation District	It is not clear why the 50% flow level was used to calculate the allowable spring reduction. If water entering the river at River Rise is proportioned at the rate surface water flow enters O'leno sink the 50% flow at Fort White may be made up of a significant amount of surface water. The use of the 50% flow value at Fort White for setting the Priority Springs MFL seems to assume that the 50% flow is all groundwater.	Section 2 of the Final Report discusses the integration of surface water and groundwater on the rivers. Providing a MFL for the river in turn provides for protection of the springs by ensuring UFA levels are raised. Individual spring runs on the Lower Santa Fe River are typically short or nonexistent. Therefore the only detailed spring run that was studied was the Ichetucknee River. The springs along the Santa Fe River contribute groundwater flow to the Santa Fe River. Once additional data is available at the priority springs more detailed analyses can be completed.
	116	ACEPD	Page 2-35, section 2.2.3. and pages 6-12 and 6-13, section 6.5, Protection of the Lower Santa Fe River and Ichetucknee River is critical to protecting Priority Springs. Additional information documenting the protective nature of the MFLs to protect the Priority Springs is needed. The one-page section (2.2.3) lists the priority springs and median flow (table 2-6). In addition to the median flow and number of measurements, the historic magnitude, the period of record, and the mean, maximum and minimum flows should be added to the table. Table 2-6 lists 17 priority springs and Table 6-6 only lists 12, added discussion or foot notes should be provided to explain the differences.	
VV	117	Bradford Soil and Water Conservation District	While Loess smoothing may be appropriate for helping to identify trends, it may not appropriate for determining if the MFL is being met or the amount of the deficit since the impacts are based on actual flows and depths not a smoothed flow that masks long periods of low flow.	Loess smoothing was not used in determination of the current basin status.

Group	#	Party	Comment	Response
WW	118	Bradford Soil and Water Conservation District	The authors assume that pumping did not impact flows prior to 1970. This assumption is not supported by any data.	The underlying assumption is that 1990 (previously 1970) is the date that effects of pumping began to be discernable in the flow data of the rivers. In other words, data prior to 1990 is considered a relatively minimally impacted flow record (see section 4.4).
XX	119	Wetland Solutions	The District's proposed MFLs are deficient because they rely on a small subset of the water resource values likely to be most important for this groundwater-dominated river and its feeder springs	It is recognized that the Lower Santa Fe and Ichetucknee rivers MFLs only address a small subset of Water Resource Values. There are many organisms that consider these rivers home, and several metrics for measuring a river's health, but in order to set an MFL, scientists need data. Specifically, data that relates WRVs to flow rates. This MFL report selected a subset of WRVs that would be representative of the overall health of the Rivers. Section 3 of the report helps outline this decision making process.
YY	120	Four Rivers Audubon	The Ichetucknee is a significant tributary to the Lower Santa Fe. If the flow of the Ichetucknee is reduced this would impact the flow of the lower Santa Fe which is already identified as needing recovery• .	MFLs are set at long term USGS gages, not at multiple points along the river. Thus, the flow out of the Ichetucknee River would not affect the flow of the Santa Fe River at Ft. White gage. In other words, each MFL stands on its own.
ZZ	121	Annette Long	Florida Water Rules, the water management district's Governing Boards and models should have stopped simple "harm" from happening to our Outstanding Florida Waters in the Suwannee Watershed. Now it appears that that didn't happen and now the Santa Fe--upper and lower--have been significantly harmed. Also, the jewel of Florida's Springs, the Ichetucknee Springs and River, is past "harm" and on the road to "significant harm" by your own figures.	Based on the current analysis, the Lower Santa Fe River and Ichetucknee River require the adoption of a recovery strategy.

Group	#	Party	Comment	Response
AAA	122	Paul Still	Literature Cited is missing, parts of the Appendix 2.2 are copied word for word from Upchurch, Chen and Cain 2011 without citing the report.	The missing citation was included in the works cited.
	123	ACEPD	Add the following reference cited in appendix 2, Upchurch, S.B., J. Chen, and C.R. Cain, 2008. Springshed of the Santa Fe River. Report prepared for Alachua County by SDII Global Corporation, Tampa Florida, Second revision October 28, 2011. Available at: http://www.alachuacounty.us/Depts/EPD/WaterResources/GroundwaterAndSprings/Documents/Springsheds%20of%20the%20Santa%20Fe%20River.pdf	
BBB	124	Jim Stevenson	It is my understanding that the statute states “best available information” rather than “best available data” as your consultant stated.	The Statute says "best information available." The definition of data is "individual facts, statistics, or items of information." Information that can be quantifiable (data) and related to flow rates was used to develop MFLs.
CCC	125	ACEPD	Page 1-14, the first paragraph briefly discusses management of public lands as “competing uses” in which Poe Springs Park and several Alachua County conservation easements and preservation lands are referenced. This statement should be corrected and clarified, these public lands, including approximately 30 acres of the Poe Springs Park that is in preservation (outside the active recreational area of the park), are not competing uses. These lands are in their natural state and function, have limited public use or impact and preserve and protect the waters and ecosystems of the Santa Fe River basin.	The intention of the paragraph is to inform the reader that proper management of recreational opportunities vs. preservation was not an issue unique to Ichetucknee Springs State Park.

Group	#	Party	Comment	Response
DDD	126	ACEPD	Pages 2-1 through 2-17, Sections 2.1, the discussions of geology and hydrogeology should be more accurate and detailed. Report section 2.1 and Appendix 2.2 should be updated to correct and clarify the information provided on the geology and springs. The geology section should include a discussion of the Avon Park and lower formations, including formation thickness across the basin. The geologic framework and physiography are critical to understanding groundwater movement in the basin. Include a discussion of the Upper and Lower Floridan aquifer system and the middle confining unit as it pertains to the Lower Santa Fe basin and springs; Miller (1986) is one suggested source of that information. Figure 2.5 requires clarification; the 2005 Floridan aquifer groundwater levels are depicted above land surface near Worthington Springs. A potentiometric surface map(s) showing groundwater elevations in the basin would be helpful.	Geology was updated according to the comments of the Peer Review.
EEE	127	ACEPD	Page 2-18, Figure 2-6 and preceding discussion describe portions of the Upper Santa Fe River as “stormwater dominated”. The land use in this area is primarily forest, range land, and agriculture and although the area has been ditched and drained for agriculture and silviculture activities, there is limited impervious area (figure 2-29 through 2-31). The flow to the river includes water that discharges from the surficial aquifer system to the river, not just “stormwater” making it surfacewater dominated when compared to the groundwater dominated Lower Santa Fe River, below River Rise.	Stormwater was used instead of surfacewater to try and relay to the reader the marked differences in the geology and surface drainage between the Upper and Lower River Basins.
FFF	128	ACEPD	Page 2-53, The following sentence in the last paragraph needs clarification. <i>The increase in water consumption from ET is typically offset with groundwater pumping.</i>	Completed

Group	#	Party	Comment	Response
GGG	129	ACEPD	Page 4-8, the well chosen for data interpolation is located in an area when the Floridan aquifer system is confined (page 2-11, Figure 2-3). Much of the Lower Santa Fe River basin and springsheds are in an area where the Floridan aquifer is unconfined or semi-confined. Consideration should be given to using a well or wells to verify the relationship (of this well) with surface water levels.	The FDOT well in Lake City is the closest long term well that can be used for Ichetucknee River Flow data synthesis.
HHH	130	ACEPD	Page 5-10, Reference to figure 4-4 should indicate figure 5-4.	Completed
III	131	ACEPD	Page 5-11, It is imperative that water quality and biological monitoring (fish, benthic macroinvertebrates, and algae) activities in the basin be reviewed and expanded. Sustained inundation is required for many long-lived invertebrate species. Developing a robust program for collection of in-stream biological data is crucial for continued assessment of ecosystem health and MFL implementation, Prevention and Recovery monitoring and providing data for subsequent modifications to the draft MFLs for the rivers and springs. In-stream habitat was reportedly one of the “predominate metrics” used for development of the draft MFL for the Santa Fe River at Fort White (page 3-5).	Considerations will be given to the requested modifications in the District’s biological monitoring programs.
	132	ACEPD	Page 5-13 and Figure 5-5 the DEP stream Condition Index (SCI) sampling sites were concentrated in the Santa Fe River downstream of Ft. White and in the Ichetucknee River; only one SCI site was present on the Lower Santa Fe River above Ft. White. Two sites on the Lower Santa Fe River were reported to have been sampled (1990 – 2010) by SRWMD using modified in-stream bioreconnissance procedures. The description of “benthos sampling” provides minimal information and refers the reader to an unidentified appendix. This section should include a brief summary of the findings.	

Group	#	Party	Comment	Response
JJJ	133	ACEPD	Page 5-70, The discussion preceding Table 5-6 discusses relatively low allowable percent reductions of 6%-3%; Table 5-6 indicates 8%-3%.	This discrepancy was corrected.
LLL	134	ACEPD	Appendix 2, Graph scaling makes it difficult to determine trends. Graphs should be revised and the median values shown on the graph. The data provided on flow in Appendix 2 (graphs and text) does not match Table 2-6; most likely due to the period of record used to calculate median values. The appendix text should be revised to accurately reference the source(s) of the data.	Appendix 2-2 describes background information for the springs. Water year 2010 was used as the cutoff for new data for MFL establishment.
LLL	135	ACEPD	Appendix 2 – page 15, Poe Spring does not have an extensive cave system. Other documents and local cave divers can substantiate this fact. It is likely that Poe Spring, in addition to Hornsby Spring, is an estavelle. In May 2012 backflow toward the spring and floodplain area was measured at 36 CFS by ACEPD staff. Additional analysis of river stage and groundwater levels should be conducted to confirm if Poe was an estavelle at that time. In 2010 through early 2012 Poe Spring flow showed a precipitous decline; without that data plotted, documentation of that occurrence in this report is lost.	Appendix 2-2 describes background information for the springs. Water year 2010 was used as the cutoff for new data for MFL establishment.
	136	ACEPD	Appendix 2, page 8, correct the last sentence in the second full paragraph to indicate that Hornsby spring is an estavelle. In June 2012 it was observed to backflow over an estimated 300CFS by ACEPD staff. On numerous occasions flow in this spring has been too low to measure or zero.	
	137	ACEPD	Appendix 2 – Page 16, The figure 3-3 caption states the discharge is from 1917 – 2007; however, the data on the graph is through early 2010. This figure along with all other in the appendix should be updated with through mid-2013.	
	138	ACEPD	Appendix 2, Flow data should be updated to include data through mid-2013 or 2012, at a minimum. This is valuable information since the period of 2010 through early – 2012 was a period of very low rainfall and corresponding decreased spring flow.	

Group	#	Party	Comment	Response
MMM	139	Bradford Soil and Water Conservation District	The two year running average which was used in the MFL documents distorts the data even more than the one year running average.	When using the Multiple Linear Regression (MLR), explanatory variables start to lose significance when analyzing rainfall after 2 years and remain significant when using up to 2 years of rainfall data.
NNN	140	Bradford Soil and Water Conservation District	Clearly a 24 month rain accumulation period is not appropriate for the Lower Santa Fe River. The use of a 24 month rain accumulation period calls into question the results produced in the MFL Documents	When using the Multiple Linear Regression (MLR), explanatory variables start to lose significance when analyzing rainfall after 2 years and remain significant when using up to 2 years of rainfall data.
OOO	141	Peer Review	Wetland communities were not thought to be influenced by river flooding on the Ichetucknee River and instead developed as a result of groundwater, yet hydric soils were assessed for IR flows? Isn't it likely that if flooding is sufficient to develop hydric soils that wetland communities would also be influenced? Or conversely, if wetland communities were not directly influenced by inundation and instead influenced principally by groundwater then why doesn't it make sense that the hydric soils are also developing in response to groundwater and not to river flooding?	Although soils and vegetation were sampled along the same transects there were two separate elevation datasets. Additionally: 1) Surveying of soil elevations was conducted by transect and across all vegetation communities within each transect. Each transect on the Ichetucknee included at least two types of vegetation communities. For example, Transect BB (east) was represented by both cypress swamp and hardwood swamp communities. 2) Vegetation community elevations were averaged by community at each transect. For a specific type of community (i.e., cypress swamp), the average elevation representing the most restrictive (highest) flow at the US27 gage represented the critical flow for that community. For the Ichetucknee, the most restrictive flow among vegetation communities was 269cfs at the US27 gage, represented by cypress swamp. 3) It should be noted that average elevations of some communities were excluded, either because the communities were not wetland communities (i.e., mesic hardwood hammock), or the community was so low in elevation that such analysis would be moot (i.e., bay swamp). 4) Hydric soil elevations were averaged by transect; and the exceedance represented by each average was assigned a corresponding flow at the US27 gage. These flows were subsequently averaged.

Group	#	Party	Comment	Response
PPP	142	Wetland Solutions	The selection of cross-section locations is not discussed, but is of paramount importance for model validity and accurate simulation of water depths. Additionally, cross-section spacing may be an issue given 171 digitized cross-sections for a total river length of 295,689 feet, or an average cross-section spacing of more than 1,700 feet.	The cross section selection was chosen based on District Staff site reviews of the Lower Santa Fe River. Sites with rapid changes in geometry and restrictions were prioritized for surveying. The model relies on LiDAR for the spatial data for the left and right over banks.
QQQ	143	Wetland Solutions	Interpolating cross-sections to resolve modeling instabilities is acceptable given uniform geometry between existing cross-sections. However in a meandering natural system with significant variability in depth this method may not be acceptable.	The District had additional surveying work done to improve the existing models. The best available information was improved upon by collection of additional survey data.
RRR	144	Wetland Solutions	The flow period (2002-2011) does not represent long-term observed flows and chronically under-predicts flow duration curves for the entire period of record. Specifically the highest observed flows at both Fort White and Worthington Springs are not represented, and are nearly twice the highest observed flows between 2002 and 2011. Additionally flows of 0 cfs are 6% more common at Worthington Springs in the 2002-2011 period compared to the entire period-of-record.	The HEC-RAS model was used to relate flow at long term USGS river gages to stages at ungaged locations. The assumption was made that the flow to stage relationships remains relatively consistent throughout the modeling period. This was considered the best available information. The fact that the flow conditions during the dynamic model calibration period did not reach the record floods on the rivers is inconsequential.
	145	Wetland Solutions	The modeling period should be expanded beyond the 2002-2011 period to represent historically higher flows. The inclusion of historic flows can be accomplished by developing regressions to estimate historic flows at stations with limited data sets. Additional uncertainty might be mitigated by improved calibration to stations with longer flow records.	
SSS	146	Wetland Solutions	Static pickup factors used for base flow do not offer any information about temporal changes that are occurring. The pickup factor appears to be representing all spring flow. Additional information should be collected on spring flow so that springs can be explicitly included in future modeling.	The District agrees that additional data collection would be beneficial. Specifically discharge data at the springs. However the best available information was used to determine the MFL for the springs.

Group	#	Party	Comment	Response
TTT	147	Wetland Solutions	A physical explanation should be provided for the maximum 200 cfs allowed for diversion through the O'Leno River Sink. Also it appears that the model predicts reverse flow occurs through the O'Leno River Sink. Has flow reversal been observed?	The maximum flow is set to 200 cfs for Vinzants swallet which is upstream of the O'Leno River Sink. The HEC-RAS model does not predict positive flow from the O'Leno River Sink.
UUU	148	Wetland Solutions	To verify that spring flows on the Ichetucknee River are greater than US 27 flows, field measurements should be made at all springs and at US 27 to define the source of error. If systematic errors occur changes should be made to rating curves. Assuming US 27 is correct and all spring flows are wrong, reduces baseline spring flows at all springs on the Ichetucknee.	Published USGS gage data is considered the "best available data."
VVV	149	Wetland Solutions	Regressions between spring flows and US 27 show many inconsistencies that should be resolved or explained.	Most of the inconsistencies are from times when the gage at US27 is being affected by backwater from high stages on the Santa Fe River. The backwater affect does not always propagate upstream to the spring locations unless there is substantial flooding on the Santa Fe River.
WWW	150	Wetland Solutions	There are large stage residuals at most of the plotted stations (>1 foot). Many of these locations have positive residuals indicating that the model produced higher stages than were observed.	The HEC-RAS model was calibrated as well as possible with the best available data.
YYY	151	Wetland Solutions	Final calibration results presented in the District MFL, Table 4-12 indicate large residuals at many of the verification stations. At several of these stations less than two-thirds of the residuals were within one-half of a foot of observed levels. WRVs including fish passage and recreation rely on shallow depths of water that a greater than one-half foot error could adversely impact.	The HEC-RAS model was calibrated as well as possible with the best available data.
ZZZ	152	Wetland Solutions	District analysis discards a portion of the data record (1927-1932) because of a data gap between 1930 and 1932.	There was insufficient nearby stream gage data to reliability synthesize the missing data from 2/1/1930-5/31/1932.

Group	#	Party	Comment	Response
AAAA	153	Wetland Solutions	Calibration of the HEC-RAS model should occur only after the model is producing reasonable results. In many cases in the calibration, roughness values were set outside of typical ranges and vary by more than an order of magnitude.	Channel Manning's n values are set an order of magnitude higher at only one location, the land bridge between O'Leno river sink and River Rise. The roughness coefficient is set higher because there is not a well-established channel where the flood flows occur over the land bridge. Left over bank and right over bank Manning's n values are higher than channel values which is typical for this type of river system.
BBBB	154	Wetland Solutions	Of primary concern are the results that show in many cases significant residuals of more than one foot. In using this model to estimate fish passage at low flows it is possible that areas of the river may be inaccessible if the model over-predicts water depth.	The District undertook extensive data collection efforts prior to moving forward with model development. The model provides the best available information to relate stages at ungaged locations to flows at long term USGS sites.
CCCC	155	Wetland Solutions	The resulting impairments observed in springs along the LSFR include less native vegetation, increased filamentous algae, impaired water quality, increasing color and turbidity, and altered dissolved oxygen and specific conductance. None of these changes or impacts is evaluated in the District's LSFR MFL analysis.	A strong relationship between flow and a WRV must be developed to use a WRV in MFL development. Additional discussion of Water Quality has been added to Section 5.

ACRONYM LIST

ACEPD – Alachua County Environmental Protection Department

AMO – Atlantic Multidecadal oscillation

DEP – Department Environmental Protection

DRP – Department of Resource Protection

ET – Evapotranspiration

FAC – Florida Administrative Code

FDOT – Florida Department of Transportation

FGS – Florida Geological Survey

FPS – Florida Parks Service

FWC – Fish and Wildlife Service

LSFR – Lower Santa Fe River

MFL – Minimum Flows and Levels

MLR – Multiple Linear Regression

NFM – North Florida Model

NFSEG – North Florida Southeast Georgia

NFUCG – North Florida Utility Coordinating Group

OFW – Outstanding Florida Water

SJRWMD – St. John's River Water Management District

SRWMD – Suwannee River Water Management District

USGS – U.S. Geological Survey

WRV – Water Resource Value

Appendix A:

Responses to Errata and Editorial comments from Peer Review

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
Ch. 2					
1	p. 2-1, § 2.1.1.	No	The Hawthorn Group is made of sedimentary rocks, not sediments	Modify terminology	Completed
2	p. 2-1 § 2.1.1.1	No	Outcrops is not a verb,	Modify terminology to "crops out"	Completed
3	p. 2-1 § 2.1.1.2	No	The Statenville Formation occurs near the northern border of the basin, rather than northeastern according to figure 2-1.	Modify text	Completed
4	p. 2-4 § 2.1.2	No	White, 1970 not in reference list	include	Completed
5	Table 2-2 and 2-3	No	The lists of Station IDs are not in comparable order making it difficult to compare;	Reorder lists; Check station ID for 23218982. Does it start with a zero	Completed
6	P. 2-23	No	Include alpha symbol		Completed
7	Tables 2-5;2-8; 2-9;	No	Correct headers		Completed

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
8	P 2-30	No	NFRWSP not included in acronym list	include	Completed
9	Figures 2-33; 2-34, 2-35	Yes	Figures are cited but missing from the document	include	Completed
10	Through out		Figures are numbered incorrectly (chapter designated as 0)		Completed
Ch. 3					
1	p. 3-1, § 3.0 Para 3	No	...which, in turn, affect	Insert commas before and after "in turn"	Completed
2	p. 3-2 § 3.1.2	No	No discussion of structural habitat, SAV in particular	Expand discussion to include	Completed
3	p. 3-2 § 3.1.4	No	...river channel "is" an important...	Replace "is" with "can be"	Completed
4	p. 3-3 § 3.1.6	No	Filamentous algae are considered a nuisance and aesthetically undesirable	the potential for flow/algal relationships should be discussed in this section (e.g. King 2012)	Completed

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
5	p. 3-3 § 3.1.7	No	"phosphate fixation"	Consider alternative wording...e.g., "provides a substrate for P-sorption"; also provide a supportive reference	Completed
6	p. 3-3 § 3.1.7	No	"nitrogen fixation"	Provide a supportive reference specific to these systems	Completed
7	p. 3-4 Figure 3-1	No	Figure is labeled as 0-1	Should be Figure 3-1	Completed
8	p. 3-5 Para 2	No	Period is missing at end of paragraph	include	Completed
9	p. 3-5 Para 2, 4, and 5	No	Searcy (1959), Vogel and Fennessey (1995), Jacobs and Ripo (2002), and FGS (2005) are not in reference list	include	Completed
10	p. 3-5 Para 4 Line 3	No	"they" refers to FDCs	Replace "they" with FDCs	Completed
11	p. 3-5 Para 6	No	Metrics listed are not consisted with those given on p 3-4 in bulleted form above § 3.2	Modify text for consistency	Completed
12	p. 3-6	No	Figure is labeled as 0-2	Should be Figure 3-2	Completed

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
13	p. 3-6 § 3.3 Line 1	No	"an MFL"	Replace with "a MFL"	Completed
14	p. 3-6 § 3.3 Line 4	No	Extraneous "in"	omit	Completed
15	p. 3-6 § 3.3 Line 6	No	SWFWMD 2005 not in reference list	include	Completed
16	p. 3-7 Para 2 Line 2	No	JEA 2012 not in reference list	include	Completed
17	p. 3-7 Para 2 Line 4	No	Period after Cichra et al., (2005)	Remove and change "In" to "in"	Completed
18	p. 3-7	No	Shaw et al. 2005 not in reference list	include	Completed
19	p. 3-7	No	JEA 2005 not in reference list	include	Completed

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
Ch. 4					
1	4-12	Yes	Add a bullet to specifically state that the baseline flows were taken to be identical to observed flows for pre-1970 and observed flows minus linear factor*time after post 1970. i.e. SLR/MLR predictions were not used directly. This is not clear from the report or appendix.		No longer applicable
2	4-12	No	Need a sub-heading before uncertainty analysis is introduced. The summary of uncertainty analysis methodology and results on 4-12 needs to be improved. The last paragraph on p. 4-12 is not understandable without a full reading of the appendix.		Uncertainty Analysis removed
3	4-12	Yes	Need further explanation/justification of use of 10 th percentile of 10 th percentile flow reductions.		Uncertainty Analysis removed

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
4	4-12	No	Why do baseline flow time series begin at different times for the Santa Fe and Ichetucknee rivers? Similarly why does the post-1970 adjustment begin at different times?		Baseline made consistent
5	Section 4-2 p4-16	No	Include an introductory paragraph summarizing the purpose of the HECRAS modeling. See main report for detailed recommendations		Completed
6	4-19	No	Last two paragraphs of this page are repetitive. Revise and consolidate. Define "short-term" and "long-tem" periods.		Completed
7	Figure 4-13	No	Fig 4-13... why doesn't 2002-2011 flow reach 100%?		Completed
8	P4-23	No	I assume calibration was done manually? If so please state. How were relative deviations of flows and stages handled in the calibration?		Completed
9	P4-28	No	Briefly describe what a pilot channel is (how it works) here.		Completed

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
10	Section 4..2.4	No	Add introductory text to explain what steady-state simulations were used for. Be clear that 2% adjustments were made over the 2002-2011 record.		Completed
11	4-28	Yes	Exactly which results show how far up the tailwater effect is propagated? Point reader to the figure (and characteristics of the figure) that shows this. Justify use of 20 th percentile downstream condition here.		Completed
12	4-30	No	Figure 4-18 and 4-19 need more descriptive captions and discussion in the text. They are difficult to interpret without going to the Appendix.		Completed
Ch. 5					
1	p. 5-1 § 5.1.1	No	Citation (FWC, 2009), not found in § 8.0	Provide reference	Completed
2	p.5-2 § 5.1.2.1	No	"...1989 through the current year..."is relative to the time the document is read.	Provide the actual year range for the period of record.	Completed

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
3	p. 5-5 § 5.1.2.2	No	What is the source of the value "...0.8 feet over 25% of the river channel"	Provide reference for this threshold value.	Completed
4	p. 5-6 § 5.1.2.2	No	What citation can be provided for the RHABSIM ecological model?	Provide reference for this model	Completed
5	p. 5-7 § 5.1.2.2	No	Inference is made to HSIs being obtained from SWFWMD or SWFWMD contractor, yet no specific indices are provided.	Reference to an appendix or table that include these indices long with justification for application to the SFR and IR would be useful.	Completed
6	p. 5-10 § 5.1.2.2	No	Reference is made to "... it is critical to maintain an inundation frequency that allows for...". Hydrologic regime critical to fish includes more than just the frequency of flooding. Depth, duration and frequency are also critical components to protect habitat.	Modify text accordingly	Resolution Document – Comment #4
7	p.5-16 § 5.2.11	No	Reference made to "Section 1.1". There is no Section 1.1 of relevance?	Change reference or create a Section 1.1	Completed
8	p. 5-17 § Figure 5-9	No	Figure redundant with Figure 5-2	Change figure reference to 5-2 and delete figure 5-9	Deleted

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
9	p. 5-18 § Figure 5-10	No	figure redundant with Figure 5-1	Change figure reference to 5-1 and delete figure 5-10	Deleted
10	P 5-22 Figure 5-15	No	y-axis represents total days over period of record. normalizing days typical days exceeding critical Q in one year would be useful and allow for comparison between graphs of different periods of record.	Add an axis to the graph with a data normalized to days per year exceeding critical Q.	Period of Record was made consistent
11	p. 5-26 § 5.2.1.2	No	Wetland communities were not thought to be influenced by river flooding on the Ichetucknee River and instead developed as a result of groundwater, yet hydric soils were assessed for IR flows? Isn't it likely that if flooding is sufficient to develop hydric soils that wetland communities would also be influenced? Or conversely, if wetland communities were not directly influenced by inundation and instead influenced principally by groundwater then why doesn't it make sense that the hydric soils are also developing in response to groundwater and not to river flooding?	Resolve discrepancy. This can presumably be done by comparing mean elevations of wetland communities and hydric soils. This should also take into account the bankfull discharges which begins at 328 for the IR and are presumably the point at which hydric soils <u>and</u> a wetland community is beginning to be inundated suggesting that at least some of the wetland communities on the IR are indeed influenced by direct river inundation.	Resolution Document – Comment #139
12	p.5-35 § 5.2.2.1	No	"X" should be lower case in "(NOX)"	Change to (NOx)	Completed

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
13	p. 5-62 § 5.2.2.5	No	A section of the paragraph in the middle of the page reads that the Critical Flow for snags was met ..." I believe the word "snags" should read recreation	Check and change accordingly.	Completed
14	p. 5-63 Figure 5-67	No	Caption reads "RALPH plot for snags in the ..." I believe this word "snags" should read recreation.	Check and change accordingly.	Completed
15	p. 5-70 § 5.2.2.7	No	End of first line on page reads ".. and a stream flow of 351 cfs)."	Need to close parenthesis	Completed
16	p. 5-73 § Oval Pigtoe	No	Extra line in second paragraph	Delete line	Completed
17	p. 5-73 § FL Manatee	No	Species name (<i>Trichechus manatus latirostris</i>) should be italicized throughout section.	Correct accordingly	Completed

Appendix B:

Evaluation of Alternative Statistical Models Using Locally-Weighted, Nonlinear Regression Techniques

As recommended in the Final Peer Review Report, a nonlinear, locally-weighted polynomial regression (LOESS) technique was utilized by the District in order to explore non-linear alternatives to the linear regression model that had been used in the Santa Fe River near Ft. White baseline calculation. A variety of statistical models were fit by implementing this technique with various combinations rainfall (P), reference evapotranspiration (ET), net rainfall (P-E), climate indices, and lagged values of total streamflow or baseflow as explanatory variables. These were models were fit using either the LOESS procedure from SAS (2012), or the Locfit Package (Loader, 1999) and the “R” software for data analysis (Ihaka & Gentleman, 1996). The specific combinations of explanatory variables that were evaluated are summarized in Table 1, which classifies them into three categories of models based on these combinations.

Table 1. Model type and explanatory variables used in alternate baseline modeling approach.

Model Type	Explanatory Variables
P, E, and/or P-ET Models (Hargreaves and Blaney-Criddle ET calculations)	0-11 month lagged P-ET 12 and 24 month antecedent P-ET averages 12 and 24 month antecedent P-ET weighted averages, using Merritt’s (2001) weighting algorithm P and ET as separate predictors using Merritt’s (2001) weighting algorithm 0-3 month lagged P-ET and average of 4-36 month lagged P-ET
Models that included P-ET and lagged discharge or baseflow	0-2 month lagged P-ET and 1-3 month-lagged total discharge or baseflow
Models that included P-ET and climate indices (fit to 1934-1965 period of record)*	0-2 month lagged P-ET and current-month AMO and ENSO values 0-2 month lagged P-ET and 72-month antecedent AMO average 0-2 month lagged P-ET and 69-71 month lagged AMO values 0-2 month lagged P-ET and 3-66 month antecedent AMO average 0-2 month lagged P-ET and 18-month antecedent ENSO average 0-2 month lagged P-ET and 8-10 month lagged ENSO 8-10 values 0-2 month lagged P-ET and 3-66 month antecedent ENSO antecedent average

*This time period was used in order to include (approximately) one complete AMO half cycle (Wendy Graham, personal comm.)

The best models from each type were chosen based on the Akaike Information Criteria (AICC) and Root Mean Square Error (RMSE) diagnostics. The explanatory variables used in these models are shown in Table 2, along with their AICC and RMSE values. Note that the response variables for the models shown in Table 2 were the baseflow (120 day minimum average of flow) values. Similar models were also fit to total discharge for the P-ET models and P-ET and lagged flow model types, however the quality of these fits were not as good as the baseflow models. For example, the RMSE value for the best “P, ET, and/ or P-ET” model type was 39 percent of the long-term average flow when predicting total flow and 20 percent of the long-term average when predicting baseflow. Similarly, the RMSE value for the best “P-ET and lagged flow” model type was 28 percent of the long-term average flow when predicting total flow and 3 percent of the long-term average when predicting baseflow. Diagnostic plots corresponding to those presented by the reviewers are shown in Figures 1-6.

Table 2. Best fit diagnostics and explanatory variables by model type.

Model Type	Explanatory Variables	AICC	RMSE
P, ET, and/or P-ET Models	24-month antecedent P-ET weighted average, using Merritt's (2000) algorithm	11.70	208.58
P-ET and lagged flow	0-2 month lagged P-ET and 1-3 months lagged baseflow	8.45	27.41
P-ET and climate indices	0-2 month P-ET lags and 30 month antecedent ENSO average	12.12	256.80

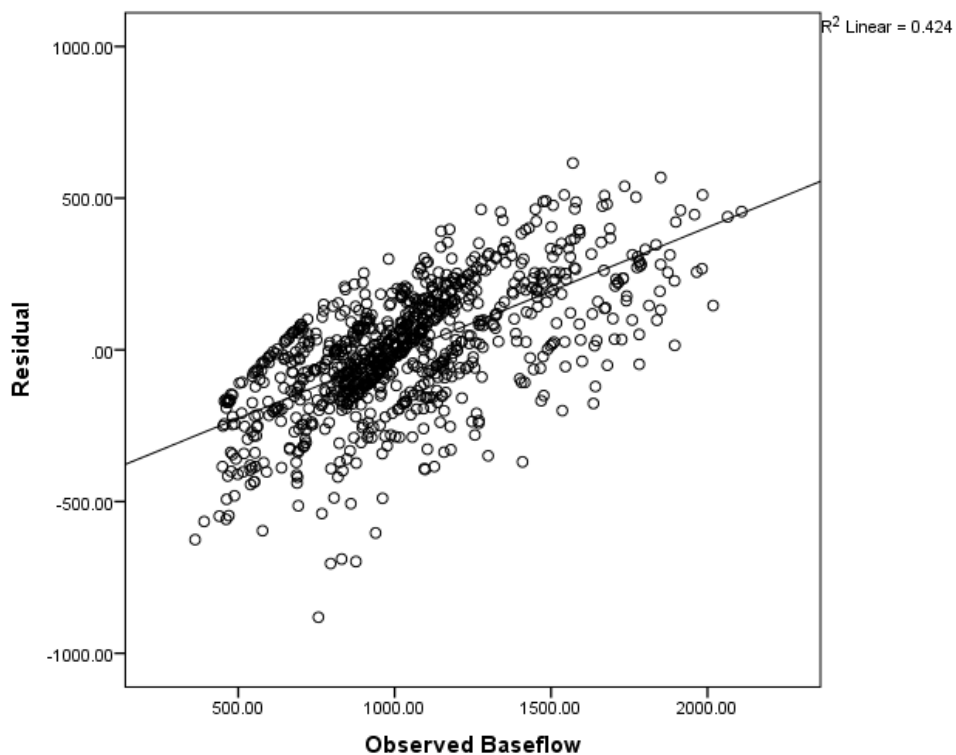


Figure 1. Plot of residual versus observed baseflow for the P, ET, and/or P-ET baseflow model listed in table 1.

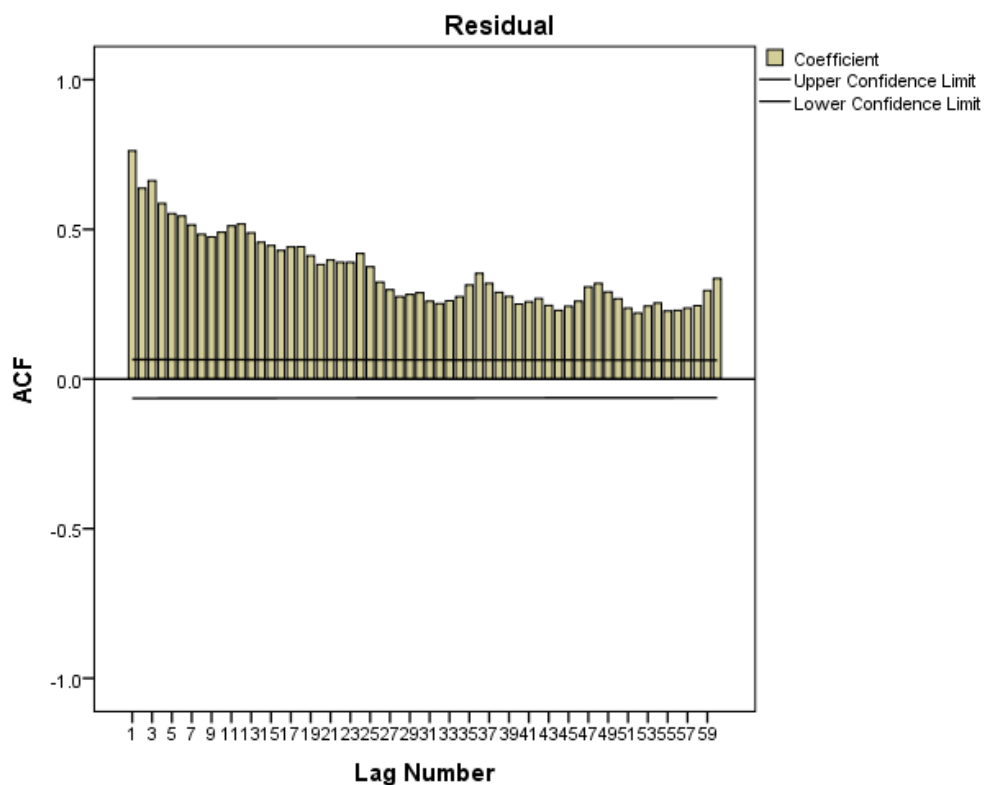


Figure 2. Autocorrelation plot for P, ET, and/or P-ET Models baseflow model listed in Table 1.

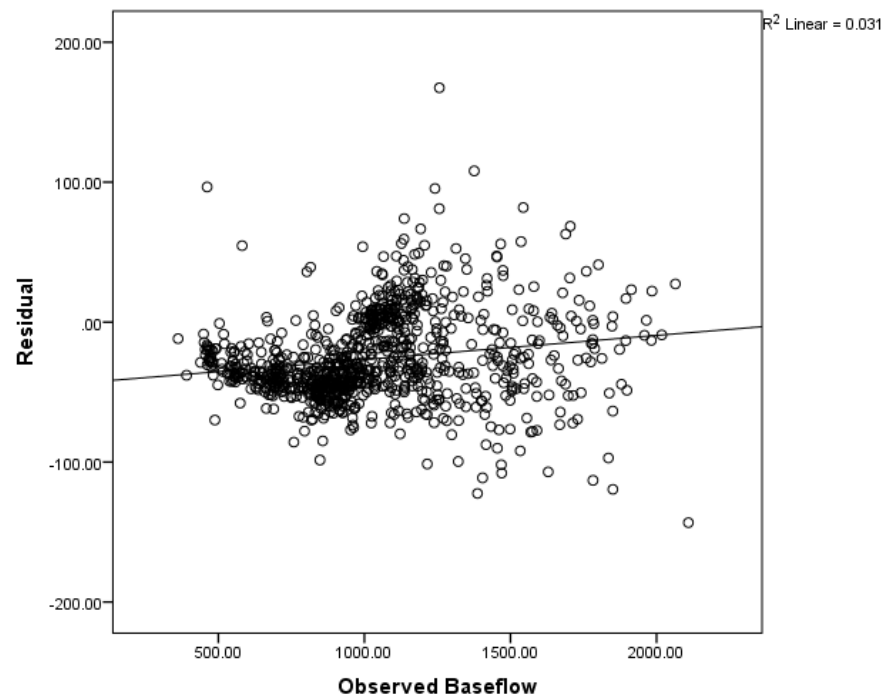


Figure 3. Plot of residual versus observed baseflow for P-ET and lagged flow model listed in Table 1.

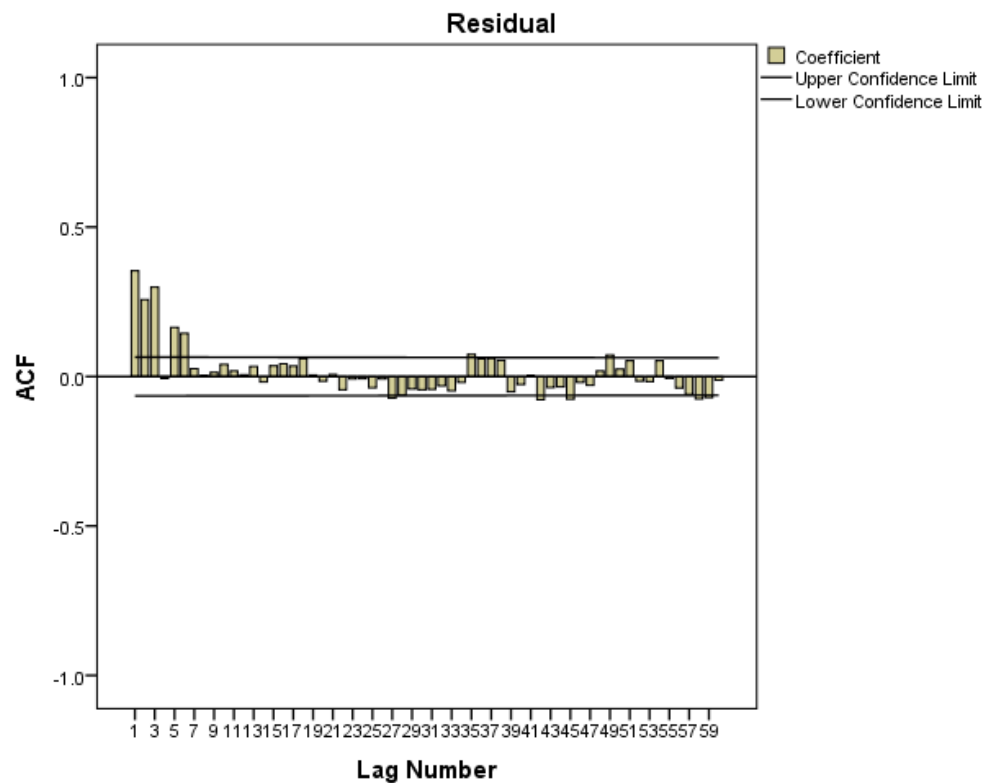


Figure 4. Autocorrelation plot for the P-ET and lagged flow baseflow model listed in Table 1.

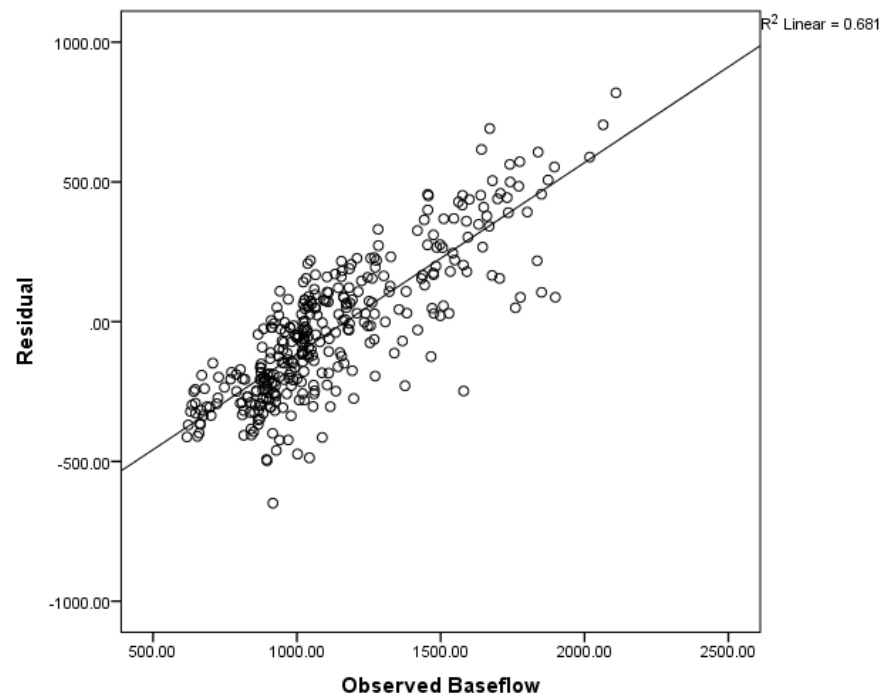


Figure 5. Plot of residual versus observed baseflow for the P-ET and climate index baseflow model listed in Table 1.

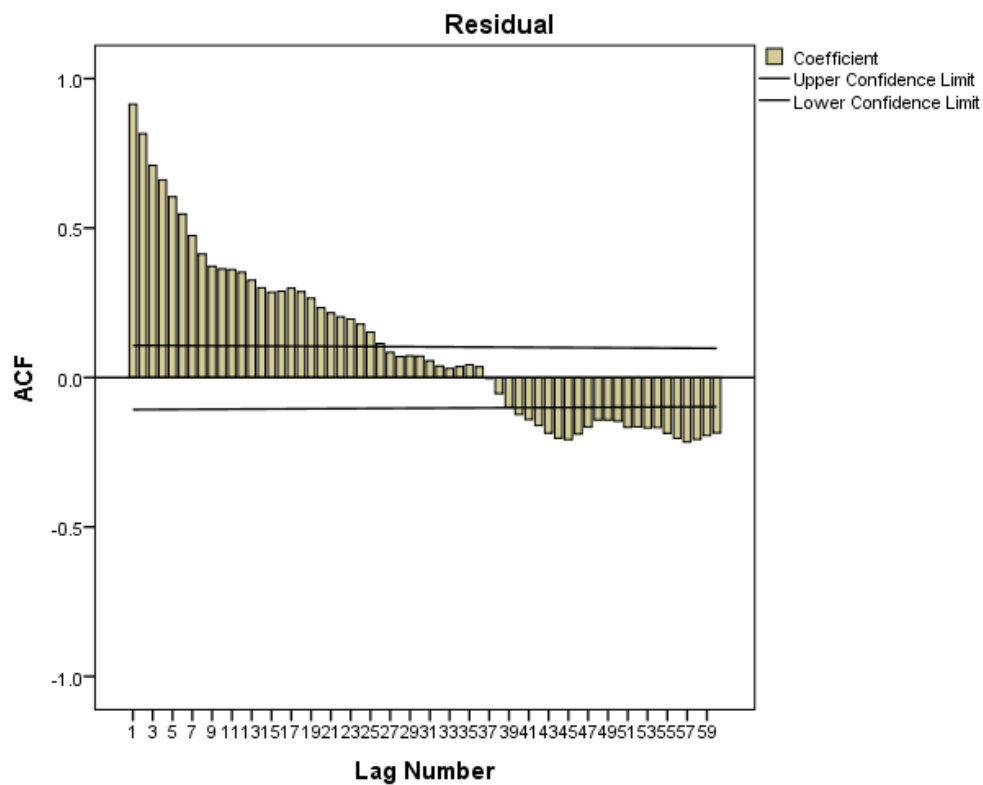


Figure 6. Autocorrelation plot for the P-ET and climate index baseflow model listed in table 1.

None of the nonlinear, locally-weighted polynomial regression models that used P, ET, P-ET, or one or more climate indices as explanatory variables appeared to be a significant improvement upon the original linear regression model used to estimate an adjusted historic flow time series for the Santa Fe River near Fort White. The nonlinear model that contained an autoregressive component (P-ET and lagged flow model type), did exhibit a much better fit than the original model and might be a suitable candidate as a short-term forecasting tool. However, it did not seem to be an appropriate model for evaluating long-term baseflow trends because of the 'self-correcting' nature of the model, in which recent lagged values of observed (rather than fitted) baseflow flows were used as explanatory models. Substitution of previous, 'forecasted values' from the model for lagged values of observed baseflow was also considered, but initial testing of this approach indicated that the values estimated using this approach quickly became unstable.

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