FINAL DRAFT

Minimum Flows and Levels Reevaluation for the Wekiva River at State Road 46, Wekiwa Springs, Rock Springs, Sanlando Springs, Palm Springs, Starbuck Springs and Miami Springs; and MFLs Determination for the Little Wekiva River, Lake, Orange, and Seminole Counties

Prepared for:

St. Johns River
Water Management District

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APPENDICIES

1.0 Introduction

1.1 Overview

The St. Johns River Water Management District (District) has included a re-evaluation of the minimum flows and levels (MFLs) for Wekiva River, Wekiwa Springs, Rock Springs, Palm Springs, Sanlando Springs, Starbuck Springs, and Miami Springs; and a new MFLs determination for Little Wekiva River in its current priority list and scheduled for the establishment of MFLs based on the provisions of Subsection 373.802, Florida Statutes (F.S.). Also, based on the provisions of this subsection, the District has identified these MFLs for independent scientific peer review.

The MFLs document reviewed is titled: *Minimum Flows and Levels Re-evaluation for Wekiva River, Wekiwa Springs, Rock Springs, Palm Springs, Sanlando Springs, Starbuck Springs, and Miami Springs; and MFLs determination for Little Wekiva River, Draft Report 2024,* by Andrew Sutherland Ph.D., Fatih Gordu Ph.D., PE, Jane Mace, and Awes Karama Ph.D.

Barnes, Ferland and Associates, Inc. (BFA) was contracted by the District to provide Independent Technical Peer Review of Wekiva River Basin MFLs.

1.2 Approach

Section 373.042, F.S., provides that MFLs shall be calculated using the best information available, that the Governing Board shall consider and may provide for non-consumptive uses in the establishment of MFLs, and when appropriate, MFLs may be calculated to reflect seasonal variation. The law also requires that when establishing MFLs, changes and structural alterations to watersheds, surface waters, and aquifers shall also be considered (Section 373.0421, F.S.). The State Water Resource Implementation Rule (Chapter 62-40, Florida Administrative Code) includes additional guidance for the establishment of MFLs.

Section 373.042, F.S., also addresses independent scientific peer review of MFLs, specifying the review of all scientific or technical data, methodologies, and models including all scientific and technical assumptions employed in each model, used to establish a minimum flow or minimum water level. In addition, the law requires that the Florida Department of Environmental Protection (FDEP) or the Governing Board (GB) should give significant weight to the final peer review panel report when establishing the minimum flow or minimum water level.

This report is the third and final draft of BFA's Peer Reviewers (PRs) report updating the status of the peer reviewer's ongoing technical review for the Wekiva River system: Wekiva River and Little Wekiva River and its associated priority springs (Wekiwa, Rock, Sanlando, Palm, Starbuck, and Miami springs). The first public meeting occurred on January 23rd, 2024. The public meeting provided an opportunity for District staff and the public to make comments. BFA's peer reviewers presented their initial findings and recommendations during the second public meeting, an online meeting that occurred on March 14th, 2024. Peer reviewers repeated this review sequence for this final draft. The Second draft was presented

at the recent online public meeting, on May 22, 2024. District staff allowed for public comment period on the second draft through June 15th. No additional comments were submitted by either members of the public, or the participating stakeholders.

2.0 Summary of BFA's Peer Reviewers' Findings and Recommendations

This report section provides a summary of individual and collective findings and recommendations based on the substantive comments made by the two reviewers:

The two independent technical PRs with their respective fields of expertise are:

- Dr. Don Rao - Water resources engineering, MFLs compliance, watershed hydrology and hydraulics.
- Dr. William Dunn - MFLs development, systems ecology, wetland & aquatic ecology, assessment and management of uncertainty, and adaptive management.

Importantly, in this peer review Drs. Rao and Dunn identify substantive comments which are those that have the possibility of causing a change to the report's conclusions including its recommended MFLs. The determination of substantive comments is embedded in a simple Yes or No question for the detailed individual review comments compiled as Table 1, Appendix. This peer review treats the identified issues of significance as risks. Specifically, each could result in increasing the likelihood for significant harm occurring to the Wekiva River system. By statute, the MFLs cannot cause or contribute to significant harm.

2.1 Summary of Substantive and Non-Substantive Review Comments - Assessing the Likelihood of Causing Significant Harm to the Wekiva River System

For this peer review BFA defines *substantive comments* as those that could directly and materially affect the conclusions of the report. *Substantive issue*s are those for which there is the likelihood of causing significant harm to the Wekiva River system. Prevention of significant harm is the statutory threshold for predicted future exceedance of MFLs. Each yes-flagged comment is thus an issue of concern, a problem, a question, a need for additional information, or a recommendation for an alternative. These are the sources of uncertainty in the eyes of each reviewer. Individually and collectively, they are the active part of the peer review.

BFA's reviewers compiled their general and specific review comments (Table 1, Appendix) on District's Wekiva River MFLs reevaluation report along with any recommended change or follow up action. In Table 1 (Appendix) each comment is treated as a separate row. Comments are grouped by sections of District's MFL document. The MFLs report has seven sections and six appendices. Drs. Dunn and Rao developed 66 total comments (Table 1, Appendix). In Table 1, Appendix, 55 out of 66 comments are flagged yes, 83% of the total. These are arrayed across sections 2 through 7 of the MFLs report.

Lack of comments on a given section of the MFLs report, and a predominance of No-flags given by peer reviewers in tables are taken as general approval of those report sections. The District's MFLs report gets

good grades on overall water resources engineering and hydrology. Reviewers generally concurred with the data sources used, statistical and analytical methods applied, and the surface water and groundwater modeling selected, as applied and presented.

2.2 Summary of Peer Review's Findings and Recommendations

This document the final draft presents BFA's revised findings and recommendations for the District's re-evaluation of the MFLs for Wekiva River, Wekiwa Springs, Rock Springs, Palm Springs, Sanlando Springs, Starbuck Springs, and Miami Springs; and MFLs determination for Little Wekiva River.

BFA's two Peer Reviewers found that all sections of the MFLs report (full text and six appendices) are on solid basis technically. The resource inventories, data and analytical approaches are scientifically reasonable and appropriate, including data collection, development of hydrological data time series, surface water (HSPF, HEC-RAS etc.) modeling, and the development of the no pumping (NP) reference flow regime are acceptable. The WRV screening process is well done. The general approach to habitat modeling and assessment using SEFA is also an excellent effort. The addition of The Nature Conservancy's Indicators of Hydrologic Alteration (IHA) to the MFLs toolbox is commended. Conclusion regarding zero freeboard, begets the designation that the Wekiva System is in recovery. However, it is noted that substantive Peer Review comments below, and actions the District may take to address comments, may alter these conclusions. Authors also do a good job documenting the need for the adaptive management plan.

The substantive issues raised collectively by the reviewers are distilled into 24 sets of questions/concerns with recommended actions. Greater detail on the issue and action can be found in the detailed comments from each reviewer (see Appendix). Reviewers have also indicated where BFA's findings and recommendations align with those submitted by stakeholders. Finally, peer reviewers screened and prioritized those comments that cover identified sources of uncertainty. This screening process sorted specific uncertainties into one of three bins or groups for further action:

- Bin 1: no further action required,
- Bin 2: issues that District should resolve now, prior to seeking GB approval, and
- Bin 3: the remaining sources of uncertainty that should be prioritized based on their likelihood to cause or contribute to significant harm. That is a high likelihood that issues should be resolved now (Bin 3a), prior to GB approval, and those that can be resolved later, following GB action (Bin 3b).

For this last group, we assume that specific concerns will become elements of the District's adaptive management plan for Wekiva basin MFLs and will cascade forward as items that can be resolved during the first 5-year reevaluation assessment (anticipated in 2029), following GB adoption.

This technical peer review concludes that the primary goal of the measures for uncertainty management process is to provide reasonable assurance that uncertainty risks can be eliminated, or avoided, or reduced to an acceptable level, such that MFLs do not cause or contribute to significant harm occurring.

Peer reviewers acknowledge that identified uncertainties sorted into Bins 2 and 3 will each require additional actions to assess and resolve the risk for causing significant harm to the Wekiva River System. To this end we also recommend a step wise resolution process as follows:

1. BFA's updates findings & recommendations and presents to online public meeting on May 17th.
2. BFA submits second draft of TM to District.
3. Public comment period on second draft runs through June 15th.
4. BFA receives public comments for consideration and incorporation into Final TM.
5. BFA submits Final TM to District.
6. District staff will draft response documents for all peer review and stakeholder comments. The responses are expected to specifically respond to BFA's recommendations for avoiding potential increases in the likelihood of significant harm occurring.
7. District will meet, as necessary, with stakeholder groups, specifically to work out resolution to the issue raised in each of their respective comments.

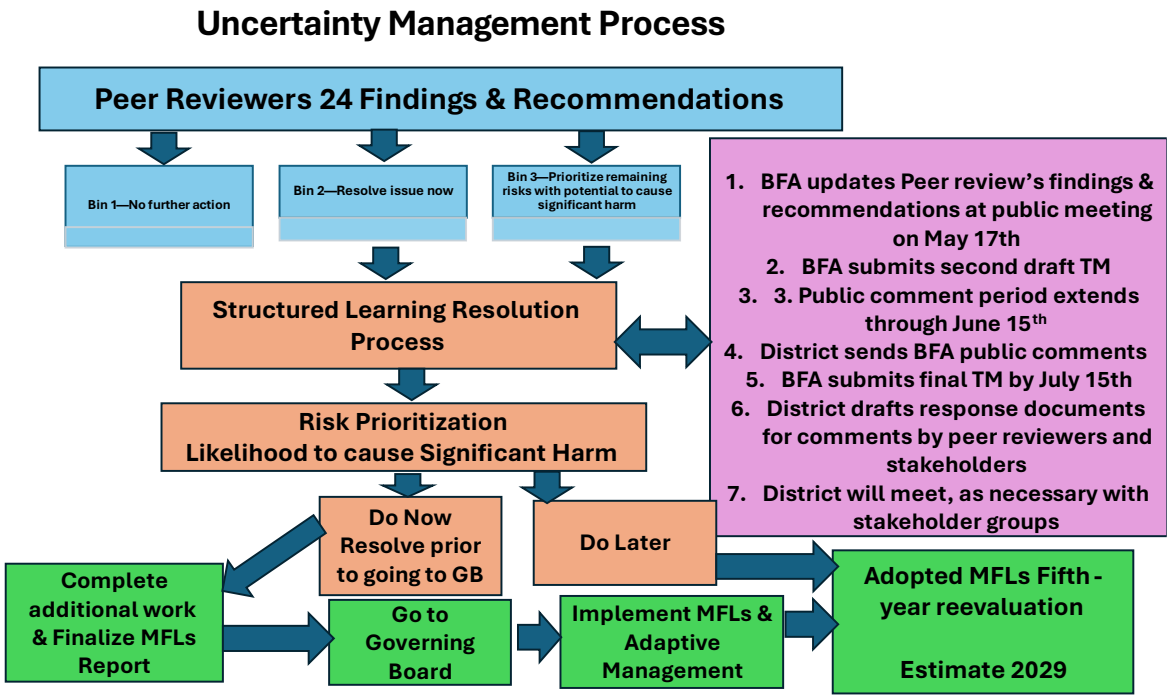

Figure 1. Resolution Process for issues of uncertainty that could increase likelihood of significant harm occurring.

BFA's findings and recommendations are:

1. **Wekiva River System Protections (Bin 1)** - This set of recommended MFLs are one of the best efforts BFA's peer reviewers have studied. District staff are to be highly commended for this effort to protect the abundant water resources and environmental human support provided by the Wekiva River system.
    a. **The Wekiva River System is a treasured natural resource.** Systems within the Wekiva River Basin are regionally important water bodies and have been designated Outstanding Florida

Waters. The Wekiva River is a Florida Scenic and Wild River, a State Canoe Trail and a National Wild and Scenic River. It is further protected as part of the Wekiva River Protection Area, and under FL statutes protecting Outstanding Florida Springs (both Rock and Wekiwa). (Wekiva Springshed Virtual Tour (usf.edu)

b. **SJRWMD's MFLs Toolbox provides robust tools for establishment, revision, and development of MFLs for water bodies in the District -** toolbox applied in the report:
    i. Five (5) standard event-based metrics, IFH, FH, MA, FL, and IFL.
    ii. Specialized adaptive event metrics
    iii. Wildlife habitat analysis with System for Environmental Flow Analysis (SEFA)
    iv. Evaluation of 10 Water Resource Values (WRVs)
    v. Indicators of Hydrologic Alteration (IHA)—developed by Nature Conservancy
    vi. Uncertainty management. Adaptive Management Plan for managing identified sources of risk and uncertainty for Wekiva River system's MFL water bodies, MFLs Prevention and Recovery plans.

Comment 1 is assigned to Bin 1, thus no further action required by the District.

2. **Uncertainties (Bins 2 or 3)** - Uncertainties have been identified and may potentially affect outcomes. Several critical concerns are identified by this peer review and other submitted comments. Key aspects of uncertainty are identified in several of the following findings and recommendations. These uncertainties should be evaluated by the District, and then develop a plan to address negative effects. Some uncertainties should be addressed prior to bringing these MFLs before the Governing Board for consideration. BFA proposes that uncertainties be addressed in two phases:
    a. Immediate action - a number of issues are identified to be resolved now, as they may materially affect the MFL recommendation or waterbody status. These uncertainties should be substantively addressed by the District prior to Governing Board action. The District should explicitly assess risks to the completion of Wekiva River MFL reevaluation . These are the Bin 2 and 3a uncertainty factors. The required actions can be determined interactively prior to adoption by the GB.
    b. Deferred action - The resolve later uncertainties are assigned to Bin 3b could be detailed, in the AM Uncertainty Management Plan that is forward looking into the implementation and monitoring post adoption. These are the Bin 3b uncertainties and should be reevaluated after the first five-year review.

3. **Structured Learning Resolution Steps (Bins 2 or 3)** - It is BFA's understanding that identified uncertainty risks can be adjudicated by District staff in a series of seven steps listed below. Each step is a learning opportunity, and together the 7 define a very structured learning process. The outcome of this process will be a defined plan of actions necessary to reach a solution/resolution that minimizes or eliminates identified uncertainty risk of causing or contributing to significant harm occurring. BFA recommends seven (7) steps to prioritize actions needed to limit the likelihood of significant harm occurring. This prioritization process results in specific assignments to Bins 2,or 3a, or 3b :

i. BFA updates findings and recommendations and presents these findings at online public meeting on May 17th.
ii. BFA submits updated second draft TM to District.
iii. Public comment period followed May 17th public meeting through June 15th.
iv. BFA receives public comments for consideration and incorporation into Final TM
v. BFA submits Final TM to District by July 15th.
vi. District staff will draft response documents for all peer review and stakeholder comments. The responses are expected to specifically respond to BFA's recommendations for avoiding potential increases in the likelihood of significant harm occurring.
vii. District will meet, as necessary, with stakeholder groups, specifically to work out resolution to the issue raised in each of their respective comments.

4. **Statistical Analysis of Data (Bins 2 or 3)** - BFA recommends that statistical analysis concerns should be addressed first in the likelihood for significant harm screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, or codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption. Stakeholders submitted similar comments: OUC (comment 13), Liquid Solutions (comments 1 through 4).

5. **Peer Reviewers also Evaluated the original set of MFLs, adopted in 1992 (Bin 1)** - Both Drs. Rao and Dunn produced, separately, independent, technical review of the establishment of the initial set of MFLs for the Wekiva River System, adopted in 1992 (see Hupalo et al. 1994). Dr. Dunn led a formal peer review of the adopted MFLs. That peer review is published as District's Special Publication SJ99 SP1. Dr. Rao conducted an evaluation of the flows and levels at the key gaging station, State Road 46 bridge. He characterized the dynamic effect on flows due to changing channel geometry at the bridge. This work is published as District's Special Publication SJ2008-SP3.

   Comment 5 is assigned to Bin 1; thus, no further action is required of the District.

6. **AMO signal (Bin 2) -** Reviewers note that report addresses need to include effects of climate change, including the predictable, such as presence of an AMO signal. They point to the range of AMO patterns observed by Kelly 2004 for rivers in Florida, and the harder to predict, such as changes to rainfall and temperature regimes, seasonal, annual, decadal, and longer behavior. Rao (2008 Draft) shows a strong qualitative correlation between the north Atlantic Sea Surface Temperatures (SSTs) and Northeast Florida rainfall. SSTs for a specific region of the North Atlantic adjacent to Florida are found to be better correlated to northeast Florida rainfall. BFA assigns the AMO issue to Bin 2 recommending that District resolve the question prior to seeking GB approval. Stakeholders submitted similar comments regarding AMO and other influential climate cycles.

7. **Review Comments Submitted by Stakeholders (Bins 2 or 3) -** As of the date of this draft report's submittal (April 10, 2024) five sets of submittals were reviewed by BFA's team of experts:
    a. Dan Smutz of Greeman Pedersen (GPI) - 3 comments, all three cover issues of uncertainty that could impact the outcomes of the Wekiva River system MFLs re-evaluation.
    b. Orlando Utilities Commission (OUC) - 32 comments, of which 21 comments cover concerns of effects of identified sources of uncertainty.
    c. Mr. Mike Cliburn on behalf of Friends of Wekiva - 8 comments, all 8 raise questions, or issues of uncertainty.
    d. Rob Denis of Liquid Solutions, on behalf of Orange County Utilities (OCU) - four topics of concern detailing unresolved uncertainties. In addition, Mr. Denis submitted a recommendation at the May 17th public meeting that compliance stations for the MFLs be gaging stations on the Wekiva and Little Wekiva Rivers.
    e. Mr. Angel Martin--4 comments, each identifying a potential uncertainty risk.

    Peer review identified stakeholder comments that could potentially be significant sources of uncertainty. Those uncertainties aligned with this report's list of 24 findings and recommendations should be addressed in the interactive screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption.

8. **Anomalies in application of some standard MFL metrics (Bin 2) -** please expand explanation of anomalies in applying FH and MA event metrics to the Wekiva and Little Wekiva Rivers. A similar comment was submitted by Dan Smutz/GPI. BFA assigns the MFL metric anomaly to Bin 2 recommending that District resolve the question prior to seeking GB approval. Several stakeholders submitted similar comments regarding the application of District's standard MFL metrics.

9. **Impacts of septic to sewer conversion projects in watershed (Bin 2) -** Outstanding Florida Springs with water quality impairments due to nutrients may have requirements to address septic systems when these are a significant source within designated primary focus areas for these springs. Traditional systems may be replaced with enhanced onsite systems that remove nutrients, but often systems are replaced with sewer systems bringing waste to wastewater treatment plants. The latter removes groundwater quantity from the converted areas, thus potentially reducing spring flows. However, this reduction is a nonconsumptive use. Similar comment submitted by OUC (Comment 8). BFA recommends that concerns regarding current and long-term potential for septic to sewer conversion projects occurring within the Wekiva River's watershed should be addressed first in the interactive screening process, outlined in Item 3 above. BFA assigns the MFL septic to sewer concern to Bin 2 recommending that District resolve the question prior to seeking GB approval

10. **Process and method assume that recent period of record for hydrologic regime components will remain the same in the next 20 years (Bin 2) -** We know that this is hopeful thinking with current

trends in climate change. POR stationarity appears to be in question. More recent data (after 2014-2018) should be evaluated to ensure whether or not that assumption is valid, and to ensure that best available data for hydrologic regimes are utilized for the MFLs. BFA recommends that concerns regarding stationarity of hydrologic parameter time series be resolved prior to seeking GB approval. Stakeholders submitted similar comments: OUC (comment 13), , Mr. Angel Martin (comments 1 and 4). Comment 10 is assigned to Bin 2, resolve questions prior to seeking adoption by Governing Board, to ensure that the best available data are used.

11. **District applies a 15% parameter reduction value threshold for a number of MFLs metrics (Bin 2)-** long-term data supporting this generic threshold is less robust, as compared to event-based metrics. BFA recommends that should be addressed first in the interactive screening process, outlined in Item 3 above. Comment is assigned to Bin 2, recommending that the District resolve prior to seeking adoption by GB.

12. **Water Quality Nexus to Flow Regime (Bin 2)**- Reviewers note that the water quality trend analysis by Janicki Environmental (2024) is both detailed and comprehensive covering available data at four key water bodies: Wekiva River, Little Wekiva River, Wekiwa Springs and Rock Springs. Separate trend analyses on both time basis and flow are included. Janicki's work shows that there are some identified water quality impairments of concern in these rivers and springs. Several recent research findings indicate, however, that some water quality problems do have a link with both time and flow regimes. The work by Janicki is so detailed that watershed wide trends are not readily discernible. To remedy this BFA recommends adding summary graphic that gives a visual, color coded view of water quality trends by water body noting for each parameter at each water body whether the temporal or flow trend was found to be either increasing, decreasing, s table, or not analyzed. Figure 2 is BFA's attempt at this. BFA also recommends that any water quality concerns raised by stakeholders should be addressed first in the interactive screening process, outlined in Item 3 above. Following the process's ranking of risks with high likelihood for causing significant harm, the actions needed to resolve risk of significant harm will be sorted into those that need be resolved now, prior to going to the Governing Board, while remaining sources can be assessed and resolved post adoption. Stakeholder OUC submitted similar comments: OUC (comments 31 and 32).

13. **Climate Change (Bin 2) -** Reviewer asks about impact of climate change on the MFL analyses. Climate change is not addressed in the document. MFLs are by their nature our estimates of sustainable resource management. If we are indeed in a time of climate change, then the assumptions upon which we base MFL type sustainability may already be changing and may not hold in the future. In statistical hydrology this is a question of stationarity of the statistical populations comprising our climate driven time series data for temperature, rainfall, runoff, aquifer recharge, etc. The consensus of climate experts is that key time series are in flux, which is they are statistically non-stationary. Climate change is another element of uncertainty, it needs to be discussed, and likely impacts identified and planned for. See also #10 above. BFA assigns the MFL metric anomaly to Bin 2 recommending that District resolve the question prior to seeking GB approval. Stakeholders submitted similar comments. Comment is assigned to Bin 2, resolve prior to seeking adoption by Governing Board.

Figure 2 - Summary of watershed wide trends in 27 parameters. Source is water quality trend analysis by Janicki Environmental (2023).

Water Quality trends In Wekiva River system

Water Quality Parameter	Wekiva River @ SR46		Wekiwa Springs		Rock Springs		Little Wekiva River	
	Time	Flow	Time	Flow	Time	Flow	Time	Flow
Alkalinity	+	-	+	-	+	-	NA	NA
Calcium	+	=	NA	NA	NA	NA	NA	NA
Chloride	=	+	+	-	+	-	-	-
Sulfate	-	+	+	-	+	=	NA	NA
Magnesium	+	-	NA	NA	NA	NA	NA	NA
Ammonia	-	-	NA	NA	NA	NA	NA	NA
Ammonia dissolved	-	-	NA	NA	=	=	=	=
Nitrate + nitrite nitrogen	-	=	-	+	-	+	NA	NA
Total kjeldahl nitrogen (TKN)	=	+	=	-	NA	NA	NA	NA
TKN dissolved	NA	NA	NA	NA	NA	NA	+	+
Total nitrogen (TN)	-	+	+	+	=	+	=	=
NOx dissolved	NA	NA	-	+	-	+	-	-
Ortho P	=	-	=	=	=	+	NA	NA
Dissolved Ortho P	-	-	=	=	=	+	-	-
Total phosphorus (TP)	=	+	+	=	+	=	-	-
Total organic carbon (TOC)	=	+	NA	NA	NA	NA	NA	NA
Dissolved organic carbon (DOC)	NA	NA	NA	NA	NA	NA	+	+
Conductivity	=	=	+	-	+	-	-	-
Chlorophyl	=	-	+	-	NA	NA	=	+
Dissolved oxygen (DO)	-	-	-	+	=	+	=	-
Oxygen saturation	-	-	NA	NA	NA	NA	-	-
Total dissolved solids (TDS)	-	+	NA	NA	+	-	=	-
Total suspended solids(TSS)	-	+	NA	NA	NA	NA	-	=
Turbidity	-	=	-	=	-	+	NA	NA
Color	=	+	=	+	-	=	+	+
Secchi disk depth	-	=	-	=	NA	NA	-	=
pH	NA	NA	=	=	=	=	=	-
Temp	NA	NA	+	-	=	=	=	=

Color codes: trends	
+	Increasing
=	Stable
-	Decreasing
NA	Not analyzed

14. **District should consider development of systems level model for the Wekiva River system (Bin 2) -** In complex hydrologic-ecologic-hydraulic systems like the Wekiva the ability to address the overall health of the Wekiva ecosystem is often difficult to capture. There are several modeling tools that might prove useful additions to the MFLs toolbox that could facilitate systems level analyses. District should consider use of calibrated and validated ecosystem models of the watershed, in this case the Wekiva System. Ecosystem models are available that can provide more detailed analysis of energy and material flows, trophic complexities and interactions, network complexity and recycling, and

much more. BFA specifically recommends consideration of the modeling package EcoPath with Ecosim.

15. **Managing Uncertainty (Bins 2 or 3) -** Reviewers note that the report would benefit from an integrated treatment of the sources of uncertainty. An inventory, characterization, and sensitivity assessment of sources, then yields a process to manage uncertainty effectively, such that its negative effects can be reduced, or eliminated. Uncertainty issues are discussed throughout the report, and are key to many decisions made for choosing methods of analysis, time series data, etc. Management of uncertainty moving forward is noted by authors but should be explicitly addressed as risks that could potentially affect outcomes of the MFL reevaluation. Sources of uncertainty in this MFL setting process include, but may not be limited to:
    a. Groundwater and surface water modeling
    b. Water budgets development, including hydrologic time series needed
    c. Reference flow developed for assessing impacts of historic consumptive use
    d. Selection of relevant WRVs, and subsequent parameterization of the assessment's metrics
    e. Water quality Impairments affected by flow or level, or temporal trend, and
    f. Effects of climate change

    This requested uncertainty assessment and management plan should be evaluated in the interactive screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption. Stakeholders submitted similar comments: OUC (20 comments), Liquid Solutions (comments 1 through 4), Mr. Angel Martin (comments 1 through 4) , and Mr. Mike Cliburn (comments 1 through 8).

16. **Concern over setting MFLs for very low flow springs in the Wekiva River system (Bin 2)** - District should proceed cautiously in applying MFL metrics to springs with very low average/median flows. BFA assigns this concern to Bin 2 recommending that District resolve the question prior to seeking GB approval. Stakeholders submitted similar comments: OUC (comment 24), and Liquid Solutions (comments 1 through 4). Peer reviewers suggest that this may be resolved by establishing regional MFLs as compliance MFL(s) for this system.

17. **Applying Adaptive Management (AM) to District's ongoing MFLs establishment process for the Wekiva River system (Bin 2) -** reviewers note that the report does include an adaptive management (AM) framework into subsequent phases of this MFL reevaluation. BFA PRs recommend that principles of AM be applied to this MFL setting effort and used as a guiding principle. BFA assigns comment 17 to Bin 2 recommending that District resolves the question prior to seeking GB approval. However, it is recognized that do now, Bins 2 and 3a, (complete prior to Governing Board action) is not intended to be iterative, but rather completed to address questions and uncertainties that may

materially affect recommendations for these MFLs. Stakeholders submitted similar comments: OUC (comment 8, Liquid Solutions (comment 2).

18. **MFLs Recovery Plan (Bin 2) -** Consider using the Adaptive Management Plan, as first cut at the recovery plan for the Wekiva River. BFA assigns comment 18 to Bin 2 recommending that District resolve the question prior to seeking GB approval. Liquid Solutions raised several questions regarding the District's finding that the Wekiva System will be in recovery over the coming 20-year period.

19. **Equity and Fairness (Bins 2 or 3) -** BFA recommends that concerns for equity and fairness be addressed first in the interactive screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption. If declaring the whole area as in recovery when some show free board, does this raise questions regarding legal defensibility?
    a. In their reevaluation Wekiva River system recommend several MFLs overlapping in the area when some are clearly not regionally significant, this seems potentially problematic.
    b. For example, could projects be required unnecessarily or in areas that provide little to no benefit to the actual recovery of waterbodies?
    c. Along the same lines, if District identifies 2-3 MFLs driving the whole system, then those and all regionally significant ones (OFSs and rivers) should be emphasized in all tables, etc.

    Stakeholders submitted similar comments: OUC (32 comments), Liquid Solutions (4 comments), Mr. Angel Martin (4 comments) , and Mr. Milke Cliburn (8 comments).

20. **Implementing Adaptive Management (Bins 2 or 3) -** Based on Dr. Dunn's experience with applying AM to water resources management problems, BFA presents a general format for how AM works within the District's statutory framework. BFA recommends that adopting and implementing a formal AM should be addressed first in the open and collaborative screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption.

21. **Time Series Records: Do critical time series inputs have stable statistical distributions? (Bins 2 or 3) -** climate change, data distribution stationarity, etc.
    a. General concern about the period of record for key data input parameters, whether each has a stable statistical population over time?
    b. Even though as part of an overall AM plan for the Wekiva River system the District could do the mandatory 5 year relook, but because it was 2014-2018 that was used, BFA recommends that District should address prior to going to the GB.

c. So, if for example that answer is already known, then BFA recommends District's MFLs staff address the problem now, during the interactive screening process, outlined in Item 3 above. Following the process's ranking of risk factors, the actions needed to resolve risk concerns will be sorted into those that need be resolved prior to seeking GB approval, while remaining sources can be elements of the AM uncertainty plan and considered again during the fifth-year reevaluation. This would ensure that the best available data are indeed included and evaluated.

Stakeholders submitted similar comments: OUC , Liquid Solutions , Mr. Angel Martin, and Mr. Milke Cliburn.

22. **Uncertainty: Sensitivity of Wekiva River system to short duration changes in time series (Bins 2 or 3) -** Wekiva System is complex, the entire system is definitely complicated, and SJRWMD has done extensive defensible work. But in addition to the wild storms, another possible contributing reason for this system being seemingly "sensitive" to short changes in data records could be because the difference between the no pumping condition and the MFLs condition is quite small for some of the driving metrics. BFA recommends that concerns regarding hydrologic time series dynamics should be addressed first in the interactive screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption.

23. **Period of Record (POR) Uncertainty (Bins 2 or 3)** - BFA recommends that the identified concerns regarding statistical analyses of time series used should be addressed first in the interactive screening process, outlined in Item 3 above. Following the ranking of significant harm risk factors, the actions needed to resolve or acknowledge risk for causing significant harm concerns will be sorted into Bins 2 and 3a for those that need be resolved prior to going to GB, while remaining sources can be retained in Bin 3b as elements of the AM uncertainty plan, codified in subsequent updates to the MFL report, and carried through to the fifth year evaluation following GB's adoption. Stakeholders submitted similar comments: OUC (12 comments), Liquid Solutions (comments 1 through 4), Mr. Angel Martin (comments 1, 2, 3, 4) , and Mr. Milke Cliburn (comments 1 through 8).

24. **Work Scope Completion (Bin 1)** - With the delivery of this Draft report, BFA's Peer Review Team successfully addressed the elements of its scope of work, see Appendix Table 2:
    a. Determine appropriateness of environmental criteria, hydrologic analyses and recommended minimum flows and levels,
    b. Determine validity and appropriateness of methods and procedures used for data analysis, assumptions used and conclusions drawn regarding the recommended minimum flows and levels,
    c. Determine adequacy of data used to support conclusions and recommendations; and

d. Identify and make recommendations regarding any deficiencies in the development of the draft recommended minimum flows and levels for the Wekiva River basin systems

Comment 24 is assigned to Bin 1; thus, no action is required.

This constitutes BFA's Peer Reviewer's synthesis of their findings and recommendations. This report identifies an array of 24 issues of significance, sources of uncertainty, which could directly and materially affect the proposed MFLs. The peer reviewers have received, reviewed and completed an initial evaluation of uncertainties and potential risk in the public stakeholder's submitted comments.

2.3 BFA's Peer Review Team's Recommended Path Forward for Implementing Uncertainty Management Using Adaptive Management

This report's inventory and evaluation give the District a start on a comprehensive analysis of identified uncertainties. Uncertainties can pose risks. The primary risk is that the Wekiva River's water resource values will not be protected from significant harm. Reducing the potential for significant harm from the identified problematic uncertainties is the management challenge now. How should we approach this next challenge?

We have been here before. During the development of the District's 2000 Water Supply Plan a number of uncertainties were identified as risks, affecting the District's ability to predict the future conditions of its water resources via simulation modeling. At that time Dr. Dunn, then with CH2M Hill proposed using an AM approach to manage uncertainty risk. Concurrence came quickly from high level staff, the Division and Department heads.

Dr. Dunn facilitated a formal project chartering processing in which a team of experts gathered to develop key questions/uncertainties, goals, and an initial set of work tasks to kick off the effort. Staffing and responsibilities were developed and became the chartering document for the AM Project.

Dr. Dunn had previously developed an AM manual of practice for water resources and environmental management in CH2M Hill, for applying AM approach to water resource, watershed and environmental management problems. Next, he produced a guidance document (CH2M Hill 1999) for applying AM to the District's water management programs, MFLs and water supply planning more specifically. Details of chartering/kickoff were distilled into several key action items, which subsequently became the first work elements in the AMP.

Initially, Dr. Dunn carried out extensive field inspections of wetlands, lakes, and ponds in CFWI in east central Florida. A health condition assessment was made at each site. Results are reported in district publication (CH2 2003). This effort was further evaluated to rank candidate sites for re-establishing MFLs. This work is summarized in Dunn, et al. (2005).

The site assessment database was later added to that used by the CFWI's Wetlands Impact Assessment Team's survey of water dependent eco systems within the CFWI.

Adaptive Management is designed to assist resource managers with managing in the face of uncertainties and associated risk, and specifically for the Wekiva River system the risk of significant harm occurring to the water resources of the District.

There is a clear path forward to the completion of this MFLs reevaluation for the Wekiva River system. Effective water resources management, including setting and implementing MFLs occurs adaptively once we understand and manage risk and uncertainty. This document's synthesis of substantive review comments is an inventory and analysis/evaluation of sources of uncertainty affecting the setting of MFLs for the water bodies in Wekiva River's watershed. Each substantive, problematic uncertainty has downside risk potential to the sustainable management of the WR and LWR, and their priority springs, and their protection from significant harm as directed in Chapter 373 F.S.

This inventory of risk from substantive uncertainties is an excellent starting point for moving forward, continuing to develop MFLs for these water bodies that do meet the directives of Chapter 373 F.S. It is also an essential step in an AM approach. As water resource managers, the District and the State must do the best possible job managing the District's water resources, but do so under clear regulatory constraints, specifically to develop MFLs that protect these water bodies from significant harm. This is a tough challenge, but it is one that can be conquered. To rise to this challenge the PRs request that the District give particular weight to PR's call: 1) for uncertainty and risk analysis, to identify problematic sources of uncertainty that could increase the risk of significant harm occurring, and 2) the use of AM to smartly manage these precious water resources in the face of risk and uncertainty. In applying to AM, we hope to do the best job we can under limits of uncertainty but use structured learning to be better managers in the future. Adaptive learning yields adaptive management.

2.4 What's Next in Peer Review Process?

This final draft report once submitted and accepted by the District will be made available to the public.

At this juncture in the technical peer review process BFA's reviewers reiterate that they have not formally adopted any public comment. The peer reviewers have, however, received and evaluated stakeholder's review comments submitted to date.

3.0 References

CH2M Hill. 1999. Water Supply Needs and Sources Assessment: Alternative Water Supply Investigation: Review of Established Minimum Flows and Levels for the Wekiva River System. Special Publication SJ99-SP1. St. Johns River Water Management District, Palatka FL

CH2M Hill 2001. Adaptive Management Plan for Water Resources Monitoring Network in the St. Johns River Water Management District. Prepared for St. Johns River Water Management District. St. Johns River Water Management District, Palatka FL

CH2M Hill 2005b. Preliminary Evaluation Criteria in Support of Minimum Flows and Levels for Sandhill Lakes. St. Johns River Water Management District. Special Publication SJ2006-SP16. St. Johns River Water Management District, Palatka FL

CH2M Hill. 2005c. Comparative Review of Use of Wetland Constraints in the Water Supply Planning Process. St. Johns River Water Management District. Special Publication SJ2005-SP20. St. Johns River Water Management District, Palatka FL

Dunn, B., et al. 2006. Minimum Flows and Levels Candidate Site Selection and Prioritization Processes for East-Central Florida. St. Johns River Water Management District. Special Publication SJ2006-SP16. St. Johns River Water Management District, Palatka FL

Hupalo et al 1994. Establishment of Minimum Flows and Levels for the Wekiva River System. Technical Publication SJ94-1. St. Johns River Water Management District, Palatka FL

Janicki Environmental, Inc. 2023. WRVs Assessment Attachment 2-Janicki Environmental, Inc. Water Quality graphs. In Appendix E - Water Resource Values (WRVs) Assessment, Sutherland et al. 2023.

Kelly, M. 2004. Florida River Flow Patterns and the Atlantic Multidecadal Oscillation. Southwest Florida Water Management District, Brooksville

Rao, D.V. 2008. AN Evaluation of Minimum Flows and Levels for the Wekiva River System at the State Road 46 Bridge, Florida, Using the 1935-2004 USGA Streamflow Data. Special Publication SJ2008-SP3. St. Johns River Water Management District, Palatka FL

Rao, Donthamsetti V. 2008 (Draft). North Atlantic Sea Surface Temperatures and Rainfall and Streamflow Occurrences in Northeast Florida. St. Johns River Water Management District, Palatka, FL.

Sutherland, A.B., F. Gordu, J.W. Mace, and A. Karama. 2023. Minimum Flows and Levels (MFLs) Reevaluation For The Wekiva Rive State At State Road 46, Wekiwa Springs, Rock Springs, Palm Springs, Sanlando Springs, Starbuck Springs, Miami Springs, and MFLs Determination for The Little Wekiva River, Lake, Orange, and Seminole Counties. Bureau of Water Supply Planning, St. Johns River Water Management District, Palatka, Florida.

SPECIFIC AND GENERAL COMMENTS - DISTILLATION OF COMMENTS BY PEER REVIEWER'S

TABLE 1 - SUMMARY OF TECHNICAL PEER REVIEW COMMENTS ON WEKIVA RIVER SYSTEM MFL DOCUMENTS

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of report? (Yes/No)	To be completed by Reviewer(s)		To be completed by Report Author(s)
			A. Reviewer's Specific Comments	B. Reviewer's Specific Recommended Corrective Action	C. Action to be Taken in Response to Comment
1	General Comment		Overall, the reevaluation is well done, and comprehensive	Report and conclusions and recommendations may need to be revised, or updated depending upon how uncertainties are addressed.	
2	General Comment	Yes	Peer Reviewers the Wekiva MFLs reevaluation 1. Robust analysis of the watershed's condition 2. Weight of Evidence is compelling, and rich 3. Six independent analyses reach the same conclusion. 4. Standard SJRWMD Event based metrics (IH, FH, MA, FI, IL) applied 5. New Adaptive Events developed to address protections of key structural/functional components of Wekiva River's natural systems 6. SEFA habitat assessments was extensive 7. WRVs assessments were extensive 8. Addition of the widely applied Indicators of Hydrologic Alterations (IHA) gives District greater insight into hydro-ecological dynamics	BFA recommends that this peer review process include the recommended uncertainty management approach.	
3	General Comment	Yes	SJRWMD standard MFL Events	Clarify, why two event based metrics were not applicable	
4	General Comment	Yes	***New Event-based Metrics Required***	This comment linked to the previous one, Please clarify the need to develop new, adaptive metrics?	
5	General Comment		WRVs	The Districts WRV assessment was also very extensive and sufficiently detailed to address all ten WRVs. No further action is requested at this time.	

Appendices

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
6	General Comment	No	SEFA very critical/ beneficial tool in the MFLs toolbox, and critical for this MFLs analysis and assessment	SEFA analysis was extensive, no further action requested at this time.	
7	General Comment	Yes	IHA very critical/ beneficial tool in the MFLs toolbox, and critical for this MFLs analysis and assessment	IHA is a valuable addition to the MFLs Metrics toolbox. Its application in this reevaluation shows high value into hydro-ecologic factors of known value to ecosystem health.	
8	General Comment	Yes	Adaptive Management	Uncertainty management is needed, as a next evaluation step for this reevaluation.	
9	Executive Summary Page	No	Well written, Sufficient content covered.	The MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty assessment.	
10	Page vi	No	Please add the appendices to the Table of Contents (TOC)	Add list of Appendices to table of contents	
11	Pages xii-xv Glossary and Acronyms	No	Glossary and Acronyms are well written and will be highly explanatory to the general public	No further action required at this time.	
12	Introduction Pages 1-7	No	Well written, Sufficient content covered.	The MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty assessment.	
13	Pages 3&4	No	Helpful map figures (Figures 1,2, and 3)	No further action needed.	
14	Page	No	Explain rationale for exclusion of Blackwater Creek	Blackwater Creek was included in the MFLs adopted for the Wekiva Basin in 1994. This report does make it clear why the Blackwater River system is excluded?	
15	Pages 6-7	Yes	BFA's reviewers find that some issues of uncertainty risk still need to be addressed: • Many assumptions are embedded, these should be all be verified, and revised as warranted • Definition of Significant Harm • Event based metrics • Freeboard assessment	The MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty assessment.	

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
			• Prevention and Recovery		
16	General Comment	No	BFA's peer review assignment did not cover independent peer review of surface and groundwater models hydrology models underpinning the MFL's reevaluation	No further action required at this time	
17	Setting and Description Pages 7-	No	Setting for the Wekiva system is well covered.	No further action required at this time.	
18	Location and physiographic Setting, Page 8-10	No	Location and Setting are well defined with the text and Figures 4 and 5.	No further action required at this time.	
19	Hydrology Pages 11-25	Yes	Sufficient streamflow and spring flow data were used in deriving the MFLs results for the Wekiva River basin. These data were both observed and modeled: District staff used an HSPF watershed model for discharges and the HEC-RAS model for river stages. These data, discharges and river stages, were comprehensively presented by figures and tables. Spring flows were simulated by groundwater models.	The MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty assessment.	
20	Surface Water Basin Characteristics Pages 26-46	No	• Land Use & Vegetation—including Tables 5 and 6, and Figures 18 and 19, • Hydric Soils—text and Figure 22, 23, and 24 • Water Quality—pages 33-46, including Tables 7-11, and Figures 25-30. • Wekiwa and Rock Springs • Wekiva River • Little Wekiva River	The MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty assessment.	
21	MFLs Determination Pages 47-89	Yes	Overview of hydrologic and ecological-environmental Hydrological Analyses-pages 47-54 Environmental Analyses pages 54-89	The MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty assessment.	
22	General Comment	Yes	**Statistical Analysis of Data** – BFA concurs with Comments submitted by several: OCU, Friends of Wekiva, GFI, and Mr. Angel Miller, and OUC. BFA	Statistical Significance between time series, and other key comparisons are identified as sources technical uncertainty. The MFLs reevaluation document may need to be revised	

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
			recommends that this be addressed in the recommended Phase 1 AM uncertainty evaluation.	pending outcomes of the recommended phased uncertainty assessment.	
23	**General Comment**	Yes	**AMO signal -** Reviewers note that report addresses need to include effects of climate change, including the predictable, such presence of an AMO signal. They point to the range of AMO patterns observed by Kelly 2004 for rivers in Florida, and the harder to predict, such as changes to rainfall and temperature regimes, seasonal, annual, decadal, and longer behavior. Rao (2008 Draft) shows a strong qualitative correlation between the north Atlantic Sea Surface Temperatures (SSTs) and Northeast Florida rainfall. SSTs for a specific region of the North Atlantic adjacent to Florida are found to be better correlated to northeast Florida rainfall. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	Climate cycles, such as the AMO, are a general category of identified technical uncertainty. The issue should be addressed during the recommended phased uncertainty management assessment.	
24	MFLs Assessment Pages 91-111	Yes	Anomalies in application of some standard MFL metrics - please expand discussion explanation of anomalies in applying FH and MA event metrics to the Wekiva and Little Wekiva Rivers. Similar comment submitted by Dan Smutz/GPI. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	BFA recommends that this be addressed in the recommended phased uncertainty management assessment.	
25	**Conclusions and Recommendations** Pages113-117.	Yes	Reviewers concur that this work effort resulted in recommendations to modify the adopted MFLs for the Wekiva River, Wekiwa Springs, Rock Springs, Sanlando, Palm, and Starbuck Springs, and develop new minimum flows for the Little Wekiva River. Recommended MFLs are based on application of SJRWMD's MFL development methods. BFA's reviewers and the review comments submitted by stakeholders have identified sources of uncertainty and risk. These should be evaluated and potential risks minimized and/or eliminated.	The District's Wekiva MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty management assessment.	
26	**Recommended Minimum Flows** Page 113-116	Yes	Major sources of uncertainty identified include: • Validated assumptions:	The District's MFLs reevaluation document may need to be revised pending outcomes of the recommended phased uncertainty management assessment.	

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**
			• Minimum flows developed with a variety of metrics to protect important ecological environmental, and human beneficial uses. • Importance of Wekiva River @ SR46—the most downstream station in the watershed. • WR @ SR 46 along with Wekiwa Springs are determined to be most constraining. Both have MFLs equal to the current pumping condition. All other MFL water bodies and Wekiwa Springs are upstream of WR@SR46. Since the minimum flow for the most downstream station (WR@SR46) is equal to the CP, then so do the MFLs for the other water bodies. • SJRWMD deemed this necessary, because any further reduction on flow from the CP condition will result violation of the MFLs at that location • This will also define the MFLs condition for Wekiwa Springs. • Table 32 provides a comparative summary MFLs, original and currently recommended) eight water bodies: Wekiva River, Little Wekiva, and Rock, Wekiwa, Miami, Palm, Sanlando, and Starbuck springs. • Original MFLs did not include an event-based metric for Wekiva River SR46, and Little Wekiva River • ECFTX model used, but not reviewable in this assignment • Recommended MFLs (Table 32) are at their threshold for significant harm, and the added increases in recent pumping, these MFLs are predicted to be violated over the next 20 years. • Current pumping is defined as 2014-2018. • MFLs are thus based on climatic conditions experienced in that period. If these conditions are repeated in the future, and average pumping remains the same, CP condition flows are expected to reflect the future flow regime.		
27	Allowable flow reductions from NP conditions	Yes	Text summarizes the allowable flow reductions from the NP condition, see also Table 29, page 98.	Freeboards are a general category of identified technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	

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
	Page 115, para 2				
28	Freeboard p. 115, para 3	Yes	Basin wide freeboard for each water body in the Wekiva River system is zero cfs.	Freeboards are a general category of identified technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
29	Wekiva Systems are in recovery p. 115, para 4	Yes	Wekiva River system is in recovery. District and stakeholders are required to develop and MFLs recovery plan	MFLs status as being in recovery is identified as a technical uncertainty. Freeboards are a general category of identified technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
30	Comparison of Wekiva River system with other MFL rivers p.115, para 5	Yes	See Table 27, 8.7% reduction compared to NP condition	The issue should be addressed during the phased uncertainty management assessment. Issue is identified as general category of technical uncertainty.	
31	WRVs protected p. 115, para 6	Yes	MFLs protect the ten WRVs	The issue should be addressed during the phased uncertainty management assessment. Issue is identified as general category of technical uncertainty.	
32	IHA Analysis p. 116, para 1	Yes	Results of IHA analysis….	The issue should be addressed during the phased uncertainty management assessment. Issue is identified as general category of technical uncertainty.	
33	Weight of evidence, from WRV and IHA analyses p.116, para 2	Yes	Weight of evidence from WRV and IHA analyses	The issue should be addressed during the phased uncertainty management assessment. Issue identified as general category of technical uncertainty. The issue should be addressed during Phase 1 Uncertainty Management Assessment	
34	p. 116. Para 3	Yes	Until the critical uncertainty concerns are addressed authors do not conclude that the recommended MFLs will assure protection of the Wekiva basins WRVs, Rule 62-40.473. F.A.C.	The issue should be addressed during the phased uncertainty management assessment. The issue is identified as general category of technical uncertainty.	
35	General Comment	Yes	**Statistical Analysis of Data** - Comments submitted by OUC. BFA recommends that this be addressed in the recommended Phase 1 AM uncertainty evaluation.	The issue should be addressed during the phased uncertainty management assessment.	

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
36	**Ongoing Status/Adaptive Management** Page 116-117	Yes	Prudent to test implicit assumption that the Wekiva River hydrologic history will repeat itself in the future. This uncertainty should regularly be tested by implementing adaptive management (AM) 1. The SJRWMD should implement an AM strategy for regular testing. 2. District should implement an AM strategy to address continuing challenges and uncertainties in ecohydrological data and tools 3. District should perform analysis at least every five years, as well as cases in which permit applications are considered that could impact the adopted MFLs. 4. If the average long-term flow for a given water body falls below its adopted minimum flow, then more detailed analysis will be triggered. 5. If the average long-term observed flow falls below an adopted MFL, more detailed analysis is triggered to determine whether reduction in flows is caused by groundwater pumping, rainfall, or other. If this analysis shows that the MFL is being met, then no further action is required beyond continued monitoring. 6. If, however, analysis finds that adopted MFLs, or are trending towards not being met, then the District will conduct a cause-and-effect analysis to independently evaluate the impact of various stressors on the water body in question…..see details p.117.	The issue should be addressed during the phased uncertainty management assessment.	
37	**General Comment**	Yes	Impacts of septic to sewer conversion projects in watershed - Add details. Similar comment submitted by OUC. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
38	**General Comment**	Yes	Uncertainties remain - uncertainties remain and may potentially affect outcomes. A number of critical are identified by this peer review, and other submitted comments. Key aspects of uncertainty are identified in several of the following findings and recommendations. These uncertainties should be discussed, and then develop a plan to address negative effects. BFA proposes that uncertainties be addressed in two phases:	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment. The issue should be addressed during Phase 1 Uncertainty Management Assessment	

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
			Phase 1 uncertainty assessment should focus on addressing the identified issues of uncertainty. The District should explicitly assess risk to the completion of MFL reevaluation as part of the ongoing technical peer review process, while Phase 2 could be a detailed, formal AM Uncertainty Management Plan that is forward looking into the implementation and monitoring post adoption.		
39	**General Comment**	Yes	**Review Comments Submitted by Stakeholders -** As of the date of this draft report's submittal (April 10, 2024) five sets of submittals were reviewed by BFA's team of experts: -Dan Smutz of Greeman Peterman: 3 comments -OUC; 32 comments prepared by Arcadis -Friends of Wekiva: 6 comments -OCU: 4 major issues identified by Liquid Solution's Rob Denis -Mr. Angel. Martin-4 comments Peer review identified stakeholder comments that could potentially be significant sources of uncertainty. Those uncertainties aligned with this list of 24 findings and recommendations and can be addressed in the Phase 1 Uncertainty Evaluation.	BFA's reviewers identified stakeholder's questions of risk and uncertainty as a general category of technical uncertainty. These issues The issue should be addressed during the phased uncertainty management assessment.	
40	**General Comment**	Yes	Process and method assume that recent period of record for hydrologic regime components will remain the same in the 20 years. We know that this is hopeful thinking with our current trends in climate change. POR stationarity. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
41	**General Comment**	Yes	**District applies a 15% parameter reduction value threshold for a number of MFLs metrics -** long-term data supporting this generic threshold is less robust, as compared to event-based metrics. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
42	**General Comment**	Yes	**Water Quality Nexus to Flow Regime -** Reviewer notes that there are clearly identified water quality impairments of concerns in these rivers and springs. These key water quality issues remain largely divorced from consideration in this MFL. Several recent research findings indicate however, that some water	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	

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
			quality problems do have a link with flow regimes. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.		
43		Yes	**Climate Change is Upon Us -** Reviewer asks about impact of climate change. Climate change is not addressed in the document. MFLs are by their nature our estimates of sustainable resource management. If we are indeed in a time of climate change, then the assumptions upon which we base MFL type sustainability may not hold in the future. In statistical hydrology this is a question of stationarity of the statistical populations comprising our climate driven time series data for temperature, rainfall, runoff, aquifer recharge, etc. The consensus of climate experts is that key time series are in flux, which is they are statistically non-stationary. Climate change is another element of uncertainty, it needs to be discussed, and likely impacts identified and planned for. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
44	**General Comment**	Yes	**Keep Abreast of Innovations in Science Environmental Flows -** It is prudent for MFLs program staff stay abreast of potentially beneficial new developments in the field of environmental flows. For example, very good, very detailed review of the state of science and practices is a recent book *Water For The Environment* (Horne et al. editors, 2017) provides in-depth reviews of current status of theory practice, research and application. T For example, wildlife habitat evaluation methods continue to evolve, and some other methods may prove useful additions to the already strong SEFA modeling. Finally, in complicated hydrologic-ecologic-hydraulic systems like the Wekiva the ability to address the overall health of the Wekiva ecosystem is often difficult to capture. There are several tools that might prove useful additions to the toolbox. Finally, the District should consider use of calibrated and validated ecosystem models of the watershed, this case the Wekiva System. Ecosystem models are available that can provide more detailed analysis of energy and material flows, trophic complexities and interactions, network complexity and	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	

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**
			recycling, and much more. The software package ECOPATH with ECOSIM appears to a good initial candidate.		
45	**General Comme General Comment**	Yes	**Managing Uncertainty -** Reviewers note that the report would benefit from an integrated treatment of the sources of uncertainty. An inventory, characterization and sensitivity assessment of sources, then yields a process to manage uncertainty effectively, such that its negative effects can reduced, or eliminated. Uncertainty issues are discussed throughout the report, and are key to many of key decisions made for choosing methods of analysis, time series data, etc. Management of uncertainty moving forward is noted by authors but should be explicitly addressed as risks that could potentially affect outcomes of the MFL reevaluation. Sources of uncertainty in this MFL setting process include: • Groundwater and surface water modeling • Surface water modeling • Water budgets develop, including hydrologic time series needed • Reference flow developed for assess impacts of historic consumptive use • Selection of relevant WRVs, and subsequent parameterization of the assessment's metrics • Water quality Impairments affected by flow or level • Effects of climate change This requested uncertainty assessment and management should be done as part of the Phase 1 Uncertainty evaluation	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
46	**General Comment**	Yes	District should proceed cautiously in applying MFL metrics to springs with very low average/median flows. Same comment submitted by Rob Denis of Liquid Solutions, on behalf of Orange Conty Utilities (OCU). BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation	Significance and sensitivity of flow regime of small volume springs is identified technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	

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
47	**General Comment**	Yes	**Applying Adaptive Management (AM to District's ongoing MFLs establishment for the Wekiva River system) -** reviewers note that the report does include adaptive management (AM) framework into subsequent phases of this MFL reevaluation. BFA PRs recommend that AM approach be applied to this MFL setting effort and used as a guiding principle. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	The issue should be addressed during the phased uncertainty management assessment.	
48	**General Comment**	Yes	**MFLs Recovery Plan - Consider using the Adaptive Management Plan, as first cut at the recovery plan for the Wekiva River.** BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
49	**General Comment**	Yes	**Develop and implement broad AM to MFLs program. Consider application to water supply planning, and TMDLs & BMAPs.**	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
50	**General Comment**	Yes	**Equity and Fairness -** BFA recommends that these concerns be addressed during the recommended Phase 1 uncertainty evaluation. a. if declaring the whole area in recovery when some show free board, does this raise questions regarding legal defensibility? b. In their reevaluation Wekiva River system recommend several MFLs overlapping in the area when some are clearly not regionally significant, this seems potentially problematic. c. For example, could projects be required unnecessarily or in areas that provide little to no benefit to the actual recovery of waterbodies? d. Along the same lines, if District identifies 2-3 MFLs driving the whole system, then those and all regionally significant ones (OFSs and rivers) should be emphasized in all tables, etc. all regionally significant ones (OFSs and rivers) should be emphasized in all tables, etc.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
51	**General Comment**	Yes	**Uncertainty: Sensitivity of Wekiva River system to short duration changes in time series -** Wekiva System is complex, the entire system is definitely complicated, and SJRWMD has done a ton of very defensible work.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	

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
			But in addition to the wild storms, another possible contributing reason for this system being seemingly "sensitive" to short changes in data records could be because the difference between the no pumping condition and the MFL is quite small for some of the driving metrics. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.		
52	**General Comment**	Yes	**Time Series Records: Do critical time series inputs have stable statistical distributions? -**climate change, data distribution stationarity, etc. There's still the comment about the period of record, whether it is stable? (Climate change, stationarity, etc.), representative, etc. Even though as part of an overall AM plan for the Wekiva River system the District could do the mandatory 5 year relook, but actually because it was 2014-2018, Therefore BFA recommends that District should address in the Phase 1 inventory and assessment of uncertainties outcomes of this reevaluation. So, if that answer is already known District's MFLs staff should address the problem now because it could materially change the answers in this case. The District is following accepted assumptions but it could matter in this case, compared to many others where there is more actual (measurable) difference between the states.	Reviewers identified this issue as a general category of technical uncertainty. The issue should be addressed during the phased uncertainty management assessment.	
53	**General Comment**	Yes	**Implementing Adaptive Management -** Based on Dr. Dunn's experience with applying AM to water resources management problems. BFA presents a general format for how AM of how this works within the statutory framework. BFA recommends that this be addressed in the Phase 1 AM uncertainty evaluation.	The issue should be addressed during the phased uncertainty management assessment.	
54	**General Comment**	Yes	Period of Record (POR) Uncertainty—statistically significant differences, BFA recommends that this be addressed in the Phase 1 Uncertainty Management Assessment.	Several statistical concerns regarding PORs are identified as sources of technical uncertainty. These issues should be addressed during the phased uncertainty management assessment.	

Comment No.	Figure, Table, or Page and Paragraph Number	Does Comment Directly and Materially Affect Conclusions of report? (Yes/No)	To be completed by Reviewer(s)		To be completed by Report Author(s)
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			For example, if we look at other rivers or springs to compare, we may find them unusually close (e.g. a few inches of water depth, for example). The District is following accepted assumptions , but it could matter in this case, compared to many others where there is more actual (measurable) difference between the states.		
55	**General Comment**	Yes	With the delivery of this Draft report, BFA's Peer Review Team successfully addressed the elements of its scope of work, see Appendix Table 2: • Determine appropriateness of environmental criteria, hydrologic analyses and recommended minimum flows and levels, • Determine validity and appropriateness methods and procedures used for data analysis assumptions used and conclusions drawn regarding the recommended minimum flows and levels, • Determine adequacy of data used to support conclusions and recommendations; and • Identify and make recommendations regarding any deficiencies in the development of the draft recommended minimum flows and levels for the Wekiva River basin systems	This determination of completion of BFA's peer review of proposed MFLs for Wekiva River Basin may need to be revised based depending on outcomes of the phased uncertainty management assessment.	