Review Comments on the "*Minimum Flows And Levels (MFLs) Reevaluation For The Wekiva River At State Road 46, Wekiwa Springs, Rock Springs, Palm Springs, Sanlando Springs, Starbuck Springs And Miami Springs; And MFLs Determination For The Little Wekiva River, Lake, Orange, And Seminole Counties*"

Draft Report Dated January 2024

Liquid Solutions Group, LLC
April 2, 2024

On behalf of Orange County Utilities (OCU), Liquid Solutions Group, LLC (LSG) has performed a review of the draft report "Minimum Flows And Levels (MFLs) Reevaluation For The Wekiva River At State Road 46, Wekiwa Springs, Rock Springs, Palm Springs, Sanlando Springs, Starbuck Springs And Miami Springs; And MFLs Determination For The Little Wekiva River, Lake, Orange, And Seminole Counties" ("Draft Wekiva MFLs Report" or "Report") prepared by the St. Johns River Water Management District (SJRWMD), dated January 2024 (i.e., file name: DRAFT_Wekiva_Basin_MFLs_Report_Jan_2024.pdf). Based on this review, LSG has developed comments on the Minimum Flow and Levels (MFL) evaluation for consideration by the SJRWMD and the Peer Review Panel.

Before presenting these comments, we would like to commend the SJRWMD staff for the significant team effort required to develop the proposed MFLs and documentation of this work. The comments provided herein are intended to help ensure that the appropriate overall conclusions are reached so that investments in addressing any MFL issues can be focused where they are most required. The Wekiva River Basin and its springs are amazing water resources, and we are extremely supportive of the protections afforded by the MFL process, when and where appropriate. We hope these review comments are helpful and look forward to discussing them with you if you have any questions.

MFL Condition Relative to No Pumping (NP) Condition for Minimum Average (MA) and Frequent High (FH)

The most constraining metrics documented in the Draft Wekiva MFLs Report are the Minimum Frequent High (FH) for the Wekiva River at State Road 46 and Wekiwa Springs and the Minimum Average (MA) for the Wekiva River at State Road 46. As such, the validity of these metrics is important. In reviewing these metrics, we found that the No Pumping (NP) condition and the MFL condition were very similar to each other as shown in Table 1. These values were calculated using the R-scripts provided by the SJRWMD because the values did not appear to be included in the Draft Wekiva MFLs Report. For completeness, the Current Pumping (CP) condition values were also calculated and included in Table 1. We have several related comments as described below.

Table 1. NP and MFL Condition for FH and MA at Selected MFL Locations

Condition	Wekiva River at State Road 46		Wekiwa Springs	
	FH (ft NAVD 88)	MA (ft NAVD 88)	FH (ft NAVD 88)	MA (ft NAVD 88)
NP	6.79	6.72	12.26	12.16
MFL	6.6	6.5	12.1	11.9
Difference (NP-MFL)	**0.19 ft**	**0.22 ft**	**0.16 ft**	**0.26 ft**
CP	6.61	6.53	12.12	12.02
Difference (NP-CP)	**0.18 ft**	**0.19 ft**	**0.14 ft**	**0.14 ft**
Difference (CP-MFL)	**0.01 ft**	**0.03 ft**	**0.02 ft**	**0.12 ft**

1. As shown in Table 1, the difference between the NP and MFL condition for these constraining metrics varies from 2 to 3 inches (0.16 to 0.26 feet). With a range this small, the effect of potential model uncertainty and error, along with field measurement error, become more important as compared with a larger range between NP and MFL. While not known, such issues could have contributed to the fact that the FH and MA for the Little Wekiva River were not met under the NP condition. As stated in public comment at the March 15, 2024 Peer Review Workshop (presentation attached), we recommend:
    a. Presentation of CP, NP and MFL conditions for the MA and FH metrics for all locations in the Draft Wekiva MFLs Report to allow better context for results
    b. Evaluation of methods to reduce uncertainty in the MFL assessment process given the narrow band (NP-MFL) and issues noted in report with some MA and FH calculations

2. Due to the narrow range between the NP and CP as shown in Table 1, caution is required before rounding as described in the report is applied. In some locations, the report appears to describe rounding in the calculation of the CP metric to the nearest 0.1 foot. However, given the range in the metric calculations, such rounding represents a significant shift in the value. For example, the difference between the NP and CP for the FH at the Wekiva River at State Road 46 is 0.18 feet by our calculations. Furthermore, there is approximately 1,600 million gallons per day (mgd) in the ECFTXv2 current pumping scenario. Therefore, each 0.01 foot of change in the FH at the Wekiva River represents approximately 90 mgd of modelwide pumping. Additionally, the Wekiva River flow difference between NP and CP conditions is 26.0 cubic feet per second (cfs). Therefore, every 0.01 ft of change could represent approximately 1.4 cfs of allowable flow reduction (which similarly correlates to approximately 90 mgd of modelwide pumping).

    Given this analysis, which is meant to be illustrative for commenting purposes only, we would recommend:
    a. Any rounding should be performed with caution and that any rounding of the metric values not be performed to 0.1 ft.
    b. We also recommend not extrapolating from the Current condition analyses performed in the Report to contemporary (2024) conditions as described in the Report (e.g., page 99 of the Report which states, "*However, in recent years water use has increased relative to the CP. (i.e., 2014 - 2018 average) condition. Therefore, all Wekiva River basin systems are in recovery*")

3. Absent rounding, as shown in Table 1, it appears that the MFL condition is met with positive freeboard of 0.01 to 0.03 feet for the three most constraining FH and MA metrics presented in the Draft Wekiva MFLs Report. As demonstrated above, this level of freeboard could represent significant additional modelwide pumping. As such, we recommend the following:

    a. Additional assessment to determine if Recovery is the appropriate MFL classification for the Wekiva River at State Road 46 and Wekiwa Springs based on these metric calculations or if additional freeboard is available before MFL exceedance.

Adaptive Management Considerations

The Draft Wekiva MFLs Report states that, "*The SJRWMD will implement an adaptive management strategy to address continuing challenges and uncertainties in ecohydrological data and tools. This screening level analysis, which incorporates changes in rainfall trends and uncertainty, will be performed to monitor the status of the adopted minimum flows for each of the eight Wekiva River basin systems.*

This analysis will be performed approximately every five years, as well as when permit applications are considered that may impact the MFLs. MFLs status will also be monitored periodically by reviewing the status of system-specific constraining metrics (e.g., the FH for the Wekiva River at SR 46).

If the average long-term observed flow for a given water body falls below the adopted minimum flow, this will trigger a more detailed analysis. This analysis will determine whether reductions in flows are caused by groundwater pumping or rainfall, and whether a further evaluation of the MFLs is necessary. If the screening level analysis shows that MFLs are still being met, then no further actions are required beyond continued monitoring."

As part of our review, and given that we are 5 years beyond the last data used for the assessment of the MFL (through 12/31/2018), we evaluated the effect of additional data on the long-term analysis of event based metrics as presented at the March 15, 2024 Peer Review Workshop (presentation attached). Our analysis results have subsequently been updated using the R-scripts provided by the SJRWMD. The results presented in Table 2 show that the addition of data through March 16, 2024 increases the available freeboard for three of the four metrics.

As discussed previously, given the narrow band between NP and MFL values, the differences noted above are meaningful and could represent significant additional allowable pumping before these metrics are violated. Combining Tables 1 and 2, the most constraining metric would be the MA at the Wekiva River at State Road 46 with a total freeboard of 0.03 feet. Since the difference between the NP and CP for the FH at the Wekiva River at State Road 46 is 0.19 feet by our calculations, then each 0.01 foot change is associated 84 mgd of pumping. Therefore, 0.03 ft of freeboard could represent approximately 250 mgd of modelwide pumping.

Table 2. NP and MFL Condition for FH and MA at Selected MFL Locations – Adaptive Data Extension (1948 to 2024)

Condition	Wekiva River at State Road 46		Wekiwa Springs	
	FH (ft NAVD 88)	MA (ft NAVD 88)	FH (ft NAVD 88)	MA (ft NAVD 88)
MFL	6.6	6.5	12.1	11.9
CP2018(1948-2018)	6.61	6.53	12.12	12.02
CP2024 (1948-2024)[1]	6.65	6.53	12.14	12.03
Increase in Freeboard (CP2024-CP2018)	**0.04 ft**	**0.00 ft**	**0.02 ft**	**0.01 ft**
Difference (CP2024 - MFL)	**0.05 ft**	**0.03 ft**	**0.04 ft**	**0.13 ft**

Table 2 note: 1) Historical data used as a surrogate for synthetic CP estimates. Assuming increased pumping rates from 2014-2018 as noted in report, then these data should be a lower elevation than a calculated CP value for this period.

We understand that an extension using additional data could be performed using different methods. Our analysis above is intended as a foundation for the following recommendations:

a. With consideration of available data, we recommend additional assessment to determine if Recovery is the appropriate MFL classification for the Wekiva River at State Road 46 and Wekiwa Springs or if additional freeboard is available before MFL exceedance at this time.

Setting a Basin-wide Freeboard

For a variety of reasons, the Report recommends that all MFL water bodies in the Wekiva River Basin be considered to have 0 cfs freeboard in the CP condition (2014-2018 average), and therefore, be extrapolated to be in recovery. However, as a result of the analyses presented in the Report, only two of the eight MFL locations are most constraining with 0.0 ft (0.0 cfs) freeboard (Page 96 of the Report, "*the most constraining MFLs water bodies in the Wekiva River basin are the Wekiva River at SR 46 and Wekiwa Springs, both with a freeboard of zero cfs"*.).

While information is provided to justify the use of a basin-wide freeboard, we recommend caution extending a prevention or recovery designation beyond the data analysis. By proposing to set all water bodies in Recovery, an unintended consequence could be that Recovery investments are not directed towards the water resources that are most in need. Such a designation places all MFL locations on equal footing with regards to project offsets/benefits when that may not be warranted as a result of the detailed MFL analyses presented in the Report.

Furthermore, the report appears to indicate that one of the main reasons for the basin-wide Recovery designation is the Recovery status of the Wekiva River, and to a lesser degree, Wekiwa Spring. Page 97 of the Report states, "*This is necessary because any further flow reduction in the springs upstream of SR 46 gage (from current-pumping condition) would decrease the flows at SR 46 and result in violation of the MFLs at that location. This recommendation also stems from the fact that the Wekiva River at SR 46 is an indicator for conditions throughout the basin, and the minimum flow at SR 46 is based on transects (used for the minimum FH and MA) whose locations extend from upstream of the confluence of the Little*

Wekiva River to downstream of SR 46 (i.e., the SR 46 FH and MA protect floodplain conditions throughout the basin, not only at SR 46; Figure 41). This recommendation is also supported by the constraint at Wekiwa Springs which has a flow freeboard of zero".

As noted in the comments above, we suggested recommended actions to help ensure that Recovery is the appropriate status for the Wekiva River and Wekiwa Springs. If these water bodies are determined to have freeboard, then we would additionally recommend reconsideration of the use of a basin-wide freeboard in order to prevent the reprioritization of limited resources toward unnecessary projects which are otherwise justifiably needed and could provide more benefit in other parts of the natural system.

Indicators of Significant Harm

Given the proposed basin-wide Recovery status, we reviewed the Draft Wekiva MFLs Report to identify if indicators of significant harm were noted or identified as a result of the environmental field work performed. From review of the information presented in the Report, we could not identify such information. We recommend the inclusion of additional information on impacts that were observed during the transect work documented in this report (e.g., during 2014-2015) or that exist at present. The use of data and observations to verify and justify the proposed MFL conditions would be very helpful.

Draft Wekiva River Basin MFLs

Observations for Peer Reviewer Consideration

March 15, 2024

Items for Discussion

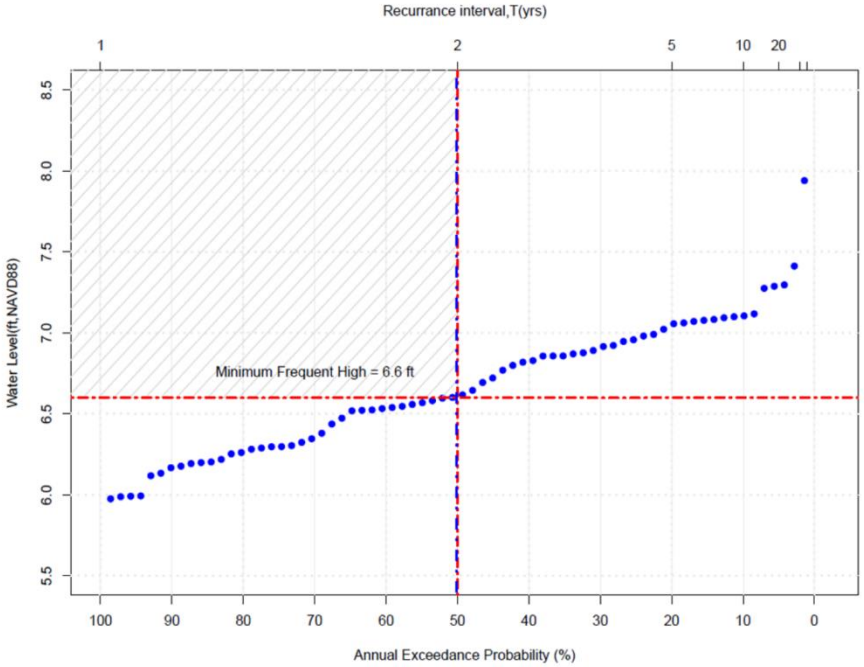
- MFL condition relative to NP condition
- Sensitivity to period of record used
- Calculation method for frequency analysis values

MFL Condition Relative to No Pumping Condition

- NP and MFL conditions very similar for MA and FH analyses
  - For Wekiva River, FH calculations show:
    - NP ~ 6.8 ft NAVD-88
    - MFL = 6.6 ft NAVD-88
    - CP ~ 6.65 ft NAVD-88
    - NP and MFL only a few inches apart
- Due to these tight bounds, low model(s) error is very important
- Recommend presentation of CP, NP and MFL conditions for MA and FH in the report to allow better context for results
- Recommend evaluation of methods to reduce uncertainty in the MFL assessment process given the narrow band (NP-MFL) and issues noted with some MA & FH analyses

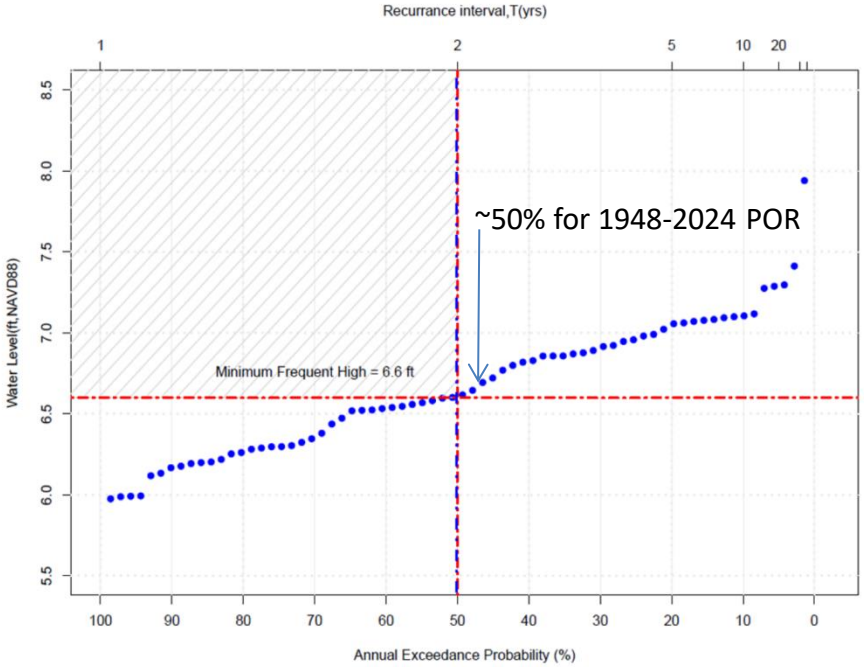
Sensitivity to Period of Record Used

- Given tight bounds between NP and MFL, sensitivity of results to other factors evaluated
- Analysis POR is 1948 to 2018
- Calculated Wekiva River FH results by extending data to current (3/24)
- Used actual data instead of calculated CP condition
  - Assuming higher pumping, should be lower than CP value



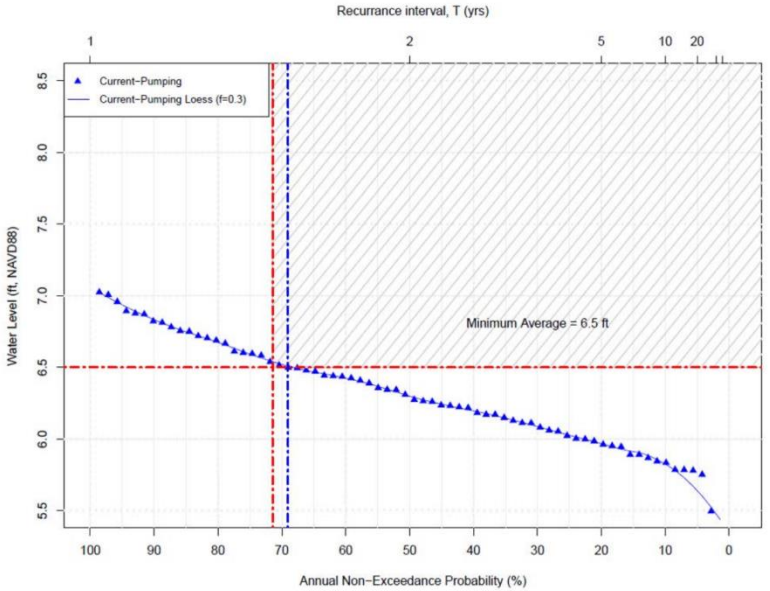
Sensitivity to Period of Record Used

- Shifts 50% exceedance probability to 6.7 ft-NAVD88
- Results in 0.1 ft freeboard
  - Significant in terms of original gap between NP and MFL conditions (previous comment)
- Recommend assessing sensitivity of results to period of record for other event metrics



Calculation Method for Frequency Analysis

- Recommend more documentation in Appendix D on specific calculations used for annual event-based metric calculations (blue triangles)
- Helpful to better understand metric calculations relative to the field measurements and proposed MFL conditions



Thank you for your time