Date:	March 22, 2021
To:	Andrew Sutherland, Ph.D., SJRWMD
From:	HSW Consulting, LLC Ken Water, Ph.D., PH, Dean Mades, P.E., and Scott Emery, Ph.D.
RE:	Contract 32927 / Work Order 03
Project Title:	Independent Technical Peer Review Minimum Levels Reevaluation for Sylvan Lake, Seminole County, Florida
HSW Project No.:	1BG900702

HSW Consulting LLC (HSW) is pleased to provide this scientific peer review of the Minimum Levels Reevaluation for Sylvan Lake, Seminole County, Florida (MFL Report). HSW's Drs. Ken Watson and Scott Emery, and Dean Mades reviewed parts, or all, of the referenced document. The reviewer comments are consolidated in the table. A summary of the reviewer assessments and preliminary conclusions were discussed during a teleconference on March 15, 2021. The discussion that follows relates to several key items in the report that directly impact the MFL. Specific comments are provided in the attached table (Attachment B).

A primary element of the minimum level reevaluations is a hydrological analysis involving surface- and groundwater modeling performed by the District using two computer programs (HSPF and MODFLOW). Both computer programs are appropriate for simulating surface- and groundwater hydrology and interaction. They are industry standards, well documented, and widely used. The calibration and validation of the Sylvan Lake watershed and vicinity using both programs is documented in peer-reviewed reports. HSW's review team inspected but did not peer review the Letter Report provided in Appendix B (CDM Smith, 2017) that describes the surface-water model, because HSW was not tasked to do so. Likewise, HSW obtained but did not peer review the technical report that describes the East-Central Florida Transient Expanded (ECFTX) groundwater model (CFWI HAT, 2020). Appendices to the ECFTX report that describe boundary condition development could not be located.

Key Discussion Topics

1. Hydrological analysis - The overall approach for the Hydrological Analysis Process described in the MFL Report Appendix B is generally valid and appropriate. The calibrated ECFTX groundwater model is used to calculate a hydraulic head in the upper Floridan Aquifer (UFA) beneath the lake for a prescribed pumping condition. The calculated UFA head is then used as a boundary condition in the calibrated Sylvan Lake HSPF model to simulate the exchange of flow between the lake and UFA. Historical regional and local groundwater withdrawals are considered in the analysis.
    a. Consider providing further to support the assumption that most of the impact on Sylvan Lake has been caused by groundwater pumping within a buffer zone (Figure B-12) with a 10-mile radius. The buffer zone extends well beyond the HSPF model area (Yankee Lake Basin) and seems appropriate for the hydrological analysis. However, the proximity of pumping stations to the lake is not evident.
    b. Consider discussing the non-zero y-intercept in the pumping-drawdown equation (Figure B-14). The Groundwater Modeling section indicates that the initial condition is

the 2003 steady-state head distribution which is associated with about 41 MGD of pumping within the 10-mile buffer and an undisclosed amount of pumping outside the 10-mile buffer zone (draft report Figure B-13). In comparison, the Calibration Period pumping within the 10-mile buffer averaged about 43 MGD.

   c. A conceptual backcheck of the 10-mile buffer zone assumption (Figure 1) indicates that UFA drawdown at 10 miles associated with a well pumping 1 MGD could be measurable (~0.05’). Consider checking the sensitivity of near-lake UFA heads to far-field pumping (outside the 10-mile buffer zone); for example, by simulating the recovery associated with holding the buffer-zone pumping at the 2003 condition and changing the 2003 far-field withdrawals to injections. An alternative approach, such as water-balance analyses, could be used. Low sensitivity would support the assumption of a 10-mile buffer zone.

   d. With a surface area of about 180 acres, the lake encompasses at least five 39-acre, square, groundwater model grid cells. The number and location of the grid cells used to calculate an average UFA head and the proximity of near-lake monitoring well S-0718 to those cells is not disclosed in the report. Consider documenting the uncertainty of the simulated UFA heads beneath the lake for comparison with the 0.1-foot precision in lake and UFA freeboards considered in the MFLs status assessment (Appendix D).

2. Hydrological analysis - The overall approach for infilling and extending the S-0718 UFA heads is valid and appropriate. However, the X-Y plots (Figure B-6) comparing regional monitoring well data with S-0718 data illustrate what appears to be two populations of data, particularly for monitoring well V-0101. These visually apparent differences and sources of uncertainty should be examined, if not already done. A step-function change in time series plots of trend-line residuals might indicate a shift in measurement datum or monitoring location. Breaks in double-mass plots might indicate same. The differences may also reflect transient conditions.

3. Hydrological data – Based on the analysis described in Key Discussion Topics 1 and 2, there were four hydrologic period of record stage data series developed and used in the analysis.

   a. Historical lake levels – measured values (approximately monthly since late 1978) or estimated values (infilled and extended to 1948) of daily stage as they would have been observed under historical conditions.

   b. Current condition lake levels - represents a reference hydrologic condition of the lakes in which the impact from regional groundwater pumping on the lake is constant from 1948 to 2018 at a rate of current-pumping impact. Current-pumping impact is defined as the impact due to the averaged groundwater pumping from 2014 to 2018. The ECFTX groundwater model was used for the groundwater pumping impact analysis, which was used to develop the current-pumping condition lake level time series used in the MFLs assessment.

   c. No-pumping condition lake levels – represents condition whereby UFA and LFA pumping throughout the ECFTX model area is zero.

   d. MFL lake levels – represents a constant-pumping condition associated with the most restrictive event and zero-freeboard condition evaluated during the MFL status assessments. The Sylvan Lake status assessment concluded that the current-condition lake levels were representative of MFL lake levels.

The word baseline shows up only in Appendix B, Figure B-17, and is synonymous with the historical record in this MFL. Other Districts view baseline as the historical record with the effects of withdrawals due to pumping removed, or like the no-pumping condition. This distinction is important because it establishes a reference condition as one that includes effects due to pumping.

4. Surface water inundation/dewatering signature (SWIDS) (Appendix C) – For the Sylvan Lake MFL, the District used 14 or 19 lakes for which associations are developed between key vegetation community elevations (magnitude) and literature defined flooding or dewatering durations, and “historical” (or baseline) lake stage record. The result is a set of box-and-whisker plots where duration is held constant, and the frequency of the events varies from lake to lake. The range of the variability is quite large for the durations considered.

    a. Comparing historical lake stage data (includes withdrawal impacts) with current or recent vegetation data (also includes withdrawal impacts to some degree), seems appropriate.

       Consider discussing where would the vegetation communities be under the no-pumping condition, perhaps using the bathymetric map (report Figure 4).

    b. By default, the District appears to use the extreme dry event frequency of the 14 or 19 frequencies developed for the reference lakes for setting MFLs. Based on literature or site-specific conditions of the object lake (i.e., Sylvan Lake), the District may use the upper dry quartile. The inference by doing this is that the more variable the frequency of the SWIDS the greater the allowable freeboard.

       Consider discussing how greater variability of SWIDS results should result in a less conservative freeboard.

    c. The District might consider a more critical look at event duration. Different soils are defined by their ability to drain – e.g., well drained versus poorly drained soils. Consider that well drained soils may support a vegetation community that requires 30 days inundation at a certain frequency while poorly drained soils may support the same community with only 7 days duration of inundation at the same frequency. In other words, the poorly drained soil may remain saturated for 30 days but flooded for only 7 days. In this example, it would be expected that the poorly drained soil is upslope of the well-drained soil.

    d. While the SWIDS analysis seems appropriate for developing an event, by using the historical record and current pumping record of Sylvan Lake to set the MFL, the District is conceding the historical impacts (i.e., impacts that have occurred because of historical pumping) and possibly allowing additional impacts due to current pumping levels. Per District’s evaluation, these impacts are determined to result in no significant harm.

    e. For clarity, consider adding 3 new figures each of which shows set of historical condition Weibull plots for a range of durations on which Sylvan Lake SWIDS for FH, MA, and FL would be based.

5. Minimum Levels evaluation using the event approach (Appendix C) – The District evaluated 3 key lakes stage elevations to develop the MFLs for Sylvan Lake – Frequent High (FH), Minimum Average (MA), and Frequent Low (FL). The FH is an exceedance criterion (flooding event) and the MA and FL are non-exceedance criteria (drying events). Selecting a range of lake levels to protect the lake from Significant Harm is appropriate. Comments were provided primarily regarding the appendices but some to the main MFL report regarding application of the method and how it is explained.

a. Baseline is established as the historical condition meaning both historical withdrawals and associated impacts to wetland communities (e.g., event magnitude) form the basis for developing a freeboard. This may be appropriate for a developed region but should be made clear in the report. Figures 2 through 7 (Attachment A) provide some insight into the range of flows associated with the four Lake Level data series used in the Sylvan Lake MFLs report.

   Figures 2 and 3 depict the estimated historical regional pumping and the associated estimated lake level hydrographs based on different pumping scenarios, respectively.

   Figure 4 depicts stage duration curves for the pumping scenario data series. Note that the control structure limits the impact of withdrawals at the high stage end, and that impacts increase at progressively lower lake stage. At the median lake stage, about half of the impact occurs from the no-pumping to the historical pumping scenarios and the other half from historical to the current pumping (and the MFL) scenarios. At progressively lower lake stage, greater impact is attributed to historical withdrawals. The total estimated impact of pumping on lake level is about 2 ft at the median and 3.5 ft at minimum lake levels.

   Figures 5 through 7 depict the Weibull plots associated with the three MFL metrics (FH, MA, and FL) and for the different pumping scenarios and the MFL scenario (i.e., current pumping). The Weibull plots provide information similar to the FDCs presented in Figure 4 but also support the District's approach of setting MFLs based on an allowable shift in the frequency of the key events (i.e., FH, MA, and FL).

   i. For clarity, consider adding information presented in Figures 3 – 6 to appropriate figures in the Sylvan Lake MFL Report and or appendices.

   ii. Consider adding language that supports using the historical record as baseline, primarily as related to the position of wetland communities.

b. As discussed under Key evaluation observations 4, the District used either the most extreme dry or upper quartile dry wetland community from 14 or 19 lakes to establish an allowable return interval for the key events associated with Sylvan Lake – i.e., FH, MA, and FL.

   i. For clarity, consider adding Sylvan Lake SWIDS to the various SWIDS plots presented in the Appendix C (Figures 45 to 46)

6. Other WRVs and other than event approach (Appendix E) –– Water Resource Value (WRV) Assessment provides a summary analysis of the 10 WRVs. The District's approach is to protect the most sensitive WRVs and therefore ensuring that all relevant Rule 62-40.473, F.A.C. environmental values are protected. Of the 10 values identified by Rule, 7 were deemed either not relevant or protected by the MFLs as developed in the report. Three WRVs (WRV 1 - recreation in and on the water, WRV 6 - aesthetics and scenic attributes, and WRV 9 – water quality) were evaluated using other methods.

   a. WRV 1 was evaluated using water depth adjacent to the docks sufficient for boat access. Since it was determined that there is sufficient water under each pumping scenario to allow boat access all the time, the District might consider another recreation metric as this one is not sensitive to lower water levels in the lake. Also, consider that most of the boats are on cradle lifts that require additional water depth for access. It was noted during a site visit that there is a community boat ramp that might offer an evaluation opportunity.

b. WRV 6 was evaluated using a change in area criteria of the open water. The District might consider a more sensitive area of the lake such as shallow and deep marsh habitats evaluated using the FL criterion.

c. WRV 9 water quality was evaluated by noting that important water quality criteria are not substantially negatively impacted by lake stage. We concur with this assessment and note that water quality is generally not a sensitive criterion for setting MFLs (i.e., other criteria are more sensitive and drive MFL setting).

7. MFLs Status Assessment (Appendix D) – Based on a comparison of the Minimum Levels (Appendix C) scenario and the current pumping scenario, it was determined that that the hydrographs were nearly identical, freeboard was zero, and that no additional water was available for withdrawal. This implies that Sylvan Lake is in prevention.

    a. Consider including the Weibull plots of other scenarios for each of the three Minimum Level events.

    b. It is understood that the MFL scenario is very near the current condition although it is not so clear how an MFL based only on the median will result in a Weibull plot that aligns with the current condition.

    c. It also seems relevant to put the MFL in context with the historical and no-pumping scenario events of the same magnitude and duration. Figure 1 in Appendix E provides some insight into the magnitude of the change that has occurred from a no-pumping condition (pre 1970s) to the period of record condition and then to the MFL and current condition. It is expected that including these Weibull plots will generate some additional discussion.

    d. Given the amount of development that has occurred around the lake, using the historical condition (i.e., the data sets used in the SWIDS analysis and the Sylvan Lake events that implicitly have pumping impacts) as the basis of establishing the MFL seems appropriate. This may not be the case in less disturbed environments that also are experiencing impacts from withdrawals.

    e. The District defines significant harm as “impairment or loss of ecological structure (e.g., permanent downhill shift in plant communities) or function (e.g., insufficient fish reproduction or nursery habitat).” It appears to these reviewers that it is reasonable to suspect that wetland communities have and may continue to migrate “downhill” in the literal geographic sense, consistent with Figures 3 through 7.

       Consider clarifying this physical migration with regard to the significant harm definition.

8. The proposed MFL is the median (P50) historical lake level. It is appropriate to establish MFLs based on stage- or flow-duration curves (i.e., daily value exceedance curves) as evinced by MFL rules adopted by the St. Johns River and other Water Management Districts. And while a single-valued MFL may facilitate water management, insufficient justification based on environmental values has been provided to substantiate the P50 MFL proposed for a seepage lake such as Sylvan Lake. Factors to consider:

    a. The District designated it a sentinel lake to define long-term hydrologic and ecologic performance measures. By statute (62-40.473, F.S.), consideration "shall be given to natural seasonal fluctuations". Precedence (original Sylvan MFL and other lakes within SJR and other WMDs). Per District MFL evaluation criteria (CH2M 2003, pg. 12) and a conceptual hydrologic continuum of lake types (Mace 2015, pg. 4) both high and low water conditions are needed to maintain expected ecosystem structure and function. Urbanization and climate changes will continue to affect lake hydrology in addition to groundwater use.

b. The effects of groundwater withdrawals are expected to be most evident during drier conditions as illustrated in Appendix E Figure 1. The diverse SWIDS illustrated in Appendix C and associated wide range in event frequencies represents a large degree of uncertainty in the level of protection associated with the FL.

c. Similarly, the FH elevation is close to the hydrologic control (i.e., culvert) near the lake outlet, and the change in surface-water discharge to the next downstream lake (i.e., Yankee Lake) is non-consumptive use that could be evaluated.

d. Consider adding the FL and possibly the FH or their associated stage exceedance frequencies to the proposed rule.

Conclusion

1. Assess validity and appropriateness of environmental analyses and criteria.

   - Are the data used to develop criteria adequate and appropriate?

     Yes, to the extent they are the best available. Ideally SWIDS would be developed using unimpaired hydrologic data and unimpacted wetlands. Since this is nearly impossible, the data are adequate and appropriate because it is reasonable that the vegetation communities assessed in 2005 and 2020 are associated with the historical hydrologic data of 1948 to 2018.

   - Are the methods and procedures used for environmental analyses appropriate?

     Yes

   - Are methods to evaluate the relevant environmental values and beneficial uses appropriate?

     Yes

   - Have all relevant environmental values been evaluated?

     yes, although the definition of WRV-5 is debatable to the extent that all relevant non-consumptive uses are evaluated. Consider evaluating any requirement for surface-water release to Yankee Lake such as a condition in the ERP for the outfall structure.

   - Are data appropriate for evaluations selected criteria and conclusions?

     Yes

   - Are assumptions reasonable and consistent given the "best information available"?

     Yes

2. Assess validity and appropriateness of hydrological analyses.

- Are the hydrologic data used to develop impact assessment methods appropriate?

  Yes

- Is the method used to assess the impact of local and regional groundwater pumping on Sylvan Lake appropriate and valid?

  Yes, to the extent the sensitivity of lake and UFA freeboards to the 10-mile buffer zone assumption can be demonstrated.

- Are the analytical and statistical methods and procedures appropriate for -

  - Conducting groundwater pumping impact assessment

    Yes

  - Developing no pumping, baseline, and current condition datasets

    Yes, to the extent that the baseline data set is the infilled and extended historical data set. We point out that this is not consistent with other districts that view the no-pumping condition as baseline. It is interesting that the no-pumping condition is used in the Sylvan Lake reevaluation report when using other methods for evaluating WRVs – e.g., %area change.

- Are assumptions reasonable and consistent given the "best information available"?

  Yes, to the extent the sensitivity of lake and UFA freeboard to the 10-mile buffer assumption can be demonstrated.

3. Appropriateness of recommended minimum levels

- The validity and appropriateness of assumptions used, and conclusions made in the development of protective minimum levels, including identifying sources of uncertainty and their impact on development of protective minimum levels for these lakes.

  Further explanation of uncertainty (or variability) is needed as it drives the freeboard estimate. The SWIDS analysis results in a broad range of return intervals for the referenced lakes. By selecting the driest or driest quartile reference return interval, freeboard becomes a concordant function of this variability. The analysis is guided by literature sources, which helps, but the broad range of values resulting from the SWIDS analyses needs more explaining, including consequences.

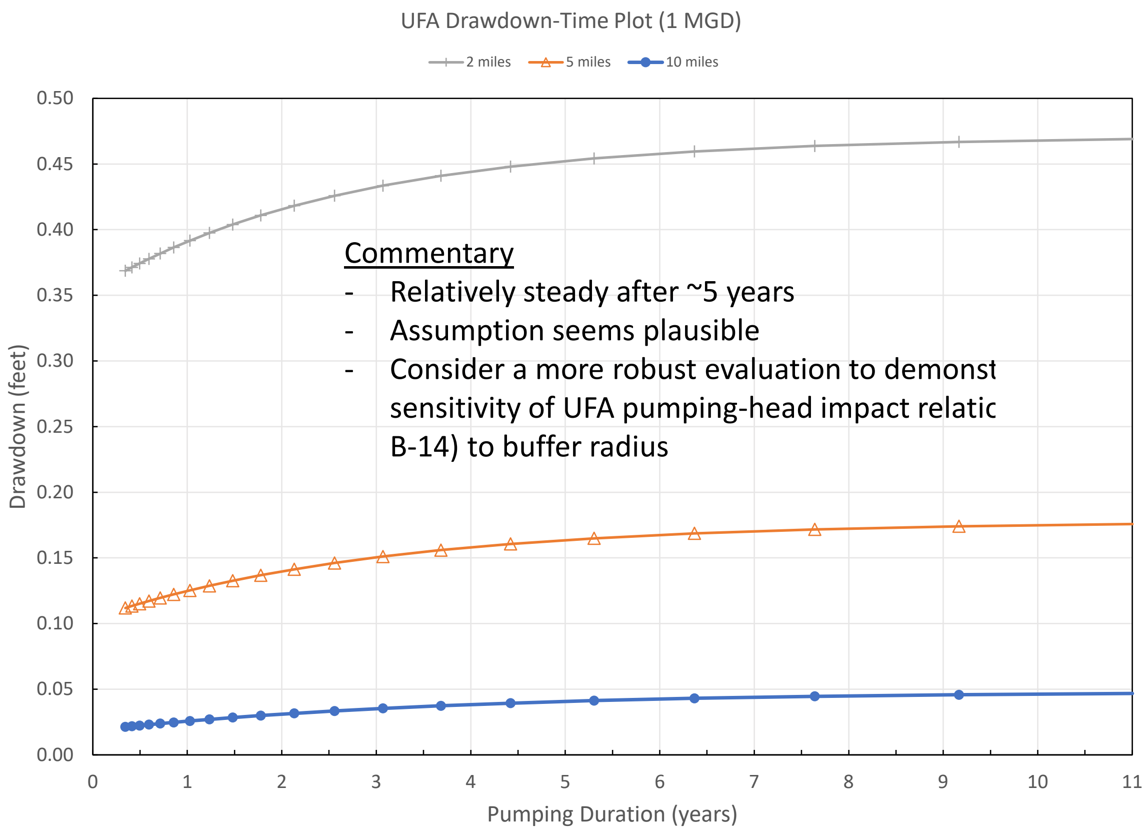
  In the report's conclusion it is state that "A premise of this MFLs determination is that by maintaining the lake's natural flooding and drying characteristics, the basic structure and functions of the ecosystems will also be maintained." Further discussion would be helpful to justify this statement given the substantial change from the natural (i.e., no-pumping scenario) flooding and drying characteristics that has already occurred.

  Also, if interpreted literally, a MFL defined as a single value at the median is open to interpretation that would not protect against significant harm. For example, a hypothetical liberal interpretation could result in complete drawdown of the lake half the time and drawdown to the median the other half of the time. The MFL would benefit from additional explicit MLs, particular at the low end.

- Adequacy of data to support conclusions and recommendations.

Yes, to the extent they are the best available. However, the conclusions and recommendations based on these data would benefit from further discussion.

Attachment A
Figures



<u>Calculated Using District's code COUAQ.EXE*</u>
(single well, 2 aquifer analysis; ECFTX parameters)

Layer 1 (Surficial Aquifer):
Pumping = 0
Transmissivity = 875 ft^2/d
Specific Yield = 0.2
ET Reduction = 1.5E-4 (1/d)

Layer 2 (Upper Floridan Aquifer):
Pumping = 1 MGD
Transmissivity = 50,000 ft^2/d
Storativity = 2.5E-4
Leakance = 1E-4 (1/d)

Confining Unit Storativity = 0

*Source: Motz and Acar (2007)

Figure 1. Conceptual backcheck of a time-distance-drawdown relationship in a leaky artesian aquifer.

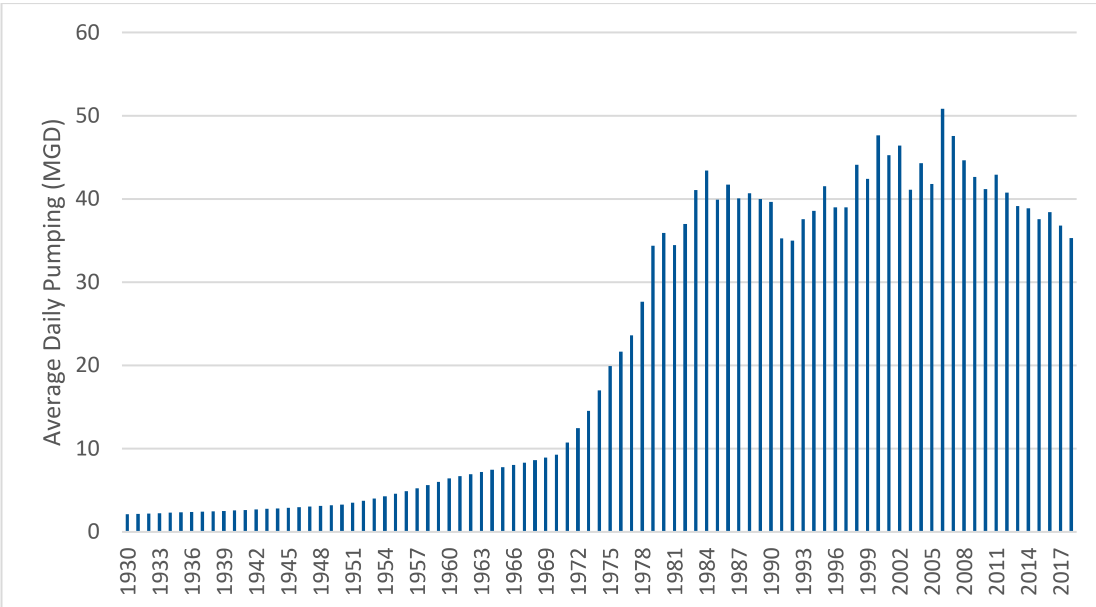


Figure B-13. Estimated historical groundwater uses in Sylvan Lake basin area.

Figure 2. From MFL Report Appendix B.

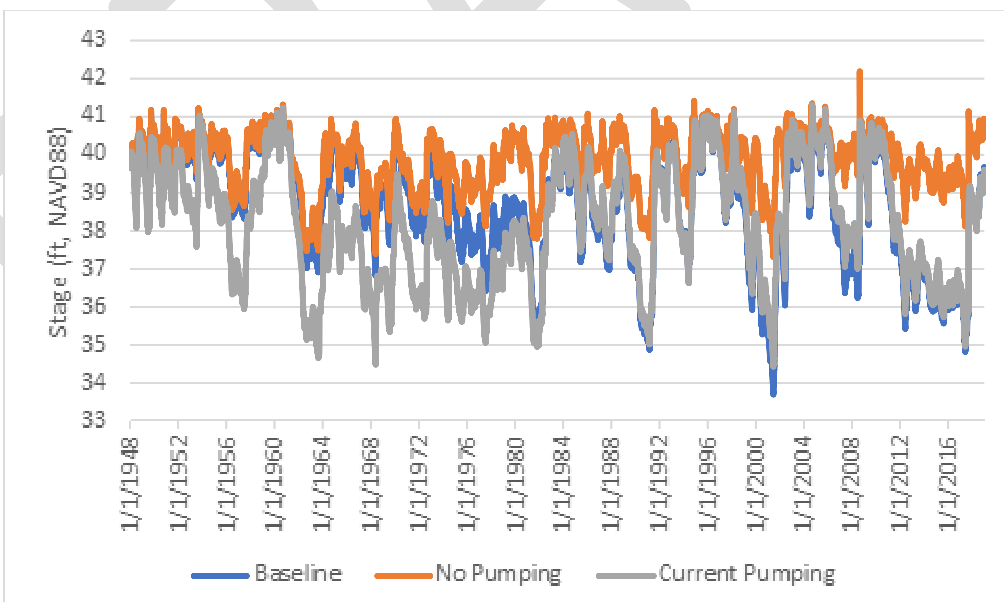


Figure B-17. The estimated no-pumping and current-pumping condition levels for Sylvan Lake

Figure 3. From MFL Report Appendix B

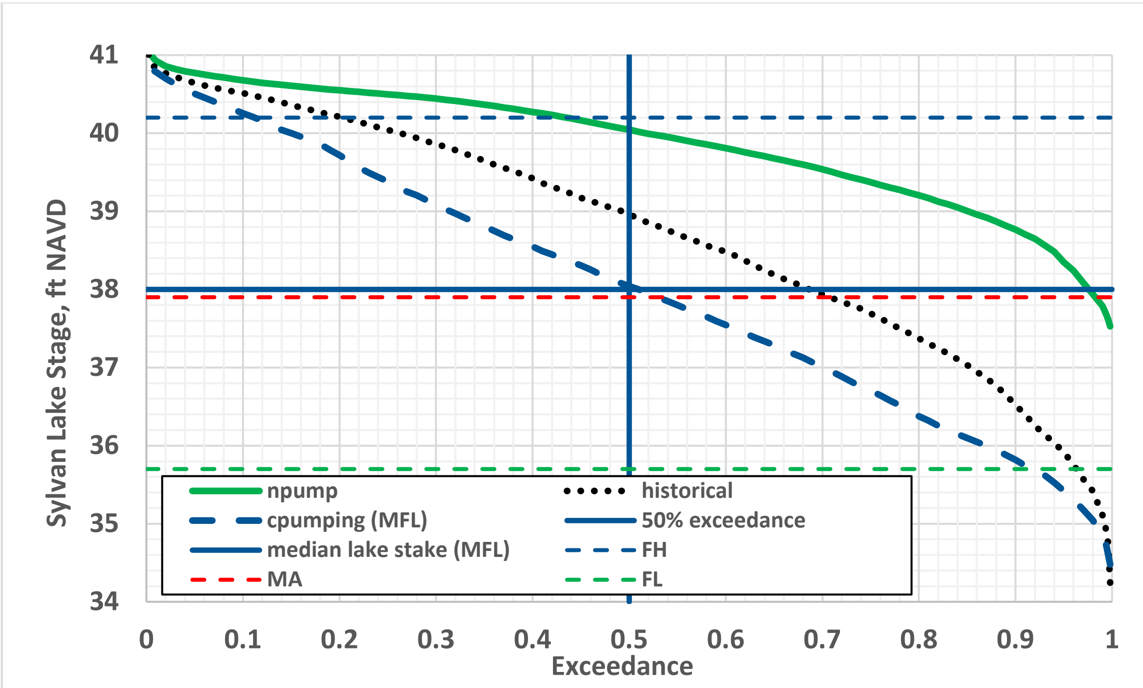


Figure 4. No-pumping, historical (baseline), and current (MFLs) condition exceedance curves for Sylvan Lake, Seminole County, Florida

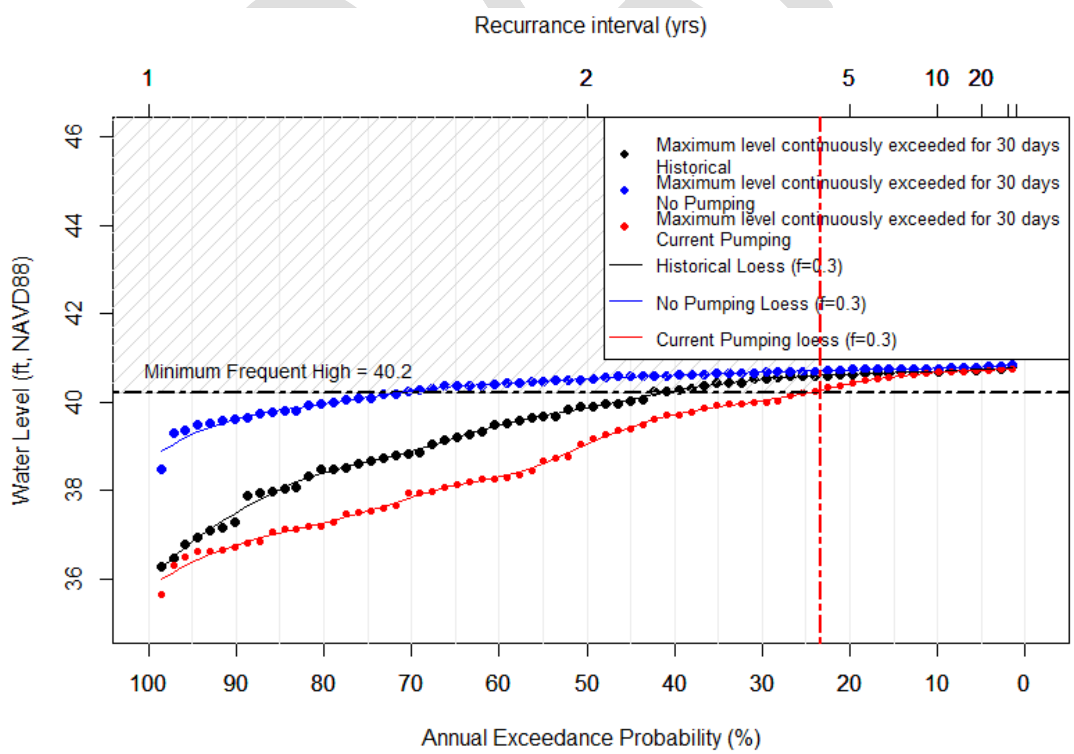


Figure 5. Minimum Frequent High (FH) Weibull plot

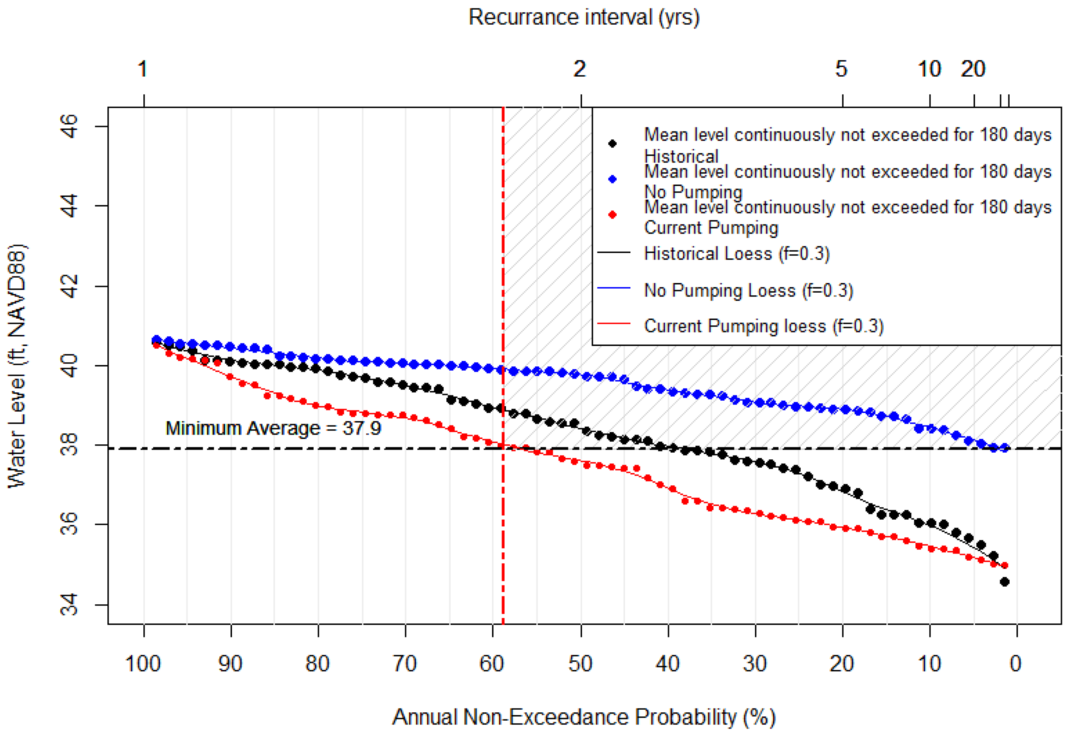


Figure 6. Minimum Average (MA) Weibull plot

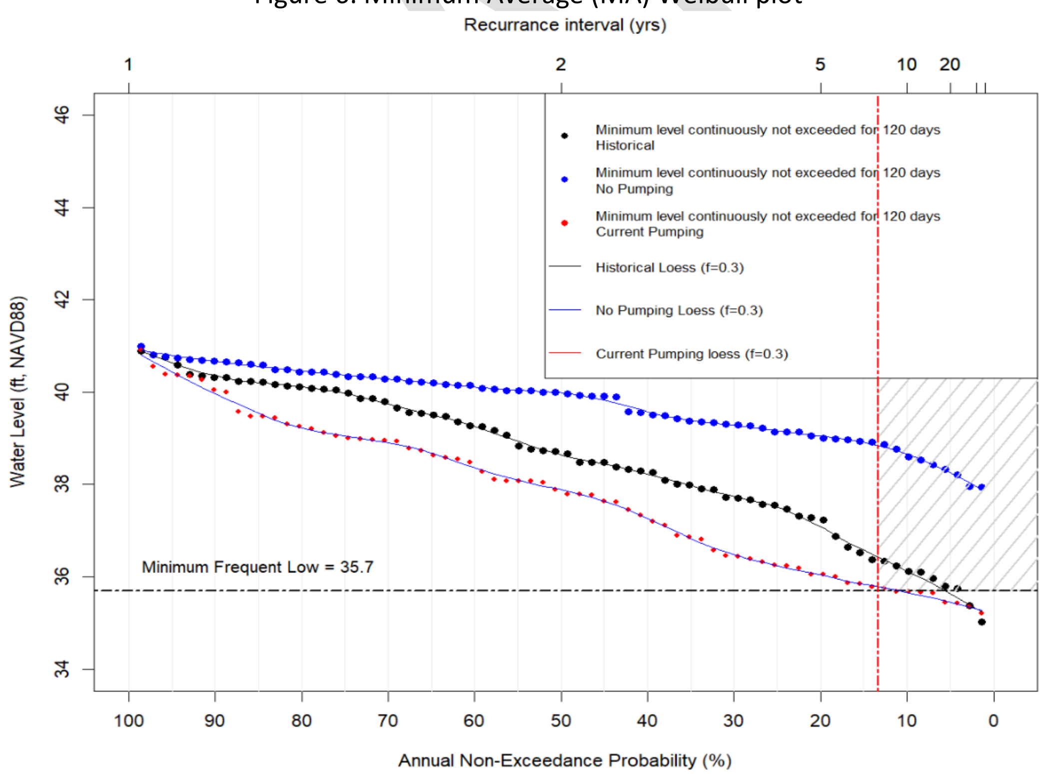


Figure 7. Minimum Frequent Low (FL) Weibull plot

Attachment B
Comment Table

Main Report

Page	Paragraph (P)	Comment
iv	3	Information is lacking in the main report "Recommended Minimum Level" section or appendixes that specifically describes how the recommended P50 lake level was calculated. Please see comment on page 33.
iv	3	The P50 historical level is proposed to facilitate water management. Insufficient justification based on environmental values has been provided to substantiate a single-valued MFL for a seepage lake such as Sylvan Lake. District designated it a sentinel lake to define long-term hydrologic and ecologic performance measures. By statute (62-40.473, F.S.), consideration "shall be given to natural seasonal fluctuations". Precedence (original Sylvan MFL and other lakes within SJR and other WMDs). Per District MFL evaluation criteria (CH2M 2003, pg. 12) and a conceptual hydrologic continuum of lake types (Mace 2015, pg. 4), both high and low water conditions are needed to maintain expected ecosystem structure and functions. Urbanization and climate changes will continue to affect lake hydrology in addition to groundwater use. The effects of groundwater withdrawals are expected to be most evident during drier conditions as illustrated in Appendix E Figure 1. The diverse SWIDS illustrated in Appendix C Figure 26 and associated wide range in event frequencies represents a large degree of uncertainty in the level of protection associated with the proposed FL. Similarly, the FH elevation is close to the hydrologic control (i.e., culvert) near the lake outlet, and the change in surface-water discharge to the next downstream lake (i.e., Yankee Lake) is non-consumptive use that could be evaluated. Consider adding the FL and possibly the FH or their associated stage exceedance frequencies to the proposed rule.
ix	"Event"	Consider adding "frequency" as the third component in the definition for consistency with Page 2, Neubauer et al. 2008 citation.
ix	significant harm	Consider adding or developing a definition of significant harm - defined on page 2 as impairment or loss of ecological structure (e.g., permanent downhill shift in plant communities) or function (e.g., insufficient fish reproduction or nursery habitat).
1	1	Add Hupalo (1997) to References Cited.
1	2	For consistency with Page 2, top paragraph, use the same reference to ERP (either Chapter 40C-4, F.A.C. or Chapter 62-330, F.A.C.).
2	4	Second sentence speaks to a condition that is lower than pre-withdrawal, but the free board is not relative to a pre-withdrawal condition, rather to the historical condition evaluated using SWIDS. Consider addressing the concept of baseline in this regard.
2	Last	Consider deleting "always" or somehow qualifying the statement. Chapter 40C-8 lists many systems with multiple "minimum surface water levels"; perhaps more recent additions to the rule (e.g., Lakes Butler and Lochloosa) reflect a different criterion.

4	Last	Consider adding that the box culvert is gated, and the outflow rate is estimated based on an inlet control nomograph (CDM Smith 2017, pg. 8). Also, who operates the structure, whether gate openings are recorded, and what other requirements (or ERP specific conditions) if any, are considered in the operating rule.
5	Figure 1	Consider expanding the map coverage to be more regional so that features noted on Page 4 (e.g., Sanford, Seminole County, Yankee Lake watershed) are evident.
6	Figure 2	Consider expanding the map coverage to include the entire HSPF modeling area (i.e., Yankee Lake watershed that includes the "direct" and "indirect" tributary areas described in the CDM Smith Letter Report). Also consider adding the key monitoring locations (2 climate stations, monitor well S-0178 near the lake, and lake stage measurement location) for later reference in the HYRDROLOGY section.
8	Figure 4	For clarity, consider adding a legend indicating units of measurement (e.g., depth in feet below elevation xx NAVD).
9	1	Reformat paragraph
9	HYDROLOGY section	For completeness, consider adding a subsection summarizing groundwater-level data.
9	2	Add reference to Appendix B. Also, add method was used to estimate PET.
9	Table 1	Consider adding period of record associated with statistics in caption or footnote.
9	2	Add reference to Appendix B and consider revising text or Figure 6 legend to refer to either "PET" or "Adjusted PET".
9	Table 2	Consider adding period of record associated with statistics in caption or footnote.
10	Figure 5	For context and reference later in the main report, consider adding horizontal line at elevation of the lake hydrologic control (culvert).
12	Tables 3 and 4	Consider adding a reference for the data sources.
17	Table 17	Revise caption to read "..TN, and TP numerical criteria….".

21	1	It is misleading to characterize the 3 event components as either biologically relevant or manageable, regardless of the District's methods paper. All 3 are biologically relevant. The point is that the District SOP is to evaluate a change in just the frequency component. When looking at a set of SWIDS (e.g., Appendix C, Figure 24), alternative management approaches could evaluate a change in duration for a prescribed frequency or a change in both duration and frequency. Consider re-phrasing sentences 2 and 3. For example, the wide range in the return intervals noted for many SWIDS plots may result from different soils associated with the same wetland type communities. Well drained soils may require 30 days inundation while poorly drained soils may only require 7 days inundation to achieve the same duration of saturation. I.e., the variability is in the duration not the frequency. Perhaps a way to reduce variability is to use wetlands associated with soils having similar drainage characteristics.
21	3	Systematic measurements of wetland flow and organic soils dating back to the early period of analysis are lacking. Consider deleting "stable" from the last sentence.
23	5	Here and in Appendix C, consider providing more discussion of the 14 "unique locations" including their location and similarity to Sylvan Lake.
23 and 24		In SJRWMD's Technical Publication SJ2015-1, Figure 1, page 4, is presented a continuum of lake types, from Wetland Lakes to Sandhill Lakes. Sylvan Lake appears to fit the descriptions for lakes close to the Wetland Lake description in Figure 1. It would seem appropriate to select other lakes for the SWIDS analyses which exhibit a similar location along this continuum. In other words, do not utilize sandhill lakes for comparative purposes.
24	2	Please clarify in 2nd sentence under "Importance of FH…." if short-term could instead be short-duration or frequent.
25		Same comment regarding selection of SWIDS lakes
26	4	Here and in Appendix C, consider providing more discussion of the 19 "unique locations" including their location and similarity to Sylvan Lake.
27		Same comment regarding selection of SWIDS lakes.
27	2	For consistency with Table 7, the FL frequency should be 13.3 years out of 100 years.
29	Last P	What is known about the operation of the control structure on Sylvan Lake? Which (if any) of the water level readings has been influenced by the raising or lowering of the structure? To what extent has structure operation affected the long-term stage hydrograph for the lake?
30	1	Please see Appendix B review comments and revise text in this section accordingly.
30 and 44	5	The narrative regarding stationarity and adaptive management is relevant. In sentence 3, consider adding temperature to the screening level analysis.

33	5	Insufficient information is provided in this section or Appendix D regarding how the "recommended minimum P50" (pg iv) was calculated. Consider adding more details including association with UFA freeboard and how an MFLs established for a single lake elevation maintains the fundamental shape of the lake stage-duration curve.
34	Table 8	Should RI for current pumping be 8.5?
36	general	Is there any requirement for the MFLs on Sylvan Lake or the ERP for the gated control structure to ensure that Yankee Lake (immediately downstream of Sylvan) does not suffer significant harm due to lack of inflow from Sylvan Lake?
38	4	WRV-5 - Please provide the basis for associating this WRV with protecting non-consumptive uses.
38	5	For accuracy, please clarify what "significant change" means in the 2nd sentence.
38-39		Recreation In and On the Water. There are somewhere between 50 and 60 docks on Sylvan Lake and its canals. Only 13 docks were measured for this analysis. None were located in the canals. How often will water levels fall to elevations where boats on the canals cannot get to the main lake? How many, if any docks on the lake will need to be extended to ensure adequate water depth for boats? There is a private community boat ramp on the lake. Will water levels fall to an elevation where the ramp becomes unsafe to use?
41 and 42		It appears that there is only one level being proposed to be set for Sylvan Lake. This approach appears inconsistent with the approach described in SJRWMD Technical Publication SAJ2015-1 (Mace 2015). In Figure 1, page 4 of that publication, lakes on the continuum that are closer to "Wetland Lakes" are recommended to have either 3-5 MFLs (for lakes closest to the "Wetland Lake" portion of the continuum), or 2-4 MFLs for the next closest category of lakes.
43	Figure 14	For accuracy, please clarify in figure caption and text at top of page 42 what time series the blue line is based on. Is it the time series of simulated current-condition lake stages?
42	general	Employing FH, MA, and FL elevations for Sylvan Lake will help ensure the protection of the water resource values that rely upon the higher water elevations (such as outflows to protect Yankee Lake) and the large number of WRVs that rely upon a "floor" (such as wetland health and recreation).
45	References Cited	Add the following references cited on the noted page: pg1 (Hupalo, 1997); pg 4 (CDM, 2017); pg 7 and 13 (SJRWMD, 2014); pg 8 (Seminole County, 2002); pg 16 (SSURGO, 2017)

APPENDIX B — HYDROLOGICAL ANALYSES

Page	Paragraph (P)	Comment
B-2	--	The overall approach for the Hydrological Analysis Process is generally valid and appropriate. Comments follow identifying items that would benefit from additional information and clarification.
B-2	--	The two computer programs HSPF and MODFLOW are appropriate for simulating surface- and groundwater hydrology and interaction. Both computer programs are industry standards, well documented, and widely used. The calibration and validation of Sylvan Lake watershed and vicinity using both programs have been calibrated, validated, and documented in peer-reviewed reports.
B-2	Figure B-1	Consider adding "lake" together with UFA in the "Freeboard/Deficit" description. Although the MFLs rule (Chapter 40C-8) lists lake levels, both water bodies are assessed.
B-3	--	For clarification, consider adding brief descriptions of the surface- and groundwater models (HSPF and MODFLOW, respectively) to this introductory section, i.e., salient points such as model area, computational time step, PERLND/grid-cell sizes, primary input and output variables, genesis, and peer review reference). Perhaps relocate the introductory paragraph under "SYLVAN LAKE LONG-TERM SIMULATIONS" section (page B-10). The HSPF model letter report attachment (CDM Smith, 2017) is helpful, and it should be pointed out that the 2017 update expanded the model area to the south (i.e., upgradient). However, similar to Appendix B, a description of the ECTFX groundwater model is lacking in the CDM Smith letter report.
B-4	Figure B-2	For clarification, consider 1) delineating the 3 primary HSPF basins (see CDM Smith Letter Report Figure 1); 2) adding the ECFTX model grid to support the additional narrative suggested in preceding comment; and 3) adding locations of the two climate stations and lake level monitoring location.
B-5	1 and 2	For clarification, add the time intervals for the collated rainfall and temperature data (e.g., daily) and the type of temperature data (e.g., daily maxima/minima, etc.). Also, check spelling of Hargreaves and Priestley.
B-5	2	To clarify validity, consider adding: 1) an explanation for why two methods (Hargreaves-Samani) and Priestley-Taylor were used, 2) what "scaled" in 2nd sentence means, and 3) table and/or graphic illustrating the mean Hargreaves-Samani vs. USGS PETs regression results. Add Hargreaves-Samani (1985) to References Cited.
B-5	Figure B-3	Is "Adjusted PET" the "scaled" PET mentioned in preceding paragraph?
B-6	Table B-2	For clarity, consider 1) revising caption to indicate period of analysis (e.g., 1948-2018); 2) adding population size (N) to list statistical parameters, and 3) rounding values to 3 significant digits.
B-6	Table B-4	Consider adding period of record (1978-2018) to caption for context.

B-6	1	For information purposes, please note that Dr. Emery during a field inspection on 2/25/21 noted at midday an approximate 0.15' difference between the lake stage at the staff gage (40.65') and the lake elevation at the hydrologic control (0.01' depth over outfall invert of 40.5' = 40.51').
B-7	1	Insufficient information is provided regarding the selection of well S-0178 as the "preferred" well and the analysis performed to determine "best" correlations between monitoring well water levels. Consider inserting additional description; define "best" or replace with "highest".
B-8	Figure B-5	To clarify perspective, consider adding: 1) Yankee Lake Basin / HSPF model boundary, 2) ECFTX model grid, 3) regional topographic contours (e.g., 10- or 25-foot interval), and 4) primary streams/rivers. The "central ridge" mention at bottom of page B-7 should be apparent in the topographic contours.
B-9	Table B-5	Suggest changing right-most column heading to Coefficient of Determination (R-squared) to reflect a regression statistic.
B-9	Figure B-6	Each X-Y plot illustrates what appears to be two populations of data: particularly for V-0101. Were these visually apparent differences examined? A step-function change in time series plots of trend-line residuals might indicate a shift in measurement datum or monitoring location. Breaks in double-mass plots might indicate the same. The differences may also reflect natural, transient conditions.
B-10	1	Consider adding the addition of "tributary areas" (direct and indirect) to this paragraph that describes HSPF model changes. Also, see comment on page B-3.
B-10	2	MOVE.3 is an appropriate statistical method and the SREF computer program is maintained and documented by the USGS, a reputable source. For completeness, consider explaining why a Line of Organic Correlation procedure (MOVE.3) was selected instead of other methods such as Ordinary Least Squares.
B-10	2	See comment on page B-7. In Sentence 2, correct the grammar "was used fill" and consider replacing "best" with "highest Coefficient of Determination". Note that the publication year in the USGS-suggested citation for Granato reference is 2009; revise citation accordingly and add (Granato, 2009) to Literature Cited.
B-11	Equation 1	This is an important equation, and insufficient information is provided to evaluate the validity of the equation. Consider adding goodness-of-fit statistics (similar to Table B-7) and/or X-Y plots (e.g., S-0718 observed vs. S-0178 predicted, residuals vs. predicted, residuals Cunane probability, etc.).
B-11	1	Did well OR-0047 have any missing record during the period July 2009-December 2018 that was infilled? If so, what equation was used? Also, in the 1st sentence, although the Sylvan UFA water levels were simulated for the entire period, they were "extended" from January 1948 to July 2009; consider revising text accordingly.

B-12	Figure B-8	Please clarify whether the line is composed entirely of synthesized daily values or a combination of synthesized (pre- July 2009) and observed (post- June 2009) S-0178 groundwater levels; modify caption accordingly.
B-12, B-13	Figures B-8 and B-9	For context, consider adding lines to both figures that illustrate the elevation of the lake hydrologic control (i.e., culvert invert); 40.8' NAVD88 pre-2014 (?) and 40.5' post.
B-12	1	Figure B-8 indicates three periods (circa 1948, 1953, 1959-60) when the synthesized near-lake groundwater level exceeded the hydrologic control and lake stage (Figure B-9). Consider checking for available anecdotal information of historic flooding (e.g., FEMA FIS) that could corroborate those estimated infrequent high ground-water levels.
B-13	1	For completeness and to support Table B-7, consider adding Figures 4 and 6 from the CDM Smith Letter report that compare simulated and observed stage frequency curves for the HSPF model calibration and validation periods. The figures illustrate reasonable fits over a wide range of observed stages and at the MFL determinations (FH, MA, and FL).
B-13	Table B-7	There are two apparent discrepancies in the table compared to values in CDM Smith Letter Report, last sentence on page 10: Mean Absolute Error of 0.73 feet in table vs. 0.5 in Letter Report; and Nash-Sutcliff Efficiency values of 0.71 and 0.72.
B-15	4	The overall approach for determining No-Pumping and Current-Pumping groundwater levels near the lake is valid, but the work description is incomplete.
B-16	1	Insufficient information is provided to support the assumption that most of the impact on Sylvan Lake has been caused by groundwater pumping within a buffer zone (Figure B-12) with a 10-mile radius. Although the buffer zone extends well beyond the HSPF model area (Yankee Lake Basin), the proximity of pumping stations to the lake and to regional topographic high and low areas is not evident. Suggestions are offered in the following comments on pages B-16, B-17, and B-18 that could support the assumption.
B-16	3	The sources of pumping data collated for analysis are reasonable, although it is not clear which counties water use data were collated for. Consider adding County boundaries and groundwater use "stations" to Figure B-12.
B-16	3	It is also unclear how the county water use data were disaggregated into discrete stations. Please consider adding more detail.
B-16	6	Sentence 1 implies Figure B-13 represents the combined total groundwater use in multiple counties, although the Figure B-13 caption refers to use in the "Sylvan Lake basin area". Please clarify whether Figure B-13 illustrates groundwater use within the 10-mile buffer zone and determine whether the text in last paragraph on page B-16 should read "these counties" or "buffer zone."

B-17	Figure B-12	Consider adding the feature noted in the preceding comment on page B-16/P3.
B-18	Figure B-13	Does graph depict groundwater use within the 10-mile buffer? To support the 10-mile assumption, consider adding bars for total use within several other areas, such as Yankee Lake Basin, and 5-mile radius. See preceding comment on page B-16/P6.
B-18	1	Although a reference is provided for this important method (ECFTX modeling), insufficient information is provided for the reader to comprehend the linkage of the GW-SW systems. Consider summarizing here, or in a background section (see preceding comment on page B-3), other salient model characteristics such as areal extent, grid-cell dimensions, layers/hydrogeological units, boundary conditions, surface-water hydrography elements and return flow near Sylvan Lake. For example, it is noteworthy that the 180-acre lake area is equivalent to about 5 model square-grid cells that are about 1/4-mile on a side.
B-18	1	The number and location of the grid cells used to calculate an average UFA head and proximity of near-lake monitoring well S-0718 to those cells is not disclosed in the report. Consider documenting the uncertainty of the simulated UFA heads beneath the lake for comparison with the 0.1-foot precision in lake and UFA freeboard considered in the MFLs status assessment (Appendix D).
B-18	1	Is Sylvan Lake and/or hydrologic control represented in the ECFTX model using the MODFLOW RIVER, LAKE, or DRAIN packages? If so, consider adding a description of how lake level is represented and whether the lake level varied over time or assumed pumping condition.
B-18	1	Two items. 1) In next-to-last sentence, what "flows" was ECFTX calibrated to? 2) Consider revising the last sentence; the 10-mile radius shown in Figure B-12 is the perimeter of a buffer zone within which UFA and LFA pumping was aggregated to build a pumping-drawdown relationship. As mentioned elsewhere, pumping within the entire ECFTX model area is considered in the 2013 initial-condition heads and withdrawals.
B-18	2	The historical impact analysis is based on a superposition approach (Reilly, T.E. and Harbauh, A.W., 2004, Guidelines for evaluating ground-water flow models, USGS SIR 2004-5038). Consider summarizing the characteristics of this application and site setting that support using superposition.

B-19	1	Insufficient information is provided to determine if the approach is accurate. More detail describing specifically how the pumps-off UFA heads were simulated is needed. The Groundwater Modeling section (page B-18) indicates the initial condition is the 2003 steady-state head distribution which is associated with about 41 MGD of UFA and LFA pumping within the 10-mile buffer and an undisclosed amount of pumping outside the 10-mile buffer zone (Figure B-13). Consider adding more description of how pumps-off heads were simulated and specifically whether just the withdrawal stations within the 10-mile buffer were zeroed or all withdrawal stations in the ECTFX model. Consider checking and illustrating the sensitivity of near-lake UFA heads to the buffer radius. A set of time-drawdown curves could be developed for a prescribed steady pumping rate (e.g., 1 MGD) and select buffer radii (e.g., 2, 5, and 10 miles). Each set of curves being based on 4 transient simulation; one for a single pumping station located north, east, south, and west at the prescribed radius. An alternative approach, such as water-balance analyses, could be used. Low sensitivity would support the assumption of a 10-mile buffer zone.
B-20	Figure B-14	Although the figure illustrates the linearity associated with the superposition approach, consider explaining why the y-intercept (0.08649) is not zero. It may be attributable to a difference between the average calibration period pumping (~43 MGD) and the 2003 initial conditions pumping (~41 MGD). Consider calculating the statistical significance of the intercept term and using a zero-intercept equation if appropriate.
B-21	Figure B-15	For clarity, consider modifying the caption to read "….impact of pumping in the 10-mile buffer area on UFA …."
B-22	Figures B-16 and B-17	For clarity, revise captions and/or Y-axis titles to indicate whether plotting points are daily or monthly values.
B-22	2	In last sentence, change "existing" to "historical" to conform with column heading in Table B-8.
B-23	Table B-8	For clarity, consider: 1) adding "daily" and period (e.g., 1948-2018) to caption; 2) adding population size (N) to table; 3) changing the 2nd parameter to "Standard Error of Mean". Lastly, consider limiting values to 3 significant digits (e.g., 39.9 instead of 39.87).
B-23	2	In 2nd sentence, change "60" years to "70" years and clarify "regional" to mean "within about 10 mile".
B-23	Literature Cited	Add Granato (2009) and Hargreaves-Samani (1985) to list.

Page	Line	Comment
3	15	There is a statement made that verification work was conducted in 2017, 208, and 2020. Cannot find any data from 2017.
7		The discussion of SWIDS begins. Based on the Neubauer et al., reference, it appears that the long-term historical data are used for the SWIDS analysis. Please confirm. If so, then the SWIDS analysis involves the association between stage that has been influenced by withdrawals since the 1980s and vegetation communities that also may have been influenced by the hydrology, but the degree of influence on vegetation is unknown. Consider discussing the appropriateness and uncertainty associated with using these SWIDS results for determining freeboard and setting MFLs. Another reference is (SJRWMD, 2006) St. Johns River Water Management District. 2006 (draft). Minimum flows and levels methods manual. G. B. Hall, C. P. Neubauer, and C. P. Robison, eds. Palatka, Fla.: St. Johns River Water Management District.
17	Figure 5	Water elevation is above control point. Most of the 20 soil samples collected would have been underwater. How were these collected?
21	general	Since many of the 20 + soil samples were underwater, how were these collected?
33	Figure 8	Water elevation is substantially above control point. Most of the 20 plus soil samples collected would have been underwater. How were these collected?
35	general	Since many of the 20 + soil samples were underwater, how were these collected?
44	Figure 10	Water elevation is substantially above control point. Most of the 20 plus soil samples collected would have been underwater. How were these collected?
46	general	Since many of the 20 + soil samples were underwater, how were these collected?
46	general	At the end of the description of the 2005 work, it appears that only 5 soil samples have been described for each transect, out of 20 plus total samples collected for each transect. But then, pages later, at least some of these other 2005 soil samples show up in a comparison with the 2018 and 2020 samples. The difficulty is that there is no table of these other 2005 samples to allow the reader to understand exactly which of these 2005 soil samples were used in the comparisons.
46	general	Overall, the descriptions of what was done in 2005 are well done. Figures 5, 8, and 10 are illustrative and summarize the efforts nicely.

47	general	In contrast to descriptions of the 2005 vegetation work, there is no elevation data or specific location data for each vegetation sampling point, or detailed species lists provided. Was the same transect methodology used as in 2005?
47	general	The description of the re-examination of the soils and vegetation in 2018 and 2020 begins here. These descriptions are not provided is as much detail as were the efforts from 2005. We do not have dates of the work, nor lake water levels on the dates, detailed lists of plant species for each of the new transects, photos of stations along transects, etc. Given that the decision was made to rely upon the 2018 and 2020 data to set the ML, it would seem that a more thorough description of the methods, dates, water levels, survey points, etc. is warranted (similar in detail to what was done in 2005).
47	last parag	The statement was made that the high water levels from the 2017 hurricane made it necessary to use different soil collection methods than were used in 2005. But water levels were also very high in 2005, with most soil sites underwater. How were most of those 60 plus soils collected in 2005?
47	general	Statements were made about the effects of the 2017 hurricane on 2018 sampling. There were 4 hurricanes that impacted the Sanford area in 2004, and which probably contributed to the high water levels on Sylvan Lake at the time of sampling in 2005. These hurricanes probably should also be mentioned.
48	general	A table for the organic soil probe data to allow comparison with the 60 plus soil samples from 2005 would be useful to help understand the comparisons. It is very difficult to figure out which subset of the 60 plus soils samples from 2005 were used to compare with the 2018 samples.
49	Figure 11	There are 2 blue dots from 2005. A table of all the soil samples from 2005 would be helpful.
49	Figure 11	This figure appears twice on the same page?
50	Figure	There are 23 blue dots representing soil information from 2005. A table of these soil samples would be useful.
51	Figure	There are 13 blue dots representing soil information from 2005. A table of these soil samples would be useful.
56	Table 11	Lists 8 peat corer samples while Figure 21 appears to show 9 peat corer dots?
57	general	In contrast to descriptions of the 2005 vegetation work, there is no elevation data or specific location data for each vegetation quadrat, or detailed species lists provided. Was the same transect approach used as in 2005?
57	para 6	A statement is made that wetland species were more consistent across transects in 2020 compared with 2005. However, there is no individual data from the 2020 transects presented to illustrate this.
57	general	There are multiple stands of cypress along the shoreline of the lake. Was consideration given to including this community type in a SWIDS analyses of wetlands?

57		It is mentioned that species composition is more consistent in 2020. Consider discussing how this might be related to the communities being better adapted to current conditions in 2020 than in 2005. Also, if SWIDS analysis is based on historical data, why was it necessary that additional field work be conducted "to ensure that elevations used for …FH…were based on current data"?
62		When were the vegetation data collected from the 14 lakes referenced for the SWIDS analysis and per an earlier comment 1, is the hydrology similarly impacted by groundwater withdrawals? Also, how similar are the hydrogeologic settings and where are the lakes located? A map would be informative.
62		The phrase "deemed appropriate" is used to justify selecting the 3rd quartile (dry side of median) rather than the driest signature RI implying two considerations: 1. that the driest is the default metric for setting MFLs, and 2. the appropriate RI is subject is a management decision bounded by science. The third quartile or the driest may be appropriate but consider discussing if it is appropriate to use the drier RI if the hydrologic record and vegetation communities are already influenced by withdrawals.
63	Figure 24	At least some of the lakes used in Figure 24 are xeric sandhill lakes. Sylvan Lake is not. Sylvan Lake has extensive wetlands, including many cypress, and deep organic soils. Sylvan Lake is located less than 1.8 miles from the Wekiva River. Would it be more appropriate to remove the xeric sandhill lakes from this SWIDS analysis?
63	Figure 24	Consider a table that highlights the range of RIs (and or probability exceedance). A measure of variability/uncertainty might be the interquartile range divided by the median. An interesting inference with the SWIDS method for selecting the RI is that the greater the variability in the results the further the selected RI is from the median. Consider adding to the discussion of uncertainty. Based on visual examination, the exceedance ranges from 95 % to about 15% or about every year to every 7 years. In this and the next two figures, it would be interesting to see the equivalent Sylvan Lake plot.
64		Similar to the FH comment, but in this case the MA metric is the max (driest) condition of the 19 lakes analyzed. Is this justified given the broad range of exceedance range.
66	Figure 25	Same question concerning xeric sandhill lakes.
66	Figure 25	Similar question comment as Figure 24. Also, consider providing an explanation for the apparent wetness of these cross-section elevations at the hydrologic signature stages.

68	Figure 26	Same question concerning xeric sandhill lakes Note: In the SJRWMD's Technical Publication SJ2015-1, on page 4, Figure 1 illustrates the continuum from wetland lakes to sandhill lakes. Selecting SWIDS lakes within the same point along this continuum would help ensure a comparison of similar lakes.
63-68	3 Figures	Where on these figures would Sylvan Lake be located?
68	Figure 26	Same as other events. The range of RIs is great (2 to 35 years), although the interquartile is more "manageable" at 13.3 to 17 years. Also, consider adding the Sylvan Lake SWIDS for FL lake level for comparison with the other 14 SWIDS. Also consider discussing the inclusion of certain SWIDS (e.g., Swan in Figure 26) that are distinctly different than the other SWIDS.

APPENDIX D — MFLS STATUS ASSESSMENT

Page	Paragraph	Comment
1-new	1st and last	Consider deleting reference to UFA freeboard on this page and limit the discussion to lake freeboard. A 1-to-1 association between lake and freeboard is inferred, which may be true for such a small difference. The UFA freeboard calculation and its association with lake freeboard is described on the following page 9.
2	3	The event frequency analyses are described as being based on '"water year" period data; however, this is the first reference to water year in the report. Consider noting the annual period in the main report and revising Appendix D accordingly.
3	Figure 1	Consider including the Weibull plots of other scenarios for each of the three events. It is understood that the MFL scenario is very near the current condition although it is not so clear how an MFL based only on the median will result in a Weibull plot that aligns with the current condition. It also seems relevant to put the MFL in context with the historical and no-pumping scenario events of the same magnitude and duration. Figure 1 in Appendices E provides some insight into the magnitude of the change that has occurred from a no-pumping condition (pre 1970s) to the period of record condition and then to the MFL and current condition. It is expected that including these Weibull plots will generate some additional discussion. Given the amount of development that has occurred around the lake, using the historical condition (i.e., the data sets used in the SWIDS analysis and the Sylvan Lake events that implicitly have pumping impacts) as the basis of establishing the MFL seems appropriate. This may not be the case in less disturbed environments that also are experiencing impacts from withdrawals.
8	Table 1	Consider adding here and or in Table 2, the associated return intervals of other scenarios (no pumping and historical).
9	Table 2	Same as above.

Page	Line	Comment
2		WRV-5. The interpretation of this value being specific to the protection of non-consumptive use is new to this reviewer, although it is noted in the Silver River MFL report. If this interpretation is correct, then it is a completely redundant value. Others have interpreted it to mean other existing users, but admittedly whatever interpretation is used, I have never observed it evaluated. Perhaps a metric associated with the potential change in hydration of Yankee Lake downstream from Sylvan would be useful for WRV-5. That could be accomplished using the hydrologic control invert elevation exceedance frequency.
4	Group 2	Consider evaluating a 15% reduction in shallow and deep marsh habitats under the no-pumping and MFL scenarios.
5	Figure 1	Based on the MFLs condition and no-pumping condition plots, it would be a surprise if any of the MFL events would have occurred under the no-pump condition. The recommended minimum level of 38 ft (at the median current condition) was exceeded about 97% of the time under no-pumping. Similarly, the frequent low of 35.7 ft would never have occurred, the minimum average elevation of 37.9 ft would have been exceeded 98% of the time, so it is very unlikely that an average 180 non-exceedance event would have occurred, and the 40.2 ft FH magnitude would have been exceeded about 44% vs 10% of the time under the MFL condition. A 30-day FH event would have occurred nearly every year under no-pumping condition. It is understood that the MFLs are set by the SJRWMD based on site specific data for the magnitude, literature values for the duration, and a combination of SWIDS evaluation using data for lakes in the region supported by literature for the return interval. However, the site-specific data developed for this study would indicate that a no-pumping condition is substantially different than either the conditions recently observed at the site (last 15 years) and the other lakes used as reference lakes for the SWIDS evaluation.
7		Note that the recreation metric is for boat draft and the stage has always been greater than the limiting stage making this not a good choice for a metric to evaluate. Many boats are kept on a cradle lift which adds another foot or so to stage needed (Figure 4). Was a survey of homeowners performed to get a read on boat access and use of boat lifts and the private community boat ramp?
7 and 8		None of the docks within the canals were evaluated. There are between 50 and 60 docks total. Measuring only 13 does not seem adequate. Access into and out of the canals may be problematic at low water.

7 and 8		There is no mention of the private community boat ramp located on the lake. Will the safe use of this ramp be negatively impacted by the low water conditions?
8		What is meant by mean "waterward" lake bottom elevation? Is this the elevation at the end of the dock? If so, consider previous comment regarding cradle lifts.
9		Per earlier comment, consider evaluating a 15% reduction in shallow and deep marsh habitat area under the no-pumping and MFL scenarios. This would require a minimum depth criterion perhaps related to the FL.