SJRWMD Initial Responses to Peer Review and Stakeholder Comments Regarding Draft MFLs for Lake Prevatt, Orange County, Florida

5/15/2025

Introduction

Independent scientific peer review was conducted for the draft Lake Prevatt MFLs Report by Phil Burkhalter, PE, PhD, a Senior Water Resources Engineer with Trihydro and Travis Richardson, CPSS, MS, president and owner of T. Richardson Soils and Environmental. Peer review comments on environmental criteria, minimum levels, and hydrological data analyses were based on review of the following documents:

Shadik, C. R., E. Revuelta, A. B. Sutherland, A. Karama, H. N. Capps Herron, and S. Fox. 2025. Minimum Levels Reevaluation for Lake Prevatt, Orange County, Florida. Draft Report. Bureau of Water Supply Planning, SJRWMD.

Appendix B: Hydrological Analyses;

Appendix C: Environmental Methods, Data, and Metrics;

Appendix D: MFLs Status Assessment;

Appendix E: Water Resource Values (WRVs) Assessment; and

Appendix F: Topobathymetric DEM Development

This preliminary resolution document provides SJRWMD responses to comments of larger concern submitted by the peer reviewers on April 10, 2025 in the initial findings teleconference presentation. In addition to comments submitted by the peer reviewers, several comments were also submitted by members of the general public. Some are addressed in this document as well. All peer review and stakeholder comments will be addressed in the final resolution document.

Peer Reviewer Comments / Recommendations:

Slide 12 of peer reviewers' initial findings presentation (T. Richardson)

In reference to page 16, Lake Level Datasets for MFL Analysis section of Appendix B: Hydrological Analysis

Figures B-12 and B-13: Because of the drastic visual difference in the pre/post +/- 1980 stage it seems that an analysis of rainfall plotted with lake levels should be presented either here or in the MFLs status assessment. (e.g., 2 yr, 3yr, 4yr moving average of annual rainfall plotted with lake levels, cumulative rainfall assessment, double mass, water budget to show that rainfall and PET are dominant factors over downward leakance, or other appropriate analysis). This is a concern of the peer reviewers and was a public comment.

SJRWMD Response:

Responses to address comments regarding trends pre/post 1980s in Lake Prevatt water levels are based on data from the south lobe (Figure B-13). This ensures the full range of lake fluctuation is considered. Visual differences in water levels pre- and post- 1980 can be attributed to a combination of multiple factors.

The first factor that seems to be contributing to a pre/post 1980 shift in Lake Prevatt hydrology is the overall decrease in rainfall. As requested by the peer reviewers, Figure 1 displays moving averages of rainfall, from the Isle-Win station and NEXRAD combined record (Sarker et al. 2024), at various time scales with no-pumping and current-pumping Lake Prevatt water levels. While no full-record trends are visible, shorter-length trends do seem to be present. Most notable are the shorter length (6-month) peaks and troughs in rainfall preceding high or low water levels. Throughout the record, decreasing wet season rainfall for multiple years (3-5 years) precede dry events, and wet events seem to be preceded by relatively wetter dry seasons or immediate wet events (storm events; Figure 1). The longer-term trends (1-year and above) are more difficult to visualize due to the small scale of average daily rainfall.

To determine relative drought or wet events on longer time scales, the Standard Precipitation Index (SPI) can be used. SPI is a widely used index for drought assessment based on accumulated rainfall for a given period compared with the long-term average of the same period (McKee et al. 1993). The SPI allows for the evaluation of localized drought by using locally-derived rainfall data rather than larger scale climatic indices.

The SPI values compared with Lake Prevatt water levels in Figure 2 display relative drought conditions in red and wet conditions in blue on a 5-year (60-month) scale. The 5-year scale for SPI was chosen as it is generally a good representation of relative wet/dry periods within the 3 to 7 year El Niño Southern Oscillation (ENSO) climate cycle (Kuss et al. 2014; Kirtman et al 2017). When comparing normalized, accumulated rainfall around Lake Prevatt with lake water levels, more pronounced rainfall trends become apparent. Lower, more pronounced, dry season lake level drawdowns began in the late 1970s and early 1980s with the presence of higher intensity and longer lasting droughts. Between the early 1990s and early 2000s, more prolonged periods of lake level drawdown occurred with the longest and most intense drought periods within the period of record. Equivalent increases in lake level with wet periods did not occur because the lake outflow elevation of 55.6 NAVD88 does not allow for long-term storage above that elevation.

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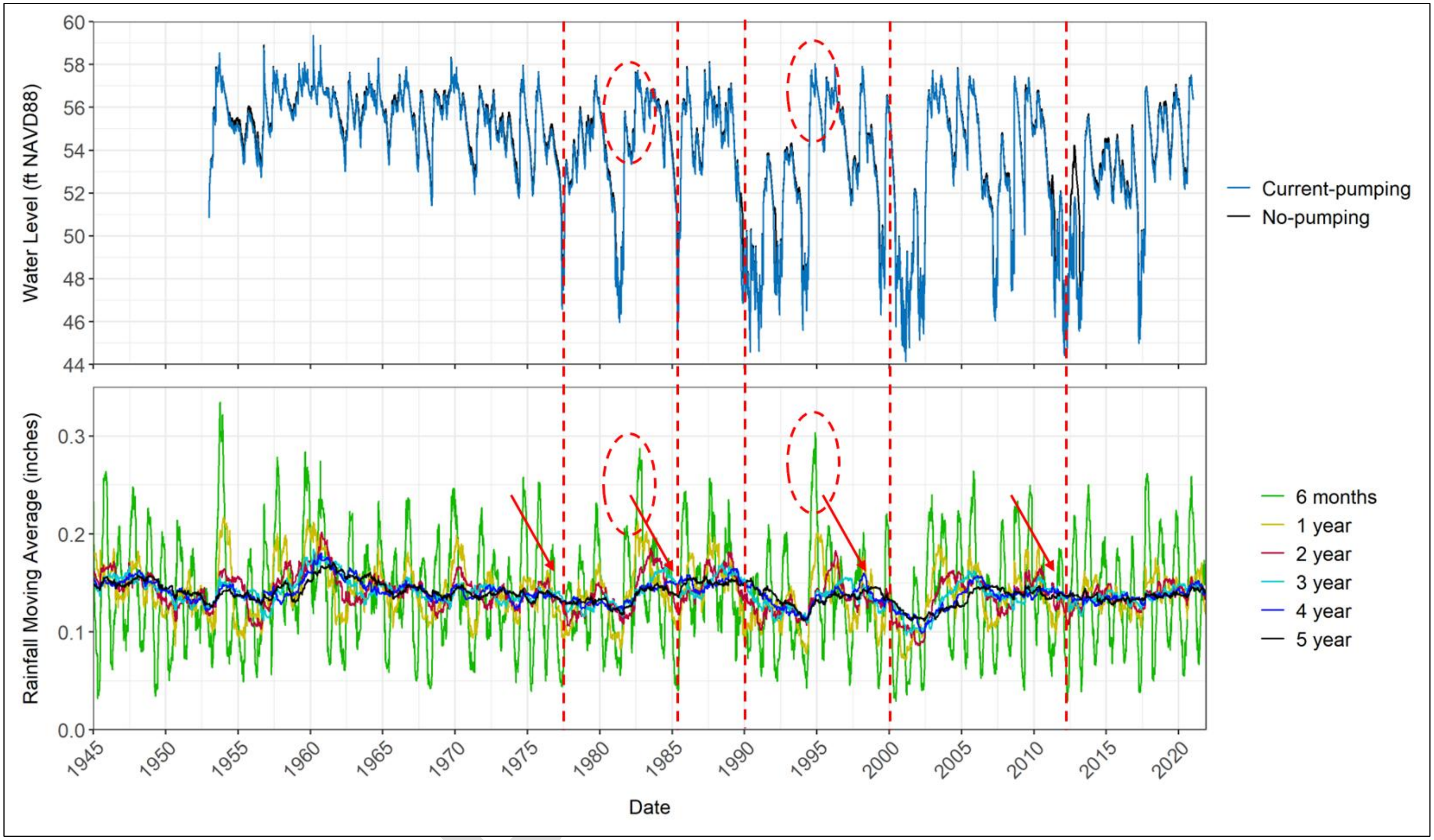

Figure 1: Lake Prevatt current-pumping and no-pumping condition lake level stages (top panel) with moving averages of daily rainfall compiled from the Isle-win station (pre-1995) and NEXRAD data (post-1995) used in the development of the Lake Prevatt surface water model (bottom panel; Sarker et al. 2024). Ovals show examples of immediate water level response to large rainfall events, dotted lines designate dry event examples, and arrows designated decreasing wet season rainfall preceding dotted line events.

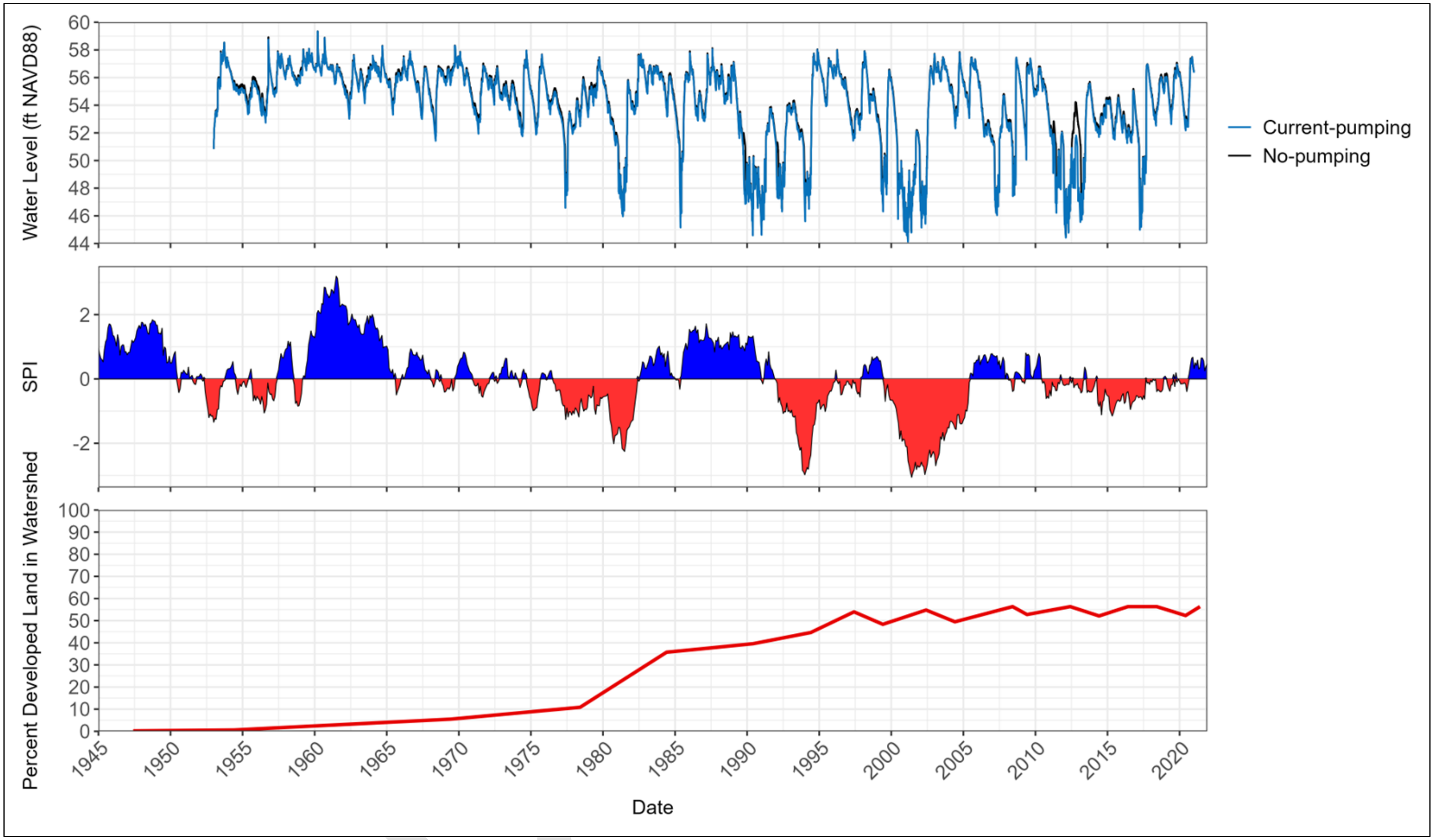

Figure 2: Lake Prevatt current-pumping and no-pumping condition lake level stages (top panel) with 5-year SPI (middle panel), and percent developed land within the watershed (bottom panel). SPI was calculated from the Isle-win station (pre-1995) and NEXRAD rainfall data (post-1995) used in the development of the Lake Prevatt surface water model (Sarker et al. 2024). Percent developed land within the watershed was compiled from digitized historical aerial imagery and FLUCCS data. Oscillations between 1997-2022 are a result of FLUCCS data classifying stormwater ponds as water vs digitized aerial imagery including stormwater ponds in developed area.

The influence of SPI on water levels (pre- and post- 1980) was statistically analyzed using a Generalized Linear Model (GLM) with pre- or post-1980 as a factor. Figure 3 displays the trend between SPI with Lake Prevatt historical water levels pre- and post-1980. Historical levels were used in this analysis to incorporate any changes in pumping that would have occurred through time. If there were no significant difference between SPI pre- and post-1980 and a significant difference in the slope of SPI influence pre- and post-1980, this would suggest that variables other than climate (e.g., pumping or land use change) might explain water level trends. The results of the GLM suggest a significant relationship between pre-1980 5-year SPI and water levels ($p < 0.05$; Table 1). The post-1980 water levels are statistically different than pre-1980; the trendline of the post-1980 relationship has an intercept 1.98 ft lower than pre-1980 levels. There was no significant difference in the slopes of the pre- and post-1980 lines (parallel lines, $p > 0.05$) suggesting that there was the same significant influence of SPI throughout the period of record. Shifting SPI (drought/rainfall) directly influenced water levels. The distribution of the SPI values pre- and post- 1980 can be further visualized in Figure 4.

These analyses suggest that climate (rainfall surplus vs deficit) are, at least in part, related to the pre/post-1980 shift in water levels at Lake Prevatt. Cumulative years of below-average rainfall are much more prevalent after the late 1970s/early 1980s (Figure 2). This drying of the landscape contributes to both declines in surface water inflows and reduced recharge to groundwater, which can partially explain the difference in mean water levels and fluctuation pre- vs post-1980.

Table 1: Output from the Generalized Linear Model (GLM) of the 5-year SPI and Lake Prevatt water levels with a factor level of pre- and post- 1980.

Effect	Estimate	Std. Error	t-value	p-value	Interpretation
Intercept	55.29	0.15	379.56	$< 2e^{-16}$	The y-intercept of the pre-1980 trend is significant
5-year SPI	0.69	0.14	4.89	$1.35e^{-6}$	SPI pre-1980 is significantly and positively related to water levels with a slope of 0.69
Post-1980	-1.98	0.19	-10.58	$< 2e^{-16}$	The post-1980 y-intercept is significant and is 1.98 ft lower than the pre-1980 trendline
5-year SPI : Post-1980	0.11	0.18	0.65	0.519	The relationship of post-1980 5-year SPI and water levels has a slope 0.11 greater than the pre-1980 relationship, but it is **not** significantly different than the pre-1980 relationship.

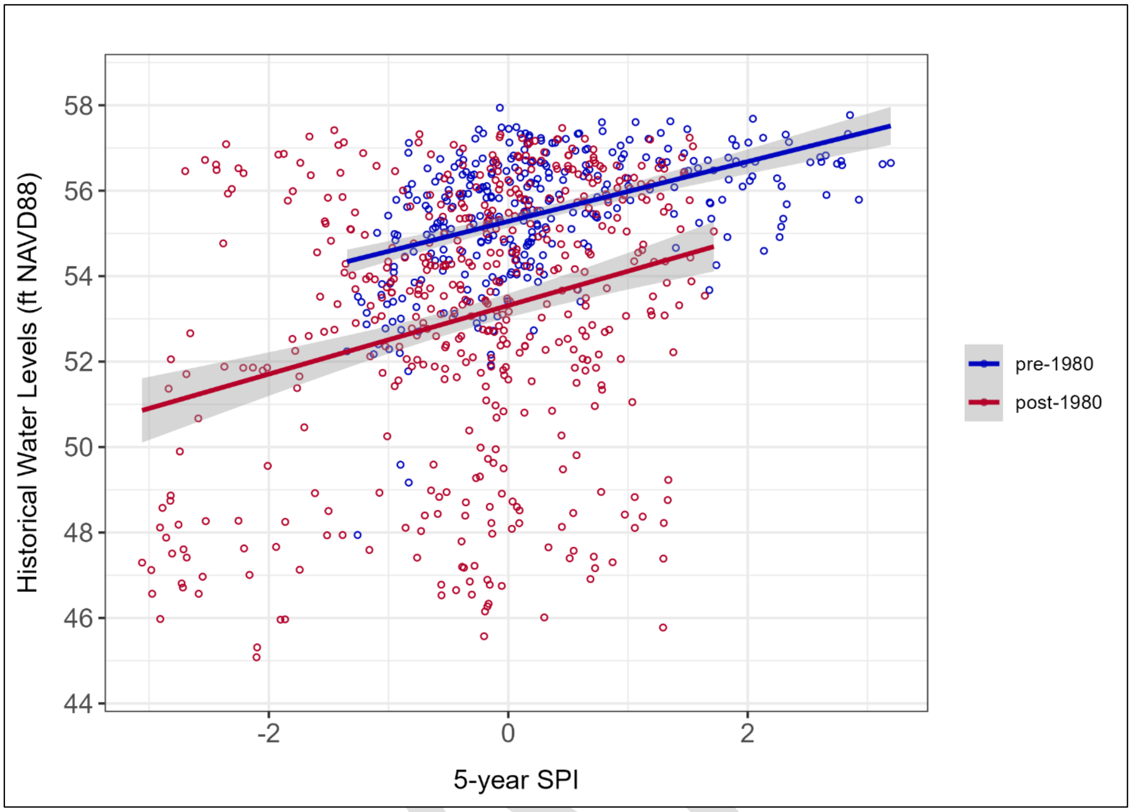

Figure 3: Lake Prevatt historical condition lake level stages in response to the 5-year SPI in the pre-1980 (blue dots) and post-1980 (red dots) record. Linear regression lines are displayed for both data sets in their respective colors. The 95% confidence intervals are displayed in gray around each line.

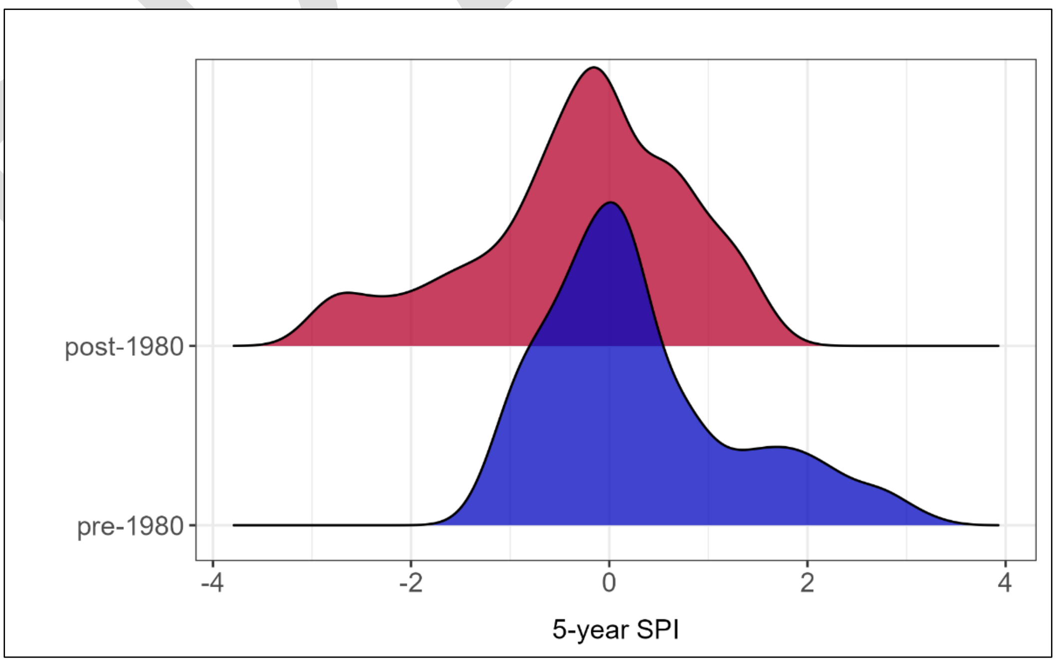

Figure 4: Density plots of pre-1980 SPI values (blue) and post-1980 SPI values (red) influencing Lake Prevatt water levels. Note the presence of major drought values and absence of major wet values post-1980 as compared to pre-1980.

Factors other than climate and pumping are known to alter surface water hydrology. Shifts in land use/land cover and increases in impervious surface % are known to change storage and runoff dynamics and thereby alter average water levels and water level fluctuation in lakes (van der Kamp et al. 2008; Engel et al. 2015; McGrane 2016). The potential role of land cover change in the pre/post-1980 water level shift at Lake Prevatt was evaluated.

Percent developed land within the Lake Prevatt watershed was analyzed using available historical areal imagery from UF and FDOT and available Florida Land Use Land Classification Code System (FLUCCS) data. The area of developed land within the watershed increased from 10.8% in 1978 to 35.7% in 1984 (Figure 5). Modern levels of developed land within the watershed were reached by 2008 (56.3%). The result of this rapidly urbanizing landscape is an increase in percent impervious surface cover and changes in the way water reaches (or does not reach) Lake Prevatt. With the installation of stormwater systems, water is held in stormwater ponds until enough rainfall allows for the release of water over control structures. This could result in reduced overall baseflow from smaller rainfall events, and larger spikes in flow (quicker water level rise) after storm events. This transition from a more stable to a flashier system, due to increased urbanization and impervious surface %, is well documented in flowing systems (Hollis 1975; Dunne and Leopold 1978; Paul and Meyer 2001; Gordon et al. 2004; Ganon et al. 2022). In areas where the amount of impervious surface within a catchment increases from 10 to 20%, runoff increases twofold; an increase from 30 to 50% increases runoff threefold (Arnold and Gibbons 1996; Paul and Meyer 2001). The reduction in baseflow, common in urbanized watersheds (Klein 1979), could be reducing the regular influx of water to Lake Prevatt outside of storm events, exacerbating drought conditions.

The water budget for Lake Prevatt was analyzed as part of the HSPF modeling process (Sarker et al. 2024). Groundwater loss to the UFA makes up the majority of lake water loss. Leakance parameters for the South Lobe change from 0.002 when water levels are above 51 ft (elevation of lobe connection) to 0.025 when water levels are below 51 ft. As is seen in other moderately connected lakes, leakance at Lake Prevatt is higher at lower stage elevations. This characteristic of the lake is accounted for in the surface water model.

The elevation of lobe connection (51 ft NAVD88) is also important for water flow between the two lobes of Lake Prevatt. When lake levels are above 51 ft NAVD88, water flows from the north lobe into the south lobe. Therefore, during wet periods, the drainage basin of the south lobe is composed of both yellow polygons shown in Figure 5. During dry periods, the effective drainage basin of the south lobe is reduced from the entire watershed to the southeast subwatershed of Figure 5. The pronounced increase in lake level fluctuation can therefore be partially attributed to the interaction of long-term rainfall with basin morphology. The trend of larger lake level fluctuations in the lower-lying south lobe of Prevatt during dry phases has also been observed in lakes cut off from the flow of other nearby lakes. In areas where drought changes the effective watershed area of a lake (from flow disconnection), water declines faster because water loss in the lake becomes larger than can be supported by the inflow of a smaller watershed area (van der Kamp et al. 2008).

SJRWMD staff understand that there is a concern from peer reviewers and stakeholders regarding the post-1980 lower water levels at Lake Prevatt especially given the small average difference between the NP and CP conditions. It should be noted, however, that the seemingly small difference between the NP and CP conditions, described in previous public meetings and the Lake Prevatt draft report, is only relative to the average. Larger differences between the two conditions do exist but only during periods of large UFA drawdown. Figure 6 gives an example of one such event where there is a 5.5 ft difference in the NP and CP conditions in the lake. While the impact value remains the same between the NP and CP UFA conditions, the effect of this drawdown becomes more pronounced in the lake at UFA elevations below about 39 ft NAVD88 and when leakance values (previously described) are higher with lake stages < 51 ft NAVD88. Multiple large drawdown events occur throughout the period of record, but on average, the difference between NP and CP conditions is small.

It is understandable that the pre/post-1980 shift in the Lake Prevatt hydrograph would cause concern about the potential impact of groundwater withdrawal on this lake. However, it is important to note the considerable work that goes into determining the relative contribution of pumping versus climate (and other factors) on MFLs systems. The ECFTX v. 2.0 groundwater model used for the Lake Prevatt impact assessment is extremely complex, bringing together numerous types of data (e.g., hydrological, hydrogeological, meteorological, landcover, soils, bathymetry, water use, etc) over large spatial and temporal scales. The ECFTX is based on best available data and extensive effort from multiple agencies. The Central Florida Water Initiative (CFWI) required the input of agencies including South Florida Water Management District (SFWMD), SJRWMD, Southwest Florida Water Management District (SWFWMD), Florida Department of Agriculture and Consumer Services (FDACS), Florida Department of Environmental Protection (FDEP), public supply utilities, and other interested parties and stakeholders in the creation of the ECFTX model. Eight separate working groups, to oversee various aspects of the groundwater model, were created to ensure collaboration employed expertise where needed. Version 2.0 of the ECFTX model was recalibrated specifically for the Wekiva River springs contributing basin and Seminole County. Therefore, the District feels confident that the impact analysis developed for this system using the ECFTX v. 2.0 represents our best understanding of the role of pumping on Lake Prevatt.

The analyses described above strongly suggest that the pre/post-1980 shift in stage fluctuations at Lake Prevatt are a result of climatic influence and watershed development. It is important to note that the NP condition is not meant to represent a system with no anthropogenic influence, only no-pumping influence. It is very likely that human-induced changes in watershed imperviousness, storage, and runoff have altered the hydrology at Lake Prevatt. When combined with the dramatic increase in deficit rainfall (post vs pre-1980; Figure 2), it is reasonable to conclude that these changes have contributed to the observed water levels at Lake Prevatt. It is also important to note that MFLs are not meant to restore systems to a pre-anthropogenic condition but prevent significant harm due to groundwater pumping. Other alterations due to anthropogenic, climatic, or other changes are possible, but cannot be addressed by the MFL.

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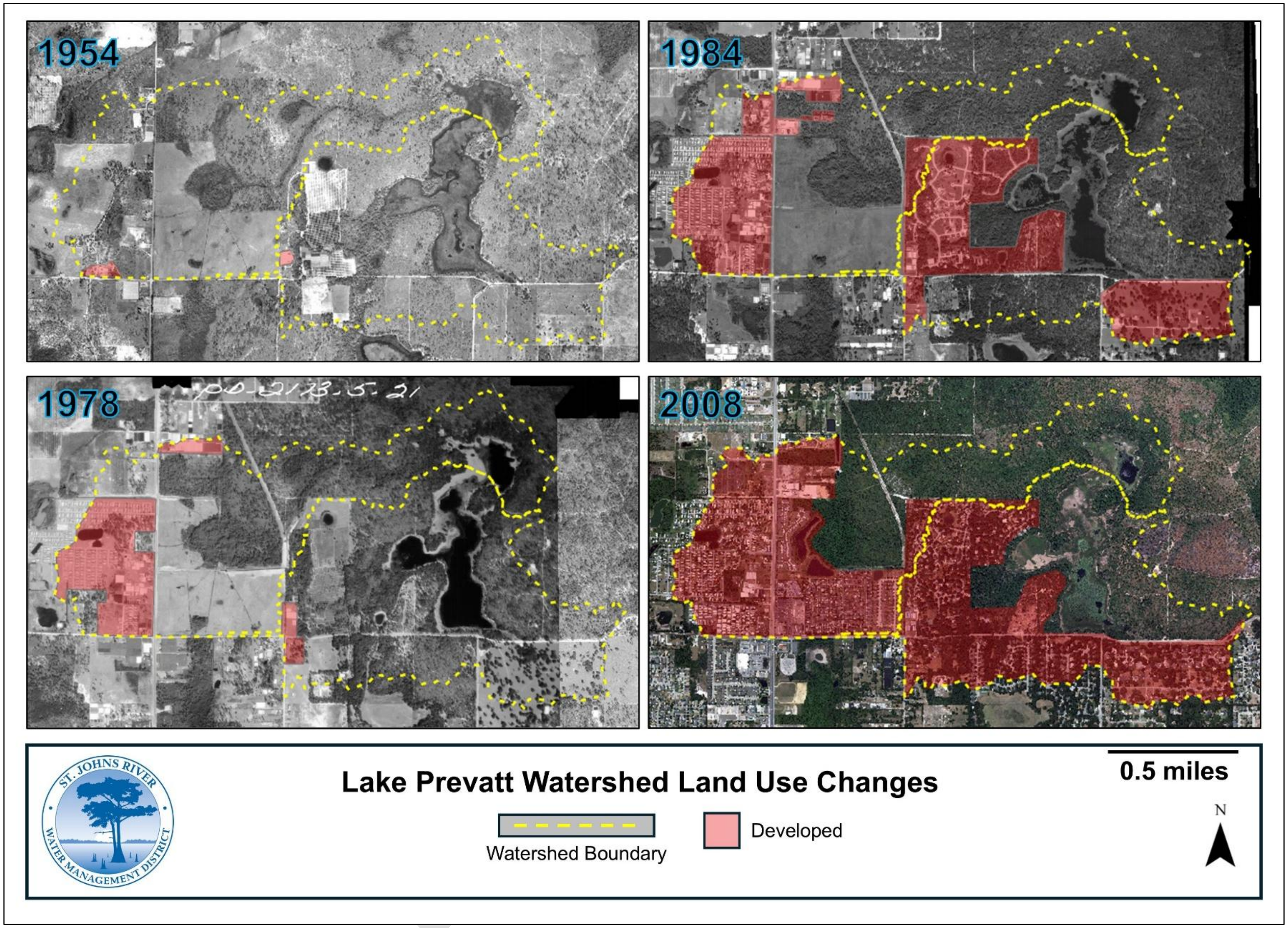

Figure 5: Developed (red shaded, mostly impervious) area within the Lake Prevatt watershed at 1954, 1978, 1984, and 2008.

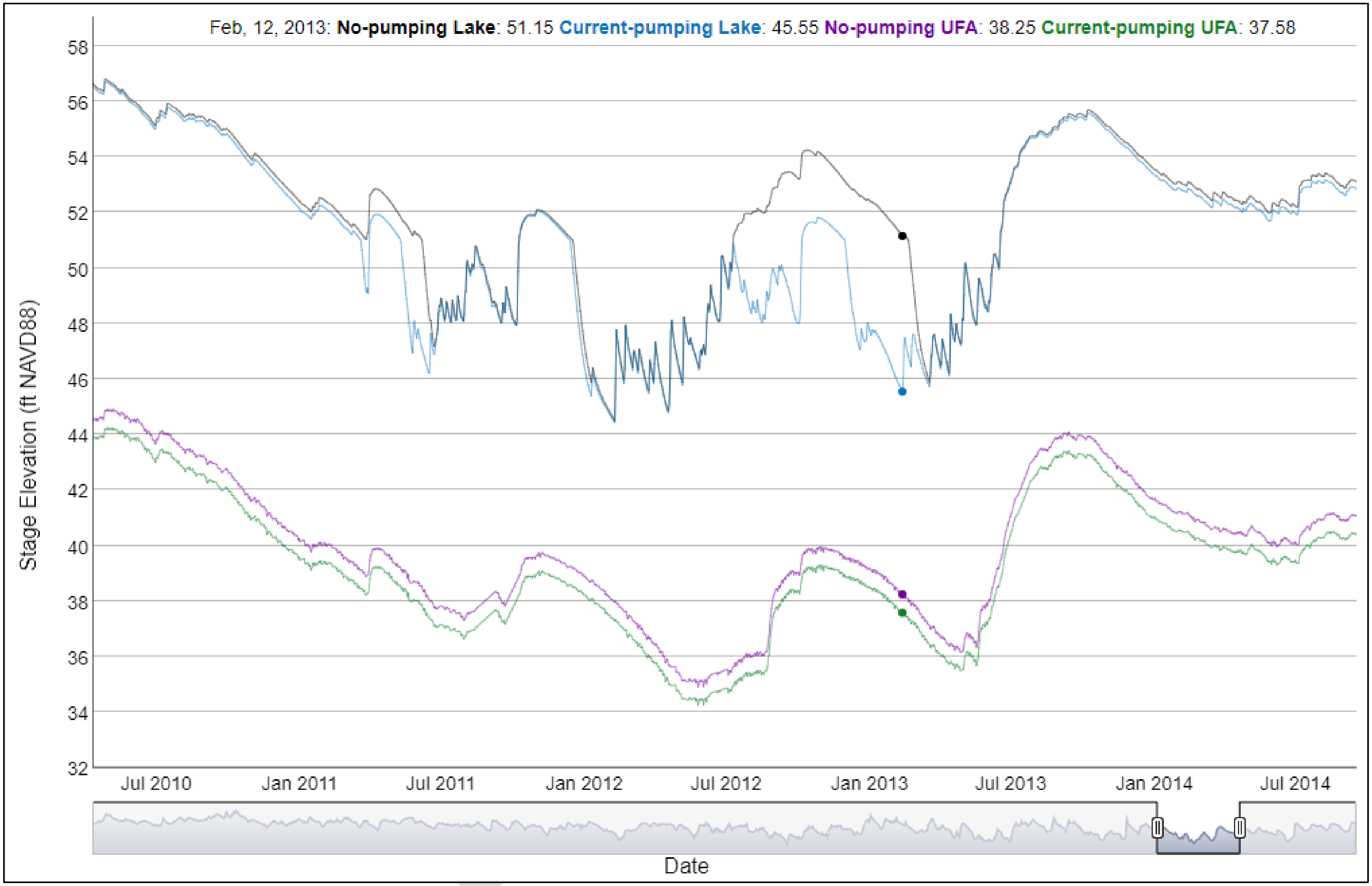

Figure 6: Lake Prevatt lake NP (black) and CP (blue) conditions with UFA NP (purple) and CP (green) conditions from July 2010 through July 2014. Stage elevations for February 12, 2013 (within a drought period) are shown at the top of the panel.

Slide 14 of peer reviewers' initial findings presentation (T. Richardson)

In reference to page 13-64, Transect Data section of Appendix C: Environmental Methods, Data, and Metrics

General Notes for future comments/discussion: comparisons using same datum: Min elevation of Mesic Hammock (current data 0.2, 2.2, 0.6 higher than 1997); Max shrub swamp (current data 1.5', 1.6', 1.9' lower than 1997 data); 0.5" muck (current data 1.25' and 1' lower than 1997 and T3 is 0.2' higher than 1997), Note for future discussion - CFWI wetland boundary (57.24, 58.12, 57.34) – 62-340 FAC wetland boundary is within Mesic Hammock on two transects; CFWI - half inch muck (54.5, 54.54, 54.53)

SJRWMD Response:

As previously described, many changes occurred in the Lake Prevatt watershed in the 25 years between the original and current MFLs data collection. Any changes in environmental data may be due to climatic or anthropogenic changes that have occurred within the past 25 years. In addition to the time elapsed, comparison of the 1997 MFL data with current MFL transects is obscure due to the way vegetation data were collected in the original MFL. The designation of original communities was not linked to vegetation abundance in the way current data are. Therefore, the comparison of communities here is a best approximation of which communities would be comparable from the 1997 report to present.

<u>Comparison of the minimum elevation of the Mesic Hammock communities (Live Oak Hammock in 1997 to current Mesic Hammock)</u>

The minimum elevations of the present Mesic Hammock community do appear higher than they were in 1997. The most comparable modern transect to the 1997 data would be T2, as it was placed in a similar area to the 1997 transect on the south side of the lake. Hupalo (1997) did not designate which plant species, besides live oak, are present in the Mesic Hammock. From wetland plant codes and previous knowledge of the area, these species are assumed to be at least live oak, shiny blueberry, saw palmetto, American holly, and inkberry. Vegetation in the Mesic Hammock of T2 is similar to that of the 1997 MFLs transect and can likely be compared. It should be noted that exact locations of transects from early MFLs cannot be directly replicated (generally working from drawings); therefore, transect locations may be close, but not exact and suggests the necessity for a reevaluation.

One possible explanation, for the lower minimum elevation of the Mesic Hammock community in 1997, is that the transects were likely in slightly different locations and therefore likely started at different elevations. The minimum elevation of the Mesic Hammock on T2 established in 2022 was 58.2 ft NAVD88 whereas the maximum elevation of the 1997 Live Oak Hammock was 57.2 ft NAVD88. This suggests that the current T2 Mesic Hammock Community began higher in the landscape.

When comparing minimum elevations of these communities, the modern MFL has an additional Transition Zone directly below the Mesic Hammock not defined in 1997. This could be due to the actual absence of a Transition Zone or a difference in the way previous staff collected vegetation data from current staff (lumpers vs splitters). The vegetation in the Transition Zone of 2022 is more comparable to the 1997 Live Oak Hammock than the Shoreline community (described as having wax myrtle, Baccharis, and inkberry).

Without direct specification of which species were included in the 1997 Live Oak Hammock community, it is unknown whether the 1997 Live Oak Hammock would be directly comparable to the Mesic Hammock or a combination of upper communities together from either 1997 or 2022. Table 2 below compares these elevations.

Table 2: Comparison of Live Oak Hammock (Hupalo 1997) and 2022 Mesic Hammock and Transition Zone elevations.

Elevation (ft NAVD88)	1997 Live Oak Hammock	1997 Live Oak Hammock + Shoreline	2022 Mesic Hammock	2022 Mesic Hammock + Transition Zone
Minimum	56.0	55.0	58.2	54.3
Maximum	57.2	57.2	*60.5	*60.5
Mean	56.6	56.0	*59.0	*57.2
Median	56.6	56.0	*58.8	*57.1

*Provided for comparison purposes only. Based on first measured elevation of transect to end of vegetation community. True maximum, mean, and median values cannot be provided (and are not in the main report) because true maximum, mean, and median values cannot be determined when upper elevations of the community are controlled by access road maintenance.

If comparing only Live Oak Hammock to Mesic Hammock, the minimum elevation of the 1997 Live Oak Hammock (56.0 ft NAVD) is lower than the current Mesic Hammock community (58.2 ft NAVD88), a difference of 2.2 ft. This difference in elevation may not be of great concern as the 1997 data collection occurred after a period of relatively longer-term drought (see Figure 2 above, 5-year SPI). The Live Oak Hammock could have been lower for a time, and higher elevations in the current vegetation of the Mesic Hammock could be a reflection of relatively wetter conditions in years preceding vegetation data collection, excluding dryer species from moving downslope.

This trend is also obscured by regular controlled burns of the higher elevation communities. Fire scars are evident in the Mesic Hammock community, and recent signs of fire were evident as of the peer review site visit in February of 2025. Higher modern Mesic Hammock elevations could be a result of fire limiting the growth of drier, newly recruited vegetation downslope.

Overall, the lower boundary of the Mesic Hammock may be dependent upon 1) the species included in the community designation, 2) whether a Transition Zone was delineated, 3) the influence of land management practices, and/or antecedent climate conditions. Antecedent conditions (i.e., being within a dry or wet cycle) prior to data collection may greatly influence these transitional elevations. Additionally, the Mesic Hammock moving upslope suggests that drier vegetation is not encroaching into lower communities; any further trends in higher community elevations would have to be addressed over a greater number of sampling events.

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Comparison of the maximum elevation of the Shrub Swamp communities

The Transitional Shrub and Shrub Swamp communities collected in 2022 were designated by buttonbush coverage. The Transitional Shrub community was a transition to increased coverage of buttonbush (cover class of 3) and the Shrub Swamp community was designated with a buttonbush cover class of 4. The Shallow Marsh Community collected in 2022 also had buttonbush with a cover class of 3 but was mixed with many other shallow marsh species.

From vegetation descriptions in Hupalo (1997), the Shrub Marsh community contained buttonbush, smartweed, warty panicum, maidencane, and foxtail. Comparing available vegetation information, it seems that the Shrub Marsh community of 1997 should be compared to the Transitional Shrub, Shrub Swamp, and Shallow Marsh communities of 2022, not just the Shrub Swamp. The current work designates a greater number and more detailed communities relative to the 1997 report. This additional resolution aids in SWIDS calculations and building SWIDS datasets. The comparison of these communities is presented in Table 3, below. These include elevations from 2022 collected at T2 for direct comparison of similar areas described in 1997.

Table 3: Comparison of Shrub Marsh (Hupalo 1997) and 2022 Transitional Shrub Swamp, Shrub Swamp, and Shallow Marsh communities.

Elevation (ft NAVD88)	1997 Shrub Marsh	2022 Shrub Swamp	2022 Transitional Shrub + Shrub Swamp + Shallow Marsh
Minimum	51.0	52.1	51.0
Maximum	55.0	53.4	54.3
Mean	52.9	52.8	52.5
Median	52.9	52.9	52.3

After considering the 2022 communities together for better comparison to the 1997 data, the maximum elevation of a community with buttonbush is only 0.7 ft (8.4 inches) lower in elevation in 2022 than in 1997. The difference of 8.4 inches on a steep slope, as is present on the south side of Lake Prevatt, is only about 10 - 15 ft laterally. Therefore, the change is not considered to be substantial as mean elevations of the 2022 Shrub Swamp are within 0.1 ft of the 1997 Shrub Marsh and the combined 2022 communities have a mean within a half foot of the 1997 Shrub Marsh. Additionally, the positions of these communities may not have changed, but may have lower elevations from 1997 if any soil subsidence occurred, as suggested by Dan Shmutz of GPI on April 10th, with prolonged droughts between 1997 and 2022 (See drought indices previously described). As described above, community and species elevations naturally shift over time due to climate. The differences noted over the 25 years between sampling efforts could be simply due to differing climate conditions antecedent to data collection.

Comparison of muck elevations

As with vegetation elevation comparisons, the comparison of muck depths between 1997 and 2022 are also not direct comparisons. The 2022/2023 relevant soils data collection at Lake Prevatt were recorded in terms of hydric soil indicators (A1, A2, A8; Table 4). The

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1997 MFLs soils data were recorded as ≥ 0.1 ft or ≥ 1.0 ft of muck (Table 4). Despite the differences in depth of organic material, the mean elevations of 2022 A1 and A2 are slightly higher than the 1997 muck depths ≥ 1 ft. This could be because T1, on which the A1 and A2 elevations in 2022/2023 were based, did not reach the same lower elevations as the 1997 Transect or the 2022 T2 or T3. If staff were able to reach the lower elevations before water levels rising to document lower deep organics, the elevations may have been more similar. The 1997 data collection occurred when water levels were 47 ft NAVD88 (P97.5) so the entire lake bottom was exposed for sampling. The lower elevation of deep organics in 1997 was likely due to the ability to sample lower elevations.

Comparing maximum 2022/2023 A8 depths to 1997 muck presence and 2021 CFWI muck at surface, the 2022/2023 depths are about a foot lower in elevation. The location of muck at the surface is not as reliable as the location of deep organics. The amount of shade/direct sunlight, seepage, or organic input that allows for the maintenance of a thin muck layer could vary greatly through time and may not always be directly related to surface water hydrology. As landward muck signatures can be variable and more influenced by recent flood-drought cycles (Richardson et al. 2009), it is reasonable that the 1997 muck presence varies from the 2022/2023 data collection due to 25 years of climatic variation. As for the 2021 CFWI muck at surface elevation, SJRWMD MFLs staff do not consider this elevation to be appropriate for comparison as the CFWI DMIT transects were established on a seepage slope (eastern side of south lobe) purposefully avoided for a transect in the current MFL for this reason.

Table 4: Comparisons of muck elevations and deep organics from 1997, 2022/2023, and 2021 at Lake Prevatt.

Elevations (ft NAVD88)	1997 Muck Presence (≥ 0.1 ft)	1997 ≥ 1 ft muck	2022/2023 A1	2022/2023 A2	2022/2023 A8	2021 CFWI Muck at Surface
Minimum	47.9	47.9	48.9	48.9	48.9	
Maximum	54.6	49.9	50.8	51.3	53.5	54.5
Mean	49.0	48.6	49.8	50.0	51.0	
Median	49.0	48.4	49.9	50.0	50.7	

Overall, when comparing the 1997 MFL data to current MFL data, determining which communities to compare between sampling points much be determined by community composition, not community names. In the 25 years between sampling points, changes in rainfall, increased urbanization, and controlled burns all occurred within the area surrounding Lake Prevatt. SJRWMD staff would not expect the elevations of these communities to remain static due to changes in antecedent sampling conditions.

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Slide 16 of peer reviewers' initial findings presentation (T. Richardson)

In reference to page 73, Transect Quadrat-level Cluster Approach – A Bottom-up Method for Vegetation and Community Frequencies and Return Interval sections of Appendix C: Environmental Methods, Data, and Metrics

"After RIs were calculated for each site included in the PCA cluster, the final site RI was calculated by taking the mean ± standard error of all observed RIs. A mean + standard error was used for exceedance metrics and the mean - standard error for non exceedance." Is this consistently applied in other MFLs? What about when the system is on the other side of the mean? Should the Median be used to minimize effects of "outliers"? Should a straight 15% reduction (for exceedance)/addition (non-exceedance) be applied to the frequency of the hydrologic signature for the no-pumping condition. See Habitat metrics for 15% threshold.

SJRWMD Response:

The application of mean +/- standard error is consistently applied in other MFLs. Due to the nature of calculating any statistic of central tendency, there will always be systems on either side of the mean or median value. The inclusion of systems on either side of the mean or median is a part of both present and past MFLs SWIDS methods; the difference in the current method is that outliers are filtered in a systematic and repeatable manner through the clustering method. Using the median would not change whether systems are on one side or another (i.e., there will always be systems on either side of the mean or median).

Using a 15% reduction from the NP RI is an option but may not be directly comparable to the way the 15% reduction is used with the HT metrics. The 15 % reduction with the HT metrics are generally an area or temporal reduction (without the duration and RI component). Using a 15% reduction from an NP RI would have to have a substantial ecological rationale over a value informed by data gathered from similar systems.

In reference to page 74, Average Habitat Area section of Appendix C: Environmental Methods, Data, and Metrics

The average habitat area may not be the most appropriate metric for determination of a 15% change in habitat. Consider adjusting to habitat area and stating that average habitat area is used for some metric while differences in area at specific stage elevations are used for other metrics to capture critical ecologic functions. For example, the 5 ft water depth is not really critical until water levels drop below 52 ft. What does the percent habitat change look like no-pumping vs. current condition in half ft increments: 52, 51.5, 51, ... (Note: since the evaluation is 5 ft depth you would evaluate change from 57, 56.5, 55…)

SJRWMD Response:

SJRWMD staff disagree that water depth is not critical until water levels drop below 52 ft. The goal of the HT percent area reduction is to account for the amount of available habitat area across all elevations present in the NP hydrograph. Critical habitat depth can occur at any elevation and should not be limited to only the lowest elevation at which it can occur. Limiting habitat area in this manner would not serve to protect the WRVs at an MFL lake. An example using the 5 ft open water depth HT metric is displayed in Figure 7. If limited to only elevations under 52 ft, very little critical depth habitat would be available, and the areas of critical depth at higher elevations would not be considered.

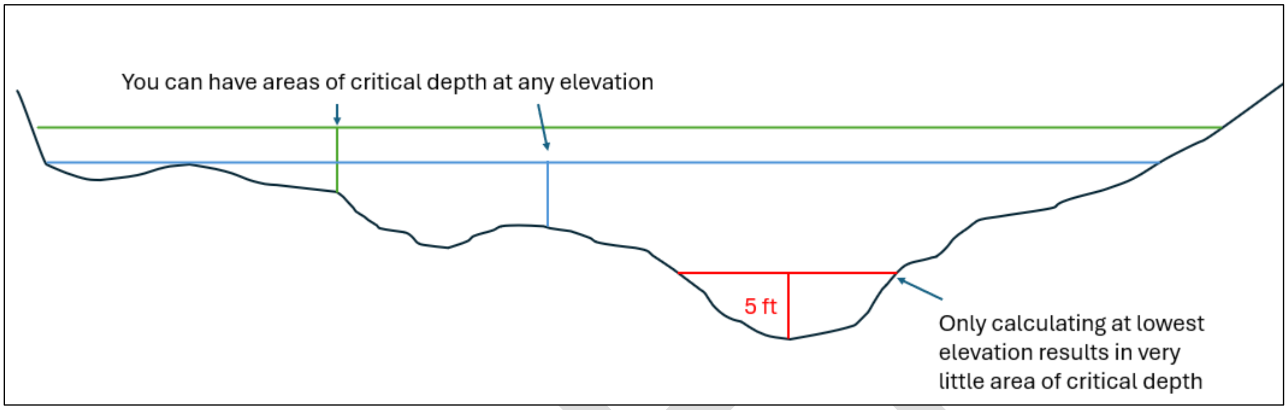

Figure 7: Conceptual drawing of the importance of upper water habitat areas in addition to lower water habitat areas.

If the comment was to be approached alternatively from a temporal exceedance perspective, only looking at a 15% reduction in time 52 ft is exceeded, there would need to be sufficient ecological rationale to do so. Again, constraining the percent reduction in time to this lowest condition excludes the importance in any loss or gain in the upper elevations. However, if we were to do this, a 15% temporal exceedance of 52 ft is 9% less constraining than the current MFLs condition.

Slide 17 of peer reviewers' initial findings presentation (T. Richardson)

In reference to Figure 25 of Appendix C: Environmental Methods, Data, and Metrics

I would assume that areas outside of the lakes fluctuation range are excluded from the area calculations?

SJRWMD Response:

Yes. The current figures will be updated in the final document to reflect the full range of elevations in the DEM as well as what is possible within the observed range of lake fluctuation.

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Slide 19 of peer reviewers' initial findings presentation (T. Richardson)

In reference to page 77, Average Habitat Area section of Appendix C: Environmental Methods, Data, and Metrics

What is the lake area change No-pumping vs. current for an elevation of 55.6' NAVD - to consider change in outflow to Carpenter Branch

SJRWMD Response:

As the outflow elevation of 55.6 NAVD would remain the same under no-pumping and current-pumping conditions, the lake area would not change at the specified elevation. However, the time that a given critical elevation is exceeded is a common MFLs metric, used by SJRWMD, SRWMD, and SWFWMD. For these metrics, the temporal exceedance of an elevation of interest is evaluated under various conditions. The Lake Prevatt outflow elevation (55.6 ft NAVD88) is exceeded 39.5% of the time under the no-pumping condition, and 36.7% of the time under the current-pumping condition. A potential impact threshold of 15% reduction from the no-pumping condition would result in a 33.6% exceedance. Under the current MFLs condition (based on the most-constraining metric – open water area), 55.6 ft NAVD is exceeded 32.2% of the time.

Therefore, a metric based on the temporal exceedance of the outflow elevation of 55.6 NAVD, with an allowable 15% reduction from no-pumping, would be met under current-pumping conditions and be slightly more constraining (by 1.4% exceedance) than the current MFLs condition. Additional model runs would be necessary to determine an exact UFA freeboard for this metric. However, it is important to note that any metric used for the final MFLs would need to have a strong environmental rationale. Without this, a metric based on outflow elevation exceedance would be difficult to defend.

While increased outflow from the lake may reduce water residence time, and there may be qualitative support relating this to slightly improved water quality, data are currently not sufficient to suggest that a 1.4% decrease in outflow exceedance would significantly affect water quality parameters. This is especially true for an urbanized system with high nutrient loading. Additionally, while there are no current plans for structural alterations, outflow elevations can be easily altered through sediment build-up or dredging. Metrics that can be achieved through structural alteration (e.g., lowering the outlet elevation) are not generally considered defensible as MFLs metrics. Any natural or manmade alteration to this elevation would majorly affect all other elevations of concern within the water body.

When considering percent reductions, it is also important to consider whether extremely high elevations (i.e., high in the exceedance curve) are appropriate for whole-system protection. These elevations are often storm-driven and as such very insensitive to pumping. Also, a high-elevation exceedance metric provides for, by definition, an extremely small amount of allowable change (e.g., a 15% reduction from a small exceedance %, yields a very small allowable % change). The resulting very small amount of allowable change may be considered overly constraining if not linked to specific ecological or human beneficial uses. If relevant environmental functions and values are already considered and protected by other metrics, this type of high-elevation metric

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(e.g., outflow elevation) would necessitate an extremely strong rationale, or may be considered not defensible.

In reference to page 77, Average Habitat Area section of Appendix C: Environmental Methods, Data, and Metrics

What is the change in lake area No-pumping vs. Current for an elevation of 57.6' NAVD - to consider a change in wetland boundary.

SJRWMD Response

Please see the notes on temporal exceedance in the comment response above. Under a no-pumping condition, the elevation of 57.6 ft NAVD is exceeded 1.3% of the time. Under a current-pumping condition, 57.6 ft NAVD is exceeded 1.2% of the time. A 15% reduction from no-pumping is an exceedance percentage of 1.1%. Under the current MFLs condition, 57.6 ft NAVD is exceeded 1.0% of the time. Therefore, a temporal exceedance of the wetland boundary elevation of 57.6 ft NAVD with a 15% reduction from no-pumping would be met under the current-pumping condition and be slightly more constraining (by 0.1% exceedance) than the current MFLs condition. Additional model runs would be necessary to determine an exact UFA freeboard for this metric. See comments above regarding high-elevation exceedance metrics, the insensitivity to pumping, and the resulting small amount of allowable change (i.e., available water). It may be hard to defend the ecological significance of a change from 1.3 to 1.0%. Therefore, it may be difficult to defend a metric based on wetland boundary exceedance, if more constraining than the open water area metric.

In reference to page 83+, MFL Determinations for Lake Prevatt section of Appendix C: Environmental Methods, Data, and Metrics

Given that the lake is and intergrade between sandhill and stable and given the fluctuation range the ecological data selected to represent the FH, MA, FL are not the most sensitive criteria. Consider the following as potentially more sensitive ecological criteria for this type of system: FH - Mean transition zone with 30-day duration, Mean Shrub Swamp 180 day non-ex, and Landward Histosol -0.61m for 30-90 days (see Richardson et al. 2009) or Mean H/HE-1.67 for FL

SJRWMD Response:

Elevations/communities chosen to represent the FH, MA, and FL are those with MFLs precedent that can be supported with available literature. SJRWMD staff agrees that the FH, MA, and FL values suggested in the main report are not the most sensitive criteria (the MFLs condition represents the most sensitive criterion); however, they are the criteria best able to be supported by current literature and MFLs precedent. It is also important to note that the hydroperiod tool metrics (especially the open water area metic) are often more constraining than conventional event-based metrics. The additional metrics suggested have been evaluated and are discussed below (Table 5).

Using a higher elevation as the magnitude for a FH does not always equate to a more constraining metric. This is often because higher elevations are more storm-driven and have a reduced sensitivity to pumping impact. In addition to this decreased sensitivity of higher elevations, the SWIDS analysis for a Transition Zone FH results in a much larger return interval (RI) of 5.7 years than the current recommended FH, allowing for > 3.5 ft of UFA freeboard. This is a good example of how increasing the FH community or elevation can result in a less constraining metric.

The lower elevations suggested for an MA or FL are more likely to be sensitive to pumping as the lower elevations in the lake are more subject to change than the upper elevations. The MA suggested in this comment, however, is not possible under a no-pumping condition (Figure 8). This is likely due to the highly fluctuating nature of the lake, and the Shrub Swamp communities at Lake Prevatt are within this most fluctuating range. Any metric not met under the no-pumping (pre-withdrawal) condition cannot be used to assess pumping impact and therefore cannot be considered further.

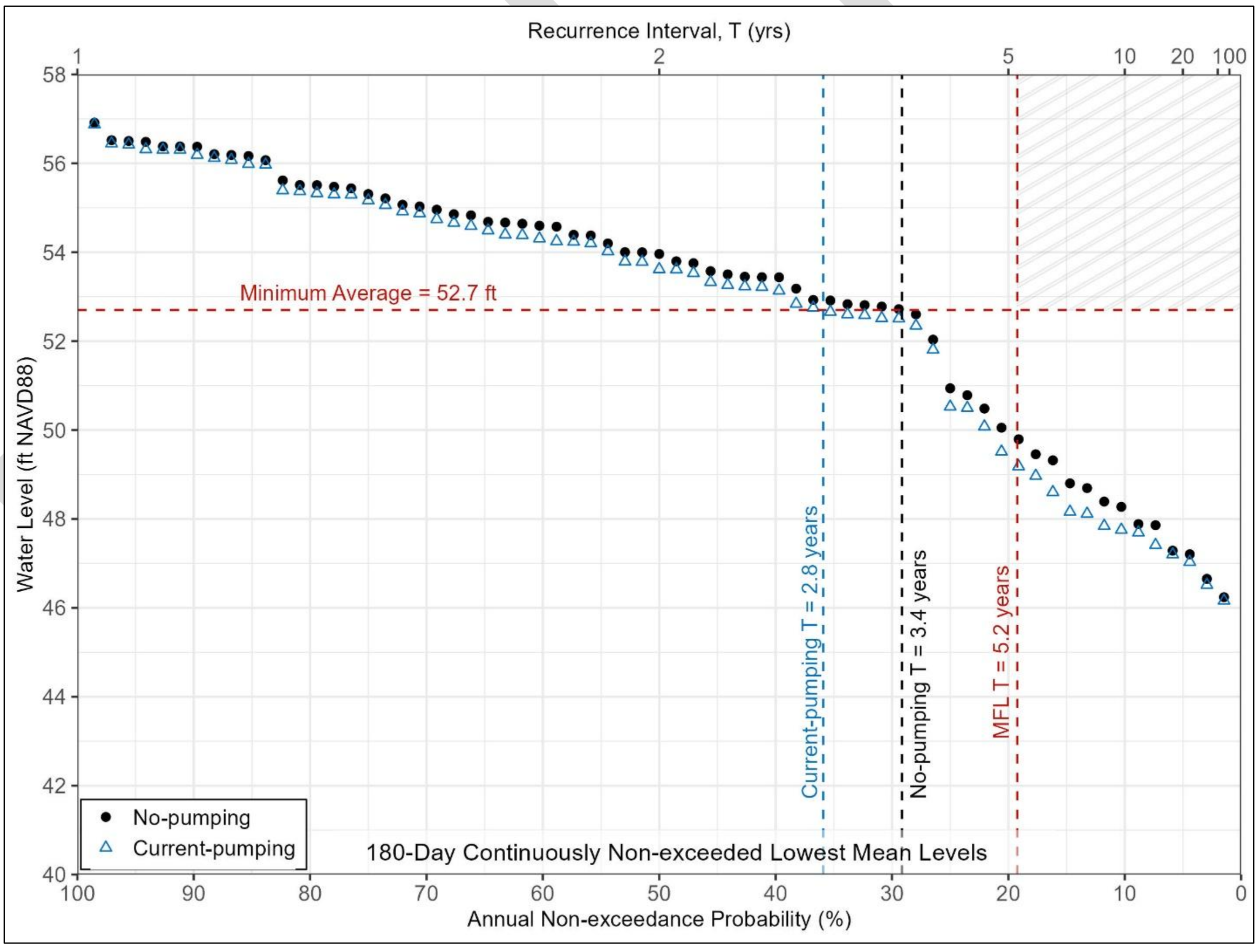

Figure 8: Weibull plot of a mean Shrub Swamp Minimum Average Level with a magnitude of 52.7 ft NAVD88, a duration of 180 days, and a return interval of 5.2 years.

The FL condition of the elevation of most landward histosol minus 0.61 m (2 ft) at a duration of either 60 or 90 days are both met under the current-pumping condition. SWIDS analysis places the return interval for the 60-day duration at 6.3 years and the 90-day duration at 8.3 years. Both FLs of the landward histosol minus 0.61 m have the same UFA freeboard as the current most constraining MFL condition of 5-ft open water. MFLs staff will research this metric further upon final report revision to determine if enough literature support can be gathered for inclusion as an official metric. However, if multiple metrics are developed to protect the same thing (e.g., the location and maintenance of organic soils and wetland vegetation) and yet they result in very different freeboards, we will likely choose to proceed with the metric with the best scientific support (e.g., MA vs soils-based FL).

Metrics suggested using a mean Histosol/Histic epipedon minus 1.67 ft also all meet under the current-pumping condition. Without guidance on a duration for this metric, 60, 90, and 120 days were all tested. A H/HE elevation minus 1.67 ft with a 60-day duration would be more constraining than the current recommended MFL; however, without sufficient rationale for use, a metric cannot be maintained for the sake of being more constraining. SJRWMD staff are open to guidance on the best use of this elevation/metric and will look for scientific support of the metric, but, as previously mentioned, will likely choose to proceed with metrics with the best scientific support.

Table 5: Additional metrics suggested for consideration by peer reviewers for Lake Prevatt. Magnitude, duration, RI, lake freeboard, and UFA freeboard are provided. Weibull plots may be provided upon request.

Metric	Magnitude (ft NAVD88)	Duration (days)	RI (years)	Lake FB (ft)	UFA FB (ft)
FH: Mean Transition Zone	55.5	30	5.7	1.6	> 3.5
MA: Mean Shrub Swamp	52.7	180	5.2	Not possible under a no-pumping condition (2.9 ft lake deficit occurring at an RI of 3.4 years under NP condition)	
FL: Landward Histosol – 0.61 m (2 ft)	48.4	60	6.3	0.3	0.9
	48.4	90	8.3	0.7	0.9
FL: Mean Histosol/Histic Epipedon -1.67 ft	48.3	60	7.6	0.1	< 0.9
	48.3	90	9.2	0.5	1.3
	48.3	120	9.7	0.7	2.3

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In reference to page 109, Frequent High (FH) Level (53.8 ft NAVD88) section of Appendix C: Environmental Methods, Data, and Metrics

Consider a more sensitive criteria given the lake type and adjust the duration and return interval. E.g., transition zone. In this type of lakes the shoreline or transition zone go from inundated (killing upland plants that have encroached) to very dry allowing recruitment of upland plants. The duration needed to kill mature pine trees could be extracted from Lake Sylvan stage data (pines may have been killed following 2004 hurricane season?) Or use the wetland boundary (as Infrequent high) (see CFWI transects) with minimum hydrology required to meet the wetland definition as a measure of significant harm. see 62-340.550 FAC (inundation for 7 continuous days or saturation for 20 continuous days)

SJRWMD Response:

The comment above mentions considering more "sensitive" criteria, implying criteria at a higher elevation. Defining more "sensitive" criteria at many lakes does not necessarily equate to a higher elevation in the landscape because the upper ends of the hydrograph/exceedance curve are not sensitive to pumping but rather are dependent on rainfall and storm events. Figure 9 shows an example of the difference in exceedance curves among the no-pumping condition, the MFLs condition (current-pumping minus 0.9 ft in the UFA), and the largest UFA drawdown scenario modeled (current-pumping minus 3.5 ft in the UFA). Notice that the parts of the hydrograph most sensitive to pumping are not those at higher elevations. The most "sensitive" elevations to pumping in the record are those between a P25 and a P90.

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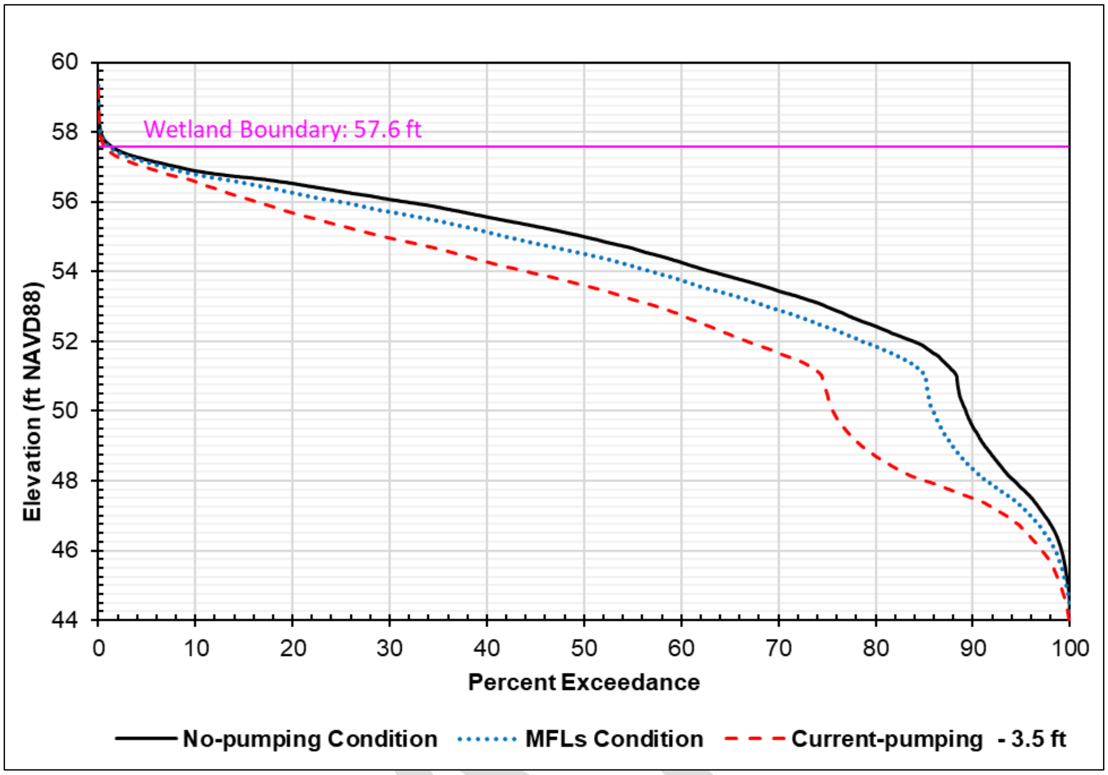

Figure 9: Exceedance curves of the no-pumping, MFLs, and current-pumping minus 3.5 ft (in the UFA) surface water level scenarios at Lake Prevatt. The largest drawdown scenario modeled (3.5 ft in the UFA) is provided to display the very little difference among no-pumping and other scenarios at the extreme high elevations at Lake Prevatt.

To address the suggestion of using the wetland boundary as an Infrequent High (IH), multiple scenarios for both saturation and inundation were tested. While 62-340.550 FAC provides guidance on the duration of inundation as 7 days and duration of saturation (6 inches within surface) for 20 days, there is no guidance on return interval besides "regularly or periodically." These terms would generally not be applied to an IH as both "regularly" and "periodically" imply a return interval more frequent than the typical 25-year return interval (infrequent) of an MFL IH. As wetland boundary data are not readily available for MFL sites, SWIDS analysis for a return interval calculation was not possible. Therefore, return intervals of 3 years, 5 years, 25 years (typical of and MFL IH), and a 15% reduction from the NP RI were tested as metrics. The results of these calculations can be found in Table 6. Due to the insensitive nature of the high elevation of the wetland boundary (P1.3 at no-pumping) metrics using this boundary are either not met under an NP condition, have a large amount of freeboard, or allow no change from an NP condition but still would have a deficit. By definition of an MFL, there must be some difference allowable from the NP condition.

Table 6: Results of Infrequent High (IH) metrics tested at Lake Prevatt using inundation or saturation of the wetland boundary.

Metric	Magnitude (ft NAVD88)	Duration (days)	RI (years)	Lake FB (ft)	UFA FB (ft)
IH: Wetland Boundary Inundation	57.6	7	3	Cannot be met under a NP condition	
	57.6	7	5	Allows no change from a NP condition but would have a deficit.	
	57.6	7	25	0.5	>3.5
	57.6	7	5.2 (15% reduction from NP RI)	Allows no change from a NP condition but would have a deficit.	
IH: Wetland Boundary Saturation	57.1	20	3	Allows no change from a NP condition but would have a deficit.	
	57.1	20	5	0.1	>2.5, < 3.0
	57.1	20	25	0.6	>3.5
	57.1	20	3.3 (15% reduction from NP RI)	Allows no change from a NP condition. Lake freeboard of < 0.1 ft.	

Slide 20 of peer reviewers' initial findings presentation (T. Richardson)

In reference to the MFLs main report

Is the adopted MFL met under current conditions?

SJRWMD Response:

Yes, the currently adopted MFLs are being met (Table 7). The 1997 FH, based on the shrub marsh – shoreline fringe ecotone, is less constraining than the recommended FH. The 1997 MA, based on a 3.5 ft flooding depth for fishery maintenance over the bottom elevation of the south lobe, is also less constraining than the current recommended MA. The 1997 FL, based on a quarter foot drawdown below the average aquatic bed, maximum elevation of muck thicker than 1ft, and a P80, was more constraining than the current discussed FL. All previous MFL metrics are less constraining than the current MFL condition based on 5 ft open water area reduction. The most constraining metric from the adopted MFL levels, the FL, has a very similar freeboard answer to the current event-based freeboards (FH: 2.5 ft, MA, 2.1 ft, FL, 2.4 ft). The most constraining of the current event-based metrics, the FH, has only a 0.1 ft difference in freeboard than the most constraining metrics developed in 1997. When multiple metrics provide similar freeboard answers despite representing varying ecological aspects of a system, the weight of evidence generally provides added confidence in the answer.

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Table 7: Lake and UFA freeboard of currently adopted Lake Prevatt MFLs. Weibull plots may be provided upon request.

Metric	Elevation (ft NGVD29)	Elevation (ft NAVD88)	Hydroperiod Category	Duration	RI	Lake Freeboard (ft)	UFA Freeboard (ft)
FH	56.0	54.9	Seasonally Flooded	30	2	1.6	> 3.5
MA	53.0	52.0	Typically Saturated	180	1.7	2.2	> 3.5
FL	50.9	49.9	Semipermanently Flooded	120	5	0.7	2.0

The rational for choosing the 5 ft depth for open water habitat reduction area was to maintain the ecosystem services and fisheries (described in Appendix C) in the main body of the Lake. The 1997 MFL (Hupalo 1997) states: "The lake basin is shallow and is frequently not an open water habitat. Water depths exceed 6.5 ft in the southern basin only 20% of time. If water levels were stable, accumulating biomass would lead to a marsh environment. Cyclic replacement or oscillatory fluctuations of plant communities are the consequence of repeated cycles of flooding and drawdown." Therefore, the 5 ft open water area reduction is meant to protect Lake Prevatt similarly to the 1997 MA, but also in a manner to reduce impact to recreational values.

In reference to page 36, FH Magnitude section of the MFLs main report

Consider that the max elevation of this community (TSS) should be considered for the FH not the mean. Per Kinser - "Hydrology similar to that of cypress, hardwood swamp, or shallow marsh communities. …lengthy seasonal inundation" or possibly mean of the Transitional Zone

SJRWMD Response:

Please see above for a discussion of a mean transition zone FH. After recalculating the return interval for a maximum Transitional Shrub Swamp, this metric would be less constraining than the current FH. The mean maximum elevation of the Transitional Shrub Swamp across all Lake Prevatt transects is 54.3 ft NAVD88. SWIDS calculation of the maximum elevation of this community results in a return interval of 1.5 years. With a 30-day duration, the lake freeboard would be 1.1 ft; the UFA freeboard would be > 3.5 ft. Despite being at a higher elevation than the FH discussed in the report, this FH is less constraining likely due to lower pumping sensitivity at higher elevations previously described.

In reference to page 38, MA Magnitude section of the MFLs main report

Consider the mean elevation of SS as the MA level. Based on Kinser description of the hydrology of this community it would seem to be an appropriate elevation for the MA level.

SJRWMD Response:

Please see above for a discussion of a mean elevation of Shrub Swamp as the MA level. The duration of this metric cannot be met under a no-pumping condition likely due to the highly fluctuating nature of the lake.

In reference to page 39, MA Magnitude section of the MFLs main report

Consider evaluating the landward most elevation (generally the max elevation) of hisitc epipedon and histosol. This may reduce variability in the SWIDS analysis by not incorporating lower elevation organics in what may be considered lake bed. See Richardson et al. 2009.

SJRWMD Response:

Please see above for a discussion of these metrics. Landward histosol will be considered as an additional metric if sufficient scientific support exists.

In reference to page 40-41, Frequent Low (FL) section of the MFLs main report

While the maximum elevation of deep marsh would normally be appropriate for a FL level for lakes with a lower fluctuation range an allowable drawdown for organic soils may be more appropriate here.

SJRWMD Response:

A previously described, if multiple metrics are developed to protect the same thing (e.g., the location and maintenance of organic soils and wetland vegetation) and they result in very different freeboards, we will likely choose to proceed with the metric with the best scientific support. SJRWMD staff and T. Richardson discussed this issue in the April 10, 2025 teleconference where both parties agreed that the current use of soils as an MA metric is more defensible than their use as a FL.

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Slide 21 of peer reviewers' initial findings presentation (T. Richardson)

In reference to page 56, Recommended Minimum Levels section of the MFLs main report

Recommended levels represent a 3.6 ft fluctuation range when the lake fluctuates 12-15'. Should additional P values be represented? Does this protect the temporal components. Does use of P values effect potential enforcement. Low lake levels are likely the most critical for fish habitat and susceptible to UFA drawdown. These P values do not seem to address low lake levels.

SJRWMD Response:

The recommended MFL percentiles (P values of comment) are based on the water level regime equal to a 15% reduction in 5-ft open water area of Lake Prevatt. While the lake does fluctuate about 13 ft, the P10 to P90 range is much less (7.4 ft under an NP condition), and adopting the three percentiles (25, 50, and 75) ensures that the entire curve will be protected. If only a P50 was adopted, other parts of the exceedance curve may shift without impacting the P50, but if the 3 percentiles are adopted and upper or lower elevations begin to shift, they will change the overall P25 and P75 as well. The drop off in lake level at a P88 and higher in the exceedance curve occurs at an elevation of 51 ft NAVD88 where the lake lobes become disconnected: these higher percentiles (i.e., lower elevations) are representative of the change in lake morphology. By protecting the water level regime with three percentiles, low lake levels and high lake levels are both addressed. High or low levels cannot be drastically reduced without also reducing the other elevation percentiles in the exceedance curve.

The lake lobe connection elevation of 51.0 ft NAVD88 could be explored as a critical elevation point. Lake lobe connectivity is a common metric explored at MFL lakes, intended to maintain recreational (e.g., canoe/kayak passage) as well as ecological (e.g., fish passage) functions and values. This metric is based on the minimum water depth required for lake lobe connectivity to which an offset is added to provide sufficient depth for boating of other forms of recreation. As large watercraft cannot access Lake Prevatt, an acceptable offset would be a 20-inch offset from the bottom elevation. The offset (20”) was chosen based in part on a 2004 environmental value assessment conducted on the St. Johns River that reported the draft of small flat bottomed jon boats of 16 ft or less to be usually 1.5 ft or less (HSW 2004). The boat depth suggested by the HSW study is also consistent with an FDEP study that suggests that a minimum of 20” water depth is required for protecting bottom vegetation damage from paddling and boat prop actions. This study was conducted to determine the likelihood of “paddle gouging” of submerged vegetation within the Wekiva River basin by canoeists and boat propellers (FDEP 1990). The chosen minimum paddling depth (20”) is also consistent with canoe paddling depths used by Suwanee River Water Management District in MFL determinations. For an implementation of lake lobe connectivity with this offset, please refer to the Lake Butler MFL (Jennewein et al. 2022) where this metric was the most constraining.

Table 8 addresses lake lobe connectivity at Lake Prevatt using the 51.0 ft connection point and a 20-inch (1.67 ft) offset for recreational connectivity. The lake lobe connection metric will be added to the final MFL report for complete documentation of the metric.

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However, compared to the current recommended MFL condition, the elevation of 52.67 ft NAVD88 could be reduced an additional 6.36%. Therefore, the recommended MFL metric of 5-ft open water is still the most constraining.

The MFLs condition, and the open water metric on which it is based, is expected to protect the temporal components needed to protect all other event-based vegetation and soils metrics. The District will monitor the status of the adopted minimum P25, P50, and P75 as well as the constraining metric (open water area) on which they are based. All original metrics will be evaluated to ensure they are protected in addition to the three water level percentiles.

To address whether low lake levels "critical for fish habitat and susceptible to UFA drawdown" are protected, we can first reference the change in game fish spawning habitat evaluated with the HT. Elevations corresponding to 1.0 – 4.0 ft of water through time were evaluated to ensure that there was not greater than a 15% reduction under current-pumping. Under a current-pumping condition, this metric (> 3.5 ft UFA freeboard) was far less constraining than the open water 5 ft metric (0.9 ft UFA freeboard). Therefore, by protecting the more constraining metric, the less constraining metrics are also protected.

We could also address fish kills with a temporal exceedance approach. Hupalo (1997) reports that a fish kill occurred after water levels receded to 47.0 ft NAVD88 where the available water habitat had been reduced to 0.25 acres. Largemouth bass, sunfish, and lake chubsucker were found around the perimeter of the remaining water body of the lake. Table 8 provides comparisons of a series of elevations under a 15% temporal exceedance change from NP. Elevations 47.0 - 51.0 ft NAVD88 represent the elevation of the recorded fish kill and 3 offset elevations (plus 2, 3, and 4 ft). The most constraining of these four values (fish kill + 3 ft) would still allow for drawdown below 50.0 ft NAVD88 10% more often than the recommended MFLs condition. The 51 ft elevation is not the most constraining of these four elevations because surface water is supplemented from the north lobe starting at this elevation.

Table 8: Examples of temporal exceedance metrics of fish kill and lobe connection elevations.

Elevation (NAVD88)	Percent Exceedance under NP condition	15% from NP exceedance	Percent Exceedance under CP Condition	Percent Exceedance in Recommended MFLs Condition	Additional percent allowable change from recommended MFLs Condition
47.0	97.39	82.78	96.85	95.95	13.16
49.0	91.22	77.53	89.61	87.90	10.36
50.0	89.29	75.89	87.63	85.88	9.99
51.0	88.33	75.08	86.70	85.12	10.03
52.67	77.70	66.04	75.42	72.41	6.36

In reference to page 57, Recommended Minimum Levels section of the MFLs main report

P25 - elevation lines up in the TZ, P50 lines up with Max TSS, P75 lines up with max SM. Again this suggests that most sensitive ecological transect data was not applied.

SJRWMD Response:

Please see the previous discussion of using a mean Transition Zone or max Transitional Shrub Swamp for a FH or the mean Shrub Swamp as an MA. The P25, P50, and P75 are not meant to be representative of a FH, MA, and FL. Upon final revision of the MFLs report, the previous and recommended MFLs summary table will be split to eliminate this confusion. As discussed above, moving upslope in this type of system (i.e., basing event-based metrics on higher elevations) does not typically result in more constraining metrics. In contrast, these higher elevations are typically storm-driven and less sensitive to pumping impact.

Slide 23 of peer reviewers' initial findings presentation (T. Richardson)

In reference to page 9, Event-based Metrics section of Appendix D: MFLs Status Assessment

Table D-3: The MA and FL criteria allow about a 50% increase in the frequency of low water events. Are the best metrics evaluated? Does the SWIDS analysis with mean – or + SE result in an appropriate RI?

SJRWMD Response:

Please see above discussions of other possible metrics. We do believe that the best metrics, defined by defensibility, weight of evidence, and pumping sensitivity, are being evaluated. The goal of the SWIDS analysis is to calculate RIs in the most repeatable, defensible, and objective way possible. As described in Appendix C, the result of updating the SWIDS process was a major reduction in the range of return intervals of the vegetation metrics and a slight reduction in the return interval range for soils. Using the mean +/- SE in the RI calculation is performed only after major outliers are removed in the clustering process.

The variability inherent in ecological data, especially among different sites, is the reason why various metrics are explored at each MFL site. When multiple metrics provide similar answers, a weight of evidence can support the use of more applicable metrics over ones that may not be appropriate for a given system. While the current MA and FL criteria allow a large increase in the frequency of low water events, they are defensible and considerably more constraining than other metrics analyzed. Of the metrics analyzed as part of the main Lake Prevatt MFL, the freeboards of the MA (2.1 ft) and FL (2.4 ft) metrics are comparable with the freeboard of the emergent marsh (2.5 ft) and overall lake area reduction (2.2 ft). The FH, based on the mean elevation of the Transitional Shrub Swamp, has the same amount of freeboard as the emergent marsh HT metric (2.5 ft). The agreement of multiple metrics with similar freeboard, and the exploration of other possible FHs, MAs, and FLs with far more freeboard (and less scientific support) suggest

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that the best metrics have been evaluated. The only metrics more constraining are the canoe metric (1.7 ft freeboard) and the open water metric on which the MFL is based.

Comments made by Mr. Dan Schmutz, GPI, on 4/10/2025:

Rainfall analysis needed to confirm groundwater model results and surface water model results

Comments made by Jay Exum, Friends of the Wekiva River, on 2/25/2025 Peer Review Kickoff Meeting:

Based on these slides, it seemed intuitive to me that the lake would have experienced drawdown due to groundwater pumping. My question was whether the stage data depicting a drop in lake levels in Lake Prevatt was determined to be statistically insignificant from previous years, or when coupled with rainfall, consistent with trends prior to 1980? But, if the declines are as significant as they appear, how do they not result in impacts to hydrological and ecological functions?

SJRWMD Response to Mr. Dan Shmutz and Dr. Jay Exum:

We believe we have addressed all concerns regarding rainfall and pre/post- 1980s water levels conditions. Please see above responses. Some key points of the pre/post- 1980s discussion include:

- The lake did experience drawdown due to groundwater pumping. The amount of drawdown is incorporated in the current-pumping condition. Differences in the no-pumping and current-pumping conditions are most apparent during drought periods. Groundwater pumping has been incorporated into MFLs analyses and MFLs model development.
- The drop in lake levels post-1980 were majorly influenced by climatic conditions. During wetter periods (pre-1980), the effective watershed of Lake Prevatt is larger due to north lobe inflow and contribution of water from the north lobe to the south lobe at water levels above 51 ft NAVD88. During drier periods, the effective watershed of the south lobe is reduced in area. Water lost through seepage and evaporation cannot be as easily maintained without inflow from the north lobe, resulting in more water level variability with drought. Increases in water levels still occur after large rainfall events due to the small, shallow nature of the basin.
- The flashy nature of lake levels post-1980 are likely due in part to increased development within the Lake Prevatt watershed. Increases in impervious surfaces in urban watersheds are known contributors to changes in baseflow and stormwater runoff to lake systems (see discussion in first response above).

Response Summary

- Pre- vs post-1980 differences in water levels are possible, even with low pumping impact, given the large differences in deficit rainfall and watershed development in these two periods. The latter can dramatically alter hydrology by changing water storage, infiltration, runoff, and ET. Higher water level fluctuations also occur at lower water levels as the effective watershed shrinks when lake levels drop below 51 ft NAVD88.
- The difference in community elevations between 1997 and current work is not unexpected given 1) 25 years elapsed and antecedent climate conditions were different, and 2) differences in transect location can result in differences in elevation
- Despite the assumption that earlier (i.e., 1997) metrics are more protective (because elevations are higher), the current recommended MFLs are more constraining (lower freeboard) than the original adopted MFLs.
- The recommended MFLs condition (based on the open water area metric) is more constraining than suggested metrics to protect the wetland boundary, depths to prevent fish-kills and outlet elevation exceedance.
- Metrics created for the MFL need to be derived from ecological rationale, then tested. Metrics that are constraining without sufficient environmental rationale cannot be defended.

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References

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