Response to Stakeholder Comments on Lake Santa Fe and Alto MFL Technical Documents

Suwannee River Water Management District

386.362.1001

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

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1.0 Response to Comments from Paul Still

Response to Comments provided by Paul Still, District 5 Board Member, Bradford Soil & Water Conservation District (Submitted by email on 12/20/2021)

MFL Levels

1) **My main concern about the actual MFLs is that the Frequent High Level may be too low and too short of duration. The duration issue has also been noted by the two peer reviewers. To get a longer duration may require a higher level. A higher level may have too much of an impact on the built environment.**

Response:

Based on input from peer reviewers and several stakeholders, the District reviewed the Frequent High minimum levels in more detail. For Lake Santa Fe, the District decided to adjust the frequency and duration of the Frequent High level to two years and 30 days, which is more consistent with other lakes in this region and will better protect the seasonally flooded wetland communities around the lake. The Lake Santa Fe MFL and Modeling reports have been revised accordingly.

For Lake Alto, the District determined that additional data collection is necessary to develop an appropriate Frequent High minimum level. The District will implement a monitoring plan to better understand the lake's hydrology and its effects on adjacent wetland communities.

Impacts of Future Withdrawals

2) **The evaluation of the impacts of future withdrawals on the lake levels may have serious flaws. The methodology appears to fail to account for anthropogenetic withdrawals from the surficial and intermediate aquifer associated with mining and barrow pit operations.**

Response:

Water use impacts from existing and projected future water demands for mining/dewatering, as well as other water use categories were considered when assessing water use impacts on Lakes Santa Fe and Alto as described in the MFL status assessment memos. An updated 2022 MFL Status Assessment memo has been created for Lake Santa Fe. More information on the water supply planning process and water use estimation is available on the District's website:

Water Supply Assessment & Plan | Suwannee River Water Management District (mysuwanneeriver.com)

Groundwater use at the Chemours facility is permitted and estimates of groundwater use are included in the regional water use estimates. The current mining extraction process proposed for this site does not involve consumptive withdrawals. If further consumptive use of groundwater is required, the effects of these withdrawals on these lake MFLs will be reviewed as a part of the consumptive use permitting process.

3) The role of the surficial and intermediate aquifers on the Levels of Lakes Santa Fe and Alto may not be clearly noted in the MFL documents.

Response:

Model simulations accounted for the surficial aquifer, the confining layer (intermediate aquifer), and the Upper Floridan aquifer system. The parameterization is explained in Sections 3.2.6, 4.3.2.2, and 4.3.3.2 of the 2021 Lake Alto and Santa Fe Hydrologic Modeling Report.

Mining impacts in or near the Lakes Santa Fe and Alto Watershed:

4) Chemours is planning to operate a heavy minerals mine in or near the Lake Santa Fe watershed. That mining operation will impact 1,750 acers of which 740 are wetlands. There will be 1,549 acres of mining cells that can be up to 40 feet deep. The average depth of the mining cells will be 22 feet. Mining cells will be dewatered to allow for a dry mining process. Water from the dewatering will be used to transport mined materials to a processing plant. Excess water will be treated and discharged via a NPDES discharge point or points. The projected end date of the mining and reclamation is 2035.

   I could find no reference to this future land use or the expected groundwater withdraws associated with mining in the MFL documents.

   My key concerns regarding Chemours mine impacts on Lakes Santa Fe and Alto levels include the following:

   1. A reduction of surface water flows into the Santa Fe Swamp from the canals and streams that originate in the mined area could reduce water levels of the Santa Fe Swamp. Reduced Santa Fe Swamp levels could cause increased flows of both surface and groundwater out of Lakes Santa Fe and Alto.
   2. The NPDES discharge points will result in water from some of the subbasin aquifers in Figure 3-2 being discharged into basins not connected to the Santa Fe Swamp. Reduced Santa Fe Swamp levels could cause increased flows of both surface and groundwater out of Lakes Santa Fe and Alto.
   3. The form and function of the reclaimed mine cells will be altered with respect to groundwater flow and storage. This could have long term positive or negative impacts on the Santa Fe Swamp levels and thus the levels Lakes Santa Fe and Alto.
   4. The altered reclaimed surface areas will not function the same as the current land use. This could have long term positive or negative impacts on the Santa Fe Swamp levels and thus the levels Lakes Santa Fe and Alto.

An evaluation of the status of the proposed MFLs 20 years in the future needs to address the concerns noted above.

Response:

Proposed mining activities in this region, including the one referenced above, were considered in the development of these MFLs with respect to surface and groundwater withdrawal effects on lake levels (as required by section 373.042, F.S.). Future increases in water use over the next 20 years are addressed as part of the Lake Santa Fe and Alto MFL status assessments.

Proposed changes to surface water drainage are addressed as part of the mine's Environmental Resource Permit and are not regulated by the District.

Lake Alto and Lake Santa Fe Water Budget Modeling Report Issues

2.6.3 Subwatershed: Sant Fe Swamp

5) **Need to clarify the flow through the Santa Fe Swamp. Figures 2-1, 2-4 and 2-5 show the Santa Fe River originating at Little Lake Santa Fe in what appears to be a straight dug canal. There is no evidence of this canal in aerial or satellite imagery.**

Response:

The flowline shown in these figures comes from the USGS National Hydrography Dataset and is not intended to represent a canal through the Santa Fe Swamp. More information regarding the National Hydrography Dataset is available at this website (National Hydrography Dataset | U.S. Geological Survey (usgs.gov)). The swamp primarily discharges to the Santa Fe River by means of sheet flow with no well-defined flow paths as described in Section 2.6.3 of the 2021 Lake Alto and Santa Fe Hydrologic Modeling Report.

6) **Need to document what happens in a major storm event like Irma.**

Response:

Documentation of hydrologic changes due to major storm events is typically addressed as part of flood protection programs and is not necessary for developing minimum lake levels.

7) **Need to define major storm event.**

Response:

The reference to a major storm event in Section 2.6.3 of the 2021 Lake Alto and Santa Fe Hydrologic Modeling Report was intended to be a general statement related to sheet flow through Santa Fe Swamp. Defining the storm event is not required for MFL assessment.

8) **If 2,899 acres are not being burned annually using FLUCCS code 7450 may not be appropriate. Need to evaluate the impact of using this land use code instead of the appropriate land use code on the model output.**

Response:

To address this comment, the District updated the water budget model with the 2016/2017 Land Use – Land Cover dataset developed by FDEP, which has reclassified the Burned Areas as Vegetated Non-Forested Wetlands.

Other comments

9) **Need to add extractive as a land use. Past extractive use is noted as urban and built up in the upper right corner of the watershed in Figure 2-4.**

Response:

The land use dataset has been updated with the 2016/2017 Land Use – Land Cover dataset developed by FDEP in the updated 2022 Lake Alto and Santa Fe Hydrologic Modeling Report.

10) **Need to evaluate the impact of land use changes from 2006 to current land use acreage and projected future land use.**

Response:

See response to Comment 8 above regarding model updates with 2016/2017 land use data (the most current available for this area). Projected future land use changes will be addressed as part of MFL re-evaluation in the future as needed.

Barrow Pits Impacts

11) **Rayonier has a permitted barrow pit with dewatering withdrawals approximately a mile from the shore of Lake Santa Fe. The impacts of barrow pits on lake levels do not appear to be evaluated in the current MFL documents.**

Response:

Borrow pits were modeled with appropriate land use codes as described in Section 3.0 of the 2021 Lake Alto and Santa Fe Hydrologic Modeling Report. While dewatering activities may result in some loss of water from the watershed, the effect on lake levels is expected to be minimal.

Lake Santa Fe MFLs Status Assessment

12) **The Status Assessment Document appears to only have considered Floridan Aquifer withdrawals. The future status assessment needs to include the withdrawals from the surficial and intermediate aquifers associated with the Chemours mine and barrow pits.**

Response:

See responses to Comments 2, 3, and 4.

13) **The relationship between Santa Fe Swamp levels and the levels of Lakes Santa Fe and Alto do not appear to be defined in the MFL documents. The impact of lower Santa Fe Swamp levels on the levels of Lakes Santa Fe and Alto is not addressed. The potential reduction of surface water flows into the Santa Fe Swamp that could result from the Chemours mine need to be evaluated if Santa Fe Swamp levels impact the levels of Lakes Santa Fe and Alto.**

Response:

The 2021 Lake Alto and Santa Fe Hydrologic Modeling Report describes how the Santa Fe Swamp and Lakes Santa Fe and Alto were incorporated into the model, which was developed to assess the effects of withdrawals on lake levels.

See response to Comment 4 regarding the proposed Chemours mine.

2.0 Response to Comments from Alachua County Environmental Protection Department

Response to Comments provided by Stephen Hofstetter, Alachua County Environmental Protection Department (Submitted by email on 12/20/2021)

Alachua County is committed to protecting the surface waters and groundwater within Alachua County and recognizes the importance of adopting Minimum Flows and Levels (MFLs) that are protective of these essential resources. Environmental Protection Department (EPD) staff have not had adequate time to thoroughly review the provided documents within the public comment window.

EPD Recommendations:

1) **Follow the recommendations from your peer review team to reconsider the frequent high threshold for adequately protecting swamp communities**

Response:

As described in response to Comment 1 from Paul Still on 12/20/2021, based on input from peer reviewers and several stakeholders, the District reviewed the Frequent High minimum levels in more detail. For Lake Santa Fe, the District decided to adjust the frequency and duration of the Frequent High level to two years and 30 days, which is more consistent with other lakes in this region and will better protect the seasonally flooded wetland communities around the lake. The Lake Santa Fe MFL and Modeling reports have been revised accordingly.

For Lake Alto, the District determined that additional data collection is necessary to develop an appropriate Frequent High minimum level. The District will implement a monitoring plan to better understand the lake's hydrology and its effects on adjacent wetland communities.

2) **Commit to re-evaluating the MFLs and the status of these waterbodies within the next three to five years.**

Response:

The District's MFL priority list is updated and approved annually by the Governing Board, which would be an appropriate time to request MFL re-evaluation for specific waterbodies. The priority list is based on the importance of the waters to the state or region and the potential for significant harm to the water resources per statute. MFLs are typically considered for re-evaluation when new data and analytical techniques would allow for an improved MFL evaluation.

The District has decided to conduct additional data collection and analysis and has therefore postponed MFL establishment for Lake Alto. When sufficient data has been collected, Lake Alto will be added to the priority list and MFL development will be restarted. In addition, MFL status assessments will be reviewed as new water use datasets become available and can occur more

frequently than MFL re-evaluations. The water supply planning process also includes an evaluation of the influence of consumptive uses of water on MFL waterbodies every five years.

3) **EPD staff attended the MFL workshop on 12/16/2021 and shares concerns voiced by citizens regarding new and proposed land uses in the basins. The draft documents show Lake Alto will be close to the proposed MFL at the end of the current planning period, which is not allowing much room for error and uncertainty. It will be important to re-evaluate the land-use and water use data for both lakes as this area continues to develop.**

Response:

The Lake Alto MFL establishment is being postponed for further data collection as described in the response to Comment 2.

4) **Future work should include surficial and intermediate aquifer withdrawals and impacts, including landscape irrigation from these sources.**

Response:

Surficial and intermediate aquifer withdrawals were estimated for this area. The District will continue to refine and improve data collection and estimation methods for water use, including estimates of landscape irrigation water use where appropriate.

5) **In addition, re-evaluation should include the uncertainties presented by climate change.**

Response:

The District will continue to review the period of record and current measured hydrologic data to assess status of the Lake Santa Fe MFLs. If the review shows that the Lake Santa Fe MFLs are not being met, or are trending toward not being met, the District will evaluate the potential impacts of various stressors on Lake Santa Fe. Factors other than consumptive uses of water (e.g., long-term drought) can cause the flow or level of a surface watercourse to drop below an adopted minimum flow or level. Based on the analysis, the District will assess existing MFL criteria and the MFL may be re-evaluated to account for changes in hydrologic conditions, including those related to climate change.

3.0 Response to Comments from Gary Long

Response to Comments provided by Gary Long (Submitted by letter and received by the District on 12/27/2021)

On 12/11/21, I received an announcement of a public workshop to be conducted by your organization on 12/16/21 regarding upcoming Minimum Flows and Minimum Levels for Lake Santa Fe. Due to previous commitments, I could not attend the workshop, but I have quickly reviewed several of your documents to which links were provided in the announcement.

My family and I are affected landowners. We owned property and lived adjacent to the water on the west shore of the large part of Santa Fe Lake for 7 years, from about 1993 to 2000, and have owned property and lived the last 21 years on the south shore of Little Santa Fe Lake, from 2000 to the present. Over this period of about 28 years, we have naturally observed recurrences of both high and low lake water conditions.

In sifting through your documents, I am struck by what is not there. There seems to be absolutely no consideration whatsoever of - people! There is a wealth of data collection and model calibration and analysis pertaining to dirt, plants, and fish, but I see no data collection nor analysis pertaining to the effects of minimum water levels on people. If these documents contain the only information that you are feeding to decision-makers to be considered in adopting minimum lake water levels, then your methodology suffers serious flaws.

Your report, "Minimum Recommended Lake Levels: Lake Santa Fe, Florida", May 2021, on page 2 indicates the first criterion listed for consideration in Rule 62-40.473(1), FAC, is "Recreation in and on the water". So, you must be aware of the requirement to consider people and recreation. Failure to consider lake-level impacts on people and recreation would seem to be not only misguided but a violation of Florida law. What follows are some of my observations of low lake water level impacts on people and recreation.

During times of low water levels, the lake has left our entire dock completely out of the water and dry. We had to leave our boat on its trailer on land. The elevation of the surface of our dock is 143.0 ft. The vertical distance from the dock surface down to the lakebed at the end of the dock is 8.3 ft. Subtracting 8.3 ft from the dock surface elevation of 143.0 ft results in 134.7 ft being the elevation of the lakebed at the end of the dock. Water levels below 134.7 ft cause our dock to be completely out of the water. Our boat is 20 ft long, as is typical, and the elevation of the lakebed 20 ft from the deep end of the dock, where one end of the boat would be when tied to the dock with the other end at the deep end of the dock, is 136.1 ft. So, a lake water elevation of 136.1 ft would bring the water edge 20 ft past the deep end of our dock, but our boat has a draft of about 2 ft, which is typical, and another 1 ft is needed for the propeller and skeg which extend below the bottom of the boat. This brings the minimum needed lake water elevation to 139.1 ft just to tie up our boat at the end of the dock with no safety margin to buffer it from hitting the lakebed when waves make it bob and bounce. Clearly, we would prefer for the minimum water level not to drop below 139.1 ft for us to be able to enjoy recreational usage of our boat and the lake.

An obvious remedy for low water would be to extend the dock. However, as shown in one of

your report exhibits, the slope of the lakebed is very flat in this and other vicinities so a lengthy extension could be required to reach the needed depth. Yet, the regulations limiting the surface area that is allowed for a dock become prohibitive. The problem of not being able to use their docks or boat slips for access to their boats when the water is low is common among a lot of our neighbors and other property-owners along the shore.

Another problem at low water levels is with boat ramps. There are only two public boat ramps. The public ramp at Melrose lacked sufficient water and was completely unusable during low water stages for medium-sized boats such as ours. The public ramp near Keystone Heights was usable, but the short channel connecting it to Little Santa Fe Lake was barely passable. This affects not only lake property owners but daytrip visitors such as wakeboarders and fishermen. Nothing prevents hurricanes during times when the water is low, and when the water is too low for boat ramps to be functional, there is no opportunity to haul watercraft out of the water for safety from avoidable hurricane damage.

If I were a decision-maker, I would want to see measurements of lakebed elevations 20 ft towards the shore from the deep ends of docks (or at the shallow end of boat slips) from around the lake to understand what effect adopting minimum water level standards will likely have on "recreation in and on the water". While I am only presenting my own observations that other property-owners also require a minimum water level of 139 ft, or perhaps more, for recreation, please do not let this matter be summarily dismissed by some non-property owner merely speculating that my situation could be unique, and the matter is not worthy of consideration. I can give you a list of names of other property-owners you can consult. As a decision-maker, I would also want to see the lakebed elevations at boat ramps and along their connections to the lake. About 3 ft can be added to all lakebed elevations to calculate the elevation for the minimum water level that is needed for recreation.

It should be much quicker and far less expensive to collect and summarize this information about minimum levels for recreational needs than what was spent to collect data about dirt and plants. Precise measurements to the 100th of a foot by a licensed surveyor are not necessary. The current lake water elevation could be obtained from the monitoring stations and a graduated pole dipped into the lake at each measuring point to determine how far the lakebed is below the water surface. This measurement just needs to be subtracted from the current water elevation. All docks could probably be visited quickly by boat and measured in a day or two. This same technique could be applied to collect data on depth suitability at the boat ramps and their channels to the lake.

For docks where the lakebed is too shallow at the recommended minimum water level, the measuring pole method could be used to determine how far the ends of the docks would need to be extended to reach minimum depths for boats. The surface areas for these extensions can be calculated and added to existing dock surface areas for comparisons with the regulations that limit dock surface areas. This information should be invaluable to decision-makers for evaluating the consequences of their decisions on recreation.

A simple linear regression, for the purpose of quelling the noise of monthly variations, through the data points shown in the Lake Santa Fe Hydrograph in Figure 3-2 of your report would surely confirm an overall trend of steadily sinking water levels from 1957 to 2021. Fortunately, the drop appears to be only a little more than 1 ft over the last 64 years. However, there is

nothing that suggests this trend of decline is going to improve in future years. Moreover, global temperatures have been rising and warmer temperatures bring more rain, but extra rainfall has not succeeded in reversing the declining water levels. Because low lake levels have hindered recreation in and on the water too frequently in the past few decades, adopting minimum lake water levels will hopefully preserve and improve the lake level needed for future recreation as well as for the conservation of plants, fish, and soils.

Response:

While the District's MFL approach focused on protecting the wetland communities around Lake Santa Fe, the District did consider recreation when developing these MFLs. This information was presented in a separate memo that assessed recreation and other aspects of the lake using methods developed by the Southwest Florida Water Management District. This included development of a dock use standard based on survey of nine docks on Lake Santa Fe. The dock use standard calculations and results are described in the memo.

In addition to dock use, the memo also includes analysis of maintaining connectivity between Lake Santa Fe and Little Lake Santa Fe and for recreational activities such as water skiing. This memo has been updated and will be posted on the District's website at the following link:

https://www.mysuwanneeriver.com/1606/Lakes-Santa-Fe-and-Alto

It is important to note that the MFL elevations specified in the revised Lake Santa Fe MFL report are not directly comparable to the dock use standard elevation because the MFL elevations are intended to maintain flooding and drying events of specific frequencies and durations.

4.0 Response to Comments from Jill McGuire

Response to Comments provided by Jill McGuire (Submitted by email on 1/13/2022)

Two of the most important issues that need clarification before the finalization of the MFLs are:

1) **More in-depth analysis of the potential effects of the expansion of the Chemours mining operation, along with monitoring strategies to safeguard against possible harm. There are many unanswered questions about the impacts to our watershed and groundwater that need to be considered as part of our MFL protections.**

Response:

See response to Comment 4 from Paul Still on 12/20/2021.

2) **The inadequate return intervals and duration of flooding events. This issue was raised in Peer Review, by BSWCD and by Terry Brant of our SFLDA. We would like to know what planned actions the District will use to address the Peer Review recommendations before the final draft.**

Response:

See response to Comment 1 from Paul Still on 12/20/2021.

5.0 Response to Comments from the Bradford Soil and Water Conservation District

Response to Comments provided by Tom Germano, Bradford Soil and Water Conservation District (Submitted by email on 1/13/2022)

Paul Still, a Bradford Soil and Water Conservation District (BSWCD) Supervisor, reviewed the documents associated with the recommended Minimum Levels for Lake Alto and Lake Santa Fe. The results of his review were presented to the other 3 BSWCD Supervisors at the January 4, 2022, BSWCD meeting. The BSWCD voted to hold a special emergency meeting on January 11, 2022, to allow the other Supervisors an opportunity to review Paul Still's comments and the documents associated with recommended Minimum Levels for Lake Alto and Lake Santa Fe. This document is the work product that was approved by Amy Morie, Ok Sun Burks and Paul Still on January 11, 2022. Tom Germano the 4th Supervisor was unable to attend the January 11 meeting.

The BSWCD is a Special District and its Supervisors can only discuss issues in public meetings. To facilitate the discussion of the comments contained in this document the BSWCD authorized Paul Still to meet with SRWMD staff and discuss the issues noted in this document.

The BSWCD has standing in this matter because Lake Santa Fe borders Bradford County and Bradford County property owners have lake front properties that would be impacted by any Minimum Flow and Level set for Lake Santa Fe. Lake Alto is entirely in Alachua County but it potentially impacts flows in the Santa Fe River which is in part the southern boundary of Bradford County. Bradford county property owners own property along the Santa Fe River. The Santa Fe Swamp, a significant conservation area that will be impacted by the minimum levels set for the two lakes, is in Bradford County. Most of the watershed for Lake Santa Fe is in Bradford County.

Copied below is Florida Administrative Code (FAC) 40B-8.121 adopted on 8/9/21. It is the current rule outlining the requirements for minimum levels of lakes in the Suwannee River Water Management District (SRWMD).

40B-8.121 Minimum Surface Water Levels for Lakes.

(1) The following terms, as used in this rule, shall have the following meanings:

(a) "Minimum Frequent High" means a chronically high surface water level or flow with an associated frequency and duration that allows for inundation of the floodplain at a depth and duration sufficient to maintain wetland functions.

(b) "Minimum Frequent Low" means a chronically low surface water level or flow that generally occurs only during periods of reduced rainfall. This level is intended to prevent deleterious effects to the composition and structure of floodplain soils, the species composition and structure of floodplain and instream biotic communities, and the linkage of aquatic and floodplain food webs.

(c) "Seasonally Flooded" means a hydroperiod category where surface water is typically present for extended periods (30 days or more) during the growing season, resulting in a predominance of submerged or submerged and transitional wetland species. During extended

periods of normal or above normal rainfall, lake levels causing inundation are expected to occur several weeks to several months every one to two years.

(d) "Semi-Permanently Flooded" means a hydroperiod category where surface water inundation persists in most years. When surface water is absent the water table is usually near the land surface. In many lakes with emergent marshes this water level is near the lower elevation that supports emergent marsh or floating vegetation and peat substrates, or other highly organic hydric substrates. This characterization may not be true for herbaceous wetlands around sandhill type lakes, which often have emergent vegetation that follows declining water levels to below the lower elevation of peat substrate. Water levels causing inundation are expected to occur approximately eighty percent of the time over a long-term period of record. Exposure of these ground elevations is expected to re-occur, on average, about every five to ten years for extended periods (several or more months) during moderate droughts.

(2) The following minimum surface water levels are established:

Water Body Name	County (Latitude/ Longitude)	Minimum Level	Level (Feet NAVD)	Event	Hydroperiod Category	Duration (Days)	Return Interval (Interval Measurement Period)
Lake Butler	Union (30°02'00''N/ 082°20'12"W)	Minimum Frequent High	129.55	Flooding	Seasonally flooded	30	2 years (June 1 to May 31)
		Minimum Frequent Low	127.30	Exposure	Semi-permanently flooded	120	5 years (October 1 to September 30)

Rulemaking Authority 373.044, 373.113 FS. Law Implemented 373.042, 373.0421, 373.103 FS. History–New 8-9-21.

The recommended Minimum Levels for Lake Santa Fe and Lake Alto are shown in the tables two Tables that follow.

Summary Table. Recommended minimum lake levels for Lake Santa Fe, Alachua County.

Minimum Level	Recommended Elevation (ft NAVD88)	Recommended Hydroperiod Categories	Recommended Duration (days)	Recommended Return Interval (years)
Minimum frequent high level (FH)	140.06	Seasonally flooded	14	2.5
Minimum average level (MA)	137.89	Typically saturated	180	1.7
Minimum frequent low level (FL)	136.52	Semi-permanently flooded	120	5

ft NAVD88 = feet above North American Vertical Datum of 1988

Summary Table. Recommended minimum lake levels for Lake Alto, Alachua County.

Minimum Level	Recommended Elevation (ft NAVD88)	Recommended Hydroperiod Categories	Recommended Duration (days)	Recommended Return Interval (years)
Minimum frequent high level (FH)	140.20	Seasonally flooded	14	2.5
Minimum average level (MA)	138.89	Typically saturated	180	1.7
Minimum frequent low level (FL)	137.52	Semi-permanently flooded	120	5

NAVD88 = feet above North American Vertical Datum of 1988

The BSWCD believes the recommended minimum levels and the methods used to establish the recommended minimum levels for Lake Santa Fe and Lake Alto have significant issues that should be addressed before the SRWMD moves forward with the rule making process. The issues are listed below along with information about the issue and recommendations to address the issue.

1) Minimum average level

   FAC-40B-8.121 does not currently address a Minimum average level.

   Recommendation: Remove the Minimum average level (MA) if it cannot be demonstrated it provides additional protection not covered by the Minimum Frequent High Level and the Minimum frequent low level.

Response:

The minimum average level is not currently defined in rule 40B-8 FAC because this specific minimum level was not appropriate for Lake Butler, which is currently the only lake in the District with adopted minimum levels. For Lake Santa Fe, the minimum average level addresses protection of the typically saturated hydroperiod category, specifically thick organic soils in the cypress and hardwood swamp wetlands adjacent to the lake, as described in the 2021 Lake Santa Fe MFL report.

2) Duration period for the Minimum Frequent High Level

   The 14-day duration period used for the Frequent High Level for both lakes does not match the 30-day duration period established for the SRWMD in FAC-40B-8.121(1)(c).

   Recommendation: Use the 30 day duration establsihed in FAC 40B-8.121(1)(c)

Minimum Surface Water Levels for Lakes.

Response:

See response to Comment 1 from Paul Still on 12/20/2021.

3) The return period for the Minimum Frequent High Level

The 2.5-year return period used for the Frequent High Level for both lakes does not match the 2-year return period used for the Minimum Frequent High Level established by the SRWMD in Florida Administrative Code (FAC) 40B-8.121(1)(c).

Recomndation: Use the June 1 to May 31 2-year return interval established in FAC 40B-8.121(1)(c).

Response:

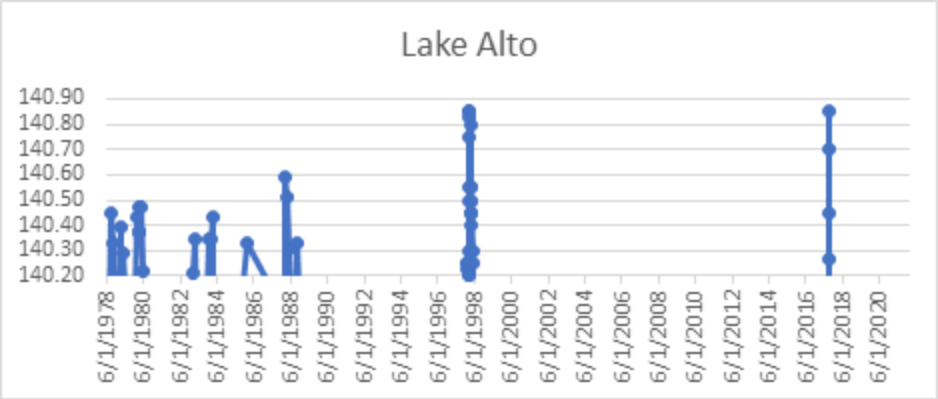
See response to Comment 1 from Paul Still on 12/20/2021.

4) Determination if the Minimum Frequent High Level is being met

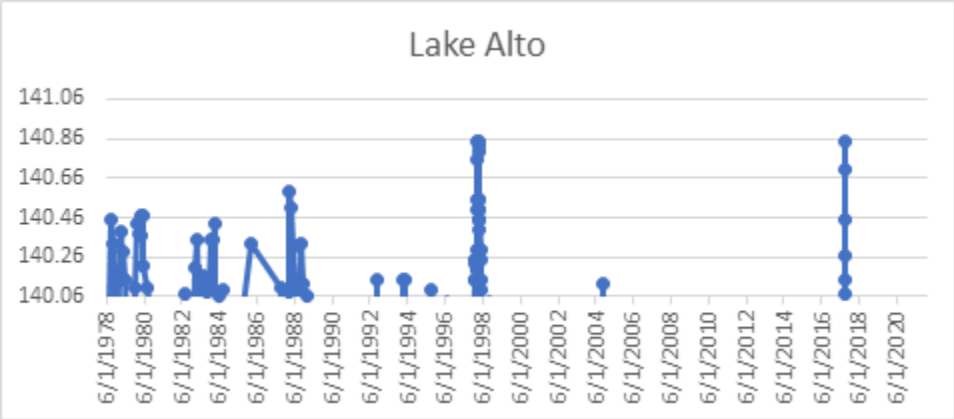
The 2021 documents for both lakes use a statistical method to determine if the Minimum Frequent High Level is being met. This method is not easy to understand. The method is not clearly explained in the documents associated with the Minimum Levels. The method appears to use Annual Exceedance Probability to determine if the minimum levels are being meet. There is no reference to Annual Exceedance Probability in FAC-40B-8.121.

A spreadsheet program with graphing capabilities can demonstrate current compliance with the rule language. All that is required is the existing lake level data. The first step is to determine whether an even or odd year will be used as the start date for the analysis. The start date of June 1, set by rule, of the odd or even year is then made the first value in the spread sheet. A graph is then created with a yearly horizontal axis and lake level as the vertical axis. The lowest line on the vertical axis is set at the Minimum High Frequency Level set by rule. Only periods that meet the Minimum High Frequency Level will appear on the graph so it is relatively easy to identify any two-year periods that do not have 30 days above the minimum level.

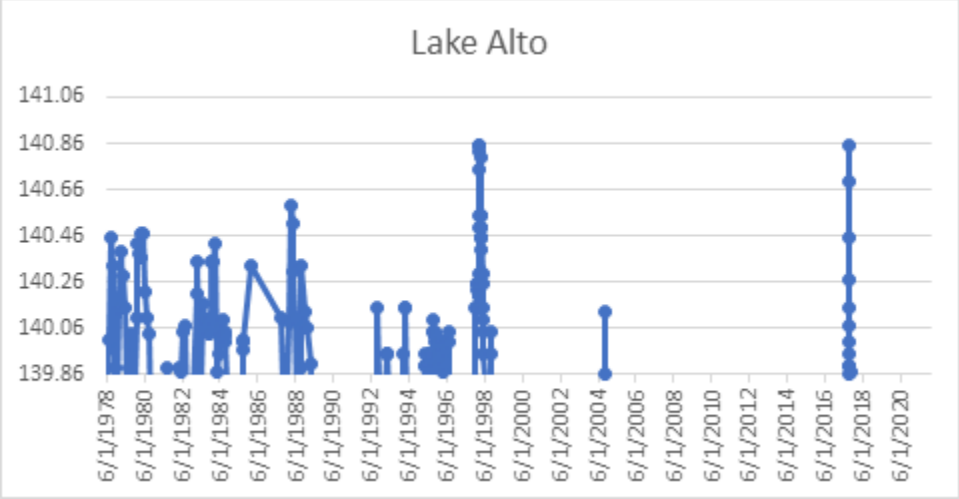
The three graphs that follow illustrate this method using three different Minimum Frequent High Level



Minimum High Frequency Level 140.20 recommended for Lake Alto



Minimum High Frequency Level of 140.06 recommended for Lake Santa Fe.



Minimum High Frequency Level of 139.86 suggested by BSWCD (see item 5 in this document)

Direct observation of the spreadsheet data can also be used and may be required if the 30-day period is not clear. This can easily be done by taking the data set selected above and sorting the data for the level column from largest to smallest. Use the highlight cell

function to highlight all cells with levels at or above the Minimum High Frequency Level. Resort the data using the date column with oldest to newest dates. Looking at the highlighted cells will clearly show if the 30-day duration period has been met.

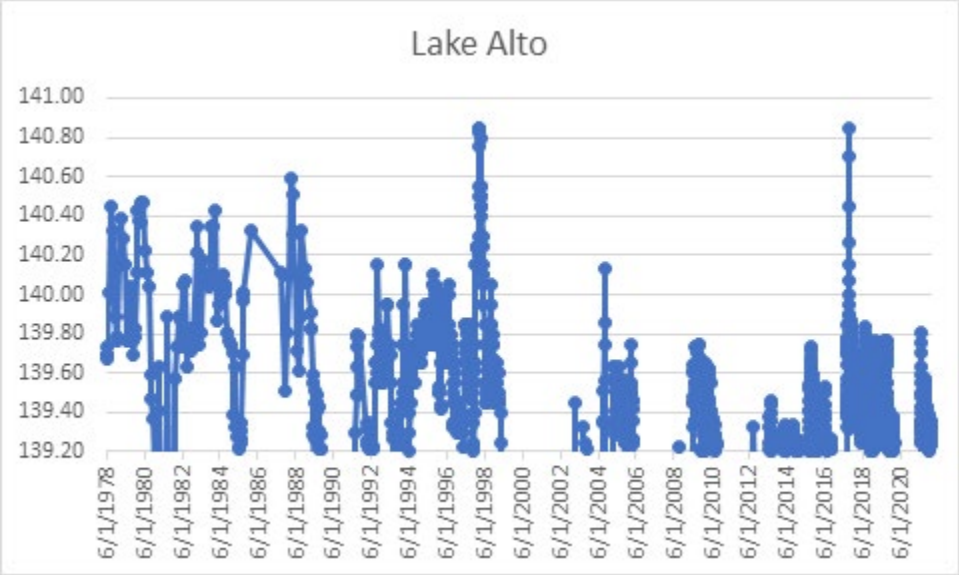
A sort of the Lake Alto data for part of September 2017 for the BSWCD recommended Minimum Frequent High Level of 139.86 feet is copied below.

9/9/2017	139.36
9/10/2017	139.75
9/11/2017	140.85
9/12/2017	140.70
9/13/2017	140.45
9/14/2017	140.27
9/15/2017	140.15
9/16/2017	140.07
9/17/2017	140.00
9/18/2017	139.95
9/19/2017	139.90
9/19/2017	139.90
9/20/2017	139.86
9/21/2017	139.83
9/22/2017	139.80

The level data for Lake Alto for part of September 2017 shows the spike in the graph did not meet the 30-day duration requirement.

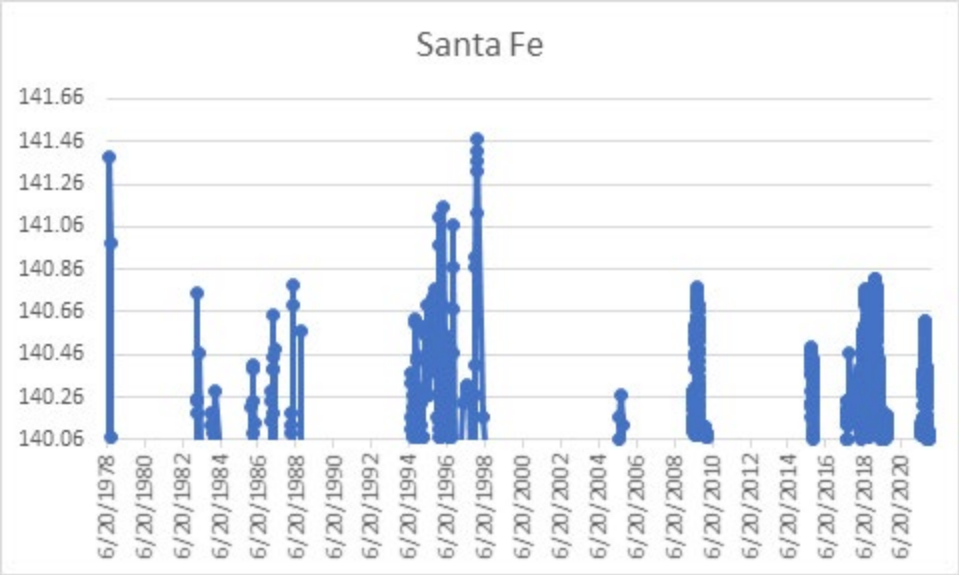
The above 3 graphs demonstrate that Lake Alto is not meeting a 30-day duration 2-year return interval for the Minimum High Frequency Level that was established in FAC 40B-8.121.

The Minimum Flows and Levels: Lake Altho Alachua County, Florida, April 30, 2014, recommended a Minimum High Frequency Level of 139.20. The graph that follows and the spreadsheet highlighted data show that the Minimum High Frequency Level of 139.20 was met for the time period June 1, 2018, to May 31, 2020, and has already been met for the time period June 1, 2020, to May 31, 2022.



A lowering of the Minimum High Frequency Level of only 0.66 feet moved Lake Alto from not currently meeting to meeting the Minimum High Frequency Level. The impact of this change may require a reconsideration of the simulated data instead of observed water level data if the model used is not calibrated better than the current model being used for the Lake Santa Fe and Lake Alto minimum levels.

When Lake Santa Fe levels are evaluated using the graph and spreadsheet method the Minimum Frequent High level of 140.06 feet was met for the for the time period June 1, 2018, to May 31, 2020, and has already been met for the time period June 1, 2020, to May 31, 2022.



The graph also clearly demonstrates that there were periods when the Minimum Frequent High level of 140.06 feet would not have been met. This should raise some concern about the need to develop a prevention plan for Lake Santa Fe.

Recommendations: Use the spreadsheet method to evaluate the status of the lake Minimum Levels.

Response:

The status assessment approach used for Lake Santa Fe minimum levels is described in the Lake Santa Fe MFL Status Assessment memo. This approach follows the event-based MFLs method developed by SJRWMD, which determines MFL status using a frequency analysis of the model-simulated lake stage data sets in comparison to the recommended MFL levels. This approach has been extensively peer-reviewed and is appropriate for assessing status of the Lake Santa Fe MFLs.

5) **BSWCD recommended Minimum High Frequency Level**

Page B-35 of the Minimum Recommended Water Levels: Lake Alto, Florida, May 2021, discusses how the 140.20 foot recommended Minimum High Frequency Level was chosen based on the highest elevation of cypress adjacent to Lake Alto. The authors also note that this highest elevation of 140.20 feet and the next highest elevation of 140.16 would be considered outlier points. The BSWCD is concerned that the 140.20 foot Minimum High Frequency Level would mean Lake Alto would never meet the Minimum High Frequency Level. Dropping the Minimum High Frequency Level to 139.86 would be the best option. Lake Alto is currently not meeting the Minimum High Frequency Level of 139.86 feet so a recovery plan may be required.

Response:

See response to Comment 1 from Paul Still on 12/20/2021. The District will continue to collect data at Lake Alto and will revisit the MFL evaluation once the hydrology of this lake is better

understood. Existing information indicates that groundwater withdrawals are not a primary driver of lower levels at Lake Alto.

6) Status Assessment

a. The method used to establish the current status of the Minimum Levels for each lake does not take into account the existing language in FAC 40B-8.121. FAC 40B-8.121 makes no reference to a Stage Duration Curve.

Recommendation: Use the 30 day duration and June 1 to May 31 2-year return interval establsihed in FAC 40B-8.121 to assess current status.

Response:

See responses to Comment 4 above and to Comment 1 from Paul Still on 12/20/2021.

b. The Minimum Recommended Water Levels: Lake Santa Fe, Florida, May 2021, and the Minimum Recommended Water Levels: Lake Alto, Florida, May 2021, by ECT provide level data for the period 1/1/57 to 1/1/2021. The Minimum Lake Levels Status Assessment for Lake Santa Fe, November, 2021, and the Minimum Lake Levels Status Assessment for Lake Alto, November, 2021, cover the period from 1960 to 2015.

Recommendation: The status assessment documents need to be updated to cover the period through January 1, 2021. Status assessments should be based on existing or proposed rule language.

Response:

The hydrologic record used for development of the Lake Santa Fe and Alto MFLs ended in 2015 because that is the year of the most recent complete water use dataset available when the MFL was developed. Water use datasets require substantial effort to compile and spatially distribute for modeling purposes and are needed at the beginning of the MFL modeling and analysis phase.

As stated in Section 5.0 of the 2021 Lake Santa Fe and Alto Modeling Report, “Current,” as used here, refers to the end of the hydrologic record utilized to develop the MFLs, in this case, 2015.

An updated water use dataset was recently compiled for Water Supply Plan development, which included average water use from 2014-2018 and projected water use in 2045. The dataset was used to evaluate the Lake Santa Fe MFL status as described in the updated 2022 Lake Santa Fe MFL Status Assessment memo.

c. The graphs in Minimum Lake Levels Status Assessment for Lake Santa Fe, November, 2021, and the Minimum Lake Levels Status Assessment for Lake Alto, November, 2021, reference a SWMM Simulation [1960-2015] but the documents do not provide the simulation or information about how the simulation was done.

Recommendation: Provide the level simulation data in a spreadsheet as an appendix.

Response:

The simulation details are described in the MFL Status Assessment memos and in Section 5.0 of the 2021 Lake Santa Fe and Alto Modeling Report. The simulated level data not included in these reports can be obtained via a public records request.

7) Location of the Lake Alto Level Gauge

   The location of the water level measuring gauge for Lake Alto is located at the western end of the Waldo canal and may not accurately record actual Lake Alto levels during or after rain events or periods of drought. Low lake levels cannot be measured because of sediment in the Waldo Canal. The highest point in the canal was reported at 135.67 feet in the Minimum Flows and Levels: Lake Alto Alachua County, Florida, April 30, 2014. The SRWMD level data has the following notation for 4/25/2012 and 524/2012 "Below limit of stage reading/dry at gauge".

   The Waldo Canal has its own drainage basin. During and after rain events the gauge could be recording Waldo Canal levels that are above actual levels in Lake Alto.

   Recommendation: SRWMD should establish a lake level gauge directly in Lake Alto.

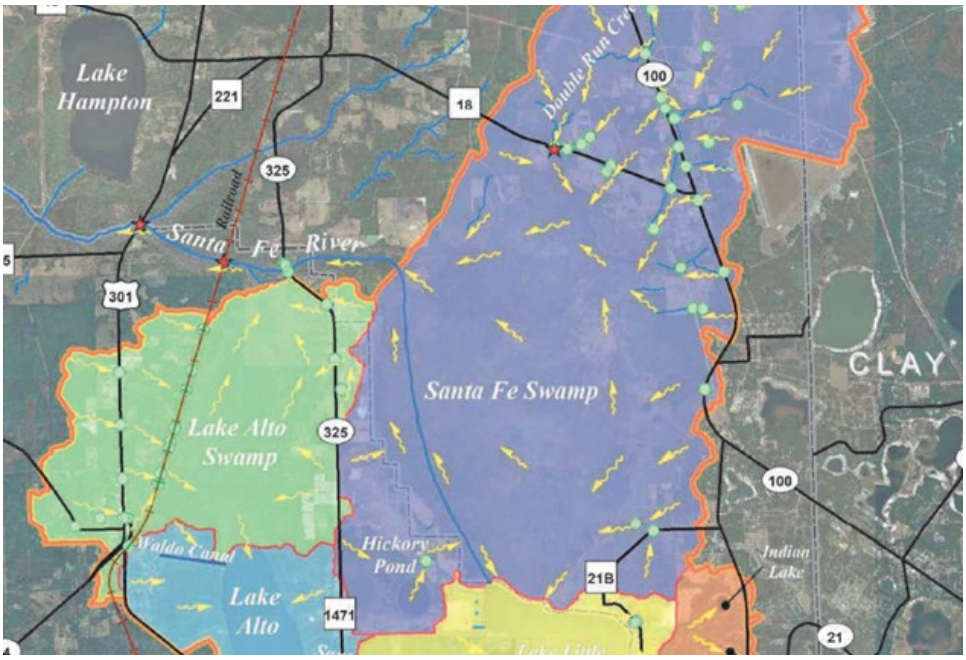
Response:

The District is planning to relocate the Lake Alto water level gage to a better location as part of the additional data collection for the lake.

8) Surface Water Flow through the Santa Fe Swamp

   The direction of surfacewater flow between Santa Fe Swamp and Little Lake Santa Fe and between Little Lake Santa Fe and Lake Santa Fe is not clearly documented.

   The part of Figure 2.5 Subwatersheds and Major Conveyance System Map from 2021 Model has yellow arriows that show flow is copied below.



The arrows indicate surface water from the southern part of the Santa Fe Swamp flows into Little Lake Santa Fe.

Figure 2.5 also seems to indicate that water flows from the blue line representing the Santa Fe River into Little Lake Santa Fe. This would idicate that Little Lake Santa Fe and Lake Santa Fe are not the headwaters of the Santa Fe River.

Recommendations:

Correct Santa Fe headwaters statements in the 2021 documents.

Initiate a study that would look at LIDAR land surface elevation to determine if LIDAR data will clearly identify the line across the Santa Fe Swamp at which surface flows are into Little Lake Santa Fe. Verify the dividing line with survey data.

Install a water level gauge in Little Lake Santa Fe.

Response:

Lake Santa Fe is generally considered the headwater of the Santa Fe River as described in Section 2.0 of the 2021 Lake Santa Fe and Alto Modeling Report. As stated in this section, the upper most reaches of the river are characterized by broad shallow lakes and swamps without a well-integrated drainage system. Depending on lake and swamp water levels, water may flow from the swamps to the lakes or vice versa. The yellow arrows in Figure 2-5 are intended to show general flow patterns. The blue lines in Figure 2-5 comes from USGS National Hydrography Dataset, which indicates that Little Santa Fe and Santa Fe Lakes are the headwaters for the Santa Fe River, but not that there is clearly defined channel within the Santa Fe Swamp.

LIDAR topography data has been reviewed as shown in Figure 2-2A and was used to delineate the sub-basins as shown in Figure 3-1. The LIDAR data indicates that the swamps are relatively flat and do not have clearly defined flow paths.

There is a water level gage installed at Lake Santa Fe, which is connected to Little Lake Santa Fe by a 1000-ft wide, over 10-ft deep channel as described in Section 2.6.5 of the 2021 Lake Santa Fe and Alto Modeling Report. As shown in Figure 4-6A, there is minimal difference in water levels between these two lakes and therefore no need for an additional water level gage.

9) Soils maping and model input

   Soil types play an important role in defining surface and groundwater features. The soil types used in the model do not appear to account for high organic (muck) soils that are found around both lakes and in both the Santa Fe and Alto Swamps.

   Recommendations:

   Investiagte if more detailed soil characteristics would improve the performance of the model.

   Expand Figures C-6, C-7, C-8, C-9 and C-10 in Minimum Recommended Water Levels: Lake Santa Fe, Florida, May 2021, to cover the entire watershed used in the MFL determination.

Response:

The model as calibrated meets the needs of the District to establish minimum levels for Lake Santa Fe. It is not necessary to incorporate additional information based on the intended use of the model.

10) The direction of surfacewater flow between Lake Santa Fe and Lake Alto is not clearly documented.

    Recommendation: Establish a plan to monitor flow direction or no flow conditions, possibly using residents to collect the data.

Response:

The flow is bi-directional depending on which lake has higher water levels as described in Section 2.6.2 of the 2021 Lake Santa Fe and Alto Modeling Report. The District is planning to collect flow and stage data in the canal to better understand the hydrology of the lakes.

11) The direction of surfacewater flow between Lake Alto and the west end of the Waldo canal is not clearly documented.

    Recommendation: Establish a plan to monitor flow direction or no flow conditions, possibly using residents to collect the data.

Response:

The flow is generally from the canal into the lake as described in Section 2.6.2 of the 2021 Lake Santa Fe and Alto Modeling Report.

12) Land uses used for the Model

The land use information from 2006 used to develop the model may not reflect current (2021) uses and future uses. Land use changes that have occurred after 2006 are not addressed.

Page 34 of the 2021 model document states:

In addition, the changes in land use/land cover and withdrawals of water during this simulation period are minimal; therefore, the water budget model developed using the 2004/2006 land use/land cover data and other best available data sources is suitable for model calibration for the selected simulation period.

The term minimal is vague. This statement does not appear to match land use changes in or near the watershed for the two lakes that have occurred since 2006 or the changes expected in the next 10 years. Some of the changes that can be seen in satellite imagery are listed below.

a. A significant part of the barren land use in 2006 was from the Santa Fe Swamp fire. That land is now in some form of regeneration that needs to be evaluated to verify the correction ECT used for the Santa Fe Swamp barren land use.

b. Borrow pits have been installed next to the watershed in the northwest corner of the Santa Fe Swamp.

c. The Straughn blueberry operation was expanded along Alachua CR 325. The operation is on over 400 acres.

d. A RV park has been constructed adjacent to the southeast corner of the Santa Fe Swamp. The current site is on about 62 acres but the site has an additional 155 acers approved for use.

Future land use changes

a. The RV Park at the corner of SR 100 and CR 21B may be expanded.

b. Rayonier is expanding its borrow pit on SE 8th Ave. east of Lake Santa Fe

c. Chemours is in the permitting phase of a mineral sands mining operation that will occur in or near the watershed for the MFLs under consideration. A Special Permit for Mining was Issued by Bradford County on 10/17/2019. An Environmental Resource Permit for the mining operation was issued by DEP on 5/26/2021.

That mining operation will impact 1,750 acers of which 740 are wetlands. There will be 1,549 acres of mining cells that will be up to 40 feet deep. The average depth of the mining cells will be 22 feet. Mining cells will be dewatered to allow for a dry mining process. Water from the dewatering will be used to transport mined materials to a processing plant. Excess water will be treated and discharged via a NPDES discharge point or points. The projected end date of the mining and reclamation is 2035.

The mining process could impact the flow in the drainage basins that flow to the Santa Fe Swamp or the Santa Fe River east of Highway 301

The final ground elevations and contours of the reclaimed land could impact the flows in drainage basins that flow to the Santa Fe Swamp or the Santa Fe River east of Highway 301.

The consumptive use of surficial aquifer water by the Chemours mining operation was not addressed in the determination that the Minimum Level for Lake Santa Fe would be met in the future.

The potential alteration in flows resulting form the Chemours mining operations was not addressed in the determination that the Minimum Level for Lake Santa Fe would be met in the future.

Recommendations:

The current and future land use changes need to be evaluated for their current and future impacts on Lake Santa Fe and Lake Alto levels.

The uncertainty created by the Chemours mine impacts should require that the Lake Santa Fe status be listed as potentially not meeting the Minimum Levels in the future. A prevention plan should be drafted for Lake Santa Fe.

Response:

See responses to Comments 8 and 10 from Paul Still on 12/20/2021 regarding land use data used to establish the Lake Santa Fe MFL.

See response to Comment 4 from Paul Still on 12/20/2021 regarding consideration of the Chemours mine. The District disagrees that potential impacts from future Chemours mining activities warrant prevention status for the Lake Santa Fe MFLs.

13) Lake Alto hydrograph data 7/11/1957 to 4/30/1983.

The 2021 recommended water level report states:

ECT (2021) developed "hybrid" lake stage time series for each of the lakes: Alto and Santa Fe. The components of the hybrid time series for a District-prepared series that was created at Lake Alto included a daily frequency for the period of 7/11/1957 to 4/301983 using a Line of Organic Correlation Analysis …

There appears to be no citation for the a "Line of Organic Correlation Analysis" or the basis for the data.

Recommendation: Provide a citation and include the data in an Appendix as a spreadsheet.

Response:

The hybrid time series and line of organic correlation approach is no longer being used for either lake. The MFL report was revised to describe the hindcasting approach used in the 2021 Lake Santa Fe and Alto Modeling Report.

14) The reports Minimum Recommended Water Levels: Lake Santa Fe, Florida, May 2021; Minimum Recommended Water Levels: Lake Alto, Florida, May 2021; Lake Alto and Leke Santa Fe Water Budget Modeling-Updated to Include Reference Timeframe Analysis, November 2021; Minimum Lake Levels Status Assessment for Lake Santa Fe, November, 2021; and Minimum Lake Levels Status Assessment for Lake Alto, November, 2021 do not appear to have been peer reviewed.

    The peer reviews reports are dated 2018 and are for the 2018 versions of the documents. Some of the significant changes were made to the 2018 documents in the 2021 documents are listed below.

    a. Hydrographs were extended from 2016 to 2021 for both reports.

    b. A new set of data for Lake Alto was generated that used a calculated values for the period 1957-1983 and Model Simulation data for the period 1983-2015. The method used to generate the calculated values is not clearly documented.

    c. An evaluation of the model used to predict lake levels was only done for the period 1/1/2006 through 12/31/2015.

    Recommendation: Conduct a peer review of the 2021 documents and any comments received by SRWMD relating to the Minimum Levels for Lake Santa Fe and Lake Alto.

Response:

The District does not intend to conduct another round of peer review for the Lake Santa Fe and Lake Alto MFL documents at this time. It is customary to make minor revisions to MFL documents between peer review and rule adoption.

6.0 Response to Comments from Paul Still

Response to Comments from Paul Still (Submitted by email on 1/14/2022)

An overriding concern I have is with the model developed by ECT to produce the simulated levels of the two lakes and to the determination if the two lakes are now meeting their Minimum Levels and will meet their Minimum Levels in the future.

The idea that you can produce a model that will tell you that a Minimum Lake Level established in rule is being met now or will be met in the future may not be realistic or productive.

1) There are two problems with the modeling approach. The first is the unknown impact of climate change on future rain patterns. The second is the lack of data about key elements needed for a Model.

   Impact of Climate Change There may be no way to predict rainfall and ET and these are two key elements in any water level model because of potential changes in storm intensities and prolonged drought periods. There can be significant investment in homes around lakes and these homes can be flooded during periods of high rainfall events. Balancing the risk of flooding and the potential impact of setting the minimum high lake level too high needs to be considered for those lakes where lake levels are controlled by outflow canals. The level of Lake Hampton is controlled by the condition of the canal that connects Lake Hampton to the Santa Fe River. When there are no factors that would significantly reduce flow through that canal Lake Hampton's peak levels would be expected to be lower than would occur if the canal has fallen trees, vegetation, or sediment that reduces flow through the canal. Human actions or inaction thus control the level of Lake Hampton. The levels of Lakes Sampson, Crosby, and Rowell are controlled by an operable control structure on the CR 225 Bridge. The operation plan for the CR 225 control structure has a significant impact on flooding of homes around Lakes Sampson and Crosby. Because a lakes minimum high level impacts the storage capacity of the lake, flooding of improved properties should be considered when the Minimum High lake levels are set.

Response:

MFLs are intended to support water supply planning activities and are required to use the best available information to estimate effects of current and future withdrawals on lake levels. To address potential future changes in rainfall, ET, and other factors that affect lake hydrology the District will re-evaluate the lake MFLs on a periodic basis as warranted.

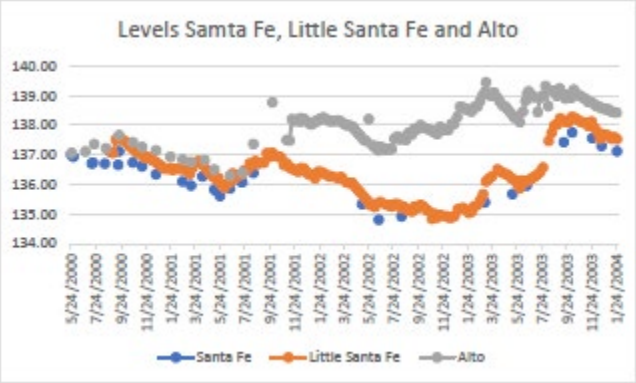
Per state statute (373.042, F.S), MFLs are defined as the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. Lake MFLs are therefore specifically focused on how withdrawals may lower lake levels and are not intended to address flooding concerns, which are the focus of the District's flood protection program.

2) Lack of Data

The surface water conveyance systems associated with the 2 lakes are not likely to be static since they are constantly changing. Trees fall into canals and ditches and reduce flows, sediment accumulates in canals and ditches and reduces flows, both emergent and submersed vegetation accumulate in canals and ditches and reduce flows.

The impact of reduced flow caused by partial blockage may have been the cause of the significant differences between Lake Alto and Little Lake Santa Fe that can be seen in the lake level data between September 2001 and July 2003. Lake Alto levels were 1.66 to 3.46 feet higher than the Little Lake Santa Fe levels. This difference could be explained by a blockage in the Waldo Canal that would have elevated the water level at the Alto gauge at the west end of the Waldo Canal. This could have caused higher levels at the Alto gauge than at the lake itself. Another possible explanation could be that there was reduced flow through the Santa Fe Canal resulting in higher levels in Lake Alto.

It would be worth the effort to see if anyone using Lake Alto between 2001 and 2003 could recall higher levels in Lake Alto or have pictures that show Lake Alto water levels.



Response:

The model as calibrated meets the needs of the District to establish minimum levels for Lake Santa Fe. It is not necessary to incorporate additional information based on the intended use of the model.

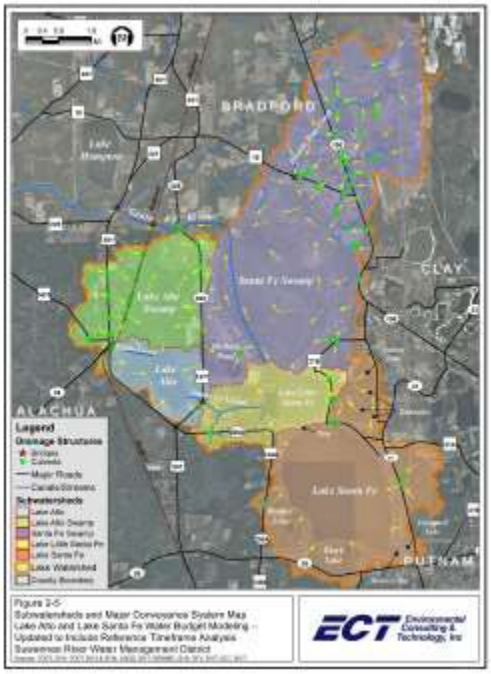
3) There appears to be no actual flow data presented in the reports that document inflow and outflow of surface water for the two lakes. The absence of flow data makes any evaluation of the model used by EDT to develop past, current, or future simulated lake levels very difficult.

Response:

The water budget model that was calibrated using lake level data meets the needs of the District for establishing the Lake Santa Fe MFLs, as described in the response to the previous comment. Regardless, the District is planning to initiate measurement of flows in the canal between Lakes

Santa Fe and Alto and in the Santa Fe River downstream of each lake to better understand the hydrology of both lakes.

4) As noted in the BSWCD comments there is no documentation that there is any surface water flow out of the two lakes. The yellow arrows in Figure 2.5 copied below indicate flow is only into Lake Santa Fe and Lake Alto.



The document Minimum Recommended Water Levels: Lake Santa Fe, Florida, May 2021, by ECT states on page 4:

> The 7,046-acre Santa Fe Swamp at the north end of the lake, is considered the headwaters of the Santa Fe River, the largest tributary of the Suwannee River. At high water levels, Lake Santa Fe overflows into the Santa Fe Swamp and ultimately into the river (Pirkle and Brooks 1959). Water levels in Lake Santa Fe have been characterized as stable relative to other nearby Florida lakes due to underlying relatively impermeable materials (Pirkle and Brooks 1959).

The abstract of the Pirkle and Brooks 1959 paper states:

> Santa Fe Lake, located in northeastern Alachua County, is largely sealed off from the principal aquifer, the Ocala limestone, by Pleistocene clayey sands and relatively impervious sediments of the Hawthorne formation. Sufficient rain water from the youthful plateau of pine-palmetto flatlands, swamps, and marshes slowly drains and seeps into the lake to largely offset losses from evaporation, transpiration, and seepage even during drought periods. In addition to discharge by

seepage in an eastward direction through surficial sands, overflow into a swampy area north of the lake occurs at times of unusually high water.

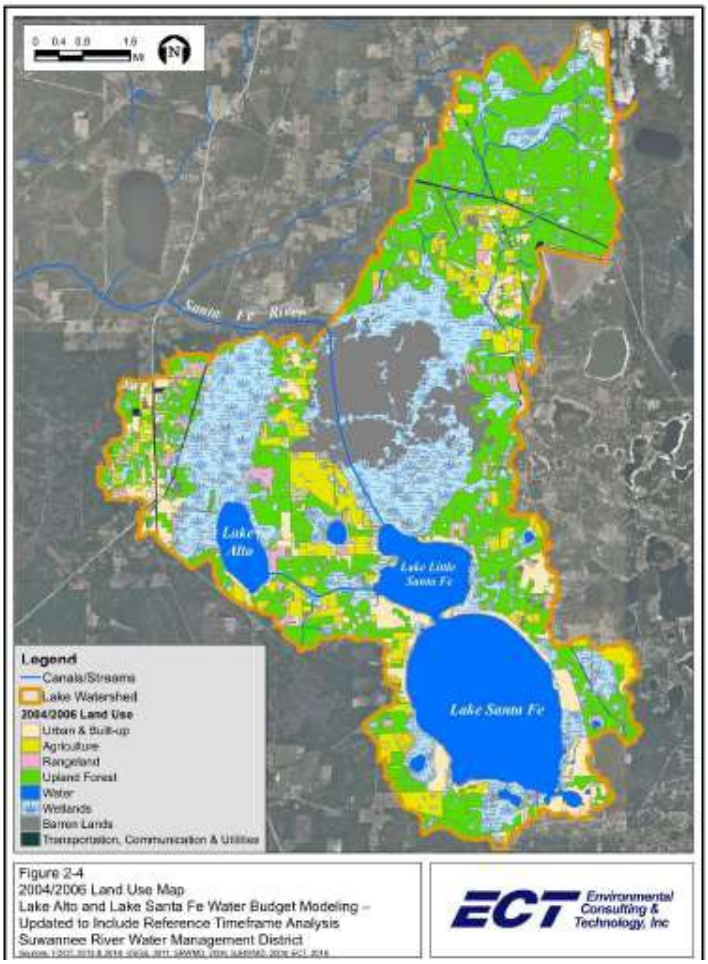
It is not known if the contents of the 1959 paper indicate that the Santa Fe River originates at Little Lake Santa Fe.

There appears to have been no attempt to verify that flow from Little Lake Santa Fe forms the headwaters for the Santa Fe River. Aerial imagery does not appear to support the location of a channel that would correspond to the dark blue line drawn through the Santa Fe Samp and labeled as the Santa Fe River in Figure 2.5.

Response:

See response to Comment 8 from the Bradford Soil and Water Conservation District on 1/13/2022.

5) Figure 2.4 from the document Lake Alto and Lake Santa Fe Water Budget Modeling-Updated to Include Reference Timeframe Analysis, November, 2021, copied below is missing most of the paved and unpaved roads in the watershed.



Response:

Figure 2-4 shows Level 1 land use data to indicate the general land uses in the watershed as described in Section 2.5 of the 2021 Lake Santa Fe and Alto Modeling Report. More detailed land use information was used for model simulations as described in Sections 3.0 and 4.0 of the modeling report.

6) The document Lake Alto and Lake Santa Fe Water Budget Modeling-Updated to Include Reference Timeframe Analysis, November, 2021 beginning on page 67 addresses the water budget and follows.

4.4.3 Water Budget Results

The water budget results of the 10-year calibration simulation were provided in the model output report file. The results of the model calibration simulation indicate that the lake watershed has on average, precipitation of 47.69 in/yr, evaporation (from land surface and conveyance system) and ET of 33.24 in/yr, deep percolation of 12.13 in/yr, outflow to the downstream canal of 2.46 in/yr, and storage change in aquifers and conveyance system of - 0.14 in/yr in the 10-year simulation period from 2006 through 2015 (Table 4-9).

Table 4-9. Summary table of water budget results in Lake Alto and Lake Santa Fe watershed (2006-2015).

Runoff Quantity

Items	Total Volume (acre-ft)	Total Depth (in)	Average Depth (in/yr)
Precipitation	1,488,629.1	476.9	47.69
Evaporation	164,108.0	52.5	5.25
Infiltration	928,501.8	297.2	29.72
Surface Runoff	397,102.2	127.1	12.71
Final Storage	5.8	0.0	0.00

Groundwater

Items	Total Volume (acre-ft)	Total Depth (in)	Average Depth (in/yr)
Initial Storage	576500.6	184.6	18.46
Infiltration	928501.8	297.2	29.72
Upper Zone ET	474804.8	152.0	15.20
Lower Zone ET	12882.2	4.1	0.41
Deep Percolation	238238.6	76.8	7.68
Groundwater Flow	205715.7	65.9	6.59
Final Storage	572285.3	183.2	18.32
Storage Change	-4215.4	-1.3	-0.13

Flow Routing

Items	Volume (acre-ft)	Volume (10^6 Gal)	Average Depth (in/yr)
Initial Storage	107,133.2	34,911.0	3.43
Surface Runoff	397,088.4	129,397.2	12.71
Groundwater Inflow	205,716.0	67,035.6	6.59
External Outflow*	216,351.7	70,501.4	6.93
Evaporation	398,742.0	129,925.7	12.38
Final Storage	107,071.2	34,890.7	3.43
Storage Change	-62.1	-20.2	0.00
* External Outflow includes:			
To Downstream Ditch	76,750.4	25,009.2	2.46
To Upper Floridan Aquifer	139,584.2	45,487.0	4.47

I did not find a Table similar to Table 4-9 above with the water budget for the watershed for the individual lakes.

Flow to the Floridan Aquifer appears to be a significant part of the water budget however The Pirkle and Brooks 1959 Abstract quoted above indicates that Floridan aquifer levels may have limited impacts on Lake Santa Fe. Comparing the lake level changes in the lakes to the east of Lake Santa Fe seems to show two clear patterns. Some but not all of the lakes to the east show significant level variation attributed to seepage losses to the Floridan aquifer.

A key question is: Can the loss of lake water to the Floridan Aquifer used in the ECT Model be supported by any data?

Response:

The District developed a water budget model that was calibrated with lake level and groundwater level data to support development of MFLs for Lake Santa Fe.

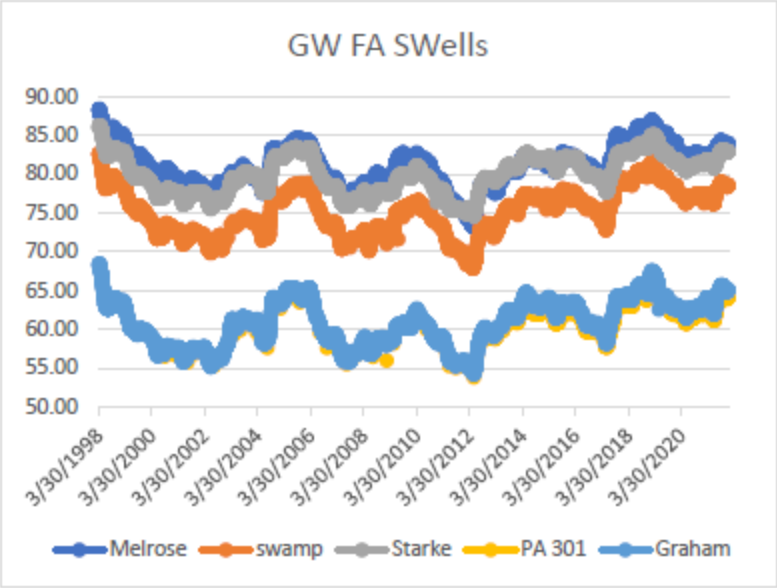
The District is not aware of data regarding loss of lake water to the Floridan Aquifer for Lakes Alto and Santa Fe. Calibrated models are customarily used to estimate groundwater loss rates to underlying aquifers as described in Sections 3.3 and 4.3 of the 2021 Lake Santa Fe and Alto Modeling Report.

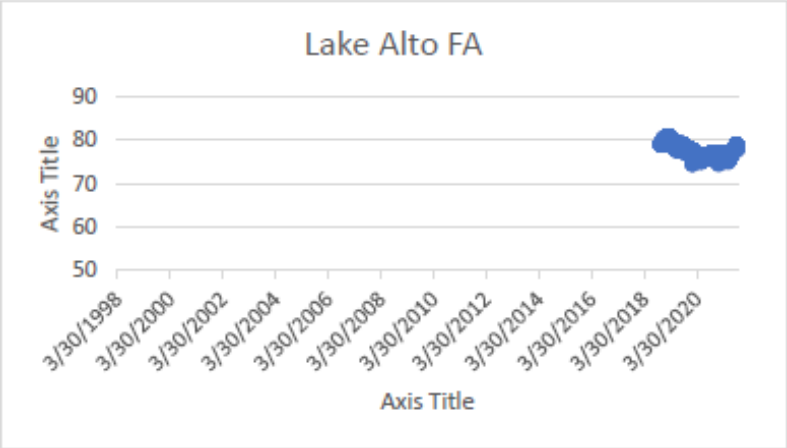
7) Another concern I have is the need to develop an approach that recognizes that lakes may have been significantly changed by drainage systems and canals that have been built since the 1870s. These changes would mean that the use of soil data particularly the use of organic content to estimate minimum high lake levels may not be appropriate. Some plant indicators such as buttress points on cypress trees may not be appropriate if the trees were growing prior to any major change in drainage systems that impact a lake.

Response:

The District considers structural alterations such as canals when developing MFLs as described in Section 6.0 of the 2021 Lake Santa Fe MFL Report. If structures have clearly altered lake levels then different approaches may be used to develop MFLs. For example, the proposed Lake Hampton MFLs were developed using methods from the Southwest Florida Water Management District that better account for these alterations. For the Lake Santa Fe MFLs, vegetation and soil conditions that existed at the time fieldwork was performed were deemed appropriate. Plant indicators such as cypress buttress inflections were not used to develop Lake Santa Fe MFLs.

8) Finally, the SRWMD has more ground water level wells near the two lakes. It is not clear why these wells were not referenced in the ECT documents. Graphs of the Floridan Aquifer wells produced from SRWMD data are shown below.





While the Lake Alto well has limited data it is important because its levels indicate there is an intermediate confining layer in the Florida Aquifer at the well location. The lower levels at the Graham well and the well at the Property Assistance location on US 301 may indicate the intermediate confining layer in the Florida Aquifer is absent.

The surficial aquifer well at Lake Alto and the surficial and intermediate wells at the Santa Fe Swamp could be used to clarify the impacts of the surficial and intermediate aquifers on lake Levels.

Response:

Your feedback is noted. The USGS Melrose well was the focus of the 2021 Lake Santa Fe and Alto Modeling Report because it had the longest period of record.

7.0 Response to Comments from Mike Hensch

Response to Comments provided by Mike Hensch (Submitted by email on 1/22/2022)

My comment is focused on the canal that connects Lake Santa Fe and Lake Alto.

1) **This canal is clogged with tree debris and vegetation which is prohibiting the flow of water between Lakes Santa Fe and Alto. The long term effect is that Lake Alto is lower and Lake Santa Fe is higher than it would be if this canal was maintained or cleared. The high water has persisted in Lake Santa Fe since the 2017 flooding from Hurricane Irma. Additionally, the MFLs for Lake Alto would probably be met more easily if this canal was cleared, and is probably the reason that Lake Alto is lower than the historical levels. (Evident on the Lake Alto water level graph showing historical levels were higher than current levels figure 5-10a in hydrologic modeling report). The canal should be cleared out allowing Lake Alto to meet its MFL more easily and also allowing Lake Santa Fe to recede. Allowing the canal to flow again helps the health of both lakes.**

Response:

Per state statute (373.042, F.S), MFLs are defined as the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. Lake MFLs are therefore specifically focused on how withdrawals may lower lake levels and are not intended to address canal maintenance. For developing the Lake Santa Fe MFLs, the lake was assessed based on its current condition as described in Sections 3.3.1 and 4.3.3 of the updated 2022 Lake Alto and Santa Fe Hydrologic Modeling Report.

For Lake Alto MFLs, the District is planning to collect additional data to better understand the lower lake levels in recent decades. This will include collecting flow and level data in the canal between Lakes Santa Fe and Alto. The District intends to review this data annually and will revisit the MFLs for these lakes when sufficient information has been collected.