

Technical Memorandum

To: Connor Blais and Andrew Sutherland, Ph.D., SJRWMD
From: Robert Burleson, P.E., and Tony Janicki, Ph.D.
Date: August 13, 2025
Re: Peer Review of the Determination of Minimum Levels for Johns Lake in Orange and Lake Counties, Florida

Introduction

The St. Johns River Water Management District (SJRWMD) completed a minimum levels determination for Johns Lake in Orange and Lake counties, Florida. Johns Lake is on the MFLs Priority Water Body List and Schedule and scheduled for adoption in 2025. This lake is a locally and regionally important water resource within the Central Florida Water Initiative (CFWI) area. As part of the CFWI's regional network of MFLs, Johns Lake is a critical indicator of potential impacts due to groundwater pumping. The minimum levels recommended for Johns Lake are intended to support the protection of aquatic and wetland ecosystems, as well as human-beneficial uses, from significant harm caused by the consumptive use of water.

MFLs determinations and reevaluations are subject to independent scientific peer review pursuant to decision by a water management district's governing board (373.042(4)(a), F.S.). The MFLs evaluation for Johns Lake was identified for independent scientific peer review by the SJRWMD's governing board. This work involves the review of all scientific or technical data and methodologies used to establish the MFLs [373.042(4)(a), F.S., and 62-40.473(10), F.A.C.].

Geosyntec Consultants, Inc. (Geosyntec) and Environmental Science Associates, Inc. (ESA) provided a peer review of the *Minimum Levels Determination for Johns Lake, Orange and Lake Counties, Florida*. A kick-off meeting and site visit took place on April 24, 2025. All documents were reviewed, and initial findings were presented at a Public Meeting on May 27, 2025. The SJRWMD provided a response to the Initial Findings on June 16, 2025. The SJRWMD responses were evaluated, and the final comments have been adjusted with consideration of the additional analysis provided.

Overall, the report and associated appendices were found to be well written, with sufficient documentation to justify the report's conclusions, including relevant and primary water resource values (WRVs) used in the determination, supporting hydrologic and environmental data, and the minimum level proposed, including its basis. There were no fatal flaws identified. Some text should be added to clarify statements made in the report. Addressing the deficiencies in the documentation will greatly improve the defensibility of the MFL determination.

This technical memorandum summarizes Geosyntec's and ESA's review of the *Johns Lake Minimum Levels Determination*, including the following documentation:

- Blais, C., O. Leta, C. Shadik, A. Sutherland and F. Gordu. 2025. Minimum Levels Determination for Johns Lake, Orange and Lake counties, Florida. Draft Report. Bureau of Water Supply Planning, SJRWMD.
 - Appendix A: DEM Development;
 - Appendix B: Hydrological Analyses;
 - Appendix C: Environmental Methods, Data and Metrics;
 - Appendix D: MFLs Status Assessment; and
 - Appendix E: WRVs Assessment

Review Questions

SJRWMD provided the following review questions. To assess each question, Geosyntec and ESA reviewed the report and appendices. Responses to the review questions are provided below.

1. The objectives of the peer review are to answer the following questions:
 - Validity and appropriateness of environmental analyses and criteria:
 - Are the environmental data used to develop environmental criteria adequate and appropriate? Are the methods and procedures used to develop and assess environmental criteria appropriate?
 - Have all relevant environmental values been evaluated?
 - Are assumptions reasonable and consistent given best available information?
2. Validity and appropriateness of hydrological analyses:
 - Are the hydrological data used to develop and assess environmental criteria adequate and appropriate?
 - Are the hydrological analyses used to develop and assess environmental criteria appropriate?
 - Are assumptions reasonable and consistent given best available information?
3. Appropriateness of recommended MFLs:
 - Are data used to support conclusions and recommendations adequate and appropriate?
 - Are the assumptions used and conclusions made in the development of protective minimum levels reasonable and appropriate given best available information?

1) Assess validity and appropriateness of environmental analyses and criteria

a) Are the environmental data used to develop environmental criteria adequate and appropriate?

Yes. The environmental data used to develop and assess the environmental criteria are considered adequate and appropriate. The SJRWMD provided a wide range of data to support its proposed MFL. These data include:

- Land use
- Wetland coverages

- Hydric soils
- Soil types
- Water quality – typical suite
- Lake stage – Secchi disc relationship
- Lake stage – Trophic State Index relationship

Other data sources used include:

- Site-specific field-based ecological data;
- Environmental data;
- Recreational data;
- Topographical information;
- Data collected at other MFLs sites; and
- Supportive information from scientific literature

b) Are the methods and procedures used to develop and assess environmental criteria appropriate?

Yes. The analyses used to assess the environmental criteria are considered appropriate. It allowed the District to apply its event-based analytical method as has been applied successfully in past studies and to apply its Hydroperiod Tool to develop the minimum lake levels for the six fish and wildlife habitat metrics.

The District identified multiple environmental criteria to be evaluated to ensure that protective minimum levels are set at Johns Lake. Criteria were chosen based on their potential to protect non-consumptive environmental values and beneficial uses (also called WRVs), whose consideration is mandated by Rule 62-40.473, F.A.C. These criteria include:

- Minimum Frequent High: Two event-based metrics, Minimum Frequent High, were developed based on the SJRWMD's conventional approach; and
- Hydroperiod Tool Metrics: Multiple fish and wildlife habitat and recreational metrics were developed using the SJRWMD's geographic information system (GIS) based hydroperiod tool.

c) Have all relevant environmental values been evaluated?

Yes. Important choices were made to evaluate both fringing wetlands and in-lake habitats for six fish and wildlife taxa.

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

Yes. The assumptions made by SJRWMD are reasonable and consistent given the "best information available".

2) Assess validity and appropriateness of hydrological analyses

a) Are the hydrological data used to develop environmental criteria adequate and appropriate?

Yes. The hydrologic data used to develop and assess the environmental criteria are considered adequate and appropriate. Available lake level data for Johns Lake extend

from 1959 to the present. Precipitation data were available from 1948 to 2020. Long-term UFA groundwater data are available from three wells with at least 34 years of data available. Long-term potential evapotranspiration (PET) data are available from 1948 to 2020 from the Clermont 9s NOAA station. The two models used to develop the long-term no-pumping and current-pumping time series [ICPR4 and East-Central Florida Transient Expanded (ECFTX) Groundwater Model] have undergone rigorous peer review. Estimates of groundwater use were developed using either annual water-use survey data or were based on per capita water use, both considered best available information. The periods of record for both surface water and groundwater data were sufficient to develop strong relationships between Johns Lake water levels and UFA water levels, as demonstrated in the report.

b) Are the hydrological analyses used to develop and assess environmental criteria appropriate?

Yes. The analyses used to assess the environmental criteria are considered appropriate. It allowed SJRWMD to apply its event-based analytical method as has been applied successfully in past studies and to apply its Hydroperiod Tool to develop the minimum lake levels for seven fish and wildlife habitat and recreation metrics.

Initial review identified three issues that required additional explanation and/or evaluation. These issues are described below.

- 1. Additional explanation needed related to the sudden change in simulated water levels around 1996 and prior as shown in Figure B-8. Consider investigating the effect of the model over-prediction of Johns Lake water levels in the first half of the simulated time period on the environmental analysis.**
- 2. Consider:**
 - a. Using the observed lake levels in the pre-development period to create a hybrid long-term lake level time series.**
 - b. Apply no-pumping and current pumping adjustments to the hybrid time series.**
 - c. Re-calculate statistics, including frequency statistics for duration, using the hybrid time series.**
 - d. Re-evaluate No-pumping and current pumping frequency analysis for FH#1 and compare to MFL recurrence interval (1.6 years) determined from the SWIDS analysis.**
 - e. Re-evaluate the open water area metric with the Hydroperiod Tool.**
 - f. Re-determine available water for FH#1 and compare to open water metric freeboard (1.3ft)**
 - g. to determine if the open water metric is still the most constraining.**
- 3. Need to discuss how you arrived at a 15-mile buffer zone when assessing groundwater pumping rate and UFA and Johns Lake drawdown impacts.**

These issues were addressed in the District's publication, "SJRWMD Initial Responses to Peer Review and Stakeholder Comments Regarding Draft MFLs for Johns Lake, Orange and Lake Counties, Florida. 6/16/2025." Some of the response required new analyses by the District. A significant amount of work had already been

performed to address similar comments raised during the Peer Review of the Johns Lake models related to the sudden change in simulated water levels around 1996 and prior as shown in Figure B-8. Review of the Peer Review Response document indicated that the District had satisfactorily addressed the issues raised.

A concern was more so that a review of the MFL document and associated appendices did not reveal a significant amount of work that was done that addressed some of the same questions raised during the model peer review process. The report will be strengthened by inclusion of a description and the results of these analyses and the District's Peer Review response document.

c) Are assumptions reasonable and consistent given best available information?

Yes. The biggest stated assumption is that the hydrological history will repeat itself (Page 28 of the draft MFL report). This needs clarification given the response to the peer review comments. Land use-land cover is not being repeated for the entire hydrological history. It is agreed that the model setup as reflected in the calibration and verification analysis is most appropriate for the MFL analysis. It should also be noted in the report as to why the final model setup following its peer review is appropriate, particularly as it relates to LULC. This would explain why even though there is overprediction based on comparison to the earlier part of the hydrologic record, it is appropriate for the MFL analysis.

Because of the rapid and significant changes that have occurred in the Johns Lake watershed (LULC, increased capacity at the CONSERV II RIBS, structural changes to lake hydraulic controls) in the more recent part of the hydrologic history, it may be more appropriate to say that climatic history is assumed to repeat (this is stated earlier on Page 28). This should be stated consistently throughout the draft report and the appendices. Given the uncertainties in future rainfall and temperature predictions, SJRWMD's approach of regularly testing this assumption by implementing an adaptive management strategy and periodic re-evaluations is considered reasonable.

3) Appropriateness of recommended minimum levels

a) Are data used to support conclusions and recommendations adequate and appropriate?

The data used to support conclusions and recommendations are considered adequate and appropriate.

b) Are the assumptions used and conclusions made in the development of protective minimum levels reasonable and appropriate given best available information?

The assumptions used and conclusions made in the development of protective minimum levels, including identifying sources of uncertainty and their impact on development of protective minimum levels for Johns Lake, were found to be valid and appropriate.