

Appendix F

Minimum Flows and Minimum Levels – Assessment

Technical Memorandum
North Florida Regional Water Supply Plan
Minimum Flows and Minimum Levels – Assessment
September 9, 2016

Minimum Flows and Minimum Levels (MFLs) were evaluated during the North Florida Regional Water Supply Plan (NFRWSP) process in order to determine whether established flows and/or levels would be achieved with projected groundwater withdrawals at the 20-year planning horizon (2035) in the NFRWSP area alone and within the entire North Florida-Southeast Georgia regional groundwater flow model (NFSEG) boundary. This document reviews the basic methodology used to assess MFLs status for the different types of waterbodies evaluated within the NFRWSP area followed by a summary of the assessment results.

Lake MFLs Assessment

Within the NFRWSP area, there are 47 lakes with adopted MFLs, all of which are located in the St. Johns River Water Management District (SJRWMD). Nineteen of those lakes were assessed in the NFRWSP. Of the 28 non-assessed MFL lakes, six show no significant connection to the Floridan aquifer and, therefore are minimally influenced by groundwater withdrawals. The remaining 22 lakes lacked sufficient data for assessment at the time of analysis (see Appendix E for additional details).

For each of the 19 assessed lakes, a freeboard value corresponding to the lake's surface water model year provided the amount of drawdown in the Floridan aquifer allowed before the most constraining MFL for each lake would no longer be achieved. Double mass analyses were performed using Floridan aquifer levels in a nearby long-term well and vicinity rainfall to determine if the aquifer level-rainfall relationship had changed during the time between the surface water model year and 2008 (or 2011 and 2012 for lakes Gore and Tuscawilla, respectively). Such a change may signify potential impacts from groundwater pumping. These analyses revealed no significant changes in the aquifer level-rainfall relationships and the conclusion was made that the freeboard values could be brought forward to 2008 (or 2011 and 2012 for lakes Gore and Tuscawilla, respectively).

The North Florida-Southeast Georgia groundwater flow model was used to derive predicted aquifer drawdowns beneath each MFL lake from 2009 (the calibrated baseline condition) to 2035. The assumption was made that freeboard values would not have changed significantly between 2008 and 2009 (or between 2011 and 2009 for Lake Gore and 2012 and 2009 for Lake Tuscawilla). The drawdown values were then compared to the starting freeboard values to determine current and future compliance with the MFL. A positive freeboard indicates that the MFL is being met and additional Floridan aquifer withdrawals are available. A negative freeboard indicates that the MFL is currently not being achieved (recovery status) or will not be achieved during the planning horizon (prevention status).

Based on the additional predicted drawdown at 2035 conditions within the NFRWSP area (with the remainder of the NFSEG domain kept at baseline, or 2009, conditions), all the evaluated lakes had freeboard available at 2035 indicating that their MFLs were met. The same was true for 2035 conditions within the NFSEG domain – all lake MFLs were achieved with various amounts of remaining freeboard.

River and Spring MFLs Assessment

The Lower Santa Fe and Ichetucknee rivers and associated priority springs were determined to be in recovery in reference to their MFLs. The analyses to support this determination can be found within the MFL document for these waterbodies (Appendix G). Under 2010 conditions, the analysis showed a flow deficit of 17 cubic feet per second (cfs) at the Santa Fe River near Ft. White and a flow deficit of 3 cfs at the Ichetucknee River at U.S. Highway 27. The impact of demand projections within the NFRWSP area through the 20-year planning horizon was evaluated by comparing the NFSEG 2009 calibrated baseline condition with the simulated withdrawal conditions at the 2035 planning horizon. Any modeled decrease in discharge relative to the 2009 model run was added to the estimated flow deficits. This planning evaluation is separate from the re-evaluation of the established MFLs that will occur prior to the end of 2019 (subsection 62-42.300(1)(e), Florida Administrative Code). The additional predicted flow reduction associated with 2035 projected water use within the NFRWSP area (with the remainder of the NFSEG domain kept at 2009 conditions) was 21.1 cfs for Santa Fe River and 12.6 cfs for the Ichetucknee River. Using 2035 pumping conditions for the entire NFSEG domain results in a further reduction in predicted flow of 4.4 cfs for the Santa Fe River and 0.6 cfs for the Ichetucknee River.

The Upper Santa Fe River MFLs were established in 2007 (WRA, 2007). The reference condition for these MFLs was evaluated using the NFSEG no pumping scenario. Flows at the Graham and Worthington Springs gages under the reference condition were compared to the modeled flows under the 2035 simulated withdrawal condition. The changes in flow at both gages were compared to the water available the reference condition as determined by the MFLs. Results indicate that the Upper Santa Fe River MFLs are met based on the total predicted reduction in flow at the Santa Fe River from the reference condition to 2035 conditions within the NFRWSP area (with the remainder of the NFSEG domain kept at baseline, or 2009, conditions) and to 2035 conditions within the entire NFSEG domain.

Table F1: NFRWSP MFLs Assessment Summary

Type	Name	County/Basin	WMD	Reference Year Freeboard ¹ (ft or cfs)	MFL Status at Reference Year	MFL Status at 2035 conditions (NFRWSP Area) ²	MFL Status at 2035 conditions (NFSEG Domain) ³
Lake	Banana	Putnam	SJR	0.5	Met	Met	Met
Lake	Bell	Putnam	SJR	1.5	Met	Met	Met
Lake	Brooklyn	Clay	SJR	Under re-evaluation			
Lake	Broward	Putnam	SJR	1.8	Met	Met	Met
Lake	Como	Putnam	SJR	0.5	Met	Met	Met
Lake	Cowpen	Putnam	SJR	Under re-evaluation			
Lake	Dream Pond	Putnam	SJR	1.5	Met	Met	Met
Lake	Geneva	Clay	SJR	Under re-evaluation			
Lake	Georges	Putnam	SJR	2.0	Met	Met	Met
Lake	Gore	Flagler	SJR	2.9	Met	Met	Met
Lake	Grandin	Putnam	SJR	1.6	Met	Met	Met
Lake	Little Como	Putnam	SJR	1.3	Met	Met	Met
Lake	Orio	Putnam	SJR	0.6	Met	Met	Met
Lake	Silver	Putnam	SJR	0.6	Met	Met	Met
Lake	Stella	Putnam	SJR	1.4	Met	Met	Met
Lake	Swan	Putnam	SJR	2.7	Met	Met	Met
Lake	Tarhoe	Putnam	SJR	0.4	Met	Met	Met
Lake	Trone	Putnam	SJR	1.6	Met	Met	Met
Lake	Tuscawilla	Alachua	SJR	1.0	Met	Met	Met
River	Upper Santa Fe at Graham	Santa Fe	SR	1.0	Met	Met	Met
River	Upper Santa Fe at Worthington Springs	Santa Fe	SR	16.5	Met	Met	Met
River/Spring System	Ichetucknee River and Priority Springs	Santa Fe	SR	-3	Recovery	Recovery	Recovery
River/Spring System	Lower Santa Fe River and Priority Springs	Santa Fe	SR	-17	Recovery	Recovery	Recovery

¹ Freeboard reference year for Gore = 2011, Tuscawilla = 2012, all other SJRWMD MFL lakes = 2008; Reference year for Ichetucknee and Lower Santa Fe = 2010, Upper Santa Fe = Pumps off

² Groundwater modeling scenario simulated 2035 projected withdrawals within the NFRWSP area, with areas outside the NFRWSP area set to 2009 conditions

³ Groundwater modeling scenario simulated 2035 projected withdrawals within the entire NFSEG domain

References

Water Resource Associates, Inc (WRA). 2007. *Technical Report: MFL Establishment for the Upper Santa Fe River*. Suwannee River Water Management District. Live Oak, FL.