

**MINIMUM FLOWS  
STATUS ASSESSMENT  
FOR THE  
LOWER SANTA FE AND  
ICHETUCKNEE RIVERS AND  
PRIORITY SPRINGS**

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Office of Minimum Flows and Minimum Water Levels



SUWANNEE RIVER WATER MANAGEMENT DISTRICT

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## Acronyms

cfs	cubic feet per second
FDEP	Florida Department of Environmental Protection
F.S.	Florida Statutes
Hwy	Highway
LSFI	Lower Santa Fe and Ichetucknee Rivers
MFL	Minimum Flows and Minimum Water Levels
NFSEG	North Florida Southeast Georgia Groundwater Model
OFS	Outstanding Florida Spring
RTF	Reference Timeframe Flow
SJRWMD	St Johns River Water Management District
SRWMD	Suwannee River Water Management District
USGS	United States Geological Survey
WRV	Water Resource Value

## Background

This document presents a comparison of the current and projected conditions of three river compliance gages and associated springs relative to a revised minimum flow and minimum water level (MFL) for the Lower Santa Fe and Ichetucknee Rivers and priority springs (LSFI) (HSW, 2021). “Current,” as used here, refers to the most recent water use estimates available for MFL status assessment, in this case, an average of 2014-2018 data.

Florida Statutes (F.S.), section 373.0421, implicitly directs the analysis of the existing and projected water body flow when an MFL is first developed or when it is revised:

If, at the time a minimum flow or minimum water level is initially established for a water body pursuant to s. 373.042 or is revised, the existing flow or water level in the water body is below, or is projected to fall within 20 years below, the applicable minimum flow or minimum water level, the department or governing board, as part of the regional water supply plan described in s. 373.709, shall concurrently adopt or modify and implement a recovery or prevention strategy.

Additionally, subsection 373.042(1)(a), F.S., states that “the minimum flow for a given watercourse is the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area.”

Therefore, this LSFI water body status assessment represents an evaluation of the current and projected water body condition relative to the revised MFL from any aggregate change due to withdrawals but is not an evaluation of permit compliance.

## Revised MFLs

The supporting information and analysis for the MFL revision is documented in “*Minimum Flows and Minimum Water Levels Re-evaluation for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs*” (HSW, 2021). The LSFI MFL has been independently peer reviewed (Dunn, 2020).

Within the LSFI study area (Figure 1), MFLs are being implemented for three river compliance gages: the Santa Fe River near Fort White (02322500) and the Santa Fe River at Hwy 441 near High Springs (02321975), both on the Lower Santa Fe River, and the Ichetucknee River at Hwy 27 near Hildreth (02322700) on the Ichetucknee River. These three gages, monitored in cooperation with the United States Geological Survey (USGS), provide the longest and most complete observed flow records for these rivers, subdivide the system into appropriate fluvial geomorphological reaches (AMEC, 2012) and serve as the reference gages for LSFI MFLs. Throughout this technical memorandum, these gages and their respective river reaches will be referred to as Fort White, Hwy 441, and Hwy 27, respectively.

For establishing MFLs, the Fort White, Hwy 441, and Hwy 27 gages were specified as compliance gages in the LSFI MFLs. The MFL proposed for a gage is based on the most conservative hydrologic shift developed from the water resource values (WRVs) evaluated and is applied at the median flow (Table 1). The relative flow reduction, expressed as a percentage, is the difference between the median reference timeframe flow (RTF<sup>1</sup>) and the median MFL flow, divided by the median RTF.

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<sup>1</sup> An RTF is defined as an estimate of the historic flow that would have been observed in absence of any groundwater withdrawals. In other words, the RTF is a time-series from which impacts of groundwater withdrawals have been removed.

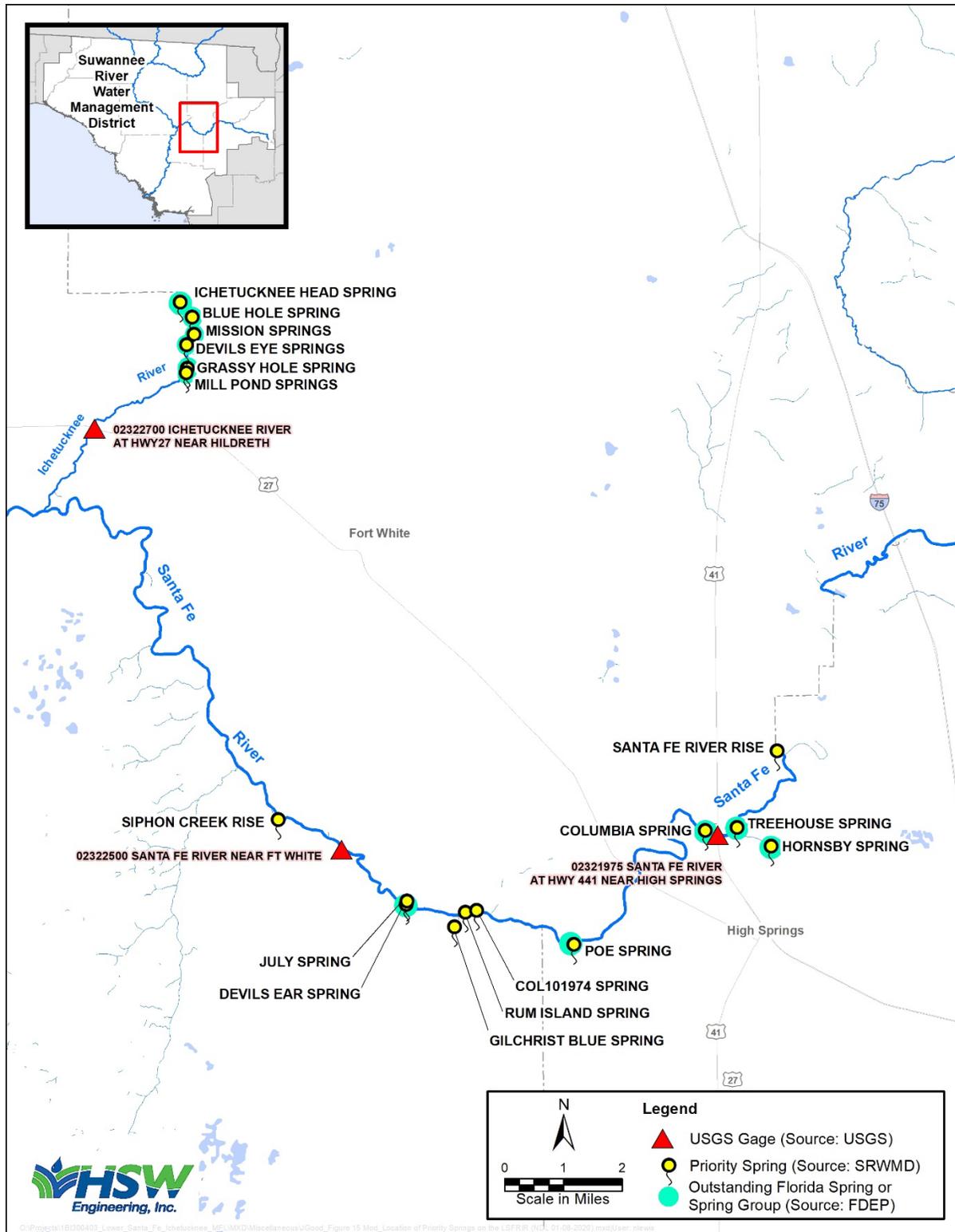


Figure 1. River Gage and Spring Location Map (from HSW, 2021)

Table 1. RTF and MFL Flow Values for the Lower Santa Fe River and Ichetucknee River.

<b>Parameter</b>	<b>Lower Santa Fe Fort White</b>	<b>Lower Santa Fe Hwy 441</b>	<b>Ichetucknee Hwy 27</b>
RTF Median Flow (cfs <sup>2</sup> )	1,270	552	356
MFL (cfs)	1,167	502	346
Difference (cfs)	103	50	10
Relative Flow Reduction (%)	8.1	9.1	2.8

There are numerous springs which contribute flow to the Lower Santa Fe and Ichetucknee Rivers, therefore reductions in groundwater flow from these springs result in corresponding reductions in river flows. Due to limited flow and biological data from individual springs, the MFLs for priority springs are based on the long-term median flow for their respective river gages. Thus, the recommended LSFI priority spring minimum flows correspond to the river flow reductions, which were established using the most limiting WRV assessed for each river or river segment.

The 17 priority springs associated with the revised LSFI MFLs are evaluated at their corresponding river gages (see Table 2). Spring flow reductions due to withdrawals are collectively limited to 9.1 percent for the four priority springs in the Hwy 441 reach, 8.1 percent for seven other priority springs on the Lower Santa Fe River downstream of Hwy 441, and 2.8 percent for six priority springs on the Ichetucknee River.

Table 2. List of Priority Spring MFLs by River Gage.

<b>Lower Santa Fe Fort White</b>	<b>Lower Santa Fe Hwy 441</b>	<b>Ichetucknee Hwy 27</b>
Poe Spring (OFS <sup>3</sup> )	Santa Fe River Rise	Ichetucknee Head Spring (OFS <sup>4</sup> )
COL101974	Hornsby Spring (OFS)	Blue Hole Spring (OFS <sup>4</sup> )
Rum Island Spring	Treehouse Spring (OFS)	Devil's Eye Spring (OFS <sup>4</sup> )
Gilchrist Blue Spring	Columbia Spring (OFS)	Grassy Hole Spring (OFS <sup>4</sup> )
Devil's Ear Spring (OFS)		Mill Pond Springs (OFS <sup>4</sup> )
July Spring		Mission Springs (OFS <sup>4</sup> )
Siphon Creek Rise		

<sup>2</sup> Cubic feet per second (rate of flow).

<sup>3</sup> Outstanding Florida Spring (OFS), as designated in the 2016 Florida Springs and Aquifer Protection Act, Florida Statute 373.802.

<sup>4</sup> These springs belong to the Ichetucknee Springs Group, which combined are designated as an OFS.

## Status Assessment

The methodology for MFL status assessment is based on changes in flows at the river gages due to surface water and groundwater withdrawals. Due to the limited use of surface water in the Santa Fe watershed, only groundwater use is evaluated to assess the effect of water use on the MFLs.

The estimated change to river flows due to groundwater withdrawals is determined through the application of a calibrated groundwater model using appropriately specified withdrawal stresses. The model used in this analysis is the North Florida Southeast Georgia Groundwater Model (NFSEG 1.1) (Durden et.al., 2019). The current and projected withdrawal impacts to flows at the LSFI river gages were assessed by simulating “pumps off” and “pumps on” scenarios.

The current condition was evaluated using a dataset based on best available information and represents 2014-2018 average water use for the Suwannee River and St Johns River Water Management Districts. A projected condition was evaluated using a 2045 water use dataset based on best available regional growth projections.

The allowable reduction in flow at each LSFI MFL compliance gage, which incorporates the groundwater flow from their respective associated springs, was compared to the change from “pumps off” to “pumps on” in steady-state groundwater model scenarios for the current and projected conditions to determine the MFL status for the LSFI river gages and associated priority springs.

## Conclusions

Water available under MFL conditions in comparison to groundwater withdrawal impacts for current and projected conditions are shown in Table 3 for the LSFI MFL compliance gages.

- For current conditions, the Lower Santa Fe Ft White compliance gage meets the MFL criteria, while the Lower Santa Fe Hwy 441 and Ichetucknee Hwy 27 compliance gages do not.
- For projected conditions, the Lower Santa Fe Ft White compliance gage meets the MFL criteria, while the Lower Santa Fe Hwy 441 and Ichetucknee Hwy 27 compliance gages do not.
- Based on 2014-2018 and 2045 assessment years, the Lower Santa Fe Ft White gage is meeting the MFL and the Lower Santa Fe Hwy 441 and Ichetucknee Hwy 27 gages are in Recovery (not currently meeting MFL requirements). The priority springs are assumed, absent other information, to be in the same status category as the river gage with which they are associated (Table 2).

As noted above, Section 373.0421, F.S. directs the assessment of a water body when an MFL is first developed or when it is revised. If the existing flow or water level in the water body is below or projected to fall below the MFL within 20 years, the department or governing board is directed to “concurrently adopt or modify and implement a recovery or prevention strategy.” Based on the status defined in Table 3, a revised Recovery Strategy should be developed for the Lower Santa Fe Hwy 441 and Ichetucknee Hwy 27 MFL compliance gages.

Table 3. MFL Status Assessment Flow Comparison by River Gage (cfs).

	<b>Lower Santa Fe Fort White</b>	<b>Lower Santa Fe Hwy 441</b>	<b>Ichetucknee Hwy 27</b>
Available Flow (RTF and MFL median flow difference)	103	50	10
Current Conditions - 2014-2018 Impact	73.3	51.0	16.3
Current Conditions - 2014-2018 Net	29.7	<b>-1.0</b>	<b>-6.3</b>
Projected Conditions - 2045 Impact	98.8	67.3	23.2
Projected Conditions - 2045 Net	4.2	<b>-17.3</b>	<b>-13.2</b>
Status	Meeting	Recovery	Recovery

## References

- AMEC. 2012. Fluvial Geomorphic Investigation of the Upper Santa Fe River, Lower Santa Fe River, and Ichetucknee River. Live Oak, Florida: Prepared for the Suwannee River Water Management District. 62 pp.
- Dunn, W.J. 2020. Chair's Final Draft: Peer Review Panel Consensus Report for: Technical Report- Minimum Flows and Minimum Levels Re-Evaluation for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs. Prepared for the Suwannee River Water Management District. Submitted September 30, 2020. 117 pp.
- Durden, D., Gordu F., Hearn D., Cera T., Desmarais T., Meridth L., Angel A., Leahy C., Oseguera J. and Grubbs T. 2019. *North Florida Southeast Georgia Groundwater Model (NFSEG v1.1)*. St. Johns River Water Management District Technical Publication SJ2019-01. Palatka, Fla. St. Johns River Water Management District. 513 pp.
- HSW Engineering, Inc. 2021. Minimum Flows and Minimum Water Levels Re-evaluation for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs January 2021. Prepared for the Suwannee River Water Management District. 129 pp.