2018 Five-Year Strategy Assessment
for the
Implementation of Minimum Flows and Levels for Volusia Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes

March 2019

A. Background

The Prevention/Recovery Strategy for the Implementation of Minimum Flows and Levels for Volusia Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes (2013 Volusia Strategy; SJRWMD, 2013) was approved by the St. Johns River Water Management District (SJRWMD) Governing Board on November 12, 2013. As part of the phased implementation approach proposed within the 2013 Volusia Strategy, completion of 5-year strategy assessments was recommended. The 2018 strategy assessment contained herein is the first assessment since approval of the 2013 Volusia Strategy in 2013. The 2018 strategy assessment includes the following components:

- Newly adopted/re-evaluated minimum flows and minimum levels (MFLs)
- Current water resource assessment
- Updated freeboard calculations (based on revised planning period)
- Updated assessment of prevention/recovery status
- Updated apportionment calculations
- Project implementation status, including alternative projects, if warranted

B. New and Re-evaluated MFLs

In Volusia County, two new and one re-evaluated set of MFLs were adopted by the SJRWMD Governing Board since approval of the 2013 Volusia Strategy (Figure 1). The re-evaluated MFLs for Lake Purdom were adopted in 2014. New MFLs for the two remaining Outstanding Florida Springs (OFS) in Volusia County, DeLeon and Gemini springs, were adopted in 2017. All of SJRWMD's adopted MFLs can be found in Chapter 40C-8, Florida Administrative Code (F.A.C.).

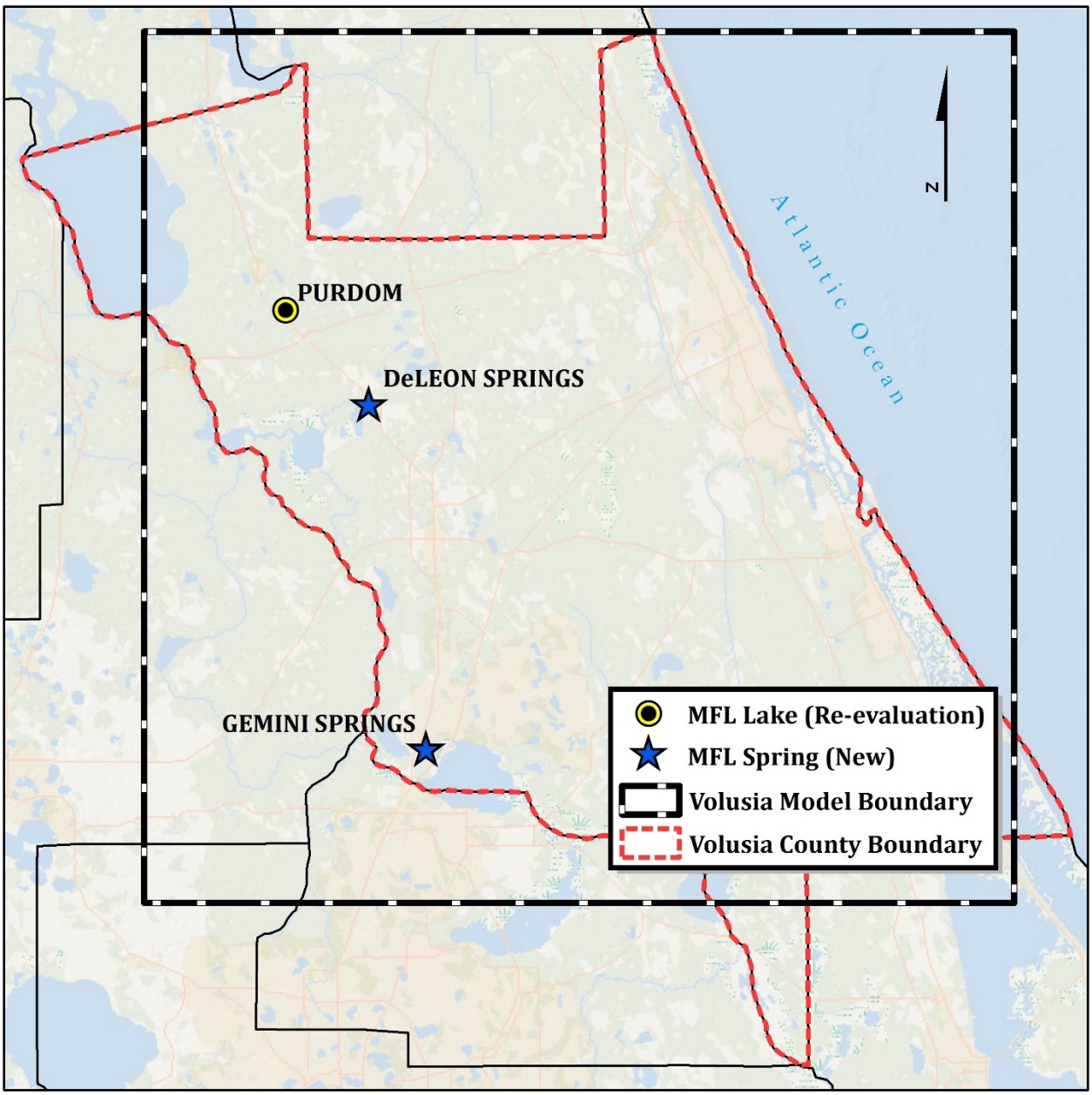

Figure 1: Location of new and re-evaluated MFL waterbodies in Volusia County

C. 2040 Water Resource Assessment

Staff utilized the 2015 Volusia Groundwater Flow Model (Volusia Model) to perform the water resource assessment (WRA) for Volusia County. Current (i.e., 2015) MFL freeboard values were compared to changes in aquifer level (for lakes) or flow (for springs) at the projected 2040 water demand scenario to determine the status of the MFLs at present and future conditions. The 2040 projected groundwater withdrawals within the Volusia Model domain was 136.5 million gallons per day (mgd), approximately 27% higher than in 2015.

Prevention/Recovery Status Update

Table 1 shows the updated status of MFLs for waterbodies identified in 2013 as being in prevention or recovery, as well as waterbodies identified as being in prevention or recovery in the 2018 WRA. All but one of the lakes identified in 2013 as being in prevention or recovery are no longer of concern, currently or through the 20-year planning horizon. Since adoption of the 2013 Volusia Strategy, SJRWMD has developed and implemented an improved approach to evaluating the future compliance status of MFLs. This approach meets the statutory requirement to evaluate projected conditions at the 20-year planning horizon (subsection 373.0421(2), *Florida Statutes*). Utilizing the revised assessment methodology, lakes Big, Daugharty, Helen, Hires, and Three Island all demonstrated compliance with their MFLs at 2040 projected water demand conditions.

Indian Lake was determined to be in recovery in the 2013 WRA. However, since 2013 nearby utilities have implemented wellfield optimization protocols and construction of the Tiger Bay Weir was completed. The water resource benefit from these projects has resulted in Indian Lake's improved MFL classification from recovery to prevention. The 2018 WRA identified two additional lakes, Scoggin and Shaw, projected to be in prevention by 2040. The assessment also indicated that Blue Spring continues to remain in prevention. Figure 2 shows the location of the impacted waterbodies.

Table 1: MFL status of waterbodies determined to be in prevention or recovery in the 2013 and/or 2018 water resource assessment (WRA)

Waterbody Name	Type	MFL Status at 2035 (Previous 2013 WRA)	**MFL Status at 2040 (Current 2018 WRA)**
Big	Lake	Prevention	**Met**
Daugharty	Lake	Prevention	**Met**
Helen	Lake	Prevention	**Met**
Hires	Lake	Prevention	**Met**
Indian	Lake	Recovery	**Prevention**[1]
Scoggin	Lake	Met	**Prevention**
Shaw	Lake	Met	**Prevention**
Three Island	Lake	Prevention	**Met**
Blue	Spring	Prevention	**Prevention**

[1] Prevention status accounts for benefits of the Tiger Bay Weir (constructed in 2016) at current (2015) conditions.

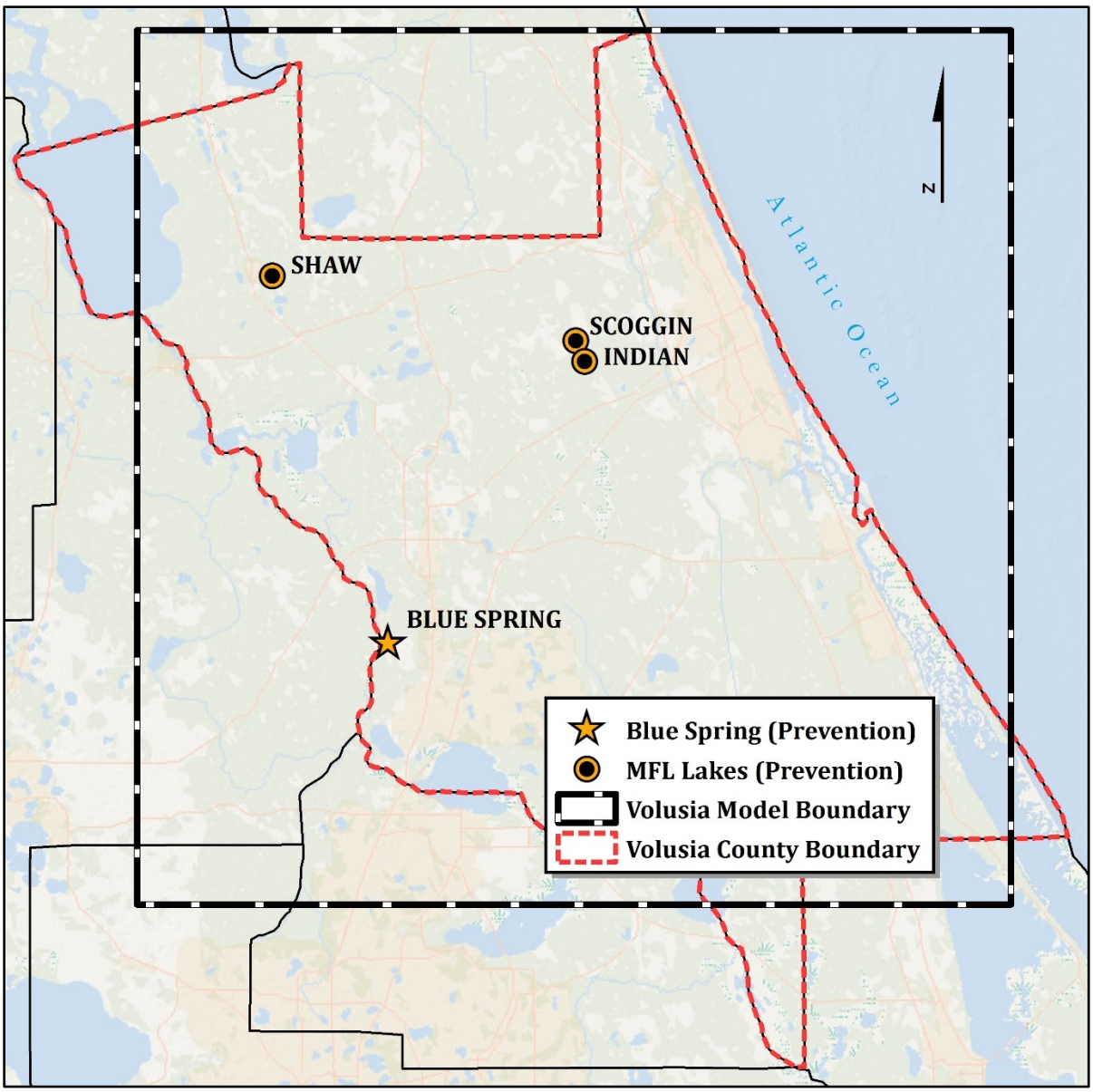

Figure 2: Location of MFL waterbodies identified as being in prevention or recovery in the 2018 water resource assessment

Influence by Use Type

Groundwater modeling was performed to determine the percent influence of impacts by withdrawal user group on the impacted MFL waterbodies. The results are displayed in Table 2.

Table 2: Impact influence by use type at 2040 projected water demand

User Group	Percent of Total Impact[1]			
	Indian	Scoggin	Shaw	Blue Spring
Public Supply	96	95	3	71
Domestic Self-supply	1	2	1	7
Agriculture	1	2	95	5
Commercial/Industrial/Institutional	<1	<1	<1	10
Landscape/Recreational/Aesthetic	<1	1	0	1
Power Generation	0	0	0	1
Users outside of Volusia County[2]	<1	<1	1	4

[1] Percentages may not total 100 due to rounding

[2] Withdrawals from all user groups outside of Volusia County but located within the Volusia Model domain

D. Project Implementation Status

Fourteen projects were identified in the 2013 Volusia Strategy. These projects, when implemented, would provide the water resource benefit required at the time to ensure achievement of the MFLs in Volusia County. The status of each of these projects is listed below. A 15th project, the Tiger Bay Weir, was not listed in the 2013 Volusia Strategy, however, construction of the weir was completed in 2016 and it currently provides a benefit to certain impacted MFL lakes.

Conservation — **ONGOING**

The 2013 Volusia Strategy estimated water conservation potential for public supply, domestic self-supply, and agricultural water use. Total water savings at 2035 was estimated at 5.1 mgd and was based on reductions in water use ranging from 4.6 % (public supply in western Volusia County) to 5.9% (agriculture). Five conservation cost-share projects (four agricultural and one public supply) have been partially funded by SJRWMD in Volusia County since 2016 with water savings estimated at 0.3 mgd.

West Volusia Water Suppliers (WVWS) Reclaimed Water Interconnects — **COMPLETE**

The reclaimed water interconnects between Volusia County and the cities of DeLand and Deltona were completed in 2016.

Sanford – Volusia County Reclaimed Water Interconnect — **COMPLETE**

The reclaimed water interconnect between the City of Sanford and Volusia County was completed in 2015.

Doyle Road Reclaimed Water Main Extension — **COMPLETE**

The Doyle Road reclaimed water main extension that connects the Deltona Lakes Water Reclamation Facility to the Alexander Avenue Resource Management Site was completed in 2015.

City of Deltona Golf Course Reclamation Water Expansion — **COMPLETE**

Originally anticipated to occur at the City of Deltona golf course, this project was subsequently renamed the "City of Deltona Reclaimed Pumping and Storage Expansion Project" and included the installation of a new reclaimed water pump station and a reclaimed water ground storage tank at the Alexander Avenue Water Resources Facility. Construction was completed in 2015.

City of Deltona — Howland Blvd. Phase 3 Reclaimed Water Project — **COMPLETE**

The reclaimed water extension to Howland Boulevard in the City of Deltona, was completed in 2015.

Ormond Beach Reclaimed Water Distribution Project — **COMPLETE**

The extension of Ormond Beach reclaimed water lines to the Hunters Ridge/Breakaway Trails development was completed in 2014.

Daytona Beach Wellfield Optimization — **COMPLETE**

To facilitate achievement of the MFLs established for Indian Lake, the City of Daytona Beach implemented a wellfield optimization plan in 2013. The wellfield optimization plan limits the use of wells 13 through 21, which are in close proximity to Indian Lake.

Tiger Bay Weir — **COMPLETE**

The Tiger Bay Weir was constructed in 2016 to retain stormwater and limit discharges from a wetland system located to the southeast of Indian Lake. Anticipated benefits from the weir include wetland hydration, aquifer recharge and stormwater treatment. Based on groundwater modeling performed for SJRWMD in 2015 (DHI, 2015), it is estimated that the Tiger Bay Weir raises the aquifer level beneath Indian Lake by almost 0.5 foot.

Alexander Avenue Water Resource Facility — **IN PROGRESS**

Project 4A (formerly Alexander Avenue Water Resources Site)
This phase is currently under construction and includes storage, treatment and pumping facilities for 4 mgd of stormwater and surface water.

Project 4B (formerly Deltona Lakes Pump Station, Transmission Main and Augmentation Facilities)

This phase of the project, which will include infrastructure to withdraw and pump surface water from Lake Monroe, has not yet begun. The City of Deltona has not yet received authorization for the use of surface water in its consumptive use permit (CUP).

West Volusia Water Suppliers (WVWS) Aquifer Recharge Enhancement Project — **IN PROGRESS**

The WVWS Aquifer Recharge Enhancement Project was conceptualized to provide recharge via 4 mgd of reclaimed water at several sites. Currently, the City of Deltona is in the process of constructing phase I of this project, which includes a new rapid infiltration basin at the Alexander Avenue Water Resource Facility that will provide 0.6 mgd of recharge to the Upper Floridan aquifer. Phase I is expected to be completed in 2020.

DeLand Reuse Retrofit Part 'B' and Wiley M. Nash Augmentation Facilities — **IN PROGRESS**

The retrofit of approximately 190 homes to receive reclaimed water was completed in 2016. The City of DeLand's CUP was modified in 2017 to authorize 4 mgd of withdrawals from the St. Johns River for augmentation of its reclaimed water system. The city is currently in the process of enhancing the river intake system and replacing necessary filters at the wastewater treatment plant. This project is anticipated to be fully functional by the end of 2019.

Deep Creek/Leffler Water Supply, Treatment and Transmission Facilities — **IN PROGRESS**

Aquifer performance tests (APTs) were completed at two sites within the Leffler property in 2018. Groundwater modeling of the proposed new wellfield should be completed in 2019, with wellfield operation planned to occur prior to 2024.

Farmton Water Supply and Transmission Facilities — **NOT YET STARTED**

The Farmton Services LLC CUP authorizes 4 mgd of withdrawals for bulk public water supply to the WVWS. This allocation, however, is limited by the quantity of water established in legal agreements between the permittee and the WVWS by December 31, 2019, with the allocation expiring at the end of 2019 if no agreements are in place. Since March of 2019, there have been no updates provided to SJRWMD concerning any established legal agreements.

E. New Projects and Measures

Even with the comprehensive list of projects identified in the 2013 Volusia Strategy, the 2018 strategy assessment determined that the list of projects was not sufficient to meet all the Volusia County MFLs at 2040 projected water demand conditions, therefore, it was necessary to supplement the current list with additional projects. The following list of

projects provides the additional water resource benefits necessary to ensure achievement of Volusia MFLs at the current planning horizon, year 2040. Table 4, which follows the list below, summarizes the projects, project capacities, and estimated costs.

Updated Water Conservation Potential — **ONGOING**

As part of the Central Springs and East Coast (CSEC) regional water supply plan (RWSP) process, updated water conservation potential for all water use types was calculated for Volusia County for 2040. The potential savings were generally greater that what was estimated in the 2013 Volusia Strategy for 2035 (Table 3). The maximum savings estimates were incorporated in the Volusia Model to evaluate the water resource benefit from a higher level of conservation and to be able to report a range of conservation and associated benefits.

Table 3. Comparison of water conservation potential estimates at 2035 and 2040

Water Use Category	Water Conservation Potential at 2035[1] (mgd)	Water Conservation Potential at 2040[2] (mgd)
Public Supply	3.7	2.7 – 6.1
Domestic Self-supply	0.3	0.3 – 0.6
Agriculture	1.1	2.5
Commercial/Industrial/Institutional	NA	0.04
Landscape/Recreational/Aesthetic	NA	0.04
Power Generation	NA	<0.01
TOTAL	**5.1**	**5.6 – 9.3**

[1] As calculated within the 2013 Volusia Strategy (SJRWMD, 2013)

[2] From the draft 2019 Central Springs East Coast Regional Water Supply Plan (SJRWMD, 2019, draft)

Reclaimed Water Expansion in Eastern Volusia County — **ONGOING**

Although the 2013 Volusia Strategy identified several proposed reclaimed water projects in western Volusia County, only one reclaimed water project was identified for the eastern portion of the county. Two MFL lakes in eastern Volusia County, Indian and Scoggin, are in prevention as determined by the 2018 WRA. With public supply uses causing the majority of aquifer level decline beneath these lakes (Table 2), additional projects are necessary to obtain the aquifer level rebound required to achieve their MFLs. Based on the assessment of current available reclaimed water and additional reclaimed water projected to become available in 2040, it is estimated that 9.3 mgd of reclaimed water can offset public supply withdrawals in 2040 in eastern Volusia County, thus providing additional aquifer rebound beneath lakes Indian and Scoggin.

The City of Daytona is currently implementing a direct potable reuse (DPR) demonstration project. It is likely that the city will move forward with full-scale DPR facilities to meet a portion of its potable demand upon completion of the demonstration. Based on the schedule for implementation, full scale operation will not occur prior to the next 5-year assessment. Project progress and the city's future DPR plans will be detailed in the 2023 strategy assessment.

Volusia Blue Wetland Recharge Project — **IN PROGRESS**

This project consists of converting a sand mine into a wetland treatment and recharge basin approximately 0.5 mile from Blue Spring, which is anticipated to provide 2 to 4 mgd of recharge to the Upper Floridan aquifer. The recharge water will consist of stormwater from Mill Lake and possibly other areas, reclaimed water produced by the WVWS, and surface water from the St. Johns River. At the time of this assessment, the Volusia Blue Wetland Recharge Project was in the feasibility and preliminary design phase.

WVWS Groundwater Withdrawal Optimization — **IN PROGRESS**

The groundwater modeling simulations that evaluated the benefits of the projects in the 2013 Volusia Strategy and the new projects listed above did not consider the optimization of groundwater withdrawals. This final project involves reducing public supply withdrawals closest to Blue Spring and replacing those withdrawals with withdrawals from the two new wellfields, which are both located outside of the springshed.

WVWS Aquifer Enhancement Expansion — **PROPOSED**

This proposed project would increase the number of recharge sites in the primary and secondary recharge areas for Blue Spring in order to increase recharge to the Upper Floridan aquifer by 0.6 mgd to 1.8 mgd.

Deltona Reclaimed Water Augmentation Expansion — **PROPOSED**

The City of Deltona is currently exploring the possibility of expanding the proposed surface water intake, transmission lines, and treatment capability associated with the Alexander Avenue Water Resource Facility from 4 mgd to 12 mgd. For this assessment, staff considered an expansion to 8 mgd, which, once fully permitted, would provide an additional 4 mgd of surface water available to augment the reclaimed water system to replace groundwater for irrigation or recharge the Upper Floridan aquifer.

Table 4. Summary of new projects with volume and cost estimates

Project Type	Project Title	Est. Volume (mgd)	Est. Capital Cost ($)
Conservation	Updated Water Conservation Potential (difference between 2030 and 2040 estimates)	0.5 – 4.2	$1.0M - $7.4M
Reuse	Reclaimed Water Expansion in Eastern Volusia County	9.3	$45.2M
	Deltona Reclaimed Water Augmentation Expansion	4.0	$0.9M
Aquifer Recharge	Volusia Blue Wetland Recharge	2.0 – 4.0	$5.4M - $8.5M
	WVWS Aquifer Enhancement Expansion	0.6 – 1.8	$1.1M – $3.3M
Water Supply	WVWS Groundwater Withdrawal Optimization	N/A	TBD[1]
		TOTAL	**$53.6M – $65.3M**

[1] To be determined. It is likely that some of the cost for this project was previously included as a component in the estimates for the Deep Creek/Leffler and Farmton transmission facilities.

F. Project Benefits

Staff utilized the Volusia Model at 2040 water demand conditions to evaluate the benefit of the projects listed in sections F and G above. Table 5 summarizes the benefits of both suite of projects with respect to the MFL lakes identified as being in prevention. The combined suite of projects is sufficient to achieve the aquifer level rebound necessary to achieve the lake MFLs in 2040.

Table 5. Summary of project benefits with respect to impacted MFL lakes

MFL Waterbody	Freeboard at 2040 (ft)	Project Benefits			Revised 2040 Freeboard with Projects (ft)
		2013 Volusia Strategy (ft)	2018 New Projects[1] (ft)	Total[2] (ft)	
Indian Lake	-1.0	0.5	1.2	1.7	0.6 ft
Scoggin Lake	-0.4	0.3	0.9	1.3	0.9 ft
Shaw Lake	-0.6	0.3	0.3	0.6	0.0 ft

[1] For MFL lakes, new projects include Blue Spring Wetland Recharge Park at 4 mgd, Reclaimed Water Expansion in Eastern Volusia County, and Updated Water Conservation Potential for agriculture only.

[2] Totals may not appear accurate due to rounding.

Table 6 summarizes the project benefits with respect to flow at Blue Spring. Implementation of all projects in the 2013 Volusia Strategy as well as the implementation of all proposed projects within this assessment can provide the benefit needed to meet the Blue Spring MFL in 2040. Achievement of the MFLs at 2040, however, will require the

maximum amount of conservation described in section G, as well the most effective recharge options.

Table 6. Summary of project benefits with respect to Blue Spring

MFL Waterbody	Freeboard at 2040[1] (cfs)	Estimated Project Benefits					Revised 2040 Freeboard with Projects (cfs)	
		2013 Volusia Strategy (cfs)	2018 New Projects (cfs)		Total (cfs)			
			Low	High	Low	High	Low	High
Blue Spring	-17	9.4	5.3	8.1	14.7	17.5	-2.3	0.5

cfs = cubic feet per second

[1] For Blue Spring, freeboard value is based on the final minimum flow, effective in 2024, and 2040 projected water demand.

G. Next Steps

The 2018 Volusia Strategy 5-Year Assessment provides assurance that, with implementation of the projects identified in the 2013 Volusia Strategy as well as those proposed in this assessment, Volusia County waterbodies will meet their MFLs at 2040 water demand conditions. The next 5-year assessment of the 2013 Volusia Strategy will occur in 2023 at which time SJRWMD will assess the Volusia MFLs at the 2045 planning horizon.

H. References

DHI, 2015. Tiger Bay Bennett Swamp Model Update and Recalibration Telescoped Model and Scenario Analysis. DHI Water and Environment Inc., Lakewood, CO.

SJRWMD, 2013. *Prevention/Recovery Strategy for Implementation of Minimum Flows and Levels for Volusia Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes.* SJRWMD, Palatka, FL. Available from: www.sjrwmd.com/static/mfls/gb1311_005.pdf

SJRWMD, 2019 (draft). Central Springs/East Coast Regional Water Supply Plan (2015 – 2040). SJRWMD, Palatka, FL.