APPENDIX G

SJRWMD APPROVED PREVENTION AND RECOVERY STRATEGIES WITHIN THE CSEC RWSP AREA

Table of Contents

Prevention/Recovery Strategy for Implementation of Minimum Flows and Levels for Volusia Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes

October 2013

SJRWMD Division of Regulatory, Engineering, and Environmental Services

A. Introduction

Within the Volusia Minimum Flows and Levels/Minimum Flow Regime Prevention/Recovery Strategy Area (VSA), Minimum Flows and Levels (MFLs) have been adopted for 26 waterbodies (Figure 1). Among these waterbodies, seven are in prevention/recovery status relative to their adopted MFLs (see Figure 2): Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island lakes. The VSA Strategy identifies measures needed to achieve the MFLs for these waterbodies and, through implementation of such measures, avoid and/or mitigate unacceptable adverse impacts to wetlands, lakes, streams, springs and aquifer levels that are due to consumptive uses of water.

Consistent with provisions for establishing and implementing MFLs provided in Chapter 373, F.S., Chapter 62-40, *F.A.C.*, and Chapter 40C-8, *F.A.C.*, this document includes the following components:

- List of affected MFL waterbodies;
- Prevention/recovery status assessment of the MFL waterbodies;
- Strategy objective (sustainable groundwater yield);
- Apportionment by user group;
- Regulatory component;
- Proposed suite of measures that would achieve the Strategy objective;
- Funding component;
- Monitoring component; and
- Timetable for phased implementation

Multiple lines of evidence provide assurance that the projects proposed in Section G of this Strategy would be sufficient to achieve MFLs in Blue Spring and the VSA lakes with projected 2030 water use demands.

B. Strategy Objective, Approach, and Phased Implementation

Objective

The objective of the Strategy is to establish and maintain actual and permitted groundwater withdrawals at or below the sustainable groundwater yield or mitigate the impact of withdrawals via recharge or other methods supported by the District that achieve equivalent water resource benefits.

Approach

The approach outlined in the VSA Strategy includes project implementation, regulatory revisions, monitoring, and routine assessment of the Strategy goals and accomplishments. The intent is to provide assurance that the water resource goals defined by the MFLs will be met in a way that maximizes flexibility for permittees and project partners. The basic approach includes the following:

- Implement projects and measures that provide water resource benefits sufficient to achieve the MFLs. *(see Section G)*
- Monitor trends in spring flow and aquifer levels at individual wells and across an appropriate regional network. Use this information to confirm benefits of implemented projects and adjust the Strategy measures as necessary. *(see "Phased Implementation" below and Section I)*
- Work with existing permittees to align permitted allocations with demonstrated need. *(Section F)*
- If necessary, conduct rulemaking to address permitting of withdrawals, including new quantities of water, that affect waterbodies in "recovery" status. *(Section F)*
- Establish standard permit conditions and related language for integrating MFLs criteria with CUPs. *(Section F)*
- Identify and obtain sufficient funding resources to facilitate Strategy implementation. *(Section H)*
- Implement in a phased approach with a full Strategy revision at 5-year intervals, including MFLs assessment and recalculation of MFLs freeboard, if necessary. *(see "Phased Implementation" below)*

Phased Implementation

Strategy implementation will occur in 5-year phases (see Table 1). Actions to occur in subsequent phases will be determined during the Strategy revision processes envisioned at the end of Phases 1 and 2, respectively. Phase 1 will begin upon SJRWMD Governing Board Strategy approval.

Annual status reports will be developed by the District, in cooperation with project partners. Status reports will contain an update on rule revisions, permit modifications, and projects implemented in the prior year that support the VSA Strategy. Upon completion of each phase, a Five-Year Strategy Assessment report will be developed. The Five-Year Assessment Report will likely include the following:

- Newly adopted/re-evaluated MFLs
- 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
- Permit revisions
- Rule revision status
- Water resource data assessment
- Adjustment to sustainable groundwater yield, if needed

Based on findings in each Five-Year Assessment Report, the Strategy may be revised by the Governing Board.

Table 1. VSA Strategy Phased Implementation – Phases 1 & 2

Actions	Phase 1 (Year 1-5)	Phase 2 (Year 5-10)	Details
Implement projects and measures with associated permit revisions.	• Initiate as permits come up for renewal or earlier by request of the permittee.	Continue per phased approach or earlier by request of the permittee.	Strategy Sections G and I
Monitor trends in spring flow and aquifer levels via individual sites and over regional network.	• Review existing monitoring resources. • Continue data collection at existing sites; initiate data collection at new sites (if needed).	Continue	Strategy Section I
Rulemaking, as necessary, including amendments to Ch. 40C-2, F.A.C. to implement substitution credits.	• Initiate and complete.	N/A (Completed in Phase 1)	Strategy Section F
Modify permitted allocations.	• Complete review of permits. • Reach out to permittees. • Initiate permit modifications with willing permittees.	Continue	Strategy Section F
Status Report	Annually	Annually	Strategy Section B
5-Year Strategy Assessment	Assess, refine, & approve revised Strategy.	Assess, refine, & approve revised Strategy.	Strategy Section B

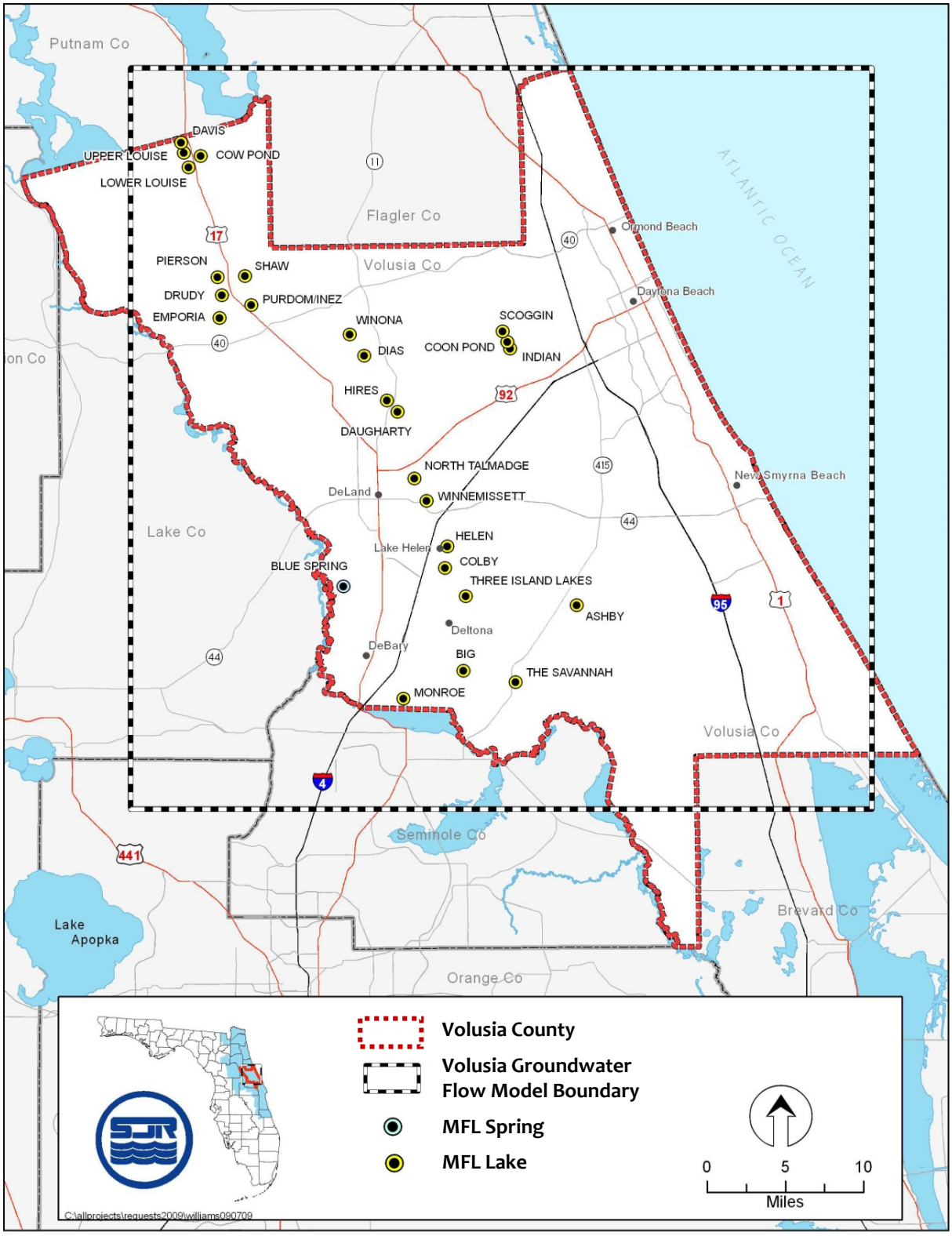
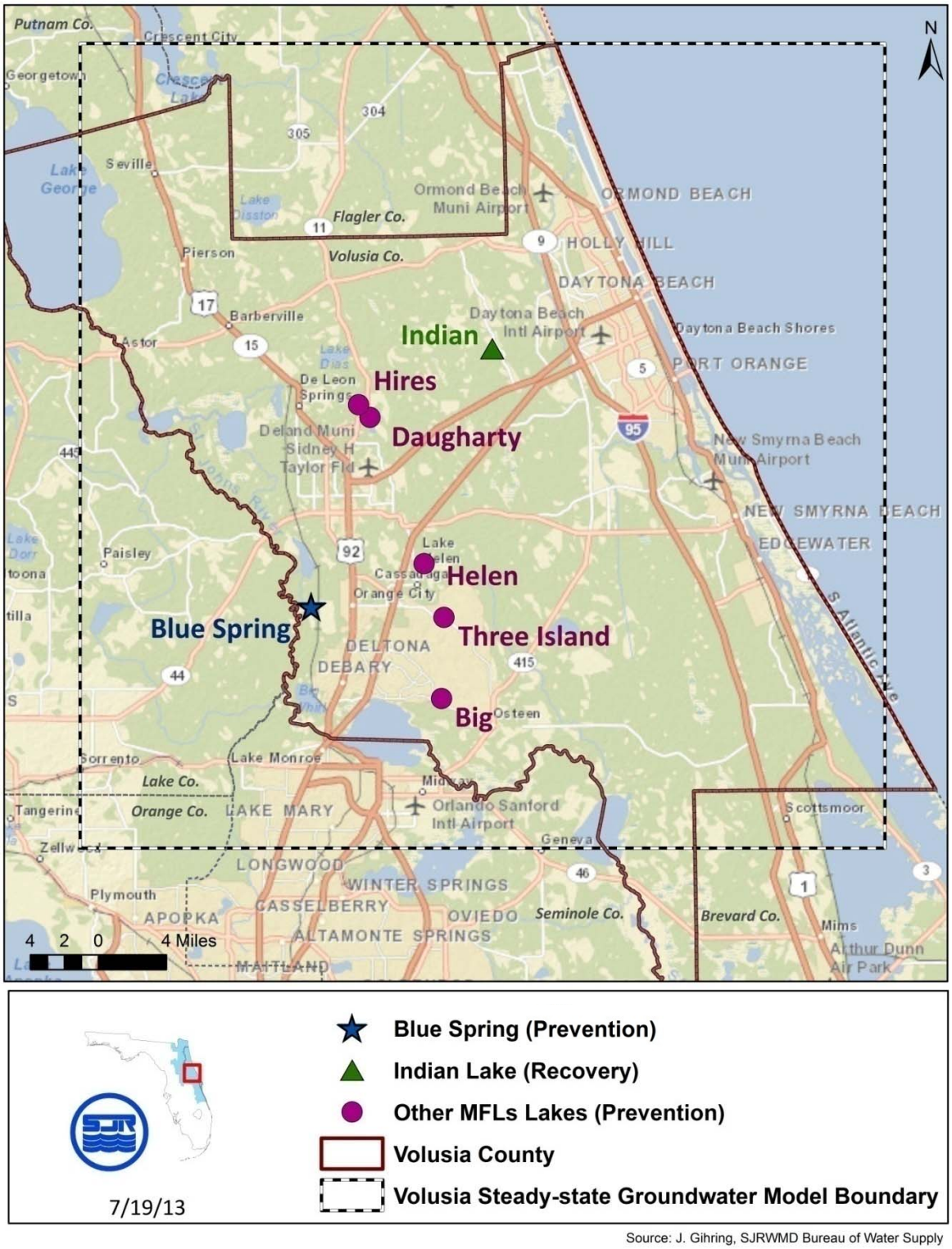


Figure 1. Volusia Strategy Area Waterbodies with Adopted MFLs



Source: J. Gihring, SJRWMD Bureau of Water Supply

Figure 2. Volusia Strategy Area Prevention/Recovery Strategy Waterbodies

C. Minimum Flows and Levels and Minimum Flow Regime for Affected Waterbodies

Adopted & Re-evaluated MFLs

SJRWMD's MFLs approach can be applied to lakes, rivers, springs, isolated wetland systems, and aquifers. The method is used in a regulatory water management framework to protect aquatic and wetland systems from ecological harm due to surface or groundwater withdrawals. MFLs are primarily ecologically based. Multiple MFLs typically are adopted for a system to ensure that the full range of hydrologic conditions are protected. SJRWMD's MFLs are represented by hydrologic statistics and are implemented with output from hydrologic water budget and groundwater flow models.

Table 2 shows the adopted MFLs for Big Lake, Lake Daugharty, Lake Helen, Lake Hires, Indian Lake, and Three Island Lakes, established by rule in chapter 40C-8, F. A. C. All levels are in feet NGVD.

Adopted minimum flows for Blue Spring (Table 3) define a minimum long-term mean flow regime with mean flows that increase in five-year increments through 2024. From 2024 on, a minimum long-term mean flow of 157 cubic feet per second (cfs) must be maintained. The Blue Spring MFLs are based upon providing adequate cold weather refugia habitat needs for the endangered West Indian Manatee.

Table 2: Adopted MFLs for Big Lake, Lake Daugharty, Lake Helen, Lake Hires, Indian Lake, and Three Island Lakes

	Frequent Low		**Minimum Average**		**Frequent High**	
	Level (ft NGVD)	**Hydroperiod**	**Level**	**Hydroperiod**	**Level**	**Hydroperiod**
Big *	23.7	Semipermanently Flooded	25.0	Typically Saturated	26.1	Seasonally Flooded
Daugharty	41.2	Semipermanently Flooded	42.6	Typically Saturated	44.8	Temporarily Flooded
Helen	43.6	Semipermanently Flooded	44.2	Typically Saturated	46.1	Temporarily Flooded
Hires *	38.0	Semipermanently Flooded	39.5	Typically Saturated	41.0	Seasonally Flooded

	Frequent Low			**Minimum Average**			**Frequent High**		
	Level	**Duration** (days)	**Return Interval** (RI; years)	**Level**	**Duration**	**RI**	**Level**	**Duration**	**RI**
Indian	32.8	120	5	35.0	180	1.7	36.2	30	3
Three Island	19.4	120	10	---	---	---	23.7	30	5

** MFLs for these lakes are not scheduled for re-evaluation. All other MFLs shown above are re-evaluated values which have been adopted by rule.*

Table 3: Adopted Minimum Flows for Blue Spring

Phased Schedule	Minimum Long-Term Mean Flow
December 3, 2006 – March 31, 2009	133 cfs
April 1, 2009 – March 31, 2014	137 cfs
April 1, 2014 – March 31, 2019	142 cfs
April 1, 2019 – March 31, 2024	148 cfs
After March 31, 2024	157 cfs

MFLs Assessment

SJRWMD uses lake-specific surface water hydrologic models for assessing compliance with MFLs for lakes. These models use long-term water level data from an Upper Floridan aquifer monitor well nearest to each lake. The model uses an adjusted well hydrograph coupled with lake stage data to produce long-term simulations of lake levels. Hydrologic statistics of the simulated lake levels are compared to MFLs for the lakes to determine whether the MFLs are met.

To determine the allowable decline in the potentiometric surface of the Upper Floridan aquifer at each of the lakes (i.e. freeboard), model runs are performed . This aquifer level is then compared to water demand projections to determine if the waterbody is in "recovery" status (aquifer levels currently below those which are required to meet the MFLs) or "prevention" status (aquifer levels projected to fall below those needed to meet the MFLs within the twenty-year planning horizon, based on projected water demands). Table 4 shows the prevention/recovery status and available freeboard under 2030 demands for the VSA lakes and Blue Spring. Among the six lakes in the VSA not achieving their MFLs, five are in "prevention" status and one is in "recovery." SJRWMD has projected that flows from Blue Spring would fall below the applicable minimum mean flows by 2019 and, as such, Blue Spring is in "prevention" status.

Table 4: 2030 Freeboard Values and Prevention/Recovery Status

Waterbody	2030 Freeboard *	Prevention/Recovery Status
Big	-0.1 ft	Prevention
Daugharty	-0.1 ft	Prevention
Helen	-0.2 ft	Prevention
Hires	-0.3 ft	Prevention
Indian	-1.3 ft	Recovery
Three Island	-0.2 ft	Prevention
Volusia Blue Spring	-16 cfs	Prevention

* All lake values are rounded to the nearest tenth of a foot. Freeboard for Daugharty was rounded from -0.06 ft and Helen from -0.16 ft. "Freeboard" for Volusia Blue Spring represents the difference between the flow needed to achieve MFLs and projected flow under 2030 water demands.

D. Sustainable Groundwater Yield

SJRWMD completed an assessment in July 2013 using the Volusia Steady-state Groundwater Flow Model to determine the sustainable Upper Floridan aquifer yield applicable to the VSA, as constrained by lake and Blue Spring MFLs (Figure 1). Water use demands were reduced incrementally from end of permit allocations until all lake and spring MFLs were met. Lake constraints were relative to aquifer levels needed to meet adopted MFLs. The Blue Spring constraint was relative to the 2024 minimum flow of 157 cfs. The resulting value was the "sustainable groundwater yield" under that set of conditions. Withdrawals in excess of this sustainable yield would result in Blue Spring flow dropping below 157 cfs. Because the sustainable yield varies depending on optimization of withdrawals and the spatial extent used in the calculation, a specific yield value is not provided in the Strategy. Estimated benefits of the proposed projects and measures were compared against the sustainable groundwater yield and future demand projections. Results of this comparison are discussed in Section G.

E. Apportionment

Apportionment quantifies the relative hydrologic impact of users on MFL water bodies. The purpose of calculating apportionment is two-fold:

1) Focus the type of projects and measures that would be most appropriate and effective for individual waterbodies by clarifying the relative impact of user groups (Table 5); and

2) Provide a basis for quantifying the magnitude of responsibility for individual permittees through the combination of water resource impacts (freeboard or increase in spring flow) and permittee-specific apportionment values.

The approach relies on end-of-permit allocations for users that have an individual or standard general consumptive use permit and estimates of domestic self-supply withdrawals and other user groups that do not have permitted allocations (see Table 5). The apportionment methodology quantifies the proportional impact of users and user groups relative to each other for a specific waterbody. Because the methodology is based on existing numerical groundwater flow models, apportionment values account for climatic considerations but do not quantify the relative influence of withdrawals relative to climate and other factors. Refinement of water demand projections in the future, including current information from the Florida Department of Agriculture and Consumer Services (DACS) and demand projections derived from the District's Water Supply Planning process, will affect the apportionment values.

Table 5: Apportionment by User Group and Waterbody

User Group	% Apportionment (Hydrologic Influence) *						
	Blue Spring	Big Lake	Lake Daugharty	Lake Helen	Lake Hires	Indian Lake	Three Island Lake
Public Supply	88.0	90.3	57.7	86.1	56.1	98.0	90.5
Agriculture	5.3	3.7	35.4	7.3	38.1	1.3	3.8
Commercial/ Industrial	1.7	1.4	3.4	1.5	2.4	0.1	1.3
Domestic Self-Supply	3.1	3.2	3.3	4.4	3.1	0.4	3.0
Recreation	0.7	0.8	0.2	0.4	0.2	0.2	0.7
Other Uses	~0	~0	~0	~0	~0	~0	~0
Mining/ Dewatering	~0	~0	~0	~0	~0	~0	~0
Power Generation	1.2	0.6	~0	0.3	0.1	0.0	0.7
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

* Values shown as "~0" are user groups with less than 0.04% hydrologic influence for the specific waterbody identified.

F. Regulatory Component

The primary purpose of the regulatory component is to provide certainty for water users that they can use for planning purposes. The proposed regulatory refinements provide equity among water users, increase certainty and predictability in the application of MFLs constraints to consumptive use permits, clarify the relationship between existing permittees and future applications for additional quantities, and provide regulatory incentives for implementation of Strategy projects and measures. The proposed regulatory component is summarized as follows:

- As necessary, amend provisions of Chapter 40C-2, F.A.C. (including Applicant's Handbook: Consumptive Uses of Water) to incorporate concepts of "impact offsets" and "substitution credits."
- Develop a consistent suite of CUP conditions that address MFLs constraints, with permit duration and cost-share qualification as incentives.

- Integrate project requirements and allocation modifications into permits through phased permit modifications.
- Review existing rule provisions and amend, if necessary, to achieve the Strategy Objective.

Definitions

Definitions used in this Strategy area as follows:

> *Impact Offset* - the use of reclaimed water to reduce or eliminate a harmful impact that has occurred or would otherwise occur because of other surface water or groundwater withdrawals. (§373.250(5)(a)1., Fla. Stat.).
>
> *Net Benefit* - activities or measures that will result in an improvement to a water body that offsets the impact of a proposed withdrawal on an adopted Minimum Flow, Level, or Flow Regime. The degree of offset required remains to be determined and may require adoption of a new rule provision.
>
> *New Quantities* - groundwater that is not currently authorized to be withdrawn by the applicant or not currently authorized to be used for the intended use by the applicant. This includes applications to modify existing permits to increase quantities, and/or change the Permit Use Type (affecting only the modified portion) and applications for an initial permit, but does not include a full or partial permit transfer.
>
> *Substitution Credit* - the use of reclaimed water to:
>
> - Replace all or a portion of an existing permitted use of resource-limited surface water or groundwater; or
> - Allow a different user or use to initiate a withdrawal or increase its withdrawal from the same resource-limited surface water or groundwater source provided that the withdrawal creates no net adverse impact on the limited water resource or creates a net positive impact if required by district rule as part of a strategy to protect or recover a water resource. (§373.250(5)(a)2, Fla.Stat.)
>
> *Sustainable Groundwater Yield* - maximum magnitude of withdrawals that can occur which result in aquifer levels sufficient to support MFLs in the Strategy Area, assuming the spatial distribution of withdrawals is optimized.

Applications for New Quantities and Renewals

Generally, requests for withdrawals of new quantities of water or renewals of existing allocations that are projected to impact VSA MFLs waterbodies in recovery status would need to meet the conditions for issuance, such that they provide a net benefit to the MFLs. The only waterbody within the VSA currently designated as "recovery" status is Indian Lake. Details of how the "net benefit" concept will be implemented remain to be determined. As part of Strategy implementation, the District will develop a clear and consistent approach to integration of MFLs constraints for applicants whose proposed

withdrawals affect a waterbody designated as “recovery” status, relative to its MFLs.

Maximum Permitted Allocations in Current Permits

When considering how to address their impact on the MFLs, individual permittees may find that reducing their permitted allocation is preferable to implementing a capital project. The incentive for permittees to reduce their permitted allocation is primarily cost-benefit, comparing the cost and implications of permit modifications against the cost of a capital project(s) sufficient to address the permittees’ proportional impact. For purposes of the VSA Strategy, proportional impacts are calculated through a combination of individual permittee apportionment values and aquifer levels needed to maintain MFLs, as defined by freeboard (lakes) and projected spring flow.

Based on a comparison of maximum permitted allocations and 2030 projected demands for public supply utilities within Volusia County, the potential reduction in permitted allocations is relatively limited - approximately 1 mgd. Changes in the projected future demand (e.g. decreased projected demand in 2035 relative to 2030 estimates) would directly affect this value. Similar potential reductions in permitted allocations for commercial/industrial, agricultural, and other permitted non-public supply water users were not calculated. Opportunities for achieving benefits through modification of permitted allocations are more limited for commercial/industrial permittees than public supply permittees, given that market conditions and associated water demands tend to be more volatile than population growth. However, the same approach, incentives, and opportunities available to public supply permittees for reducing permitted allocations as a measure to achieve the MFLs in the VSA will be available to non-public supply permittees.

Step-up or step-down allocations within existing permits do not impact the magnitude of an individual permittee’s mitigation obligation under future demand scenarios because analyses conducted for the P/R Strategy address 2030 demands, which are beyond the time horizon of existing permits which include step-up or step-down allocations. Variable allocations may be incorporated into future permits, but withdrawal impacts would remain constrained by the MFLs and associated sustainable groundwater yield.

Permittees that have allocations based on rainfall-year conditions (e.g. permits for agricultural, golf course, or municipal recreation irrigation with allocations based on 2-in-10 drought year demands) will be reviewed to determine if greater efficiencies and expanded implementation of best management practices (BMPs) would be economically feasible. Depending on the outcome of this review, allocations may be modified to reflect increased efficiencies gained through implementation of irrigation BMPs (see Section G) and additional actions may be identified to improve the participation rate in BMP implementation. Further details remain to be determined.

The District intends to use information regarding permitted allocations versus demonstrated need as the basis for conversations with permittees regarding the feasibility of mitigating their impact on the MFLs through allocation reductions or capital projects. Investigation of allocation reduction opportunities on an individual basis would involve refinement of planning-level estimates with permittee-specific information and analyses.

G. Projects and Measures that Achieve the Strategy Objective

Table 6 provides a proposed suite of projects and measures that together would be sufficient to achieve the VSA MFLs. Projects and measures include a combination of conservation, development of alternative water supplies, regulatory changes, aquifer recharge, and expansion of reclaimed water systems. These projects are included herein as a suite of measures that would be sufficient to achieve the Strategy objectives. Projects and measures implemented to achieve the Strategy objectives may differ from those shown in Table 6. Further, projects and measures identified in Table 6 do not become permit conditions by virtue of Strategy approval. Projects in Table 6, or alternative projects that the District concurs will provide an equivalent benefit, may be developed and incorporated as CUP conditions through standard permitting procedures (also see Section F) and in future Strategy revisions, as appropriate. Benefits of specific projects will be compared against values derived from the combination of projected water resource impacts (freeboard) and apportionment values for individual permittees.

Proposed projects include:

- Five reclaimed water projects, two aquifer recharge projects, and two water supply projects proposed by the West Volusia Water Suppliers (WVWS).
- Proposed reclaimed water project and wellfield optimization efforts by the City of Ormond Beach.
- Wellfield optimization project proposed by the City of Daytona Beach.
- An increase in the participation rate and effectiveness of conservation activities implemented by agricultural water users, public supply utilities, and domestic self-supply users.
- Limited reduction in permitted allocations.

Projects proposed by the WVWS constitute the bulk of the benefit for Blue Spring and the MFL lakes in western Volusia County. Overall, these projects can be divided into two categories: projects designed to avoid impacts from groundwater withdrawals on Blue Spring and VSA lakes and projects designed to meet future demand with alternative water supplies that minimize both water resource impacts and cost. Greater than 16 mgd in reclaimed water projects for the WVWS are identified in the Strategy (Table 6). The Alexander Avenue and Aquifer Recharge Enhancement projects provide 3.6 mgd of direct aquifer recharge in close proximity to Blue Spring. The two water supply development projects, Deep Creek/Leffler and Farmton, provide approximately 8 mgd of groundwater to support future growth, with the associated withdrawals located outside (east) of the area considered as the Volusia Blue springshed to minimize impacts on spring flow and lake levels (Shoemaker, et al., 2004).

In addition to the projects shown in Table 6, three other large-scale project concepts developed by stakeholders in the VSA may benefit the Blue Spring and lake MFLs:

- Seminole – Volusia County Yankee Lake Potable Water Interconnect
- Deltona Lower Floridan Aquifer Test Well (Project 6; WVWS, 2013)
- Maytown Reservoir (Project 10; WVWS, 2013)

These projects were not included in the current proposed suite of Strategy measures, as the project concepts are still under development (see "*Project Benefit Assessment*" and Table 7 below). As these three projects progress, it may be appropriate to incorporate them in a future revision of the VSA Strategy (see Section B).

Regarding agricultural conservation, the Strategy envisions implementation of agricultural best management practices consistent with commodity-specific manuals adopted by DACS in Title 5M, F.A.C. Agricultural conservation estimates shown in Table 6 assume an adoption rate of 12.5% among agricultural operations in Volusia County. Given the extent to which agricultural withdrawals affect lakes Daugharty and Hires in particular (see Table 5), the District intends to work closely with DACS and individual permittees in those areas to identify and implement feasible water conservation practices.

Assessment Tools

Currently, several groundwater modeling tools cover portions of the VSA: the District Volusia Steady-state Groundwater Flow Model, the Volusia Regional Transient Groundwater Flow Model, and a site-specific shallow aquifer MODFLOW model (WVWS, 2013). Tool development is an ongoing process and different tools are appropriate for different purposes. The specific modeling tool selected for purposes of VSA Strategy project assessment (SJRWMD Volusia Steady-state Groundwater Flow Model) does not constrain the District or permittees' option to use alternative tools for future analyses related to permitting, MFLs Strategy revision, compliance, project cost-share evaluations, or other purposes.

Project Benefit Assessment

District staff used the Volusia Steady-state Groundwater Flow Model, information provided in Table 6, additional project details from the WVWS, Ormond Beach, Daytona Beach, and other sources to estimate the benefits of this suite of projects relative to Blue Spring and lake MFLs. Results are shown in Table 7. Based on this modeling assessment, the proposed projects would provide sufficient aquifer recovery to achieve the Blue Spring and lake MFLs within the VSA, assuming a 2030 projected demand scenario.

The WVWS conducted independent analysis of their proposed projects using the Volusia Regional Transient Groundwater Flow Model. The transient model analysis also found that the proposed WVWS projects would be sufficient to maintain minimum flow of 157 cfs from Blue Spring . The similarity between results from these independent modeling efforts provides assurance that, upon full implementation, the proposed projects would achieve MFLs for Blue Spring and VSA lakes.

Table 6. Proposed Suite of Strategy Measures Sufficient to Achieve MFLs

Project Type	Project Title [1]	Est. Volume (mgd)	Est. Capital Cost ($)
Conservation	Implementation of Agricultural Best Management Practices	1.1	Estimate pending
	Domestic Self-Supply	0.3	$1.4M
	Public Supply	3.7	$8.4M
Regulatory	Modify Permitted Allocations	1	N/A
Reuse	Deland Reuse Retrofit Part 'B' and Wiley M. Nash Augmentation Facilities (Project 1)	4.1	$3.8M
	West Volusia Reclaimed Water Interconnects (Project 2a)	2.5	$9.3M
	Sanford - Volusia County Reclaimed Water Interconnect (Project 2b)	1.5	$3.4M [2]
	Deltona Lakes Pump Station, Transmission Main and Augmentation Facilities (Project 4)	4	$6.9M
	Doyle Road Reclaimed Water Main Extension (Project 7)	2	$6.0M
	City of Deltona Golf Course Reclamation Water Expansion [3]	0.7	$1.8M
	City of Deltona – Howland Blvd. Phase 3 Reclaimed Water Project [3]	2.0	$0.5M
	Ormond Beach reclaimed water distribution project [3]	1.3	$3.3M
Aquifer Recharge	WVWS Aquifer Recharge Enhancement Project (Project 3)	2.4	$4.4M
	Alexander Avenue Water Resource Management Site (Project 8)	1.2	$1.5M
Water Supply	Deep Creek/Leffler Water Supply, Treatment and Transmission Facilities (Project 5)	4	$44.1M + Additional Transmission Costs (Estimate pending)
	Farmton Water Supply and Transmission Facilities (Project 9)	4	$40.5M
	Daytona Beach Wellfield Optimization	N/A	Estimate pending
		TOTAL	**$135.3M + Pending Project Costs**

Notes:
1 Project identification numbers match naming conventions in the WVWS Phase III Water Supply Plan (2013). Volumes and costs for these projects were derived from the same source, with the exceptions noted.
2 Total project cost $3.4M, per 2013 Alternative Water Supply Project Cost-share Solicitation (SJRWMD). Proportional cost for the West Volusia Water Suppliers is $1.6M (per WVWS 2013).
3 Volumes and costs for the City of Deltona and Ormond Beach projects are per 2013 SJRWMD Alternative Water Supply Project Cost-share Solicitation submittals.

Table 7. Aquifer Benefits Associated with Proposed Projects

Waterbody	2030 Freeboard / Flow with No Project Implementation	UFA Rebound / Flow with Proposed Project Scenario
Big Lake	-0.1 ft	1.10 ft
Lake Daugharty	-0.1 ft	0.96 ft
Indian Lake	-0.2 ft	2.64 ft
Lake Hires	-0.3 ft	1.00 ft
Lake Helen	-2.6 ft	1.03 ft
Three Island Lakes	-1.3 ft	1.10 ft
Blue Spring	141 cfs *	160 cfs

* 141 cfs = MFL (157 cfs) - Freeboard (16 cfs). See Table 4.

H. Funding

Projects implemented as part of this Strategy will likely be funded through cooperative cost-share among permittees and, in select cases, the District. Available District cost-share is contingent upon budget availability. Although not directly quantified, projects and measures funded by District ad valorem funds, either through District projects or via cost-share agreements with project partners, are intended to mitigate the water resource impact of domestic self-supply uses and uses authorized under a permit by rule. Under the assumption that permitted water users are only responsible for their proportion of the water resource impact, District cost-share may exceed the typical 40% threshold for projects if additional action is needed beyond mitigating the effect of permitted withdrawals in order to meet the MFLs.

Based on the scenario provided in Table 6, 40% District cost-share results in a minimum of $54M in District cost-share that would be needed to construct the projects identified. The following factors are important to note, relative to this estimate:

1) This estimate does not include cost-share for capital projects noted in Table 6 for which estimated costs remain to be determined;
2) District and partner agency costs for monitoring are not included in this estimate; and
3) This estimate primarily addresses capital costs. It does not reflect the perpetual operation and maintenance costs that would become obligations for project partners.

Through the 2013 cooperative cost-share solicitation process, the District provided funding for construction of water resource development, alternative water supply development, water conservation and springshed nutrient-loading reduction projects. Table 8 shows a subset of these cooperative cost-share projects which benefit water resources in the VSA. The District has committed $15M in cost-share funding to support implementation of the projects shown in Table 8. This does not reflect the entire financial investment on the part of the District in the VSA, but provides a view of current investment on the part of the District and project partners.

Details regarding cost-share agreements will be developed on a project-by-project basis, consistent with statutory directives and District cost-share guidelines. It should be noted that certain water supply development projects that are consistent with the District's Water Supply Plan and that "bring[] about replacement of existing sources in order to help implement a minimum flow or level" are to be given "first consideration" for state or water management district funding assistance. (§373.705(4), Fla. Stat.)

I. Project Implementation and Monitoring Progress

Project Implementation

The implementation schedule for particular projects will be set forth in applicable cost-share agreements and/or the consumptive use permit(s), as appropriate. For projects that involve District cost-share, funding recipients shall provide annual progress reports summarizing project status, demonstrated change in withdrawals or aquifer benefits achieved to-date, and expenditures. On an annual basis, the District will compile project progress reports into a MFLs Strategy Implementation report, summarizing pertinent permit modifications, permit compliance, project progress during the previous year, and anticipated permit revisions, projects and anticipated cost-share for the upcoming year. Annual reports shall be developed on a calendar-year or fiscal-year basis, as appropriate.

The District will identify a monitoring network of existing monitoring wells that reflect both conditions near the subject lakes and regional aquifer rebound needed to support water resources within the VSA. This network will be based primarily on existing Floridan aquifer wells with an extended period-of-record. Manatee counts in the Blue Spring run will also continue, in cooperation with partner agencies. Use of the Volusia Steady-state Groundwater Flow Model for purposes of this document does not constrain the District or project partners' future options regarding which tools to use for Strategy assessment and revision.

Table 8. Current Cooperative Cost-share Projects in the VSA

Project Type	Project Title	Estimated Construction Cost (M)	FY 14 District Share (M)	FY 15 District Share (M)	Total District Share (M)
Reuse	Deland Reuse Retrofit Part 'B' and Wiley M. Nash Augmentation Facilities (Project 1)	$3.8	$1.1	$0.4	$1.5
	West Volusia Reclaimed Water Interconnects (Project 2a)	$9.3	$2.6	$1.1	$3.7
	Sanford - Volusia County Reclaimed Water Interconnect (Project 2b)	$3.4	$1.4	-	$1.4
	Doyle Road Reclaimed Water Main Extension (Project 7)	$6.0	$1.7	$0.7	$2.4
	City of Deltona Golf Course Reclamation Water Expansion	$1.8	$0.7	-	$0.7
	City of Deltona – Howland Blvd. Phase 3 Reclaimed Water Project	$0.5	$0.2	-	$0.2
	Deltona Lakes Pump Station, Transmission Main and Augmentation Facilities (Project 4)	$6.9	-	$2.7	$2.7
	Ormond Beach Reclaimed Water Distribution Project	$3.3	-	-	$1.32
Aquifer Recharge	WVWS Aquifer Recharge Enhancement Project (Project 3)	$4.4	-	$1.8	$1.8
	Alexander Avenue Water Resource Management Site (Project 8)	$1.5	-	$0.6	$0.6
	Total	**$44.2**	**$7.7**	**$7.3**	**$16.3**

Water Resource Response

The combination of flow at Blue Spring, aquifer levels, and lake levels will form the statistical basis from which the District can determine if the MFLs are being achieved. Continuous discharge monitoring of Blue Spring will continue. In addition, throughout the duration of Strategy implementation, existing or equivalent lake level stations will continue to be monitored at a frequency sufficient to facilitate statistical evaluation of MFLs.

Data Analysis

The combination of spring flow, lake level, and aquifer level data will be used to evaluate progress toward achieving MFLs. Data assessments will include four primary components:

1) Volusia Blue Spring flow;
2) Upper Floridan aquifer levels near each of the VSA lakes;
3) Aquifer levels across a local Upper Floridan trend network; and
4) Quantitative relationship between lake levels and aquifer levels.

The District will develop a statistical methodology for integrating aquifer level data from these wells as part of Strategy implementation. Aquifer level protection goals will integrate levels needed to achieve lake MFLs as well as head needed to achieve the Blue Spring minimum flows. Interpolated freeboard values identified in Table 9 are provided as interim goals against which progress can be measured. Linear change in freeboard values is not anticipated, but these values provide a trend against which monitoring data can be evaluated. Aquifer level targets may be set to advise and guide in tracking the accuracy of the estimated sustainable groundwater yield, but neither aquifer levels, nor the interim freeboard targets, will be used as the sole basis by which the District will approve or disapprove the Strategy and subsequent amendments or updates.

Table 9. Interim Freeboard Targets for VSA Lakes

Lake	Starting Freeboard (1995 Conditions)	Interim Freeboard Targets		
		2015	2020	2025
Big	0.8	0.3	0.2	0.1
Daugharty	1.1	0.5	0.3	0.2
Helen	1.0	0.4	0.3	0.1
Hires	1.0	0.5	0.3	0.2
Indian	-0.7	-0.3	-0.2	-0.1
Three Island	0.7	0.3	0.2	0.1

Note: Values rounded to the nearest tenth-foot.

J. References

Shoemaker, W.B., O'Reilly, A.M., Sepúlveda, N., Williams, S.A., Motz, L.H., and Sun, Q, 2004, Comparison of estimated areas contributing recharge to selected springs in north-central Florida by using multiple ground-water flow models: U.S. Geological Survey Open-File Report 03-448.

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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.).

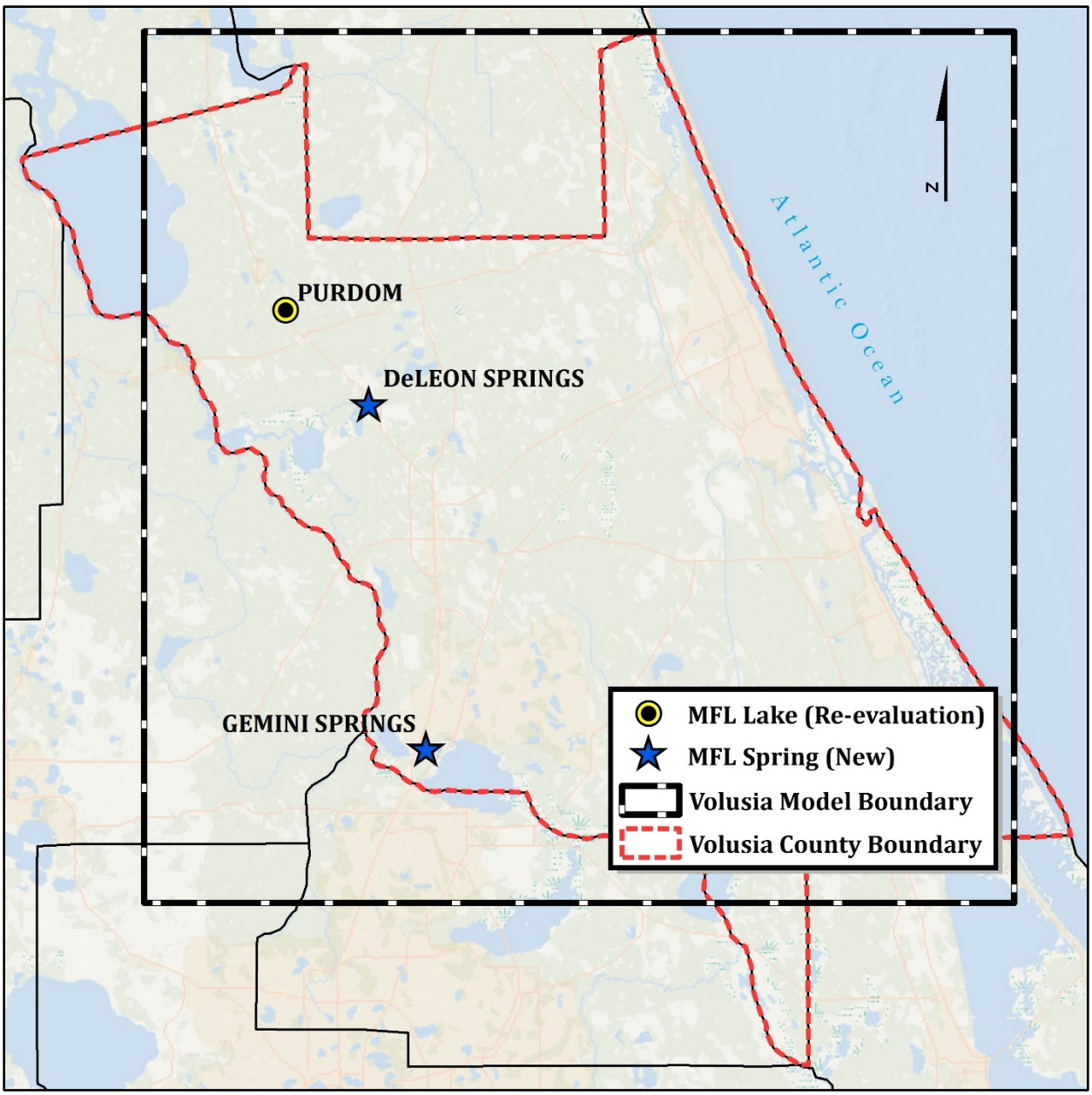

Figure 1: Location of new and re-evaluated MFL waterbodies in Volusia County

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.

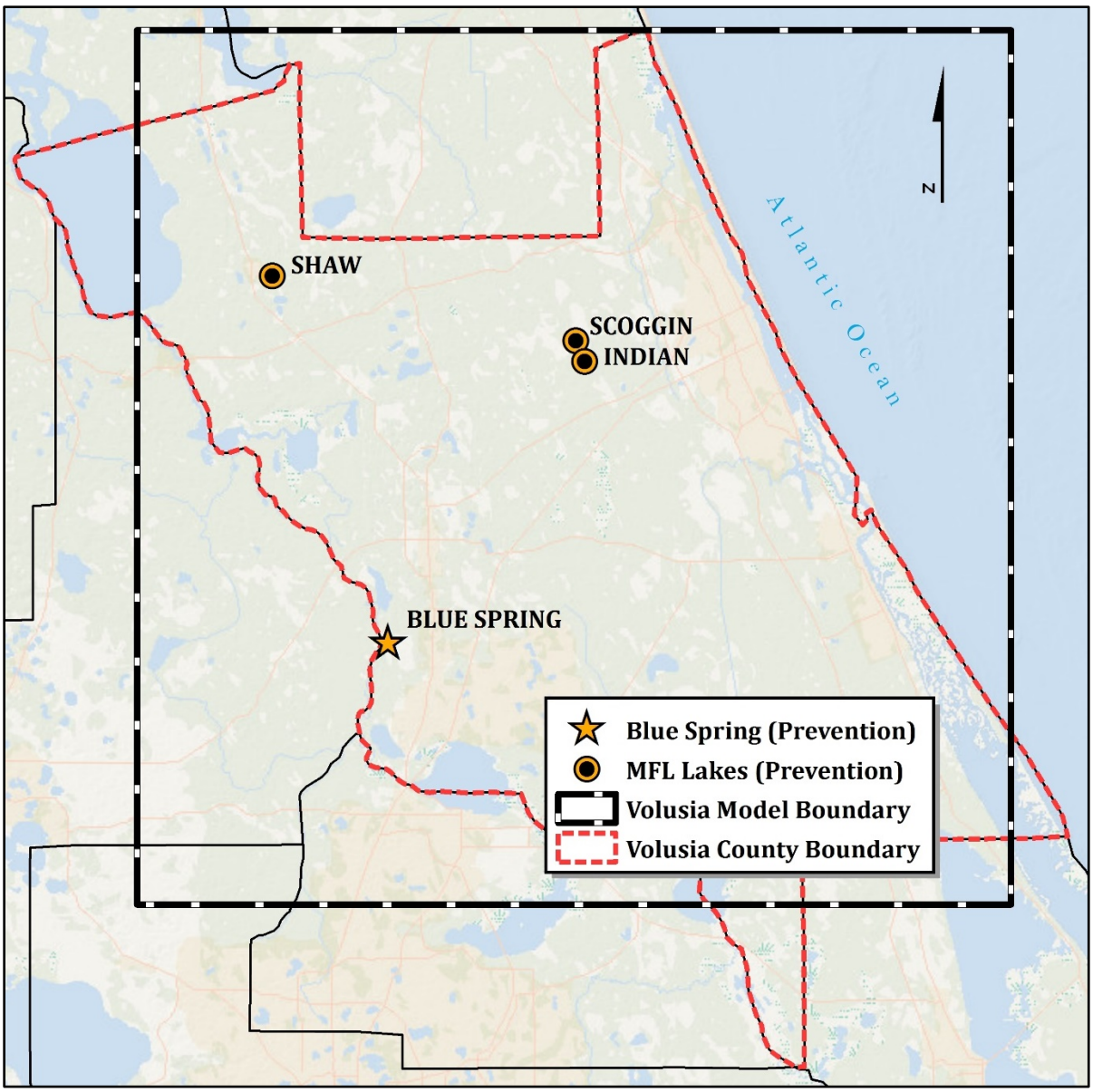

Figure 2: Location of MFL waterbodies identified as being in prevention or recovery in the 2018 water resource assessment

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

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Prevention Strategy for the Implementation of Silver Springs Minimum Flows and Levels

April 2017

St. Johns River Water Management District
Division of Water Supply Planning and Assessment
Bureau of Water Supply Planning

A. Introduction

Silver Springs, located in Marion County in north central Florida, is an iconic first-magnitude spring that was designated as an Outstanding Florida Spring (OFS) pursuant to subsection 373.802(4), Florida Statutes (F.S.). At the time of minimum flows and minimum levels (MFLs) adoption for an OFS, a prevention or recovery strategy must be adopted concurrently if the spring is below, or is projected within 20 years to fall below, an adopted MFL (subsection 373.805(1), F.S.). The St. Johns River Water Management District (SJRWMD) evaluated the recommended MFLs for Silver Springs based on current and projected water use conditions and determined that the MFLs would not be achieved over the next 20 years; therefore, a prevention strategy was required.

Consistent with the provisions for establishing and implementing MFLs provided for in section 373.0421, F.S., the Prevention Strategy for the Implementation of Silver Springs MFLs (Strategy) identifies a suite of projects and measures that, when implemented, prevents the Silver Springs MFLs from being violated due to consumptive uses of water, while simultaneously providing sufficient water supplies for all existing and projected reasonable beneficial uses.

To meet the requirements of an OFS prevention strategy according to subsection 373.805(4), F.S., this Strategy contains the following information:

- A listing of all specific projects and measures identified for implementation of the plan
- A priority listing of each project
- The estimated cost and date of completion for each project
- The source and amount of financial assistance offered by the St. Johns River Water Management District (SJRWMD)
- An estimate of each project's benefit to the OFS
- An implementation plan to achieve the adopted MFLs

Groundwater withdrawals within Marion County contribute to the majority of the pumping-related impacts to Silver Springs. Therefore, this Strategy focuses primarily on projects and measures within the county boundary where their benefits will be the greatest. This does not preclude the development of projects outside of Marion County that are anticipated to result in flow increases at Silver Springs. The proposed projects (Section G) and regulatory component (Section I) listed within this Strategy provide assurance that the MFLs for Silver Springs will be achieved while meeting projected 2035 water use demand and permitted withdrawal quantities[1] (PQ).

[1] Permitted withdrawal quantities represents a groundwater model simulation where withdrawals are equal to the allocations authorized by existing consumptive use permits. Exceptions within the Northern District Groundwater Flow Model Version 5.0 include permitted agricultural allocations which were adjusted to better reflect average irrigation, and domestic self-supply (a use exempt from permitting) and subthreshold agricultural use (authorized via a general permit by rule), which were both estimated using 2035 projected demand.

B. Strategy Objective, Approach, and Phased Implementation

Objective

The objective of the Strategy is to ensure that flows and levels within Silver Springs do not fall below adopted MFLs during the next 20 years. This objective can be achieved by establishing and maintaining groundwater withdrawals at or below the sustainable groundwater yield[2] through water conservation and water supply development projects or by mitigating the impact of groundwater withdrawals on Silver Springs through water resource development projects.

Approach

The approach outlined in this Strategy includes project and measure identification and implementation, proposed regulatory actions, monitoring, and routine assessment of the Strategy goals and accomplishments. The intent is to provide assurance that MFLs will be met in a way that maximizes flexibility for permittees and project partners. The basic approach includes the following:

- Identify projects and measures that provide water resource benefits sufficient to achieve the MFLs. *(Section G)*
- Identify sufficient funding resources to facilitate Strategy implementation. *(Section H)*
- Prescribe regulatory measures that define a permitting path for existing and new uses. *(Section I)*
- Monitor trends in flow and water levels and then utilize this data to confirm benefits of implemented projects and adjust the Strategy measures as necessary. *(Section J)*
- Implement Strategy projects and measures in a phased approach with a comprehensive review at five-year intervals, including MFLs assessment, recalculation of MFLs freeboard[3], and Strategy revisions, if necessary. (*below*)

Phased Implementation

Strategy implementation will occur in five-year phases (Table 1). Actions to occur in subsequent phases will be determined during the Strategy review process envisioned at the end of Phases 1 and 2. Phase 1 would begin upon Strategy approval by the SJRWMD Governing Board. Upon completion of each five-year phase, a Five-Year Strategy Assessment report will be prepared. This report may include the following information:

- Newly adopted/re-evaluated MFLs

[2] For purposes of this Strategy, the sustainable groundwater yield is defined as the quantity of groundwater from the Upper Floridan aquifer which can be withdrawn without causing significant harm to Silver Springs (i.e., violate its MFLs).

[3] For Silver Springs, freeboard is defined by the amount of spring flow in excess of the MFLs (positive freeboard) or less than the MFLs (negative freeboard). Positive freeboard indicates that the MFLs are met with additional water available for withdrawal. Negative freeboard indicates the MFLs are not, or will not be, met and the water body is considered in recovery or prevention, respectively.

- Utilization of updated tools for resource assessments and analyses
- Updated freeboard calculations (based on the revised planning period)
- Updated assessment of prevention/recovery status
- Project implementation status, including alternative projects, if warranted
- Rule revision status
- Water resource data assessment
- Evaluation of the sustainable groundwater yield

Based on the findings in each Five-Year Strategy Assessment report, the Strategy may be revised by the Governing Board.

Table 1. Silver Springs Strategy Phased Implementation – Phases 1 and 2

Actions	Phase 1 (2017 - 2022)	Phase 2 (2023 – 2027)
Strategy approval	- By SJRWMD Governing Board (2017) - Initiates Strategy implementation	- If necessary, recommend revised Strategy for Governing Board approval
Implement projects and measures	- Continue to work with Ocala to develop and construct the major Strategy projects - Through the District Cost Share program, incentivize water conservation and reclaimed water project development	- Continue to incentivize project development with an emphasis on water conservation, reclaimed water, and stormwater harvesting projects
Alignment of permitted allocations	- As permits expire, adjust allocations where necessary to meet reasonable/beneficial use criteria	- Continue
Rulemaking for regulatory component	- Complete concurrent with Strategy approval	- As necessary based on recommended Strategy revisions
Monitor trends in flow and water levels	- Continue data collection at existing sites	- Continue
Five-Year Strategy Assessment	- Assess, refine and approve revised Strategy, if necessary	- Assess, refine and approve revised Strategy, if necessary

C. Stakeholder Outreach

SJRWMD has been coordinating with stakeholders within the region for several years regarding potential projects to benefit Silver Springs. Stakeholder outreach activities specifically related to the formal Strategy began in February 2017 with briefings to staff from Marion County and the City of Ocala. The draft Silver Springs MFLs report and Strategy were posted for public viewing on the District's website on March 9, 2017, and a public workshop was held on March 16, 2017, in Ocala, Florida.

D. Silver Springs MFLs

Table 2 shows the MFLs for Silver Springs, which consist of three minimum flows and levels that protect the ecological functions of Silver Springs and the Silver River; the minimum frequent high, minimum average and minimum frequent low (Sutherland et. al. 2017). At the time of proposing MFLs, an assessment is made of the existing and projected future hydrologic regimes compared with the MFLs. If the MFLs are not achieved under existing conditions, a recovery strategy is necessary. If existing conditions meet or exceed the MFLs, but conditions during the next 20 years are projected to not meet the MFLs, then a prevention strategy is necessary.

Table 2. Minimum flows and levels associated with the Silver Springs MFLs[1]

MFLs	Flow (cfs[2])	Level NAVD88 (ft)	Duration (days)	Return Interval (years)	2010 Baseline Condition Freeboard (cfs)
Minimum Frequent High	828	40.0	30	5	98
Minimum Average	638	38.2	180	1.7	19
Minimum Frequent Low	572	37.0	120	3	17

[1] MFLs are tied to Silver Springs surface water flows and levels at the USGS 02239501 gauging station.
[2] cfs = cubic feet per second

A frequency analysis was performed on Silver Springs flow at a 2010 baseline condition to determine the current compliance status associated with the three minimum flows and levels. The baseline year was selected to correlate with the most current regional groundwater model output. It should be noted that pumping during more recent years has actually been less than the amount pumped in 2010. For Silver Springs, the minimum frequent low, which protects floodplain and marsh habitats along the Silver River from excessive drying, was determined to be the most sensitive MFL. The frequency analysis for the minimum frequent low demonstrated 17 cubic feet per second (cfs) of freeboard under 2010 pumping conditions. In other words, the Silver Springs minimum frequent low flow was met (i.e., not in recovery) under the current baseline condition with 17 cfs of flow reduction available to consumptive uses.

To determine the MFLs compliance status in 2035 and at PQ conditions, groundwater modeling results were used to compare the predicted change in flow under the 2010 baseline condition and under projected 2035 and PQ conditions. The Northern District Groundwater Flow Model Version 5.0 (NDMv5) was determined to be the best available tool to evaluate the status of the Silver Springs MFLs and to estimate the benefits of projects recommended in this Strategy. The model predicted a 27.3 cfs decline in flow at Silver Springs at 2035 conditions when compared to the 2010 baseline condition. This exceeds the available freeboard by 10.3 cfs (Table 3). Since the Silver Springs MFLs will not

be met under projected 2035 pumping conditions, Silver Springs is in prevention. Under PQ pumping conditions, flow in Silver Springs declined by 29.4 cfs exceeding the available freeboard by 12.4 cfs.

Table 3. Silver Springs predicted freeboard under 2010 baseline, 2035 projected, and PQ conditions

Model Scenario	Modeled Silver Springs Flow (cfs)	Silver Springs Freeboard (cfs)	SJRWMD-Marion Withdrawals[1] (mgd[2])
2010 Baseline	708.8	17 cfs	36.5
2035	681.5	-10.3 cfs	62.7
Permitted Quantities[3]	679.4	-12.4 cfs	66.9

[1] Does not include recharge wells or return flow estimates for irrigation withdrawals.
[2] mgd = million gallons per day
[3] Agricultural allocations (based on 2-in-10 year drought) adjusted to represent estimated average irrigation demands. Domestic self-supply and subthreshold agricultural use represented by 2035 projected demand.

E. Sustainable Groundwater Yield

For purposes of this strategy, the sustainable groundwater yield (SGY) defines the quantity of Upper Floridan aquifer groundwater withdrawals that can occur without causing significant harm to Silver Springs. However, due to infinite potential variation in withdrawal distribution, it is not practicable to define the SGY as a finite number. SJRWMD completed an assessment using the NDMv5 to estimate a range for the sustainable Upper Floridan aquifer yield applicable to the SJRWMD-portion of Marion County as constrained by Silver Springs MFLs. For this assessment, gross withdrawals[4] and corresponding freeboard values were annually interpolated between 2010 and 2035 modeled conditions and between 2010 and PQ modeled conditions (PQ withdrawals were assumed to occur at 2035). The gross withdrawal quantity associated with the last year of positive freeboard for the 2035 and PQ withdrawal distribution provided an estimated range of the sustainable groundwater yield.

The resulting estimated SGY for the SJRWMD-portion of Marion County ranges from 52.2 to 53.5 million gallons per day (mgd). Based on current projections and permitted allocations, it is estimated that the SGY of the SJRWMD-portion of Marion County will be exceeded between 2025 and 2026.

F. Influence by Use Type

When determining project types to implement in a prevention or recovery strategy, it is important to develop an understanding of the water uses that have the largest impact on the water resource of concern. Only then can projects be developed that will result in the

[4] For the sustainable groundwater yield analysis, only permitted, estimated domestic self-supply, and General Permit by Rule withdrawals and permitted return flows were considered.

greatest benefit to the constrained water resource. An analysis was performed using the NDMv5 PQ simulation that evaluated the impacts to Silver Springs from groundwater withdrawals by water use type in the SJRWMD-portion of Marion County. The results indicate that impacts due to public supply withdrawals contribute 62% of the total impacts when only assessing SJRWMD-Marion County withdrawals (Table 4). Agricultural and domestic self-supply account for 16% and 14% of the impacts, respectively. Impacts from the remaining use types account for less than 8% of the impacts to Silver Springs.

Table 4. Impact Influence by Use Type in the SJRWMD-portion of Marion County at PQ Conditions

Use Type	Estimated Impact to Silver Springs (cfs)	Percent of SJRWMD-Marion County Impact	Modeled Groundwater Withdrawals (mgd)
Public Supply	26	62%	29.1
Agriculture	7	16%	18.0
Domestic Self-supply	6	14%	14.0
Commercial/Industrial/ Institutional	2	5%	2.8
Landscape/Recreation/ Aesthetic	1	2%	2.2
Mining/Dewatering	<1	<1%	0.7
TOTAL	42	100%	66.9

G. Projects and Measures that Achieve the Strategy Objective

Table 5 provides a proposed suite of projects and measures specific to the SJRWMD-portion of Marion County that, implemented together, would be sufficient to achieve the Silver Springs MFLs while meeting projected 2035 water use needs (see also Appendix A). Projects and measures include enhanced conservation, aquifer recharge, development of alternative water supplies, and expansion of reclaimed water systems. The benefits predicted from the suite of proposed projects and measures listed within this Strategy, together with the regulatory component described in Section H, provide assurance that the Silver Springs MFLs will be achieved through 2035.

Table 5. Strategy projects and measures to achieve Silver Springs MFLs in 2035

Project/Measure	Est. Volume (mgd)		Est. Silver Springs Flow Benefit (cfs)		Est. Capital Cost ($)		Implementation Priority
	Low	High	Low	High	Low	High	
Water Conservation	4.4	7.6	1.9	4.2	9.6M	13.1M	1
Aquifer Recharge	2.9		1.4		8.0M		2
Ocala LFA Conversion	7.5		7.0		6.7M – 31.7M		3
Reclaimed water conversion	1.9[1]		0.5		3.2M		4
TOTAL	16.7	19.9	10.8	13.1	27.5M	56.0M	

[1] Total reclaimed water available at 2035 (less the 2.9 mgd planned for recharge). Actual groundwater offset is less.

Actual projects and measures implemented to achieve the goals of the Strategy objective may differ from those shown in Table 5. Moreover, projects and measures identified in Table 5 do not become permit conditions by virtue of their inclusion in an approved Strategy. Projects in Table 5, or alternative projects that SJRWMD concurs will provide an equivalent benefit, may be developed and incorporated as consumptive use permit (CUP) conditions through standard permitting procedures and in future Strategy revisions, as appropriate.

Water Conservation

Water conservation is an important component of any prevention or recovery strategy as it directly affects projected demand and, therefore, the magnitude of resource impacts. Water conservation may be the preferred measure to achieve the Strategy objective rather than development of costly alternative water supplies. Best management practices such as improved irrigation scheduling, conversion to more efficient irrigation systems, or moisture sensor-controlled automation can reduce the amount of water applied to crops and landscape. Water efficient fixture replacement, such as showerheads, appliances, urinals, and faucet aerators, reduce water use in homes, commercial establishments, institutions, and any facility with sinks and restrooms.

For this Strategy, two scenarios of potential water conservation for public supply and domestic self-supply (DSS) were explored. Irrigation efficiency estimates for agriculture were adapted from the FSAID II Final Report (FDACS, 2015). For the remaining water use categories and low range public supply and DSS, conservation quantities were estimated based on the methodologies employed for the North Florida Regional Water Supply Plan (SJRWMD and SRWMD, 2017) and the Central Florida Water Initiative Regional Water Supply Plan (SFWMD et. al., 2015). The high range conservation potential for public supply

and DSS would be achieved if all public supply systems and DSS residents achieved the average 2010-2014 gross per capita rate, 169 gallons per day per capita, for the SJRWMD-portion of Marion County. The predicted range of benefits to Silver Springs with achievement of the low to high conservation savings is approximately 1.9 and 4.2 cfs, respectively.

Table 6. Estimated 2035 conservation potential for the SJRWMD-portion of Marion County

Category	2035 Projected Water Use[1] (mgd)	2035 Low Conservation Potential (mgd)	2035 High Conservation Potential (mgd)
Public Supply	24.3	1.0	3.0
Domestic Self-supply	15.5	0.6	1.7
Agriculture	16.3	2.7	2.7
Landscape/Recreation/ Aesthetic Self-supply	3.3	0.1	0.1
Commercial/Industrial/ Institutional Self-supply and Mining/Dewatering	3.8	<0. 1	<0. 1
TOTAL	63.2	4.4	7.6

[1] As calculated by SJRWMD Water Supply Planning (June 2016). Modeled water use may vary slightly due to timing of well file development and processing of multi-District well files.

Aquifer Recharge

Of the 4.8 mgd of reclaimed water projected at 2035 (see *Reclaimed Water* subsection below), it is currently anticipated that 2.9 mgd will be used for aquifer recharge. The majority of this quantity, 2.8 mgd, is projected for the City of Ocala who is in the process of designing a wetland groundwater recharge park in the groundwater contributing area of Silver Springs. Located adjacent to the Pine Oaks Golf Course, it is anticipated that the recharge park could accept between 3 and 5 mgd of reclaimed water and stormwater. For purposes of this Strategy, the 2035 projected reclaimed water quantity, 2.8 mgd, was utilized to assess the benefits of this project. If additional reclaimed water becomes available or when stormwater quantities can be verified, the benefits of the project could potentially exceed Strategy estimates. Although there are many parameters that affect the potential level of benefit assigned to the recharge park, staff was able to calculate an estimated benefit of 1.4 cfs based on the range of parameters that were evaluated.

The remaining 0.1 mgd of available reclaimed water planned for recharge is associated with the growth of a small public supply utility in Marion County whose current reclaimed

water disposal method is considered beneficial recharge based on SJRWMD guidelines. The predicted benefit to Silver Springs is negligible.

Ocala Lower Floridan Aquifer Conversion

The City of Ocala currently obtains its potable water from an Upper Floridan aquifer wellfield located approximately two miles from Silver Springs. Expansion plans currently dictate the construction of a second wellfield located six miles southwest of Silver Springs. Although relocating the wellfield further from Silver Springs would itself alleviate a portion of the groundwater pumping impacts, the City is interested in further reducing impacts by transferring a portion of their withdrawals to the Lower Floridan aquifer (LFA), which is considered an alternative water supply based on initial water quality testing results.

Preliminary investigations have shown appreciable confinement between the Upper and Lower Floridan aquifers in the vicinity of the City's new wellfield which would likely result in reduced impacts to the Upper Floridan aquifer, the source of Silver Springs. The SJRWMD and the City of Ocala are currently partnering on an LFA aquifer performance test (APT) to more accurately predict the benefits of a 7.5 mgd conversion. The results of the APT will be incorporated into future versions of SJRWMD groundwater flow models. Interim benefit estimates resulting from a 7.5 mgd conversion to the LFA at the new wellfield predict a 7.0 cfs increase in flow at Silver Springs.

Reclaimed Water

Marion County has the largest domestic self-supplied population in the state (Marella 2014). As such, the quantities of reclaimed water generated within the County are relatively limited compared to other counties within SJRWMD. The majority of reclaimed water within the SJRWMD-portion of Marion County is produced by the City of Ocala, Marion County Utilities, and the City of Belleview. According to SJRWMD planning estimates, an additional 2.6 mgd of reclaimed water from utilities in Marion County is currently available to offset groundwater withdrawals. Growth through 2035 is anticipated to make available an additional 2.2 mgd of reclaimed water for a total available quantity of 4.8 mgd (Table 7). Of the 4.8 mgd of available reclaimed water at 2035, it is anticipated that 2.9 mgd will be utilized for recharge leaving 1.9 mgd to offset groundwater withdrawals. Recent expansion projects are providing, or will provide, up to 0.9 mgd of reclaimed water to several area golf courses and parks. Assuming that reclaimed water provides a 75% groundwater offset for recreational/aesthetic irrigation self supply users and a 60% offset for mixed users, replacing existing groundwater withdrawals with 1.9 mgd of reclaimed water within the SJRWMD-portion of Marion County results in a modeled increase in flow at Silver Springs of 0.4 cfs.

Table 7. 2035 projected reclaimed water quantities for SJRWMD-Marion County

Waste Water Treatment Facility Name	2035 Total Potential Additional Reclaimed Water (mgd)	Anticipated Reclaimed Water Use
Marion Co. - Silver Springs Shores	1.2	Reuse
Belleview	0.3	Reuse
Ocala WWTPs	2.8	Recharge
Marion Co. - Stonecrest WWTF	0.4	Reuse
Rolling Greens	0.1	Recharge
TOTAL	4.8	Reuse (1.9 mgd); Recharge (2.9 mgd)

Stormwater Harvesting

The SJRWMD is expanding efforts to promote stormwater harvesting within the Silver Springs groundwater contributing area to increase recharge opportunities. Two feasibility studies were completed in 2016 to estimate potential quantities of surface runoff that could be diverted and potential locations where this diverted stormwater within and near the Silver Springs Forest Conservation Areas could recharge the Upper Floridan aquifer. In addition, the District has been coordinating with the Florida Department of Transportation on opportunities to incorporate stormwater harvesting design concepts in upcoming projects within Marion County with the goal of promoting greater recharge and enhancing water quality. At the time of Strategy development, potential stormwater harvesting projects to enhance recharge were conceptual and in the process of being further developed. It is anticipated that stormwater harvesting projects, once fully vetted, will be incorporated within the Five-Year Strategy Assessment reports and any subsequent Strategy revisions.

H. Funding

Pursuant to subsection 373.805(4)(b), F.S., which defines the guidelines for prevention and recovery strategies for OFS MFLs, the SJRWMD will provide financial assistance for the implementation of projects and measures identified in the Strategy totaling no less than 25% for each project. Based on the estimated cost of Strategy implementation (Table 5), the SJRWMD will be responsible for providing a minimum of $6.9M to $14.0M in financial assistance for the projects identified in this Strategy.

The SJRWMD primarily provides funding assistance through the Districtwide Annual Cost-Share Program, which is administered annually and supports projects that benefit one or more of the District's four core missions; water supply (alternative water supply, non-traditional sources, and water conservation), water quality, natural systems restoration (including projects that provide a significant percent recovery for an MFL waterbody whose status is in prevention or recovery), and flood protection. This funding assistance is exclusively available for construction-related costs with the District's percent match

typically at 33% or 50% (conservation projects only). However, cost-share projects that benefit springs may be eligible to receive additional funding through the Florida Department of Environmental Protection (FDEP). The SJRWMD scoring criteria is geared such that projects that benefit an MFL waterbody that is determined to be in prevention or recovery receive the highest score in the core mission benefit ranking criterion, thereby giving weight to projects with demonstrated benefits that are listed within a prevention or recovery strategy.

The SJRWMD Agricultural Cost Share program provides funding assistance to agricultural operations for the implementation of projects that conserve water and/or result in nutrient loading reductions. This program is offered to agricultural operations outside of the Tri-County Agricultural Area[5] and as such is available to the agricultural community in Marion County. The cost-share is up to 75%, not to exceed $250,000 per project, and covers engineering, design, construction, and implementation costs. Funds allocated to this program typically include $1.5 million from ad valorem funds.

With the passage of the 2016 Legacy Florida legislation, $50 million from the Land Acquisition Trust Fund was earmarked for the next 20 years for springs restoration. These funds are typically administered through FDEP to the water management districts to increase the percent match for springs-related projects selected for funding through each districts' cost share program. This often results in a 50% total cost-share match, 25% from FDEP and 25% from SJRWMD. It is anticipated that the districts, local governments and public supply utilities will continue to partner with the state of Florida through FDEP to aggressively implement springs protection projects well into the future.

I. Regulatory Component

Ensuring the maintenance of the Silver Springs MFLs will require careful management of local and regional groundwater withdrawals. As such, a regulatory component is necessary to ensure that existing and future groundwater use is consistent with maintaining Silver Springs MFLs. The regulatory component of this Strategy will be developed and adopted concurrently with the proposed MFLs. These new regulatory measures along with existing rules will provide the regulatory framework needed to ensure achievement of the Silver Springs MFLs through 2035.

Current Permitting Rules

Presently, the SJRWMD possesses a comprehensive system of rules, which regulate consumptive uses of water. These permit criteria are listed in Chapter 40C-2, Florida Administrative Code (F.A.C.)., and are expanded upon in the SJRWMD *Applicant's Handbook: Consumptive Uses of Water*. Several existing permit requirements will continue to provide assurance that existing and new permitted consumptive uses are consistent with the Strategy objective:

[5] The Tri-County Agricultural Area (TCAA) includes Flagler, Putnam and St. Johns counties. A separate cost-share partnership exists to assist agricultural projects in the TCAA.

- Reasonable-beneficial water uses *must utilize the lowest quality water source that is technically, economically and environmentally feasible*. Lower quality water sources include reclaimed water, stormwater, saline water, and other alternative water supplies.
- Reasonable-beneficial uses *must not cause harm to the water resources of the area*. According to the definition of an MFL, withdrawals that result in MFLs not being achieved are considered significantly harmful to that waterbody.
- Reasonable-beneficial uses *must be in accordance with any minimum flow or level and implementation strategy*.
- Reasonable-beneficial uses *must be in such quantity as is necessary for economic and efficient use*. To meet the requirements of this criterion, water use must be consistent with the demonstrated demand for a particular water use.

Regarding the economic and efficient use permitting criterion as it relates to demonstrated demand, the demonstrated demand at the time of permit issuance may differ from the realized water use over the life of a CUP due to a variety of causes. Population projections for specific utility service areas increase and decrease over time due to fluctuations in growth rates or economic conditions. Actual water use for specific facilities can change over time due to process improvements or updated equipment. In addition, the actual demand may be less than the projected demand due to the implementation of conservation measures and expanded use of reclaimed water. At the time of permit renewal, applicants must again provide a demonstration of need for the requested quantities. This provides SJRWMD the opportunity to realign the allocation with current demand.

An evaluation of reported water use versus permitted allocations was completed in 2014 for Marion County non-agricultural[6] CUPs with allocations greater than 0.1 mgd. The average reported groundwater use for 25 permits from 2011 to 2013 totaled approximately 76% of the corresponding 2013 permitted groundwater allocations. The unused allocations equate to just over 5 mgd that could potentially be reduced from existing permitted quantities as these permits are renewed.

Water Shortage

In addition to permitting rules, the SJRWMD Governing Board is authorized via section 373.175, F.S., to declare a water shortage if it determines that "insufficient ground or surface water is available to meet the needs of the users or when conditions are such as to require temporary reduction in total water use within the area to protect natural resources from serious harm." Extended periods of less than average precipitation can exacerbate declining groundwater levels (which can lead to decreased spring discharge) as there will typically be an increase in groundwater withdrawals for irrigation to offset the rainfall deficit. Water Shortage Orders provide a mechanism to reduce impacts to water resources during periods of water deficit. As necessitated by local climatic patterns and hydrologic

[6] Analysis focused on non-agricultural projects since SJRWMD agricultural allocations are based on a 2-in-10 drought scenario with actual anticipated water use expected to be less than the allocation except during drought conditions.

conditions, the SJRWMD may utilize Water Shortage Orders to implement water conservation and management practices to prevent or reduce impacts to Silver Springs from consumptive uses during periods of drought.

New Rules

In addition to rules currently in place, the SJRWMD will adopt additional regulatory measures designed to ensure the Silver Springs MFLs will continue to be met. The rule language to implement these measures is provided in Appendix B. Specifically, the new regulatory measures will:

- Allow existing permitted uses to retain reasonable-beneficial groundwater allocations up to their demonstrated 2024 demand.
- Require potential impacts to Silver Springs to be offset for groundwater allocation requests greater than the demonstrated 2024 demand and for new uses.
- Define a series of opportunities for permittees to offset potential impacts by implementing alternative water supplies, impact offset projects, water resource development project participation, and the retiring of water use from existing CUPs.
- Authorize the inclusion of irrigation allocations for average climatic conditions in addition to drought conditions, for landscape, recreational, and agricultural irrigation CUPs.
- Outline a process by which permittees can relocate existing permitted withdrawals to reduce impacts to Silver Springs.

J. Project Implementation and Monitoring Progress

Project Implementation

Water conservation, recharge, alternative water supply, and reclaimed water projects will be incorporated as permit conditions, where applicable and feasible, in CUPs that impact Silver Springs. These additional conditions will be incorporated as appropriate over the next 20 years as permits are modified or renewed. The implementation schedule for specific projects will be set forth in applicable cost-share projects and/or the CUP(s), as appropriate.

The City of Ocala has already begun implementing two of the major Strategy projects. The City of Ocala Pine Oaks wetland recharge park project is anticipated to be operational within the first five-year phase of Strategy implementation (by 2022). Engineering and design is currently underway and the City plans to apply for cost-share funding in the SJRWMD 2017 cycle. Additionally, the City's utilization of the Lower Floridan aquifer as a primary source of water, in lieu of the Upper Floridan aquifer, will benefit flows in Silver Springs. Construction of the first LFA well at the City of Ocala's new wellfield was completed in early 2017. It is anticipated that this first 5 mgd production well will be fully operational within Phase 1 of Strategy implementation (by 2022). The City's second proposed LFA well will likely be constructed during the second five-year phase (by 2027). The resulting benefits to Silver Springs from the Strategy projects and measures will ensure achievement of the MFLs through 2035.

Silver Springs' Response

The period of record water levels and flows collected at Silver Springs and Silver River form the baseline from which SJRWMD will determine compliance with the Silver Springs MFLs in the future. Continuous water level monitoring at the SJRWMD stations listed in Figure 1 will continue throughout Strategy implementation until such time that monitoring revisions may be necessary as determined by SJRWMD staff. Data analysis results from future data collected from the monitoring sites will be used by SJRWMD to perform revised freeboard determinations to coincide with the Five-Year Strategy Assessment Reports.

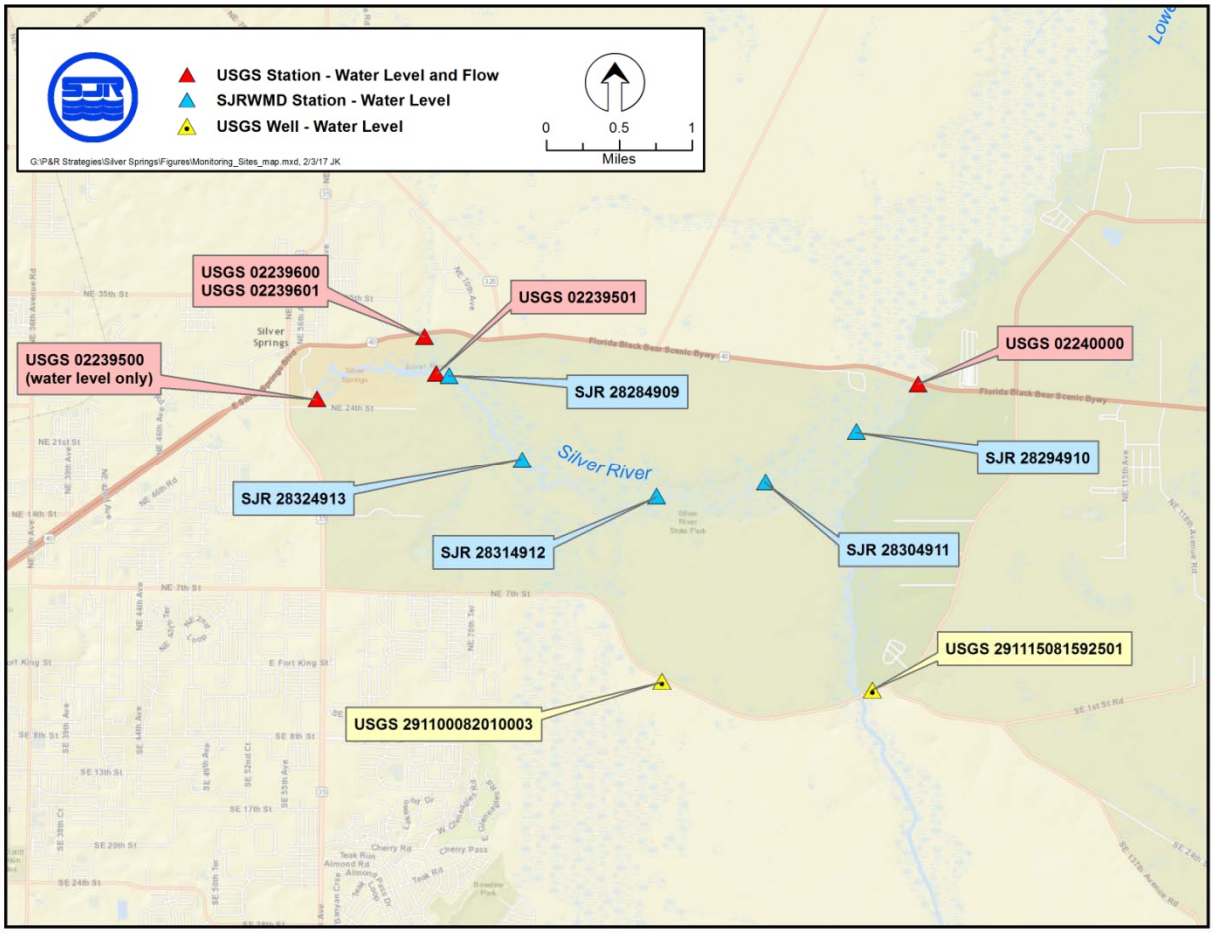

Figure 1. Monitoring sites for future Silver Springs MFLs assessments

As directed by section 373.036(7), F.S., each water management district is required to submit a consolidated water management district annual report to FDEP, which describes each district's managing of water resources. This report must contain, in part, the following information regarding all projects related to water quantity:

- A list of all projects identified to implement a recovery or prevention strategy.
- A priority ranking for each listed project for which state funding through the water resources development work program is requested.
- The estimated cost for each listed project.

- The estimated completion date for each listed project.
- The source and amount of financial assistance to be made available by FDEP, a water management district, or other entity for each listed project.
- A quantitative estimated of each listed project's benefit to the water body identified in the recovery or prevention strategy.

This report will track the status of projects identified in this Strategy with annual updates reflecting new information and realized values added upon project completion. As a means to measure Strategy progress towards meeting its objective, the estimated flow increases identified in Table 8 are provided as interim goals.

Table 8. Predicted flow increases at Silver Springs resulting from project implementation

Waterbody	Cumulative Predicted Flow Increase (cfs)			Target Flow Increase[1] (cfs)
	2025	2030	2035	
Silver Springs	6.0	10.2	12.0	10.3

[1] Based on estimated freeboard deficit at 2035 projected pumping conditions.

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Appendix A

Proposed Projects and Measures within the Prevention Strategy for the Implementation of Silver Springs Minimum Flows and Levels

Table A1. Proposed projects and measures within the Prevention Strategy for the Implementation of Silver Springs MFLs

Project/Measure Priority	Project Description	Estimated Date of Completion	Estimated Construction Cost ($M)	Mandated District Contribution[1] ($M)	Estimated Project Benefit[2] (cfs[3])
1	**Water Conservation** - Includes residential indoor fixture replacement (toilets, showers, and faucets) and outdoor irrigation audits with subsequent system improvements and soil moisture sensor installation. For commercial-type establishments, includes replacement of pre-rinse spray valves, toilets, urinals, showers, and site specific water audits. Agricultural conservation measures include installation of soil moisture sensors, irrigtion system retrofits, and construction of tailwater ponds.	Ongoing through 2035	9.6 - 13.1	2.4 - 3.3	1.9 - 4.2
2	**Aquifer Recharge** - Construction of the Ocala wetland groundwater recharge park, which will polish reclaimed water (and stormwater in the future) prior to recharge to the Upper Floridan aquifer.	2022	8.0	2	1.4
3	**Ocala Lower Floridan Aquifer Conversion** - Relocation and replacement of 7.5 mgd of withdrawals from the Upper Floridan aquifer at Ocala's historic wellfield to the Lower Floridan aquifer at Ocala's new wellfield. Note the range in cost is the result of the uncertainty related to the level of water treatment that will be required, which directly affects the cost of the water treatment plant.	5.0 mgd conversion - 2022 2.5 mgd conversion - 2027	6.7 - 31.7	1.7 - 7.9	7.0
4	**Reclaimed Water** - Expanded use of reclaimed water from Marion County Silver Springs Shores WRF, Marion County Stonecrest WRF, and the City of Belleview WRF.	Ongoing through 2035	3.2	0.8	0.5
TOTAL			27.5 - 56.0	6.9 - 14.0	10.8 - 13.1

[1] Pursuant to subsection 373.805(4)(b), F.S., SJRWMD will provide financial assistance for the implementation of Strategy projects/measures totaling no less than 25% for each project.

[2] Benefits, as measured by the predicted increase in flow at Silver Springs, were estimated using the Northern District Groundwater Flow Model Version 5.0.

[3] cfs = cubic feel per second

Appendix B

Supplemental Rules for Silver Springs

3.3.3 Supplemental Rules for Silver Springs

3.3.3.1 Effect of Supplemental Rules.

These "Supplemental Regulatory Measures for Silver Springs" shall be adopted by the District, as a component of the overall prevention strategy for Silver Springs. In adopting these rules, the District acknowledges the increasing stress on Silver Springs and the mandate of the legislature to foster the development of additional water supplies and avoid the adverse effects of competition. However, these rules do not abrogate the rights of the Governing Board or of any other person under Section 373.233, F.S. This regulatory framework provides a comprehensive strategy for allocations of available Upper Floridan groundwater and expeditious development of alternative water supplies and offset projects to minimize competition and thereby provide greater certainty of outcome than competition.

3.3.3.2 Definitions

Demonstrated 2024 Demand - the quantity of water from the Upper Floridan aquifer needed to meet demands in 2024. Demonstrated 2024 Demand will be calculated utilizing the methodologies described in Section 2.2 of the Applicant's Handbook and water use data.

Existing permitted uses – permitted uses as of April 12, 2017.

Silver Springs MFLs – the minimum flows and levels adopted for Silver Springs in 40CER17-01 or as adopted in rule 40C-8.031, F.A.C., whichever is in effect.

3.3.3.3 Evaluation of Potential Impacts

All applications, including applications for renewals, modifications, and new uses, shall be evaluated for their potential individual and cumulative impacts on the Silver Springs MFLs. Potential impacts to the Silver Springs MFLs shall be assessed using the Northern District Groundwater Flow Model Version 5.0. Section 3.3.3 and all subsections thereof shall not apply within the Central Florida Water Initiative Area, as defined in paragraph 373.0465(2)(a), F.S. (2016).

3.3.3.4 Existing Permitted Uses

Existing permitted uses shall be considered consistent with the Prevention Strategy for uses up to the Demonstrated 2024 Demand, or its permitted allocation in 2024, whichever is lower.

3.3.3.5 Individual Permit Applicants that do not have a Potential Impact to the Silver Springs MFLs

Permit applications that do not demonstrate a potential impact to the Silver Springs MFLs based on the total requested allocation shall be issued provided the applicant meets the conditions for issuance.

3.3.3.6 Additional Review Criteria for all Individual Permit Applicants that have a Potential Impact to the Silver Springs MFLs

3.3.3.6.1 Renewals and Modifications with a Requested Allocation Less Than or Equal to the Demonstrated 2024 Demand

(a) Renewals and modifications of existing permitted uses with requested allocations from the Upper Floridan aquifer less than or equal to the Demonstrated 2024 Demand shall be issued provided the applicant meets the conditions for issuance; however, an applicant may seek a duration that extends beyond 2024 for that level of allocation.

(b) Exceptions

The limitation in Subsection 3.3.3.6.1(a) on groundwater allocations to an amount no greater than a permittee's Demonstrated 2024 Demand shall not limit permitted groundwater withdrawals from:

1. Aquifer storage and recovery wells that receive only surface water, stormwater, or reclaimed water, when the volume of water withdrawn does not exceed the volume of water injected; or

2. The surficial aquifer immediately below or adjacent to a stormwater management system or surface water reservoir where any drawdown in the surficial aquifer will be offset by recharge from the system or reservoir.

3.3.3.6.2 Renewals and Modifications with Requested Allocations Greater Than the Demonstrated 2024 Demand

Renewal and modification applications for existing permitted uses proposing an allocation of groundwater from the Upper Floridan aquifer greater than the Demonstrated 2024 Demand shall provide reasonable assurance of elimination or offset of potential impacts to the Silver Springs MFLs for that portion of the requested allocation that exceeds the Demonstrated 2024 Demand.

3.3.3.6.3 New Permits

In addition to meeting the conditions for issuance, applications that request the use of groundwater from the Upper Floridan aquifer for a duration beyond 2024 shall provide reasonable assurance of elimination or offset of potential impacts to the Silver Springs MFLs for the requested allocation.

3.3.3.6.4 Methods for Addressing Potential Impacts

An applicant may eliminate or offset potential impacts to the Silver Springs MFLs by implementation of one or more of the options listed below:

(a) Propose an alternative water supply, as defined in Section 373.019(1), F.S., sufficient to meet the additional demand, and identify a schedule for implementation, construction and operation for the alternative water supply system. An alternative water supply will be approved under this rule if it is adequate to meet the reasonable increased demands without causing harm to the water resources of the area and meets all other permitting criteria in Chapter 40C-2, F.A.C.

(b) Propose adequate offset projects to eliminate potential impacts to the Silver Springs MFLs, and identify a schedule for implementation, construction and operation of the offset project(s). Offset projects may include, but are not limited to, the use of impact offsets [Subsection 62-40.416(7), F.A.C.] and recharge systems. For offset projects that are not addressed by Subsection 62-40.416(7), F.A.C., the following requirements apply:

1. The benefit of any offset project, or a portion thereof, shall accrue to the entity providing the offset project, or one or more entities designated by the providing entity, so long as the providing entity or designated entity demonstrates a demand for the water and meets the conditions for permit issuance. If the providing entity or designated entity cannot demonstrate a demand for all the water made available by the offset project during the recommended duration of the permit, any remaining water shall be available for use in the following order:

    i. Deficits associated with existing exempt and sub-threshold uses.

ii. Deficits associated with anticipated exempt and sub-threshold uses.

iii. Deficits associated with existing permitted uses.

iv. Applications for new uses or increases in allocation in accordance with District rules.

2. The proposed withdrawal, after application of the offset project credit, must result in no net adverse impact on the limited water resource.

3. If an applicant meets the conditions for permit issuance after consideration of an offset project (either as a providing entity or designated entity), the District shall incorporate the project into the permit. The duration of an offset project must be, at a minimum, equal to or greater than the duration of the consumptive use permit in which it is incorporated.

4. When reviewing an application for renewal of a consumptive use permit containing an offset project, the District shall renew the allocation based on the continuation of the offset project provided the conditions for permit issuance are met.

5. Credits shall not be granted for past actions or actions taken under existing permits, unless the credits are already authorized in a permit. This limitation shall not restrict the District's consideration of the effect of past actions when considering the potential impacts of a permit application, or consideration of a permittee's request to modify an existing permit to quantify the amount of any credit remaining available.

6. Offset projects recognized in a consumptive use permit cannot be transferred to other users, except in the same manner as the permit itself and in compliance with applicable water management district rules.

(c) The District anticipates that its water resource development projects and its designation as a receiving entity of offsets from District's cost-share projects may result in the development of new quantities above and beyond the quantities necessary to ensure that the Silver Springs MFLs will be met. All or a portion of these new quantities that are not reserved or otherwise

designated for the water resource will be made available to permit. If an applicant has contributed to a District water resource development project, the applicant may apply for quantities made available through a District water resource development project as an offset to potential impacts to the Silver Springs MFLs, provided the applicant demonstrates that:

1. Both the proposed withdrawal and the water resource development or cost-share project affect the Silver Springs MFLs.

2. The quantity developed in excess of the quantity reserved or otherwise designated for Silver Springs has been determined.

3. The proposed quantities will not interfere with quantities reserved or otherwise designated by the District for water resource development.

(d) Permanently retiring from use the reasonable-beneficial quantities associated with one or more CUPs that impact the Silver Spring MFLs. The amount of offset credit for retiring CUPs will be limited to the amount of reduction in potential impacts to the Silver Springs MFLs associated with the retired quantity. For agricultural, recreational, and landscape irrigation uses, the retired quantity will be based on the average annual allocation which is the amount of supplemental irrigation required during a five in ten rainfall condition. For all other use types, the retired quantity will be based on the actual permitted allocation.

For each option selected under Subsection 3.3.3.6.4, an applicant must provide reasonable assurance that the option will be implemented as proposed.

3.3.3.7 Conservation

In determining the amount of offsets that must be developed as set forth in Subsection 3.3.3.6 above, the applicant may subtract the portion of its demand that the applicant demonstrates will be satisfied by water conservation under Subsection 2.2.2.5.

3.3.3.8 Temporary Allocation

A permittee that will lack sufficient supplemental water supplies or offsets after 2024 from which to obtain the increase in quantity above its

Demonstrated 2024 Demand shall be allocated a temporary amount of groundwater to meet that increase only if it has exercised due diligence to meet all schedule requirements in the permit for developing and using supplemental water supply and providing that other conditions for issuance in Rule 40C-2.301, F.A.C., and this Handbook are met. Any such temporary allocation shall cease when water from the supplemental water supply or offset project becomes available.

3.3.3.9 Irrigation Uses

The reasonable need for an agricultural, recreational, or landscape irrigation use is based on the amount of water needed to supply the supplemental irrigation requirements of the type of crop, turf or landscape grown. In determining reasonable need, the District will determine the supplemental irrigation requirements for both drought and average annual conditions. Drought allocation will be considered the amount of supplemental irrigation required during a two in ten year rainfall condition. Average annual allocation will be considered the amount of supplemental irrigation required during a five in ten year rainfall condition. This quantity does not include crop protection.

3.3.3.10 Self-Relocation

A Permittee with existing permitted impacts on Silver Springs may modify its consumptive use permit to relocate to a different property all or a portion of the used and unused reasonable-beneficial permitted quantity. When relocated, the withdrawal of the quantities cannot increase impacts to Silver Springs and must meet all other applicable permitting criteria included in Chapter 40C-2, F.A.C., and this Applicant's Handbook. A Self-Relocation cannot include any change in ownership, control, Use Type or increase in quantities. Crop rotation, by planting and irrigating non-contiguous properties within the same locale in a structured, revolving fashion, is allowed under a single permit and is not considered Self-Relocation.

Prevention Strategy for the Implementation of Lake Butler Minimum Levels

June 2020

St. Johns River Water Management District
Division of Water Supply Planning and Assessment
Bureau of Water Supply Planning

A. Introduction

Lake Butler is a sandhill lake located almost entirely within the city limits of Deltona in southwestern Volusia County and is included on the St. Johns River Water Management District (SJRWMD) minimum flows and minimum levels (MFLs) Priority List for adoption in 2020. The Lake Butler MFLs are currently met, however, they are projected to not be met during the 20-year planning horizon as a result of increased groundwater demand (Jennewein et. al. 2020). Pursuant to subsection 373.0421(2), *Florida Statutes* (F.S.), a prevention or recovery strategy must be approved concurrently with MFLs adoption if the water body is below, or is projected within 20 years to fall below, an adopted MFL. Consistent with the provisions for establishing and implementing MFLs provided for in section 373.0421, F.S., the *Prevention Strategy for the Implementation of Lake Butler Minimum Levels* (Lake Butler Prevention Strategy) lists projects and measures that, when implemented, ensure the Lake Butler MFLs will be met, while simultaneously providing sufficient water supplies for existing and projected reasonable beneficial uses.

B. Background

Volusia County has had a prevention/recovery strategy covering its boundary since 2013. On November 12, 2013, the SJRWMD Governing Board approved 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). As part of a phased implementation approach proposed within the 2013 Volusia Strategy, completion of five-year strategy assessments was recommended, and in 2018, SJRWMD performed its first assessment. The *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* (2018 Volusia Strategy Assessment; SJRWMD 2019) identified additional projects that were necessary to ensure achievement of MFLs through the 2040 planning horizon.

Upon completion of the MFLs assessment for Lake Butler, SJRWMD reviewed the project scenario defined within the 2013 Volusia Strategy and determined that the projects contained therein would provide sufficient benefit to Lake Butler to ensure achievement of its MFLs at 2040. Furthermore, the projects identified in the 2018 Volusia Strategy Assessment, when implemented, would provide additional benefit to Lake Butler. Since Lake Butler MFLs will be achieved through the 2040 planning horizon as a result of the implementation of projects identified in the 2013 Volusia Strategy, it was not necessary to identify a new list of projects. All projects listed in the Lake Butler Prevention Strategy were extracted from the approved 2013 Volusia Strategy and the 2018 Volusia Strategy Assessment.

C. Strategy Objective, Approach, and Phased Implementation

Objective

The objective of the Lake Butler Prevention Strategy is to ensure that the Lake Butler adopted MFLs continue to be met during the next 20 years. This objective can be achieved by establishing and maintaining groundwater withdrawals at or below the sustainable groundwater yield through water conservation and water supply development projects or by mitigating the impact of groundwater withdrawals on Lake Butler through water resource development projects.

Approach

The approach outlined in the Lake Butler Prevention Strategy is intended to provide assurance that Lake Butler MFLs will be met in a way that maximizes flexibility for permittees and project partners. The basic approach includes the following:

- Identify projects and measures that provide water resource benefits sufficient to achieve the MFLs
- Identify and obtain funding resources to facilitate strategy implementation
- Continue to monitor water level trends to confirm benefits of projects and adjust projects and measures as necessary
- Implement projects and measures in a phased approach with a comprehensive review at five-year intervals

Phased Implementation

Strategy implementation will occur in five-year phases (Table 1). Actions to occur in subsequent phases will be determined during the strategy review process envisioned at the end of phases 1 and 2. Upon completion of each five-year phase, a five-year strategy assessment report will be prepared. This report may include the following information:

- Utilization of updated tools for resource assessments and analyses
- Updated freeboard calculation (based on the revised planning period)
- Updated MFL status assessment
- Project implementation status, including alternative projects, if warranted

Based on the findings of a five-year strategy assessment, the Lake Butler Prevention Strategy may be revised by the SJRWMD Governing Board. It is also possible that Lake Butler will be included in a future comprehensive update of the 2013 Volusia Strategy.

Table 1. Lake Butler Prevention Strategy Implementation

Action	Phase 1 (2020–2025)	Phase 2 (2025–2030)
Strategy approval	- By SJRWMD Governing Board (2020) - Initiates strategy implementation	- If necessary, recommend revised strategy for Governing Board approval
Implement projects and measures	- Continue to work with the WVWS[1] to develop and construct strategy projects - Through the SJRWMD cost-share program, provide funding dollars, when available, to strategy projects	- Continue to incentivize project development with an emphasis on water conservation and alternative water supply projects
Alignment of permitted allocations	- As permits modify or renew, adjust allocations where necessary to meet reasonable/ beneficial use criteria	- Continue
Monitor trends in Lake Butler water levels	- Continue data collection efforts	- Continue
Five-year strategy assessment	- Assess, refine, and approve revised strategy, if applicable	- Assess, refine and approve revised strategy, if applicable

[1] WVWS = West Volusia Water Suppliers, which include Volusia County and the cities of DeLand, Deltona, and Orange City.

D. Stakeholder Outreach

SJRWMD has been coordinating with stakeholders for numerous years regarding MFL constraints in western Volusia County. Specifically, regular meetings with the West Volusia Water Suppliers (WVWS), consisting of Volusia County and the cities of DeLand, Deltona, and Orange City, have been helpful in identifying and implementing strategic projects in the area that benefit MFL water bodies. SJRWMD briefed interested members of the WVWS on the draft Lake Butler MFLs and Lake Butler Prevention Strategy on June 16, 2020. In addition, Lake Butler Prevention Strategy was posted for public viewing on the SJRWMD website on June 26, 2020.

E. Lake Butler MFLs

The MFLs for Lake Butler consist of seven environmental criteria with associated minimum level conditions (Jennewein et. al. 2020). These environmental criteria include a minimum infrequent high water level, minimum emergent marsh habitat reduction, large and small

wading bird forage habitat reduction, sandhill crane nesting habitat reduction, game fish spawning habitat reduction, and lake lobe connectivity (for small boat and fish passage). The MFL current status was assessed for each of the environmental criterion by comparing the minimum level condition with the current-pumping condition[1]. The MFLs current status provides an Upper Floridan aquifer (UFA) freeboard value in cases where the MFL is currently met, or an UFA deficit in cases where the MFL is not currently met. For Lake Butler, all the MFLs were met under the current-pumping condition. The lake lobe connectivity MFL condition was the most constraining with 0.1 foot (ft) of UFA freeboard. Detailed information regarding the Lake Butler MFLs and current status assessment can be found in Lake Butler MFLs report (Jennewein et. al. 2020).

To determine the MFLs status at 2040, the UFA drawdown beneath Lake Butler was compared under current-pumping conditions (i.e., average withdrawals from 2014 to 2018) and 2040 projected-pumping conditions. The pumping/drawdown relationship provided in the Lake Butler hydrological analysis (Jennewein et. al. 2020) was used to estimate the drawdown associated with current-pumping conditions (1.8 ft). The Volusia groundwater flow model (Volusia model; Williams 2006) was then utilized to quantify the drawdown associated with 2040 projected-pumping conditions (2.3 ft). The increase in drawdown (0.5 ft) was applied to the current-pumping freeboard (0.1 ft) which resulted in a deficit of -0.4 ft at 2040. Because the Lake Butler MFLs will not be met under projected 2040 pumping conditions, Lake Butler is in prevention. Table 2 summarizes Lake Butler drawdown and freeboard values for the two pumping conditions.

Table 2. Lake Butler UFA Freeboard/Deficit at Current and 2040 Pumping Conditions

Pumping Scenario	UFA Drawdown from No Pumping (ft)	Lake Butler UFA Freeboard/Deficit (ft)	Withdrawals (10-mile radius[2]) (mgd)
Current Pumping (2014–2018)	1.8	0.1	22.1
2040 Projections	2.3	-0.4	26.0

ft = feet; mgd = million gallons per day

[1] The current-pumping condition is defined as the reference hydrologic condition in which the lake was under the constant influence of *current groundwater pumping* for the period from 1948 to 2018. *Current groundwater pumping* in this analysis totaled average withdrawals from 2014 through 2018 (Jennewein et. al. 2020).

[2] Groundwater withdrawals within a 10-mile radius of Lake Butler is shown for comparative purposes only. The modeled drawdown and pumping/drawdown relationship both reflect impacts from groundwater withdrawals within the entire Volusia model domain.

F. Influence by Use Type

When determining project types to implement in a prevention or recovery strategy, it is important to develop an understanding of the water uses that have the largest impact on the water resource of concern. Only then can projects be selected that will result in the greatest benefit to the constrained water resource. An analysis was performed using the Volusia model 2040 simulation that evaluated UFA drawdown beneath Lake Butler from projected groundwater withdrawals by the various water use types in the Volusia model domain. The results indicate that UFA drawdown due to public supply withdrawals contribute 81 percent of the total impacts (Table 3). Commercial/ industrial/institutional and agricultural uses each account for 6 percent of the impacts to Lake Butler, with domestic self-supply use accounting for 5 percent. Impacts from the remaining use types account for less than 3 percent of the impacts to Lake Butler.

Table 3. 2040 Lake Butler Impact Influence by Use Type

Use Type	Percent of Total Impact[1]	Modeled Groundwater Withdrawals (mgd)
Public Supply	81%	93.2
Commercial/Industrial/Institutional	6%	3.7
Agriculture	6%	26.7
Domestic Self-supply	5%	10.3
Landscape/Recreation/Aesthetic	2%	2.5
Power Generation	<1%	0.3
TOTAL	**100%**	**136.7**

ft = feet; mgd = million gallons per day

[1] For Lake Butler, impact is defined as the UFA drawdown beneath the lake.

G. Projects and Measures that Achieve the Strategy Objective

Lake Butler is located in Volusia County, which has been covered by an approved prevention and recovery strategy since 2013. An analysis of the projects identified in the 2013 Volusia Strategy demonstrate that their implementation would provide sufficient benefit (i.e., UFA rebound) to Lake Butler to ensure MFL compliance through 2040 while meeting projected 2040 water demand. Furthermore, projects proposed in the 2018 Volusia Strategy Assessment will provide additional benefit to Lake Butler. Therefore, the Lake Butler Prevention Strategy does not propose new projects but instead summarizes the existing projects that provide benefit to Lake Butler, which were identified within the 2013 Volusia Strategy and 2018 Volusia Strategy Assessment.

Projects and measures that were identified in the 2013 Volusia Strategy include water conservation, aquifer recharge, development of alternative water supplies, and expansion of reclaimed water systems. These existing projects provide more than enough benefit to Lake Butler to ensure MFLs compliance at 2040. Projects proposed in the 2018 Volusia Strategy Assessment provide additional benefit to Lake Butler and include enhanced water conservation, increased aquifer recharge, and increased use of alternative water supplies.

2013 Strategy Project Implementation Status

Fourteen projects were identified in the 2013 Volusia Strategy, 11 of which provide measurable benefits to Lake Butler. As stated previously, implementation of the 2013 Volusia Strategy projects alone is sufficient to ensure compliance with Lake Butler MFLs at 2040. The status of each of these eleven projects is listed below.

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 million gallons per day (mgd) and was based on reductions in water use ranging from 4.6 percent (public supply in western Volusia County) to 5.9 percent (agriculture). Six conservation cost-share projects (five agricultural and one public supply) have been partially funded by SJRWMD in western 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.

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

Project 4A (formerly Alexander Avenue Water Resources Site)
This phase, completed in 2019, included 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, is currently being designed. The city of Deltona has not yet requested authorization for the use of surface water from Lake Monroe 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 with 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 originally included a new rapid infiltration basin at the Alexander Avenue Water Resource Facility. The project was recently redesigned as an exfiltration trench that will provide 0.6 mgd of recharge to the UFA. Phase I is expected to be completed in 2020.

DeLand Reuse Retrofit Part "B" and Wiley M. Nash Augmentation Facilities — **COMPLETE**

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 withdrawal and treatment facilities became fully operational in 2019 upon the completion of enhancements to the river intake system and the replacement of filters at the treatment plant.

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 2020, with wellfield operation planned to occur prior to 2024.

Farmton Water Supply and Transmission Facilities — **EXPIRED**

The Farmton Services LLC CUP authorized 4 mgd of withdrawals for bulk public water supply to the WVWS. However, an agreement between the permittee and the WVWS was never finalized and authorization of this allocation expired on December 31, 2019. In order to pursue this project in the future, Farmton Services LLC will need to reapply and receive authorization for a bulk public water supply allocation. Because this project is not currently being actively pursued, its benefits were not included in the analysis.

2018 Assessment Project Implementation Status

Six additional projects were identified in the 2018 Volusia Strategy Assessment, five of which provide a measurable benefit to Lake Butler. Although these projects are not necessary to achieve Lake Butler MFLs, their inclusion does offer flexibility to water users as additional project options. The status of each of these five projects is listed below.

Updated Water Conservation Potential — **ONGOING**

As part of the Central Springs/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 than what was estimated in the 2013 Volusia Strategy for 2035. The maximum savings estimates were incorporated in the Volusia model to evaluate the water resource benefit from a higher level of conservation.

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 UFA. The recharge water will consist of stormwater from Mill Lake, reclaimed water produced by the WVWS, and surface water from the St. Johns River. Additional feasibility analyses, including construction and performance of a load test, are currently underway with a final project feasibility determination expected in the fall of 2020.

WVWS Groundwater Withdrawal Optimization — **IN PROGRESS**

The groundwater modeling simulations that evaluated the benefits of the projects in the 2013 Volusia Strategy, did not consider the optimization of groundwater withdrawals. This project involves reducing public supply withdrawals closest to Blue Spring and replacing those withdrawals with withdrawals from the proposed Deep Creek/Leffler wellfield.

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 to 1.8 mgd (final recharge quantity depends on the realized capacity of the Volusia Blue Wetland Recharge Project).

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 the 2018 Volusia Strategy Assessment, staff considered an expansion to 8 mgd, which, once fully implemented, 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.

Project Benefits

The projects within the 2013 Volusia Strategy provide 0.8 ft of UFA rebound beneath Lake Butler, which is more than sufficient to ensure compliance with its MFLs at 2040 projected water demand (Table 4). Implementation of the projects within the 2018 Volusia Strategy Assessment, although not necessary to achieve Lake Butler MFLs, would provide an additional 0.1 to 0.3 ft of UFA rebound and offer flexibility to permittees in terms of project selection. Implementation of all projects within both the 2013 Volusia Strategy and 2018 Volusia Strategy Assessment would provide between 1.0 and 1.1 ft of UFA rebound beneath Lake Butler resulting in freeboard of 0.6 to 0.7 ft in 2040.

Table 4. Summary of Project Benefits[1] at Lake Butler

2040 Freeboard/ Deficit (ft)	2013 Volusia Strategy Benefits (ft)	2040 Freeboard/Deficit with 2013 Strategy Projects (ft)	2018 Strategy Assessment Benefits (ft)	2040 Freeboard/ Deficit with All Projects[2] (ft)
-0.4	0.8	0.4	0.1 – 0.3	0.6 – 0.7

ft = feet

[1] For Lake Butler, benefit is defined as the amount of UFA rebound beneath the lake.

[2] Totals may not appear accurate as a result of rounding.

Actual projects and measures implemented to achieve the goals of the strategy objective may differ from those discussed in this strategy. Moreover, projects and measures listed within this and previous strategy documents do not become permit conditions by virtue of their inclusion in an approved strategy. Projects listed within this or previous strategy documents, or alternative projects that SJRWMD concurs will provide an equivalent benefit, may be developed and incorporated as CUP conditions through standard permitting procedures and in future strategy revisions, as appropriate.

H. Funding

Projects implemented as part of this and related strategies can be funded through cooperative cost-share among permittees and possibly SJRWMD through its cost-share program. The SJRWMD cost-share program is offered annually, upon budget availability, as a competitive solicitation for projects that benefit at least one SJRWMD core mission. SJRWMD provides 33 percent of construction costs for selected cost-share projects. From fiscal year (FY) 2014 through FY 2020, SJRWMD has awarded more than $30 million in cost-share funds to cooperators in western Volusia County, with $16.9 million awarded specifically for water supply, natural systems, and water conservation projects. Once fully implemented, these projects will provide approximately 16.9 mgd of alternative water supply and 0.3 mgd in water savings, with 0.2 mgd providing a natural systems benefit.

In addition to funding from SJRWMD, fiscal support may be available from the Florida Department of Environmental Protection (FDEP) for projects that benefit Florida springs. Because Lake Butler is located along the boundary of the Blue Spring springshed, it is possible that projects that benefit Lake Butler will also benefit Blue Spring. In these cases, cost-share dollars can increase to 50 percent of total construction cost with the addition of FDEP springs protection funds.

It is important to note that SJRWMD cost-share funding derived from ad valorem funds are intended to mitigate the water resource impact of domestic self-supply use and uses authorized under a general permit by rule. Therefore, a portion of the benefit achieved by a cost-share project may be reserved for the benefit of the water resource to offset these impacts, with the remaining benefit assigned to the entity(ies) constructing the project.

I. Regulatory Component

Ensuring the maintenance of Lake Butler and other Volusia County water body MFLs will require careful management of local and regional groundwater withdrawals. This can be achieved via the existing comprehensive system of rules, which regulate consumptive uses of water.

Consumptive Use Permit Criteria

The SJRWMD CUP permit criteria are listed in Chapter 40C-2, Florida Administrative Code (F.A.C.), and are expanded upon in the SJRWMD Applicant's Handbook: Consumptive Uses of Water. Several permit requirements will continue to provide assurance that existing and new consumptive uses are consistent with the strategy objective:

- Reasonable-beneficial water uses *must utilize the lowest quality water source that is technically, economically, and environmentally feasible*. Lower quality water sources include reclaimed water, stormwater, surface water, and other alternative water supplies.
- Reasonable-beneficial uses *must not cause harm to the water resources of the area*.
- Reasonable-beneficial uses *must be in accordance with any minimum flow or level and implementation strategy*.
- Reasonable-beneficial uses *must be in such quantity as is necessary for economic and efficient use*. To meet the requirements of this criterion, water use must be consistent with the demonstrated demand for a particular water use.

Regarding the economic and efficient use permitting criterion as it relates to demonstrated demand, the demonstrated water demand at the time of permit issuance may differ from the realized water use over the life of a CUP due to a variety of causes. Population projections for utility service areas increase and decrease over time due to fluctuations in growth rates or economic conditions. Actual water use for specific facilities can change over time due to process improvements or updated equipment. In addition, the actual water demand may be less than the projected water demand due to the implementation of conservation measures and expanded use of reclaimed water. At the time of CUP renewal, applicants must again provide a demonstration of need for the requested CUP allocations. This provides SJRWMD the opportunity to realign the CUP allocation with current water demand.

Water Shortage

In addition to permitting rules, the SJRWMD Governing Board is authorized via section 373.175, F.S., to declare a water shortage if it determines that "insufficient ground or surface water is available to meet the needs of the users or when conditions are such as to require temporary reduction in total water use within the area to protect natural resources from serious harm." Extended periods of less than average precipitation can exacerbate declining groundwater levels as there will typically be an increase in groundwater withdrawals for irrigation to offset the rainfall deficit. Water Shortage Orders provide a mechanism to reduce impacts to water resources during periods of water deficit. As necessitated by local climatic patterns and hydrologic conditions, SJRWMD may utilize Water Shortage Orders to implement water conservation and management practices to

prevent or reduce impacts to Lake Butler, or other MFL water bodies, from consumptive uses during periods of drought. Additional information regarding the SJRWMD water shortage rule can be found in 40C-21, F.A.C.

J. Project Implementation and Monitoring Progress

Project Implementation

Water conservation, aquifer recharge, alternative water supply, and reclaimed water projects originally identified in the 2013 Volusia Strategy will be incorporated as permit conditions where applicable and feasible in CUPs that impact Volusia County MFL water bodies that are in prevention or recovery. These project conditions will be incorporated as appropriate over the next 20 years as CUPs are modified or renewed. The implementation schedule for specific projects will be set forth in applicable cost-share projects and/or the CUP(s), as appropriate.

With the exception of one project that is currently not actively being pursued (Farmton), all of the projects from the 2013 Volusia Strategy have been completed or are in the feasibility determination or design phase. This level of project implementation has only been possible due to the extensive cooperation among the WVWS and its members' dedication to protecting MFL water bodies in western Volusia County.

Lake Butler's Response

The model-derived current-pumping condition water levels at Lake Butler form the baseline from which SJRWMD will determine compliance with the Lake Butler MFLs in the future. Water level monitoring at the SJRWMD Lake Butler monitoring station will continue throughout strategy implementation until such time that monitoring revisions may be necessary as determined by SJRWMD staff. Water level data will be added to the current pumping-condition water levels and frequency analyses will be performed to determine revised freeboard values for Lake Butler, which will occur no less than every five years to coincide with the Lake Butler five-year strategy assessments, or a comprehensive updated Volusia Strategy that would include all Volusia County MFL water bodies.

Reporting Requirements

As directed by subsection 373.036(7), F.S., each water management district is required to submit a consolidated water management district annual report to FDEP, which describes each water management district's managing of water resources. This report must contain, in part, the following information regarding all projects related to water quantity:

- A list of all projects identified to implement a recovery or prevention strategy
- A priority ranking for each listed project for which state funding through the water resources development work program is requested
- The estimated cost for each listed project
- The estimated completion date for each listed project
- The source and amount of financial assistance to be made available by FDEP, a water management district, or other entity for each listed project
- A quantitative estimate of each listed project's benefit to the water body identified in the recovery or prevention strategy

This report will track the status of projects listed in this and other SJRWMD strategies with annual updates reflecting new information and realized benefits added upon project completion. In order to ensure that Lake Butler MFLs will continue to be met throughout the 20-year planning horizon, interim UFA deficit values were calculated based on projected increases in Volusia County groundwater demand at five-year intervals. The interim deficit values dictate the minimum amount of UFA rebound that will be necessary through project implementation at each five-year interval (Table 5). Although it is estimated that UFA rebound will exceed the interim goals and ultimate target for Lake Butler, by achieving the minimum interim goals, Lake Butler MFLs will continue to be met throughout the entire 20-year planning horizon to 2040.

Table 5. Minimum Interim UFA Rebound Goals for Lake Butler

Total UFA Rebound at 2025 (ft)	Total UFA Rebound at 2030 (ft)	Total UFA Rebound at 2035 (ft)	Total UFA Rebound at 2040 (ft)	Target UFA Rebound (ft)
0.1	0.2	0.3	0.4	0.4

ft = feet

K. References

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