

**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 quantities¹ (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 yield² 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 freeboard³, 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	<ul style="list-style-type: none"> - By SJRWMD Governing Board (2017) - Initiates Strategy implementation 	<ul style="list-style-type: none"> - If necessary, recommend revised Strategy for Governing Board approval
Implement projects and measures	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Continue to incentivize project development with an emphasis on water conservation, reclaimed water, and stormwater harvesting projects
Alignment of permitted allocations	<ul style="list-style-type: none"> - As permits expire, adjust allocations where necessary to meet reasonable/beneficial use criteria 	<ul style="list-style-type: none"> - Continue
Rulemaking for regulatory component	<ul style="list-style-type: none"> - Complete concurrent with Strategy approval 	<ul style="list-style-type: none"> - As necessary based on recommended Strategy revisions
Monitor trends in flow and water levels	<ul style="list-style-type: none"> - Continue data collection at existing sites 	<ul style="list-style-type: none"> - Continue
Five-Year Strategy Assessment	<ul style="list-style-type: none"> - Assess, refine and approve revised Strategy, if necessary 	<ul style="list-style-type: none"> - 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 MFLs¹

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 withdrawals⁴ 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 Area⁵ 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-agricultural⁶ 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.

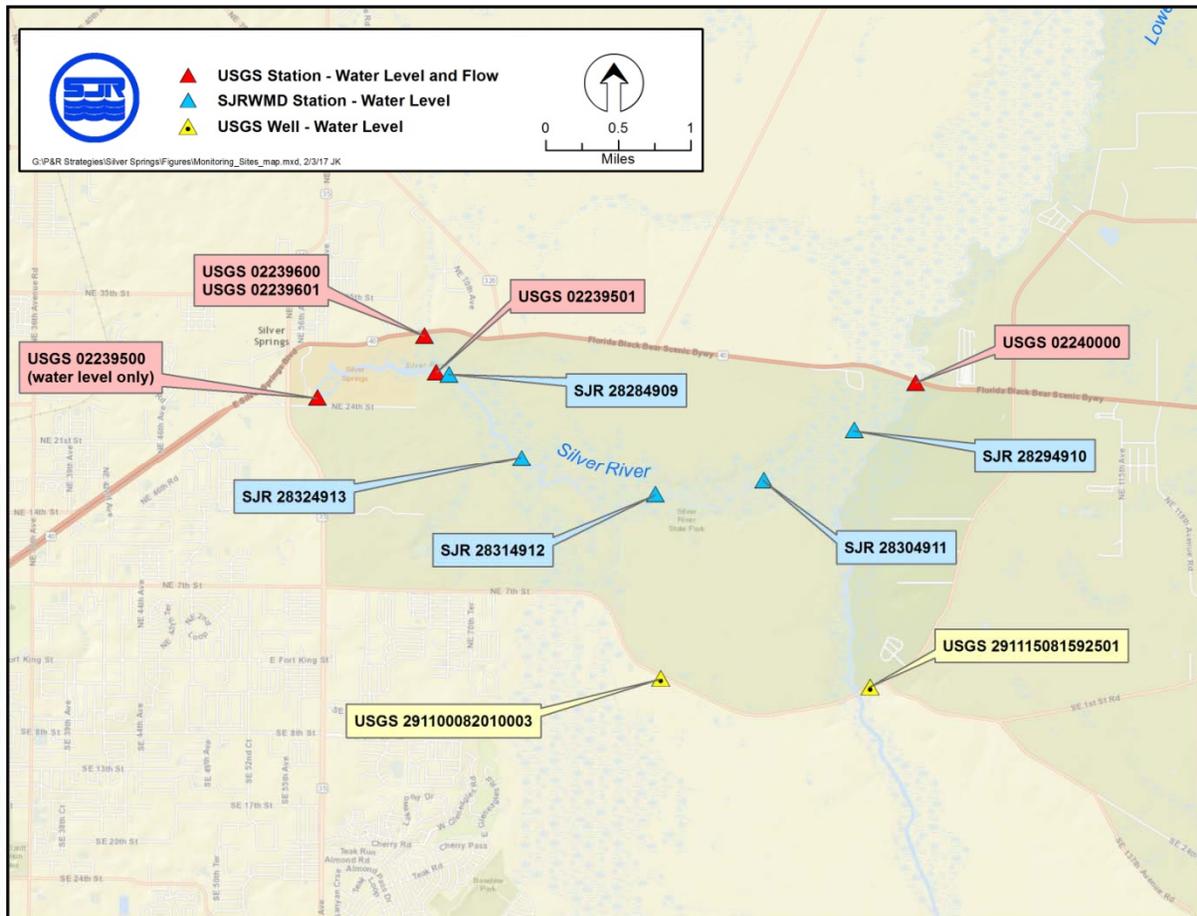


Figure 1. Monitoring sites for future Silver Springs MFLs assessments

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.

References

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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, irrigation 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	6.7 - 31.7	1.7 - 7.9	7.0
		2.5 mgd conversion - 2027			
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 feet 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.