M E M O R A N D U M

Date: October 29, 2013

To: Governing Board

Oct 31 2013 11:56 AM

Through: Hans G. Tanzler III, Executive Director
or
Jeff Cole, Chief of Staff

Jeff Cole

Oct 29 2013 5:20 PM

From: Michael A. Register, Director
Division of Regulatory, Engineering & Environmental Services

Mike Register

Harold A. Wilkening III, P. E., Director
Division of Strategic Deliverables

Hal Wilkening

Subject: Approval of Minimum Flows and Levels Prevention/Recovery Strategy for Volusia County

RECOMMENDATION

Staff recommends that the St. Johns River Water Management District (SJRWMD) Governing Board approve the Prevention/Recovery Strategy for Implementation of Minimum Flows and Levels for Volusia Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes.

BACKGROUND

The St. Johns River Water Management District establishes Minimum Flows and Levels (MFLs) under provisions of Sections 373.042 and 373.0421, Florida Statutes. These statutory provisions also provide for the implementation of MFLs via a Prevention/Recovery Strategy. Under this statutory directive, the District, in cooperation with partners in Volusia County, developed a strategy to address MFLs adopted for Volusia Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes, all of which are located within Volusia County. Upon full implementation, projects and measures proposed in the strategy would be sufficient to achieve MFLs in Blue Spring and the affected lakes and meet future water demands for public supply utilities and other water users throughout Volusia County. The Volusia MFLs Prevention/Recovery Strategy supports four District Initiatives: MFLs Prevention and Recovery Strategies, Regional Water Supply Planning, Springs Protection, and Water Resource Development/Alternative Water Supplies.

DISCUSSION

The objective of the Volusia Area Prevention/Recovery Strategy is to establish and maintain actual and permitted groundwater withdrawals at or below the sustainable groundwater yield. The Strategy provides a combination of assurance that Blue Spring and the lakes will achieve

their MFLs and flexibility for project partners to make adjustments as strategy implementation continues.

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.
- Monitor trends in spring flow and aquifer levels at individual wells and across an appropriate regional network.
- Work with existing permittees to align permitted allocations with demonstrated need.
- Identify and obtain sufficient funding resources to facilitate Strategy implementation.
- Implement in a phased approach with a full Strategy revision at 5-year intervals, including re-assessment of MFLs, if necessary.

The Strategy document includes the following components:

- List of affected MFL waterbodies and their prevention/recovery status;
- Strategy objective;
- Apportionment of hydrologic influence by user group;
- Regulatory component;
- Proposed suite of projects and measures, including evaluation of the associated water resource benefits;
- Funding component;
- Monitoring component; and
- Timetable for phased implementation.

Success of the strategy is based upon implementation of conservation, reclaimed water system expansions, aquifer recharge, and water supply development projects; either those specified in the strategy or alternative concepts that provide equivalent water resource benefits. Project concepts were derived from four primary sources:

1) Recharge and water supply development projects provided by the West Volusia Water Suppliers;
2) Projects submitted by multiple entities as part of the District's 2013 Alternative Water Supply Cooperative Cost-share Program;
3) Projects included in pertinent Consumptive Use Permits; and
4) The District Water Conservation Potential Estimation Tool.

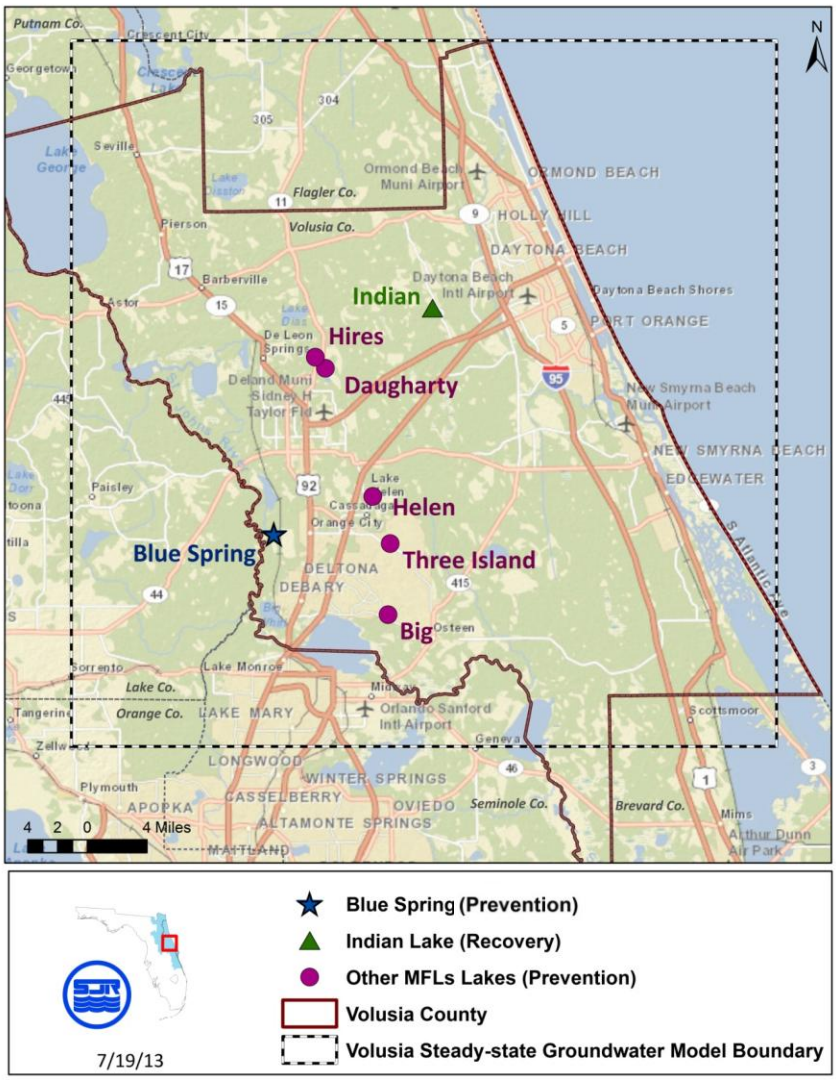
Implementation of selected strategy projects is in progress. For example, through the Cooperative Cost-share Program, the District has committed more than $16M in cost-share toward the implementation of ten strategy projects.

Strategy components are also coordinated with CUPs, including Daytona Beach, Ormond Beach, and Deltona. Implementation of the strategy will occur largely through incorporation of strategy components as conditions within individual Consumptive Use Permits. The Volusia Prevention/Recovery Strategy is also a key component of the 2013 District Water Supply Plan that is under development with the draft plan scheduled to be released in December 2013.

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

Waterbodies: Blue Spring and Big, Daugharty, Helen, Hires, Indian, and Three Island Lakes MFLs

Strategy Objective:
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 that achieve equivalent aquifer benefits.



Strategy Components:

- Implement projects and measures that provide aquifer benefits sufficient to achieve the MFLs throughout the planning horizon (2030).
- Work with existing permittees to align permitted allocations with demonstrated need.
- Establish standard permit conditions and related language for integrating MFLs criteria with CUPs.
- Identify sufficient funding resources, including District cost-share, to facilitate Strategy implementation
- 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 measures.
- Implement in a phased approach with full assessment, recalculation of MFLs freeboard, and Strategy revision, if necessary, at 5-year intervals.
- If necessary, revise existing or adopt new rule provisions to clarify existing and implement new consumptive use permitting (CUP) incentives, including impact offsets, substitution credits, and net benefit, that provide flexibility in addressing MFLs mitigation obligations for existing permittees, permit renewals, and applications for new quantities.

Proposed Projects and Measures (see Table 1):

- Reclaimed water, aquifer recharge, and water supply projects proposed by the West Volusia Water Suppliers (derived directly from WVWS Water Supply Plan, Phase III).
- Reclaimed water project proposed by the City of Ormond Beach (note - additional wellfield optimization, allocation reductions, and similar measures designed to address impacts to Indian Lake were adopted in current permit, June 2012).
- Wellfield optimization project proposed by the City of Daytona Beach.
- Enhanced conservation activities on the part of agricultural water users, public supply utilities, and domestic self-supply users.
- Alignment of permitted allocations with demonstrated use, across all permitted use types.

Items of Note:

- Multiple lines of evidence provide reasonable assurance that the proposed projects and measures would be sufficient to achieve the Blue Spring and lake MFLs with projected 2030 water use demands. Analyses conducted by the District and water suppliers concur in this regard.
- Proposed projects and measures in the Strategy do not become CUP conditions upon Governing Board approval of the Strategy. Permittees and the District would retain flexibility to modify intended projects. The District's intention is for those negotiations to occur as part of CUP renewal or modification.
- The geographic bounds of the "Volusia Strategy Area" are intentionally vague. The spatial reach of the Prevention/Recovery Strategy depends on impacts to the water resources, which are related to the combination of geographic proximity and withdrawal volumes. As such, the District felt it was inappropriate to define a geographic Strategy Area.
- The District and project partners in the Volusia Strategy Area are already cooperating on implementation of several components of the Prevention/Recovery Strategy (noted in Table 1)

Table 1. Volusia MFLs Prevention/Recovery Strategy - Proposed Projects and Measures

Project Type	Project Title	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
	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 *	0.7	$1.8M
	City of Deltona – Howland Blvd. Phase 3 Reclaimed Water Project *	2.0	$0.5M
	Ormond Beach reclaimed water distribution project *	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 Costs**

* Cooperative cost-share projects.

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

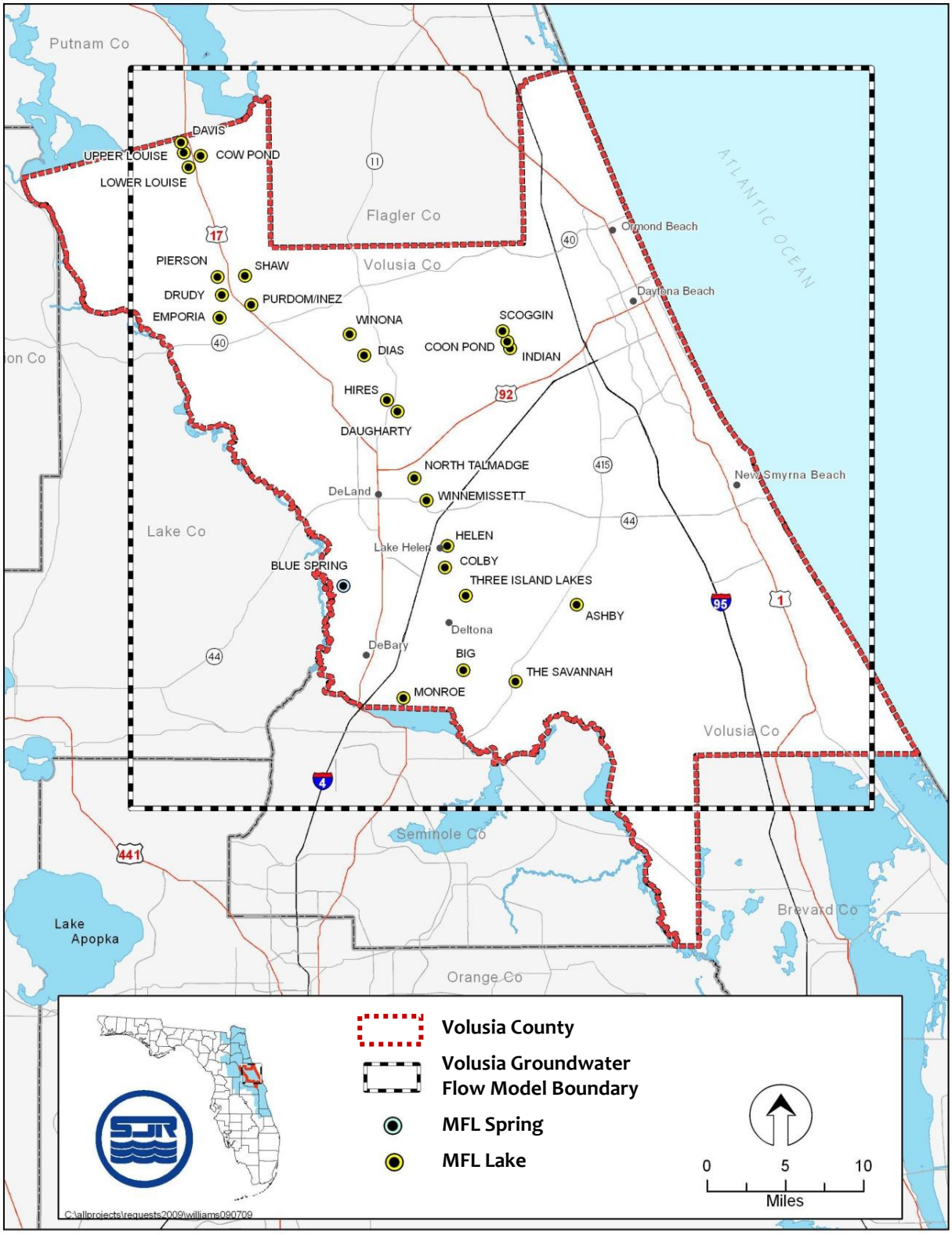


Figure 1. Volusia Strategy Area Waterbodies with Adopted MFLs

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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