
2015-2019
Springs Management Plan
Southwest Florida
Water Management District

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Vision

"The District takes an ecosystem-level approach to springs management by improving water quality and clarity, minimizing human impacts on flows, and restoring natural habitats."

The Southwest Florida Water Management District (District) is responsible for managing and protecting water resources in west-central Florida. Among our most precious water resources are the more than 200 documented springs and the rivers, bays, and estuaries that are fed by them. Over the past half century many of these spring-fed systems have experienced significant ecological changes caused by both natural variability and human activities. The District's Springs Management Plan is focused on understanding natural variability while mitigating impacts caused by human activities where practical. Through strategic investments and partnerships, the District is implementing projects to conserve and restore the ecological balance of our spring systems, thereby supporting regional economies and quality of life.

The District's Springs Management Plan (Plan) is a road map that is consistent with the District's Strategic Plan and builds upon previous plans like the Springs Coast Comprehensive Watershed Management Plan (2001) and the Springs Coast Initiative (2002), as well as more than 20 years of Districtwide expertise designing and implementing projects and monitoring activities. This Plan is a living document with adaptive management at its core. This Plan lays out a general restoration strategy, an overview of the goals and issues, and a list of proposed projects for the five-year period 2015–2019.

For current information about the springs within the District and ongoing management activities visit our website:

WaterMatters.org/Springs

Rainbow Springs

A Unique Resource

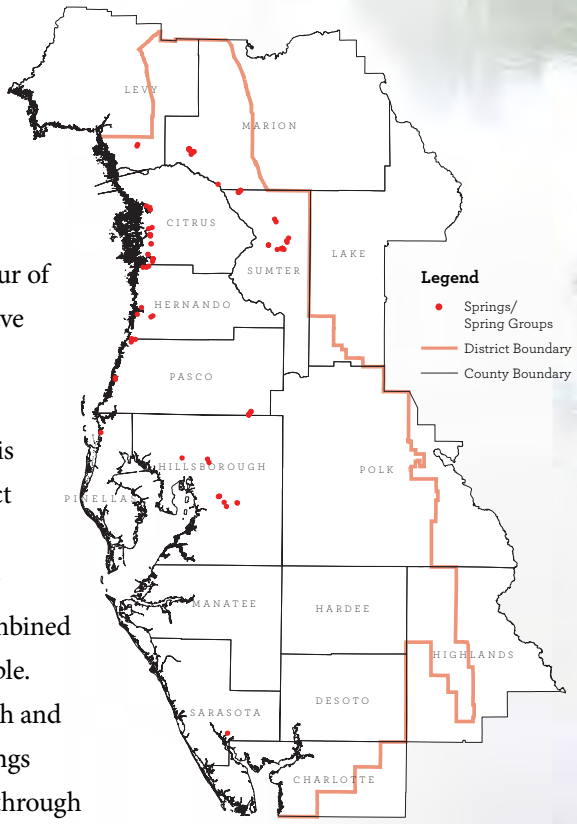
There are more than 200 documented springs, and many more undocumented smaller springs and seeps that occur throughout the District. Most individual springs cluster around 16 groups of springs, five of which are classified as first-magnitude groups based on the amount of water they discharge.

MAGNITUDE	DISCHARGE	
	Million gallons per day (mgd)	Cubic feet per second (cfs)
1	>65	>100
2	6.5 – 65	10 – 100
3	0.6 – 6.5	1 – 10

The size of a spring is classified by its "magnitude," a category based on the volume of flow over time.

The 2015–2019 Plan recognizes the need to manage all springs within the District but places a priority on the five first-magnitude spring groups: Rainbow, Crystal River/Kings Bay, Homosassa, Chassahowitzka and Weeki Wachee. These spring groups collectively discharge more than one billion gallons per day. Four of the five groups discharge directly into the Gulf of Mexico in a region known as the Springs Coast, home to the second largest seagrass area in the United States. With an estimated 700,000 acres, the Springs Coast seagrass area is one of the largest seagrass areas in the world. These coastal springs also are critical manatee habitat providing thermal refuge during the winter months. Crystal River/Kings Bay is the largest natural thermal refuge for manatees in the United States.

Springs are important not only for their ecological value but also for their economic benefits to the surrounding communities. Four of the five first-magnitude groups have state parks associated with them that draw more than one million non-resident visitors annually. This translates into $46 million in direct economic impact. More than 900 jobs are supported by these spring groups in communities with a combined population of less than 8,000 people. According to the United States Fish and Wildlife Service, Crystal River/Kings Bay supports 42 small businesses through kayaking and diving tours alone.



Map of the larger springs (red dots) within the District boundary (orange line).

Rainbow Springs

- Freshwater
- Submerged aquatic vegetation (SAV) dominated
- High nitrate concentrations
- One of the largest spring-fed rivers in Florida
- Exceptional water clarity (>200 feet) in upper river
- Historic phosphate mining in the lower river
- Rainbow Springs State Park

Crystal River/Kings Bay

- Tidal freshwater/brackish
- Phytoplankton and filamentous algae dominated
- Relatively low nitrate concentrations
- Numerous seawalls and canals
- Atypical spring system with large open bay
- Largest natural manatee refuge in the U.S.
- Crystal River Preserve State Park and National Wildlife Refuge

Homosassa Springs

- Tidal freshwater/brackish
- Phytoplankton algae dominated
- Numerous seawalls and canals
- Large saltwater fish populations at headsprings
- Homosassa Springs Wildlife State Park

Chassahowitzka Springs

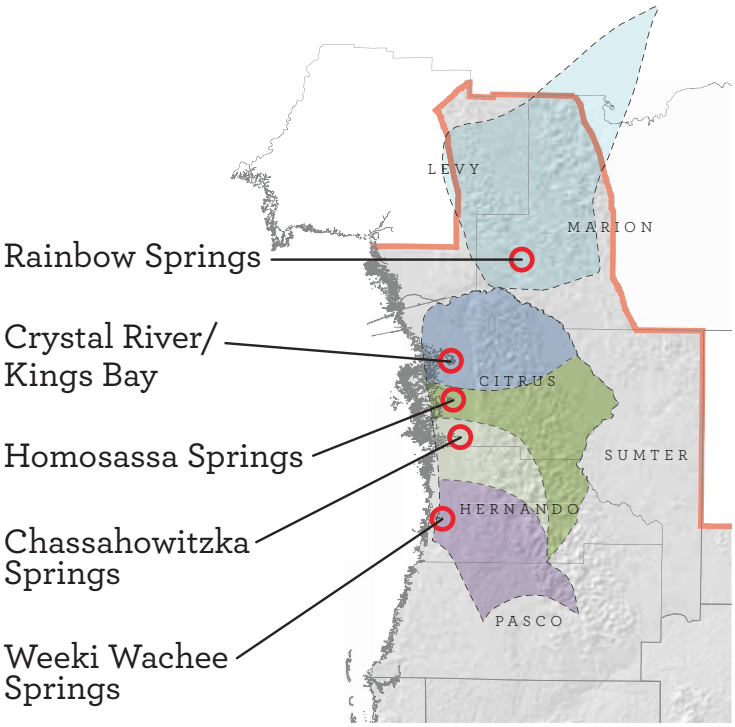
- Tidal freshwater/brackish
- SAV dominated
- Mostly natural shoreline
- Numerous canals upstream
- Chassahowitzka National Wildlife Refuge

Weeki Wachee Springs

- Freshwater upper river; tidal freshwater/brackish lower river
- Sand dominated, some SAV and filamentous algae
- Relatively high nitrate concentrations
- Weeki Wachee Springs State Park, known for mermaid shows

The source of spring discharge is from groundwater in the aquifer, which is replenished by rainfall that soaks into the ground. The area of land that contributes rainfall to a spring is referred to as a springshed. This area extends much farther than just the land immediately surrounding a spring. For example, the Rainbow Springs springshed covers approximately 735 square miles and includes parts of three counties. It is important to note that unlike watershed boundaries, springshed boundaries are not easily defined and may move in response to rainfall patterns and aquifer levels.

Generalized Springshed Boundaries of Major Springs



Map showing the location of the first-magnitude spring groups within the District, including the approximate springshed boundary for each group.

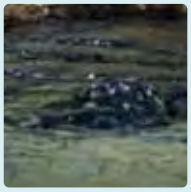
What Makes a Healthy Spring?

Springs within the District vary widely in their size, ecology and human uses. However, there are three attributes that are common to healthy springs and can be used to assess their condition: water quality, flow and discharge, and fish and wildlife habitat. The goal of the District's management actions is to maintain these attributes in springs where they are acceptable and restore these attributes where they have been degraded, if practical. Although the District does not have the ability to address each of these attributes directly, these attributes may be used as indicators to assess the overall progress of various management actions toward the goal of healthy springs.

Water Quality

The quality of water is a key attribute of the ecology and aesthetics of a spring, especially with regard to clarity, nutrients and salinity. A defining characteristic of many Florida springs is exceptionally clear water, which is a primary driver of the productive aquatic vegetation that supports spring ecosystems. Nutrients control many ecological processes and may lead to imbalances of flora and fauna at elevated levels. For the coastal spring systems, salinity variation has a major influence on the type and abundance of organisms that live in these historically freshwater ecosystems.

Flow and Discharge



The amount of water that discharges from a spring vent, or in most cases a collection of spring vents, is the primary feature of a spring system. Spring discharge is the main source of flow that creates and maintains the riverine portion of spring systems. Adequate flow influences springs ecology by maintaining water temperature, inhibiting algal blooms, reducing detrital buildup and stimulating productivity. Without adequate flow, the ecology and human use potential of a spring diminishes.

Fish and Wildlife Habitat

Florida spring ecosystems are known for their abundance and diversity of aquatic vegetation, fish and wildlife, including birds, turtles, alligators and otters. Native aquatic vegetation is the foundation of spring ecosystems by providing habitat for many organisms, removing nutrients from the water, stabilizing sediments and improving water clarity by filtering particles. Several springs also serve as warm-water refuges for the endangered West Indian manatee during the winter.

Issues and Drivers

The condition of an ecosystem is a result of the cumulative effects of recent and historical drivers. These drivers can be natural or anthropogenic and can range in time scale from decades (e.g. nutrient enrichment or rainfall deficits) to days (e.g. salinity pulses due to storm surge). The net result of these drivers has given rise to significant issues in the five first-magnitude spring groups. This Plan addresses four priority issues that are common throughout these groups and were identified as having the greatest potential to impact their ecological health.

- HABITAT
- NUTRIENTS
- FLOW
- SALINITY

Algae 101

Excess algal abundance is a primary indicator of ecological imbalance. But the term "algae" can mean different things to different people. In general, algae:

- Are not always bad and are an integral part of a healthy spring system.
- Like terrestrial plants, algae produce chlorophyll and need sunlight and nutrients to survive.
- Can range in size from microscopic (micro-algae), such as phytoplankton, to large individuals (macro-algae), such as the Giant Kelp.

Algae in our spring systems come in three basic types:

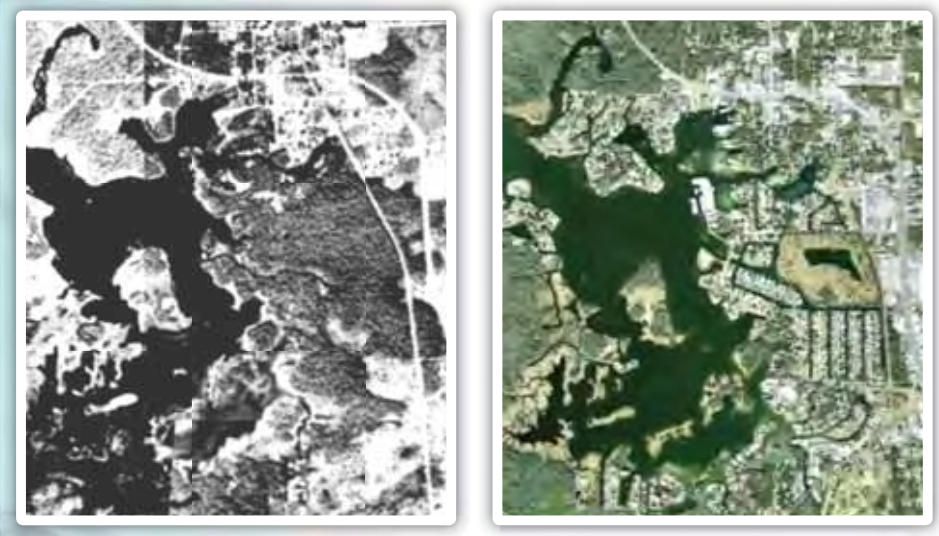
Phytoplankton
- Live in the water column
- Turn water green
- Can block sunlight from reaching SAV

Epiphytic Algae
- Grow on the leaf surfaces of SAV
- Can be beneficial in limited quantities
- Can smother SAV in large quantities

Benthic Algae
- Filamentous (ex. *Lyngbya* and *Vaucheria*)
- Can form mats or float on surface
- Can smother SAV in large quantities

Habitat

Spring habitats include those within a spring system itself (e.g. submerged aquatic vegetation) and those adjacent to a spring system (e.g. wetlands and uplands). Habitat loss is due to several drivers, which are primarily related to human activities. Filling and development of wetlands near springs may be the most significant land-use change, as wetlands support many organisms and provide essential services, such as filtration of suspended particles and bank stabilization. Human development near springs also has caused increased sedimentation, which may smother aquatic vegetation and other benthic habitats. Recreational activities such as boating, swimming and diving may have cumulative negative effects on aquatic habitats, particularly in shallow areas. Finally, in some springs manatee populations have increased to the point at which manatee grazing of aquatic vegetation has contributed to habitat loss.



Land-use change in Crystal River from 1944 to 2012. Most forested and marsh wetlands, critical for maintaining good water quality, were systematically replaced with more than 16 miles of seawalls and canals adjacent to the 600-acre Kings Bay.

In springs, loss of native aquatic vegetation is often followed by invasion of nuisance aquatic plants and algae. Because Florida is sub-tropical, invasive species often find their way from largely tropical regions like South America and Southeast Asia. Humans have exacerbated this invasion by introducing species like hydrilla (*Hydrilla verticillata*) originally from Sri Lanka and water hyacinth (*Eichhornia crassipes*) from South America. In the past few decades the invasive blue-green algae (cyanobacteria) *Lyngbya* has become a major nuisance in many of our spring systems. These invasive species can take over large areas, increase detrital buildup and make it difficult to restore native vegetation.

Nutrients

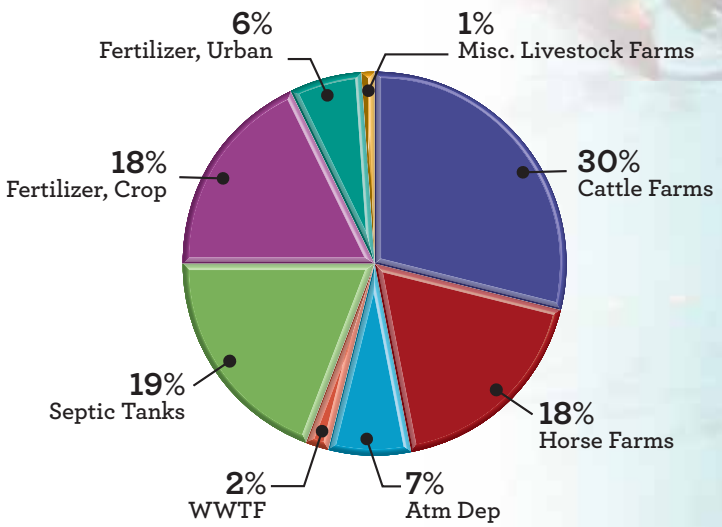
Two of the most important nutrients for plant and algae growth are nitrogen and phosphorus. Nitrogen concentrations have increased in most springs throughout the District, primarily in the inorganic form of nitrate. Phosphorus concentrations have not increased significantly in most springs in the District; however, phosphorus remains a concern, particularly where it accumulates in sediments.

Nutrient enrichment becomes problematic when it leads to imbalances in a spring ecosystem, particularly when nutrients stimulate the growth of nuisance algae including phytoplankton, epiphytes and benthic algae. Nutrient enrichment originates from many sources, the majority of which occur in the springshed where nutrients applied to the land infiltrate into the groundwater and eventually emerge in spring discharge. Because groundwater can take decades to travel through the aquifer, nutrient concentrations in spring discharge may not respond to changes in land use for extended time periods.

Source: Harley Means

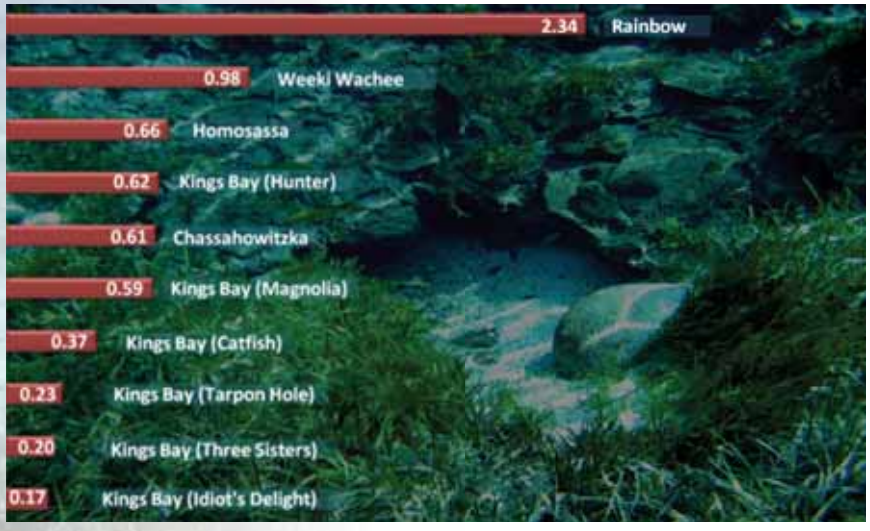
Hunters Cove in Crystal River/Kings Bay has experienced increases in nitrate and phosphorus concentrations over the past several decades. One of the issues often associated with increased nutrient loading is periodic phytoplankton algae blooms such as this one.

Nitrogen sources include agricultural operations, septic tanks, lawn fertilization, stormwater, wastewater treatment facilities (WWTF) and atmospheric deposition. Phosphorus sources are more localized and primarily include stormwater and septic tanks.



Nitrogen loading to groundwater comes from several sources and varies for each spring due to the differences in activities within each springshed. This chart shows the estimated contribution of each nitrogen source to groundwater in the Rainbow Springs springshed (Basin Management Action Plan, FDEP 2015).

While nutrient enrichment often leads to excessive algal growth, this is not always the case. For example, while nitrate concentrations in Rainbow Springs are among the highest in the District, the upper portion of the Rainbow Springs system has some of the clearest water in the world, with visibility approaching that of pure water (>200 ft). In contrast, nitrate concentrations in some areas of Crystal River/Kings Bay are near background levels, but the water is often green colored with visibility less than 10 feet.



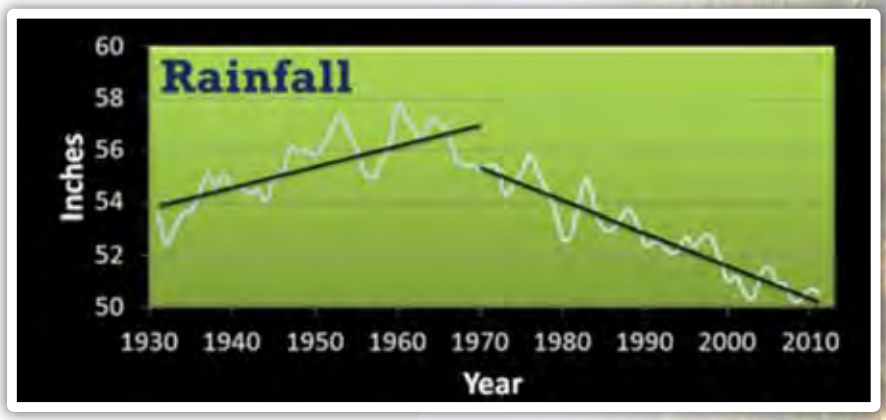
Nitrate concentrations (mg/L) from ten major springs found within the five first-magnitude groups (SWFWMD, October 2013). The FDEP has established numeric criteria for nitrate of 0.35 mg/L or less for these springs.

The aquatic vegetation in Rainbow Springs also is healthier than that in Crystal River/Kings Bay. Rainbow Springs contains a diverse abundant community of native species with minimal epiphyte growth, whereas the vegetation in Crystal River/Kings Bay is dominated by a few filamentous algal species. These examples do not downplay the importance of nitrates or other nutrient impacts on water clarity and aquatic vegetation, or the management efforts focused on reducing nutrient concentrations. However, given the unique nature of each spring system, other factors such as flow and salinity may be just as important, and in some cases more important than nutrients to sustain a healthy ecosystem.

It's not just nutrients. Factors such as high flow and abundant aquatic vegetation are important drivers helping maintain Rainbow Springs' exceptional water clarity despite high nitrate concentrations. Conversely, by virtue of its long residence times (5–7 days), elevated salinity, and grazing pressure from manatees, Crystal River/Kings Bay has relatively poor visibility and sparse aquatic vegetation.

Flow

As indicated in the previous section, flow plays a significant role in maintaining the ecological health of many springs. Greater flow velocity (current speed) limits the buildup of algae and detritus, benefits many organisms and stimulates ecosystem productivity. Flow velocity varies from place to place within each system due to channel morphology (width and depth) and amount of aquatic vegetation. However, the ultimate driver of flow velocity in spring systems is spring discharge. Within the northern District, spring discharge is strongly influenced by rainfall patterns. Since around 1970, there has been a long-term declining trend in rainfall and a corresponding decrease in spring discharge, although rainfall and discharge have increased in recent years. While much of the variability in spring discharge is caused by rainfall patterns, groundwater withdrawals have accounted for a 2 percent to 7 percent decrease in average flow across the five first-magnitude spring groups. For example, Rainbow Springs flow had declined by 19 percent as of 2010 in comparison to the historical average (1929-1969), but only 2 percent was attributable to groundwater withdrawals and the balance was due to reductions in rainfall.



Spring flow and rainfall trends over time at Rainbow Springs in Marion County. Rainfall data are the average of gages located in Hernando, Citrus and Marion Counties. Similar flow trends have been observed for the other first-magnitude spring systems in the District. However, over the past two years rainfall has increased and spring flows have returned to average or above-average levels.

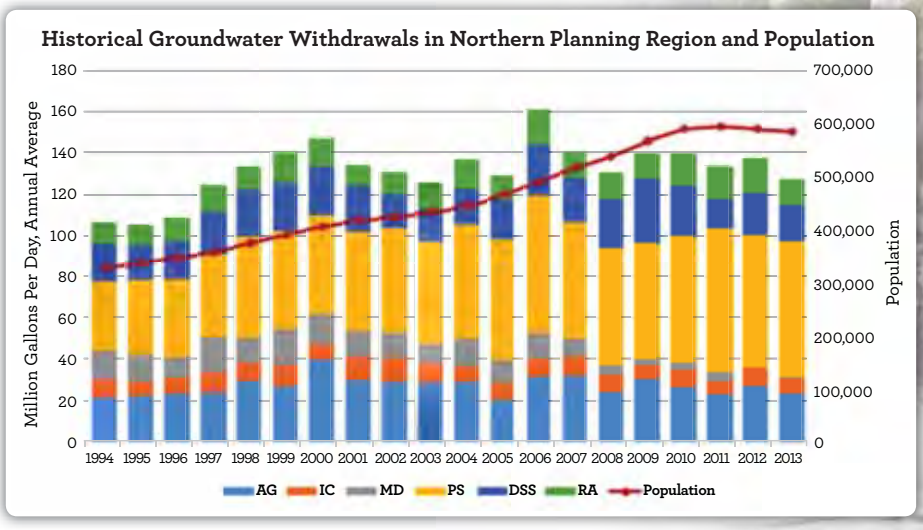
A major issue related to declining flow, along with other drivers, is increased sedimentation. As flow velocity decreases, particles begin to settle out of the water column and accumulate on the bottom, reducing the amount of light that reaches the bottom and potentially smothering aquatic vegetation. The shading and smothering of native aquatic vegetation through sedimentation likely promotes the growth of nuisance vegetation and benthic algae such as *Lyngbya*.

As flow decreases, residence time increases and the water takes longer to move through the system. Longer residence times typically lead to higher amounts of phytoplankton in the water column, especially where nutrient enrichment has occurred. Phytoplankton can reduce water clarity and the amount of light reaching aquatic vegetation, and in extreme cases, form persistent algal blooms that can kill fish and other wildlife.

Sections of Gum Slough dried up in early 2012 following several years of below-average rainfall.

Organic sediment accumulation in the upper Homosassa River is caused by detritus settling out from the water column as flow declines. Organic sediment thickness can be as much as 4-feet thick in the upper reaches of the river.

While groundwater withdrawals currently have minimal impact on flow for most springs in the District, the demand for water is expected to increase over the coming decades due to population growth and expansion of agriculture and industry. The District has estimated water demand for the Northern Planning Region, which includes the six counties that contain the majority of the five first-magnitude springsheds. Water demand is projected to increase for the following categories: public supply, agriculture, industry (including commercial, mining and power generation) and recreation. The 2005 to 2030 increase in demand in the Northern Planning Region is projected to be 90.4 mgd. This demand will be supplied by a combination of groundwater from the Upper Floridan aquifer, additional reclaimed water supplies, water conservation and alternative water supplies.



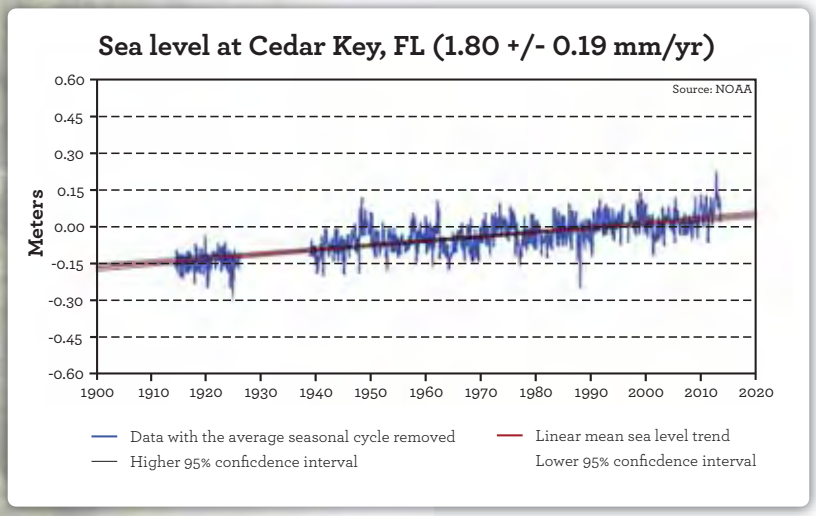
Population and groundwater withdrawals per water use category from 1994 to 2013 in the District's Northern Planning Region. Water use categories include agriculture (AG), industry/commercial (IC), mining/dewatering (MD), public supply (PS), domestic self-supply (DSS) and recreational/aesthetic (RA).

Salinity

Salinity is a primary determinant of the organisms that can survive in an aquatic ecosystem. Many springs across Florida are getting saltier. The root cause of salinity increases varies with location. In some inland springs it may be caused by the upward migration of mineralized groundwater from deep within the Floridan aquifer. However for coastal springs, salinity increases are due to the encroachment of water from the Gulf of Mexico.

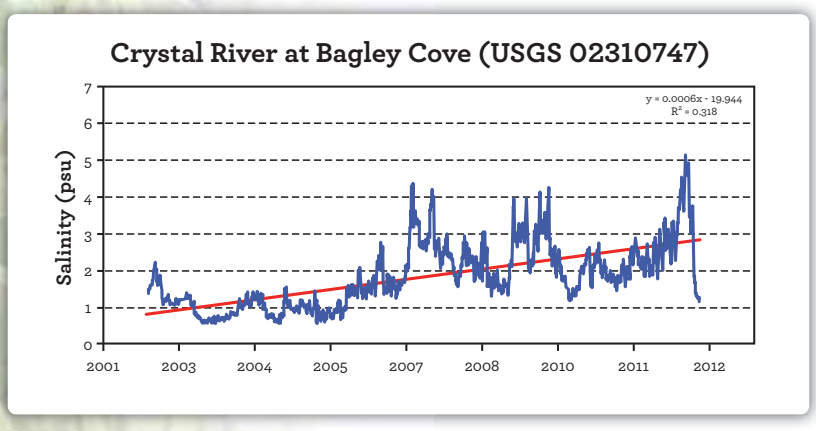
Salinity stress due to increased tidal inundation is contributing to the well-documented decline of coastal forests along the Springs Coast.

Sea-level rise has become a major driver of increased salinity in our coastal spring groups. Over the past century, sea-level rise along the Springs Coast was approximately 1.8 mm/yr, which equates to a rise of seven inches in a hundred years. Given that land elevations along the Springs Coast are naturally low, even small increases in sea level have the potential for widespread impacts.



Sea-level data from Cedar Key, Florida northwest of Crystal River on the Springs Coast. Similar trends in sea-level rise have been recorded at most other NOAA stations throughout the United States though sea levels and rates of increase vary from station to station (Sea Level Variations of the United States 1854-2006, Technical Report NOS CO-OPS 053).

Three of the coastal spring groups (Crystal River/Kings Bay, Homosassa and Chassahowitzka) have a long history of connection to the Gulf of Mexico. However, more recently sea-level rise coupled with long-term decreases in spring discharge have resulted in shifts from more freshwater to more estuarine ecosystems. For example, minimum salinity in Crystal River tripled from 2002 to 2012, meaning Kings Bay was becoming less fresh until recent increases in rainfall. Freshwater species have a difficult time surviving in environments with higher and more variable salinity. Ultimately salt-tolerant plant species will have a competitive advantage over their more freshwater counterparts.



Minimum salinity from 2002 to 2012 steadily increased at the gage on Crystal River at Bagley Cove, just downstream of the mouth of Kings Bay. Maximum salinity also increased slightly but not as much as minimum salinity indicating that the bay was becoming less fresh.

Management Strategy

The Springs Management Plan is the roadmap describing the overall approach the District is taking to conserve and restore the ecology of all springs within its borders. While the Plan prioritizes the District's five first-magnitude spring groups, it does not limit the potential for restoration and management of other smaller springs and spring groups should opportunities arise.

The Management Strategy is laid out in four parts. First, are the Stakeholder Initiatives that contribute to the District's strategy. Next, are the Limitations that may inhibit the ability of the District to achieve the stated goal of healthy springs. Then, the Quantifiable Objectives that will guide District management efforts and project planning. Finally, the Adaptive Management section details the eight components of the District's strategy, including specific projects that will be implemented over the five-year period.

Stakeholder Initiatives

There are many stakeholders involved with springs management and restoration throughout the District, ranging from government agencies to concerned citizens. The participation of these stakeholders is critical to successful springs management.

Springs Coast Steering Committee

In 2014, the District initiated the Springs Coast Steering Committee (SCSC), which consists of representatives from state, regional and local governmental agencies. Their mission is to build consensus and partnerships to restore and protect our Springs Coast through effective implementation of system-specific, scientifically sound and community-based management plans. Modeled after the National Estuary Programs (NEPs), the first goal of the SCSC is to develop comprehensive conservation and management plans tailored for each of the five first-magnitude spring groups. To assist in the effort, the SCSC has created the Springs Coast Management Committee to review technical data and make recommendations to the SCSC. In support, technical working groups have been established primarily to engage stakeholders at the technical level to develop these management plans, beginning with Rainbow Springs and Crystal River/Kings Bay.

*Additional information about the Springs Coast Steering Committee can be found at **WaterMatters.org/SpringsCommittees**.*

Other Stakeholder Meetings and Working Groups

The District is a leader in many stakeholder groups including the Kings Bay Working Group and the Citrus-Hernando Waterways Restoration Council. The Florida Legislature passed House Bill 221 and Senate Bill 430 during the 2003 session creating the Citrus-Hernando Waterways Restoration Council in response to regional concerns for the health of Citrus and Hernando waterways. The Legislature named the District as the administrative lead responsible for facilitating this council. The Kings Bay Working Group is a technical group that has met on a regular basis since 2003 and is made up of federal, state and local governments, and various stakeholders including local citizens.

Cooperative Funding Initiative

The District recognizes the importance of partnerships when managing water resources. The Cooperative Funding Initiative is a program that allows local governments to share costs for projects that assist in creating sustainable water resources, providing flood protection and enhancing conservation efforts. This program covers up to 50 percent of the cost of projects that meet the District's management strategy for springs protection and restoration. By partnering with local governments we can develop projects that involve habitat restoration, stormwater retrofits and reclaimed water. These projects are often supported by local governments but cannot be implemented without funding assistance from the District. The District uses this program to leverage public funds to implement projects with local governments and to complement other District initiatives associated with springs management.

Additional information about the Cooperative Funding Initiative can be found at ***WaterMatters.org/CFI***.

Three Sisters Springs

Limitations

Among the issues impacting springs, there are several that the District has either limited ability or no authority to manage.

Climate Variability

Two primary limitations to springs management include sea-level rise and rainfall patterns, which are driven by large-scale climatic changes that the District has no ability to control. Sea-level rise is contributing to increased salinity in coastal spring systems and is expected to cause substantial ecological changes as these historically freshwater environments become more estuarine and increasingly dominated by salt-tolerant species. Fluctuations in rainfall patterns are the major driver of variation in spring discharge, and both rainfall and discharge have declined over recent decades, due in part to decadal climate cycles.

Agency Authority

There are some springs issues which are amenable to management activities; however, the District is not the primary agency responsible for their management. For example, manatee herbivory contributes to aquatic vegetation loss in some springs. Since manatees are a federally listed species, the District has limited authority to manage this issue, but does coordinate with the United States Fish & Wildlife Service (USFWS) to implement temporary exclusion zones for revegetation projects.

Identification of nutrient impairment through the Florida Department of Environmental Protection's (FDEP) Total Maximum Daily Load (TMDL) Program and the development of Basin Management Action Plans (BMAPs) to reduce nutrient loading are the responsibility of the FDEP. The District is heavily involved in this process by providing technical expertise on the development of TMDL targets and the feasibility of nutrient-load reduction projects to achieve these targets. Similarly, the District reviews land-use changes, but the Florida Department of Economic Opportunity (FDEO) is ultimately responsible for development and land-use planning.

One of the primary contributors to nutrient enrichment in springs is fertilizer application, which the District does not regulate. Local ordinances may limit residential fertilizer use and the Florida Department of Agriculture and Consumer Services (FDACS) is responsible for establishing best management practices (BMPs) to limit agricultural fertilizer use. Another contributor to nutrient enrichment is effluent from septic tanks, which are regulated by the Florida Department of Health (FDOH) and FDEP. Collectively, septic tank effluent is a significant source of nutrients to groundwater within the District's springs region, where septic tanks currently number in the hundreds of thousands.

Quantifiable Objectives

Quantifiable objectives are used by the District to develop a management strategy specific to each spring group over the five-year plan period. The District takes an ecosystem-level approach to leveraging the various activities that the District is engaged in toward improving our spring systems. Quantifiable objectives allow prioritization of management actions based on the likelihood of achieving each stated objective, thus enabling effective and efficient resource management. The following section describes the types of quantifiable objectives that will be tailored to each of the five first-magnitude spring groups in their management plans that are under development.

Water Quality

Nutrient enrichment in springs, particularly nitrate-nitrogen, is widespread and primarily results from increased nutrient loading to the springshed through various human activities. Nutrient enrichment often leads to degraded ecosystems as it increases the tendency for nuisance algal blooms and can be toxic to certain aquatic organisms. Nutrient-load reductions are necessary in many springs to meet the recently established numeric nutrient criterion for Florida springs of 0.35 mg/L or less for nitrate-nitrogen. Nutrient-load reductions can be achieved by improving stormwater and wastewater treatment, and reducing the amount of fertilizer and animal wastes, which seep into the aquifer in spring recharge areas. The specific objectives are to:

- ☑ **Implement projects to reduce nitrogen loads**
- ☑ **Implement projects to reduce phosphorus loads where appropriate**
- ☑ **Implement projects to maximize the nutrient removal efficiencies of spring systems to offset increases in nutrient loads**

Water Quantity

Variation in springs discharge is largely driven by long-term fluctuations in rainfall over the region, which limits the ability of the District to manage spring flows. While groundwater withdrawals currently have minimal impact on flow for most springs in the District, the demand for water is expected to increase over the coming decades. Minimum flows and levels (MFLs) are used by the District to prevent significant harm to water resources due to human water withdrawals. Developing and adopting MFLs for each spring is the main tool available to the District for regulating groundwater withdrawals to maintain springs discharge. Water conservation and development of alternative water supplies will help reduce the effects of current and future withdrawals. The specific objectives are to:

- ☑ **Develop and reevaluate MFLs as appropriate**
- ☑ **Implement projects to reduce and/or conserve groundwater withdrawals**

Natural Systems

Aquatic habitat degradation in our spring ecosystems has resulted in shifts from SAV to algae, especially in the Homosassa River and Crystal River/Kings Bay. A major objective of this plan is to implement projects designed to conserve, enhance and restore SAV and emergent wetland habitat in strategic locations for maximum ecological and economic benefit. Revegetation can improve these spring groups by reducing sediment resuspension, increasing nutrient removal rates, and promoting natural recruitment of desirable aquatic vegetation to improve fish and wildlife habitat availability. Conservation, enhancement and restoration of aquatic habitat will be necessary to reverse shifts in dominance of aquatic vegetation to nuisance algae in the short term, and are complementary to long-term efforts to reduce nutrient loading to downstream waters, such as coastal estuaries and the Gulf of Mexico. The specific objectives are to:

- ☑ **Maximize beneficial aquatic vegetation coverage (both submerged and emergent)**
- ☑ **Minimize invasive plant and benthic algal coverage**
- ☑ **Maintain seagrass coverage in coastal areas**

Adaptive Management

Due to the variety of issues facing springs, their complex interactions, and the diversity of stakeholders, the District's Springs Management Plan is based on an adaptive management strategy. Adaptive management is an iterative process, which includes both a passive phase (planning and monitoring) and an active phase (restoration). Adaptive management is best suited to situations involving considerable uncertainty about the causes of ecological degradation and how to address them because the purpose of adaptive management is to learn from each restoration activity. Monitoring is a key component of adaptive management, both for identifying the causes of ecological changes and evaluating the effects of restoration activities. Each component of the District's adaptive management strategy is described in the upcoming pages, along with tables that show specific projects and programs that are ongoing or projected for the five-year plan period.

Restoration

Restoration is the cornerstone of this plan. Restoration activities are varied and often require creative solutions given the unique nature of these systems. Implementing innovative natural systems and water quality projects are the two major types of springs restoration efforts that fall within two of the District's core areas of responsibility. Although each project is included in a single category several of these projects can improve both natural systems and water quality, such as the revegetation and sediment removal projects. Additionally the District's Facilitating Agricultural Resource Management Systems (FARMS) program will incentivize the implementation of both water quality and water quantity BMPs for the agricultural community.

Natural Systems

Natural systems restoration projects focus on improving fish and wildlife habitat along and within spring systems. Examples of these projects include revegetation, living shorelines, algae and sediment removal, and channel restoration. In disturbed areas where native aquatic plant communities have been altered, invasive species like hydrilla and *Lyngbya* gain a foothold and out-compete native species like eelgrass (Vallisneria americana). Revegetation of our spring systems with native aquatic vegetation is a District priority. Aquatic vegetation is the hallmark of healthy spring ecosystems, providing critical services including habitat and food for many species of fish and wildlife, sediment stabilization, and maintenance of water quality. Living shorelines utilize emergent wetland plants near seawalls and other shoreline areas that have been eroded and have poor habitat. Algae and sediment removal projects will aid revegetation efforts and have their own direct benefits such as reducing internal nutrient loads from the sediment. In some of the coastal springs, revegetation may include establishing more salt-tolerant species that can withstand long-term salinity increases due to sea-level rise. Channel restoration is another activity in situations where a spring channel has been physically altered. Overall, these types of restoration activities can provide immediate habitat and water quality benefits while complementing long-term efforts to reduce springshed nutrient loading and prevent groundwater declines.

Springs Natural Systems Restoration Projects 2015-2019

Spring Group	Project Name	Project Type	Cooperators	Budget*
Kings Bay	Hunters Cove Revegetation	Revegetation	FDEP	$745K
Kings Bay	Hunter Springs Park Living Shoreline	Shoreline Restoration Revegetation	FDEP City of Crystal River	$500K
Kings Bay	Three Sisters Springs Bank Stabilization	Erosion Control	FDEP FWC	$950K
Kings Bay	Kings Bay Sediment Removal	Sediment Removal		$900K
Homosassa	Homosassa Springs Revegetation	Revegetation		$145K
Chassahowitzka	Canal Turnaround Basin Sediment Removal	Sediment Removal		$925K
Districtwide	Springs Aquatic Vegetation Restoration	Revegetation		$300K

**Estimated budgets cover existing approved and future fiscal year amounts (2015–2019).*
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Water Quality

Water quality restoration projects focus on reducing nutrient, sediment, and other pollutant inputs to spring systems. Nitrate is the nutrient that is the primary pollutant of concern because nitrate readily infiltrates into the aquifer and eventually emerges in springs. Water quality projects can focus on either inputs to springsheds or direct inputs to spring systems.

District water quality projects typically focus on stormwater systems and wastewater treatment facilities. Stormwater BMPs that are implemented within springsheds or adjacent to spring systems will reduce nutrient and other pollutant inputs. Wastewater treatment facilities within the northern District typically dispose of reclaimed water on the land surface using technologies such as rapid infiltration basins and sprayfields. To reduce nitrate loading from wastewater facilities, restoration activities include building

nutrient removal systems such as treatment wetlands or reusing reclaimed water for irrigation or industrial purposes.

Springs Water Quality Restoration Projects 2015-2019

Spring Group	Project Name	Project Type	Cooperators	Budget*
Rainbow	NW 119 Ave. Stormwater Retrofit	Stormwater Retrofit	Marion County	$54K
Rainbow	NW Hwy 225 Stormwater Retrofit	Stormwater Retrofit	Marion County	$182K
Kings Bay	Three Sisters Springs Wetland Treatment	Stormwater Retrofit Treatment Wetland		$593K
Kings Bay	Hunter Springs Water Quality Improvement	Stormwater Retrofit	Citrus County	$350K
Kings Bay	Kings Bay Stormwater Project Phase I	Stormwater Retrofit	City of Crystal River	$600K
Homosassa	Homosassa South Fork Water Quality Improvement	Stormwater Retrofit Treatment Wetland	Citrus County	$2.0M
Homosassa	Homosassa Floating Wetland System	Treatment Wetland Pilot Project		$130K
Weeki Wachee	Weeki Wachee Rogers Park LID Implementation	Stormwater Retrofit	Hernando County	$450K
Weeki Wachee	Weeki Wachee Springs State Park Stormwater Improvements	Stormwater Retrofit		$350K
Springs Coast	Springs Coast Wastewater Treatment Wetlands	Wastewater Retrofit Treatment Wetland		$400K

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FARMS Program: Facilitating Agricultural Resource Management Systems

Agricultural BMPs provide important water resource benefits. The District's FARMS Program is an agricultural BMP cost-share reimbursement program that provides incentives to the agricultural community for implementation of approved water quantity and water quality BMPs. BMPs can promote improved water quality in spring systems through reduction of nutrients. BMPs also can impact groundwater resources by reducing groundwater withdrawals from the Floridan aquifer through conservation measures.

While FARMS has largely focused on reducing groundwater withdrawals in the District's southern region, the program is expanding its role in the northern region to include a focus on reducing nutrient loading to groundwater. FARMS can cost-share proposals from 50 up to 75 percent of total project costs, and can partner with other federal, state and local agencies such as the U.S. Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS) Environmental Quality Incentives Program (EQIP), FDACS, and FDEP. Total annual fiscal year funding available for these projects is upwards of approximately $6 million. Potential projects may include approved precision nutrient application technologies or conservation practices. The agricultural community is highly encouraged to contact FARMS staff to discuss and develop potential projects.

Additional information about the FARMS Program can be found at ***WaterMatters.org/FARMS****.*

Planning

Effective planning is a key element to any successful management strategy.

Surface Water Improvement and Management (SWIM) Plans

In recognition of the need to place additional emphasis on the restoration, protection and management of the surface water resources of Florida, the Florida Legislature, created the Surface Water Improvement and Management (SWIM) Act of 1987. This legislation directed the state's water management districts to "design and implement plans and programs for the improvement and management of surface water" (Section 373.451, Florida Statutes). The SWIM legislation requires the districts to protect the ecological, aesthetic, recreational and economic value of the state's surface water bodies, keeping in mind that water quality degradation is frequently caused by point and non-point source pollution, and that degraded water quality can cause both direct and indirect loss of habitat.

Two of the five first-magnitude spring groups, Rainbow and Crystal River/Kings Bay, were designated as SWIM priority water bodies in 1988. The SWIM plans for these water bodies are scheduled to be updated by the end of 2015. The remaining first-magnitude spring groups, Homosassa, Chassahowitzka and Weeki Wachee, were added to the SWIM priority water body list in 2014. There are no existing SWIM plans for these water bodies and the District intends to develop these plans by the end of 2016. The Springs Coast Steering Committee was established in part to develop and approve these comprehensive management plans for each of the District's five first-magnitude spring groups.

Regional Water Supply Plans (RWSPs)

The 2015 Regional Water Supply Plan (RWSP) for the District is an assessment of projected water demands and potential sources of water to meet these demands for the period from 2015 through 2035. The Northern Planning Region includes Hernando, Citrus and Sumter counties and the portions of Lake, Levy and Marion counties within the District. This region includes the five first-magnitude spring groups and several second-magnitude springs. The RWSP for the Northern Planning Region shows that demand for water through 2035 can be met with fresh groundwater. However, the need for additional fresh groundwater supplies will be minimized through the use of all available reclaimed water and implementation of comprehensive water conservation measures.

Watershed Management Plans (WMPs)

The District takes a watershed approach to managing surface water and related resources within its boundaries. By doing so, all of the characteristics of each watershed can be evaluated to reflect the interconnected nature of Florida's water resources. This increases the District's ability to clearly identify, prioritize and address issues related to the area's water resources. The Watershed Management Program provides a methodology to evaluate and restore water quality and natural systems while achieving flood protection. Groundwater originates as rainfall, which mostly infiltrates into the soils and sediments diffusely to recharge the underlying aquifer. It also can be focused as runoff to a sinkhole that provides a direct connection to the aquifer. Proper management of surface water in watersheds and springsheds is critical to the health of the springs. The WMP program includes five major elements: topographic information, watershed evaluation, a watershed management plan, implementation of best management practices, and maintenance of watershed parameters and models.

Total Maximum Daily Loads (TMDLs) and Basin Management Action Plans (BMAPs)

As part of the requirements of the 1972 Clean Water Act and the 1999 Florida Watershed Restoration Act (Chapter 99-223, Laws of Florida), the FDEP is required to assess waters of the state on a continual basis for water quality impairment. If a water body is verified impaired for nutrients, as is the case for most springs in Florida, then a TMDL is established. A TMDL sets a maximum allowable nutrient load that the water body can assimilate and still meet water quality standards for its designated use. The TMDLs that are established are then used to develop BMAPs, which create the roadmap to reduce nutrient loading and achieve the TMDL. While TMDLs and BMAPs are FDEP efforts, the District has provided a great deal of technical input and expertise during the development process. Currently TMDLs and BMAPs for all five first-magnitude groups are under development. FDEP's efforts to reduce nutrient loading will be incorporated into the District's SWIM plans.

Weeki Wachee Springs

Communications and Education

The issues affecting local springs are complex and diverse. Because many problems affecting the water quality of springs occur in the springshed, it's important for residents to understand that their actions, even many miles from a spring, can affect the health of a spring and the water flowing from it.

The District's springs protection outreach goals are to increase the public's awareness and knowledge of springs-related issues as well as change their attitudes and behaviors that negatively affect the health of the springs. As part of its outreach efforts, the District conducts public perception surveys to better understand the public's opinions, knowledge, attitudes and beliefs regarding the health of the springs and the District's efforts to restore them. The survey results are used to develop and evaluate the success of the District's springs protection outreach campaigns and activities.

Springs Protection Outreach Activities Include:

- Informing residents through public service advertisements about the District's scientific expertise and commitment to restoring our springs
- Encouraging residents to join the community effort to protect springs
- Increasing awareness of the District's springs protection efforts through *WaterMatters.org/Springs*
- Providing an at-a-glance view of water quality and flows through the online springs dashboards
- Promoting Springs Team projects through webpages, signage, videos and social media as well as outreach to the news media
- Educating various groups through Springs Team speaking engagements
- Sponsoring springs-related community events and workshops
- Participating in volunteer *Lyngbya* cleanup events
- Delivering quarterly updates through the Restoring Our Springs! e-newsletter
- Posting educational springs signs at various locations
- Communicating with local governments about ways municipalities can help promote springs protection

Additionally, the Youth Water Resources Education Program helps educators teach students about their local springs and freshwater resources. Program components include teacher trainings, Splash! grants and field-trip programs that provide students hands-on opportunities to learn about and test water quality at local springs and associated water bodies. Publications and curriculum tools, correlated to state education standards, also are available at ***WaterMatters.org/Publications***.

Monitoring

Monitoring the status of water resources is a primary role of the District. For springs, both surface water and groundwater information is essential for proper management. To provide this information the District collects data on hydrology,

meteorology, water quality and aquatic vegetation. Real-time data stations for hydrology and water quality are being established in each of the five first-magnitude spring systems. Combined, these data are used to assess the current status and trends of spring ecosystems, and to develop projects to address sources of degradation. For individual restoration projects, pre- and post-project monitoring is conducted where feasible to evaluate the project's measurable benefits and the potential for implementing similar projects in other areas.





Springs Monitoring Projects 2015-2019

Spring Group	Project Name	Budget*
Rainbow	Rainbow River Vegetation Evaluation	$100K
Kings Bay	Crystal River/Kings Bay Vegetation Evaluation	$150K
Homosassa	Homosassa River Benthic Monitoring	$150K
Chassahowitzka	Chassahowitzka River Benthic Monitoring	$150K
Weeki Wachee	Weeki Wachee River Benthic Monitoring	$150K
Springs Coast	Springs Coast Seagrass Mapping	$300K
Springs Coast	Project COAST –Water Quality Monitoring	$372K
Springs Coast	Springs Coast Fish Community Assessment	$195K
Districtwide	Quarterly Springs Water Quality Monitoring	$909K
Districtwide	Upper Floridan Aquifer Nutrient Monitoring Network	$504K
Districtwide	Stream Water Quality Monitoring	$413K
Districtwide	USGS Groundwater Data Collection	$99K
Districtwide	USGS Surface Water Data Collection	$428K
Districtwide	USGS Water Quality Data Collection	$74K
Districtwide	Hydrologic Data – Groundwater Data Collection	$847K
Districtwide	Hydrologic Data – Surface Water Data Collection	$407K
Districtwide	Hydrologic Data – Meteorologic Data Collection	$173K
Districtwide	Hydrologic Data – RADAR Rainfall Data Services	$16K

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Research and Development

To successfully plan, design and implement projects to facilitate restoration and conservation of our spring systems, the District is committed to Research & Development (R&D). Through strategic R&D, the District is:

1. Striving to understand the complex and unique issues and drivers affecting our spring systems.
2. Ensuring that the District stays on the cutting-edge of technology.
3. Continuing to share information with other stakeholders and academic institutions.

Over the past 20 years, the District has funded numerous diagnostic studies in all five first-magnitude spring groups. Projects include vegetation evaluations, sediment studies, water quality investigations, nutrient cycling studies and many others. Of note is a seminal piece of work completed by the University of Florida in 2001 titled Physical, Chemical, and Vegetative Characteristics of Five Gulf Coastal Rivers. This publication serves as a reference that is frequented not only by District scientists and engineers but by outside agencies and other stakeholders.

The District funds research projects with the University of Florida Institute of Food and Agricultural Sciences (UF-IFAS), providing valuable insight into impacts of groundwater use for agronomic crop production and urban landscapes. Since 2011 the District has funded 47 projects, with a total funding of $8.4 million dollars. The majority of research involves exploring techniques to reduce groundwater use and conserve water resources thereby reducing excess runoff from both urban and agricultural irrigation. The District-funded research projects address a wide variety of commodities such as citrus, blueberries, strawberries, tomatoes and peppers, as well as turf grasses, landscape ornamentals, landscape trees and shrubbery. Two of the 34 projects involve research on developing fertilizer BMPs and evaluating nutrient runoff from urban landscapes.

Springs Research and Development Projects 2015-2019

Spring Group	Project Name	Cooperators	Budget*
Rainbow	Rainbow River Algae and Sediment Assessment	UF-IFAS	$375K
Kings Bay	Kings Bay Sediment Feasibility Study	UF-IFAS	$350K
Kings Bay	Kings Bay Algal Grazer Evaluation	UF-IFAS	$369K
Weeki Wachee	Weeki Wachee Sand Assessment		$75K
Districtwide	Managing Forests for Increased Regional Water Supply	FDACS Other WMDs	$638K

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Regulatory

Minimum Flows and Levels (MFLs)

The District has been directed to establish MFLs for priority surface watercourses (e.g. streams and rivers) and aquifer systems within its boundaries (Section 373.042, F.S.). As defined by statute, "the minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." In scheduling the development and adoption of MFLs, State Law further directs the District to prioritize all first-magnitude springs, and second-magnitude springs within state or federally owned lands purchased for conservation purposes. MFLs serve as a protective metric for making permitting and planning decisions regarding water withdrawals, either surface or groundwater. If it is determined that water levels or flows in a waterbody are either below or projected to fall below the applicable MFLs during the next 20 years as a result of water withdrawals, then a recovery or prevention strategy must be developed and implemented as part of a regional water supply plan. MFLs have been adopted for three first-magnitude spring groups (Weeki Wachee, Chassahowitzka and Homosassa) and four second-magnitude springs (Sulphur, Lithia, Buckhorn and Crystal). MFLs for the remaining first-magnitude spring groups (Rainbow and Crystal River/Kings Bay) and a second-magnitude group (Gum Slough) are scheduled for adoption during this five-year plan period.

Springs MFL Schedule

Spring Group	Status	Adoption Schedule**	Budget*
Rainbow	Data collection ongoing	2017	$330K
Kings Bay	Data collection ongoing	2017	$435K
Homosassa	Re-evaluation in progress***	2019	$307K
Chassahowitzka	Re-evaluation in progress***	2019	$380K
Gum Slough	Peer review complete	2016	$150K

**Estimated budgets cover existing approved and future fiscal year amounts (2015–2019).*

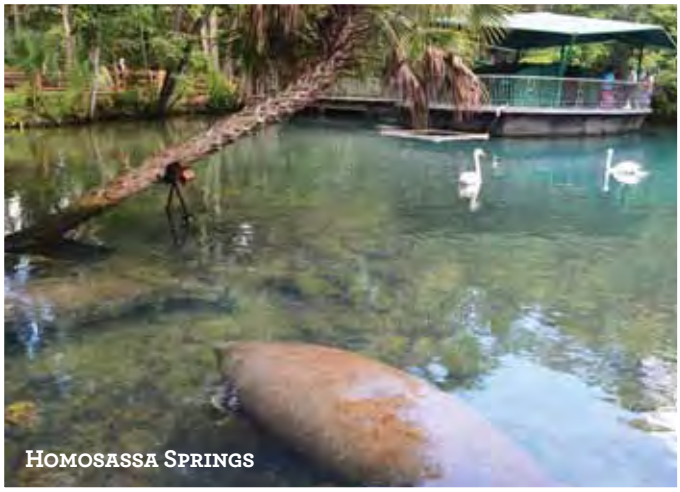
All budget requests are subject to annual Governing Board approval.

***Tentative dates*

****MFLs for Homosassa and Chassahowitzka have been adopted by the Governing Board and are scheduled for re-evaluation in 2019.*

Water Use Permits (WUPs)

Chapter 373, F.S., enables and directs the District to regulate the use of water within its jurisdictional boundaries. The purpose of the WUP program is to ensure that those water uses permitted by the District are reasonable-beneficial, will not interfere with any presently existing legal use of water, and are consistent with the public interest. Permits are required in accordance with specific thresholds for the use of fresh and saline, ground and surface water sources. The use of seawater and treated wastewater effluent does not require a WUP. Permits are issued for public supply, landscape/recreational, agricultural, industrial/commercial, mining/dewatering, institutional and other uses. The quantity of water needed is a function of demand for water, efficiency of the water treatment and distribution systems, conservation practices and other factors. During the evaluation of a permit application, the District ensures that the applicant's withdrawals combined with other withdrawals does not adversely impact environmental features and minimum flows and levels.



Homosassa Springs

Environmental Resource Permits (ERPs)

Part IV of Chapter 373, F.S., enables and directs the District to implement the ERP program to regulate the construction, alteration, operation, maintenance, abandonment and removal of stormwater management systems. A stormwater management system is a system that is designed and constructed or implemented to control discharges from rainfall events. This includes most activities that create new impervious surface or alter surface water flows. It also includes projects for dredging and filling in wetlands and other surface waters. The stormwater management system incorporates methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over drainage, environmental degradation and water pollution. An ERP is required before beginning any construction activity that would affect wetlands, alter surface water flows or potentially contribute to water pollution. The review process of an ERP application ensures that the permit will authorize activities that are not harmful to the water

resources or inconsistent with the public interest. The ERP program requires new development to properly treat and attenuate stormwater runoff, compensate for losses in floodplain storage, and minimize and mitigate wetland impacts.

Land-Use Reviews

The local government technical assistance program, supported by Chapter 163, F.S., integrates District planners with local governments. The aim of this program is to encourage sound water resource management and better link management activities of the District with the land use planning activities of local government. Coordination with local governments for the preparation of comprehensive plans has become one of the program's cornerstones, and encompasses assistance with flood protection and floodplain management, wetlands and other surface waters, and regional water supply.

Water Supply

The District works closely with local governments and the Withlacoochee Regional Water Supply Authority (WRWSA) for water supply planning and project implementation in the Northern Planning Region where the five first-magnitude springs are located. Although groundwater withdrawals currently have minimal impact on aquifer levels and springs discharge in this region, these water supply activities will help reduce the effects of current and future withdrawals. Two of the primary water supply activities involve promoting reclaimed water and water conservation projects.

Reclaimed water use is encouraged by the District as an alternative to groundwater and other sources. Reclaimed water is wastewater effluent that has received at least secondary treatment and disinfection and is used for a beneficial purpose, such as irrigation, manufacturing processes or power generation. By replacing demand for groundwater and surface water, this alternative water source reduces stress on environmental systems by decreasing groundwater withdrawals and nutrient loading in springsheds, and providing economic benefits by delaying costly water system expansions. Most reclaimed water systems in the Springs Coast are generally in the early stages of development and, as such, many opportunities exist for potential projects related to golf courses, large industry, residential irrigation and advanced treated recharge.

Water conservation is promoted by the District through cooperatively funded indoor and outdoor water conservation projects as well as District-funded research projects through UF-IFAS. Outdoor water conservation projects focus on improving the efficiency of residential landscape and irrigation systems while promoting Florida-Friendly Landscaping™. Indoor water conservation projects focus on providing financial incentives for the replacement of older high-flow toilets with high-efficiency models.

Springs Water Supply Projects 2015-2019

Spring Group	Project Name	Project Type	Cooperators	Budget*
Rainbow	Marion County Utilities Toilet Rebate Program	Conservation	Marion County	$65K
Kings Bay	City of Crystal River to Duke Energy Reclaimed Water Pipeline	Reclaimed Water	City of Crystal River FDEP	$6.2M
Aripeka	Heritage Pines Residential Reclaimed Water Service	Reclaimed Water	Pasco County FDEP	$1.6M
Springs Coast	Citrus County Toilet Rebate Program	Conservation	Citrus County WRWSA	$19K
Springs Coast	Rain Sensor Replacement Rebate Program	Conservation	Citrus County WRWSA	$9K
Springs Coast	WRWSA Regional Landscape and Irrigation Evaluation Program	Conservation	WRWSA	$80K

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Land Acquisition and Management

The District's land acquisition and management activities provide significant benefits for the conservation and protection of spring systems. Through the original Save Our Rivers, Preservation 2000, and current Florida Forever conservation land acquisition programs, the District has been acquiring and managing lands for the protection and conservation of Florida's water and related natural resources for over 30 years. District lands acquired in conjunction with spring systems include the Weeki Wachee Preserve, Chassahowitzka River and Coastal Swamps, and most recently, the Boat Spring properties. These properties were acquired with the intent of providing protection from encroaching land uses and are managed to conserve and maintain the natural ecosystems that surround the namesake springs and their associated river systems.


Boat Spring

Although not directly associated with major spring systems, other District-owned and managed lands located within the District's springs region afford protection to water resources for both quality and quantity. The management of such lands in their natural state provides for attenuation and treatment of stormwater runoff, conservation of groundwater recharge areas, and reduced or eliminated water supply demands and nutrient loads that would otherwise result from development. The District's land management practices include a variety of activities intended to maintain or restore these lands to their natural condition, while providing for their use and enjoyment by the public. Management activities include, but are not limited to, use of prescribed fire, mechanical vegetation treatments, control of exotic plant and animal species, and selective wetland, upland and/or other hydrologic restoration activities that may be required to maintain the lands in their natural state. The District has recently begun exploring the potential for land management practices that promote groundwater recharge, such as restoration of longleaf pine communities.

The District also manages aquatic plants in some spring systems as directed by the Florida Fish and Wildlife Conservation Commission. At the request of FDEP the District treats populations of the invasive aquatic plant hydrilla to contain its expansion on the Rainbow River. Similarly, water lettuce is controlled on both the Rainbow and Weeki Wachee rivers. While the native or exotic origin of water lettuce is unsettled, this species has the potential to displace native plant communities and may shade out submerged plants if not controlled.

Although several first-magnitude and numerous smaller springs within the District are protected through public ownership, additional opportunities remain for the protection of property within springsheds, along spring runs and in some cases, around the headsprings. The District has a comprehensive strategy to identify property for springs protection and restoration. Some of the factors considered include:

- **Proximity to a spring**
- **Aquifer recharge potential**
- **Habitat restoration potential**
- **Nutrient abatement potential**
- **Current ecological condition**

The acquisition of conservation lands, including property identified as candidates for springs protection and restoration, will occur on a voluntary basis. When acquisition opportunities are identified, the owners of the property are contacted to discuss their interest to participate in the protection of the resource. Local governments and other stakeholders are strongly encouraged to cost-share with the District, thereby reducing the financial burden on any single organization.

Rainbow Springs

Moving Forward

The District's Springs Management Plan summarizes the vision, issues and solutions that the District will address over the next five years to restore and conserve springs. Moving forward, the District will create specific management plans for each of the five first-magnitude spring groups: Rainbow Springs, Crystal River/Kings Bay, Homosassa Springs, Chassahowitzka Springs and Weeki Wachee Springs. As management of the first-magnitude springs progresses, the second-magnitude and smaller springs will receive increased attention. This management plan and the plans for each spring group will evolve over time.

The District's adaptive management strategy for springs is designed to promote learning from each management action. All projects will be assessed to determine their contribution to the quantifiable objectives, and the quantifiable objectives themselves will be evaluated and updated as appropriate. In addition, the condition of each spring group will be monitored to assess trends in water quality, flow and discharge, and fish and wildlife habitat. The District also will continue to develop partnerships with other agencies and stakeholders, including the regional Springs Coast Steering Committee, so that the full range of issues and solutions associated with springs are considered and addressed. As the District gains further knowledge of the issues facing springs and implements projects to improve their condition, the better off these unique, valuable resources will be in the future.

Chassahowitzka Springs

Southwest Florida
Water Management District

1-26-16