

Water Supply Assessment (2015-2035)



Water for Nature, Water for People

July 10, 2018

Water Supply Assessment (2015-2035)



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EXECUTIVE SUMMARY

Section 373.036, Florida Statutes (F.S.) requires the Suwannee River Water Management District (District) to conduct a Districtwide Water Supply Assessment (WSA) at least once every five years. Each WSA is required to provide the following information for each water supply planning region within the District for at least a 20-year planning period:

- Existing legal uses, reasonably anticipated future needs, and existing and reasonably anticipated sources of water and conservation efforts
- Whether existing and reasonably anticipated sources of water and conservation efforts are adequate to supply water for all existing legal uses and reasonably anticipated future needs to sustain the water resources and natural systems

This assessment provides Districtwide and countywide growth and water demand projections to complement the projections presented in the North Florida Regional Water Supply Plan (2015-2035, NFRWSP), which addresses water supply constraints for the District's four existing Water Resource Caution Areas (WRCAs). This WSA updates the findings of the 2010 WSA. It uses a 2010 base year and growth projections for the 2015 to 2035 planning horizon. These projections were developed collaboratively as a part of the regional water supply planning process. These data and the North Florida-Southeast Georgia Regional Groundwater Flow Model (NFSEG), version 1.0 were used to evaluate whether fresh groundwater sources are adequate to meet Districtwide water demands based on regional water demand projections and natural system constraints. Updated draft growth projections using a 2015 base year and a 2020 to 2040 planning horizon are appended to this WSA.

In this District, over 90% of the water supply is met with fresh groundwater, predominantly from the Floridan aquifer system (FAS). For planning purposes, fresh groundwater is recognized as the only traditional water supply source, with all other water sources considered to be nontraditional (i.e., alternative water supplies; 373.019(1) F.S.). This WSA was conducted to determine whether fresh groundwater supplies in the District will be adequate to satisfy water supply demands for the 2015-2035 planning period while protecting natural systems. Existing use and future water demand projections were examined as required by Rule 62-40, Florida Administrative Code (F.A.C.). Total water demand in the District is projected to grow from 229 million gallons per day (mgd) to 300 mgd, with fresh groundwater from the FAS supplying over 90% of this demand. Agricultural Self-supply remains the largest use category in the District, and represents the largest projected water demand growth through 2035.

The FAS serves as a significant source of water both inside and outside of the District. Understanding how regional withdrawals from the FAS impact the availability of water in this District was identified as a critical need in the 2010 WSA. Implementation of the recommendations from the District's 2010 WSA has resulted in an improved understanding of these cross-boundary impacts. Water available for reasonable and beneficial uses and to support natural systems within the District is constrained by water demands that extend beyond the District's 7,640-square mile jurisdictional boundary.

The NFSEG was developed following the 2010 WSA. The NFSEG provides an improved and more laterally-extensive groundwater flow model, which, along with groundwater demand projections for regions adjacent to the District, has enabled improved estimations of cross-boundary impacts to the water resources within this District. Within the 60,000-square mile NFSEG domain, fresh groundwater demands are projected to increase from 1,662 mgd to at least 2,086 mgd between 2009 and 2035. Modeling these regional withdrawals allowed staff to identify regions in the District where fresh groundwater supplies may be inadequate to meet estimated current or projected future reasonable-beneficial uses while sustaining minimum flows and minimum levels (MFLs) in natural systems.

This WSA finds that 8 springs and 3 river segments could exceed flow constraints by 2035 if all projected future demands are met with fresh groundwater. The development of projects or the use of alternative water supplies may be necessary to meet projected water demands through 2035 while protecting natural systems in the Suwannee River and Waccasassa River Basins

This WSA makes the following recommendations:

- Split the District into two water supply planning regions to increase efficiency for planning and project implementation (see Figure ES-1). Moving forward, the North Florida Regional Water Supply Plan will serve as the water supply assessment and plan for the Eastern Planning Region.

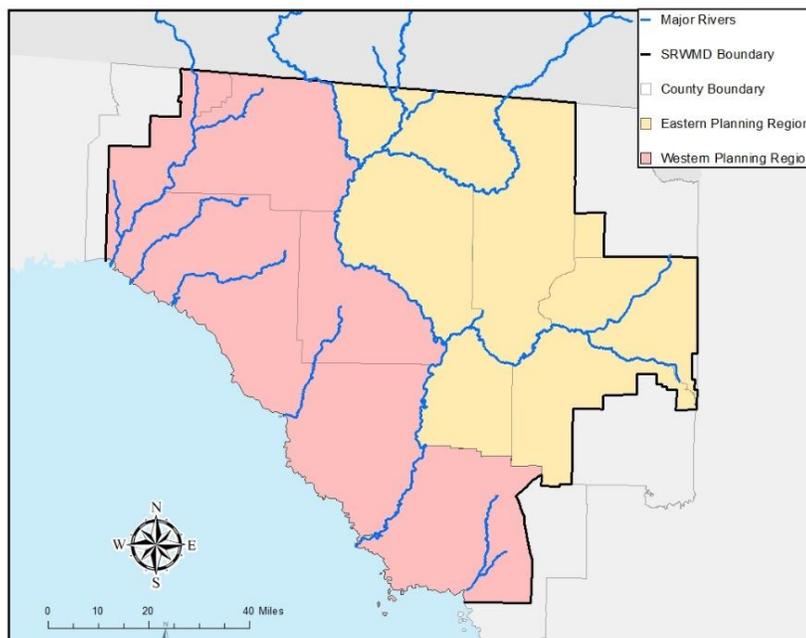


Figure ES-1. Recommended planning regions for the District.

- Declare the Eastern Planning Region a Water Resource Caution Area. The Eastern Water Resource Caution area would encompass the existing Water Resource Caution Areas (as identified in the 2010 WSA) and the declare the remainder of the Eastern Planning Region a water resource caution area (this will include the remaining portions

of Hamilton, Suwannee, Gilchrist, and Alachua counties located within the District, Figure ES-2). The intent to extend the water resource caution areas to the full extent of the North Florida Regional Water Supply Partnership area was initially described in the approved NFRWSP.

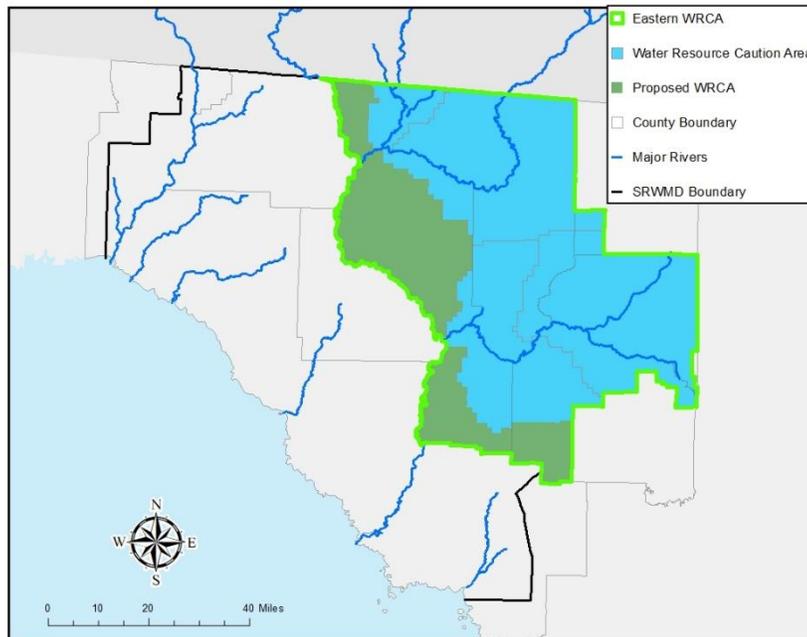


Figure ES-2. Proposed extent of Eastern Water Resource Caution Area in the Eastern Planning Region

- Initiate regional water supply planning in the Western Planning Region, to include portions of the planning region contributing groundwater or surface water to the Withlacoochee, Suwannee and Waccasassa Rivers (Figure ES-3).

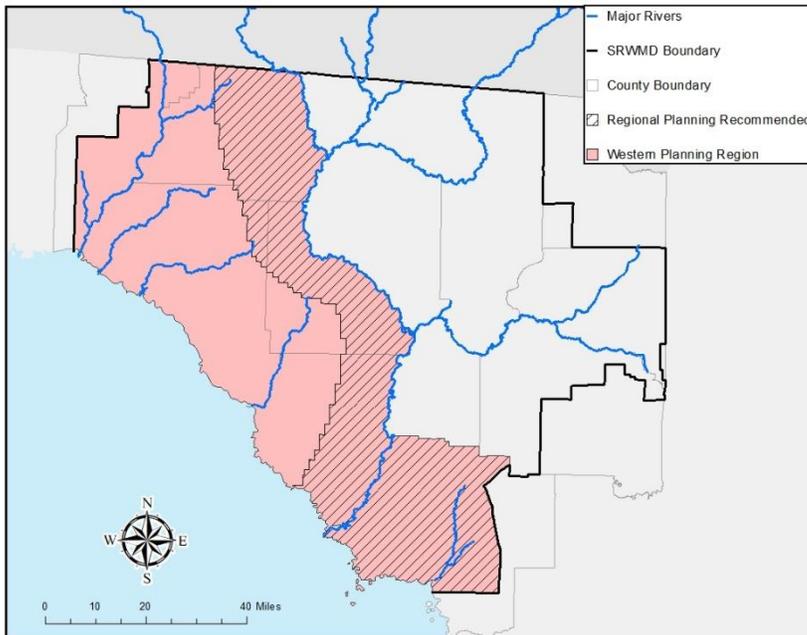


Figure ES-3. Proposed extent of regional water supply planning in the Western Planning Region

Results from the NFSEG indicate that two waterbodies with established MFLs, Madison Blue Spring and Levy Blue Spring, warrant a more detailed evaluation of their status, based on simulated changes in flow under 2009 conditions. Available water at the Suwannee River at Wilcox may also be constrained by 2035 if all projected water demands are met with fresh groundwater. The proposed extension of regional water supply planning includes these MFL waterbodies, and will result in a detailed examination of available water supplies, projected groundwater demands, and water resource and water supply development options. Regional water supply planning, in conjunction with the continued establishment, evaluation, and enforcement of Minimum Flows and Minimum Levels (MFLs) for all priority waterbodies, will be critical to meeting the projected future water demands in the District while protecting natural systems.

1.0 INTRODUCTION

The purpose of this Water Supply Assessment (WSA) for the Suwannee River Water Management District (District) is to assess the potential impacts of current and future water supply needs and water supplies on the environmental systems throughout the District. The District currently has four Water Resource Caution Areas (WRCAs) declared as a result of the 2010 Water Supply Assessment. Based on the conclusion that cross-boundary impacts were influencing groundwater availability in the District, regional water supply planning was initiated in cooperation with the St. Johns River Water Management District (SJRWMD) and the Florida Department of Environmental Protection (FDEP). The resulting, approved, North Florida Regional Water Supply Plan (2015-2035, NFRWSP) provides a detailed analysis of water availability, water resource development projects, and options for alternative water supplies (AWS) in these WRCAs and the northern portion of the SJRWMD (District and SJRWMD, 2017). This WSA uses the data and tools prepared for the NFRWSP to determine where traditional groundwater supplies throughout the District could be inadequate to satisfy projected water supply demands for the 2015 - 2035 planning period while sustaining water resources and protecting natural systems. This report provides information regarding:

1. Estimates of actual water use in 2010 and projected future water demand for all water use categories through 2035.
2. Estimates of water savings that can potentially be achieved through water conservation.
3. Availability and feasibility of using traditional and AWS to meet projected demands.
4. Groundwater flow modeling, evaluation of withdrawal impacts, and an examination of the ability to meet projected water demands with traditional sources (i.e., fresh groundwater).

In addition to discussion of the District's water demands and water supply options, this WSA also provides conclusions and recommendations intended to assist the District in ensuring an adequate water supply for all existing and future reasonable-beneficial uses in a manner that sustains water resources and natural systems for the 20-year planning period. Additionally, Section 2.0 of this WSA reviews the recommendations of the District's previous 2010 WSA, and provides a summary of the actions the District has taken since 2010 to meet the water supply recommendations of that assessment. Appendix A of the WSA provides a draft of updated population and water demand projections using a 2015 base year and a 2020 - 2040 planning horizon.

1.1 STATUTORY AND RULE REQUIREMENTS

Subsection 373.036(2)(b)(4), Florida Statutes (F.S.), requires that a WSA provide the following information:

1. *Existing legal uses, reasonably anticipated future needs, and existing and reasonably anticipated sources of water and conservation efforts; and*

2. *Whether existing and reasonably anticipated sources of water and conservation efforts are adequate to supply water for all existing legal uses and reasonably anticipated future needs and to sustain the water resources and related natural systems.*

Rule 62-40.520(2), Florida Administrative Code (F.A.C.), provides additional guidance for the statutory requirements to develop WSAs and directs the state of Florida's (state) water management districts (WMDs) to conduct a Districtwide WSA at least once every five years. This rule provides that when a WMD determines in a WSA that sources of water are not adequate to supply water for all existing and future reasonable-beneficial uses, and to sustain the water resources and related natural systems for a particular area, a regional water supply plan (RWSP) shall be developed. Additionally, within one year of the determination that a RWSP is needed, the region is also required to be designated as a WRCA. A WRCA is a geographic area identified by a WMD as having existing water resource problems or an area in which water resource problems are projected to develop during the next twenty years if all projected water demands are met with fresh groundwater. Regional water supply planning is undertaken to identify potentially viable AWS sources, water resource development projects, and water conservation strategies to meet projected water supply demands for the 20-year planning period in a reliable and sustainable manner.

1.2 BACKGROUND

The District's most recent WSA was conducted in 2010 (District, 2011), and accepted by the District's Governing Board in December of 2010. The 2010 WSA generally concluded that groundwater levels in the Upper Floridan aquifer (UFA) in some areas of the District had declined significantly during the past 75 years as a result of regional groundwater withdrawals in the District, the adjacent SJRWMD, and southeast Georgia. The 2010 WSA also concluded that the water resources in the northeastern portion of the District were declining, or were predicted to decline, during the 2010-2030 planning period. As a result, the northeast portion of the District was subdivided into four water supply planning regions (WSPRs). Pursuant to Rule 62-40.520(2), F.A.C., the District's Governing Board then designated the four WSPRs as WRCAs on October 11, 2011.

Section 2.0 of this WSA provides an overview of the recommendations of the 2010 WSA, and the actions taken by the District in response to those findings. The District's four WSPR/WRCAs established as a result of the 2010 WSA are:

- Alapaha River basin WSPR/WRCA
- Upper Santa Fe River basin WSPR/WRCA
- Lower Santa Fe River basin WSPR/WRCA
- Upper Suwannee River region WSPR/WRCA

Based on the unique geology within the District and the fact that impacts to the District's groundwater resources are linked to regional groundwater trends (both within and outside of the District), the District concluded that water supply planning for the four WRCA's should be conducted as part of a broader multi-region planning effort with the SJRWMD. On September 13, 2011, the District, SJRWMD, and the FDEP entered into an interagency agreement referred to as the "North Florida Regional Water Supply Partnership" (Partnership). This Partnership recognized the potential for cross-jurisdictional groundwater withdrawal impacts and included a commitment by all parties to collaborate on a number of important initiatives intended to cooperatively address these regional issues. These development efforts have included collaboration on data collection, Minimum Flows and Minimum Levels (MFLs), the development of new modeling tools, and joint development of future water demand projections and other planning efforts. Throughout the joint planning process, the District and SJRWMD have sought open public collaboration and provided public forums for stakeholder participation. One of the primary efforts of the Partnership was the development of the NFRWSP (District and SJRWMD, 2017). Much of the information presented herein has been developed and shared as part of the Partnership process to provide public access to planning data and consistency with the NFRWSP (www.northfloridawater.com).

The North Florida-Southeast Georgia Regional Groundwater Flow Model (NFSEG) is one of the recommended outcomes of the 2010 WSA highlighted in Section 2.0, and used in Section 4 to examine natural system constraints. The NFSEG is the result of a collaborative effort involving the District, SJRWMD, and Southwest Florida Water Management District, with input from community/ business stakeholders and technical experts. The NFSEG is one of the most innovative groundwater flow models in the state and incorporates all elements of the water budget including: recharge, evapotranspiration, surface water flows, groundwater levels and water use. The development of the NFSEG utilized a state-of-the-art calibration process to incorporate the most current data (at the time of development) and provides the best available approximation of all components of the water budget within the District based on conditions throughout the model domain. The NFSEG provides the most technologically sophisticated picture of the impact of current and projected groundwater withdrawals on water resources in north Florida. This WSA updates the findings of the 2010 WSA using collaboratively-developed growth and water demand projections from the Partnership and the estimated impacts to natural systems from the NFSEG, version 1.0.

1.3 PHYSICAL SETTING, GEOLOGY, AND HYDROGEOLOGY

The jurisdictional area of the District is 7,640 square miles and includes all or part of 15 counties in north-central Florida (Figure 1-1). The District includes all of Columbia, Dixie, Gilchrist, Hamilton, Lafayette, Madison, Suwannee, Taylor, and Union counties, and parts of Alachua, Baker, Bradford, Jefferson, Levy, and Putnam counties. The District contains over 300 documented springs, including the highest concentration of both freshwater springs in the state and first magnitude freshwater springs in the United States (Figure 1-2). Of these springs, 14 springs and spring groups have been designated as Outstanding Florida Springs (Subsection 373.802(4), F.S.). The District also includes 13 contributing river basins. Major rivers include the

Suwannee, Santa Fe, Withlacoochee, Aucilla, Alapaha, Ichetucknee, Fenholloway, Steinhatchee, Econfinia, Waccasassa, and the Wacissa as shown in Figure 1-3. A substantial portion of the land area that coincides with the Aucilla, Alapaha, Withlacoochee, and Suwannee river basins is located in Georgia.

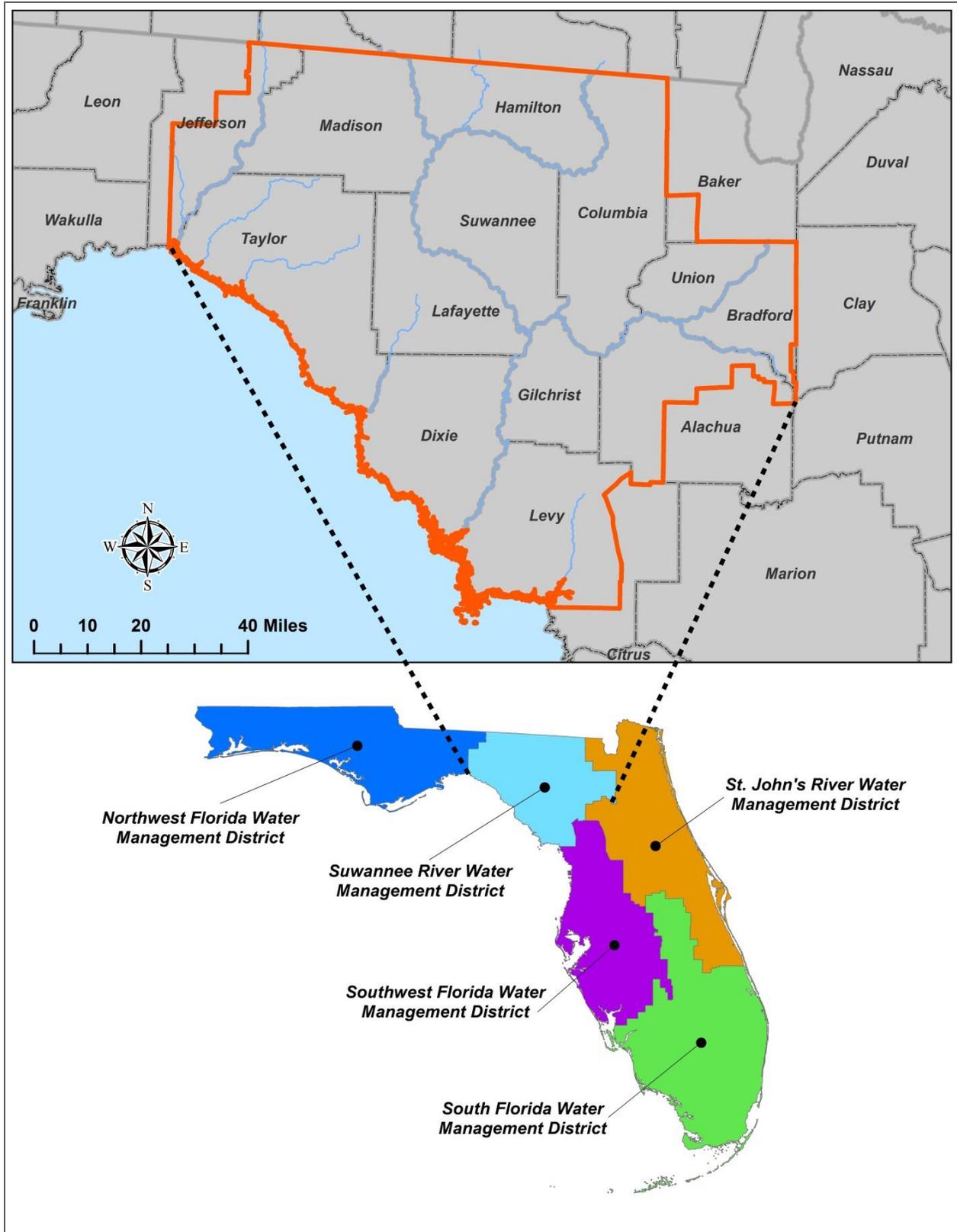


Figure 1-1. Map of the Suwannee River Water Management District

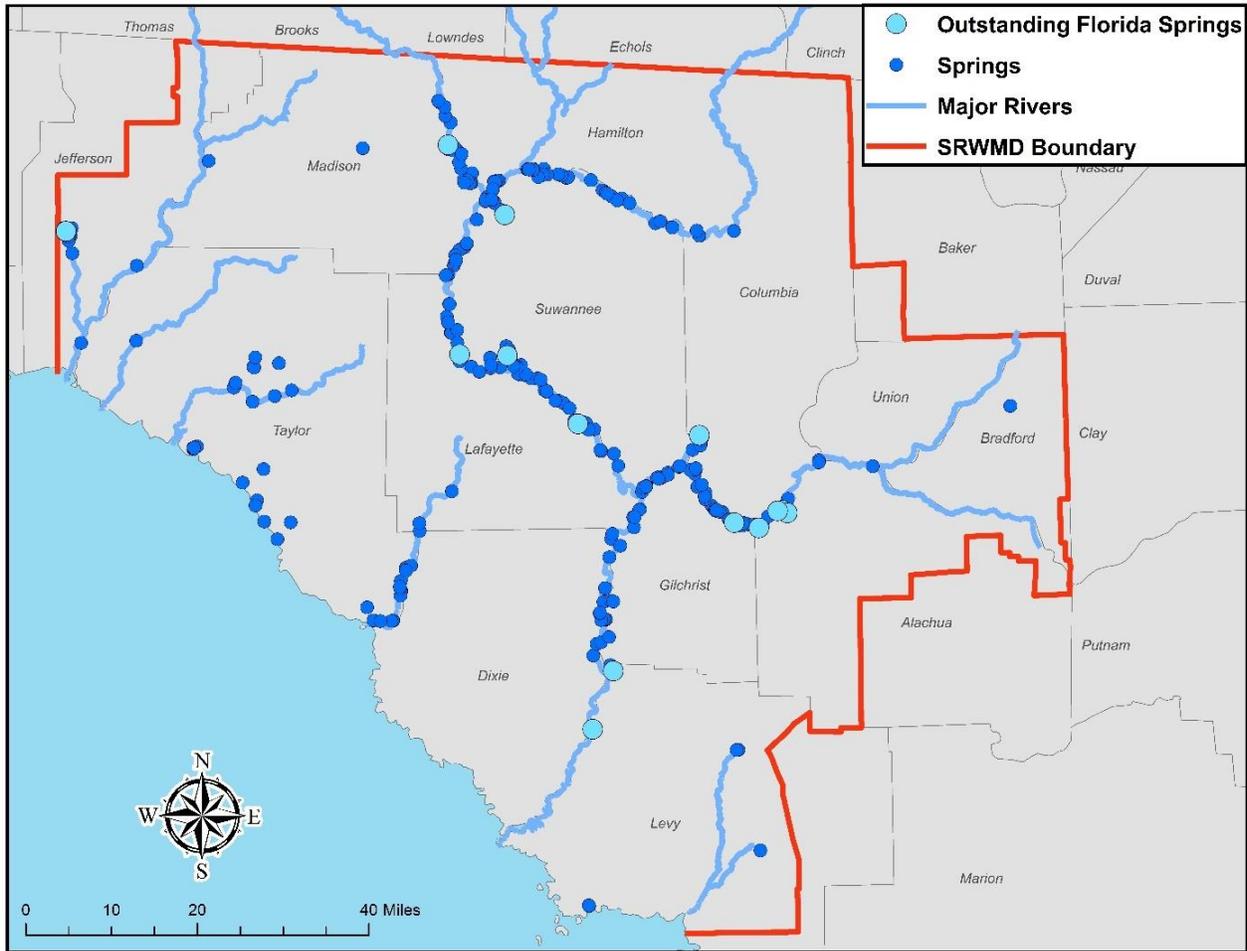


Figure 1-2. District Boundary, Major Rivers and Springs, including designated Outstanding Florida Springs (Subsection 373.802(4), F.S.)

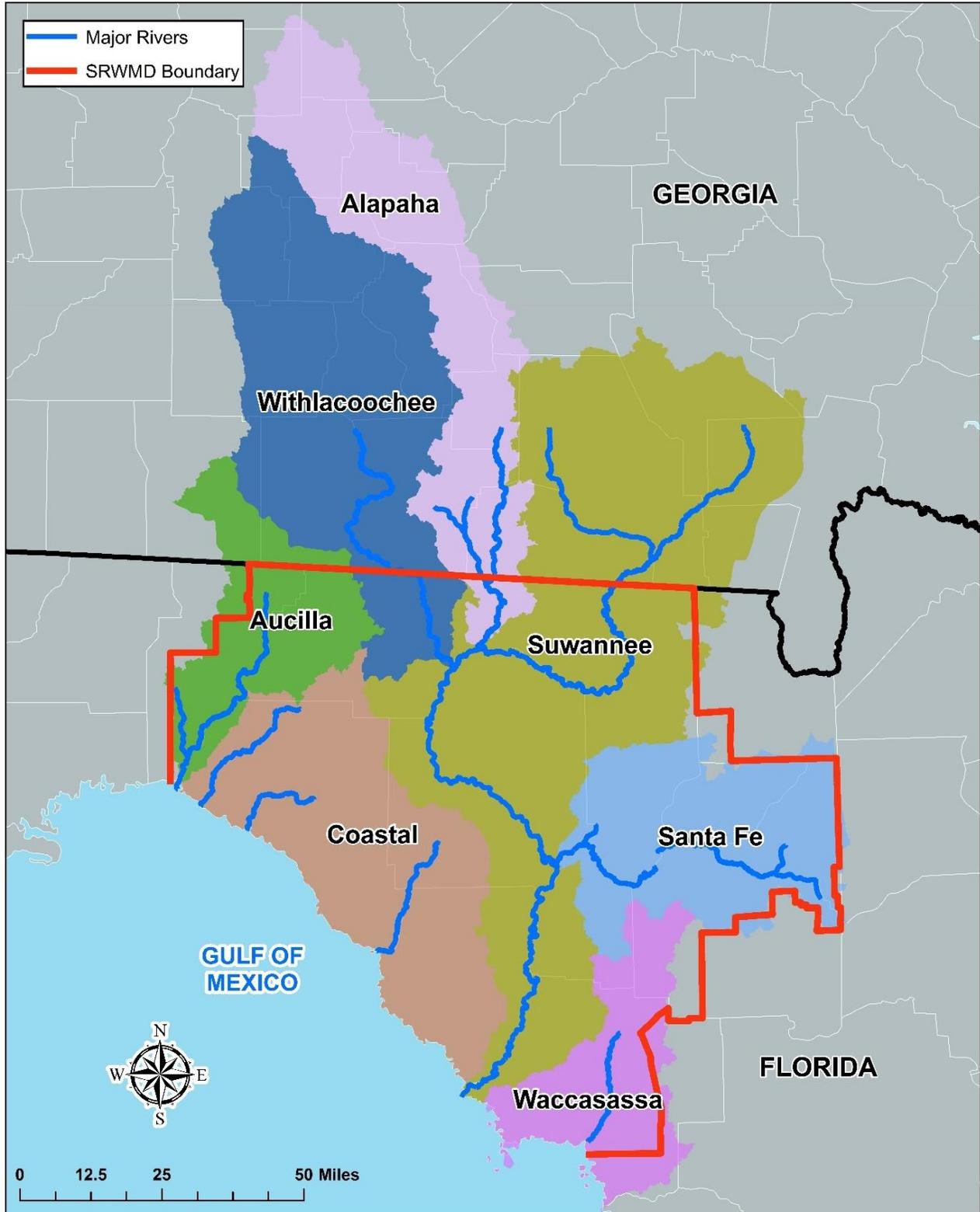


Figure 1-3. Major River Basins within the District and their Extent in the State of Georgia

1.3.1 Physical Setting

The two major physiographic provinces in the District include the Northern Highlands and Gulf Coastal Lowlands (White, 1970; Ceryak et al., 1983; Figure 1-4). Characteristics of the Northern Highlands include gently rolling topography, generally from 100 - 200 feet above mean sea level. Soils typically range from sand to clayey sand. The presence of relatively low permeability clayey sediments, at or near the surface, limits the infiltration of rainfall. Therefore, local rainfall drainage in the Northern Highlands (i.e., the Upper Suwannee and Santa Fe River basins) is characterized by surface water features as shown in Figure 1-4. The Gulf Coastal Lowlands are characterized by elevations ranging from sea level to approximately 100 feet above mean sea level. The Gulf Coastal Lowlands feature a low relief, karstic topography, and shallow sandy soils with muck in many wetland areas. Karst landforms are widespread in the lowlands, with abundant sinkholes, sinking streams and springs, and a high degree of interconnection between surface water and groundwater systems. The Gulf Coastal Lowlands therefore have high rates of recharge to the limestone aquifer and extensive karst development, resulting in a groundwater-dominated (subsurface) drainage pattern throughout much of this region.

A significant geologic feature separating the two major physiographic provinces is the Cody Escarpment or Cody Scarp (depicted as a red line in Figure 1-4), which generally separates the Northern Highlands Physiographic Province and the Gulf Coastal Lowlands Physiographic Province. The Cody Scarp is an erosional geomorphologic feature which represents the break between the surface-water dominated hydrology of the Northern Highlands, and the groundwater dominated hydrology of the Coastal Lowlands. The Cody Scarp region is characterized by active sinkholes, springs, sinking streams, and river rises (Ceryak et al., 1983). During average and lower flows, with the exception of the Suwannee River, all rivers and streams, including the Santa Fe and Alapaha Rivers, are completely captured by sinkholes as they cross the Cody Scarp. Some subsequently re-emerge downgradient as river rises.

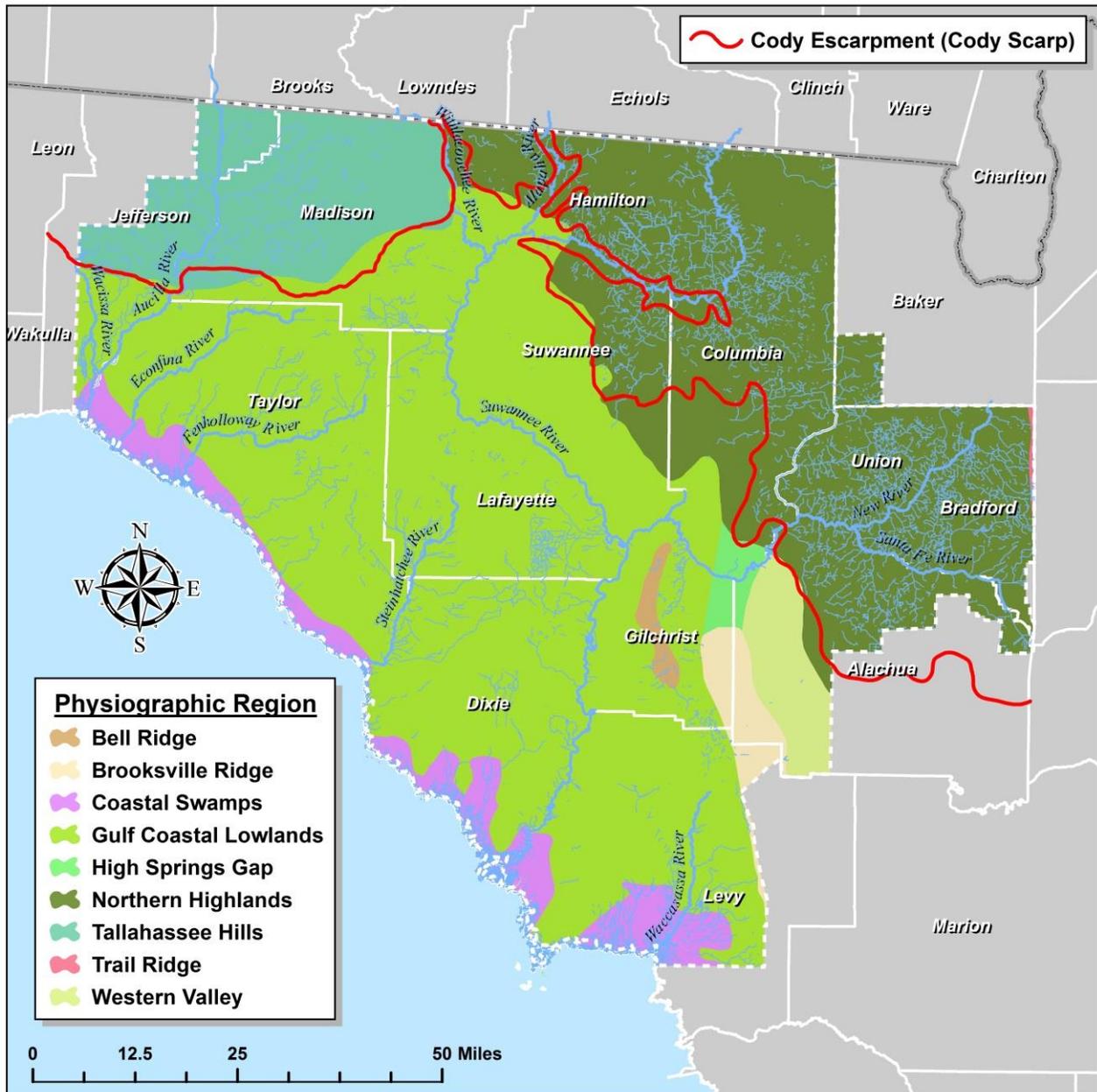


Figure 1-4. Physiographic Regions of the District

1.3.2 Geology and Hydrogeology

The District has three primary hydrostratigraphic units which are, in descending order, the unconfined surficial aquifer system, the intermediate aquifer system/intermediate confining unit (located in the northeastern and eastern portions of the District), and the UFA. The UFA is highly productive and represents the primary source of water supply for all water use types in the District and provides the baseflow to rivers and springs in much of the District (Figure 1-5).

The Cody Scarp approximates the transitional area between the confined and unconfined UFA (Figure 1-6). In the Northern Highlands region, which includes the Upper Suwannee and Santa Fe River basins, the UFA is overlain by a thick confining layer of clay, which retards recharge into the UFA, whereas, to the south and west in the Gulf Coastal Lowlands, these clay layers are generally absent and the UFA is generally unconfined. The UFA in the Gulf Coastal Lowlands region experiences very high rates of recharge by way of sinking streams, sinkholes, and diffuse recharge through the land surface. Therefore, in this area, maintenance of groundwater levels is critically important to maintaining spring flow and baseflow in rivers (e.g., the Lower Santa Fe and Ichetucknee Rivers).



Figure 1-5. Extent of the Floridan aquifer system in the Southeastern United States (aquifer extent from Miller, 1986)

The District is underlain by only a small portion of the entire Floridan aquifer system (FAS) which extends throughout the Florida peninsula and into the coastal reaches of Mississippi, Alabama, Georgia, and South Carolina. The FAS is comprised of the UFA which is present throughout the District, and the Middle Confining Unit (MCU) and Lower Floridan aquifer (LFA) which are present in the northern and eastern portions of the District (Scott, 1992). The extent of

the MCU and the LFA are not well known in the District. The UFA is the primary source of water in the District. The MCU and LFA are not used for water supply in the District, but are included in the regional groundwater modeling efforts.

Table 1-1 depicts the hydrostratigraphic (aquifer system) and geologic units relevant to water supply in the District. The presence or absence of the Hawthorn Group determines whether the UFA is confined/semi-confined or unconfined (Scott, 1988, 1992), respectively (Figure 1-6). In addition, the relative recharge rate is generally inversely proportional to the degree of confinement (i.e., the less confinement, the higher the recharge).

Table 1-1. Generalized Aquifer Systems within the District

Geologic Unit	Hydrostratigraphic Unit
Undifferentiated Sand	Surficial Aquifer System
Hawthorn Group St. Marks Formation	Intermediate Aquifer System and Intermediate Confining Unit
Suwannee Limestone Ocala Limestone Avon Park Formation Oldsmar Formation	Floridan aquifer system (Upper Floridan aquifer where Middle Confining Unit is absent)

The UFA is composed of multiple geologic units, not all of which are present across the District. The Ocala Limestone is the primary source of groundwater for all water-use categories in the District. The Suwannee Limestone overlies the Ocala Limestone in places (particularly in portions of Madison, Hamilton, Suwannee, and Taylor Counties, and along major streams). The high porosity and productivity of the UFA, as well as its generally high water quality, and its relative shallow depth from ground surface all contribute to the utilization of the UFA as the primary source of fresh water in this region.

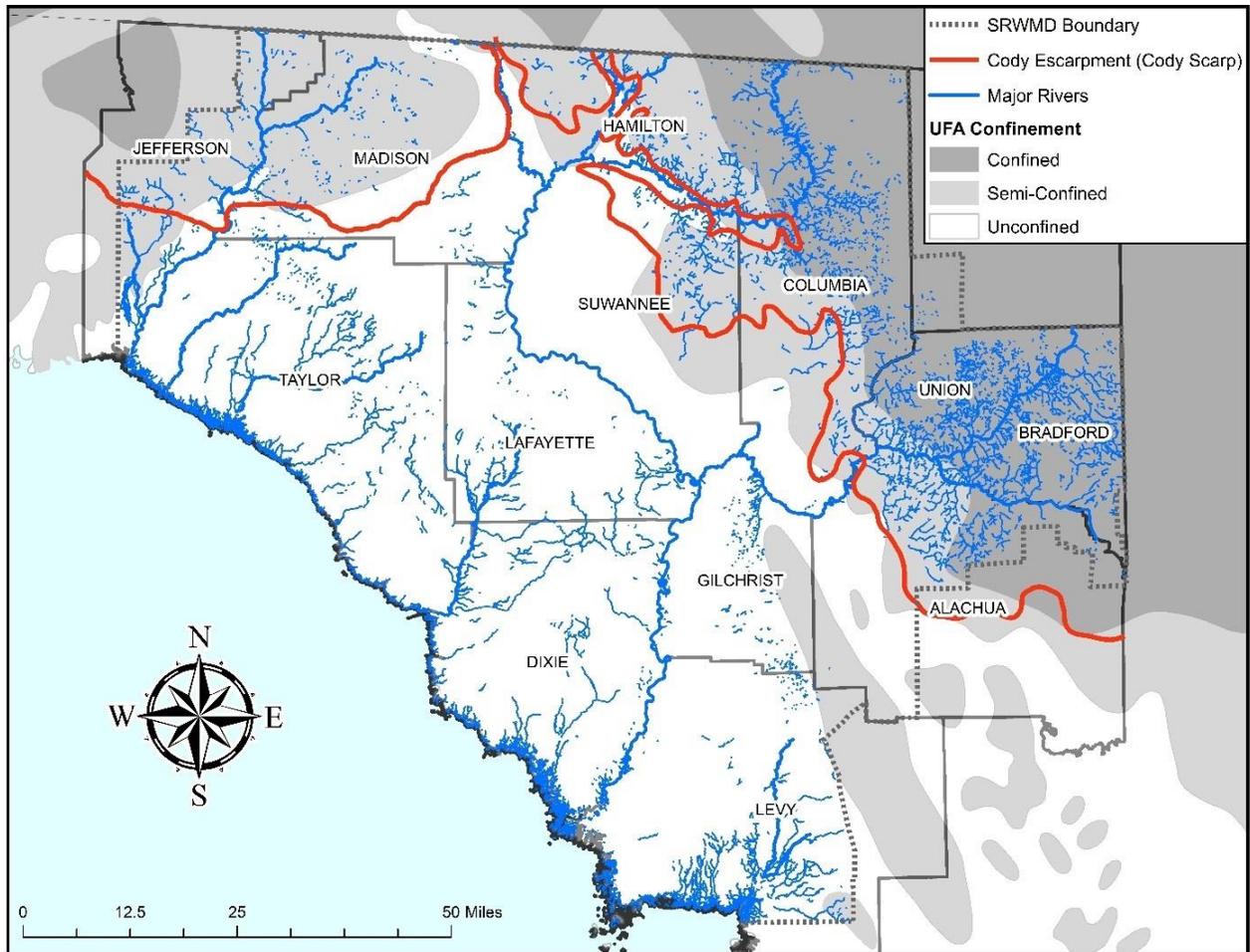


Figure 1-6. Confinement Conditions of the Upper Floridan Aquifer within the District (confinement conditions from Miller, 1986)

2.0 OVERVIEW OF INITIATIVES AND ACCOMPLISHMENTS

Since completion of the 2010 WSA (District, 2011), the District has undertaken intensive efforts to further enhance management of the water resources within the WSPR/WRCA areas and throughout its entire jurisdiction. These efforts have included extensive coordination with adjacent WMDs, the FDEP, the Governor's office, the Florida Legislature, other elected officials, and stakeholders. This section describes the water resource and supply planning activities undertaken by the District since 2010 in response to the list of recommendations provided in the 2010 WSA.

The 2010 WSA recommendations fell within the following six categories:

1. Proposed WSPRs
2. MFLs
3. Data collection
4. Modeling
5. Coordination and outreach
6. Water supply planning, development, and conservation

The following subsections include the 2010 WSA's recommendations in italics (District, 2011), followed by an overview of the initiatives undertaken or accomplished since the 2010 WSA was published.

2.1 PROPOSED WATER SUPPLY PLANNING REGIONS

2.1.1 Designate Water Supply Planning Regions

2010 WSA Recommendation:

Designate the Upper Santa Fe River Basin, Lower Santa Fe River Basin, Upper Suwannee River Region, and Alapaha River Basin as Water Supply Planning Regions due to significant regional declines in the Upper Floridan aquifer potentiometric surface and predicted exceedances of established minimum flows and interim flow constraints in these areas.

Update:

In December 2010, the District Governing Board accepted the District's 2010 WSA. The 2010 WSA concluded that cumulative groundwater withdrawals from both within the District and outside (i.e., the SJRWMD and the State of Georgia) were suspected to have impacted a number of rivers and springs to the degree that they were either not currently meeting their established MFLs or interim flow constraints (IFC), or were projected not to meet them during the 2010 - 2030 planning period. As a result, the 2010 WSA recommended the designation of the above-referenced areas as WSPRs, which in turn triggered the need to develop a regional water supply plan for these regions.

The 2010 WSA identified the potential for cross-jurisdictional groundwater withdrawal impacts and the need for interagency cooperation across the northern Florida region. In response to the 2010 WSA and to carry out its statutory obligations, the District subdivided the northeastern sector of its jurisdictional area into four WSPRs. On October 11, 2011, the District Governing Board designated the four WSPRs as WRCAs (Figure 2-1). Given the potential for cross-jurisdictional groundwater withdrawal impacts, the District concluded that water supply planning efforts would best be conducted for all four areas as part of a regional and multi-jurisdictional effort with the SJRWMD.

On September 13, 2011, the District, SJRWMD, and FDEP entered into an interagency agreement. This agreement and subsequent amendments (February 28, 2012, January 25, 2013, and May 13, 2015) specify the desire of all parties to coordinate and collaborate on a comprehensive and integrated approach to addressing regional water resource challenges. The resulting Partnership has provided a framework for the District and SJRWMD to collaborate on interagency issues such as:

1. Assessment of impacts to UFA from groundwater withdrawals
2. Development of a joint regional groundwater flow model
3. Water resource monitoring, data collection, and analysis
4. MFLs
5. Recovery and Prevention Strategies
6. Joint Regional Water Supply Planning in the form of the NFRWSP (Figure 2-1)
7. Coordination during water shortage conditions

The Partnership recognizes that assuring the availability of reliable water supplies while protecting north Florida's water resources and natural systems requires a collaborative effort among the District, the SJRWMD, FDEP, state and local governments, Water or Consumptive Use Permit (CUP / WUP) applicants, and other stakeholders. The Partnership is designed to ensure: A) effective coordination and communication on northern Florida regulatory programs; B) sharing of data and associated technology; C) development of consistent water resource protection strategies; and D) cross-jurisdictional communications among the agencies and affected parties. Since creation of the Partnership, these parties have been working together to address all of the above-referenced issues in an open public process, including approval by both the District's and SJRWMD's governing boards on January 17, 2017 of the NFRWSP, which represents the first joint regional water supply plan for these planning regions.

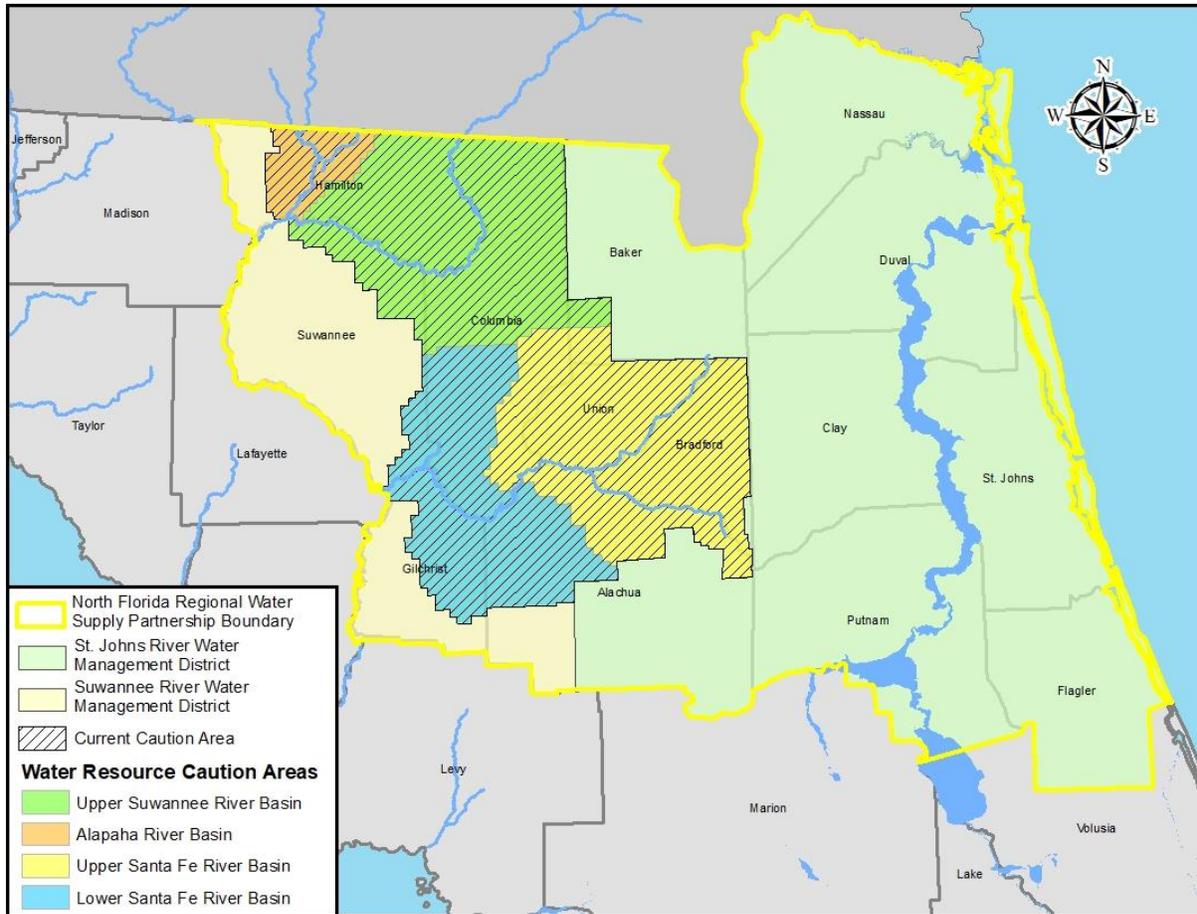


Figure 2-1. North Florida Regional Water Supply Partnership Boundary with Water Resource Caution Areas Designated in 2011

2.1.2 Water Use Permitting Regulatory Enhancement

Permit Duration

2010 WSA Recommendation:

Limit the duration of Water Use Permits in the proposed Water Supply Planning Regions to no more than five years until recovery and prevention strategies are developed and implemented unless the applicant implements measures to provide reasonable assurance that their proposed use will result in a net benefit to the resource.

Update:

The District temporarily limited the duration of WUPs as recommended for all the planning regions. A Recovery Strategy for the Lower Santa Fe and Ichetucknee Rivers and priority springs that implements this approach has since been implemented. Currently, permit duration is determined as set forth in Section 1.5 (Permit Duration) of the District’s March 2014 WUP

Applicant's Handbook. Further, Section 3.9 (Minimum Flows and Levels) requires that, where the District or the FDEP has adopted a recovery or prevention strategy for an MFL water body from which an applicant proposes to directly or indirectly withdraw or divert water, the applicant's proposed use must be consistent with the recovery or prevention strategy in order to obtain a WUP.

Water Use Monitoring/Reporting

2010 WSA Recommendation:

Develop a plan to require all new applicants for water use permits and those renewing permits in excess of 100,000 gallons per day in the proposed Water Supply Planning Regions to monitor and report their use. Continue efforts to develop a more accurate assessment of the actual water use of the major water users in the District, especially in the proposed Water Supply Planning Regions.

Update:

Section 4.1 (Withdrawal Quantity) of the District's March 2014 WUP Applicant's Handbook includes requirements for monitoring of water withdrawals. Sections 4.1.1 (Automated Monitoring of Groundwater Withdrawals) and 4.1.2 (Automated Monitoring of Surface Water Withdrawals) require new water uses, renewed permits, and modifications of permits proposing new withdrawals to implement automated monitoring of ground and surface water withdrawals. To this end, the District has also reached agreements with four major electrical cooperatives providing service primarily to agriculture; and provides District telemetry devices where pumps are diesel-powered. By receiving electrical billing information or real-time telemetry, the District can unobtrusively gather essential water use monitoring data necessary for water supply planning, water demand projections and water resource modeling. The data collected as a result of these efforts now provides the District with a more accurate assessment of the actual water use of the major water users in the District. As further described below, the District has offered existing permittees the regulatory incentive to extend the duration of their WUP up to ten years in return for voluntarily entering this water use monitoring program.

Encourage Use of Alternative Water Supplies

2010 WSA Recommendation:

Encourage all new applicants for water use permits in excess of 500,000 gallons per day in the proposed Water Supply Planning Regions to use alternative sources of water if the sources are technically, economically, and environmentally feasible.

Update:

Section 373.019, F.S., defines "Alternative Water Supplies" as "salt water; brackish surface and groundwater; surface water captured predominately during wet-weather flows; sources made available through the addition of new storage capacity for surface or groundwater; water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reclaimed water; storm

water; and any other water supply source that is designated as nontraditional for a water supply planning region in the applicable regional water supply plan.”

Section 2.2 (Source Identification) of the District’s March 2014 WUP Applicant’s Handbook now requires applicants to consider the availability of the lowest quality water which is acceptable for the intended use. If a water source of lower quality is available and is environmentally, technologically, and economically feasible for all or a portion of an applicant’s proposed use, this lower quality water must be used. Such lower quality water may be in the form of reclaimed water, recycled irrigation return flow, stormwater, saline water, or other sources. Section 2.2.1 of the District’s March 2014 WUP Applicant’s Handbook (AWS Feasibility Determination) also requires WUP Applicants to evaluate the technical, economic, and environmental feasibility of using AWS to meet all or a portion of their needs.

2.1.3 Recovery and Prevention Strategies

Develop Coordinated Strategy with SJRWMD

2010 WSA Recommendation:

Develop recovery and prevention strategies in conjunction with the St. Johns River Water Management District for the proposed Water Supply Planning Regions that will implement enhanced levels of conservation, aquifer recharge projects, use of alternative sources, and reductions in groundwater withdrawals.

Update:

As provided above, in 2011, the District, SJRWMD, and the FDEP entered into an interagency agreement and formed a Partnership. The Partnership, subsequently amended in 2015, specifies the desire of all parties to coordinate and collaborate on a comprehensive and integrated approach to addressing identified water resource challenges. The District developed and implemented the Recovery Strategy for the Lower Santa Fe and Ichetucknee Rivers and priority springs, in collaboration with the SJRWMD, FDEP, and stakeholders. Implementation of projects highlighted in the recovery strategy is under way, and the NFRWSP identifies additional projects with regional benefits that have been approved by the governing boards of both the District and SJRWMD (District and SJRWMD, 2017). Cross-jurisdictional coordination, collaboration, and planning will continue as the NFRWSP is implemented.

Funding & Legislative Support – AWS and Water Conservation

2010 WSA Recommendation:

Pursue funding sources and legislative backing for the implementation of recovery and prevention strategies and for the development and study of alternative supply and water conservation options.

Update:

The Florida Legislature has provided both legislative and financial support to the District on these matters since publication of the 2010 WSA. In 2015, the Legislature provided support for

springs restoration projects to provide improved nutrient management and water conservation on agricultural operations; assist water conservation efforts in Lake City and Columbia County; and work with cooperators to become more water efficient and thereby reduce groundwater use and nutrient loading. Stormwater, water quality restoration, and reuse projects have also been developed and implemented in priority springshed basins to address groundwater declines and improve water quality. As of January 2017, the FDEP has awarded 29 springs grants totaling over \$45 million for projects to protect and restore springs. The 2016 Legacy Florida legislation has established dedicated funding from the Land Acquisition Trust Fund for springs protection, restoration, and management.

Collaborative efforts between the District and the FDEP have included additional springshed delineation and several spring restoration projects. Work to delineate springsheds was completed for the Cathedral/Falmouth, Lafayette Blue, Mearson/Troy/Little River, and Peacock systems. Restoration projects include an expansion of the Middle Suwannee River and Springs Restoration and Recharge Project. This project is intended to benefit a number of springs along the Middle Suwannee River. Another restoration project, completed in 2016, converted Lake City's wastewater sprayfield into a constructed wetland to reduce nitrogen loading in the Ichetucknee Trace. The District has also implemented water conservation retrofit programs, agricultural conservation, residential conservation, enhanced regulatory strategies and community assistance to further its efforts.

2.2 MINIMUM FLOWS AND MINIMUM LEVELS

2.2.1 Expeditiously Establish MFLs

2010 WSA Recommendation:

The importance of establishing minimum flows and minimum levels (MFLs) for all the District priority water resources as expeditiously as possible cannot be overemphasized. The District should investigate every avenue to secure the necessary funding to complete the required data collection, analysis, peer review, and establishment.

Update:

In June 2013, the District requested that the FDEP adopt proposed MFLs for the Lower Santa Fe and Ichetucknee Rivers and associated priority springs (District, 2013). The District also determined that a recovery strategy was required. The MFLs for the Lower Santa Fe and Ichetucknee Rivers and associated priority springs were adopted by the FDEP at the request of the District's Governing Board, due to the potential for impacts from groundwater withdrawals beyond the District's jurisdictional boundaries.

The FDEP's MFL rule is codified in Rule 62-42, F.A.C. This rule sets forth the FDEP's adopted MFLs and the associated regulatory provisions of related recovery/prevention strategy as provided in Section 373.0421, F.S. Through Rule 62-42, F.A.C., the FDEP also adopted and incorporated by reference Section 6.0, entitled "Supplemental Regulatory Measures" (Supplemental Measures). The FDEP's MFL rule became effective on June 10, 2015. These

Supplemental Measures are a component of the overall recovery strategy for the Lower Santa Fe and Ichetucknee Rivers and associated priority springs MFLs. The rules are applicable within the boundaries of the District and that portion of the Partnership within the SJRWMD. On June 13, 2017, the District also requested the FDEP adopt the Middle and Upper Suwannee Rivers and Priority Springs Minimum Flows and Minimum Water Levels. On June 30, 2017, the FDEP filed a Notice of Rule Development which will address the MFLs for the upper and middle reaches of the Suwannee River, and their associated priority springs, including four Outstanding Florida Springs.

The District has also adopted MFLs under Rule 40B-8, F.A.C. for Madison Blue Spring; the Lower Suwannee River, Little Fanning Spring, Fanning Spring and Manatee Spring; Waccasassa River and Levy Blue Spring; Upper Santa Fe River; Aucilla River and Nutall Rise; Wacissa River and Wacissa River priority springs; and the Econfina River. On June 13, 2017, the District adopted emergency rule 40BER 17-01, F.A.C., setting MFLs for four Outstanding Florida Springs (Falmouth Spring, Lafayette Blue Spring, Peacock Springs, and Troy Spring). Efforts to adopt other MFLs remain ongoing and are included in the District's annual MFL Priority List.

2.2.2 MFL Tools/Methodologies

2010 WSA Recommendation:

Develop and refine tools and methodologies to implement minimum flow and levels. This will make them easier to establish, peer review, and defend.

Update:

The District has made progress in developing and refining its MFLs establishment tools and methodologies since publication of the 2010 WSA. Establishment of MFLs per the District's priority list is ongoing. Since the 2010 WSA, MFLs were set on the Lower Santa Fe River and associated priority springs, the Aucilla and Wacissa Rivers and associated priority springs, and the Econfina River. The District has coordinated with the FDEP, SJRWMD, and area stakeholders to develop tools to evaluate priority water bodies. Methodologies have been developed to allow the District to effectively address the establishment and application of MFLs to priority water bodies that are potentially affected by withdrawals from an adjacent WMD (i.e., cross-boundary effects).

2.3 DATA COLLECTION

2.3.1 Establish Enhanced District Monitoring Network

2010 WSA Recommendation:

Staff should recommend changes to the monitoring network following a comprehensive audit of the District's existing monitoring networks. Use various statistical methods to optimize the locations of data collection sites and frequency of collection for rivers, groundwater, springs, lakes, wetlands,

and rainfall throughout the District to gain a better understanding of hydrologic trends and to gauge whether minimum flows and minimum levels and interim flow constraints are being met.

Update:

The District has made significant efforts to upgrade its water monitoring network and has added a number of new stations including groundwater, surface water, and rainfall stations. The District has worked to modernize its data collection techniques and is now employing telemetry technology to provide real-time data access from over 90% of District monitoring stations. The total number of hydrologic stations on the District telemetry network is currently 288 (203 groundwater wells, 45 surface water stations, and 40 rain gauges). This total excludes approximately 40 primarily surface water level monitoring stations maintained by the United States Geological Survey (USGS) on major rivers throughout the District. Telemeterization improves staff efficiency by reducing the number of trips needed to travel to monitoring stations to physically collect the data.

In addition to the network improvements outlined, District staff recommended to the District's Governing Board that a Monitor Well Network Improvement Plan be implemented in order to close identified data "gaps". The program is ongoing and envisions well construction and development at up to twenty-five locations for purposes of monitoring water levels. The improved network will include approximately 25 UFA, 9 intermediate aquifer system (IAS), and 16 surficial aquifer system (SAS) wells.

2.3.2 Partnership with the State of Georgia

2010 WSA Recommendation:

Develop a monitoring partnership with the State of Georgia for ground- and surface water data collection and sharing.

Update:

The District has made efforts to coordinate with the State of Georgia, however multi-state water supply planning remains a challenge. The District is continuing efforts to analyze and manage regional water resources.

2.4 MODELING

2.4.1 North Florida Model

Continued Use of North Florida Model

2010 WSA Recommendation:

Continue to use the North Florida Model, Mega Model and Northeast Florida Model to refine the understanding of the magnitude of existing and projected impacts to water resources in the Upper and Lower Santa Fe River and springs, White Sulfur Springs, Ichetucknee Springs, and the Upper Suwannee, Alapaha, and Withlacoochee Rivers. In addition, use the models to apportion the

degree of impact to water resources from groundwater withdrawals in the District, the St. Johns River Water Management District, and the State of Georgia.

Update:

The District has continued to use, develop, and improve regional groundwater flow models. The North Florida Model, version 1.0 was used until completion of the North Florida Model, version 2.0, which was completed in 2014. The North Florida Model, version 2.0 is used by the District in its WUP regulatory program to assess impacts of proposed withdrawals and for other impact assessment evaluations. Development of a regional groundwater flow model that can be used to understand the degree of impacts from groundwater withdrawals in the District, SJRWMD, and the state of Georgia is described in Section 2.4.3.

Update North Florida Model

2010 WSA Recommendation:

Update the calibration of the North Florida Model to reflect average hydrologic conditions. The model is currently calibrated to a drought condition. Continue to pursue other modifications that will allow the model to mesh more seamlessly with the St. Johns River Water Management District's North East Florida model.

Update:

The District completed an update to the North Florida Model in 2014. The updated model is referred to as the North Florida Model, version 2.0, and is calibrated to a condition that more closely approximates average hydrologic conditions. This model is used by the District in its WUP regulatory program to assess impacts of proposed withdrawals and for other impact assessment evaluations. The WSA uses NFSEG version 1.0, described in Section 2.4.3, to assess regional groundwater availability.

2.4.2 Investigate Southern Georgia Models

2010 WSA Recommendation:

Investigate any existing or planned modeling efforts in the southern third of Georgia.

Update:

Since completion of the 2010 WSA, the District has conducted investigations on modeling efforts in the southern third of Georgia and developed a new model referred to as the NFSEG as a part of an open and collaborative process. Version 1.0 of the NFSEG has been released for use in water supply planning and peer review is ongoing for Version 1.1. The NFSEG model domain improves the ability to estimate impacts of consumptive use of groundwater occurring outside the District's boundaries. The NFSEG is described further in Section 2.4.3.

2.4.3 Develop North Florida Southeast Georgia Regional Groundwater Flow Model

2010 WSA Recommendation:

Coordinate with the St. Johns River Water Management District, the State of Georgia, the US Geological Survey and other agencies to begin a process to develop a groundwater flow model with an area that would encompass the entire north Florida/South Georgia Region that may contribute to water resource impacts in the District.

Update:

A key element of the Partnership is the development of the NFSEG. The purpose of the NFSEG is to provide a tool that allows for consistency in planning and permitting decisions between the District and the SJRWMD. The District and the SJRWMD have been proactive in seeking stakeholder input throughout the development of the NFSEG, and in providing updates to the State of Georgia on model development. Development of the NFSEG has been guided by a Technical Team (to provide feedback on model development and calibration) and a Steering Committee (to provide guidance and oversight to the Technical Team).

The District and the SJRWMD established a work plan for development of the NFSEG. The work plan envisioned the NFSEG serving at least two primary functions: 1) enable the assessment of regional-scale cones of depression that result from the cumulative effect of the individual withdrawals that comprise regional pumping centers; and 2) provide a regional framework for the development and application of sub-regional models to be used in the assessment of areas of special interest within the NFSEG domain.

The NFSEG domain represents approximately 60,000 square miles and is larger than previous models used to assess groundwater withdrawal impacts in the District and the SJRWMD areas. The NFSEG includes water use estimates from four of Florida's WMDs, southeast Georgia, and part of South Carolina. Version 1.0 of the NFSEG was used to provide a regional-scale assessment of the impact of cumulative withdrawals in the NFRWSP and this WSA, and to estimate the benefits of water resource development projects included in the NFRWSP. The NFSEG will continue to be improved to meet upcoming water supply planning needs.

2.5 COORDINATION AND OUTREACH

2.5.1 Intrastate and Interstate Coordination/Cooperation

2010 WSA Recommendation:

Work with State of Georgia, the St. Johns River Water Management District, the US Geological Survey, and other agencies to develop a strategy for data collection, data analysis and groundwater modeling to better define current and future regional water resource impacts. Coordinate with the State of Georgia and the St. Johns River Water Management District to produce periodic, regional potentiometric maps to develop a more complete understanding of long-term aquifer trends in North Florida.

Update:

The District has closely coordinated with the SJRWMD, the FDEP, the Florida Department of Agriculture and Consumer Science (FDACS), and others as part of the Partnership. These agencies collaborated to complete the NFRWSP (District and SJRWMD, 2017), however multi-state water supply planning remains a challenge. The Florida Geological Survey (FGS) maintains current and historical potentiometric surface maps for the state, and coordinates the generation of statewide potentiometric maps. The FGS updates potentiometric surface maps twice per year.

2.5.2 Cross-Boundary WUP Coordination

2010 WSA Recommendation:

Coordinate the review of water use permits in the boundary regions of adjacent water management districts and the State of Georgia to ensure consistency in requirements, restrictions, and special conditions.

Update:

The WMDs in Florida continue to coordinate on the review of WUP/CUPs that have the potential to cause cross-boundary impacts. Coordination responsibilities are codified in interagency agreements for each WUP/CUP. Ensuring consistency in permitting in the state is an ongoing effort. Quarterly meetings, led by the FDEP, are held to ensure ongoing consistency in permitting. Going forward, the NFSEG will provide a model that spans the WMDs to evaluate WUP/CUPs using a unified model. Consistency in permitting across state lines remains a challenge. The District is continuing efforts to analyze and manage regional water resources.

2.5.3 Enhanced Outreach

Outreach/Education**2010 WSA Recommendation:**

Enhance outreach programs to educate stakeholders, elected officials, and individuals on water supply issues.

Update:

The District's outreach and education efforts have been greatly enhanced as recommended. Outreach activities have included:

- The formation of a Stakeholder Advisory Committee to educate and solicit stakeholder input on water supply planning and the components of the NFRWSP
- Revitalizing the Suwannee River Partnership to promote implementation of Best Management Practices (BMPs) that protect water quantity and quality in the Suwannee River Basin
- Soliciting public input to update and implement Surface Water Improvement and Management Plans for the Suwannee Basin and the Coastal Rivers Basin
- Project showcase forums, including the Fanning Springs Forum, to highlight ongoing projects in the District
- Stakeholder/Educational Tours to highlight District resources, projects, and challenges

- Participation in the Ichetucknee Partnership which promotes the environmental and economic well-being of the Ichetucknee Springshed through locally-led, voluntary, incentive-based programs
- Coordination of agricultural BMPs in collaboration with FDACS
- Targeted public outreach via social media
- Cooperative funding assistance to local stakeholders via the Regional Initiative Valuing Environmental Resources (RIVER) Program, Agricultural Cost-Share Program, and State Springs Grant Program
- Participation in various community forums including the North Central Florida Regional Planning Council, the Rural Economic Development Initiative, the Springs Forum, and the North Central Florida Regional Economic Development Partnership to keep communities informed of water supply programs, initiatives, and opportunities
- Facilitation of presentations and guest speaking for local governments and community organizations
- Provision of model landscape irrigation ordinances to local municipalities to encourage consistent conservation practices

Public Input

2010 WSA Recommendation:

Continue to seek input on all aspects of the water supply assessment and planning process from affected parties throughout the District.

Update:

Public input has been and continues to be sought in a variety of forums. To this end, the District, in cooperation with the SJRWMD, created the Stakeholder Advisory Committee (SAC) for the Partnership to facilitate the development of the NFRWSP (2015-2035). This committee was made up of representatives from six stakeholder groups throughout north Florida, including water utilities, local governments, environmental groups, agriculture, commercial/industrial, and mining. The SAC provided a key forum for input to the NFRWSP process and guidance on the development of the Lower Santa Fe Basin Recovery Strategy. An additional example of the degree to which the District has conducted its efforts in an open public process, includes the creation of a Stakeholder Steering Committee to provide guidance and oversight to the Technical Team that is developing the NFSEG.

2.6 WATER SUPPLY PLANNING, DEVELOPMENT AND CONSERVATION

2.6.1 Improve Data Collection and Reporting for Improvement in Projection Methodologies

2010 WSA Recommendation:

Continue to work with the major users in each water use category to identify, improve, and modify water use data collection and reporting methods that will refine and enhance demand projection methodologies.

Update:

As provided above, District WUP rules now require monitoring and reporting of ground and surface water withdrawals for all large users pursuant to Subsection 373.223(6), F.S. Since 2012 the District's Governing Board has provided assistance to agricultural water users to implement this requirement and allow for convenient water use reporting. Data collected from agricultural monitoring wells is being provided to FDACS to improve estimates of current and future agricultural demands used in water supply planning.

2.6.2 Provide Incentives for Water Supply Regionalization

2010 WSA Recommendation:

Provide incentives to encourage local governments and water suppliers to coordinate water supply projects to facilitate a regional approach to water supply development.

Update:

The District encourages and supports a regional approach to water supply development. The eastern portion of the District is included in the NFRWSP, which highlights project options which can be implemented to meet the current and future water supply demands for the District (District and SJRWMD, 2017).

Regional water supply authorities serve as important partnerships for providing safe and reliable water supplies while sustaining water and associated natural resources. A feasibility study regarding the Nature Coast Regional Water Authority (NCRWA) was completed in October 2010. The NCRWA is a governmental entity that formed in 2009 through an interlocal agreement between Dixie County, Gilchrist County, the Town of Bell, and the City of Fanning Springs. It is an independent special district created pursuant to Section 163.01, F.S., to provide water, wastewater, and reclaimed water services. The NCRWA is a prime example of a community partnership that collaborates to address regional water supply issues. The District has worked with the NCRWA to acquire wellfield protection areas to ensure a high-quality water supply source that will remain viable for existing citizens and for future generations. Construction of a water distribution line from the City of Fanning Springs to Old Town was completed in early 2017.

2.6.3 Investigate Viability of the Lower Floridan Aquifer

2010 WSA Recommendation:

Encourage the exploration and use of the Lower Floridan aquifer for large industrial water users and thermo-electric power generation.

Update:

Within the District, the LFA is present only where a MCU separates the more permeable UFA from the LFA. The location and extent of the MCU is generally poorly defined, as is the presence of the LFA. Given the variability of confinement in the MCU and the productivity of the UFA, projects accessing the LFA will need to demonstrate that consumptive use of the LFA will not impact UFA water supplies. Because the MCU is not continuous, withdrawals from the LFA are likely to contribute to drawdown in the UFA. Use of the LFA in this District is currently considered infeasible due to relatively ineffective confinement between the LFA and UFA, the likelihood that such withdrawals would contribute to drawdown in the UFA, and the lower quality of LFA groundwater.

2.6.4 Enhanced Use of Reclaimed Water

2010 WSA Recommendation:

Encourage the beneficial and efficient use of all reclaimed water resources in the District.

Update:

The District encourages and supports beneficial use of reclaimed water to meet non-potable water demands wherever it is feasible to do so. In response to requirements of Senate Bill 536 (SB 536), which passed in Florida's 2014 Legislative Session, the District recently participated in the development of a statewide study in conjunction with the FDEP Office of Water Policy entitled "Report on Expansion of Beneficial Use of Reclaimed Water, Stormwater, and Excess Surface Water (Senate Bill 536)" (FDEP, 2015). As a rural area, the District's domestic wastewater infrastructure is relatively small in scale, and is made up of small local utilities, the majority of which dispose of their treated effluent via land application using sprayfields. Municipal wastewater supplies in the District are small in comparison to overall water use in the District. For 2015, municipal wastewater flows were estimated to be approximately 11 million gallons per day (mgd), while total groundwater demand was projected to be 234 mgd. Nonetheless, improvements in wastewater disposal methods and the expansion of reclaimed water availability provides opportunities for AWS and improved nutrient management in sensitive recharge areas. Additionally, on a regional level, expansion of the beneficial use of reclaimed water in the large urban centers outside of the District could have significant regional benefits to water supply and natural systems in the District.

Although opportunities for large, regional reclaimed water and stormwater projects may be limited by the rural nature of the District, the expanded use of these alternative water sources represents a potential opportunity on a local level. The District, through its RIVER cost-share program has funded reclaimed water projects, including a project to connect the Suwannee County Golf Club to the City of Live Oak's public access reuse system. This project will allow

the golf club to utilize public access reuse water in lieu of withdrawing groundwater. The primary opportunity for the enhanced use of stormwater in the District is the hydrologic restoration of historically ditched and drained rural or natural areas for dispersed water storage, natural system enhancement and enhanced aquifer recharge. Agricultural tailwater recovery projects and local scale urban stormwater recharge projects in small communities provide opportunities for aquifer recharge, nutrient management and local flood mitigation.

2.6.5 Partner with Farmers to Enhance Agricultural Water Conservation

2010 WSA Recommendation:

Work through the Suwannee River and Ichetucknee Partnerships to enhance agricultural water conservation incentive and outreach efforts, such as the mobile irrigation lab program, to help farmers increase the efficiency of their water use.

Update:

The Suwannee River Partnership has been instrumental in implementing conservation partnerships with the agricultural community in the Suwannee River Basin. These projects include irrigation system retrofits, soil moisture sensors, remote access for irrigation system control, as well as other BMPs that provide cost-effective water savings. The Legislature and the FDEP have provided further assistance for agricultural cost-share programs as well. Through springs grant funding, the District has been awarded grants for agricultural cost-share programs for irrigation and nutrient management retrofits for agricultural and dairy operations. In 2016, the District was awarded two springs grants for the Sustainable Suwannee Pilot Program. This pilot program will provide incentives to agricultural operations within specific springsheds to transition to low input agriculture and land conservation practices and/or to implement advanced water quality improvement technologies. Most recently, the District has reinvigorated the Suwannee River Partnership to establish two advisory councils on environmental and agricultural issues, build consensus, and host roundtable discussions.

2.6.6 District Water Conservation Coordinator

2010 WSA Recommendation:

Designate a water conservation coordinator to enhance the District's efforts to develop and implement water conservation programs for all use categories.

Update:

Since the 2010 WSA, the District restructured its organization to create the Agriculture and Environmental Projects Division. This division dedicates five employees to partner with stakeholders for water conservation and other projects.

2.6.7 Water Conservation Plans for Large-Scale Users

2010 WSA Recommendation:

Require the major industrial, mining, and agricultural users in the proposed Water Supply Planning Regions to develop and implement comprehensive water conservation plans to maximize reductions in water use.

Update:

The District's March 2014 WUP Applicant's Handbook includes requirements for Water Conservation Plans for large scale users of all water use types. The elements of water conservation plans are outlined in Section 2.3 of the handbook for respective users.

2.6.8 Crop Protection

2010 WSA Recommendation:

Develop a method to assess freeze protection quantities prior to the 2015 Water Supply Assessment. Develop a set of Best Management Practices for the frost/freeze protection of various crops.

Update:

The District's March 2014 WUP Applicant's Handbook and associated procedures identify methods for calculation of frost/freeze protection quantities and for assessing impacts of withdrawals for this use. Currently, a separate allocation is provided for frost/freeze protection. According to Section 2.3.3.3. of the handbook, frost/freeze protection quantities shall be based on the irrigated acreage and the type of irrigation used. Permittees submit a separate accounting of withdrawals for this use to the District.

2.7 OTHER DISTRICT INITIATIVES AND ACCOMPLISHMENTS SINCE THE 2010 WATER SUPPLY ASSESSMENT

The following section provides additional information on other District initiatives and accomplishments.

2.7.1 Non-Agricultural Water Conservation

Through the RIVER cost-share program the District has contributed to 21 Non-Agricultural Water Conservation projects with an estimated conservation of 0.52 MGD.

The District also encourages implementation of urban conservation practices such as Florida-Friendly Landscaping™. The District has also partnered with the Florida Water StarSM and EPA's WaterSense® programs. The Florida Water StarSM program provides standards and guidelines for water efficiency in residential, business, and commercial buildings, as well as a certification program. The WaterSense® program provides simple ways for consumers to use

less water with water-efficient products, new homes and services, and also provides a guide to local, participating conservation cost-share programs.

Additionally, the District has implemented year-round lawn and landscaping irrigation efficiency measures. These measures apply to residential landscaping, public or commercial recreation areas, and businesses that are not regulated by a District WUP. The District has also strongly encouraged the adoption of the model year-round irrigation and water shortage ordinance, and has worked with local governments to implement this ordinance throughout the District. To date, 20 local governments throughout the District have adopted some form of the model ordinance.

2.7.2 Water Resource Development, Restoration, and Enhancement Projects

The District has 31 current and proposed WRD, restoration, and enhancement projects that are in various stages of development and implementation. These projects focus on enhancing the water resources of the District to ensure that sufficient quantities of water are available to meet current and future needs of both water users and natural systems.

Through the use of Reclaimed Water and Alternative Water supplies for irrigation and industry the District is reducing the groundwater withdrawal. Natural Systems restoration projects provide recharge to the Floridan Aquifer. A brief overview of some of the initiatives is provided below.

Middle Suwannee River and Springs Restoration and Aquifer Recharge

The Middle Suwannee River and Springs Restoration and Aquifer Recharge project will increase groundwater discharge to the Middle Suwannee River, and augment groundwater supplies in Lafayette and Dixie Counties, which also benefits springs and agricultural users. This project is made possible through funding from the state, Dixie County, and the District.

Lower Suwannee Drainage Basin Aquifer Recharge Project

The Lower Suwannee Drainage Basin Aquifer Recharge Project will rehydrate approximately 500 acres of sand ponds and approximately 1,250 acres of wetlands by re-establishing natural flow through natural recharge features and an aquifer recharge well. The project will conserve approximately 3.26 mgd of water, supporting water supply and spring flow of Fanning Springs and the Lower Suwannee River. The project is possible through funding from the state, Dixie County, and the District.

Cow Pond Drainage Basin Aquifer Recharge Project

The Cow Pond Drainage Basin Aquifer Recharge Project will re-establish natural drainage patterns by using natural recharge features and aquifer recharge wells to enhance aquifer recharge. The project will rehydrate wetlands and currently dry lakes in the Lower Suwannee

Drainage Basin, including approximately 300 acres of sand ponds and approximately 1,750 acres of wetlands, resulting in the conservation of approximately 1.69 mgd of water. The project is possible through funding from the state, Dixie County, and the District.

Eagle Lake/Upper Suwannee River Springs Enhancement

The Eagle Lake/Upper Suwannee River Springs Enhancement Project is an AWS project implemented by Nutrien (formerly PotashCorp) in Hamilton County, with the FDEP, and District support. The project has reduced Nutrien WUP permitted quantities by 20 mgd and will seasonally reduce withdrawals from the UFA, thereby benefitting spring flows and reduce the nutrient loading to the Upper Suwannee River. The project will facilitate the recovery of a portion of the water from Eagle Lake that would otherwise discharge into Swift Creek and the Upper Suwannee River. This reduction in flow from Eagle Lake will reduce total nutrient loading to the river between White Sulfur Springs and Ellaville. This project was completed in 2016.

Brooks Sink Aquifer Recharge

The Brooks Sink Aquifer Recharge Project, located in Bradford County, recharges the UFA by restoring a natural hydrologic connection to Brooks Sink. Brooks Sink is known as one of the largest cover collapse sinkholes in the state of Florida and is directly connected to the IAS, which overlies the UFA. This project was completed in early 2015. Total recharge from March 1, 2015 through October 31, 2017 has been calculated to be over 190 million gallons.

3.0 WATER DEMAND PROJECTIONS

The determination of “reasonably anticipated future water needs” is a fundamental requirement of the WSA. Future water needs are determined through development of water demand projections. Demand projections are then used to formulate an understanding of potential withdrawal impacts on water resources and environmental systems, and development of informed water management options for supplying all existing and future water needs in a sustainable manner. To accomplish this objective, it is necessary to develop detailed water demand projections for each major water use category and to locate them geospatially across the District.

3.1 DEMAND PROJECTIONS METHODOLOGIES

As part of the coordinated joint NFRWSP the District and the SJRWMD have developed a consistent methodology for projection of water demands for all water use type categories for the 20-year planning period (2015 - 2035). A detailed description of the methodology and resulting projections can be found in Appendix B of the NFRWSP (District and SJRWMD, 2017). Agricultural water demand projections for the District were also developed by FDACS and were considered by the District and SJRWMD in the development of the agricultural water demand projections presented herein. The 2010 baseline water use and projected water demands for 2015 - 2035 (expressed as annual average values) and geospatial demand locations used in this WSA have been estimated for the following water use type categories:

1. Public Supply
2. Domestic Self-Supply and Small Public Supply Systems
3. Agriculture
4. Commercial/Industrial/Institutional and Mining Dewatering
5. Power Generation
6. Landscape/Recreational/Aesthetic

As required by Rule 62-40.531(1)(a), F.A.C., projections were calculated in five-year intervals for the years 2015, 2020, 2025, 2030 and 2035. The starting point or “baseline year” for the NFRWSP is Calendar Year 2010. The data for the baseline year consists of reported and estimated water usage for 2010, whereas data for the years 2015 through 2035 are projected water demands (estimated needs). It is important to note that the water demand projections presented herein assume maintenance of the current degree of water conservation and use of AWS sources (e.g., reclaimed water) through the year 2035. If water conservation efforts and/or reclaimed water are increased, then traditional groundwater demands would be reduced accordingly. A 1-in-10-year drought water demand for 2035 was also calculated. This represents an event that would result in a specified increase in water demand of a magnitude that would have a 10 percent probability of occurring during any given year. Overall, it is estimated that water demand in 2035 could increase by an additional 8.5 percent in the District if a 1-in-10-year drought event occurred.

As part of the development of the joint NFRWSP, the District and the SJRWMD developed water demand projections for not only the counties to be included in the NFRWSP (Alachua, Baker, Bradford, Columbia, Gilchrist, Hamilton, Suwannee and Union in the District) but also for the remaining counties of the District and SJRWMD. Although a portion of Putnam County is included in this District, demand projections developed for this county in its entirety are incorporated into SJRWMD growth projections. These water demand projections were jointly developed by the District and SJRWMD with input from area stakeholders, therefore the District elected to utilize the Districtwide water demand projections developed for the NFRWSP for this WSA.

The methodologies employed by the District and the SJRWMD for projection of population (for Public Supply and Domestic Self-Supply categories) and water demands for the NFRWSP utilized a number of pertinent data sources including:

1. Water use and population estimates reported by utilities collected by the FDEP, commonly referred to as “Monthly Operating Reports” (MORs).
2. Water use estimates reported by utilities collected by the SJRWMD through the SJRWMD Water Use/Pumpage Report Form (aka EN-50 form).
3. The SJRWMD annual water use inventory data, commonly called “Annual Water Use Survey Data” (SJRWMD, 2007-2014).
4. Water use, population, permitted quantities and percentages of use reported in District Water Use Permits (WUPs) and SJRWMD Consumptive Use Permits (CUPs).
5. The SJRWMD’s Public Supply Permittee Historic Database, which contains historic population, water use and gross per capita rates for all SJRWMD public supply permittees.
6. The University of Florida's Bureau of Economic and Business Research (BEBR) publications (Smith 2007-2010, 2011a, 2011b, 2012-2015a, 2015b).
7. The United States Geological Survey (USGS) water use estimates (Marella 2009, 2014).
8. The FDEP Annual Reuse Inventory Reports (FDEP 2011, 2016).
9. Ten-Year Site Plans collected by the Public Service Commission (PSC).
10. The Agricultural Acreage and Water Demand Projections Tool, Florida Statewide Agricultural Irrigation Demand (FSAID2, FDACS, 2015).

Uncertainty in Projected Future Demand Quantities and Geospatial Locations

As required by Subsection 373.709(2)(a), F.S., the District and the SJRWMD have undertaken extensive efforts to project future demands as accurately as possible for the 2015 - 2035 planning period. The District and SJRWMD are confident that these projections represent the best available information. However, projection of future water demands inherently includes a degree of uncertainty in relation to the quantities projected and their geospatial location. The water demand projections contained herein were utilized in the NFSEG assessment of potential impacts for the 2015 - 2035 planning period. These impact assessments were then considered in relation to the sufficiency of traditional groundwater to meet the projected water demands in a sustainable manner.

The degree of confidence in water demand projection quantities and locations is generally higher for the earlier years and decreases for the latter years of a 20-year planning period. In general, the farther into the future a prediction is made, the greater the degree of uncertainty that the projected water demands and/or their predicted geospatial location will actually occur. Therefore, these inherent uncertainties should be kept in mind when making decisions related to water supply planning, regulatory actions, and investment in AWS projects.

3.2 PUBLIC SUPPLY DEMANDS

The Public Supply (PS) category includes all large municipal, public, and private systems that supply potable water to the public from a central water supply system for the purpose of human consumption and other uses and have average annual permitted quantities of 0.1 mgd or more. To provide consistency with demand reporting for the NFRWSP, public suppliers with average annual permitted quantities less than 0.1 mgd are included in the Domestic Self Supply (DSS) category. Public Supply water demand is typically calculated using two variables: 1) Served Population; and 2) the Per Capita Water Use Rate. These parameters are discussed further below.

3.2.1 Population Projections

Subsection 373.709(2)(a)1a, F.S. and Rule 62-40.531(1)(c), F.A.C. pertain to WMDs regional water supply planning requirements, and require that medium population growth projections developed by the University of Florida's Bureau of Economic and Business Research (BEBR) be considered as part of the population projections for regional water supply plans. The population projections developed by BEBR are generally accepted as the standard throughout Florida.

Since BEBR projects populations at the county level only, the WMDs must distribute the county-level projections among Public Supply systems within each county as appropriate. The projection methodology employed for this WSA is commonly referred to as a "percent-share" method. For example, if a utility serves 10 percent of the county population in 2010, then it is assumed that this utility will continue to serve 10 percent of that county population in 2035.

While the percent-share method does not take into account varying growth rates, it is generally accepted as a valid method for regional planning purposes. For this WSA the District and SJRWMD also estimated a “build-out” population, or the maximum population within a public water utility service area boundary, for each Public Supply system using current land use and zoning/parcel layers.

Using BEBR’s estimates of population by county (Smith 2011a), a percent of 2010 county population for each PS system was calculated. These respective percentages were then used to calculate future population projections for the years 2015, 2020, 2025, 2030, and 2035 for each PS system. Estimated 2010 population and projected population for 2015, 2020, 2025, 2030 and 2035 by service area are shown in Table 3-1. As shown therein, total population served by PS systems in the District is projected to grow from 89,892 in 2010 to 104,751 in 2035, an increase of 14,859 persons (16.5%).

A minority portion of GRU’s service area provides water to persons located in the District. However, the vast majority of GRU withdrawals and population served are and will continue to be located outside the District during the 2015 - 2035 planning period. Since the NFRWSP was a joint regional effort that includes both the District and SJRWMD, GRU-served populations were accounted for in the SJRWMD. Groundwater modeling and impact evaluations conducted as part of this WSA are regional in nature and take into account GRU withdrawals, as well as all other withdrawals within the model domain.

Table 3-1. Public Supply Service Area Population Projections for suppliers permitted greater than 0.10 mgd

		CURRENT	PLANNING PERIOD PROJECTIONS						
		2010	2015	2020	2025	2030	2035	Change	Percent Change
Alachua	City of Alachua	9,059	9,273	9,727	10,156	10,559	10,954	1,895	20.9%
Alachua	City of Newberry	4,950	5,067	5,315	5,550	5,770	5,986	1,036	20.9%
Alachua	City of Archer	1,118	1,146	1,202	1,255	1,305	1,354	236	21.1%
Alachua	City of High Springs	5,350	5,476	5,744	5,997	6,235	6,469	1,119	20.9%
Alachua	City of Waldo	1,015	1,039	1,090	1,138	1,183	1,228	213	21.0%
Bradford	City of Lawtey	730	706	727	747	765	781	51	7.0%
Bradford	City of Starke	5,449	5,272	5,425	5,578	5,712	5,827	378	6.9%
Columbia	City of Lake City	21,242	21,519	22,651	23,752	24,728	25,546	4,304	20.3%
Columbia	Columbia County Board of Commissioners	0	0	0	0	0	0	0	N/A
Columbia	Clayton Smith Wells	0	0	0	0	0	0	0	N/A
Columbia	Melton Bishop Wells	0	0	0	0	0	0	0	N/A
Dixie	Town of Horseshoe Beach	169	171	180	190	198	205	36	21.3%
Dixie	Town of Cross City	1,728	1,746	1,841	1,936	2,020	2,093	365	21.1%
Dixie	Town of Suwannee	920	930	980	1,030	1,075	1,114	194	21.1%
Gilchrist	City of Trenton	1,999	1,999	1,999	1,999	1,999	1,999	0	0.0%
Hamilton	City of Jasper	2,936	2,897	2,976	3,075	3,155	3,214	278	9.5%
Hamilton	Hamilton County Water Facilities	50	50	51	53	54	55	5	10.0%
Hamilton	Town of White Springs	777	767	788	814	835	851	74	9.5%
Hamilton	Town of Jennings	878	866	890	919	943	961	83	9.5%
Jefferson	Jefferson Communities Water System Inc.	0	0	0	0	0	0	0	N/A
Lafayette	Town of Mayo	1,237	1,214	1,264	1,264	1,264	1,264	27	2.2%
Levy	City of Fanning Springs	764	764	806	847	882	912	148	19.4%
Levy	Cedar Key SP Water & Sewer District	702	702	740	778	811	838	136	19.4%
Levy	City of Chiefland	2,245	2,245	2,366	2,487	2,591	2,680	435	19.4%
Levy	Town of Bronson	1,113	1,113	1,173	1,233	1,285	1,329	216	19.4%
Madison	Town of Lee	352	353	357	361	361	362	10	2.8%
Madison	City of Madison	2,843	2,854	2,884	2,914	2,914	2,928	85	3.0%
Madison	Town of Greenville	843	847	856	865	865	869	26	3.1%
Madison	Cherry Lake Utilities Corporation Inc.	620	623	630	636	636	640	20	3.2%
Suwannee	City of Live Oak	6,850	7,371	7,800	8,196	8,575	8,921	2,071	30.2%
Suwannee	Wellborn	466	466	466	466	466	466	0	0.0%
Suwannee	Town of Branford	712	764	809	850	889	910	198	27.8%
Taylor/Dixie	Big Bend Water Authority	3,202	3,264	3,349	3,420	3,505	3,576	374	11.7%
Taylor	Taylor Coastal	659	659	659	659	659	659	0	0.0%
Taylor	City of Perry	7,017	7,151	7,337	7,493	7,679	7,835	818	11.7%
Union	City of Lake Butler	1,897	1,925	1,925	1,925	1,925	1,925	28	1.5%
PUBLIC SUPPLY		89,892	91,239	95,007	98,583	101,843	104,751	14,859	16.5%

3.2.2 Per Capita Water Use Rate

The “per capita water use rate” is the factor applied to projected population served by each public supply utility in order to project water demand. For public supply systems, the gross per capita (gpcd) rate is defined as the total water use (including residential and non-residential uses) for each individual permittee divided by its’ respective residential population served, and is reported in gallons for each person served by the public supplier.

Per capita use rates during a particular time period are affected by several factors that must be taken into account. For example, a downturn in economic conditions, seasonal variations in population, and variation in annual climatic conditions can all contribute to year-to-year variation in per capita use rates. The use of a five-year average per capita can serve to attenuate such variations and help account for variability due to these factors.

As part of the state’s CUP consistency effort (aka “CUPCON”), the state’s five WMDs and the FDEP reached consensus that the basis for Public Supply water use projections in planning and permitting should include the use of five-year average gross per capita rates. The water demand projections presented herein were based on the most recent five-year average gpcd rate (at the time the projections were developed). For the NFRWSP (District and SJRWMD, 2017) and this WSA, the five-year average gpcd was calculated based upon 2010 - 2014 data. The District and SJRWMD calculated five-year average gpcd for each individual PS and small public supply system (Table 3-2).

3.2.3 Public Supply Demand Projections

Estimated 2010 PS water use and projected water demands (in mgd) for 2015, 2020, 2025, 2030 and 2035 by public supply service area and by county are shown in Tables 3-2 and 3-3, respectively. Public Supply water demands within the District are projected to increase from 14.47 mgd in 2010 to 16.28 mgd in 2035 (increase of 12.5%) over the planning period.

Table 3-2. Public Supply Demand Projections (mgd) by Service Area for suppliers permitted greater than 0.10 mgd

County	Utility	2010-2014 Average Gross Per Capita	WATER USE / DEMAND							
			Historic	PLANNING PERIOD PROJECTIONS					Planning Period Change	Percent Change
				2010	2015	2020	2025	2030		
Alachua	City of Alachua	133	1.37	1.23	1.29	1.35	1.40	1.46	0.09	6.6%
Alachua	City of Newberry	96	0.48	0.49	0.51	0.53	0.55	0.57	0.09	18.8%
Alachua	City of Archer	90	0.11	0.10	0.11	0.11	0.12	0.12	0.01	9.1%
Alachua	City of High Springs Water Plant	76	0.42	0.42	0.44	0.46	0.47	0.49	0.07	16.7%
Alachua	City of Waldo	70	0.08	0.07	0.08	0.08	0.08	0.09	0.01	12.5%
Bradford	City of Lawtey	250	0.19	0.18	0.18	0.19	0.19	0.20	0.01	5.3%
Bradford	City of Starke	140	0.81	0.74	0.76	0.78	0.80	0.82	0.01	1.2%
Columbia	City of Lake City	162	3.48	3.49	3.67	3.85	4.01	4.14	0.66	19.0%
Columbia	Columbia County Board of Commissioners	156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Columbia	Clayton Smith Wells	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Columbia	Melton Bishop Wells	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Dixie	Town of Horseshoe Beach	243	0.04	0.04	0.04	0.05	0.05	0.05	0.01	25.0%
Dixie	Town of Cross City	283	0.53	0.49	0.52	0.55	0.57	0.59	0.06	11.3%
Dixie	Town of Suwannee	87	0.10	0.08	0.09	0.09	0.09	0.10	0.00	0.0%
Gilchrist	City of Trenton Water Treatment Plant	117	0.23	0.23	0.23	0.23	0.23	0.23	0.00	0.0%
Hamilton	City of Jasper	222	0.66	0.64	0.66	0.68	0.70	0.71	0.05	7.6%
Hamilton	Hamilton County Water Facilities	902	0.01	0.05	0.05	0.05	0.05	0.05	0.04	400.0%
Hamilton	Town of White Springs	73	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.0%
Hamilton	Town of Jennings	160	0.13	0.14	0.14	0.15	0.15	0.15	0.02	15.4%
Jefferson	Jefferson Communities Water System Inc.	156	0.02	0.00	0.00	0.00	0.00	0.00	-0.02	-100.0%
Lafayette	Town of Mayo	133	0.17	0.16	0.17	0.17	0.17	0.17	0.00	0.0%
Levy	City of Fanning Springs	130	0.11	0.10	0.10	0.11	0.11	0.12	0.01	9.1%
Levy	Cedar Key SP Water & Sewer District	189	0.13	0.13	0.14	0.15	0.15	0.16	0.03	23.1%
Levy	City of Chiefland	226	0.33	0.51	0.53	0.56	0.59	0.61	0.28	84.8%
Levy	Town of Bronson	131	0.16	0.15	0.15	0.16	0.17	0.17	0.01	6.3%
Madison	Town of Lee	194	0.07	0.07	0.07	0.07	0.07	0.07	0.00	0.0%
Madison	City of Madison	337	1.12	0.96	0.97	0.98	0.98	0.99	-0.13	-11.6%
Madison	Town of Greenville	140	0.12	0.12	0.12	0.12	0.12	0.12	0.00	0.0%
Madison	Cherry Lake Utilities Corporation Inc.	92	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.0%
Suwannee	City of Live Oak	159	0.94	1.17	1.24	1.30	1.36	1.42	0.48	51.1%
Suwannee	Wellborn	91	0.05	0.04	0.04	0.04	0.04	0.04	-0.01	-20.0%
Suwannee	Town of Branford	118	0.10	0.09	0.10	0.10	0.10	0.11	0.01	10.0%
Taylor	Big Bend Water Authority	102	0.30	0.33	0.34	0.35	0.36	0.36	0.06	20.0%
Taylor	Taylor Coastal	71	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.0%
Taylor	City of Perry	213	1.67	1.52	1.56	1.60	1.64	1.67	0.00	0.0%
Union	City of Lake Butler	169	0.37	0.33	0.33	0.33	0.33	0.33	-0.04	-10.8%
Public Supply		157	14.47	14.24	14.80	15.36	15.82	16.28	1.81	12.5%

¹ A minor portion of Gainesville Regional Utilities' (GRU) service area provides water to persons located in the District. However, the vast majority of GRU withdrawals and population served are and will continue to be located outside the District during the 2015 - 2035 planning period. Since the NFRWSP is a joint regional effort that included both the District and SJRWMD GRU-served populations were accounted for by SJRWMD.

Table 3-3. Public Supply Demand Projections by County (mgd)

County ¹	Water Use	PLANNING PERIOD PROJECTIONS							2035 1 in 10 Demand
	2010 (mgd)	2015 (mgd)	2020 (mgd)	2025 (mgd)	2030 (mgd)	2035 (mgd)	Planning Period Change	Percent Change	
Alachua	2.46	2.31	2.43	2.53	2.62	2.73	0.27	10.98%	2.90
Baker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	0.00
Bradford	1.00	0.92	0.94	0.97	0.99	1.02	0.02	2.00%	1.08
Columbia	3.48	3.49	3.67	3.85	4.01	4.14	0.66	18.97%	4.39
Dixie	0.67	0.61	0.65	0.69	0.71	0.74	0.07	10.45%	0.79
Gilchrist	0.23	0.23	0.23	0.23	0.23	0.23	0.00	0.00%	0.24
Hamilton	0.86	0.89	0.91	0.94	0.96	0.97	0.11	12.79%	1.02
Jefferson	0.02	0.00	0.00	0.00	0.00	0.00	-0.02	N/A	0.00
Lafayette	0.17	0.16	0.17	0.17	0.17	0.17	0.00	0.00%	0.18
Levy	0.73	0.89	0.92	0.98	1.02	1.06	0.33	45.21%	1.13
Madison	1.37	1.21	1.22	1.23	1.23	1.24	-0.13	-9.49%	1.31
Suwannee	1.09	1.3	1.38	1.44	1.5	1.57	0.48	44.04%	1.67
Taylor	2.02	1.90	1.95	2.00	2.05	2.08	0.06	2.97%	2.20
Union	0.37	0.33	0.33	0.33	0.33	0.33	-0.04	-10.81%	0.35
TOTAL	14.47	14.24	14.80	15.36	15.82	16.28	1.81	12.51%	17.26

¹Putnam county projections are wholly incorporated and reported in SJRWMD

3.3 DOMESTIC SELF-SUPPLY DEMANDS

The DSS category includes domestic water uses generally associated with residential dwellings that are not served by a central public supply utility and water usage from small public supply systems that have average annual permitted quantities of less than 0.1 mgd. In order to align demand projections in this WSA with the water demand projections presented in the NFRWSP, projections for small public suppliers were incorporated into the DSS category. Small public suppliers in the District include the City of Hampton, the Town of Brooker, the Town of Fort White, Fowlers Bluff Water Association, the Town of Otter Creek, the Town of Bell, and the Town of Worthington Springs.

3.3.1 Population Projections

The 2010 population for DSS was estimated for each county by comparing the total BEBR estimate of population by county (Smith, 2011a) and the estimated 2010 population served by PS systems. The 2010 DSS county estimate was compared and adjusted when necessary to coincide with the District's DSS parcel estimates. The total number of 2010 DSS parcels was

multiplied by the 2010 persons per household value from BEBR (Smith, 2011b) to verify the estimate of the 2010 DSS population.

Projected DSS population for 2015, 2020, 2025, 2030 and 2035 were estimated for each county using the BEBR medium-range population projections (Smith, 2015), by subtracting the estimated population for PS and small public supply systems within each county for these same years. The DSS and small public supply systems estimated population by county for 2010 - 2035 is shown in Table 3-4. As shown therein, total DSS population is projected to grow from 223,868 in 2010 to 265,374 in 2035, an increase of 41,506 persons (18.5%).

Table 3-4. Domestic Self-Supply Population Projections

County ¹	Population	PLANNING PERIOD PROJECTIONS						
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change
Alachua	21,891	22,410	23,508	24,542	25,516	26,471	4,580	20.9%
Baker	602	608	650	693	733	770	168	27.9%
Bradford	16,560	16,027	16,491	16,956	17,362	17,710	1,150	6.9%
Columbia	46,289	46,881	49,349	51,748	53,872	55,654	9,365	20.2%
Dixie	13,605	13,753	14,499	15,244	15,907	16,488	2,883	21.2%
Gilchrist	14,940	14,901	15,801	16,601	17,401	18,101	3,161	21.2%
Hamilton	10,158	10,020	10,295	10,639	10,913	11,119	961	9.5%
Jefferson	3,532	3,518	3,590	3,685	3,757	3,829	297	8.4%
Lafayette	7,633	7,486	7,936	8,336	8,736	9,136	1,503	19.7%
Levy	15,239	15,237	16,058	16,880	17,590	18,187	2,948	19.3%
Madison	14,566	14,623	14,773	14,924	14,924	15,001	435	3.0%
Suwannee	33,523	36,099	38,225	40,188	42,070	43,803	10,280	30.7%
Taylor	11,692	11,926	12,255	12,528	12,857	13,130	1,438	12.3%
Union	13,638	13,975	14,475	14,975	15,475	15,975	2,337	17.1%
TOTAL	223,868	227,464	237,905	247,939	257,113	265,374	41,506	18.5%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

3.3.2 Domestic Self-Supply Demands

As previously stated, estimates of DSS water use were jointly developed by the District and the SJRWMD for use in the NFRWSP. For the DSS water use category, the residential per capita rate (also referred to as household water use rate) is defined as the water use for solely residential purposes. As DSS water use is not metered, the estimated residential water use within PS systems was utilized to estimate per capita DSS water use. Once the residential DSS per capita water use was estimated for each county, this per capita water use can be applied to the total DSS population within each county to estimate total county-wide DSS water use.

In the development of the NFRWSP, DSS residential per capita rates were estimated for counties in both the District and the SJRWMD. For each SJRWMD PS and small public supply system, the total water use for each year (2010 - 2014) was multiplied by the percent of the total water use allocated to residential use, as authorized in the relevant consumptive use permits. The resulting total residential water use values for each SJRWMD PS and small public supply system were then summed to the county level and divided by the total public supply population served (at county level) to obtain the average 2010 - 2014 residential per capita value for each county. In the District, detailed information on the total water use allocated to solely residential use is not reported by PS WUP permittees. As such, the SJRWMD average 2010 - 2014 residential per capita value for Alachua, Baker and Bradford counties was used for the District portions of those respective counties and the SJRWMD total average 2010 - 2014 residential per capita value was used for the remaining District counties.

Estimated 2010 DSS water use and projected demands for 2015, 2020, 2025, 2030 and 2035 are shown in Table 3-5. DSS demands within the District are projected to increase from 19.13 mgd in 2010 to 24.41 mgd in 2035 (increase of 27.6 %) relative to the 2010 estimated water use.

Table 3-5. Domestic Self-Supply Demand Projections (mgd)

County ¹	Demand	PLANNING PERIOD PROJECTIONS							2035 1 in 10 Demand
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change	
Alachua	2.80	1.54	1.62	1.69	1.76	1.82	-0.98	-35.0%	1.93
Baker	0.04	0.07	0.07	0.08	0.08	0.09	0.05	125.0%	0.10
Bradford	1.70	1.38	1.43	1.47	1.50	1.53	-0.17	-10.0%	1.61
Columbia	3.72	4.48	4.72	4.95	5.16	5.32	1.6	43.0%	5.64
Dixie	0.98	1.31	1.38	1.45	1.51	1.57	0.59	60.2%	1.66
Gilchrist	1.29	1.42	1.50	1.58	1.65	1.72	0.43	33.3%	1.82
Hamilton	0.74	0.95	0.98	1.01	1.04	1.06	0.32	43.2%	1.12
Jefferson	0.37	0.33	0.34	0.35	0.36	0.36	-0.01	-2.7%	0.38
Lafayette	0.65	0.71	0.75	0.79	0.83	0.87	0.22	33.8%	0.92
Levy	1.03	1.43	1.50	1.58	1.65	1.71	0.68	66.0%	1.81
Madison	1.00	1.39	1.40	1.42	1.42	1.43	0.43	43.0%	1.52
Suwannee	2.74	3.43	3.63	3.82	4.00	4.16	1.42	51.8%	4.41
Taylor	0.91	1.14	1.17	1.20	1.23	1.25	0.34	37.4%	1.32
Union	1.16	1.33	1.38	1.42	1.47	1.52	0.36	31.0%	1.61
TOTAL	19.13	20.91	21.87	22.81	23.66	24.41	5.28	27.6%	25.85

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

3.4 AGRICULTURAL DEMANDS

The agricultural water use category includes the irrigation of crops, water used to raise livestock, and other miscellaneous water uses associated with agricultural production. These users typically obtain water from a dedicated, on-site well or surface water withdrawal and are not connected to a central utility. Irrigated acreage and projected water demands were determined for a variety of crop rotations as well as livestock water needs.

The FDACS is charged by Section 570.93, F.S., (FDACS; agricultural water conservation and agricultural water supply planning) with developing estimates of statewide agricultural water demand. These water demand projections are summarized in a document created by FDACS, commonly referred to as the “Florida Statewide Agricultural Irrigation Demands, version 2” or “FSAID2”. FDACS’ FSAID2 projection methodology is fully described in the document entitled “Florida Statewide Agricultural Irrigation Demand, Final Report” (FDACS, 2015). Based on the 2015 FSAID2 agricultural water demand projections, FDACS anticipates that a substantial increase in irrigated acreage and water demand is likely to occur within the District over the next twenty years as agricultural operations in the southern half of the state experience the impacts of urbanization and relocate northward. FDACS also anticipates that over time, agricultural water use per acre is likely to increase as irrigation is implemented on previously unirrigated agricultural lands, and agricultural practices become more intensive.

Subsection 373.709(2)(a)(1)(b), F.S., requires the District to consider FDACS’ agricultural water demand projections when developing RWSPs. The District and SJRWMD utilized the FSAID2 2015 - 2035 projections in their development of the NFRWSP agricultural water demand projections presented herein. The District and SJRWMD also utilized FDACS’ previous estimates of 2010 water use, in combination with agricultural water use monitoring data (i.e., actual use) collected by the District and SJRWMD to develop regional estimates of agricultural water use for the 2010 baseline year.

Estimated 2010 irrigated acreage and water use, and projected agricultural water demands for 2015, 2020, 2025, 2030 and 2035 are shown in Table 3-6 and 3-7. As of 2010, approximately 87,206 acres of irrigated agricultural lands existed within the District. Irrigated land acreage in the District is projected to increase by 86% to 162,104 irrigated acres by 2035. Agricultural irrigation demands within the District are projected to increase from an estimated 116.36 mgd in 2010 to 161.07 mgd in 2035, representing an increase of 38%.

Table 3-6. Estimated and Projected Agricultural Irrigated Acreage

County ¹	Estimated Acreage	PLANNING PERIOD PROJECTIONS						
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change
Alachua	8,951	12,588	13,205	13,840	14,176	14,491	5,540	61.9%
Baker	0	0	0	0	0	0	0	N/A
Bradford	716	1,030	1,064	1,064	1,064	1,064	348	48.6%
Columbia	3,778	5,010	8,081	10,831	13,577	16,479	12,701	336.2%
Dixie	3,115	6,745	6,275	5,245	4,454	3,958	843	27.1%
Gilchrist	8,235	13,378	13,877	14,140	14,535	14,947	6,712	81.5%
Hamilton	8,272	11,708	11,859	11,911	11,950	12,134	3,862	46.7%
Jefferson	1,802	2,327	2,559	2,604	2,717	2,832	1,030	57.2%
Lafayette	9,237	10,583	12,376	13,521	14,900	16,285	7,048	76.3%
Levy	6,829	10,136	10,416	11,125	12,055	13,617	6,788	99.4%
Madison	11,292	18,155	19,459	21,226	22,768	24,309	13,017	115.3%
Suwannee	23,629	30,657	32,126	35,345	37,714	40,092	16,463	69.7%
Taylor	144	398	739	767	864	969	825	572.9%
Union	1,206	1,242	1,166	1,050	990	927	-279	-23.1%
TOTAL	87,206	123,957	133,202	142,669	151,764	162,104	74,898	85.9%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table 3-7. Agricultural Demand Projections (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS							2035 1 in 10 Demand
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change	
Alachua	14.55	12.23	12.86	13.35	13.76	14.15	-0.4	-2.7%	16.22
Baker	0.00	0.01	0.01	0.01	0.01	0.01	0.01	N/A	0.01
Bradford	1.27	1.30	1.34	1.34	1.34	1.34	0.07	5.5%	1.51
Columbia	4.23	4.53	8.22	11.26	14.41	17.41	13.18	311.6%	19.96
Dixie	1.76	5.08	4.74	4.03	3.45	3.01	1.25	71.0%	3.45
Gilchrist	9.71	12.93	13.44	13.72	14.25	14.72	5.01	51.6%	16.60
Hamilton	11.56	10.57	10.66	10.74	11.03	11.35	-0.21	-1.8%	13.02
Jefferson	4.00	2.82	3.10	3.16	3.36	3.47	-0.53	-13.3%	3.98
Lafayette	9.86	11.39	13.54	14.68	16.29	17.70	7.84	79.5%	19.95
Levy	10.61	9.82	10.16	10.84	11.97	13.52	2.91	27.4%	15.50
Madison	17.35	15.29	16.86	18.67	20.56	22.25	4.9	28.2%	25.43
Suwannee	30.16	28.97	30.65	33.86	36.82	39.68	9.52	31.6%	45.25
Taylor	0.54	0.41	0.90	0.93	1.02	1.12	0.58	107.4%	1.27
Union	0.76	1.67	1.61	1.46	1.41	1.34	0.58	76.3%	1.54
TOTAL	116.36	117.02	128.09	138.05	149.68	161.07	44.71	38.4%	183.69

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

3.5 COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL DEMANDS

The Commercial, Industrial, and Institutional (C/I/I) category represents water use associated with the production of goods or provisions of services by C/I/I establishments. The C/I/I category also includes the use of water associated with mining and long-term dewatering operations. This category does not include entities whose water needs are met by PS systems.

3.5.1 Water Uses Included in Commercial/Industrial/Institutional Category

The water use types included within the C/I/I category include:

Commercial Uses

Commercial uses include general businesses, office complexes, commercial cooling and heating, food and beverage processing restaurants, gas stations, hotels, car washes, laundromats, beverage processing, and water used in zoos, theme parks, and other attractions.

Industrial Uses

Industrial uses include manufacturing and chemical processing plants and other industrial facilities; spraying water for dust control; maintenance, cleaning, and washing of structures and mobile equipment; and the washing of streets, driveways, sidewalks, and similar areas within such facilities.

Institutional Uses

Institutional uses include use at facilities such as hospitals, group home/assisted living facilities, churches, prisons, schools, universities, and military facilities not served by public water supply utilities.

Mining and Dewatering Uses

Mining uses include water associated with the extraction, transport, and processing of subsurface materials and minerals. Dewatering uses include the long-term removal of water to control surface or groundwater levels during construction or excavation activities.

3.5.2 Demand Projection Methodology

Demand for the C/I/I water use category was projected at the county level using a respective historic average gpcd. The county-specific average gpcd was calculated from average C/I/I category water use for 2010 - 2014, USGS data (Marella 2009, 2014), and BEBR estimates of county population for 2010 - 2014 (Smith 2011a, 2012-2015a). C/I/I category historic water use and water demand consists of only consumptive uses; recycled surface water and non-consumptive uses were removed. For the NFRWSP effort and this WSA, surface water use by mining operations represents five (5) percent of surface water use, to account for the loss of water in mining products and evaporation (Appendix B, NFRWSP, District and SJRWMD, 2017). The remaining surface water was assumed to be recirculated in the mining process and, therefore, is considered non-consumptive. "Non-consumptive use" is defined by the District and SJRWMD as any use of water that does not reduce the water supply from which it is withdrawn or diverted. The C/I/I category average gpcd was applied to the additional population projected by BEBR (Smith 2015) for each five-year increment and the associated water demand was added to the base year (2010) water use.

3.5.3 Commercial/Industrial/Institutional Demand Projections

Estimated 2010 C/I/I category water use and projected water demands for 2015, 2020, 2025, 2030 and 2035 are shown in Table 3-8. C/I/I water demands within the District are projected to increase from an estimated 73.21 mgd in 2010 to 80.99 mgd in 2035 (increase of 10.6%) over the planning period.

Table 3-8. Commercial, Industrial, and Institutional Demands (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS ²						
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change
Alachua	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.0%
Baker	0.21	0.21	0.22	0.24	0.25	0.26	0.05	23.8%
Bradford	1.07	1.04	1.07	1.10	1.13	1.15	0.08	7.5%
Columbia	0.30	0.30	0.31	0.32	0.33	0.34	0.04	13.3%
Dixie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Gilchrist	0.34	0.34	0.36	0.37	0.38	0.39	0.05	14.7%
Hamilton	25.82	25.52	26.13	26.90	27.51	27.97	2.15	8.3%
Jefferson	2.14	2.13	2.17	2.23	2.27	2.31	0.17	7.9%
Lafayette	0.27	0.27	0.28	0.29	0.30	0.31	0.04	14.8%
Levy	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.0%
Madison	0.55	0.55	0.56	0.57	0.57	0.57	0.02	3.6%
Suwannee	1.71	1.83	1.93	2.02	2.11	2.19	0.48	28.1%
Taylor	40.16	40.91	41.96	42.84	43.89	44.77	4.61	11.5%
Union	0.46	0.47	0.49	0.51	0.53	0.55	0.09	19.6%
TOTAL*	73.21	73.75	75.66	77.57	79.45	80.99	7.78	10.6%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

² The Districts determined that drought events (1-in-10 year) do not have significant impacts on water use in this category. Water use is related primarily to processing and production needs.

3.6 THERMOELECTRIC POWER GENERATION

Thermoelectric Power Generation (PG) category represents the water use associated with power plant and power generation facilities. PG water use includes the consumptive use of water for steam generation, cooling, and replenishment of cooling reservoirs.

3.6.1 Demand Projection Methodology

Demand was calculated for each PG facility and then summed to the county level for consumptive uses of water only; recycled surface water or non-consumptive uses were removed. For the NFRWSP, surface water consumptive use by PG facilities represents two (2) percent of surface water use to account for the loss of water due to evaporation (Appendix B, NFRWSP, District and SJRWMD, 2017). An example of this non-consumptive use is surface water used for once-through cooling for power plants, which is returned to surface water bodies.

The Florida Public Service Commission requires that each PG facility produce detailed ten-year site plans for each of its facilities. These plans include planned facilities and generating capacity expansion. The 2015 ten-year site plans for each PG facility within the NFRWSP counties were downloaded from the Public Service Commission website (<http://www.psc.state.fl.us/ElectricNaturalGas/TenYearSitePlans>) and used in developing the PG demand projections.

For each PG facility with a planned capacity expansion, PG consumptive use capacity projections were interpolated between the existing capacity and the planned capacity, as detailed in the ten-year site plans. The projection of PG consumptive demand beyond the planned expansion in the ten-year site plans was calculated for each facility using a linear extrapolation of the existing and planned expansion dates and BEBR medium population projection rates (Smith 2015). In addition, the average daily gallon per megawatt use was estimated for 2010 - 2014 and used as a proxy to project future water demand beyond the ten-year site plans when projected water demand (for the ten-year site plan period) was not available.

3.6.2 Thermoelectric Power Generation Demands

Estimated 2010 PG water use and projected water demands for 2015, 2020, 2025, 2030 and 2035 are shown in Table 3-9. PG demands within the District are projected to increase from an estimated usage of 4.49 mgd in 2010 to 15.32 mgd in 2035 (increase of 241%) over the planning period. This increase in water demand is based on the large projected increase associated with power generation in Suwannee County. The projected growth in power generation is associated with power demand based on population growth projections that extend beyond District boundaries.

Table 3-9. Thermoelectric Power Generation Demands (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS ²						
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change
Alachua	2.17	2.93	2.93	2.58	2.58	2.58	0.41	18.9%
Baker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Bradford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Columbia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Dixie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Gilchrist	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Hamilton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Jefferson	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Lafayette	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Levy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Madison	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Suwannee	2.32	3.86	10.74	11.33	12.02	12.74	10.42	449.1%
Taylor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
Union	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
TOTAL	4.49	6.79	13.67	13.91	14.60	15.32	10.83	241.2%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

² The Districts determined that drought events (1-in-10 year) do not have significant impacts on water use in this category. Water is related primarily to processing and production needs.

3.7 LANDSCAPE, RECREATIONAL AND AESTHETIC DEMANDS

The Landscape, Recreational and Aesthetic (L/R/A) Irrigation category represents water use associated with the irrigation, maintenance, and operation of golf courses, cemeteries, parks, medians, attractions, and other large self-supplied green areas.

3.7.1 Water Uses Included in Landscape/Recreational/Aesthetic Category

The water use types included within the L/R/A category include:

Landscape Demands

Landscape use includes the outside watering of plants, shrubs, lawns, ground cover, trees, and other flora in diverse locations such as the common areas of residential developments and industrial buildings, parks, recreational areas, cemeteries, public rights-of-way, and medians.

Recreational Demands

Recreational use includes the irrigation of recreational areas such as golf courses, soccer, baseball and football fields, and playgrounds. Water-based recreation use is also included in this category, which includes public or private swimming and wading pools, and other water-oriented recreation such as water parks.

Aesthetic Demands

Aesthetic use includes fountains, waterfalls, and landscaped lakes and ponds where such uses are ornamental and decorative.

Miscellaneous Use

Miscellaneous irrigation use represents wells that are less than six inches in diameter, and those uses which have a permit by rule and are used for irrigation at residences that receive potable water for indoor use from a utility. Due to data limitations, residential irrigation wells are not explicitly represented in the District's future projections.

3.7.2 Demand Projection Methodology

Demand for the L/R/A category was projected at the county level using a respective L/R/A historic average gpcd. The county specific L/R/A average gpcd was calculated from L/R/A average water use for 2010 - 2014 including USGS data (Marella 2009, 2014); and BEBR estimates of county population for 2010 - 2014 (Smith 2011a, 2012-2015a). The average L/R/A per capita water use was applied to the additional population projected by BEBR (Smith 2015b) for each five-year increment and the associated water demand was added to the 2010 base-year water use. Future acreage estimates were interpolated from 2010 acreage and 2010 water use ratios.

3.7.3 Landscape/Recreational/Aesthetic Demand Projections

Estimated 2010 L/R/A water use, and projected water demands for 2015, 2020, 2025, 2030 and 2035 are shown in Table 3-10. L/R/A demands within the District are projected to increase from 1.58 mgd in 2010 to 1.76 mgd in 2035 (increase of 11%) over the planning period.

Table 3-10. Landscape, Recreational and Aesthetic Demands (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS							2035 1 in 10 Demand
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change	
Alachua	0.30	0.31	0.32	0.33	0.34	0.35	0.05	16.7%	0.54
Baker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	0.00
Bradford	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.0%	0.18
Columbia	0.38	0.38	0.40	0.42	0.44	0.45	0.07	18.4%	0.52
Dixie	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.0%	0.00
Gilchrist	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	0.00
Hamilton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	0.00
Jefferson	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.0%	0.25
Lafayette	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	0.00
Levy	0.20	0.20	0.21	0.22	0.23	0.24	0.04	20.0%	0.39
Madison	0.23	0.23	0.23	0.23	0.23	0.23	0.00	0.0%	0.26
Suwannee	0.10	0.11	0.12	0.12	0.12	0.12	0.02	20.0%	0.12
Taylor	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.0%	0.09
Union	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	0.00
TOTAL	1.58	1.60	1.65	1.69	1.73	1.76	0.18	11.4%	2.35

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

3.8 TOTAL PROJECTED DEMANDS – ALL WATER USE CATEGORIES

The total projected water demands for all six water use categories are provided below at both the Districtwide level (Table 3-11 through 3-13) and for each county (Table 3-14 through 3-17).

3.8.1 Total Districtwide Demands per Water Use Category

Estimated Districtwide 2010 water use and projected water demands for 2015, 2020, 2025, 2030 and 2035, in total and by water use category, are provided in Table 3-11.

Table 3-11. Total Districtwide Demand Projections (mgd)

Water-Use Category	Estimated Demand	PLANNING PERIOD PROJECTIONS								2035 1 in 10 Demand
	2010	2015	2020	2025	2030	2035	Planning Period Change	Percent Change (2010 - 2035)	Increase Percent from Category	
Public Supply	14.47	14.24	14.80	15.36	15.82	16.28	1.81	12.5%	2.6%	17.26
Domestic Self-Supply	19.13	20.91	21.87	22.81	23.66	24.41	5.28	27.6%	7.5%	25.85
Agricultural	116.36	117.02	128.09	138.05	149.68	161.07	44.71	38.4%	63.3%	183.69
Commercial / Industrial / Institutional	73.21	73.75	75.66	77.57	79.45	80.99	7.78	10.6%	11.0%	80.99
Thermo-Electric Power Generation	4.49	6.79	13.67	13.91	14.60	15.32	10.83	241.2%	15.3%	15.32
Landscape / Recreational / Aesthetic	1.58	1.60	1.65	1.69	1.73	1.76	0.18	11.4%	0.3%	2.35
TOTAL	229.24	234.31	255.74	269.39	284.94	299.83	70.59	30.8%	100%	325.46

* "Total" in Percent Change Column is the Total Percent Change for the All Water Use Types During the Planning Period.

Total projected water demands for 2015 and 2035 are 234.31 mgd and 299.83 mgd, respectively. The 2035 water demands represent an increase of 70.59 mgd (30.8%) above estimated 2010 water use and 65.52 mgd (28.6%) above projected 2015 water demands.

The total estimated 2010 water use and projected 2015 and 2035 water demands presented in Table 3-11 are illustrated in Figures 3-1 through 3-3 as described below. As shown therein, the largest water use category for each year is Agriculture followed by the C/I/I use category, each of which represent more water use than all the remaining categories combined.

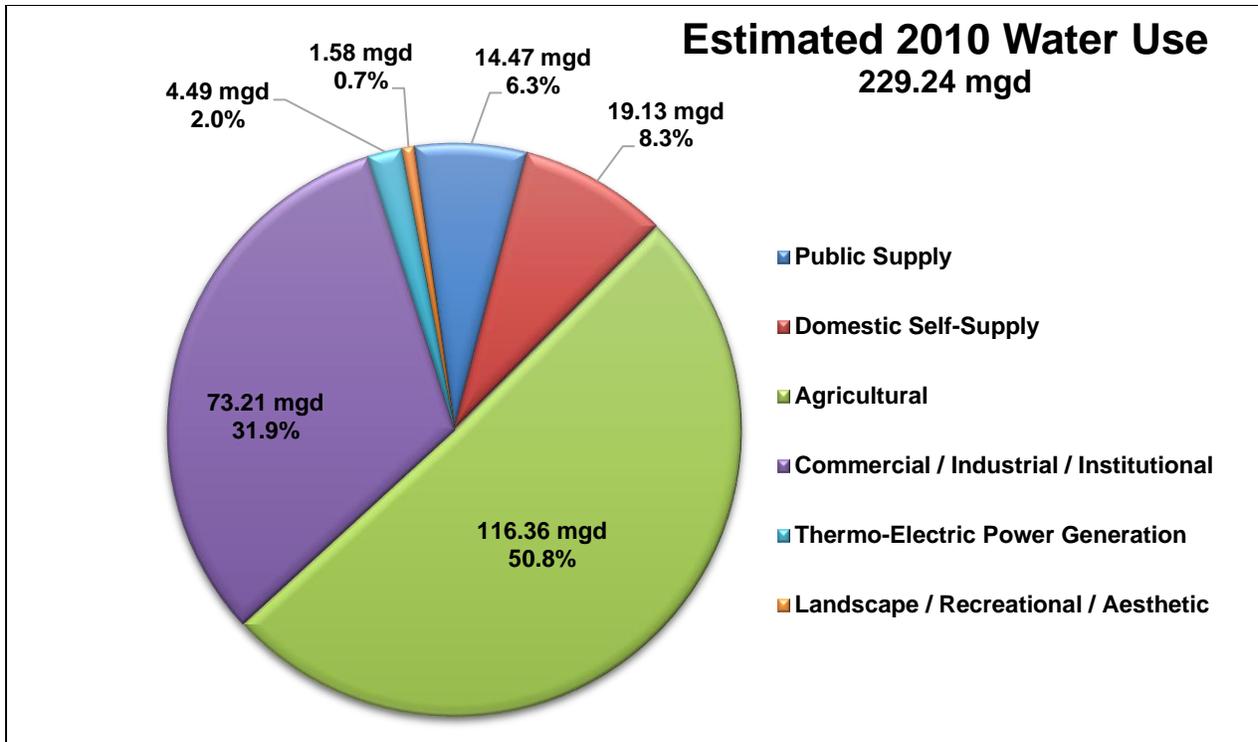


Figure 3-1. Estimated Water Use by Category, 2010

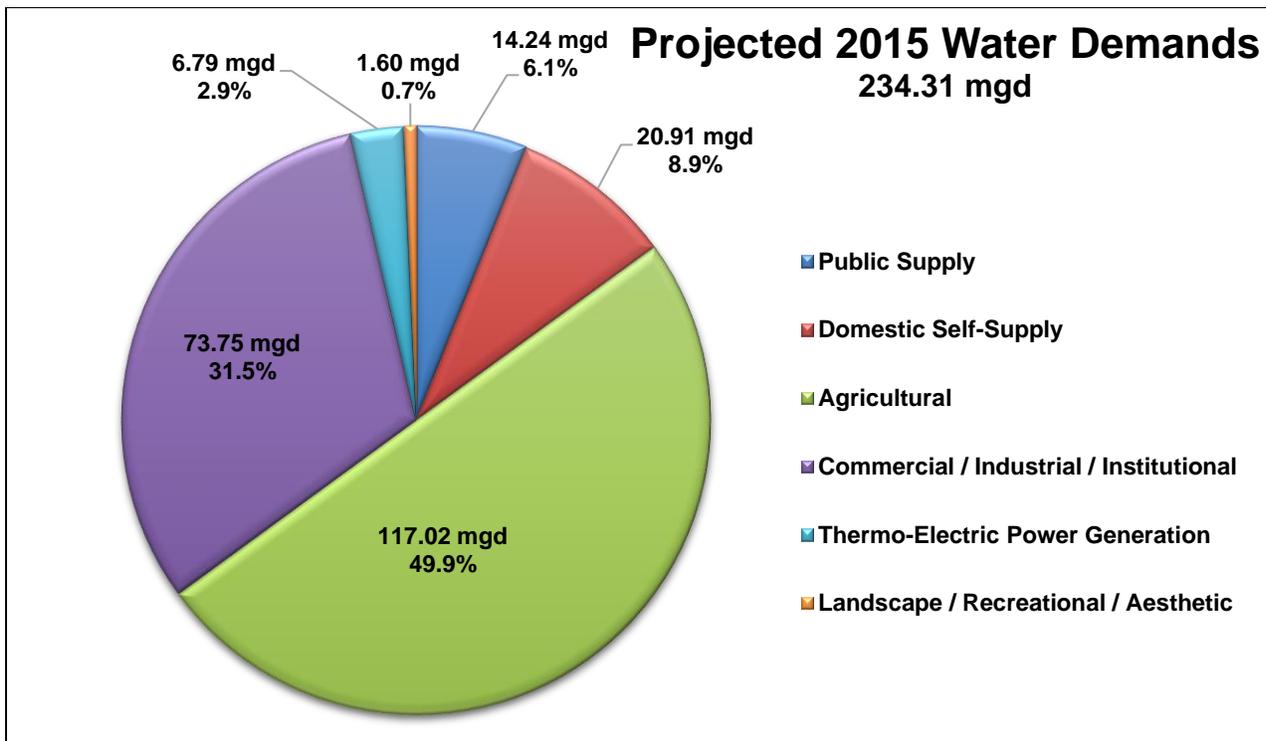


Figure 3-2. Projected demand by water use category, 2015

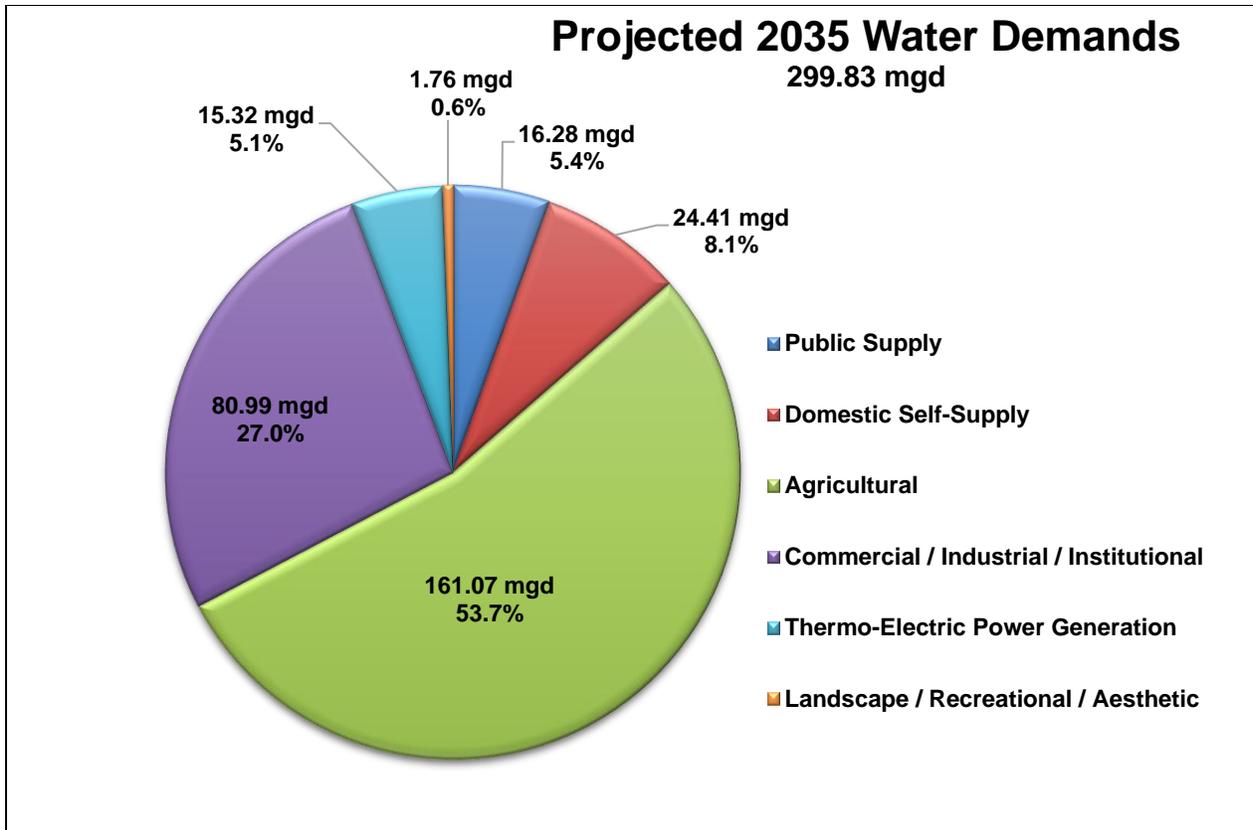


Figure 3-3. Projected demand by water use category, 2035

3.8.2 Total Districtwide Demands by Source

As shown in Table 3-12, groundwater is currently the primary source of supply within the District (94.8%).

Table 3-12. 2010 Estimated Water Use by Source

Water Use Category	2010				
	Groundwater		Surface Water		Total
	mgd	%	mgd	%	mgd
Public Supply	14.47	100.0%	0.00	0.0%	14.47
Domestic Self-Supply	19.13	100.0%	0.00	0.0%	19.13
Agricultural	106.94	91.9%	9.42	8.1%	116.36
Commercial / Industrial / Institutional	73.21	100.0%	0.00	0.0%	73.21
Thermo-Electric Power Generation	2.33	51.9%	2.16	48.1%	4.49
Landscape / Recreational / Aesthetic	1.13	71.5%	0.45	28.5%	1.58
TOTAL	217.21	94.8%	12.03	5.2%	229.24

As shown in Table 3-13, based on current relative utilization of groundwater and surface water for the various use categories, groundwater demands are expected to continue to grow throughout the planning horizon. Of the six water use type categories, three would be projected to derive 99% or more of their water supply from groundwater, in the absence of water resource or supply constraints.

Table 3-13. 2015 and 2035 Water Demand Projections by Source

Water Use Category	2015					2035				
	Groundwater		Surface Water		Total	Groundwater		Surface Water		Total
	mgd	%	mgd	%	mgd	mgd	%	mgd	%	mgd
Public Supply	14.24	100.0%	0.00	0.0%	14.24	16.28	100.0%	0.00	0.0%	16.28
Domestic Self-Supply	20.91	100.0%	0.00	0.0%	20.91	24.41	100.0%	0.00	0.0%	24.41
Agricultural	106.62	91.1%	10.40	8.9%	117.02	146.83	91.2%	14.24	8.8%	161.07
Commercial/Industrial/ Institutional	73.75	100.0%	0.00	0.0%	73.75	80.99	100.0%	0.00	0.0%	80.99
Thermo-Electric Power Generation	3.16	46.5%	3.63	53.5%	6.79	3.32	21.7%	12.00	78.3%	15.32
Landscape/Recreational /Aesthetic	1.14	71.7%	0.45	28.3%	1.60	1.26	71.6%	0.50	28.4%	1.76
TOTAL	219.82	93.8%	14.48	6.2%	234.31	273.09	91.1%	26.74	8.9%	299.83

3.8.3 Spatial Distribution of Changes to Water Use

Table 3-14 indicates that the highest concentration of estimated 2010 agricultural water use (53% of total agricultural use) is within, in descending order, Suwannee, Madison, and Alachua counties. The County with the highest estimated 2010 total water use is Taylor County, followed in descending order by Hamilton and Suwannee counties. These three counties make up a combined 53% of the total 2010 estimated water use throughout the District. Both Taylor and Hamilton county estimate 2010 water use is dominated by C/I/I water use while Suwannee County's water use is dominated by agricultural use.

Table 3-14. 2010 Estimated Water Use by County

County ¹	Public Supply	Domestic Self-Supply	Commercial, Industrial, Institutional	Landscape, Recreational, Aesthetic	Power Generation	Agriculture	Total 2010 Water Use	
	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	Percent
Alachua	2.46	2.80	0.10	0.30	2.17	14.55	22.38	4.9%
Baker	0.00	0.04	0.21	0.00	0.00	0.00	0.25	0.1%
Bradford	1.00	1.70	1.07	0.08	0.00	1.27	5.12	1.2%
Columbia	3.48	3.72	0.30	0.38	0.00	4.23	12.11	2.8%
Dixie	0.67	0.98	0.00	0.01	0.00	1.76	3.42	0.8%
Gilchrist	0.23	1.29	0.34	0.00	0.00	9.71	11.57	2.8%
Hamilton	0.86	0.74	25.82	0.00	0.00	11.56	38.98	9.6%
Jefferson	0.02	0.37	2.14	0.20	0.00	4.00	6.73	1.8%
Lafayette	0.17	0.65	0.27	0.00	0.00	9.86	10.95	3.0%
Levy	0.73	1.03	0.08	0.20	0.00	10.61	12.65	3.6%
Madison	1.37	1.00	0.55	0.23	0.00	17.35	20.50	6.1%
Suwannee	1.09	2.74	1.71	0.1	2.32	30.16	38.12	12.1%
Taylor	2.02	0.91	40.16	0.08	0.00	0.54	43.71	15.8%
Union	0.37	1.16	0.46	0.00	0.00	0.76	2.75	1.2%
TOTAL	14.47	19.13	73.21	1.58	4.49	116.36	229.24	100.0%
Percent	6.3%	9.1%	31.7%	0.7%	1.9%	50.4%		

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table 3-15 indicates the highest concentration of projected 2015 agricultural water use (49% of total agricultural use) is within, in descending order, Suwannee, Madison, and Gilchrist counties. The County with the highest projected 2015 total water use remains Taylor County, followed in descending order by Suwannee and Hamilton counties. The vast majority of the water demand for Taylor (92%) and Hamilton (67%) counties is associated with two C/I/I water users (one per county). In fact, Taylor and Hamilton Counties contain the majority of all Districtwide C/I/I water demand throughout the planning period (>90%).

Table 3-15. 2015 Projected Demand by County

County	Public Supply	Domestic Self-Supply	Commercial, Industrial, Institutional	Landscape, Recreational, Aesthetic	Power Generation	Agriculture	Total 2015 Demand	
	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>Percent</i>
Alachua	2.31	1.54	0.10	0.31	2.93	12.23	19.42	4.1%
Baker	0.00	0.07	0.21	0.00	0.00	0.01	0.29	0.1%
Bradford	0.92	1.38	1.04	0.08	0.00	1.30	4.72	1.1%
Columbia	3.49	4.48	0.3	0.38	0.00	4.53	13.18	3.0%
Dixie	0.61	1.31	0.00	0.01	0.00	5.08	7.01	1.6%
Gilchrist	0.23	1.42	0.34	0.00	0.00	12.93	14.92	3.5%
Hamilton	0.89	0.95	25.52	0.00	0.00	10.57	37.93	9.3%
Jefferson	0.00	0.33	2.13	0.20	0.00	2.82	5.48	1.5%
Lafayette	0.16	0.71	0.27	0.00	0.00	11.39	12.53	3.4%
Levy	0.89	1.43	0.08	0.20	0.00	9.82	12.42	3.5%
Madison	1.21	1.39	0.55	0.23	0.00	15.29	18.67	5.5%
Suwannee	1.30	3.43	1.83	0.11	3.86	28.97	39.50	12.3%
Taylor	1.90	1.14	40.91	0.08	0.00	0.41	44.44	15.7%
Union	0.33	1.33	0.47	0.00	0.00	1.67	3.80	1.6%
TOTAL	14.24	20.91	73.75	1.60	6.79	117.02	234.31	100.0%
Percent	6.1%	8.9%	31.5%	0.7%	2.9%	49.9%		

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table 3-16 indicates the highest concentration of projected 2035 agricultural water demand remains within Suwannee and Madison counties from 2015 - 2035. Suwannee County is also projected to experience the second greatest increase in agricultural water demand over the planning period (10.83 mgd). The greatest increase in agricultural water demand over the planning period is projected to occur in Columbia County (13.18 mgd), which results in Columbia County rising to the third highest agricultural water demand county, with Gilchrist County ranking fourth. Combined, the water use within these four counties represents 58% of all projected 2035 agricultural water demand. Suwannee and Columbia counties also represent over half of the total projected increase in agricultural water demand for the planning period.

Table 3-16. 2035 Projected Demand by County

County	Public Supply	Domestic Self-Supply	Commercial, Industrial, Institutional	Landscape, Recreational, Aesthetic	Power Generation	Agriculture	Total 2035 Demand	
	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>Percent</i>
Alachua	2.73	1.82	0.10	0.35	2.58	14.15	21.73	3.6%
Baker	0.00	0.09	0.26	0.00	0.00	0.01	0.36	0.1%
Bradford	1.02	1.53	1.15	0.08	0.00	1.34	5.12	0.9%
Columbia	4.14	5.32	0.34	0.45	0.00	17.41	27.66	4.8%
Dixie	0.74	1.57	0.00	0.01	0.00	3.01	5.33	1.0%
Gilchrist	0.23	1.72	0.39	0.00	0.00	14.72	17.06	3.2%
Hamilton	0.97	1.06	27.97	0.00	0.00	11.35	41.35	7.9%
Jefferson	0.00	0.36	2.31	0.20	0.00	3.47	6.34	1.3%
Lafayette	0.17	0.87	0.31	0.00	0.00	17.70	19.05	4.0%
Levy	1.06	1.71	0.08	0.24	0.00	13.52	16.61	3.6%
Madison	1.24	1.43	0.57	0.23	0.00	22.25	25.72	5.9%
Suwannee	1.57	4.16	2.19	0.12	12.74	39.68	60.46	14.6%
Taylor	2.08	1.25	44.77	0.08	0.00	1.12	49.30	14.0%
Union	0.33	1.52	0.55	0.00	0.00	1.34	3.74	1.2%
TOTAL	16.28	24.41	80.99	1.76	15.32	161.07	299.83	100%
Percent	5.4%	8.1%	27.0%	0.6%	5.1%	53.7%		

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table 3-17 shows that the highest projected increases in total water demand during the planning period occur in Suwannee, Columbia, Madison and Lafayette counties. These four counties make up a combined 49.01 mgd (75%) of the total projected increase in total water demands throughout the planning period. Of the 49.01 mgd water demand increase for these four counties, 36.86 mgd (75.2%) is due to projected increases in agricultural water demands.

Table 3-17. 2015 to 2035 Change in Total Projected Demand by County

County ¹	Total 2015 Projected Demand	Total 2035 Projected Demand	Planning Period (2015 to 2035)		
			Difference County Demand	Percent Change County Demand	Percent Change Total District Demand
	mgd	mgd	mgd	Percent	Percent
Alachua	19.42	21.73	2.31	11.9%	3.5%
Baker	0.29	0.36	0.07	24.1%	0.1%
Bradford	4.72	5.12	0.40	8.5%	0.6%
Columbia	13.18	27.66	14.48	109.9%	22.1%
Dixie	7.01	5.33	-1.68	-24.0%	-2.6%
Gilchrist	14.92	17.06	2.14	14.3%	3.3%
Hamilton	37.93	41.35	3.42	9.0%	5.2%
Jefferson	5.48	6.34	0.86	15.7%	1.3%
Lafayette	12.53	19.05	6.52	52.0%	10.0%
Levy	12.42	16.61	4.19	33.7%	6.4%
Madison	18.67	25.72	7.05	37.8%	10.8%
Suwannee	39.50	60.46	20.96	53.1%	32.0%
Taylor	44.44	49.30	4.86	10.9%	7.4%
Union	3.80	3.74	-0.06	-1.6%	-0.1%
TOTAL	234.31	299.83	65.52	N/A	100.0%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

4.0 WATER RESOURCE MODELING AND IMPACT ASSESSMENT

The purpose of conducting a water resource impact assessment as part of this WSA is to identify areas where current and/or projected groundwater withdrawals in the District and adjacent regions are believed to be causing, or have the potential to cause, cumulative adverse impacts to rivers and springs during the 2015 - 2035 planning period. The water resource impact assessment was conducted by utilizing the planning version (version 1.0) of the NFSEG. The following section provides a summary of the methods used to conduct the water resource modeling and impact assessment, and a brief overview of the findings of this assessment.

4.1 METHODOLOGIES

The potential for water supply constraints was assessed by utilizing regional groundwater modeling simulations to assess the effects of varied levels of regional water use on the District's priority waterbodies, including Outstanding Florida Springs (Subsection 373.802(4), F.S.). This was conducted by comparing the modeled effects of regional groundwater withdrawals on flowing natural systems (rivers and springs) to a reference criterion developed from established MFLs or planning-level Interim Flow Constraint (IFC) where MFLs have not yet been adopted for a priority water body. Lakes on the priority list without an established MFL were not individually assessed. Screening of priority lakes is based on estimated changes to groundwater flow modeled in adjacent rivers and springs. Following MFL adoption, lakes will be evaluated individually as a part of the assessment process.

Regional groundwater withdrawals were modeled domain-wide using NFSEG version 1.0 based on estimates of withdrawals in 2009 and projected 2035 groundwater withdrawals. Due to limited information regarding agricultural growth projections for Georgia, agricultural water demand in Georgia was held to 2009 levels for the 2035 model run. With 2035 agricultural water demand in Georgia held to 2009 levels, total water supply demand in Georgia and South Carolina was projected to increase from 850 mgd in 2009 to 944 mgd in 2035. Projected growth for all water use categories for the portions of Florida's WMDs in the model domain, including the District, SJRWMD, Southwest Florida Water Management District (SWFWMD) and Northwest Florida Water Management District (NFWMD), are shown in Figure 4-1.

In this WSA, NFSEG-simulated river and spring flows for the planning period were compared to flows simulated for a "pumps-off" condition, in which anthropogenic groundwater withdrawals were removed from the model. Differences between stream flows and spring flows estimated from this "pumps-off" simulation and flows estimated from simulations with 2009 and projected 2035 groundwater withdrawals (Figure 4-1) provided a means to estimate the potential effects of current and projected groundwater use on the District's water resources through the planning horizon. Once these groundwater modeling exercises were complete, the resulting estimates of flow reductions for the various water resources were compared to metrics from resource-

specific MFLs or IFCs, providing a basis to assess the potential impact of regional groundwater use on these natural systems.

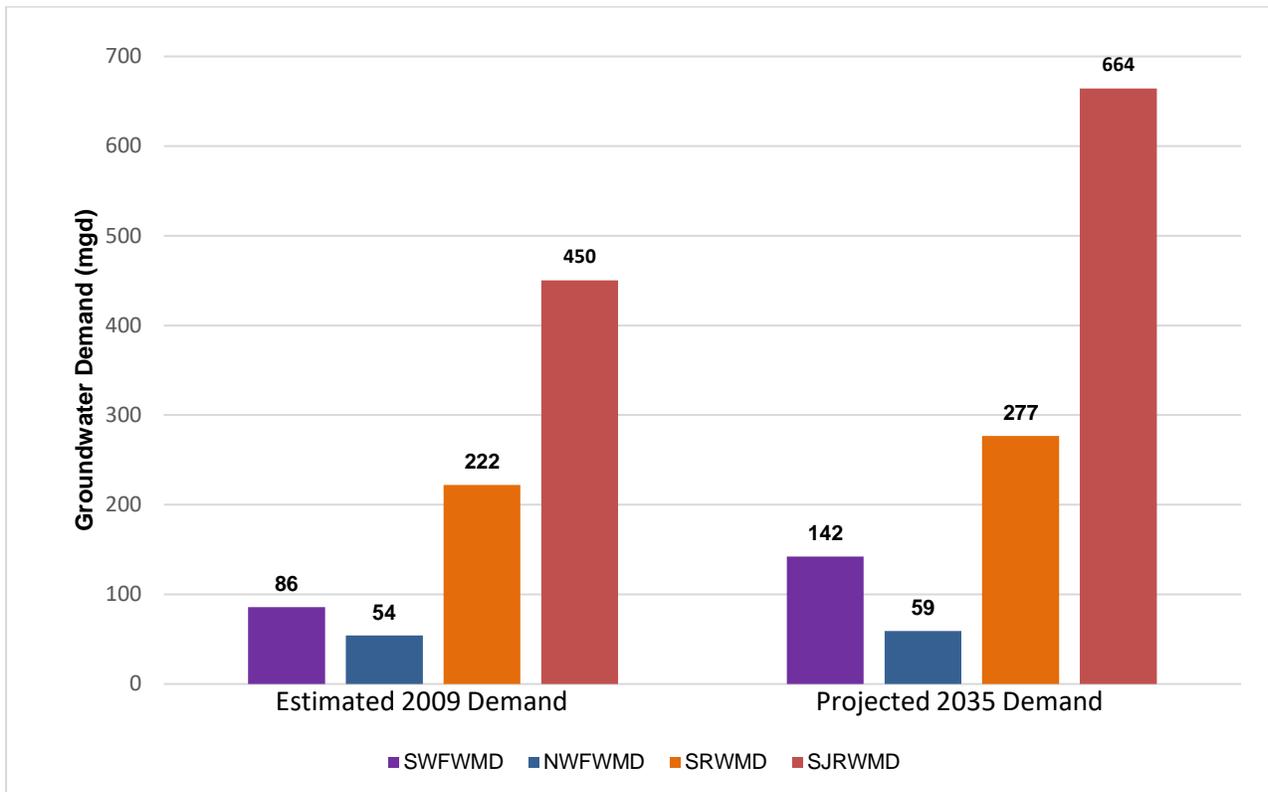


Figure 4-1. NFSEG Domain Groundwater Demand Projections for Florida

4.1.1 Groundwater Modeling

As part of the development of this water resource assessment, all groundwater modeling was conducted with the planning version (version 1.0) of the NFSEG. The NFSEG was developed as a joint regional groundwater water model with the SJRWMD to provide consistency and enhance efficiency and effectiveness for the water supply planning and assessments in the region. Technical experts from the District, SJRWMD, and other key stakeholders worked collaboratively to develop the NFSEG. The technical team's mandate was to ensure appropriate science is applied to the modeling and data analysis to support decision-making, and that the work completed is defensible, understood by the team, and collaboratively developed, as described in the Partnership's charter and model conceptualization, available at <http://northfloridawater.com>.

The NFSEG is a three-dimensional, steady-state, groundwater flow model covering approximately 60,000 square miles (Figure 4-2). The NFSEG is vertically discretized into seven layers that generally represent, from top to bottom: (1) the surficial aquifer system, where present (2) the intermediate confining unit/aquifer system, where present; (3) the UFA; (4) the middle semi-confining unit, where present (UFA otherwise); (5) the LFA, where present (UFA

otherwise); (6) the upper confining unit of the Fernandina permeable zone, where present; and (7) the Fernandina permeable zone of the LFA, where present. The model is horizontally discretized into uniform grid cells measuring 2,500 feet by 2,500 feet. Calibration of the NFSEG was based on hydrologic conditions occurring during calendar years 2001 and 2009 (District and SJRWMD, 2016).

Prior to development of the NFSEG, the groundwater models of the FAS in north Florida and southeast Georgia used by the WMDs often focused on specific geographic regions relative to each district. The primary design objective of the NFSEG was to develop a tool capable of making assessments that span water management districts and state boundaries at required levels of accuracy and reliability. To this end, considerable effort has been expended in the development and compilation of required data sets, in the model calibration, and in collaboration between affected WMDs and other stakeholders.

Version 1.0 of the NFSEG, which was released in October 2016 and used to evaluate resource constraints for the NFRWSP (District and SJRWMD, 2017), meets the requirements to be used in water supply planning in the NFSEG domain. NFSEG version 1.0 does not meet the requirements outlined in Rule 62-42.300(1)(e), F.A.C., for the re-evaluation of the established Lower Santa Fe and Ichetucknee River (LSFI) MFLs that will occur prior to the end of 2019. It is anticipated that once the peer review of the NFSEG is complete, that version and subsequent versions of the NFSEG will be used in planning, regulatory and MFLs programs.

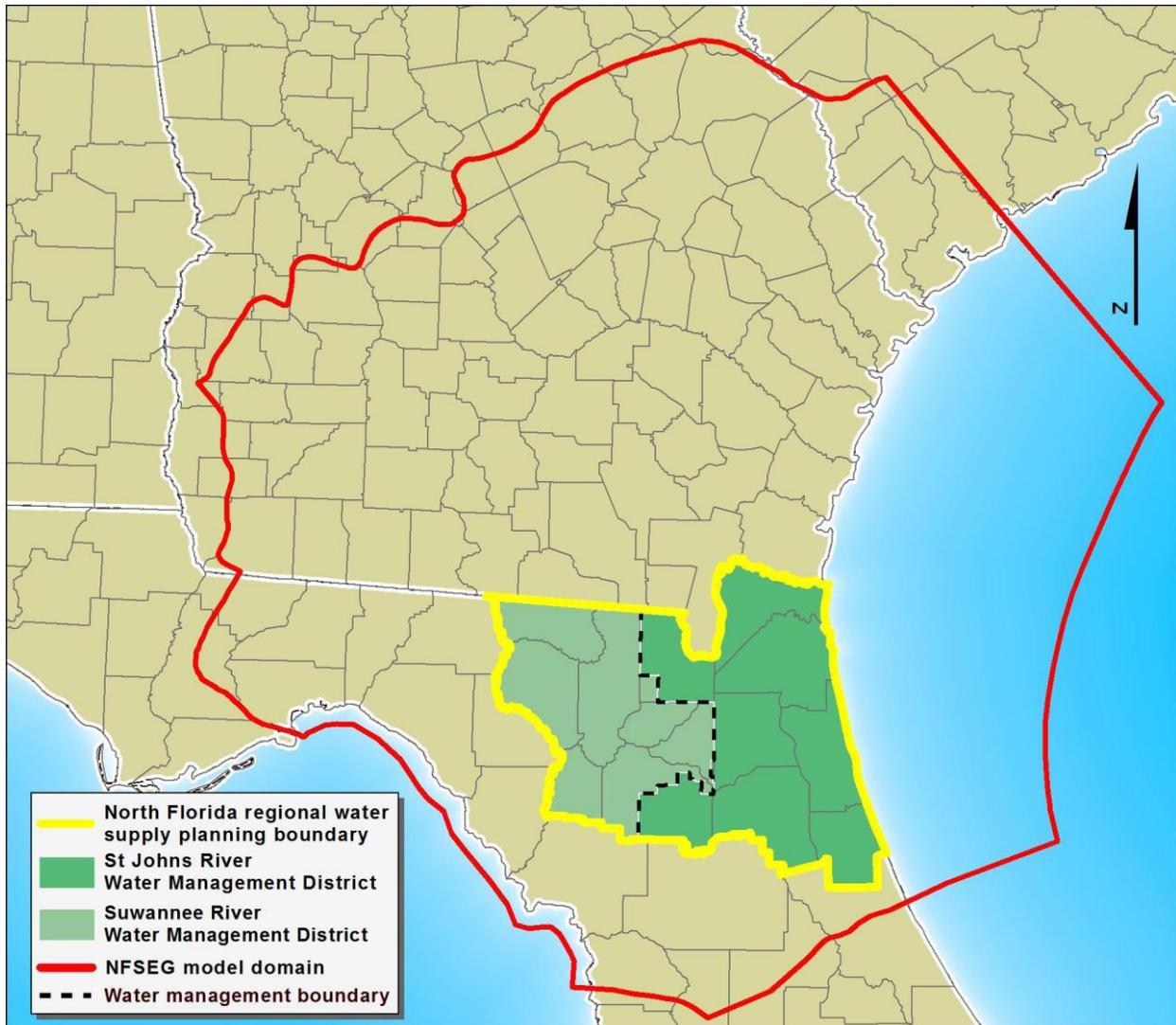


Figure 4-2. NFSEG Domain with District and SJRWMD portions of Partnership area identified

4.2 NATURAL SYSTEMS CONSTRAINTS

Where available, metrics from adopted MFLs were utilized as local constraints to evaluate whether current and projected levels of regional water demand result in adverse impacts to natural systems. Where MFLs have not yet been developed for priority waterbodies, IFCs were developed for use in the water resource impact assessment in the place of waterbody-specific MFLs. These interim constraints are planning-level estimates of the degree of flow reduction that would limit the ability to sustain natural systems associated with a river or spring and are utilized in the water supply planning process until MFLs are formally established. For this WSA, the maintenance of 90% of baseline flow was used as a standard to develop IFCs for priority waterbodies without adopted MFLs. Because the withdrawals used in the 2009 simulation used to calibrate the NFSEG are comparable to the 2010 baseline year for this assessment, the 2009

model run was used to estimate current conditions. The 2035 model run estimates the potential impact to resources if fresh groundwater is used to meet all of the projected future water demand within the model domain.

In order to identify where available water supplies could be inadequate to supply all projected water demands while sustaining natural systems, the NFSEG v. 1.0 was used to predict the reductions in groundwater flow contributions to a particular river gage or spring. To be able to analyze the results from the groundwater flow model, each priority waterbody must have a reference criterion that estimates the allowable shift from baseline conditions. If the reductions predicted by the groundwater flow model exceed the reference criterion, then further investigation is warranted to ensure the adequacy of water supplies for that resource. The reference criterion has been calculated for each MFL in the District for which sufficient data was available (either measured or simulated). To calculate the reference criterion, the daily baseline time series of measured (or estimated) data and the MFL time series are subtracted from one another on a daily basis. The result of that subtraction is the daily available water. After calculating the daily available water, the annual average baseline of measured data and the available water are calculated for each water year. The annual ratios of the available water and the measured flow data are also calculated for each water year. The ten percent exceedance is then calculated from the time series of annual ratios to arrive at the resultant reference criterion. For priority water bodies for which MFLs have not yet been set, a 10% reference criterion was used.

The impact assessment for priority water bodies was derived from NFSEG v 1.0 simulations. With the exception of the constraints on the lower Santa Fe and Ichetucknee River (described on the next page), the baseline condition was evaluated using the NFSEG v. 1.0 under a no-pumping scenario. This “pumps off” baseline condition simulates conditions where the anthropogenic groundwater withdrawals estimated for the calibrated 2009 model year were removed. Flows simulated for the pumps-off baseline condition at each waterbody were compared to corresponding flows simulated for the 2009 year calibrated conditions, and also to flows simulated for withdrawal conditions estimated to occur in 2035. The simulated flow change for each priority water body was compared to the reference criterion to assess whether current (2009) or projected (2035) water demands have the potential to exceed available water supplies (Table 4-1 and 4-2, Figure 4-3 and 4-4). There are five priority waterbodies which could not be directly evaluated using the planning version of the NFSEG. Falmouth Spring functions as a karst window, with flow returning to the UFA before reaching the river. Changes in flow to Falmouth spring are estimated using flow changes at Lime, Lime Run Sink, and Suwannee Springs. Discharge from these three springs has been linked to Falmouth via dye tracing. Rock Sink Spring is not represented in this version of the model, but will be incorporated in future versions. The NFSEG version 1.0 does not provide a good estimate of flow at Little Fanning, Charles, Guaranto, and White Springs. Improvements to the modeling of spring flow at these resources will be incorporated in future model versions. These five springs were therefore not directly evaluated; instead estimates of regional groundwater availability were made based on the modeled changes in flow at nearby springs and river reaches.

The Lower Santa Fe and Ichetucknee Rivers and associated priority springs are currently assessed as being in recovery (Rule 62-42.300, F.A.C.). Status of the priority springs of the Lower Santa Fe and Ichetucknee Rivers are tracked via flow at the river gages on the Santa Fe and Ichetucknee Rivers (Table 4-3). The flow deficit was estimated to be 17 cubic feet per second (cfs) for the Santa Fe River near Ft. White, and 3 cfs for the Ichetucknee River at Highway 27 (District, 2014). Consistent with the methodology used in the NFRWSP, to estimate the potential additional flow change if all projected growth within the planning region was met with fresh groundwater, this WSA estimated the potential additional flow change that could result if all future groundwater demands domain-wide were met with fresh groundwater. The impact of projected water demands through the 20-year planning horizon on the Lower Santa Fe and Ichetucknee Rivers and associated priority springs was evaluated using the NFSEG simulation for the 2009 model year and for simulated domain-wide withdrawal projections for 2035. Any modeled decrease in discharge at these two river gages relative to the 2009 model run represents an additional flow deficit if all projected water demands are met with fresh groundwater (Table 4.3). Note that this planning evaluation is separate from the re-evaluation of the established MFLs that will occur prior to the end of 2019 (Rule 62-42.300(1)(e), F.A.C.).

Table 4-1. Rivers with MFLs/IFCs

	Water Body Name ¹	MFL/ IFC	Reference Criterion	NFSEG Pumps Off Flow Estimate (cfs)	Modeled % Flow Decrease		Potential Resource Constraint?
					2009	2035	
R1	Alapaha River at Jennings	IFC	10.0%	1237	0.1%	0.1%	No
R1	Aucilla River at Lamont	MFL	6.5%	198	0.7%	0.9%	No
R3	Wacissa River near Wacissa	MFL	5.1%	533	2.1%	2.4%	No
R4	Econfina River near Perry	MFL	9.8%	58.1	1.8%	2.4%	No
R5	Suwannee River near Wilcox	MFL	12.3%	6438	9.8%	12.3%	Yes, 2035
R6	Suwannee River at Branford	IFC	10.0%	4839	10.5%	12.8%	Yes, 2009
R7	Suwannee River at Ellaville	IFC	10.0%	4173	11.2%	13.5%	Yes, 2009
R8	Steinhatchee River near Cross City	IFC	10.0%	80.2	0.6%	1.1%	No
R9	Suwannee River at White Springs	IFC	10.0%	42.5	0.6%	0.8%	No
R10	Waccasassa River near Gulf Hammock	MFL	12.5%	62.4	6.0%	9.3%	No
R11	Withlacoochee River near Pinetta	IFC	10.0%	1187	2.8%	3.6%	No
R12	Santa Fe River at Graham	MFL	14.5%	9.1	0.6%	0.8%	No
R13	Santa Fe River at Worthington Springs	MFL	13.8%	59.2	3.0%	3.6%	No

¹ The Lower Santa Fe and Ichetucknee Rivers are in recovery. See Table 4-3.



Figure 4-3. Rivers with MFLs/IFCs, IDs from Table 4-1 and 4-3

Table 4-2. Springs with MFLs/IFCs

ID	Water Body Name ⁴	MFL/ IFC	Reference Criterion	NFSEG Pumps Off Flow Estimate (cfs)	Modeled % Flow Decrease		Potential Resource Constraint?	
					2009	2035		
S1	Nuttall Rise ²	MFL	6.5%	1436	1.5%	1.8%	No	
S2	Wacissa group ³	MFL	5.1%	537	2.0%	2.4%	No	
S3	Fanning ³	MFL	10.0%	69.9	4.9%	6.4%	No	
S4	Little Fanning ¹	MFL	10.0%	-0.02	0.3%	0.4%	No	
S5	Manatee ³	MFL	10.0%	113	3.1%	3.7%	No	
S6	Allen Mill Pond	IFC	10.0%	7.7	3.4%	4.8%	No	
S7	Anderson	IFC	10.0%	15.3	3.5%	5.1%	No	
S8	Bell	IFC	10.0%	8.1	6.4%	8.4%	No	
S9	Bonnet	IFC	10.0%	29.7	2.0%	3.0%	No	
S10	Branford	IFC	10.0%	11.2	7.2%	12.7%	Yes, 2035	
S11	Charles ¹	IFC	10.0%	-0.6	N/A	N/A	N/A	
S12	Falmouth ³	MFL	Not modeled, see results for S29, S30, and S38					
S13	Guaranto ¹	IFC	10.0%	-0.008	N/A	N/A	N/A	
S14	Hart	IFC	10.0%	51.1	6.5%	9.0%	No	
S15	Lafayette Blue ³	MFL	10.0%	53.9	2.7%	4.0%	No	
S16	Little River	IFC	10.0%	46.8	3.6%	6.2%	No	
S17	Otter	IFC	10.0%	8.9	4.7%	6.3%	No	
S18	Peacock ³	MFL	10.0%	14.3	2.1%	3.1%	No	
S19	Pothole	IFC	10.0%	26.0	5.2%	8.2%	No	
S20	Rock Sink	IFC	Not modeled, see results for S14 and S19					
S21	Royal	IFC	10.0%	1.9	8.2%	9.4%	No	
S22	Ruth/Little Sulfur	IFC	10.0%	4.8	3.3%	7.0%	No	
S23	Troy ³	MFL	10.0%	95.5	3.7%	5.8%	No	
S24	Turtle	IFC	10.0%	16.7	5.1%	8.7%	No	
S25	Steinhatchee Rise	IFC	10.0%	-74.4	0.0%	0.0%	No	
S26	Beaver Creek (TAY76992)	IFC	10.0%	77.9	0.0%	0.0%	No	
S27	Alapaha Rise	IFC	10.0%	464	8.8%	10.6%	Yes, 2035	
S28	Holton Creek Rise	IFC	10.0%	160	14.2%	17.1%	Yes, 2009	
S29	Lime	IFC	10.0%	13.9	2.9%	3.7%	No	
S30	Lime Run Sink	IFC	10.0%	29.6	3.4%	4.7%	No	
S31	Blue (SUW1017972)	IFC	10.0%	37.5	21.2%	25.4%	Yes, 2009	
S32	Stevenson	IFC	10.0%	91.0	4.3%	5.3%	No	
S33	Suwannee	IFC	10.0%	10.3	18.0%	21.4%	Yes, 2009	
S34	White ¹	IFC	10.0%	-1.4	N/A	N/A	N/A	
S35	Levy (Bronson) Blue	MFL	10.0%	3.0	12.4%	19.3%	Yes, 2009	
S36	Madison Blue ³	MFL	14.0%	126	16.7%	19.8%	Yes, 2009	
S37	Pot	IFC	10.0%	36.0	12.3%	14.6%	Yes, 2009	
S38	Suwanneochee	IFC	10.0%	29.3	4.0%	6.0%	No	

¹ NFSEG 1.0 model runs do not provide a good estimate of flow at this resource, MFL/IFC not assessed (N/A).

² Site did not have good flow observation data for calibration of NFSEG 1.0

³ Outstanding Florida Spring or Spring Group (Subsection 373.802(4), F.S.)

⁴ Springs of the Lower Santa Fe and Ichetucknee Rivers are in recovery. These resources are tracked via recovery of flow at the river gages on the Santa Fe and Ichetucknee Rivers, See Table 4-3

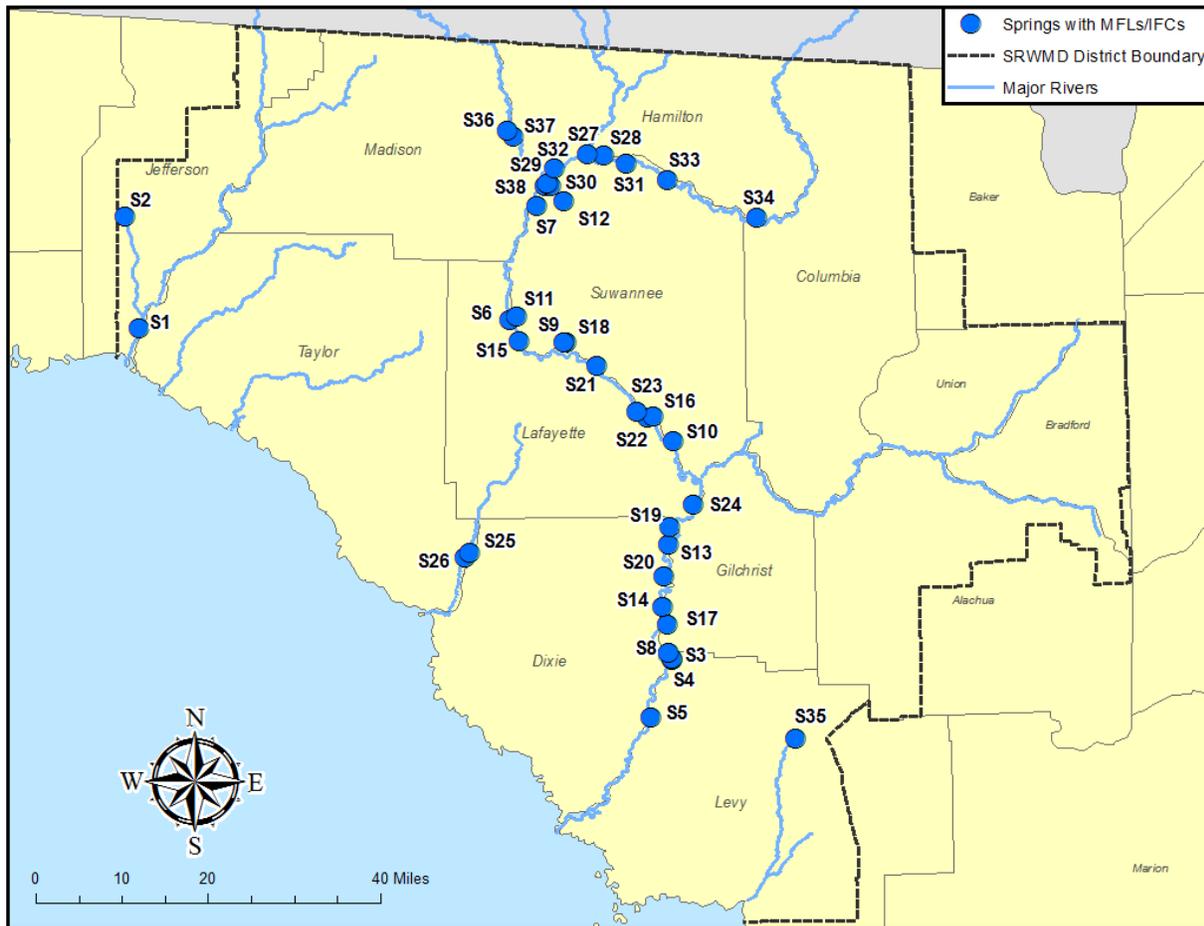


Figure 4-4. Springs with MFLs/IFCs, IDs from Table 4-2

Table 4-3 Estimated additional impacts for the LSF1 through 2035 if fresh groundwater is used to meet all future demands

ID	Water Body Name ³	MFL/IFC	Water Body Type	Flow Constraint (cfs) ¹	Existing deficiency (cfs) ¹	Percent Decrease 2009 to 2035 ²	Additional Deficiency 2035 (cfs) ²
R14	Ichetucknee River at US 27	MFL	River	18	3	3.2%	13
R15	Santa Fe River near Fort White	MFL	River	118	17	4.7%	26

¹ Obtained from the Recovery Strategy for the Lower Santa Fe River Basin

² Obtained from NFSEG version 1.0

³ The priority springs associated with this recovery strategy are: Santa Fe Rise, Treehouse (ALA112971), Hornsby, Columbia, Poe, COL101974, Rum Island, July, Devil’s Ear (Ginnie Group), Siphon Creek Rise, Ichetucknee Head, Blue Hole, Mission, Devil’s Eye, Grassy Hole, and Mill Pond. Outstanding Florida Springs or Spring Groups (Subsection 373.802(4), F.S.) included in this recovery strategy are Ichetucknee Head Spring, Hornsby Spring, Columbia Spring, Treehouse Spring, Devils Ear Spring, and Poe Spring.

4.3 PROJECTED IMPACTS FOR THE PLANNING PERIOD

Modeled changes in flow between pumps-off and 2009 conditions were used to estimate the potential impacts of groundwater withdrawals. When comparing the reference criteria against estimated reductions in streamflow, (between the pumps-off and 2009 model runs) further investigation is warranted for two river reaches and six springs (Tables 4-1 and 4-2, Figure 4-5). Modeled changes in flow between pumps-off and 2035 conditions were used to estimate the percent change in flow that would result if all projected future water demands are met with fresh groundwater. Comparison of reference criteria to projected demands through 2035 indicate that two additional springs warrant further investigation (Branford Spring and Alapaha Rise, Table 4-2, Figure 4-6). Also, the Suwannee River at Wilcox is projected to reach its reference criterion by 2035, indicating that further investigation is warranted. Similarly, if increases in projected water demand between 2009 and 2035 were met with fresh groundwater, the potential deficiencies in flow at the Ichetucknee River at US 27 and the Santa Fe River near Fort White (Table 4-3) would also increase.

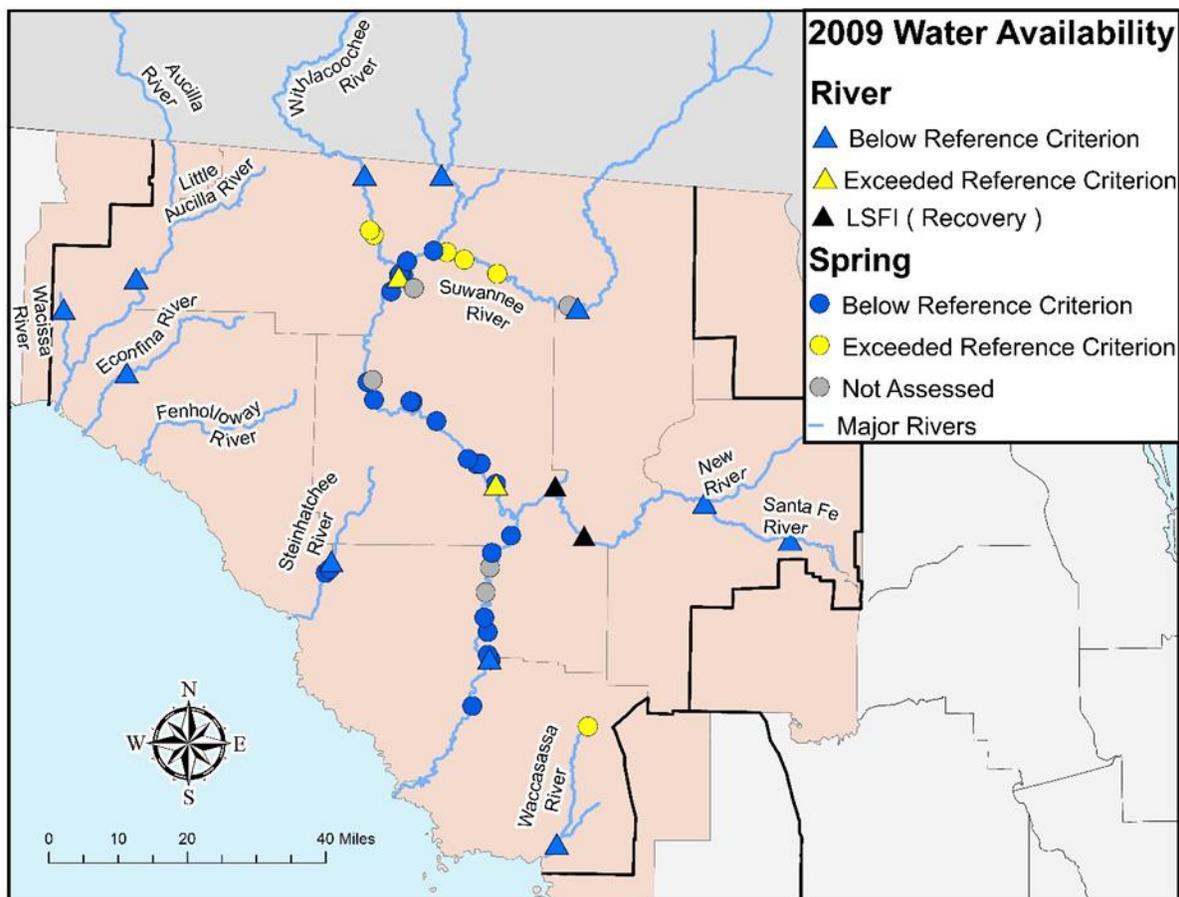


Figure 4-5. Water availability relative to 2009 demand estimates for rivers and springs.

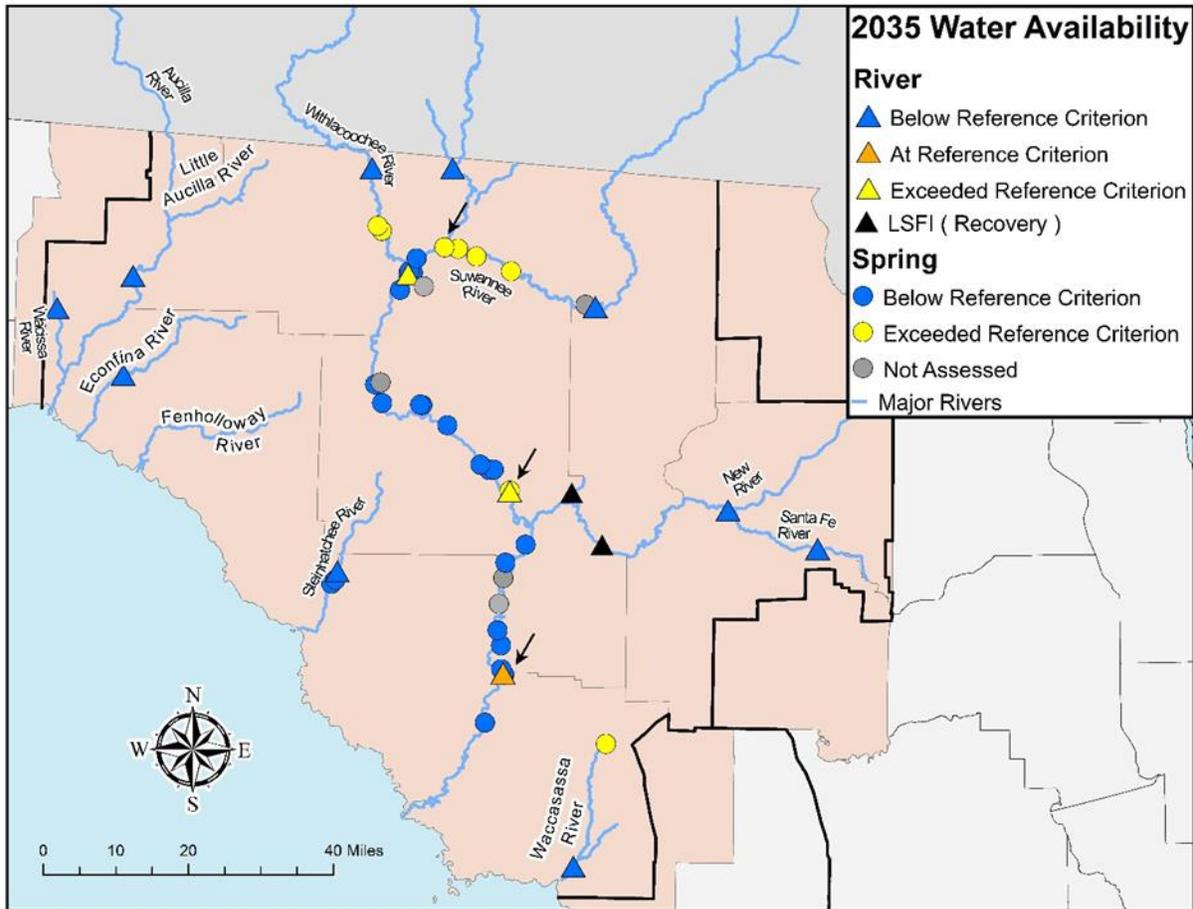


Figure 4-6. Water availability relative to 2035 demand projections for rivers and springs.

Estimated changes in groundwater flow at the rivers and springs during the planning period are the result of increased fresh groundwater demand domain-wide. The magnitude of these potential impacts on springs and rivers within the District vary spatially based on regional hydrogeology, and the proximity and magnitude of water demands. In the District, groundwater from the FAS is the critical source of flow to priority surface water features, including rivers and springs. Ensuring adequate water supply to meet current and projected future water demand while sustaining natural systems requires understanding how water demands alter groundwater flow to rivers and springs throughout the District.

Simulated changes in flows from pumps-off to 2009 conditions for rivers in the District are shown in Figure 4-7. Simulated flows to the Suwannee River at Wilcox in 2009 decreased by approximately 9.8% relative to the baseline, “no pumping” conditions (Figure 4.7). Other priority rivers also saw decreases in flow in 2009, ranging from 6% on the Waccasassa River to 0.6% on the Steinhatchee River.

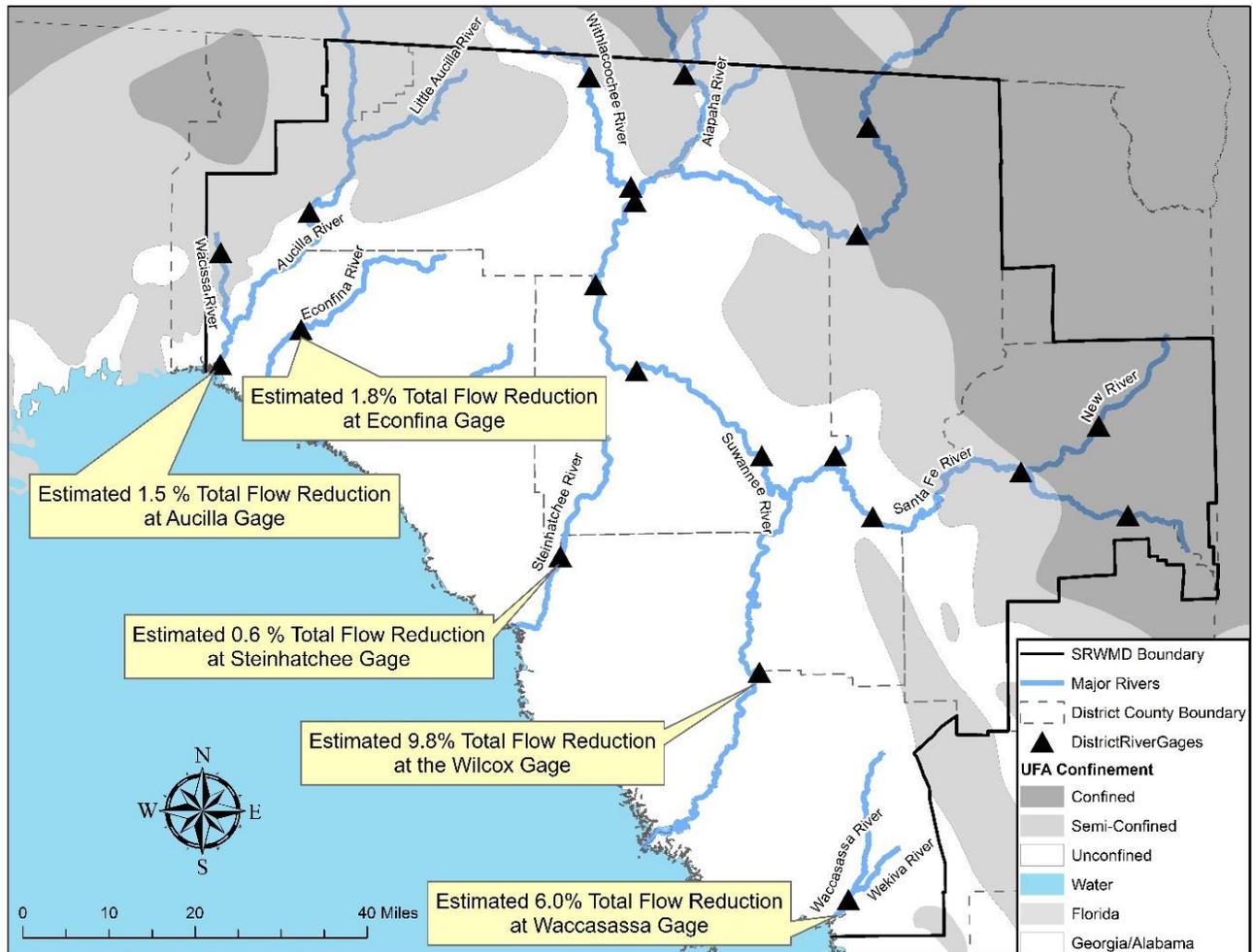


Figure 4-7. Estimated change in groundwater flow in District rivers between baseline and 2009 model runs. UFA confinement from Miller (1986).

Most of the priority water bodies where flow changes relative to the reference criterion indicate a potential resource constraint through the planning horizon are along the Suwannee River and its tributaries. Examination of the flow changes in each river reach contributing flow to the Suwannee River at Wilcox are conducted to identify where consumptive use is estimated to have the greatest impact on availability of groundwater to meet flow requirements of priority waterbodies (Figure 4-8). The decline in flow at the Wilcox gage represents the cumulative impact of reductions in groundwater flow across multiple river reaches. Figure 4-8 shows the simulated reduction in flow for individual river reaches upstream of the Wilcox gage, expressed as a percentage of the modeled cumulative decline in flow at the Wilcox gage. The largest simulated declines in groundwater inflow occur along the Upper Suwannee and Alapaha Rivers, which account for approximately 50% of the simulated decrease in flow at the Wilcox gage. Decreases in simulated groundwater inflows to the Withlacoochee River between the Pinetta and Lee gages account for approximately 19% of the flow loss at the Wilcox gage, while

decreases in inflow along the Santa Fe River between the Worthington and Ft. White gages account for approximately 12%.

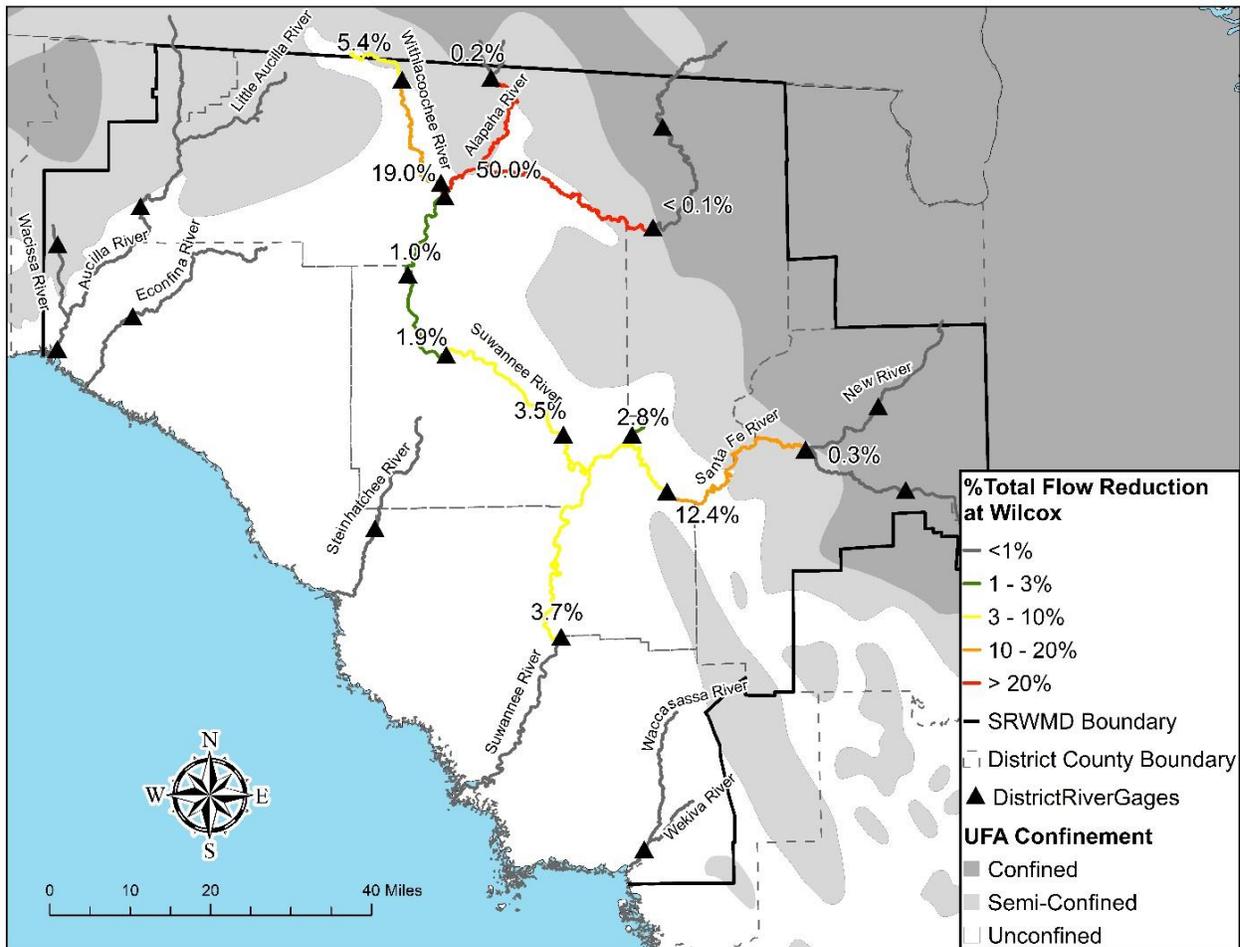


Figure 4-8. Simulated flow reductions in river reaches of the Suwannee River and its major tributaries between the baseline and 2009 model runs, expressed as a percentage of the modeled cumulative reduction in the flow of the Suwannee River near Wilcox. UFA confinement from Miller (1986).

Groundwater withdrawals that alter flow to the Suwannee River and other priority rivers and springs in the District occur both inside and outside the District. Figure 4-9 shows the percentage of the simulated change in flow to river reaches that can be attributed to groundwater withdrawals within the District based on the NFSEG v. 1.0. The percentage of the total simulated change in flow that the NFSEG v. 1.0 attributes to groundwater withdrawals within the District ranges from 100% on the Steinhatchee River to 15% on the Waccasassa River. In the Upper Suwannee and Alapaha River reach, where total changes in flow were greatest, less than 25% of the change in flow estimated by the model is due to estimated groundwater withdrawals in the District. The balance of the groundwater flow change is due to estimated groundwater withdrawals in adjacent water management districts in Florida, and from

groundwater withdrawals in Georgia and South Carolina. Although the coastal rivers in the Northwestern part of the District (Wacissa, Aucilla, and Econfinia Rivers) show reductions in total flow of less than 2% (Figure 4-7), the simulated flow reductions to these rivers from cross-boundary groundwater demands represent more than 50% of these estimated flow changes (Figure 4-9).

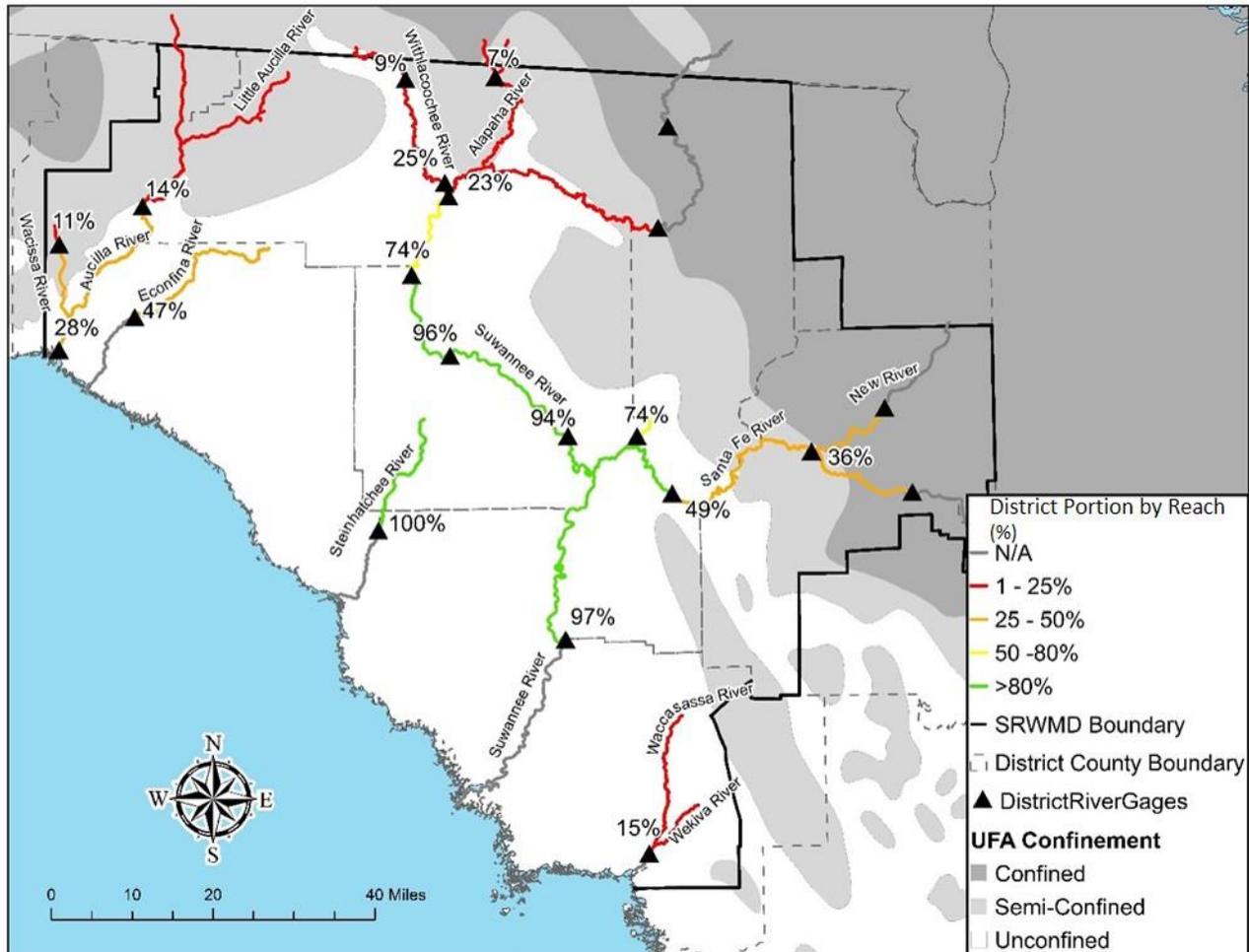


Figure 4-9. Simulated flow change for each river reach attributed to consumptive use within the District, expressed as a percentage of simulated flow change from within-District and cross-boundary withdrawals. UFA confinement from Miller (1986).

4.4 IDENTIFICATION OF CURRENT & POTENTIAL FUTURE IMPACTED AREAS

Subsection 373.709(1), F.S., requires the District to conduct water supply planning for areas of the District where it is determined that existing sources of water are not adequate to supply all existing and future reasonable-beneficial uses and to sustain the water resources and related natural systems for the planning period. The NFRWSP fulfills this requirement for the four

existing WRCA's. This assessment is used to evaluate the spatial extent of existing water supply planning regions and recommend, if necessary, other areas requiring regional water supply planning based on water availability and water demand projections through 2035.

The District's current designation of the Lower Santa Fe, Upper Santa Fe, Alapaha and Upper Suwannee River basins as WRCA's remains warranted. All four areas are currently included as part of the District's joint planning effort with the SJRWMD. As a result of this joint planning process, the District is proposing that the extent of regional water supply planning and water resource caution area be extended to the boundary of the Withlacoochee River in Hamilton County, the Suwannee River in Suwannee County, the Suwannee River in Gilchrist County, and to include the portion of Alachua County not currently in the planning region (Figure 4-10). The NFRWSP concluded that fresh groundwater alone is not sufficient to meet demands in this region, therefore the NFRWSP details projects and AWS to meet current and future demands. The existing WRCA's and the proposed WRCA would be merged to form the Eastern WRCA.

As described above, estimated changes in flow modeled along the Withlacoochee River (including Madison Blue Spring and Pot Spring), along the Suwannee River at the Ellaville, Branford and Wilcox gages, and at Levy Blue Spring on the Waccasassa River warrant further scrutiny by the District. Regional water supply planning is recommended as illustrated in Figure 4-10 to ensure adequate water supplies are available to meet all reasonable-beneficial uses and sustain natural systems through the planning horizon.

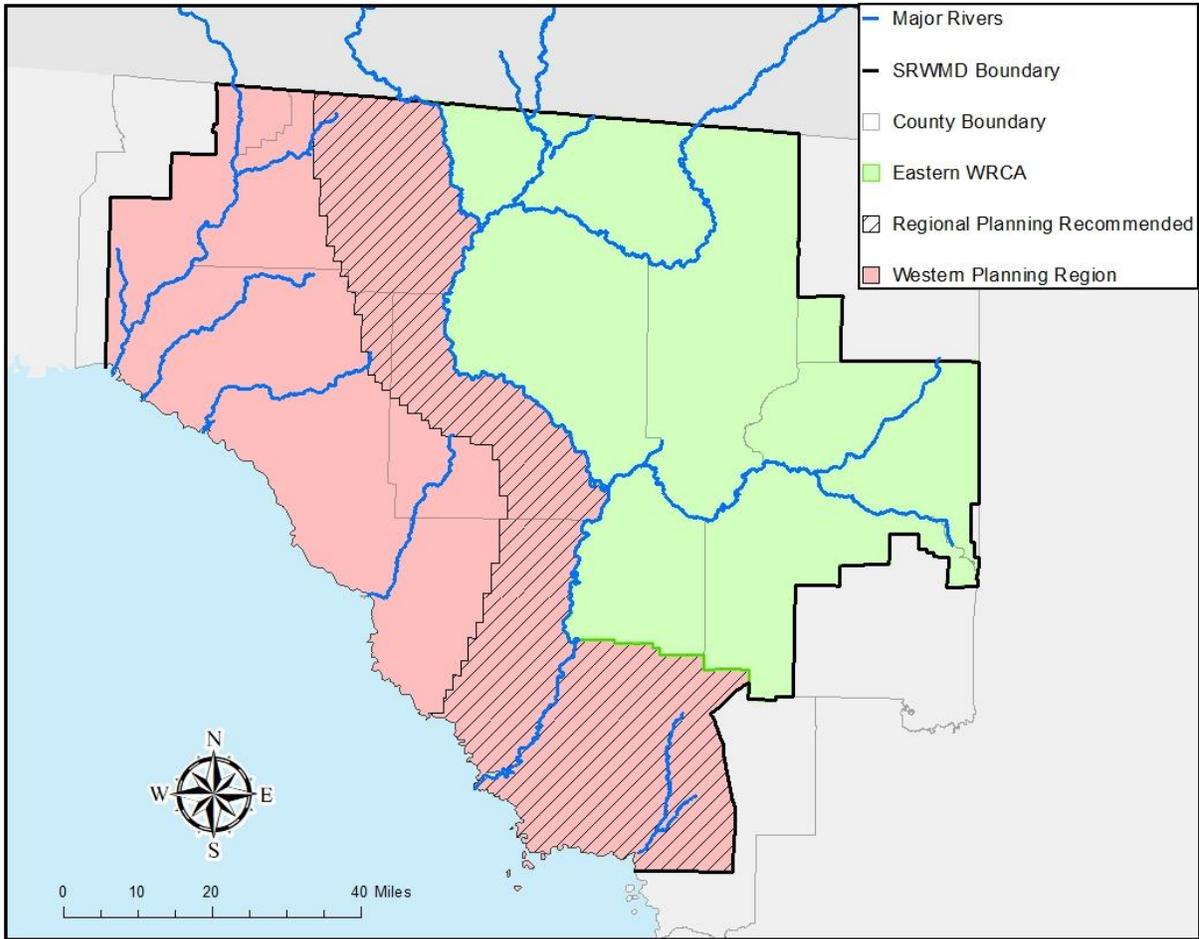


Figure 4-10. Proposed Eastern Water Resource Caution Area and Recommended Regional Planning Area in the Western Plannin Region.

5.0 ALTERNATIVE WATER SUPPLY AND CONSERVATION

Subsection 373.036(2)(b)4.b., F.S., regards Districtwide Water Supply Assessments (WSA) and requires analysis of:

“Whether existing and reasonably anticipated sources of water and conservation efforts are adequate to supply water for all existing legal uses and reasonably anticipated future needs and to sustain the water resources and related natural systems.”

Since the 2010 WSA, the District has been actively participating in a joint regional water supply planning effort in partnership with the SJRWMD to address the water resource challenges in the eastern portion of the District. This planning document is referred to as the NFRWSP. Among other activities, the NFRWSP included evaluation of the availability of AWS sources and potential water conservation options that together could serve to meet projected demands in a sustainable manner.

The Florida Legislature passed SB536 during the 2014 Legislative Session, which was signed into law by the Governor on June 13, 2014. SB536 required “the Florida Department of Environmental Protection, in coordination with the stakeholders, to conduct a comprehensive study and submit a report on the expansion of the beneficial use of reclaimed water, stormwater, and excess surface water within this state”. The District collaboratively worked with the FDEP and other water management districts to study the potential to utilize alternative water supplies for the beneficial use of our stakeholders and the protections of our natural systems and springs (FDEP, 2015). The resulting document includes potential sources and planning level estimates of available water that could be used to meet projected future demands within the District.

5.1 ALTERNATIVE WATER SUPPLY (AWS) AVAILABILITY

Section 373.019, F.S., defines “Alternative Water Supplies” as “salt water; brackish surface and groundwater; surface water captured predominately during wet-weather flows; sources made available through the addition of new storage capacity for surface or groundwater, water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of waterbodies with reclaimed water; stormwater; and any other water supply source that is designated as nontraditional for a water supply planning region in the applicable regional water supply plan.” AWS projects can be implemented districtwide to meet current and projected future water supply demands.

5.2 RECLAIMED WATER

As defined by Rule 62-40, F.A.C., “reclaimed water” is water that has received at least secondary treatment and basic disinfection, and is reused after flowing out of a domestic wastewater treatment facility (WWTF). “Reuse” means the deliberate application of reclaimed water for a beneficial purpose. Reclaimed water is regularly used in Florida for non-potable purposes and can serve to decrease demands upon traditional fresh groundwater resources. Potential uses include activities such as irrigation of residential and commercial landscapes, golf courses, and agricultural crops; cooling or make-up water for power generation and other industrial processes; fire protection; artificial augmentation, recharge, and restoration of surface waters, aquifers, or wetlands.

Some wastewater utilities within the District discharge excess reclaimed water to surface waters and sprayfields, or into rapid infiltration basins (aka RIBs). Often, this is done during the wet season when abundant rainfall eliminates the need for supplemental irrigation. Discharge through RIBs to the underlying aquifer can contribute to aquifer recharge where hydrogeologic conditions are favorable.

The state’s WMDs generally consider beneficial reuse to be comprised of uses in which reclaimed water takes the place of a pre-existing or potential use of higher quality water for which reclaimed water is suitable, such as water used for landscape irrigation. Delivery of reclaimed water to sprayfields, absorption fields and RIBs is generally not considered beneficial reuse by the District and SJRWMD in most areas. However, an exception is made for high recharge areas to the UFA. Since much of the District is a high UFA recharge area, reclaimed water disposed via sprayfields and RIBs can be beneficial to the degree they serve to recharge the UFA and effectively offset groundwater demand.

Table 5-1 provides an overview of existing wastewater treatment facilities within the District. The source of information was the FDEP 2015 Reuse Inventory (FDEP, 2016).

Table 5-1. Existing Wastewater Treatment Facilities in the District

Reuse System Name	County	Wastewater Treatment Capacity (mgd)	2015 Wastewater Treatment Plant Total Flow (mgd)	FDEP Reuse Type
Alachua	Alachua	1.50	0.61	Industrial, Sprayfield
High Springs	Alachua	0.24	0.15	Sprayfield
Newberry WWTF	Alachua	0.50	0.22	Disposal Only
Florida State Prison WWTF	Bradford	1.78	0.92	Sprayfield
Starke, City of	Bradford	0.98	0.89	Industrial, Sprayfield
Columbia Correctional Institution	Columbia	0.53	0.43	Sprayfield
Lake City WWTF	Columbia	2.95	2.18	Sprayfield*
Cross City, Town of	Dixie	0.40	0.38	Sprayfield
Lancaster Correctional Institution	Gilchrist	0.25	0.10	Sprayfield
Trenton WWTF	Gilchrist	0.20	0.11	Sprayfield
Jasper, City of	Hamilton	1.20	0.66	N/A
Jennings, Town of	Hamilton	0.18	0.12	Sprayfield
SR-61/I-75 WWTF	Hamilton	0.05	0.02	Sprayfield
White Springs, Town of	Hamilton	0.15	0.08	Industrial
Jefferson Correctional Institution	Jefferson	0.25	0.18	Toilet, Sprayfield
Mayo Correctional Institution	Lafayette	0.50	0.15	Toilet, Sprayfield
Mayo, Town of	Lafayette	0.15	0.09	Sprayfield
Cedar Key	Levy	0.18	0.09	Recharge, Landscape
Chiefland	Levy	0.48	0.25	Recharge
Greenville, Town of	Madison	0.15	0.06	Sprayfield
Madison, City of	Madison	0.99	0.65	Sprayfield
Advent Christian Home	Suwannee	0.21	0.06	Sprayfield
Branford	Suwannee	0.10	0.06	Recharge
Live Oak, City of	Suwannee	1.82	1.09	Recharge, Landscape, Sprayfield
Perry, City of	Taylor	1.25	0.82	Industrial, Sprayfield
Taylor Correctional Institution	Taylor	0.40	0.18	Recharge
Lake Butler	Union	0.70	0.47	Sprayfield
Total		18.09	11.02	

* Following generation of these reuse estimates the Ichetucknee Springshed Water Quality Improvement Project was completed which converted Lake City's wastewater effluent disposal system into constructed treatment wetlands, which will provide both water supply and water quality benefits to the region.

Projections of 2035 WWTF flows were undertaken as part of the creation of the NFRWSP. Tables 5-2 and 5-3 show the quantity of wastewater that the District projects to be produced by each WWTF (Table 5-2) and by each county (Table 5-3). The District's projections of potential

beneficial reuse are based on the assumption that all WWTFs will be capable of producing public access-quality reclaimed water. Projected WWTF flows were multiplied by 75% (FDEP's beneficial reuse goal) to identify potential reclaimed water quantities that could potentially be available for beneficial reuse in 2035.

Projections of wastewater flow and potential reclaimed water availability were made for domestic WWTFs using 2010 permitted wastewater treatment capacities equal to or greater than 0.1 mgd (2010 baseline). Wastewater flows regularly fluctuate from year to year in response to varying environmental circumstances. The projected increase in wastewater flows over the planning period is relatively minor in scale.

The District's public access wastewater infrastructure is relatively small in scale, however reclaimed water represents potential alternative water supply to meet projected demands. About 13% of wastewater flows in the District are utilized for reclaimed uses that directly offset or replace other consumptive water uses. As shown in Table 5-1, 2015 total wastewater flows in the District were approximately 11.0 mgd. Table 5-2 indicates that 2035 total wastewater flows in the District will be approximately 11.8 mgd, with a potential reclaimed water availability of 8.5 mgd (assuming achievement of 75% reuse on a regional scale).

Use of reclaimed water, where feasible, is required by District WUP rules and the District has worked cooperatively with reclaimed water producers to accomplish increased beneficial reuse. It is generally anticipated that beneficial reuse projects for wastewater generated from within the District will typically be local projects in proximity to the WWTF (e.g. local residential, commercial, or industrial projects). Although reclaimed expansion in the District is limited in scale from a water supply standpoint, increased development of reclaimed water can have local water supply and resource benefits and represents a potential tool for nutrient management.

Table 5-2. Projected Reclaimed Water Availability by Utility for 2035

County	Reuse System Name	2035 Total Facility Treatment Flow (mgd)	2035 Total Additional Available if FDEP 75% Beneficial Reuse is Met (mgd)
Alachua	Alachua	0.77	0.55
Alachua	High Springs WWTF	0.22	0.16
Alachua	Newberry WWTF	0.30	0.23
Alachua	Waldo	0.11	0.08
Bradford	Florida State Prison WWTF	1.06	0.80
Bradford	Starke, City of	0.36	0.20
Columbia	Columbia Correctional Institution	0.35	0.09
Columbia	Lake City WWTF	2.75	2.07
Dixie	Cross City WWTF	0.25	0.19
Gilchrist	Lancaster Correctional Institution	0.12	0.09
Gilchrist	Trenton WWTF	0.11	0.08
Hamilton	Jasper	0.72	0.54
Hamilton	Jennings	0.14	0.10
Hamilton	White Springs WWTF	0.06	0.04
Jefferson	Jefferson Correctional Institution	0.19	0.07
Lafayette	Mayo, Town of	0.20	0.15
Lafayette	Mayo Correctional Institution	0.11	0.08
Levy	Cedar Key	0.13	0.09
Levy	Chiefland	0.21	0.16
Madison	Greenville, Town of	0.09	0.07
Madison	Madison, City of	0.66	0.49
Suwannee	Advent Christian Home	0.06	0.05
Suwannee	Branford	0.09	0.06
Suwannee	Live Oak, City of	0.87	0.65
Taylor	Perry, City of	1.00	0.75
Taylor	Taylor Correctional Institution	0.33	0.25
Union	Lake Butler	0.49	0.37
TOTAL		11.75	8.46

Table 5-3. Projected Reclaimed Water Availability by County for 2035

County	2035 Total Facility Treatment Flow (mgd)	FDEP 75% Beneficial Reuse (mgd)
Alachua	1.40	1.02
Baker	0.00	0.00
Bradford	1.42	1.00
Columbia	3.10	2.16
Dixie	0.25	0.19
Gilchrist	0.23	0.17
Hamilton	0.91	0.69
Jefferson	0.19	0.07
Lafayette	0.31	0.23
Levy	0.35	0.25
Madison	0.75	0.56
Suwannee	1.01	0.76
Taylor	1.33	0.99
Union	0.49	0.37
TOTAL	11.75	8.46

Regionally, expansion of reclaimed water use from WWTF located outside of the District may have significant potential in more densely populated areas of North Florida outside of the District's jurisdiction (e.g. SJRWMD). Increased regional use of reclaimed water for recharge or to offset groundwater use in the Partnership area could have significant benefits for water supply and natural systems in both the SJRWMD and the District.

5.3 SURFACE WATER

Surface water obtained from rivers is increasingly being used for water supply within certain areas of the state, as the sustainable yield of fresh groundwater resources is constrained. Although rivers within the District are not widely used for water supply purposes, the potential exists to use surface water in a sustainable manner that protects water resources and environmental systems while providing supplies for aquifer recharge, natural system restoration, or other beneficial purposes. The total potential safe yield of surface water is ultimately dependent upon the establishment of MFLs for the rivers within the District and the economic and technical feasibility of developing withdrawal, storage and distribution infrastructure.

Surface water availability in the District exhibits strong seasonality, with varied quantities of water available depending on rates of surface water flow during dry and wet seasons. Thus, when developing surface water supplies, a seasonal mismatch of surface water availability in comparison to water demands can constrain the potential for surface water development. In some areas, significant investment in storage capacity may be required to utilize surface water for water supply purposes. Thus, optimizing the capture of surface water during higher flow conditions will potentially require the construction, operation, and maintenance of substantial withdrawal and storage-related infrastructure.

As a part of the SB 536 report, the District completed a planning level estimate of surface water availability within the District. The District identified four major rivers where excess surface water from high river flows may be available: the Aucilla, Steinhatchee, Withlacoochee and Suwannee Rivers. A preliminary assessment indicates that the availability of water from the Suwannee River varies significantly on a year-to-year basis. Planning level estimates suggest up to 18.4 mgd for the Aucilla River, 10.5 mgd for the Steinhatchee River, and 156 mgd for the Suwannee River (including up to 45.5 mgd on the Withlacoochee River) may be available. These planning level estimates are contingent on compliance with established MFLs for these systems. Little, if any water would be considered excess during certain low flow periods or drought conditions. The seasonality of these systems emphasizes that significant storage capacity would be required to develop these potential surface water supplies for beneficial use.

5.4 STORMWATER

Rule 62-40, F.A.C., defines “stormwater recycling” as the capture of stormwater for irrigation or other beneficial use. The FDEP and the state’s WMDs identified stormwater as the flow of water which results from, and which occurs immediately following, a rainfall event and which is normally captured in ponds, swales, or similar areas for water quality treatment or flood control. Development of the natural landscape can result in significant changes to the characteristics of stormwater flows. Stormwater runoff can provide considerable volumes of water that can be captured and beneficially used, resulting in water supply, aquifer recharge, water quality, and natural system benefits. The reliability of stormwater can vary considerably depending upon climatic conditions and storage capability. Therefore, the feasibility of effectively utilizing stormwater as an AWS source often relies on the ability to use it in conjunction with another source (or sources) in order to decrease operational vulnerability to climatic variability (aka “conjunctive use”).

5.5 BRACKISH GROUNDWATER DESALINATION

Brackish groundwater desalination is widely-used in areas of Florida where freshwater sources are not readily abundant to meet PS and other water demands. Typically, mineralized groundwater is withdrawn from the UFA or from the intermediate aquifer system and treated using reverse osmosis (RO) membrane technology to remove high levels of total dissolved solids and other mineral or environmental impurities. RO treatment of brackish groundwater

produces a highly-mineralized concentrate that requires disposal, typically through an expensive deep injection well or ocean outfall which can pose permitting challenges. Additionally, RO treatment requires relatively high energy inputs and operation and maintenance costs when compared to other AWS strategies.

Currently, there are no brackish groundwater treatment facilities in operation within the District, and brackish groundwater in the UFA is limited primarily to coastal areas. Cedar Key has a RO system purchased due to salt water intrusion, however it is currently not in operation since the water quality has returned to acceptable levels. The coastal source location and the high cost of treatment and disposal of treatment byproducts make the use of brackish groundwater an unlikely option for most water users within the District, because they are located well inland of the coast. Depending on site-specific conditions and operational requirements, brackish groundwater from the UFA could potentially serve as a feasible water supply source for a new coastal C/I/I or PG user. However, feasibility would have to be determined on a case-by-case basis.

5.6 SEAWATER DESALINATION

Seawater desalination in the District would involve withdrawing water directly from the Gulf of Mexico or an estuary and removing the salts and minerals to render it fit for potable or other uses. Seawater desalination is not widely-used in Florida. As with brackish water desalination, treatment of seawater is energy intensive and produces a concentrate that requires disposal through deep injection wells or an ocean outfall which can pose considerable permitting challenges. Seawater sources are located in coastal areas of the District where demands for fresh groundwater are relatively low. As with brackish groundwater, the coastal source location and the high cost of treatment and disposal make seawater desalination an unlikely option for most water users within the District.

5.7 WATER CONSERVATION

The following section provides an overview of regional-scale estimates of the potential water savings that could be achieved through implementation of conservation options for all six water use categories including PS, DSS, Agricultural, C/I/I, PG and LRA water uses. Potential water savings for all six categories within the eastern portion of the District were calculated as part of the preparation of the NFRWSP, whereas potential savings within the remainder of the District were calculated in a manner consistent with the NFRWSP as part of the WSA (2015-2035) effort.

5.7.1 Methodology

Low and high-range estimates of potential water conservation were estimated Districtwide. Estimates are presented for the Eastern and Western District regions. The Eastern District

includes the portions of the District contained within the Partnership area for the NFRWSP. The Western District contains all areas in the District outside the Partnership area.

Low-Range Conservation Estimates

A range of potential water conservation savings was calculated for all six water use categories. “Low-Range” estimates of potential savings were developed for all use categories, with the exception of the agricultural water use category, using estimates previously developed for regional planning efforts via Conserve Florida’s “EZ Guide,” (<http://www.conservefloridawater.org>). The estimated potential percent reduction in water use for each category was multiplied by its respective 2035 projected water demand to calculate potential Low-Range savings for each category. Estimates of agricultural water conservation potential were developed from the irrigation efficiency estimates provided by FDACS in the 2035 FSAID2 water demand projections geodatabase.

High-Range Conservation Estimates

“High-Range” conservation estimates were also developed. The sole difference between Low and High Range estimates relates to PS and DSS conservation. High-Range estimates for the PS and DSS categories were calculated using a per capita water use reduction methodology which resulted in a greater degree of savings for these categories. High-Range estimates for the Agricultural, C/I/I, PG, and LRA categories also used the EZ Guide and are identical to the Low-Range values.

Additional details regarding the estimates of potential water conservation for each water use category is provided in the sections below.

5.7.2 Public Supply Water Conservation

Water savings can be achieved through a combination of regulatory, economic, incentive-based, outreach measures, and technical assistance. Regulatory measures include water restrictions, codes, and ordinances that require water efficiency standards for new development and existing areas. For example, the National Energy Policy Act of 1992 requires that all new construction built after 1994 be equipped with low-flow plumbing fixtures. In Florida, Senate Bill 494, which took effect in July 2009, required all automatic irrigation systems to use an automatic shutoff device. Senate Bill 2080, effective October 2012, prohibited contractual and/or local government ordinance restrictions on the implementation of Florida-Friendly™ landscaping.

Economic measures such as inclining block rate structures require customers of public water supply systems to pay more per gallon when they use water in excess of a standard base quantity. Incentive programs include rebates, utility bill credits or giveaways of devices and fixtures that will replace older, less water-efficient models. Recognition programs are also incentive programs that recognize home owners and businesses for their environmental stewardship.

Education is an important element of a successful conservation program. While the actual quantity of water saved as a result of customer education is not always measurable, the effort greatly increases the success of all facets of the conservation program by raising customer awareness and changing attitudes regarding water use. Educating the public is a necessary component of every water conservation program and education programs accompanied with other effective conservation measures can be an effective long-term water conservation strategy.

Public Supply Utilities

Water conservation planning for PS utilities is often achieved using the unit-based method whereby water savings are based on the unit savings rates of BMPs. BMPs for utilities include high efficiency clothing washer rebates, ultra-low flow and high efficiency toilet rebates, hot water on demand water heater rebates, waterless urinal rebates, water use evaluations, non-potable outdoor irrigation source installations, and water efficient landscape and irrigation evaluations and rebates. The unit-based method is appropriate when sufficient account-level utility data is available and can be used to identify the number of BMP opportunities (for example, the number of non-conserving fixtures).

As previously stated, high and low range projections of water conservation potential were derived using two different methods.

Low-Range Public Supply Conservation

Potential low range percent conservation savings for the PS category were determined using estimates previously developed for regional planning efforts via Conserve Florida's "EZ Guide" in accordance with the NFRWSP for the low range conservation projections. The Conserve Florida estimate for potential reductions in demand for PS is 4.1% regardless of location within the District.

High-Range Public Supply Conservation

Unlike the Low-Range estimates which used the EZ Guide, the high range conservation projections utilized a regional gpcd reduction approach for PS. The High Range analysis divided the District into an eastern and western region. The average 2010-2014 gpcd rate for each utility was then compared to its corresponding average regional per capita use rate. Those utilities with average gpcd rates less than or equal to the average regional per capita use rate were kept at their average gpcd rates, while those utilities with average gpcd rates above the regional rate were reduced to the average regional gpcd rate. Demands for each utility were then recalculated based on this methodology and a regional conservation reduction percentage was calculated and summarized as shown in Table 5-8. The estimated reductions in total projected PS water use for the eastern (20 utilities) and western (16 utilities) regions of the District are 1.11 mgd and 0.82 mgd, respectively (total 1.93 mgd savings Districtwide). In terms of percent reduction, the estimated reduction in the eastern region is 10.1%, whereas the estimated reduction in the western region is 15.5%.

5.7.3 Domestic Self Supply

Due to the largely rural nature of the District, there are a relatively high number of DSS users. Because indoor water use for DSS is not regulated, the District takes a non-regulatory approach to encourage conservation for DSS users. The District's website gives multiple examples of water conservation techniques which can be employed to reduce residential water use (<http://www.srwmd.state.fl.us/index.aspx?nid=294>). These examples include leak repairs, water-efficient fixture upgrades, and behavioral changes that can yield hundreds to thousands of gallons of savings per household per month. Although these BMPs are identified for PS users, many of these BMPs are also applicable to DSS users.

To estimate the potential for DSS conservation for the Low and High Range projections, it was assumed that the 2035 DSS water demands had the same potential for water conservation as PS systems. Thus the PS conservation potential percentages for the eastern and western regions of the District were applied to DSS water use as shown in Table 5-4.

5.7.4 Agricultural Water Conservation

Extensive research has been conducted in the state regarding the potential water savings that can be accomplished through improvements in irrigation system efficiency and distribution uniformity as well as use of smart technologies such as weather stations and soil moisture sensors. Efficient agricultural water use is a District priority. The District's March 2014 WUP Applicant's Handbook includes requirements for Water Conservation Plans for large scale users of all water use types including agriculture.

The Suwannee River Partnership has been instrumental in implementing conservation partnerships with the agriculture community in the Suwannee River Basin. The Suwannee River Partnership coordinates with the District and agricultural water users to bring mobile irrigation lab services to area farmers to achieve substantial water savings. The District has also initiated an agricultural cost-share program to incentivize agricultural producers to implement irrigation efficiencies and reduce groundwater pumpage. These projects include irrigation system retrofits, soil moisture sensors, remote access for irrigation system control, as well as other BMPs that provide cost-effective water savings.

Technical resources are also available from the FDACS, the Natural Resource Conservation Service (NRCS), the Institute of Food and Agricultural Sciences, and the county agricultural extension offices to assist the agricultural community in the implementation of BMPs. Additionally, funding for water conservation upgrades may be available to the agricultural community through NRCS cost share programs such as the Environmental Quality Incentive Program.

Potential percent reduction in the agricultural water use category was determined using the estimated percent reduction reported by the FDACS using the FSAID2 model (FDACS, 2015) for both the Low and High Range conservation projections. The FSAID2 estimate for potential reductions in water demand for the agricultural water use category in this region was estimated to be 16.1%. Therefore, the 2035 agricultural water demands were multiplied by this percentage to produce a potential reduction in demand for both the Low and High range conservation estimates as shown in Table 5-4.

5.7.5 Commercial/Industrial/Institutional and Thermo-Electric Power Generation Water Conservation

The District's water conservation strategies for the C/I/I category include WUP regulations to require submittal of Water Conservation Plans for large-scale users, as referenced by Rule 40B-2.301(3), F.A.C.

Potential percent water savings for C/I/I and PG water use was determined using estimates previously developed for regional planning efforts via the Conserve Florida's EZ Guide in accordance with the NFRWSP for both the Low and High-Range conservation projections. The Conserve Florida estimate for potential savings in demand for the C/I/I category is 1.2%. Therefore, the projected 2035 C/I/I and PG water use demands (Chapter 3) were multiplied by this percentage to produce a potential water savings for both the Low and High-range conservation estimates as shown in Table 5-4.

5.7.6 Landscape/Recreational/Aesthetic Conservation

Landscape/Recreational/Aesthetic users can save water by implementing smart irrigation technologies, which are irrigation strategies that maximize water efficiency by monitoring and using climatic information such as soil moisture, rainfall, wind, slope, soil, and plant type, and applying the right amount of water to the landscape based upon these factors. Smart irrigation technologies are typically weather-based or soil moisture-based. Both types of smart controllers use various technological configurations, all of which are capable of saving significant volumes of water. Another potential LRA water conservation option is the use of low volume irrigation technology in lieu of overhead irrigation.

Potential percent water savings for the LRA water use was determined using estimates previously developed for regional planning efforts via the Conserve Florida's EZ Guide in accordance with the NFRWSP for both the Low and High-Range conservation projections. The Conserve Florida estimate for potential reductions in water demand for the LRA category is 2.8%. Therefore, the 2035 LRA water demands were multiplied by this percentage to produce a potential water savings for both the Low and High-Range conservation estimates as shown in Table 5-4.

5.7.7 Estimate of Total Potential Conservation Savings

From the above analyses, a range of total water savings that could potentially be achieved was developed. As shown in Table 5-4, of the total projected annual average water demand in 2035 (299.83 mgd), it is estimated that a range of 29 mgd to 32 mgd of water savings could potentially be achieved Districtwide through implementation of enhanced water conservation.

Table 5-4. High and Low Range Potential Conservation Potential by Water Use Category

Water Use Category	2035 Demand (mgd)	High Range		Low Range	
		Percent Conservation	Projected 2035 Conservation (mgd)	Percent Conservation	Projected 2035 Conservation (mgd)
Public Supply (Eastern Region)	10.99	10.10%	1.11	4.10%	0.45
Public Supply (Western Region)	5.29	15.50%	0.82	4.10%	0.22
Domestic Self-Supply (Eastern Region)	17.22	10.10%	1.74	4.10%	0.71
Domestic Self-Supply (Western Region)	7.19	15.50%	1.11	4.10%	0.29
Agricultural	161.07	16.10%	25.93	16.10%	25.93
Commercial / Industrial / Institutional	80.99	1.20%	0.97	1.20%	0.97
Thermo-Electric Power Generation	15.32	1.20%	0.18	1.20%	0.18
Landscape/ Recreational/ Aesthetic	1.76	2.80%	0.05	2.80%	0.05
TOTAL	299.83	10.64%	31.91	9.61%	28.80

5.8 SUMMARY OF POTENTIAL AWS AVAILABILITY & CONSERVATION SAVINGS

Table 5-5 provides a summary of the quantity of water that may potentially be available from AWS sources and potential projected water conservation as of 2035.

Surface water availability and the values presented are highly preliminary as described in the surface water section of this chapter, and will ultimately depend upon establishment of MFLs. However, surface water represents the largest potential source of AWS within the District and the most promising option for potential regional projects. Reclaimed water and stormwater represent important potential AWS sources for localized use. Overall, stormwater can be an

important component of future local supplies where stormwater management systems are capable of retaining water on a sustained basis. Brackish groundwater exists in coastal areas and is available for use on a project and site-specific basis, but is not expected to play a significant role in AWS development in the District. Seawater is abundant along the coast; however, the cost of seawater desalination is the highest of the potential AWS sources and the feasibility of its use during the planning period is minimal.

Table 5-5. Summary of Potential AWS Availability and Conservation Savings – 2035

Alternative Water Supply	Potential Availability ¹
	<i>mgd</i>
Reclaimed Water	Up to 8.46 ²
Surface Water	Up to 185 ³
Stormwater	Project and Site Specific
Brackish Groundwater	Project and Site Specific
Seawater	Project and Site Specific

Water Conservation Use Type	Potential Savings
	<i>mgd</i>
Agricultural (Low/High)	25.93 mgd / 25.93 mgd
Non-Agricultural (Low/High)	2.87 mgd / 5.98 mgd
Total	28.80 mgd / 31.91 mgd

¹ Potential AWS quantities are preliminary planning-level, conceptual estimates only.

² Potential quantities for reclaimed water assume Districtwide achievement of FDEP 75% reuse goal.

³ See section 5.3. These planning level estimates are contingent on compliance with established MFLs for the systems. No water would be available during certain low flow periods or drought conditions.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This WSA was conducted to determine whether water supplies in the district will be adequate to satisfy water supply demands for the 2015-2035 planning period while protecting natural systems. Existing and future water demand projections were examined as required by Rule 62-40, F.A.C. Total water demand in the District is projected to grow from 229 mgd to 300 mgd, with fresh groundwater from the FAS supplying over 90% of the water. Agricultural Self Supply remains the largest use category in our District, and represents the largest projected water demand growth through 2035. Draft estimates of actual use for 2015 and projections for the 2020-2040 planning horizon were generated (Appendix A).

Implementation of the recommendations from the District's 2010 WSA have resulted in an improved understanding of the water supply challenges facing the District. Water available for reasonable and beneficial uses and to support natural systems is affected by water demands that extend beyond the District's boundaries. Domain-wide water demand projections modeled using NFSEG version 1.0 enabled these cross-boundary impacts to be estimated. Within the 60,000 square mile model domain, groundwater demands are projected to increase from 1,668 mgd to 2,085 mgd between 2009 and 2035. These growth projections held agricultural irrigation demands constant in Georgia from 2009 through 2035, therefore actual water demands will likely be higher than the growth in water demand projected domainwide. The NFSEG version 1.0 was used to evaluate the impact to priority water bodies that would occur if all projected future demands are met with fresh groundwater. Output from the NFSEG was used to identify regions in the district where the traditional water supplies may be inadequate to meet estimated current or projected future water demand while sustaining flows and levels in natural systems.

This WSA makes the following recommendations based on an evaluation of projected growth in water demand and natural resource constraints:

- Split the District into two water supply planning regions to increase efficiency for planning and project implementation (see Figure 6-1). Moving forward, the North Florida Regional Water Supply Plan will serve as the water supply assessment and plan for the Eastern Planning Region.

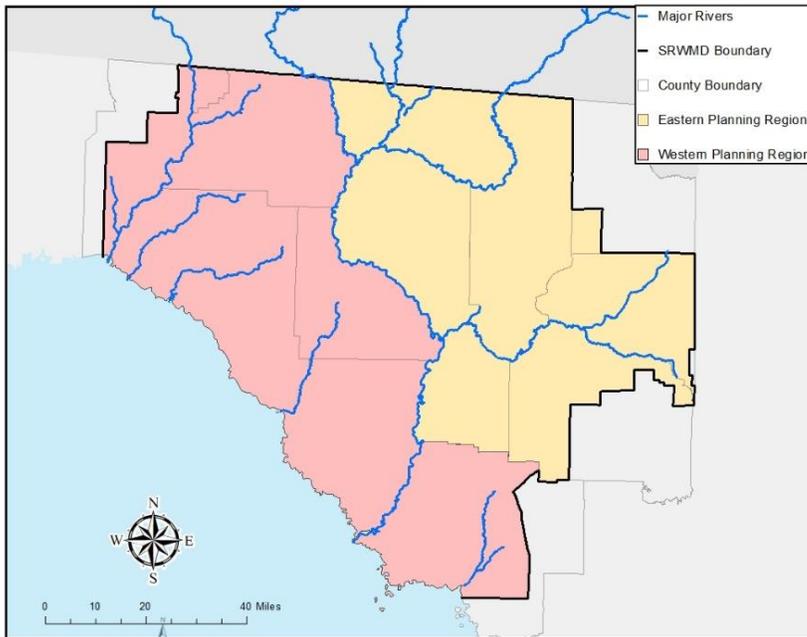


Figure 6-1. Recommended planning regions for the District.

- Declare the Eastern Planning Region a Water Resource Caution Area. The Eastern Water Resource Caution area would encompass the existing Water Resource Caution Areas (as identified in the 2010 WSA) and declare the remainder of the Eastern Planning Region a water resource caution area (this will include the remaining portions of Hamilton, Suwannee, Gilchrist, and Alachua counties located within the District, Figure ES-2). The intent to extend the water resource caution areas to the full extent of the Partnership area was initially described in the approved NFRWSP.

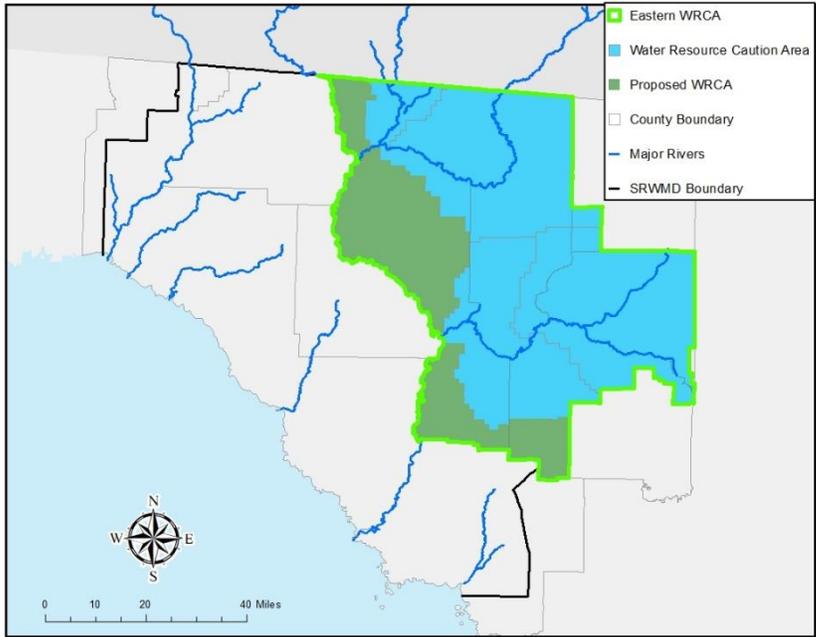


Figure 6-2. Proposed extent of Eastern Water Resource Caution Area in the Eastern Planning Region

- Initiate regional water supply planning in the Western Planning Region, to include portions of the planning region contributing groundwater or surface water to the Withlacoochee, Suwannee and Waccasassa Rivers (Figure ES-3).

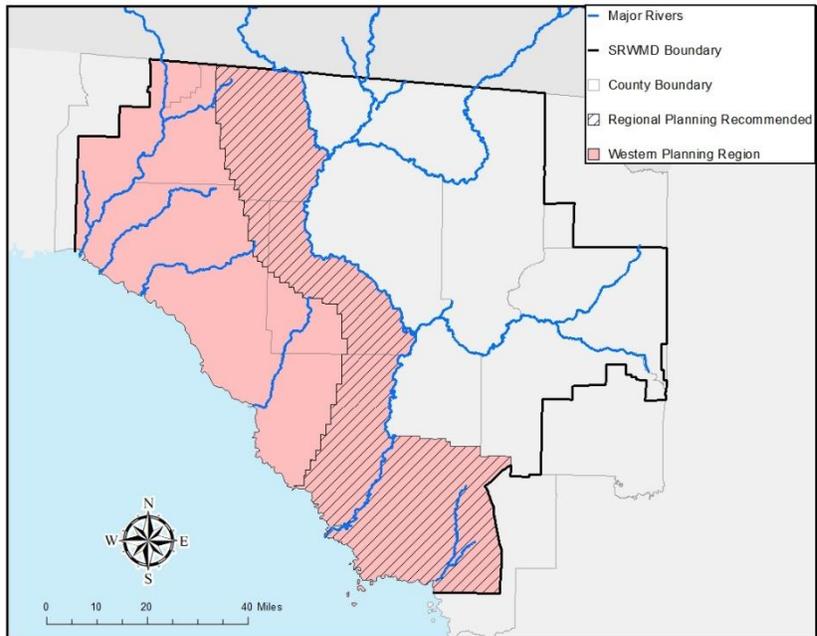


Figure 6-3. Proposed extent of regional water supply planning in the Western Planning Region

Detailed evaluations needed

The NFSEG version 1.0 simulation indicates that two MFL waterbodies, Madison Blue Spring and Levy Blue Spring, warrant a more detailed evaluation based on the predicted changes in flow from 2009 conditions. One additional MFL waterbody, the Suwannee River at Wilcox, may be constrained by 2035 if all future water demands are met with fresh groundwater. The proposed extension of the regional water supply planning area includes these MFL waterbodies, and will result in a detailed examination of available water supplies and projected groundwater demands in these regions. Regional water supply planning and the identification of AWS options, in conjunction with the continued establishment, evaluation, and enforcement of MFLs for all priority waterbodies, will be critical to meeting the projected future water demands in the District while sustaining natural systems.

REFERENCES

Ceryak, R., Knapp, M.S., and Burnson, T., 1983, *The Geology and Water Resources of the Upper Suwannee River Basin* Bureau of Geology/Suwannee River Water Management District, Report of Investigation No. 87

District. 2011. *2010 Water Supply Assessment*. SRWMD, Live Oak, FL.

District, Florida Department of Environmental Protection, and SJRWMD, 2011. *Interagency Agreement Between SRWMD, SJRWMD, and the Florida Department of Environmental Protection*.

District. 2013. *Minimum Flows and Levels for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs*. SRWMD. Live Oak, FL.

District. 2014. *Recovery Strategy for the Lower Santa Fe River Basin*. Live Oak, FL.

District and SJRWMD, 2015. *2010 Water Use Estimates and 2015-2035 Demand Projections*, North Florida Regional Water Supply Plan (Draft). SRWMD, Live Oak, FL. SJRWMD, Palatka, FL

District and SJRWMD, 2016. Development and Calibration of the North Florida Southeast Georgia Groundwater Model (NFSEG V 1.0) SRWMD, Live Oak, FL. SJRWMD, Palatka, FL. Available from: <https://northfloridawater.com/groundwaterflowmodel.html>

District and SJRWMD, 2017. North Florida Regional Water Supply Plan (2015-2035) and Appendices. SRWMD, Live Oak, FL. SJRWMD, Palatka, FL. Available from: <http://northfloridawater.com/watersupplyplan/document.html>

FDACS, 2014. *Estimating Florida Statewide Agricultural Irrigation Demand using Economics and Engineering Models*. Prepared by The Balmoral Group. Winter Park, FL, and FDACS, Tallahassee, FL.

FDACS, 2015. *Florida Statewide Agricultural Irrigation Demand, Final Report*. Prepared by The Balmoral Group, Winter Park, FL, and FDACS, Tallahassee, FL

FDACS, 2017. *Florida Statewide Agricultural Irrigation Demand Estimated Agricultural Water Demand 2015 – 2040*. Prepared by The Balmoral Group, Winter Park, FL, and FDACS, Tallahassee, FL

FDEP, 2003. *Water Reuse for Florida: Strategies for Effective Uses of Reclaimed Water*. FDEP, Tallahassee, FL. Available from: http://www.dep.state.fl.us/water/reuse/docs/valued_resource_FinalReport.pdf.

FDEP, 2011. *2010 Reuse Inventory: Florida Department of Environmental Protection Water Reuse Program*. FDEP, Tallahassee, FL. Available from: <http://www.dep.state.fl.us/water/reuse/inventory.htm>.

- FDEP, 2016. 2015 Reuse Inventory: *Florida Department of Environmental Protection Water Reuse Program*. FDEP, Tallahassee, FL. Available from:
http://www.dep.state.fl.us/water/reuse/docs/inventory/2015_reuse-report.pdf
- FDEP, 2015. Florida Department of Environmental Protection, 2015 (Draft), Report on Expansion of Beneficial Use of Reclaimed Water, Stormwater, and Excess Surface Water (Senate Bill 536). FDEP, Tallahassee, FL.
<http://www.dep.state.fl.us/water/reuse/docs/sb536/SB536-Report.pdf>.
- Marella, R. 2009. *Water Withdrawals, Use, and Trends in Florida, 2005*. USGS Scientific Investigations Report 2009-5125.
- Marella, R. 2014. *Water Withdrawals, Use, and Trends in Florida, 2010*. USGS Scientific Investigations Report 2014-5088.
- Miller, J.A., 1986, Hydrogeologic Framework of the Floridan aquifer system in Florida and in parts of Georgia, Alabama, and South Carolina: U.S. Geological Survey Professional Paper 1403-B, p. 25-27.
- Scott, T.M., 1988, *The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida*: Florida Geological Survey Bulletin 59, 147 p.
- Scott, T.M., 1992, *A geologic overview of Florida*: Florida Geological Survey, Open File Report, no. 50, 78 p.
- SJRWMD. 2007. *2006 Annual Water Use Survey*. Technical Publication SJ2007-FS1. SJRWMD, Palatka, FL.
- SJRWMD. 2008. *2007 Annual Water Use Survey*. Technical Publication SJ2008-FS1. SJRWMD, Palatka, FL.
- SJRWMD. 2008. *Engineering Assistance in Updating Information on Water Supply and Reuse System Component Costs*. Special Publication SJ2008-SP10. Revised May 28, 2008. SJRWMD, Palatka, FL. Black& Veatch, Jacksonville, FL.
- SJRWMD. 2009. *2008 Annual Water Use Survey*. Technical Publication SJ2009-FS1. SJRWMD, Palatka, FL.
- SJRWMD. 2010. *2009 Annual Water Use Survey*. Technical Publication SJ2010-FS1. SJRWMD, Palatka, FL.
- SJRWMD. 2011. *2010 Survey of Estimated Annual Water Use for St. Johns River Water Management District*. Technical Publication SJ2011-FS1. SJRWMD, Palatka, FL.
- SJRWMD. 2012. *2011 Survey of Estimated Annual Water Use for St. Johns River Water Management District*. Technical Publication SJ2012-FS1. SJRWMD, Palatka, FL.
- SJRWMD. 2013. *2012 Survey of Estimated Annual Water Use for St. Johns River Water Management District*. Technical Publication SJ2013-FS1. SJRWMD, Palatka, FL.

- SJRWMD. 2014. *2013 Annual Water Use Survey*. Technical Publication SJ2014-FS4. SJRWMD, Palatka, FL.
- Smith, S.K. 2007. *Florida Estimates of Population 2006*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2008. *Florida Estimates of Population 2007*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2009. *Florida Estimates of Population 2008*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2010. *Florida Estimates of Population 2009*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2011a. *Florida Population: Census Summary 2010*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2011b. *Number of Households and Average Household Size in Florida*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2012. *Florida Estimates of Population 2011*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2013. *Florida Estimates of Population 2012*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2014. *Florida Estimates of Population 2013*. BEBR, University of Florida. Gainesville, FL.
- Smith, S.K. 2015. *Projections of Florida Population by County, 2015 – 2040. Volume 48, Bulletin 171*. BEBR, University of Florida. Gainesville, FL.
- White, W.A., 1970, *Geomorphology of the Florida Peninsula*: Florida Geological Survey Bulletin 51, 164 p.

APPENDIX A

DRAFT BASE YEAR 2015 WATER DEMAND PROJECTIONS

Chapter 3 of this assessment shows water demand projections for 2015 through 2035 based on estimates of 2010 water use. In this appendix, these chapter 3 projections are referred to as “2010 Base (2015-2035 projected)”.

This appendix reviews the most recent water demand projections, using 2015 estimated water use, and projecting water demand for 2020 through 2040. In this appendix, these demand projections are referred to as 2015 base (2020-2040 projected).

The water use categories analyzed are consistent with Chapter 3, as follows:

1. Public Supply
2. Domestic Self-Supply and Small Public Supply Systems
3. Agriculture
4. Commercial/Industrial/Institutional and Mining Dewatering
5. Power Generation
6. Landscape/Recreational/Aesthetic

This appendix summarizes the 2015 base (2020-2040) water demand projections. Differences in source data and methodologies are summarized below.

DEMAND PROJECTIONS METHODOLOGIES

The water demand projection methodologies as seen in chapter 3.0 have remained the same for the 2015 base (2020-2040 projected) for most water use categories, and are summarized in Appendix B of the NFRWSP (District and SJRWMD, 2017). The BEBR data for estimated 2015 and projected 2020-2040 population growth was updated (BEBR, 2016; BEBR, 2017), resulting in a change to population dependent categories. The 2015 base (2020-2040 projected) projections used an updated estimate of per capita water use rate which depends on the past 5 years historical self-reported population estimates by large utilities. The 5 year GPCD average in this appendix now includes 2015 estimates of population (MOR, 2017)

The methodology of population distribution at the county level between public supply and domestic self-supply differs between chapter 3 and this appendix. The 2010 base (2015-2035 projected) distributed population growth between public supply (large and small) and domestic self-supply by assuming that the percentage of population using public supply and domestic self-supply would remain constant through the planning horizon. A constant percentage was applied to populations in each projection year.

For the 2015 base (2020-2040 projected) the BEBR population projection was distributed between the Public Supply (large and small) and Domestic Self-Supply by using parcel-level population distribution model developed by SJRWMD. This model gave parcels a development ranking based on current zoning (agricultural, industrial, non-developed) and density characteristics. Through the model, the growth of public supply and domestic self-supply

populations were calculated and then used to calculate water use. The conversion of a nonresidential land to public supply was favored over the conversion to domestic self-supply within any existing public supply service area boundary.

Agricultural water demand projections were updated to a 2015 base year and projected using FSAID IV, which represents the most current estimate of water demand projections for use in regional water supply planning (FDACS, 2017). The Agricultural portion of the 2010 base (2015-2035 projected) water demand used the FSAID II model (FDACS, 2015).

The FSAID II projected that 2015 water demand at 117 mgd, while the estimated water use reported in FSAID IV for 2015 was 136 mgd. The estimated water use for 2015 compared to the previous 2010 estimated water use results from an increase in irrigated acreage of field crops and vegetables as well as a decrease in irrigated acreage of hay. The average irrigation applied per acre per year of vegetables and field crops combined is 17 inches greater than the average irrigation per acre per year of hay. The FSAID II projected that agricultural water demand in 2035 would be 161 mgd while the agricultural water demand for 2035 as seen in FSAID IV was 189 mgd. This increase is due to the change in the agricultural acreage of the base year used and the updated estimated acreage for specific crops, which changed irrigation demand.

Table A-1. Public Supply Service Area Population Projections for suppliers permitted greater than 0.10 mgd.

County	Permittee	CURRENT	PLANNING PERIOD PROJECTIONS						
		2015	2020	2025	2030	2035	2040	Change	Percent Change
Alachua	City of Alachua	9,300	10,861	12,686	14,396	16,500	17,862	8,562	92.06%
Alachua	City of Newberry	5,148	5,086	5,832	7,924	8,634	10,074	4,926	95.69%
Alachua	City of Archer	1,440	1,482	1,651	1,823	1,963	2,118	678	47.09%
Alachua	City of High Springs	5,440	5,556	5,913	6,266	6,347	6,589	1,149	21.12%
Alachua	City of Waldo	1,042	1,176	1,227	1,227	1,227	1,227	185	17.75%
Bradford	City of Lawtey	735	768	868	868	885	911	176	23.95%
Bradford	City of Starke	5,542	5,668	5,967	6,204	6,256	6,355	813	14.67%
Columbia	City of Lake City	21,039	21,946	22,748	23,396	23,952	24,415	3,376	16.05%
Columbia	Columbia County Board of Commissioners	25	26	27	28	28	29	4	16.05%
Columbia	Clayton Smith Wells	0	0	0	0	0	0	0	N/A
Columbia	Melton Bishop Wells	0	0	0	0	0	0	0	N/A
Dixie	Town of Horseshoe Beach	165	237	239	263	263	263	98	59.39%
Dixie	Town of Cross City	1,713	2,190	2,299	2,326	2,341	2,341	628	36.66%
Dixie	Town of Suwannee	920	961	989	1,011	1,028	1,045	125	13.55%
Gilchrist	City of Trenton	1,965	2,893	3,008	3,021	3,064	3,247	1,282	65.24%
Hamilton	City of Jasper	2,978	2,752	2,874	3,065	3,092	3,097	119	4.00%
Hamilton	Hamilton County Water Facilities	55	58	59	60	61	62	7	12.10%
Hamilton	Town of White Springs	819	917	1,024	1,064	1,104	1,119	300	36.63%
Hamilton	Town of Jennings	800	967	1,083	1,152	1,165	1,165	365	45.63%
Jefferson	Jefferson Communities Water System Inc.	1,300	1,294	1,291	1,310	1,318	1,335	35	2.68%
Lafayette	Town of Mayo	1,216	1,414	1,414	1,414	1,414	1,414	198	16.28%
Levy	City of Fanning Springs	900	1,364	1,471	1,561	1,619	1,621	721	80.11%
Levy	Cedar Key SP Water & Sewer District	707	732	745	760	771	772	65	9.17%
Levy	City of Chiefland	2,031	2,102	2,141	2,185	2,214	2,217	186	9.17%
Levy	Town of Bronson	1,125	1,561	1,637	1,637	1,637	1,637	512	45.51%
Madison	Town of Lee	402	448	448	458	458	458	56	13.93%
Madison	City of Madison	3,115	3,147	3,164	3,180	3,196	3,212	97	3.13%
Madison	Town of Greenville	800	860	879	905	905	973	173	21.63%
Madison	Cherry Lake Utilities Corporation Inc.	620	626	630	633	636	639	19	3.13%
Suwannee	City of Live Oak	6,826	6,479	6,603	6,603	6,605	6,605	-221	-3.24%
Suwannee	Wellborn	466	482	501	517	530	543	77	16.53%
Suwannee	Town of Branford	700	792	804	808	808	808	108	15.43%
Taylor/Dixie	Big Bend Water Authority	3,202	3,149	3,273	3,455	3,851	3,963	761	23.77%
Taylor	Taylor Coastal	659	647	655	664	670	673	14	2.09%
Taylor	City of Perry	7,031	7,817	8,182	8,468	8,468	8,616	1,585	22.54%
Union	City of Lake Butler	1,920	1,966	2,026	2,063	2,111	2,135	215	11.19%
PUBLIC SUPPLY		92,146	98,424	104,358	110,714	115,120	119,540	27,394	29.73%

Table A-2. Public Supply Demand Projections (mgd) by Service Area for suppliers permitted greater than 0.10 mgd

County	Utility	2011-2015 Average Gross Per Capita	WATER USE / DEMAND								Planning Period Change	Percent Change
			Historic	PLANNING PERIOD PROJECTIONS								
			2015	2020	2025	2030	2035	2040				
Alachua	City of Alachua	133	1.13	1.44	1.69	1.91	2.19	2.38		1.24	110%	
Alachua	City of Newberry	96	0.45	0.49	0.56	0.76	0.83	0.97		0.52	114%	
Alachua	City of Archer	90	0.11	0.13	0.15	0.16	0.18	0.19		0.08	73%	
Alachua	City of High Springs Water Plant	76	0.41	0.42	0.45	0.48	0.48	0.50		0.09	22%	
Alachua	City of Waldo	70	0.07	0.08	0.09	0.09	0.09	0.09		0.02	32%	
Bradford	City of Lawtey	250	0.19	0.19	0.22	0.22	0.22	0.23		0.04	22%	
Bradford	City of Starke	140	0.70	0.79	0.84	0.87	0.88	0.89		0.19	28%	
Columbia	City of Lake City	162	3.23	3.56	3.69	3.79	3.88	3.96		0.72	22%	
Columbia	Columbia County Board of Commissioners	156	0.04	0.00	0.00	0.00	0.00	0.00		-0.04	-89%	
Columbia	Clayton Smith Wells	N/A	0.00	0.00	0.00	0.00	0.00	0.00		0.00	N/A	
Columbia	Melton Bishop Wells	N/A	0.00	0.00	0.00	0.00	0.00	0.00		0.00	N/A	
Dixie	Town of Horseshoe Beach	243	0.04	0.06	0.06	0.06	0.06	0.06		0.02	60%	
Dixie	Town of Cross City	283	0.52	0.62	0.65	0.66	0.66	0.66		0.15	28%	
Dixie	Town of Suwannee	87	0.06	0.08	0.09	0.09	0.09	0.09		0.03	49%	
Gilchrist	City of Trenton Water Treatment Plant	117	0.23	0.34	0.35	0.35	0.36	0.38		0.15	64%	
Hamilton	City of Jasper	222	0.61	0.61	0.64	0.68	0.69	0.69		0.08	13%	
Hamilton	Hamilton County Water Facilities	902	0.07	0.05	0.05	0.05	0.05	0.06		-0.02	-25%	
Hamilton	Town of White Springs	73	0.04	0.07	0.07	0.08	0.08	0.08		0.04	90%	
Hamilton	Town of Jennings	160	0.16	0.15	0.17	0.18	0.19	0.19		0.03	19%	
Jefferson	Jefferson Communities Water System Inc.	156	0.02	0.20	0.20	0.20	0.21	0.21		0.19	996%	
Lafayette	Town of Mayo	133	0.17	0.19	0.19	0.19	0.19	0.19		0.02	12%	
Levy	City of Fanning Springs	130	0.08	0.18	0.19	0.20	0.21	0.21		0.13	163%	
Levy	Cedar Key SP Water & Sewer District	189	0.14	0.14	0.14	0.14	0.15	0.15		0.01	8%	
Levy	City of Chiefland	226	0.44	0.48	0.48	0.49	0.50	0.50		0.07	15%	
Levy	Town of Bronson	131	0.11	0.20	0.21	0.21	0.21	0.21		0.10	88%	
Madison	Town of Lee	194	0.07	0.09	0.09	0.09	0.09	0.09		0.02	29%	
Madison	City of Madison	337	1.01	1.06	1.07	1.07	1.08	1.08		0.07	7%	
Madison	Town of Greenville	140	0.10	0.12	0.12	0.13	0.13	0.14		0.04	43%	
Madison	Cherry Lake Utilities Corporation Inc.	92	0.05	0.06	0.06	0.06	0.06	0.06		0.01	15%	
Suwannee	City of Live Oak	159	1.07	1.03	1.05	1.05	1.05	1.05		-0.02	-2%	
Suwannee	Wellborn	91	0.04	0.04	0.05	0.05	0.05	0.05		0.01	18%	
Suwannee	Town of Branford	118	0.08	0.09	0.09	0.10	0.10	0.10		0.02	27%	
Taylor	Big Bend Water Authority	102	0.29	0.32	0.33	0.35	0.39	0.40		0.11	37%	
Taylor	Taylor Coastal	71	0.05	0.05	0.05	0.05	0.05	0.05		0.00	-3%	
Taylor	City of Perry	213	1.41	1.67	1.74	1.80	1.80	1.84		0.43	30%	
Union	City of Lake Butler	169	0.22	0.33	0.34	0.35	0.36	0.36		0.14	65%	
Public Supply		173.85	13.39	15.34	16.17	16.98	17.54	18.08		4.69	35%	

¹ A minor portion of Gainesville Regional Utilities' (GRU) service area provides water to persons located in the District. However, the vast majority of GRU withdrawals and persons served are and will continue to be located outside the District demand for GRU-served populations are being accounted for under the SJRWMD. Note that the Groundwater Modeling and Impact Evaluations conducted are regional in nature and do take into account GRU withdrawals

Table A-3. Public Supply Water Demand Projections by County (mgd)

County ¹	Water Use	PLANNING PERIOD PROJECTIONS							2040 1 in 10 Demand
	2015 (mgd)	2020 (mgd)	2025 (mgd)	2030 (mgd)	2035 (mgd)	2040 (mgd)	Planning Period Change	Percent Change	
Alachua	2.17	2.57	2.93	3.40	3.77	4.12	0.27	12.46%	4.3672
Baker	0	0	0	0	0	0	0	N/A	N/A
Bradford	0.88	0.99	1.05	1.09	1.10	1.12	0.02	2.27%	1.1845
Columbia	3.27	3.56	3.69	3.79	3.88	3.96	0.66	20.16%	4.1973
Dixie	0.62	0.76	0.79	0.81	0.82	0.82	0.07	11.35%	0.8663
Gilchrist	0.23	0.34	0.35	0.35	0.36	0.38	0	0.00%	0.4027
Hamilton	0.89	0.88	0.94	1.00	1.01	1.01	0.11	12.43%	1.0719
Jefferson	0.02	0.20	0.20	0.20	0.21	0.21	-0.02	-105.26%	0.2207
Lafayette	0.17	0.19	0.19	0.19	0.19	0.19	0	0.00%	0.1993
Levy	0.77	1.00	1.03	1.05	1.07	1.07	0.33	43.14%	1.1365
Madison	1.23	1.33	1.33	1.35	1.35	1.37	-0.13	-10.60%	1.4484
Suwannee	1.19	1.17	1.19	1.19	1.19	1.19	0.48	40.40%	1.2667
Taylor	1.75	2.03	2.12	2.20	2.24	2.29	0.06	3.42%	2.4244
Union	0.22	0.33	0.34	0.35	0.36	0.36	-0.04	-18.26%	0.3825
TOTAL	13.39	15.34	16.17	16.98	17.54	18.08	4.69	35.02%	19.169

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-4. Domestic Self-Supply Population Projections

County ¹	Population	PLANNING PERIOD PROJECTIONS						
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change
Alachua	21,274	21,903	24,396	26,930	29,004	31,295	10,021	47.10%
Baker	580	566	562	551	541	531	-49	-8.45%
Bradford	22,485	23,661	24,062	24,220	24,366	24,552	2,067	9.19%
Columbia	56,019	58,433	60,570	62,296	63,775	65,008	8,989	16.05%
Dixie	15,263	15,941	16,404	16,775	17,053	17,331	2,068	13.55%
Gilchrist	12,350	12,835	13,495	13,935	14,375	14,742	2,392	19.37%
Hamilton	12,760	13,344	13,606	13,868	14,130	14,304	1,544	12.10%
Jefferson	2,231	2,221	2,215	2,247	2,261	2,290	59	2.64%
Lafayette	8,406	8,635	8,926	9,217	9,508	9,702	1,296	15.42%
Levy	17,316	17,922	18,254	18,627	18,873	18,905	1,589	9.18%
Madison	17,143	17,322	17,411	17,500	17,589	17,678	535	3.12%
Suwannee	43,318	44,816	46,558	48,010	49,268	50,429	7,111	16.42%
Taylor	17,591	17,265	17,496	17,727	17,882	17,959	368	2.09%
Union	15,562	15,935	16,424	16,717	17,108	17,304	1,742	11.19%
TOTAL	262,298	270,799	280,379	288,620	295,733	302,030	39,732	15.15%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-5. Domestic Self-Supply Water Demand Projections (mgd)

County ¹	Demand	PLANNING PERIOD PROJECTIONS							2040 1 in 10 Demand
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change	
Alachua	1.49	1.53	1.7	1.88	2.03	2.19	0.7	46.98%	2.32
Baker	0.06	0.06	0.06	0.06	0.06	0.06	0	0.00%	0.06
Bradford	1.79	1.88	1.91	1.92	1.93	1.94	0.15	8.38%	2.05
Columbia	5.08	5.29	5.49	5.64	5.77	5.88	0.8	15.75%	6.24
Dixie	0	0	0	0	0	0	0	N/A	0
Gilchrist	1.11	1.16	1.21	1.25	1.29	1.33	0.22	19.82%	1.41
Hamilton	1.15	1.2	1.22	1.25	1.27	1.29	0.14	12.17%	1.37
Jefferson	0.2	0.2	0.2	0.2	0.2	0.21	0.01	5.00%	0.22
Lafayette	0.76	0.78	0.8	0.83	0.86	0.87	0.11	14.47%	0.92
Levy	1.54	1.59	1.62	1.65	1.68	1.68	0.14	9.09%	1.78
Madison	1.54	1.56	1.57	1.58	1.58	1.59	0.05	3.25%	1.69
Suwannee	3.9	4.04	4.19	4.32	4.44	4.54	0.64	16.41%	4.81
Taylor	1.59	1.56	1.58	1.6	1.62	1.62	0.03	1.89%	1.72
Union	1.4	1.43	1.48	1.5	1.54	1.56	0.16	11.43%	1.65
TOTAL	21.61	22.28	23.03	23.68	24.27	24.76	3.15	14.58%	26.24

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-6. Estimated and Projected Agricultural Irrigated Acreage

County ¹	Estimated Acreage	PLANNING PERIOD PROJECTIONS						
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change
Alachua	9,777	10,053	10,392	10,667	10,951	11,205	1,428	14.61%
Baker	0	0	0	0	0	0	0	N/A
Bradford	1636	1,579	1,504	1,440	1,301	1,215	-421	-25.73%
Columbia	3,882	5,184	6,408	7,630	8,881	10,133	6,251	161.03%
Dixie	6,195	7,196	8,244	9,226	10,215	11,201	5,006	80.81%
Gilchrist	15,560	16,287	17,018	17,796	18,544	19,284	3,724	23.93%
Hamilton	13,692	14,709	15,715	16,799	17,828	18,847	5,155	37.65%
Jefferson	2,333	2,152	1,996	1,795	1,548	1,181	-1,152	-49.38%
Lafayette	9,324	10,355	11,376	12,445	13,534	14,591	5,267	56.49%
Levy	11,154	12,800	14,119	15,804	17,083	18,040	6,886	61.74%
Madison	18,912	20,126	21,333	22,659	23,878	25,157	6,245	33.02%
Suwannee	28,002	29,679	31,367	33,135	34,965	36,753	8,751	31.25%
Taylor	476	622	740	837	958	1067	591	124.16%
Union	755	840	1,014	1,116	1216	1306	551	72.98%
TOTAL	121,698	131,582	141,226	151,349	160,902	169,980	48,282	39.67%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-7. Agricultural Water Demand Projections (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS							2040 1 in 10 Demand
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change	
Alachua	11.78	12.06	12.69	13.14	13.64	14.04	2.26	19.19%	18.1
Baker	0	0	0	0	0	0	0	N/A	0
Bradford	1.52	1.51	1.53	1.5	1.28	1.22	-0.3	-19.74%	1.62
Columbia	4.27	5.9	7.35	8.87	10.4	12.08	7.81	182.90%	15.81
Dixie	6.66	7.68	8.84	10.15	11.31	12.56	5.9	88.59%	16.34
Gilchrist	16.84	17.63	18.8	19.95	20.99	22.09	5.25	31.18%	28.56
Hamilton	15.94	17.26	18.85	20.62	22.19	23.87	7.93	49.75%	31.02
Jefferson	2.93	2.72	2.47	2.27	1.99	1.52	-1.41	-48.12%	1.83
Lafayette	9.11	10.27	11.68	13.12	14.61	16	6.89	75.63%	20.88
Levy	14.12	15.89	17.86	20.13	21.99	23.35	9.23	65.37%	30.13
Madison	20	21.45	23.1	24.94	26.63	28.36	8.36	41.80%	36.6
Suwannee	31.27	33.29	35.79	38.44	41.03	43.71	12.44	39.78%	56.91
Taylor	0.41	0.61	0.79	0.91	1.06	1.21	0.8	195.12%	1.61
Union	1.05	1.14	1.39	1.55	1.71	1.88	0.83	79.05%	2.5
TOTAL	135.9	147.41	161.14	175.59	188.83	201.89	65.99	48.56%	261.91

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-8. Commercial, Industrial, and Institutional Water Demands (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS ²						
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change
Alachua	0.05	0.1	0.06	0.1	0	0.1	0.04	80.00%
Baker	0.21	0.2	0.2	0.2	0	0.2	-0.01	-5.00%
Bradford	1.01	1.1	1.08	1.1	1	1.1	0.1	9.43%
Columbia	0.21	0.2	0.23	0.2	0	0.3	0.05	22.73%
Dixie	0	0	0	0	0	0	0	N/A
Gilchrist	0.28	0.3	0.31	0.3	0	0.3	0.06	20.69%
Hamilton	21.7	23	23.3	24	24	25	2.83	12.41%
Jefferson	2.4	2.4	2.38	2.4	2	2.5	0.05	2.09%
Lafayette	0.25	0.3	0.27	0.3	0	0.3	0.05	19.23%
Levy	0.02	0	0.02	0	0	0	0	0.00%
Madison	0.5	0.5	0.51	0.5	1	0.5	0.01	1.96%
Suwannee	1.87	1.9	2	2.1	2	2.2	0.29	15.03%
Taylor	40.1	39	39.9	40	41	41	0.85	2.16%
Union	0.69	0.7	0.72	0.7	1	0.8	0.07	10.00%
TOTAL*	69.3	70	71	72	73	74	4.39	6.33%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

² The Districts determined that drought events (1-in-10 year) do not have significant impacts on water use in this category. Water use is related primarily to processing and production needs.

Table A-9. Thermoelectric Power Generation Water Demands (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS ²						
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change
Alachua	1.83	1.91	1.91	1.91	1.91	1.91	0.08	4.37%
Baker	0	0	0	0	0	0	0	N/A
Bradford	0	0	0	0	0	0	0	N/A
Columbia	0	0	0	0	0	0	0	N/A
Dixie	0	0	0	0	0	0	0	N/A
Gilchrist	0	0	0	0	0	0	0	N/A
Hamilton	0	0	0	0	0	0	0	N/A
Jefferson	0	0	0	0	0	0	0	N/A
Lafayette	0	0	0	0	0	0	0	N/A
Levy	0	0	0	0	0	0	0	N/A
Madison	0	0	0	0	0	0	0	N/A
Suwannee	2.58	1.7	1.73	1.85	1.97	2.09	-0.49	-18.99%
Taylor	0	0	0	0	0	0	0	N/A
Union	0	0	0	0	0	0	0	N/A
TOTAL	4.41	3.61	3.64	3.76	3.88	4	-0.41	-9.30%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

² The Districts determined that drought events (1-in-10 year) do not have significant impacts on water use in this category. Water is related primarily to processing and production needs.

Table A-10. Landscape, Recreational and Aesthetic Water Demands (mgd)

County ¹	Estimated Demand	PLANNING PERIOD PROJECTIONS							2040 1 in 10 Demand
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change	
Alachua	0.16	0.17	0.19	0.21	0.23	0.25	0.09	56.25%	0.4375
Baker	0	0	0	0	0	0	0	N/A	0
Bradford	0.03	0.03	0.03	0.03	0.03	0.03	0	0.00%	0.0801
Columbia	0.28	0.29	0.3	0.31	0.32	0.33	0.05	17.86%	0.4224
Dixie	0	0	0	0	0	0	0	N/A	0
Gilchrist	0	0	0	0	0	0	0	N/A	0
Hamilton	0	0	0	0	0	0	0	N/A	0
Jefferson	0.15	0.15	0.15	0.15	0.15	0.15	0	0.00%	0.195
Lafayette	0	0	0	0	0	0	0	N/A	0
Levy	0.1	0.1	0.1	0.1	0.1	0.1	0	0.00%	0.18
Madison	0.18	0.18	0.18	0.18	0.18	0.18	0	0.00%	0.225
Suwannee	0.1	0.1	0.1	0.1	0.1	0.1	0	0.00%	0.11
Taylor	0.08	0.08	0.08	0.08	0.08	0.08	0	0.00%	0.0888
Union	0	0	0	0	0	0	0	N/A	0
TOTAL	1.08	1.1	1.13	1.16	1.19	1.22	0.14	12.96%	1.7388

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-11. Total Districtwide Water Demand Projections (mgd)

Water-Use Category	Estimated Demand	PLANNING PERIOD PROJECTIONS								
	2015	2020	2025	2030	2035	2040	Planning Period Change	Percent Change (2010 - 2035)	Increase Percent from Category	2040 1 in 10 Demand
Public Supply	13.39	15.34	16.17	16.98	17.54	18.08	4.69	35.02%	5.86%	19.17
Domestic Self-Supply	19.13	20.91	21.87	22.81	23.66	24.41	5.28	27.60%	6.59%	26.24
Agricultural	135.9	147.41	161.14	175.59	188.83	201.89	65.99	48.56%	82.40%	261.91
Commercial / Industrial / Institutional	69.32	69.79	70.95	72.11	73.07	73.71	4.39	6.33%	5.48%	73.71
Thermo-Electric Power Generation	4.41	3.61	3.64	3.76	3.88	4	-0.41	-9.30%	-0.51%	4
Landscape / Recreational / Aesthetic	1.08	1.1	1.13	1.16	1.19	1.22	0.14	12.96%	0.17%	1.7388
TOTAL	243.23	258.16	274.90	292.41	308.17	323.31	80.08	32.92%	100%	386.77

* "Total" in Percent Change Column is the Total Percent Change for the All Water Use Types During the Planning Period.

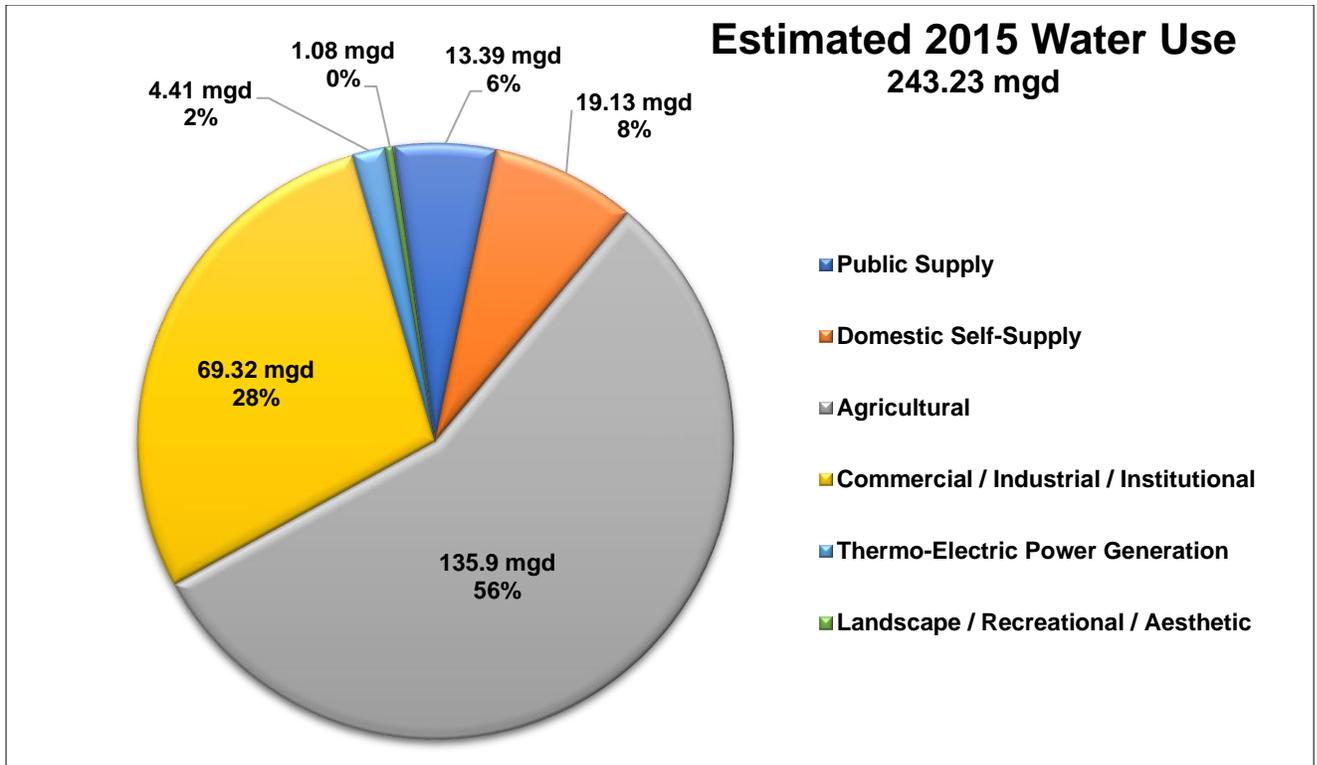


Figure A-1. Estimated Water Use by Category, 2015

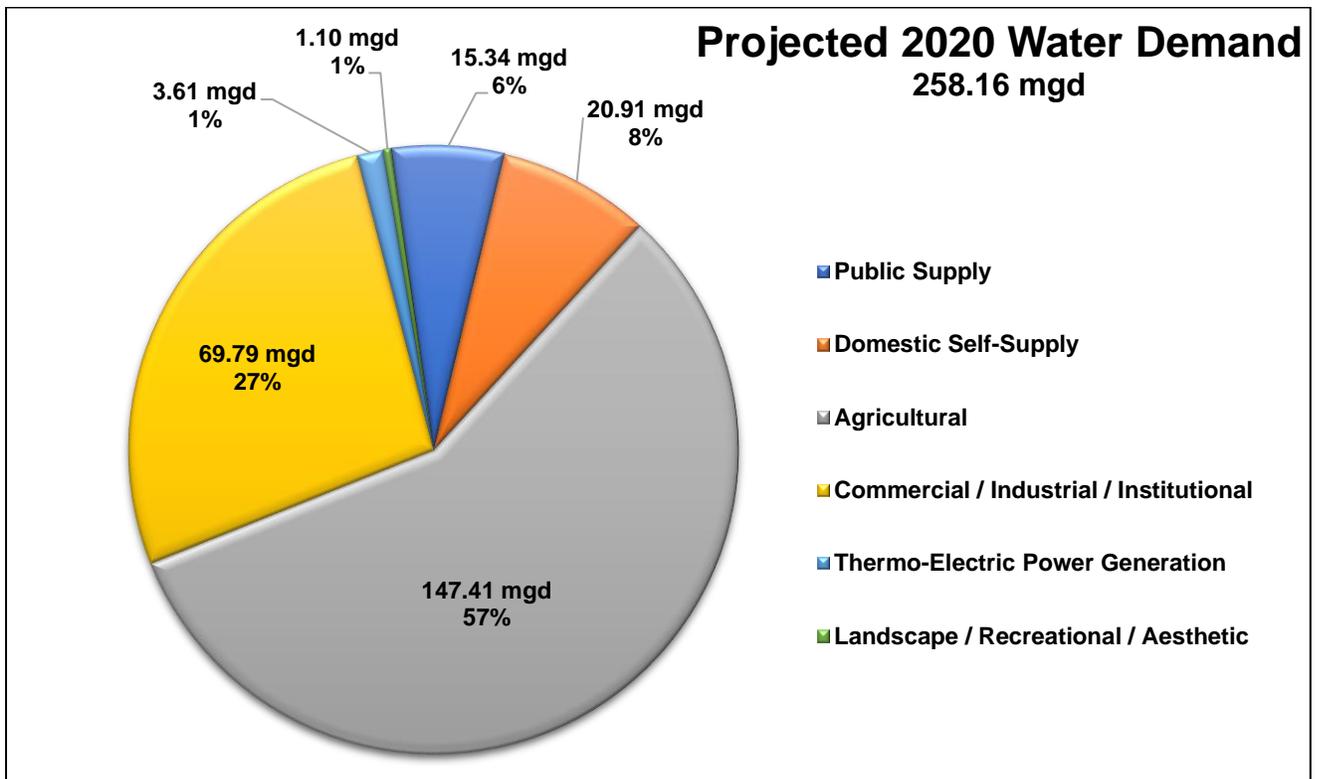


Figure A-2. Projected demand by water use category, 2020

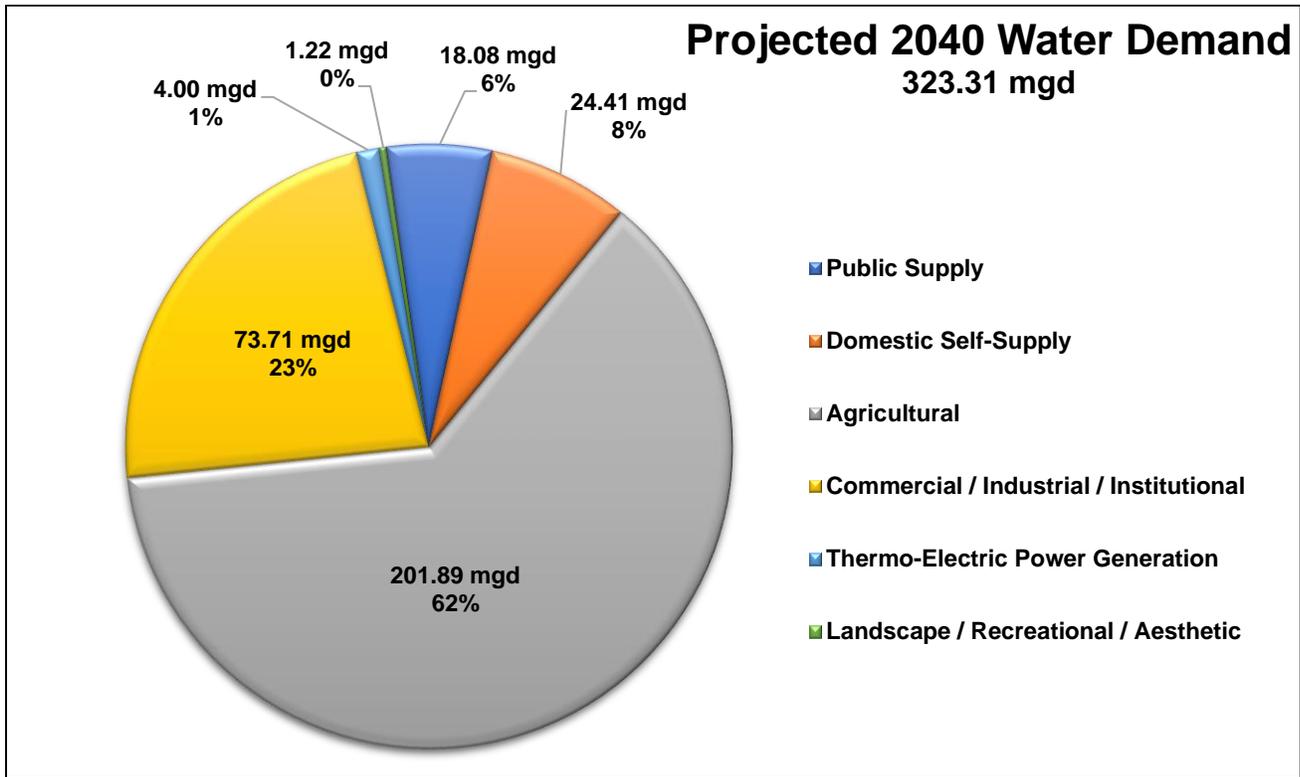


Figure A-3. Projected demand by water use category, 2040

Table A-12. 2015 Estimated Water Use by Source

Water Use Category	2015				
	Groundwater		Surface Water		Total
	mgd	%	mgd	%	mgd
Public Supply	13.39	100.00%	0	0.00%	13.39
Domestic Self-Supply	21.61	100.00%	0	0.00%	21.61
Agricultural	134.53	98.99%	1.37	1.00%	135.90
Commercial / Industrial / Institutional	69.32	100.00%	0	0.00%	69.32
Thermo-Electric Power Generation	1.99	45.12%	2.42	54.88%	4.41
Landscape / Recreational / Aesthetic	0.83	76.85%	0.26	23.15%	1.08
TOTAL	241.67	98.35%	4.05	1.65%	245.71

Table A-13. 2020 and 2040 Water Demand Projections by Source

Water Use Category	2020					2040				
	Groundwater		Surface Water		Total	Groundwater		Surface Water		Total
	mgd	%	mgd	%	mgd	mgd	%	mgd	%	mgd
Public Supply	15.34	100.00%	0.00	0.00%	15.34	18.08	100.00%	0.00	0.00%	18.08
Domestic Self-Supply	22.28	100.00%	0.00	0.00%	22.28	24.76	100.00%	0.00	0.00%	24.76
Agricultural	145.92	98.99%	1.49	1.01%	147.41	199.89	99.01%	2.00	0.99%	201.89
Commercial/Industrial/ Institutional	69.79	100.00%	0.00	0.00%	69.79	73.71	100.00%	0.00	0.00%	73.71
Thermo-Electric Power Generation	2.09	57.89%	1.52	42.11%	3.61	2.13	53.25%	1.87	46.75%	4.00
Landscape/Recreational /Aesthetic	0.85	76.58%	0.26	23.42%	1.11	0.94	76.42%	0.29	23.58%	1.23
TOTAL	256.27	98.74%	3.27	1.26%	259.54	287.06	88.69%	4.16	1.29%	323.67

Table A-14. 2015 Estimated Water Use by County

County ¹	Public Supply	Domestic Self-Supply	Commercial, Industrial, Institutional	Landscape, Recreational, Aesthetic	Power Generation	Agriculture	Total 2015 Water Use	
	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>Percent</i>
Alachua	2.17	1.49	0.05	0.16	1.83	11.78	17.48	7.11%
Baker	0.00	0.06	0.21	0	0	0	0.27	0.11%
Bradford	0.88	1.79	1.01	0.03	0	1.52	5.23	2.13%
Columbia	3.27	5.08	0.21	0.28	0	4.27	13.11	5.34%
Dixie	0.62	0	0	0	0	6.66	7.28	2.96%
Gilchrist	0.23	1.11	0.28	0	0	16.84	18.46	7.51%
Hamilton	0.89	1.15	21.73	0	0	15.94	39.71	16.16%
Jefferson	0.02	0.2	2.4	0.15	0	2.93	5.70	2.32%
Lafayette	0.17	0.76	0.25	0	0	9.11	10.29	4.19%
Levy	0.77	1.54	0.02	0.1	0	14.12	16.55	6.73%
Madison	1.23	1.54	0.5	0.18	0	20	23.45	9.54%
Suwannee	1.19	3.9	1.87	0.1	2.58	31.27	40.91	16.65%
Taylor	1.75	1.59	40.1	0.08	0	0.41	43.93	17.88%
Union	0.22	1.40	0.69	0.00	0.00	1.05	3.359	1.37%
TOTAL	13.39	21.61	69.32	1.08	4.41	135.90	245.71	100.00%
Percent	5.45%	8.79%	28.21%	0.44%	1.79%	55.31%		

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-15. 2020 Projected Water Demand by County

County ¹	Public Supply	Domestic Self-Supply	Commercial, Industrial, Institutional	Landscape, Recreational, Aesthetic	Power Generation	Agriculture	Total 2020 Demand	
	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>Percent</i>
Alachua	2.57	1.53	0.05	0.17	1.91	12.06	18.29	7.05%
Baker	0.00	0.06	0.2	0	0	0	0.26	0.10%
Bradford	0.99	1.88	1.06	0.03	0	1.51	5.47	2.11%
Columbia	3.56	5.29	0.22	0.29	0	5.9	15.26	5.88%
Dixie	0.76	0	0	0	0	7.68	8.44	3.25%
Gilchrist	0.34	1.16	0.29	0	0	17.63	19.42	7.48%
Hamilton	0.88	1.2	22.8	0	0	17.26	42.14	16.24%
Jefferson	0.20	0.2	2.39	0.15	0	2.72	5.66	2.18%
Lafayette	0.19	0.78	0.26	0	0	10.27	11.50	4.43%
Levy	1.00	1.59	0.02	0.1	0	15.89	18.60	7.16%
Madison	1.33	1.56	0.51	0.18	0	21.45	25.03	9.64%
Suwannee	1.17	4.04	1.93	0.1	1.7	33.29	42.23	16.27%
Taylor	2.03	1.56	39.36	0.08	0	0.61	43.64	16.82%
Union	0.33	1.43	0.70	0.00	0.00	1.14	3.60	1.39%
TOTAL	15.34	22.28	69.79	1.10	3.61	147.41	259.53	100.00%
Percent	5.91%	8.58%	26.89%	0.42%	1.39%	56.80%		

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-16. 2040 Projected Water Demand by County

County ¹	Public Supply	Domestic Self-Supply	Commercial , Industrial, Institutional	Landscape, Recreational , Aesthetic	Power Generation	Agriculture	Total 2040 Demand	
	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>mgd</i>	<i>Percent</i>
Alachua	4.12	2.19	0.09	0.25	1.91	14.04	22.60	6.98%
Baker	0.00	0.06	0.2	0	0	0	0.26	0.08%
Bradford	1.12	1.94	1.11	0.03	0	1.22	5.42	1.67%
Columbia	3.96	5.88	0.26	0.33	0	12.08	22.51	6.95%
Dixie	0.82	0	0	0	0	12.56	13.38	4.13%
Gilchrist	0.38	1.33	0.34	0	0	22.09	24.14	7.46%
Hamilton	1.01	1.29	24.56	0	0	23.87	50.73	15.67%
Jefferson	0.21	0.21	2.45	0.15	0	1.52	4.54	1.40%
Lafayette	0.19	0.87	0.3	0	0	16	17.36	5.36%
Levy	1.07	1.68	0.02	0.1	0	23.35	26.22	8.10%
Madison	1.37	1.59	0.51	0.18	0	28.36	32.01	9.89%
Suwannee	1.19	4.54	2.16	0.1	2.09	43.71	53.79	16.62%
Taylor	2.29	1.62	40.95	0.08	0	1.21	46.15	14.26%
Union	0.36	1.56	0.76	0.00	0.00	1.88	4.56	1.41%
TOTAL	18.08	24.76	73.71	1.22	4.00	201.89	323.66	100.00%
Percent	5.59%	7.65%	22.77%	0.38%	1.24%	62.38%		

¹ Putnam county projections are wholly incorporated and reported in SJRWMD

Table A-17. 2020 to 2040 Change in Total Projected Water Demand by County

County ¹	Total 2020 Projected Demand	Total 2040 Projected Demand	Planning Period (2020 to 2040)		
			Difference <i>County Demand</i>	Percent Change <i>County Demand</i>	Percent Change <i>Total Demand</i>
	mgd	mgd	mgd	Percent	Percent
Alachua	18.29	22.60	4.31	23.56%	1.66%
Baker	0.26	0.26	0.00	0.00%	0.00%
Bradford	5.47	5.42	-0.05	-0.88%	-0.02%
Columbia	15.26	22.51	7.25	47.52%	2.79%
Dixie	8.44	13.38	4.94	58.48%	1.90%
Gilchrist	19.42	24.14	4.72	24.31%	1.82%
Hamilton	42.14	50.73	8.59	20.37%	3.31%
Jefferson	5.66	4.54	-1.12	-19.85%	-0.43%
Lafayette	11.50	17.36	5.86	50.97%	2.26%
Levy	18.60	26.22	7.63	41.02%	2.94%
Madison	25.03	32.01	6.98	27.89%	2.69%
Suwannee	42.23	53.79	11.57	27.39%	4.46%
Taylor	43.64	46.15	2.51	5.74%	0.97%
Union	3.60	4.56	0.96	26.61%	0.37%
TOTAL	259.53	323.66	64.13	N/A	100.00%

¹ Putnam county projections are wholly incorporated and reported in SJRWMD