BEFORE THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
ORDER NO. SJR 2023-32
SJRWMD FILE OF RECORD NO. 2013-17

IN RE: 2023 NORTH FLORIDA REGIONAL WATER SUPPLY PLAN (2020-2045 Planning Horizon)

ORDER APPROVING THE
2023 NORTH FLORIDA REGIONAL WATER SUPPLY PLAN

THIS MATTER came before the Governing Board of the St. Johns River Water Management District ("District") on December 12, 2023. The Governing Board, having been fully advised of the matter, hereby approves the 2023 North Florida Regional Water Supply Plan with appendices (2023 NFRWSP), recognizing that the District's authority for water supply planning extends to water supply planning regions within the District's jurisdictional boundaries as established in section 373.069, F.S.

The 2023 NFRWSP is attached hereto:

DONE and ORDERED by the Governing Board of the St. Johns River Water Management District on December 12, 2023.

ST. JOHNS RIVER WATER
MANAGEMENT DISTRICT

By: _____
Rob Bradley, Chair

Attest: _____
J. Chris Peterson, Secretary

Filed December 12, 2023

_____
District Clerk

BEFORE THE SUWANNEE RIVER WATER MANAGEMENT DISTRICT
ORDER NO. SR 23-007
SRWMD FILE OF RECORD NO. 2023-02

IN RE: 2023 NORTH FLORIDA REGIONAL WATER SUPPLY PLAN (2020-2045 Planning Horizon)

ORDER APPROVING THE 2023 NORTH FLORIDA REGIONAL WATER SUPPLY PLAN

THIS MATTER came before the Governing Board of the Suwannee River Water Management District ("District") on December 12, 2023. The Governing Board, having been fully advised of the matter, hereby approves the 2023 North Florida Regional Water Supply Plan with appendices (2023 NFRWSP), recognizing that the District's authority for water supply planning extends to water supply planning regions within the District's jurisdictional boundaries as established in section 373.069, F.S.

The 2023 NFRWSP is attached hereto:

DONE and ORDERED by the Governing Board of the Suwannee River Water Management District on December 12, 2023.

SUWANNEE RIVER
WATER MANAGEMENT
DISTRICT

By:

Virginia Johns, Chair

Attest:

Charles Keith, Secretary

Filed December 12, 2023

District Clerk

2023 North Florida Regional Water Supply Plan (2020–2045)

St. Johns River Water Management District
Palatka, Florida

Suwannee River Water Management District
Live Oak, Florida

December 2023

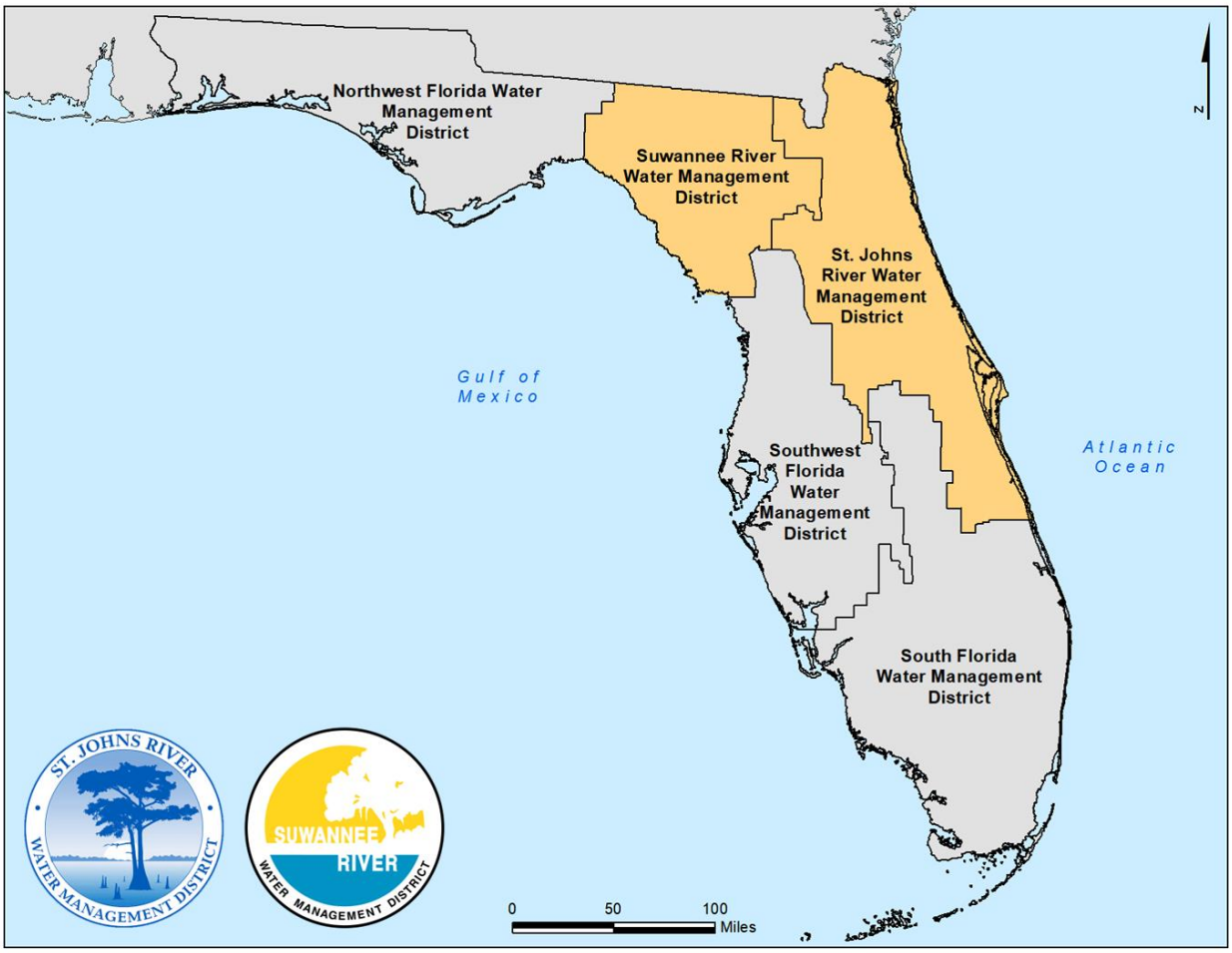

Figure 1. Location and boundaries of the St. Johns River and Suwannee River Water Management Districts

Acknowledgements

The Florida Department of Environmental Protection (DEP), St. Johns River Water Management District (SJRWMD) and Suwannee River Water Management District (SRWMD) recognize and thank our stakeholders for their contributions, comments, advice, information, and assistance throughout the development of the update to the North Florida Regional Water Supply Plan. Furthermore, SJRWMD and SRWMD express their appreciation to all staff who contributed to the development and production of this collaborative regional water supply plan. For further information about this document, please visit northfloridawater.com.

Executive Summary

In Florida, the state's five water management districts (districts) develop regional water supply plans (RWSPs) to identify sustainable water supplies for all water uses while protecting water resources and related natural systems. The North Florida Regional Water Supply Plan (NFRWSP) area includes 14 counties in the St. Johns River Water Management District (SJRWMD) and the Suwannee River Water Management District (SRWMD): Alachua, Baker, Bradford, Clay, Columbia, Duval, Flagler, Gilchrist, Hamilton, Nassau, Putnam, St. Johns, Suwannee, and Union. This 2023 NFRWSP is consistent with the water supply planning requirements of Chapter 373, Florida Statutes (F.S.) and is an update to the 2017 NFRWSP. The 2023 NFRWSP was developed through a highly collaborative process among the Suwannee River and St. Johns River Water Management Districts (Districts), the Florida Department of Environmental Protection (DEP), local governments, public supply utilities, environmental advocates, and other stakeholders.

This regional water supply plan covers a planning period through 2045 and is based on the best data and research available. A key component of the plan is the North Florida Southeast Georgia groundwater flow model (NFSEG), developed by the two Districts in collaboration with the Southwest Florida Water Management District in a separate open-public process with stakeholder input. This groundwater flow model is the largest 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 model utilized a state-of-the-art calibration process to incorporate the most current data and provides the best available approximation of all components of the water budget within the planning area and the model domain. This model provides the most technologically sophisticated picture of groundwater withdrawals on water resources in North Florida.

The population within the NFRWSP area during the 2015 base year was approximately 2.02 million people. The area's population is projected to reach approximately 3.01 million by 2045, which represents a 49% increase. Irrigated agricultural land is also expected to increase by approximately 30,000 acres, a 24% increase. The total water use in the NFRWSP area, which includes groundwater, surface water, and alternative water supply sources, is projected to increase 32% from approximately 530 million gallons per day (mgd) in 2015 to 698 mgd in 2045, which is a 168 mgd increase.

Fresh groundwater use is projected to increase from 461 mgd in 2015 to 596 mgd in 2045, which is a 135 mgd increase in groundwater demand. Similar to the 2017 NFRWSP, this 2023 NFRWSP concludes that fresh groundwater alone cannot supply the projected increase in demand during the planning horizon without causing unacceptable impacts to water resources. There are waterbodies that have adopted recovery strategies, which indicates the current distribution of groundwater use has already exceeded the fresh groundwater sustainable yield of the system. In addition, the analysis of waterbodies without MFLs, groundwater quality, and wetlands identified potential constraints on increased groundwater withdrawals during the planning horizon.

To meet current and future water demands while protecting water resources, the 2023 NFRWSP identifies water conservation efforts and water supply development (WSD) and water resource development (WRD) project options. The NFRWSP also recognizes the ongoing implementation of the Lower Santa Fe River Basin Recovery Strategy and the Lakes Brooklyn and Geneva Recovery Strategy for these minimum flows and levels (MFL) waterbodies. While there are increases in surface water demand projected, the Districts determined that there are sufficient water sources to meet the projected demand.

Water conservation is an important and cost-effective strategy in meeting future demands. Potential water savings through the implementation of public supply, agricultural and other self-supply water conservation measures ranges from 60 mgd to 83 mgd. This demonstrates the Districts' commitment to water conservation throughout the planning horizon.

The NFRWSP identifies 160 mgd of estimated benefit from WSD, WRD and water conservation project options to assist water users and suppliers in their efforts to meet the projected groundwater demand while protecting our natural resources. Project options range from groundwater recharge to alternative water supply sources like reclaimed water, indirect potable reuse, surface water and stormwater. Both Districts are committed to working with local governments to share costs to help facilitate implementation of these beneficial projects. The breakdown of estimated benefits from projects by type includes:

- 92.4 mgd of WSD
- 51.2 mgd of WRD
- 16.8 mgd of water conservation

The 2023 NFRWSP provides a roadmap that offers options to achieve sustainable water use through the planning horizon. The Districts will continue to encourage and support project implementation within the NFRWSP area to ensure a sufficient water supply to meet 2045 water demand, while protecting water resources and associated natural systems. Water supply planning is an ongoing process, with enhanced scientific methodologies and new data acquired all the time. District staff are already working on the science and data collection for the next five-year update.

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List of Abbreviations

Abbreviation	Description
AG	Agricultural irrigation self-supply
AMI	advanced metering infrastructure
AMR	automatic meter reading
ASR	Aquifer storage and recovery
AWS	Alternative water supply
BAC	Biologically activated carbon
BEBR	Bureau of Economic and Business Research
B-G Recovery Strategy	Recovery Strategy for the Implementation of Lakes Brooklyn and Geneva Minimum Levels
BMAP	Basin management action plan
BMP	Best management practice
CAM	Community Association Manager
CBAT	Carbon-based advanced treatment
CEU	Continuing Education Unit
cfs	Cubic feet per second
CFWI	Central Florida Water Initiative
CII/MD	Commercial/industrial/institutional and mining dewatering self-supply
CP	Current pumping
CUP	Consumptive use permit
DEM	Digital elevation model
DEP	Florida Department of Environmental Protection
Districts	Refers to SRWMD and SJRWMD
districts	Refers to all Florida water management districts
DPR	Direct potable reuse
DSS	Domestic self-supply and small public supply systems
EDR	Electrodialysis reversal
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
ET	Evapotranspiration
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FAS	Floridan aquifer system
FDACS	Florida Department of Agriculture and Consumer Services

FDOT	Florida Department of Transportation
FFL	Florida Friendly Landscaping
FSAID	Florida Statewide Agricultural Irrigation Demand
FWCA	Florida Water and Climate Alliance
FWS	Florida Water Star
FY	Fiscal year
GAC	Granular activated carbon
GEPD	Georgia Environmental Protection Division
GIS	Geographic information system
gpcd	Gallons per capita per day
GWQ	Groundwater quality
H_2OSAV	Water Savings, Analytics, and Verification
HOA	Homeowner Association
IAS	Intermediate aquifer system
ICU	Intermediate confining unit
IFAS	Institute of Food and Agricultural Sciences
IPCC	International Panel on Climate Change
IPR	Indirect potable reuse
KHTM	Keystone Heights Transient groundwater flow Model
LFA	Lower Floridan aquifer
LR	Landscape/recreational irrigation self-supply
LSFI	Lower Santa Fe and Ichetucknee river and priority springs
LSFRB Recovery Strategy	Lower Santa Fe River Basin Recovery Strategy
MCU	Middle confining unit
MFLs	Minimum flows and levels
MFRO	Micro-filtration reverse osmosis
mg/L	Milligrams per liter
mgd	Million gallons per day
MKTA	Mann-Kendall trend analysis
MOR	Monthly operating report
ND	Non-detect
NFRWSP	North Florida Regional Water Supply Plan
NFSEG	North Florida Southeast Georgia Regional Groundwater Model
NFUCG	North Florida Utility Coordinating Group
NOAA	National Oceanic and Atmospheric Administration

NRCS	Natural Resources Conservation Services
NSFAC	No significant Floridan aquifer connection
NWFWMD	Northwest Florida Water Management District
OAWP	Office of Agricultural Water Policy
OFS	Outstanding Florida Spring
Partnership	North Florida Regional Water Supply Partnership
PCS	Public Service Commission
PG	Power generation
PO	Pumps-off
POR	Period of record
PS	Public supply
PSAB	Public service area boundary
PSC	Public Service Commission
REDI	Rural Economic Development Initiative
RIB	Rapid infiltration basin
RIVER	Regional Initiative Valuing Environmental Resources
RO	Reverse osmosis
RWSP	Regional Water Supply Plans
SA	Surficial aquifer
SAS	Surficial aquifer system
SDWS	Secondary drinking water standard
SJRWMD	St. Johns River Water Management District
SL	Significance level
SLR	Sea level rise
SPSS	Small public supply system
SRP	Suwannee River Partnership
SRWMD	Suwannee River Water Management District
SWCD	Soil and Water Conservation District
SWFWMD	Southwest Florida Water Management District
SWI	Saltwater interface
TCAA	Tri-County Agricultural Area
TDS	Total dissolved solids
UF	University of Florida
UFA	Upper Floridan aquifer
USDA	United States Department of Agriculture
USGS	United States Geological Survey

UV	Ultraviolet
VA	Vulnerability assessment
VFD	Variable frequency drive
WIFIA	Water Infrastructure Finance and Innovation Act
WMP	Water Management Partnership
WPCG	Water planning coordination group
WPSP	Water Protection and Sustainability Program
WRCA	Water resource caution area
WRD	Water resource development
WRDWP	Water resource development work program
WRV	Water resource value
WSD	Water supply development
WSPA	Water supply planning area
WTP	Water treatment plant
WUP	Water use permit
WWTF	Wastewater treatment facility
WWTP	Wastewater treatment plant

Chapter 1: About the North Florida Planning Region

Introduction

The North Florida Regional Water Supply Partnership (Partnership) was established in 2011 via a formal Interagency Agreement executed by the Florida Department of Environmental Protection (DEP) and the St. Johns River and Suwanee River Water Management Districts (Districts). The North Florida Regional Water Supply Plan (NFRWSP) area includes 14 counties in the St. Johns River Water Management District (SJRWMD) and the Suwannee River Water Management District (SRWMD): Alachua, Baker, Bradford, Clay, Columbia, Duval, Flagler, Gilchrist, Hamilton, Nassau, Putnam, St. Johns, Suwannee, and Union (Figure 2). In total, the NFRWSP area covers more than 8,000 square miles.

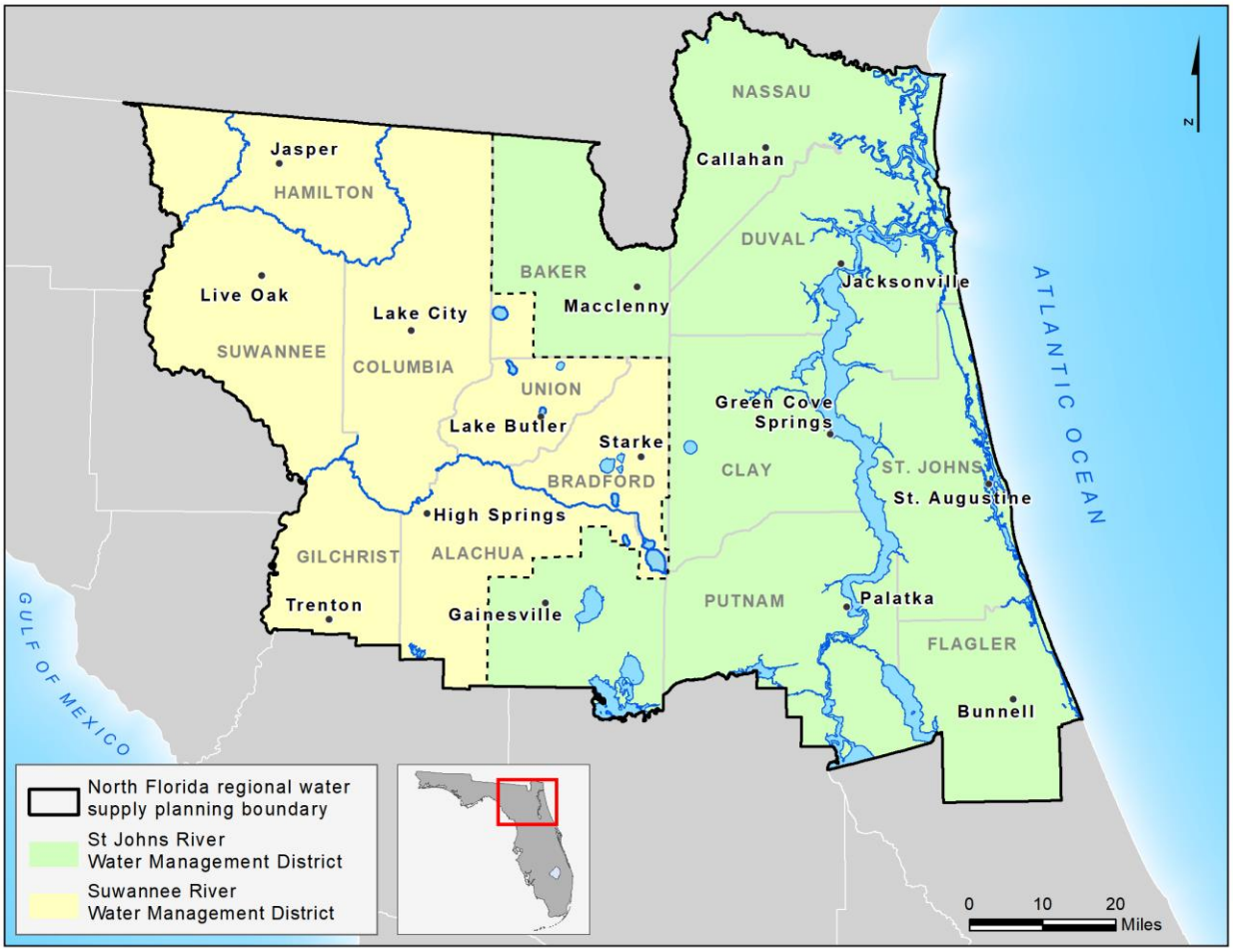

Figure 2. North Florida Regional Water Supply Partnership Area

Purpose

The purpose of the Partnership is to protect natural resources and water supplies in North Florida. This is being achieved through collaborative planning, scientific-tool development, and related efforts. The text of the agreement and other information about the Partnership can be found at northfloridawater.com. This 2023 NFRWSP serves as the 5-year update to the 2017 NFRWSP.

The following statistics apply within the NFRWSP area.

Population:

The population in the Partnership area for 2015, the base year used in this update, is as follows:

- *SJRWMD:* approximately 1.76 million
- *SRWMD:* approximately 264,000
- *Total NFRWSP:* 2.02 million

More information on the use of base years in population and demand projections can be found in Chapter 2.

Watersheds:

- *SJRWMD:* Daytona-St. Augustine, Lower St. Johns, Nassau, Ocklawaha, Santa Fe, St. Marys, Upper St. Johns, and Upper Suwannee (Figure 3).
- *SRWMD*: Alapaha, Lower Suwannee, Ocklawaha, Santa Fe, St. Marys, Upper Suwannee, Waccasassa, and Withlacoochee. Over 90% of the Alapaha and over 55% of the Suwannee River basins are in Georgia (Figure 3).

Springs (4th magnitude and larger):

- *SJRWMD:* There are 18 documented springs, of which there are no Outstanding Florida Springs (OFS).
- *SRWMD:* There are 204 documented springs. On the Lower Santa Fe River, the following springs are OFS: Devil's Ear (Ginnie Group), Poe, Columbia, Treehouse, and Hornsby. On the Ichetucknee River, the Ichetucknee Springs Group is a first magnitude spring complex that is comprised of nine named and many unnamed springs that have collectively been identified as an OFS. The named springs in the Ichetucknee Springs Group, include: Ichetucknee Headspring, Cedar Head, Blue Hole, Mission, Devil's Eye, Grassy Hole, Mill

Pond, and Coffee. On the Suwanee River, the following springs are OFS: Falmouth, Lafayette Blue, Peacock, and Troy.

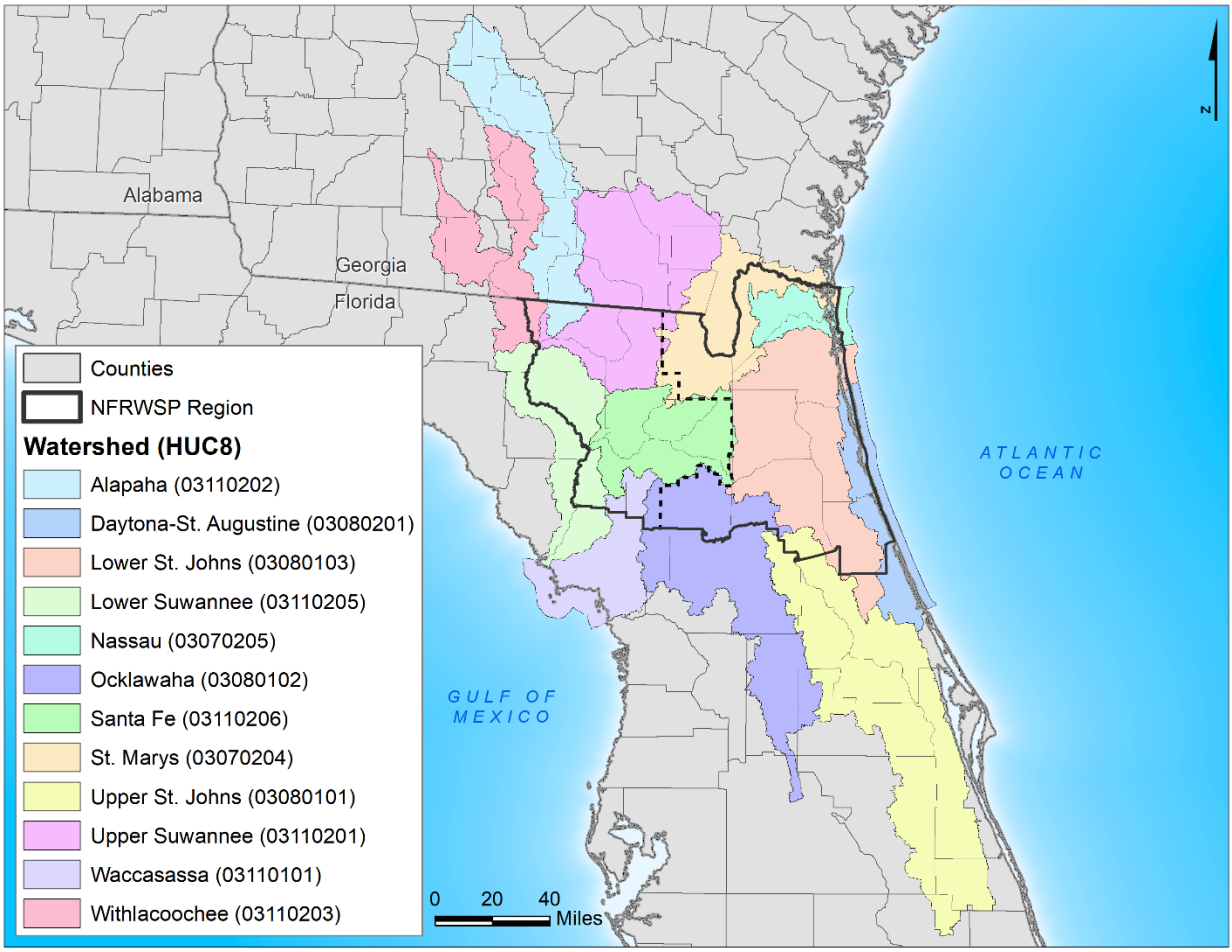

Figure 3. Watersheds (8-digit hydrologic unit code) in the NFRWSP area (USGS, 2023)

Groundwater Resources:

Groundwater resources in the NFRWSP area include the Surficial aquifer system (SAS), the Floridan aquifer system (FAS) and, where present, the intermediate aquifer system (IAS). A brief description of these aquifer systems is listed below:

- The SAS is the uppermost aquifer system, generally unconfined, and comprised primarily of unconsolidated beds of sand, shelly sand, shell, and clay.

- The intermediate confining unit (ICU) or the IAS separates the underlying FAS from the overlying SAS throughout a large portion of the planning region. In some areas, the FAS is unconfined due to the absence of the ICU, such as in the lower Suwannee River basin in the SRWMD. In other areas within the planning region, the ICU is quite thick, such as in Duval and Nassau counties, where it is upwards of hundreds of feet thick.

- The FAS within the planning area is comprised primarily of carbonate rocks. In much of its extent, the FAS is comprised of an upper aquifer, the Upper Floridan aquifer (UFA) and lower aquifer, the Lower Floridan aquifer (LFA). The two aquifers are separated by a semi-confining unit referred to as the middle confining unit (MCU). Regionally, the MCU varies in lithologic and hydraulic characteristics and the degree of confinement of the MCU can vary significantly. In Northeast Florida, the LFA is further subdivided into an upper zone, referred to as the upper zone of the Lower Floridan aquifer and a lower zone, the Fernandina permeable zone. The upper zone of the Lower Floridan aquifer is separated from the Fernandina permeable zone by the lower semi-confining unit.

Detailed information on the representation of these aquifer systems can be found in the North Florida-Southeast Georgia regional groundwater flow model version 1.1 (NFSEG) Final Report (Durden et al., 2019).

Traditional Water Sources:

Current water sources in the NFRWSP area include groundwater (fresh and brackish), reclaimed water, surface water, and stormwater. The majority of water use in 2015 in the NFRWSP area was fresh groundwater (Appendix B, Table B-2). Given this consistent pattern of historical and current utilization of fresh groundwater, the Districts recognize fresh groundwater as the only traditional water supply source in the NFRWSP area and designate all other water sources to be nontraditional (i.e., alternative water supply; (subsection 373.019(1), F.S.).

Chapter 2: Introduction to Water Supply Planning

Introduction

The districts develop water supply plans to identify sustainable water supplies for all existing and anticipated water uses while protecting water resources and related natural systems. Water supply plans provide a view of projected future water needs, potential water supply sources and avoidable water resource impacts to help all water users make informed decisions regarding how to meet their future water needs. The elements of water supply planning are:

- Identify projected water demands for all use types through the planning horizon.
- Identify the water resource impacts that could occur as a result of meeting the projected increase in water demand with traditional sources.
- Identify technically and economically feasible water resource development (WRD) and water supply development (WSD) project options, including water conservation measures, that could be implemented to meet future water demands and avoid unacceptable water resource impacts.

Base Year

Population and water demand projections are essential components to regional water supply plan development. In developing population and water demand projections, a base year comprised of actual population and water use data is needed. The base year is the “starting point” to which projected changes in population and water demand are applied. For the NFRWSP, the base year is 2015, which was the most current year with population and water use data at the time projections were developed. Population and water demand were then projected at five-year intervals throughout the planning horizon, 2020 through 2045, per statewide regional water supply planning guidelines.

The 2023 NFRWSP has been prepared in accordance with the guidance document, “Format and Guidelines for Regional Water Supply Planning” (DEP, 2019). This plan also serves as the 2023 Water Supply Assessment (WSA) for both Districts.

Legislative Mandates

Section 373.709, F.S., provides that the districts shall conduct water supply planning for a water supply planning region where it determines that existing 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 the planning period. The districts must conduct planning in an open public process, in coordination and

cooperation with local governments, regional water supply authorities, water and wastewater utilities, multijurisdictional water supply entities, self-suppliers, reuse utilities, DEP, the Florida Department of Agriculture and Consumer Services (FDACS), and other stakeholders (subsection 373.709(1), F.S.). In addition, subsection 373.709(2), F.S., requires each Regional Water Supply Plan (RWSP) to be based on at least a 20-year planning period and to include the following:

- Water supply and water resource development components.
- Funding strategies for water resource development projects.
- Consideration of how water supply development project options serve the public interest or save costs overall by preventing the loss of natural resources or avoiding greater future expenditures for WRD or WSD projects.
- The technical data and information applicable to each planning region, which are necessary to support the RWSP.
- The minimum flows and minimum water levels (MFLs) established for water resources within each planning region.
- MFLs prevention and recovery strategies, if applicable.
- Reservations of water adopted by rule pursuant to subsection 373.223(4), F.S., within each planning region.
- Identification of surface waters or aquifers for which MFLs are scheduled to be adopted.
- An analysis, developed in cooperation with DEP, of areas or instances in which the variance provisions of paragraph 378.212(1)(g), F.S., or subsection 378.404(9), F.S., may be used to create WSD or WRD projects.
- An assessment of how the RWSP and the projects identified in the funding plans prepared support the recovery or prevention strategies for implementation of adopted MFLs or water reservations while ensuring that sufficient water will be available for all existing and future reasonable-beneficial uses and identified natural systems, while avoiding the adverse effects of competition.

Relationship to SJRWMD and SRWMD Regulatory Programs

Subsection 373.709(7), F.S., states that nothing contained in the water supply development component of the NFRWSP shall be construed to require any entity to select or implement a WSD project identified in the component merely because it is identified in the plan. Pursuant to subsection 373.709(7), F.S., the NFRWSP may not be used in the review of consumptive/water use permits (CUPs/WUPs), unless the plan or

an applicable portion thereof has been adopted by rule, with one exception. The one exception is for the evaluation of an application for the use of water which proposes the use of an alternative water supply (AWS) project as described in the NFRWSP and provides reasonable assurances of the applicant's capability to design, construct, operate, and maintain the project (subsection 373.223(5), F.S.). It is then presumed that the AWS use is consistent with the public interest under paragraph 373.223(1)(c), F.S.

It is important to note that, while the NFRWSP may not be used in the review of CUPs/WUPs, the Districts are allowed to use data or other information that was used to establish the plan in reviewing CUPs/WUPs.

NFRWSP Outreach

The Districts held two technical methods public workshops in each District in November 2021. Comments were received during the public workshops and during the subsequent written public comment period lasting approximately four weeks. After reviewing the feedback received, the water use and population demand projections were revised. There was a second public review opportunity on the revised datasets in June 2022, and the datasets were finalized in July 2022. Additionally, there were two constraint assessment public workshops in November 2022 (one in each District), followed by a public comment period of approximately six weeks. Lastly, two draft NFRWSP workshops were held in September 2023, associated with a public comment period of three weeks. All public workshops were consistent with subsection 373.709(1), F.S. The public workshops were available in person and online to maximize the opportunity for public participation. Additionally, the presentation slides and recordings were made available on the North Florida Water Webpage and were available upon request. Comments received during the public workshops and comment periods were considered for incorporation, as appropriate, into the NFRWSP and are detailed in Appendix A.

In addition, beginning in February 2023, District staff held many focused stakeholder meetings with local governments, regional organizations, agricultural entities, and other stakeholders in the NFRWSP area. The purpose of these meetings was to share an overview of the NFRWSP process, provide background information of interest to stakeholders, and answer questions. Staff also solicited feedback and project concepts from stakeholders. These efforts provided a valuable means for stakeholders to engage with the NFRWSP development and share their perspectives with the Districts. The Districts found the expanded input received during these discussions to be beneficial to the NFRWSP development.

Approval Process

As noted previously, the Districts held public workshops consistent with subsection 373.709(1), F.S., to highlight the results of the NFRWSP. The draft plan was posted for 24 days of public comment from September 12, 2023, through October 6, 2023. Upon completion of the updates to the NFRWSP, the Districts presented the NFRWSP to their

respective governing boards on December 12, 2023. The order approving the 2023 NFRWSP reflects the final approval date, which is attached at the beginning of this document.

Requirements after Plan Approval

The water supply planning process of the Districts is closely coordinated and linked to the water supply planning efforts of local governments and utilities. Therefore, significant coordination and collaboration throughout the development, approval, and implementation of the NFRWSP is necessary among all water supply planning entities.

Paragraph 373.709(8)(a), F.S., requires the Districts to notify water supply entities identified in the NFRWSP as the parties are responsible for implementing the various project options listed in the NFRWSP. When the notice is received by the water supply entity, the water supplier must respond to the Districts within 12 months informing the Districts of their intentions to develop and implement the project options identified by the NFRWSP or provide a list of other projects or methods to meet the identified water demands (paragraph 373.709(8)(b), F.S.).

In addition to the requirements above, local governments are required to adopt water supply facilities work plans and related amendments into their comprehensive plans within 18 months following the approval of the NFRWSP (subparagraph 163.3177(6)(c)3., F.S.). The work plans contain information to update the comprehensive plan's capital improvements element, which provides specifics about the need for and location of public facilities, principles for construction, cost estimates, and a schedule of capital improvements.

Local governments in the NFRWSP area are required by subparagraph 163.3177(6)(c)3., F.S., to modify the potable water sub-elements of their comprehensive plan by:

- Incorporating the AWS project projects selected by the local government from those projects identified in the NFRWSP or proposed by the local government;

- Identifying such AWS projects and traditional water supply projects and conservation and reuse necessary to meet the water needs identified in the NFRWSP within the local government's jurisdiction; and

  Including a work plan, covering at least a 10-year planning period, for building public, private and regional water supply facilities, including the development of AWS, which are identified in the element as necessary to serve existing and new development.

Chapter 3: Water Demand, Reclaimed Water and Water Conservation Projections

Purpose

The Districts develop water demand projections to determine existing legal uses, anticipated future needs, and existing and reasonably anticipated sources of water and water conservation efforts. The Districts' goal in projecting water demands is to develop reasonable estimates of projected need based on the best information available. Water demand projections were reviewed with water users. Additionally, these projections are consistent with statewide planning guidance on water demand projections. The projected increase in water demand is used in water resource assessments to determine the potential for unacceptable impacts to water resources and related natural systems.

Water use and projected water demand in the Districts is grouped into six water use categories for water supply planning.

- Public Supply (PS)
- Domestic Self-supply (DSS) and Small Public Supply Systems (SPSS)
- Agricultural Irrigation Self-supply (AG)
- Landscape/Recreational Irrigation Self-supply (LR)
- Commercial/Industrial/Institutional and Mining Dewatering Self-supply (CII/MD)
- Power Generation Self-supply (PG)

In addition to the six categories listed above, the Districts project future reclaimed water flows that can potentially offset future water demand.

Total water demand in the NFRWSP area is anticipated to increase from 530 million gallons per day (mgd) in 2015 to 698 mgd in 2045 (32%; Table 1; Figure 5). Public supply represents the largest demand in the NFRWSP area (41%), followed by agriculture (25%) and CII/MD (19%) in 2045, (Table 1, Figure 4). The Districts also calculated a 1-in-10 year drought water demand for 2045, which represents an event that would result in an increase in water demand of a magnitude that would have a 10% probability of occurring during any given year. The Districts estimate that total water demand in 2045 could increase by an additional 12% if a 1-in-10 year drought event occurred.

Table 1. Summary of water use (mgd) by District and use type in the NFRWSP area

Water Use Category	2015 SR	2015 SJR	2015 NF Area	2045 SR	2045 SJR	2045 NF Area	Increase SR	Increase SJR	Increase NF Area
PS	9.3	180.0	189.3	13.8	274.1	287.9	4.5	94.1	98.6
DSS	9.3	30.9	40.3	10.8	35.6	46.4	1.5	4.6	6.2
AG	88.9	48.0*	136.9	111.5	63.9	175.4	22.6	15.9	38.5
CII/MD	45.8	77.5	123.2	46.8	84.6	131.4	1.1	7.1	8.2
L/R	2.7	15.4	18.1	3.2	26.3	29.5	0.5	10.9	11.3
PG	1.9	19.8	21.7	2.1	25.8	27.8	0.1	6.0	6.1
Total	158.0	371.6	529.6	188.2	510.2	698.4	30.2	138.5	168.8

*SJR 2015 AG water use is based on actual reported water use in a wetter than average rainfall year and 2045 water use is estimated based on projections from FSAID VII.

**Totals may be slightly different due to rounding of individual values.

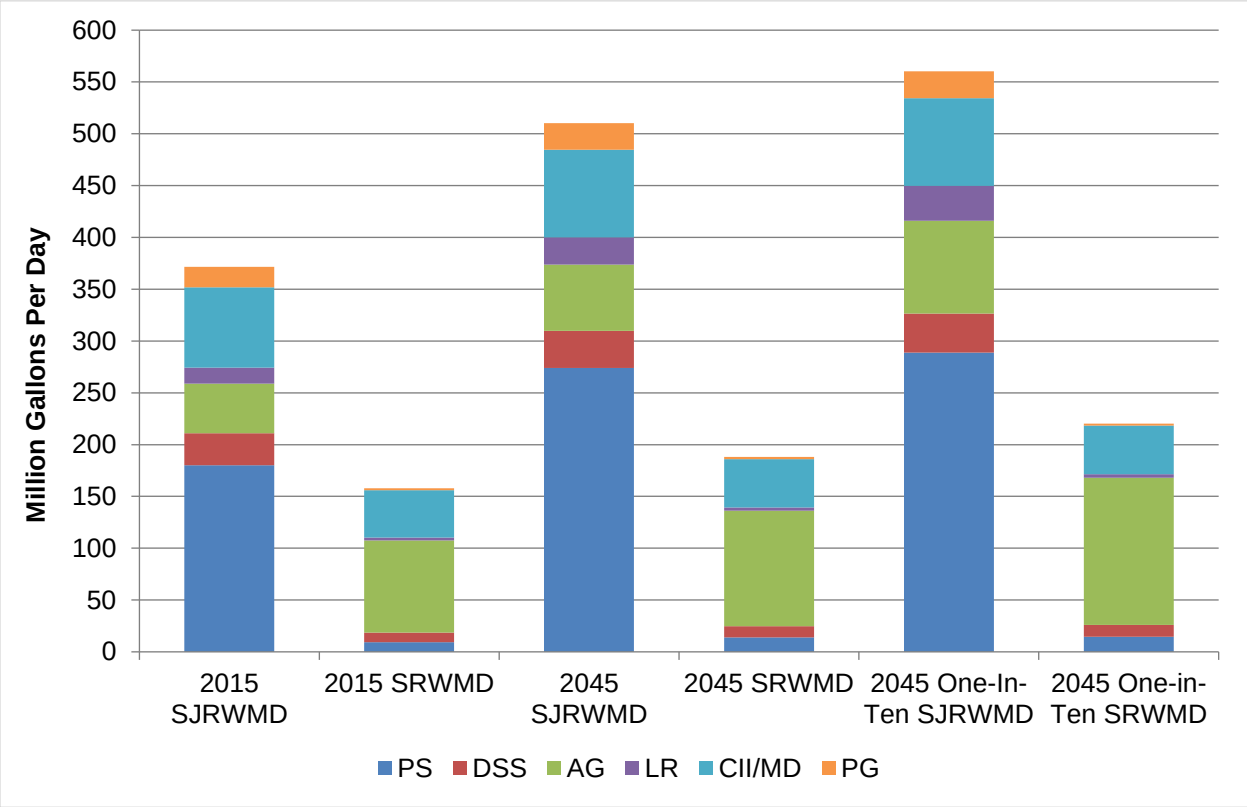

Figure 4. 2015 water use estimates and 2045 water demand projections in the NFRWSP by category

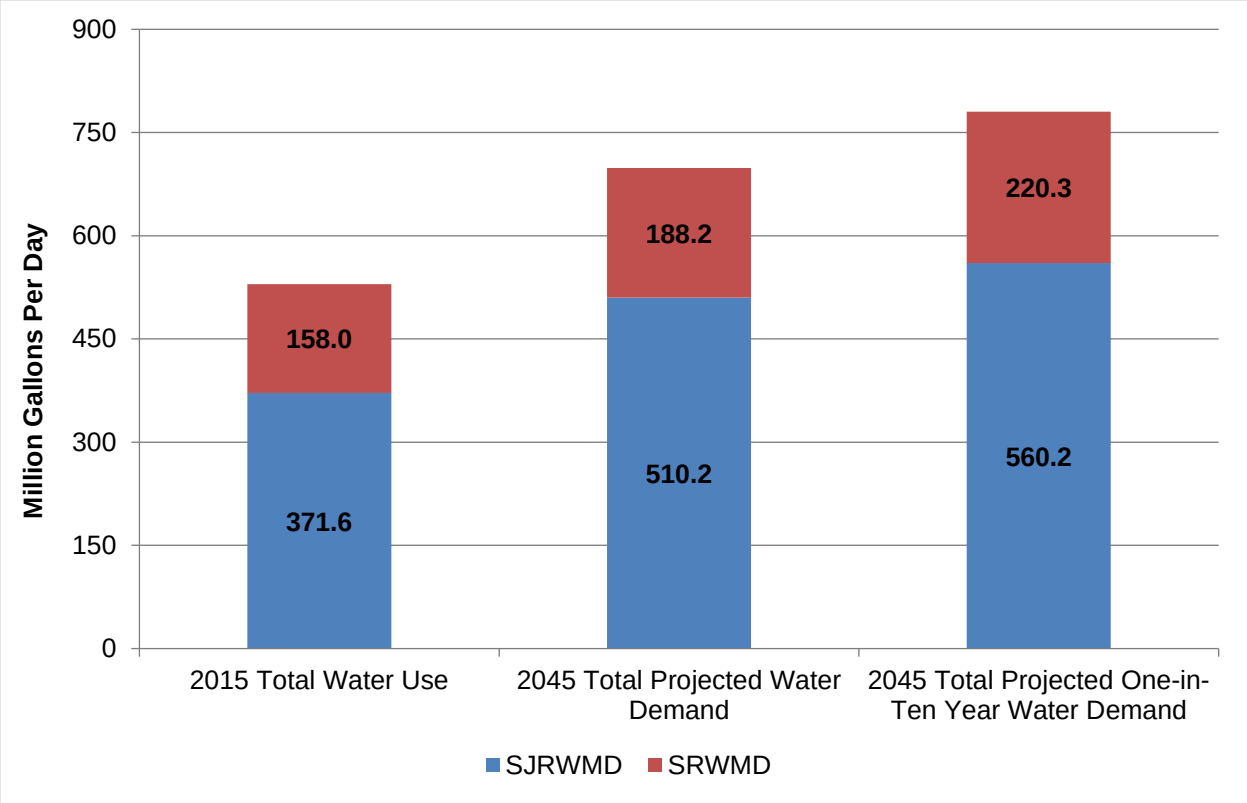

Figure 5. 2015 total water use estimates and 2045 water demand projections in the NFRWSP

Future Water Demand Projections and Methodology

Assumptions

For the purposes of the NFRWSP, the Districts assume that projected increases in supply will come from traditional sources unless users have made a commitment to the development and use of other sources of supply. Public water supply utilities in Florida are in varying stages of transitioning exclusively from fresh groundwater sources to include alternative sources.

Guidance and minimum requirements for developing water demand and population projections are described in section 373.709, F.S. The detailed methodology for the development and spatial distribution of population and water demand projections can be found in Appendix B.

Population Projections

Population projections yield the estimated population growth and percent change from 2015 to 2045. The Districts estimated the population projections for water supply utilities in two categories: public supply and domestic self-supply/small public supply systems.

More details on the methods used for estimating population are described in Appendix B.

The Districts' total population for the NFRWSP area is expected to increase by 982,000 people (50% to approximately 2.96 million people) by 2045 (Figures 6 and 7). The SRWMD population estimates in Figure 7 do not include the institutional population. For the 2045 total population projections, 80% of the projected population will use water from public supply, and the remaining 20% will use water via DSS and SPSS. The population served by public supply utilities in the NFRWSP area is expected to increase by 923,000 people (63% to approximately 2.4 million people) through 2045. Domestic self-supply and small public supply systems population in the NFRWSP area is expected to increase by 59,000 people (11% to approximately 579,000 people) through 2045.

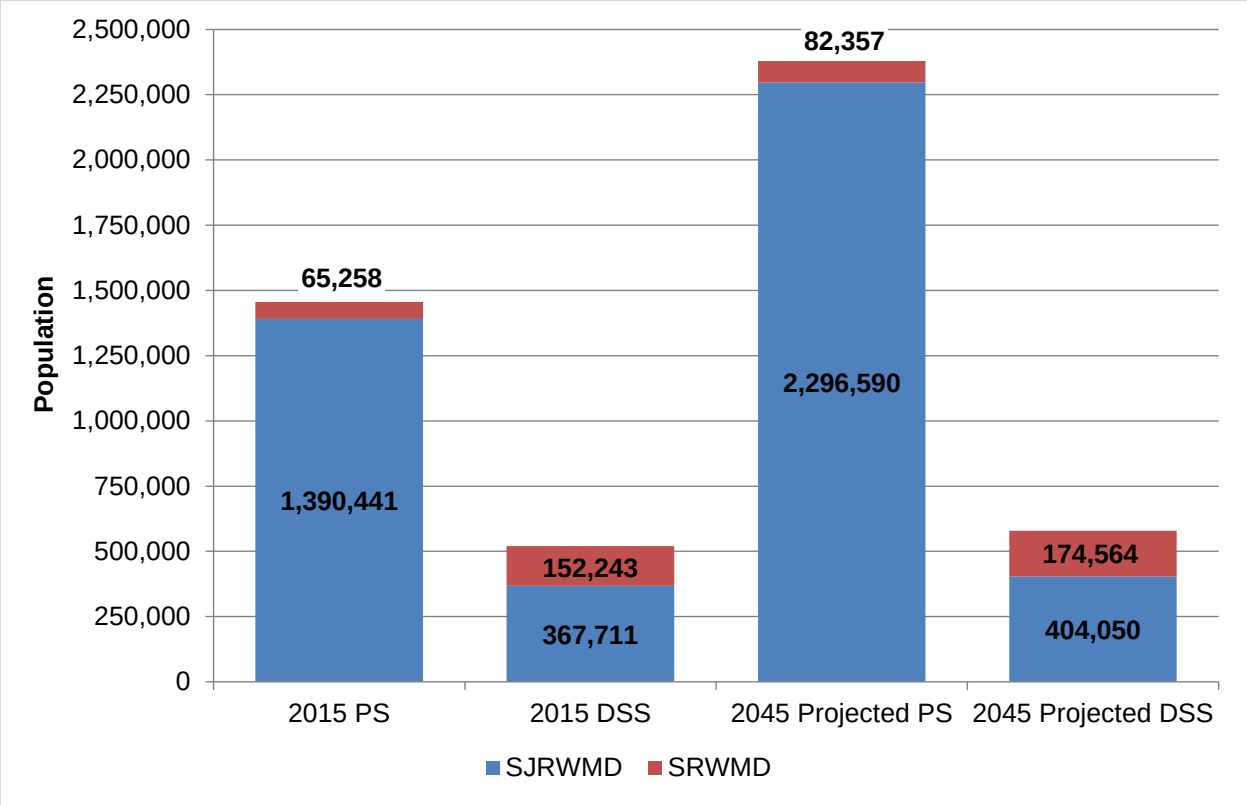

Figure 6. 2015 population estimates and 2045 population projections in the NFRWSP by category

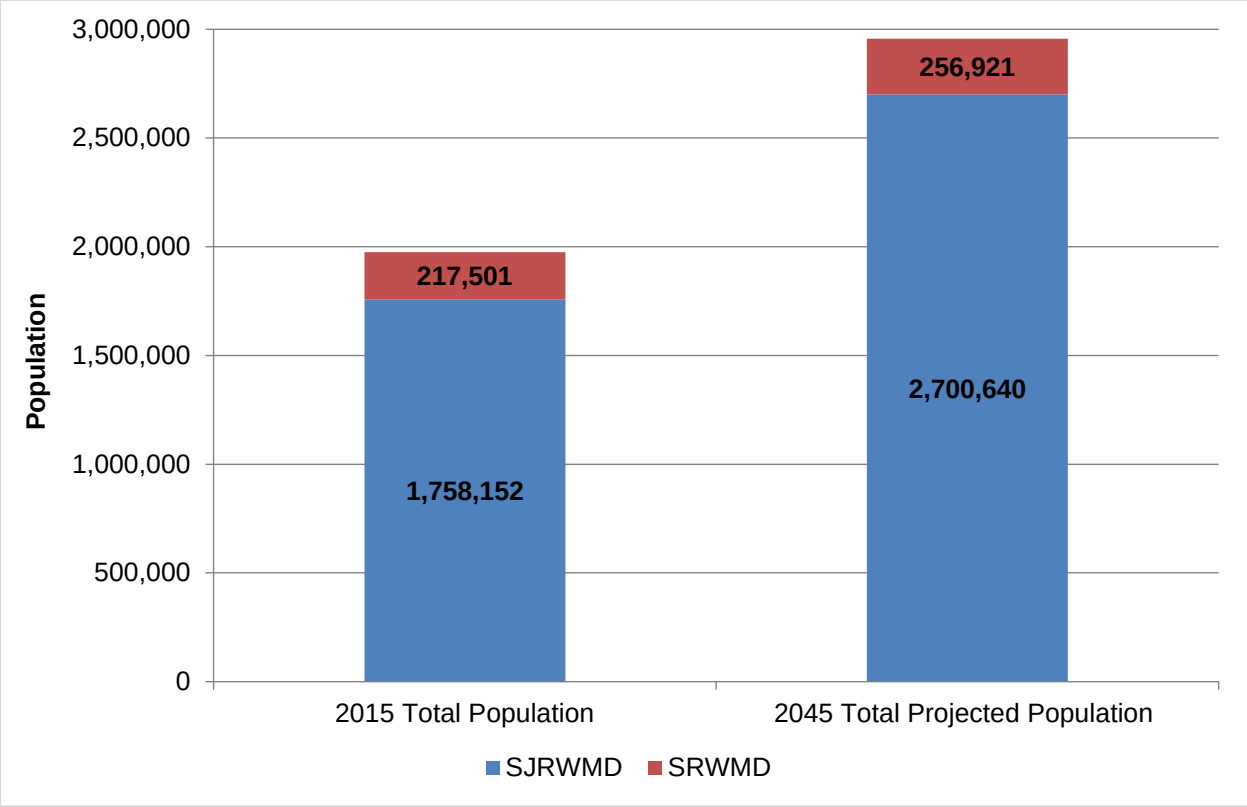

Figure 7. 2015 total population estimates and 2045 population projections in the NFRWSP

Public Supply

The public supply category consists of indoor and outdoor residential and nonresidential uses supplied by a municipality, county, regional water supply authority, special district, public or privately owned water utility or multijurisdictional water supply authority for human consumption and other purposes. This category is split between large public supply systems, which include permits that withdraw an annual average of 0.1 mgd or more, and SPSS that withdraw less than 0.1 mgd. The methods for projecting water demand for SPSS are the same as for large public supply systems and are described immediately below. However, the water use estimates for small public supply are aggregated and incorporated with the domestic self-supply estimates which are described in the next section.

Demand

For the NFRWSP, the Districts based the water demand projections for large public supply and small public supply on the most recent five-year average gross per capita rate (2014-2018). The gross per capita water use rate is the factor applied to projected population to determine future water demand. This rate represents, on average, how much water one person uses in a day. For large public supply and small public supply, the gross per capita 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 expressed in average gallons per capita per day (gpcd). A five-year average is used to address annual variations in water use due to climate variations and implementation of water conservation programs. The Districts calculated five-year average gross per capita water use rates for each individual public supply and small public supply.

The use of gross per capita is recognized as a national standard methodology for water supply planning. However, this practice assumes that past water use is predictive of future water use and incorporates the current economic conditions and current rates of reclaimed water use and water conservation into the future projections. Factors such as the implementation of water conservation measures, reductions in landscape irrigation with potable water, and increases in multifamily housing occupancy can decrease the gross per capita rates. Conversely, factors such as expanded tourism and other commercial development, larger irrigated lots, and increases in single family housing can increase the gross per capita rates. Factors affecting gross per capita rates and public supply water demands will be captured during future water supply plan updates.

The Districts' large public supply water demand for the NFRWSP area is expected to increase by 99 mgd (52% to approximately 288 mgd) by 2045 (Figure 8). The Districts aggregated the projected water demand for the small public supply for each county and summed those values to the total respective county demand for the DSS category, shown in the next section. Public supply represents 38% of the 2045 projected water demand in the NFRWSP area. Of note, public supply also represents 41% of the total increase in water demand in the NFRWSP area.

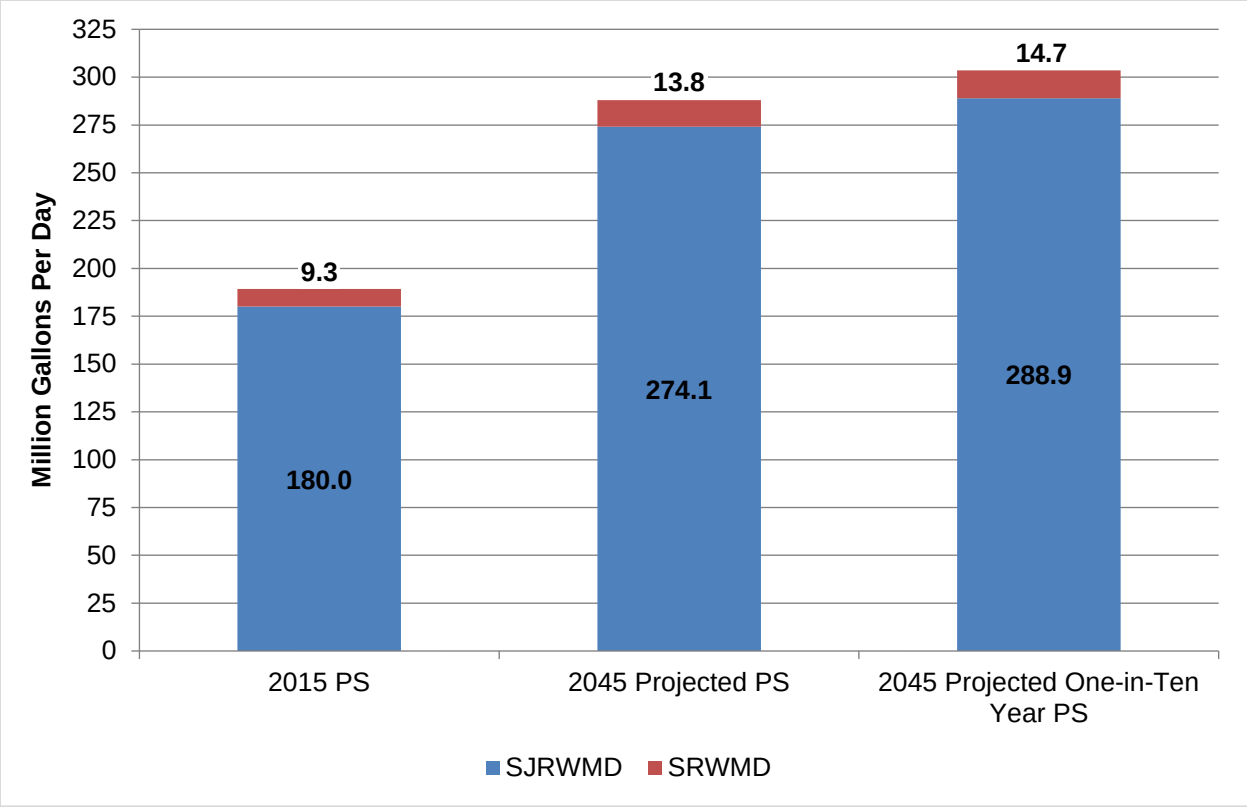

Figure 8. 2015 large public supply water use estimates and 2045 water demand projections in the NFRWSP

Domestic Self-Supply

The DSS category consists of indoor and outdoor water use at residential dwellings not served by a central public supply and water usage from SPSS (systems less than 0.1 mgd). Historic water use and population and projected water demand and population for SPSS are calculated individually but are aggregated with the DSS category for reporting purposes at the county level.

Demand

For the NFRWSP, the Districts based the DSS water demand projections on the most recent five-year average residential per capita rate (2014-2018). For DSS, the residential per capita rate (also referred to as household use, both indoor and outdoor) is defined as the water used for solely residential purposes. Gross per capita is not used for this category as it includes more than just residential uses. Details on the small public supply water demand is described in the Public Supply section.

The Districts' total combined DSS and small public supply water demand for the NFRWSP area is expected to increase by six mgd (15% to approximately 46 mgd) by 2045 (Figure 9). Of the 2045 combined DSS water demand, DSS wells represent 7% of the projected water demand.

The Districts also calculated a 1-in-10 year drought water demand for 2045 (Figure 9). It is estimated that water demand in 2045 could increase by six percent if a 1-in-10 year drought event occurred.

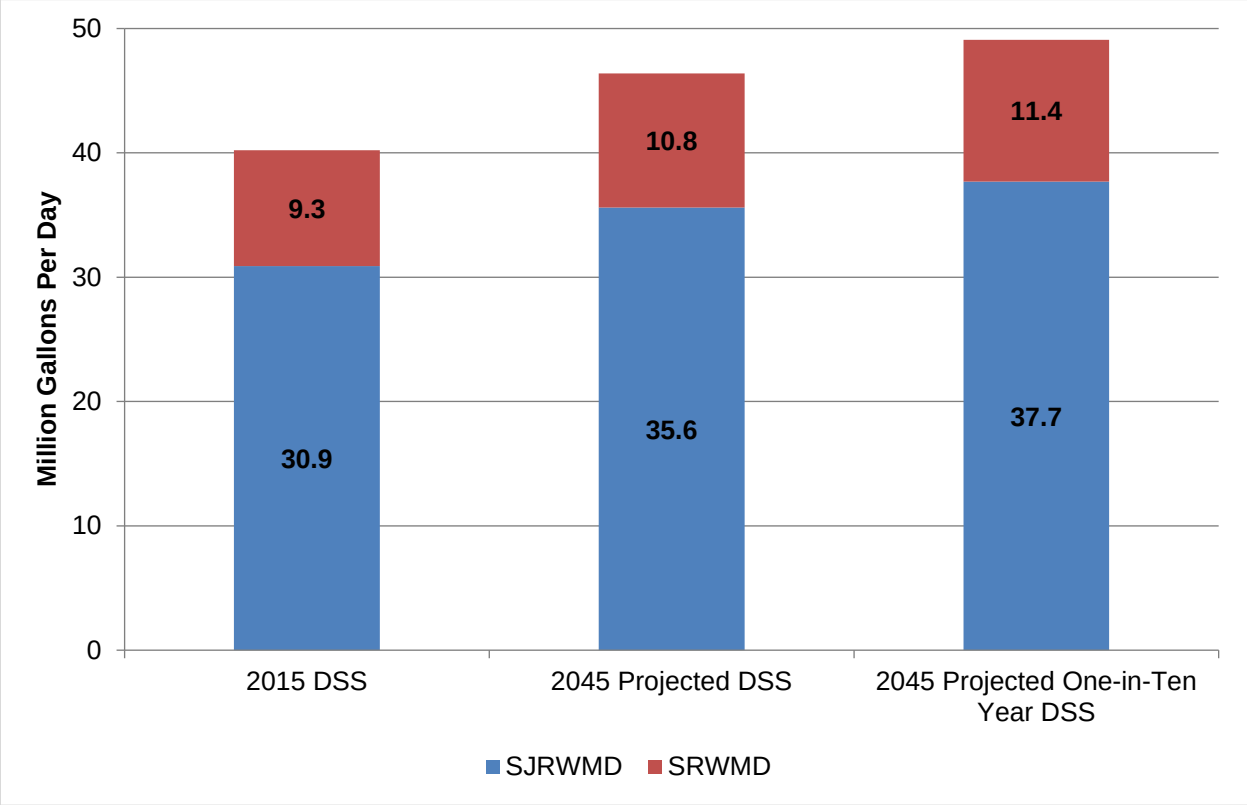

Figure 9. 2015 domestic self-supply water use estimates and 2045 water demand projections in the NFRWSP

Agriculture

The agricultural irrigation self-supply category includes the irrigation of crops and other miscellaneous water uses associated with agricultural production. Irrigated acreage and projected water demands were determined for a variety of crop categories, including citrus, vegetables, fruit, field crops, greenhouse/nursery, sod, etc. In addition, projected water demands associated with other agriculture uses were estimated and reported as miscellaneous type uses, such as aquaculture, dairy/cattle, poultry and other livestock.

Pursuant to subsection 373.709(2)(a)1b., F.S., the districts are required to consider agricultural demand projections provided by FDACS when developing RWSPs. FDACS develops future agricultural acreage, water demand projections, and a 1-in-10 drought demand for the State of Florida, which is updated annually. This product is known as the Florida Statewide Agricultural Irrigation Demand (FSAID), and the final report for the version identified as FSAID VII was delivered on June 30, 2020. This FSAID VII iteration has base year acreage and water use estimates for 2018 with projections for 2020-2045. The Districts used the final FSAID VII agricultural acreage and water demand

projections for the NFRWSP. Detailed methodology can be found in the June 30, 2020, FSAID VII Final Report (FDACS, 2020).

Acreage and Demand

The Districts' total agricultural water demand for the NFRWSP area is expected to increase by 39 mgd (28% to approximately 175 mgd) by 2045 and acreage is expected to increase by 29,000 acres (24% to approximately 150,000 acres) (Figures 10 and 11) by 2045. Discussion of the 2015 water use trends for SJRWMD are discussed in Appendix B.

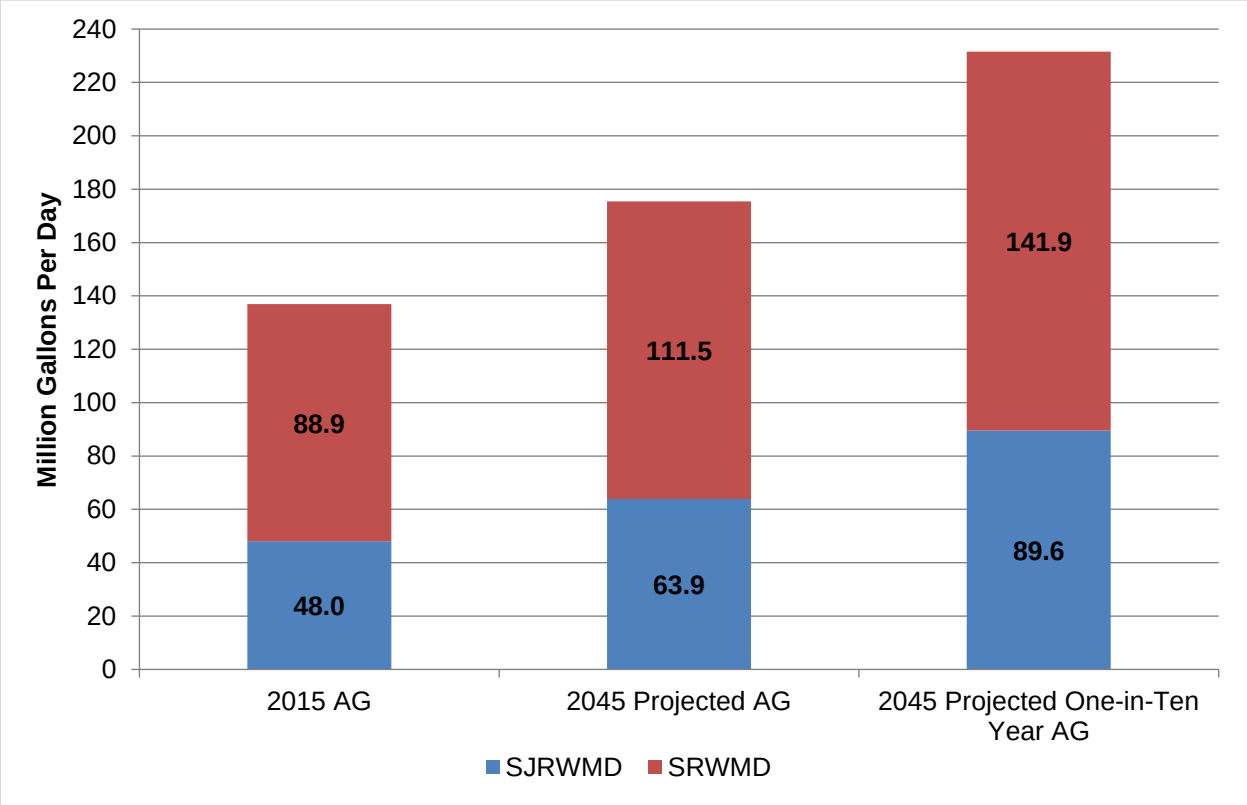

Figure 10. 2015 agriculture self-supply water use estimates and 2045 water demand projections in the NFRWSP

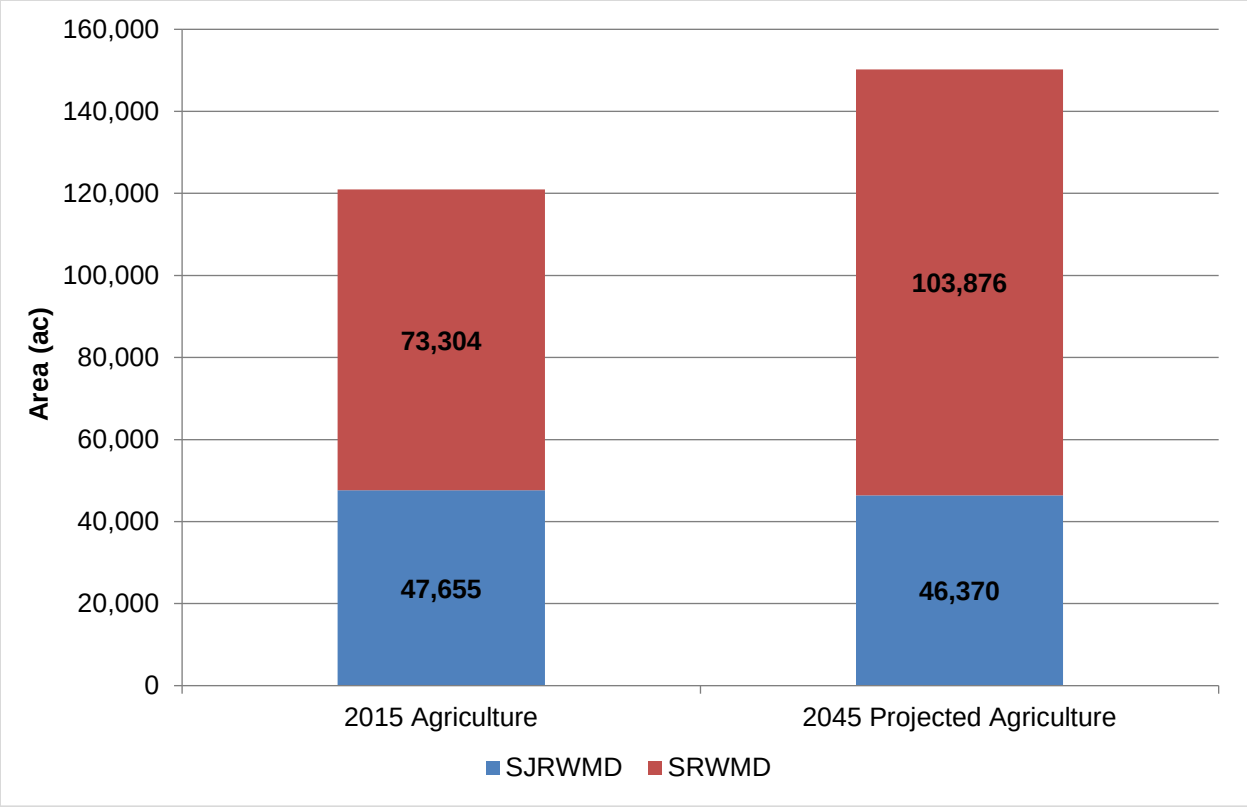

Figure 11. 2015 agriculture self-supply acreage estimates and 2045 acreage projections in the NFRWSP

Commercial/Industrial/Institutional and Mining/Dewatering

The CII/MD category represents water use associated with the production of goods or provisions of services by CII/MD establishments. Commercial uses include general businesses, office complexes, commercial cooling and heating, bottled water, food and beverage processing, restaurants, gas stations, hotels, car washes, laundromats, and water used in zoos, theme parks and other attractions. 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. Institutional use includes hospitals, group home/assisted living facilities, churches, prisons, schools, universities, military bases, etc. Mining uses include water associated with the extraction, transport, and processing of subsurface materials and minerals. Dewatering uses includes the long-term removal of water to control surface or groundwater levels during construction or excavation activities.

Demand

Water demand for the CII/MD category was projected at the county level using a respective CII/MD historic average gpcd. Commercial/Industrial/Institutional and Mining/Dewatering historic water use and projected water demand consists of only

consumptive uses; recycled surface water and other non-consumptive uses were removed. The Districts define consumptive use as any use of water that reduces the supply from which it is withdrawn or diverted. For the NFRWSP, the Districts use the loss of water in the mining operations due to evaporation and water removed in the product in calculating demand. The amount of water lost is represented by 5% of the total surface water withdrawals of the mine operation. The remaining surface water was assumed to be recirculated in the mining process and, therefore, is considered non-consumptive. The CII/MD average gpcd was applied to the additional population projected by BEBR (Rayer, 2020) for each five-year increment and the associated water demand was added to the base year, 2015 water use. Water demands for large commercial and industrial facilities (e.g., pulp and paper mills) that are not impacted by population growth were held constant.

The Districts' total combined CII/MD water demand for the NFRWSP area is expected to increase by eight mgd (7% to approximately 131 mgd) by 2045 (Figure 12). The districts determined that drought events (1-in-10 year) do not have significant impacts on water use in the CII/MD category. Water use for these categories is related primarily to processing and production needs.

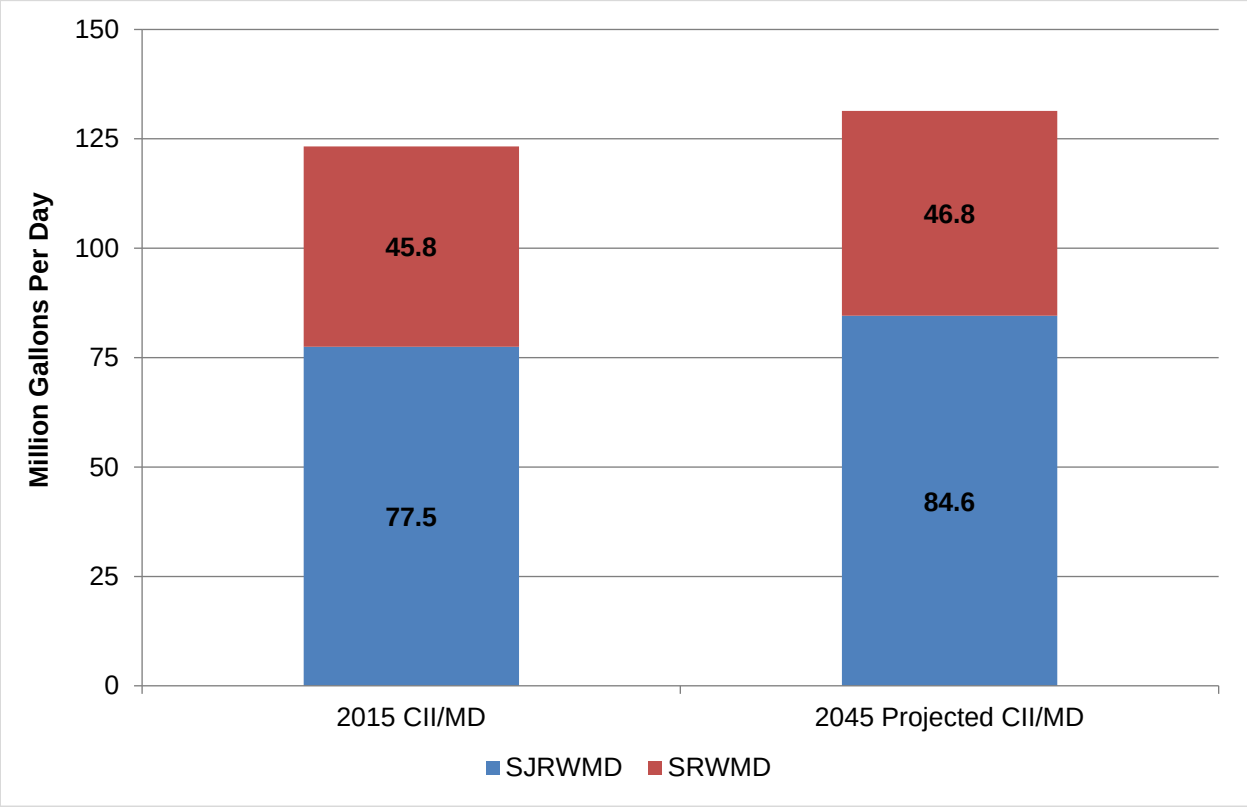

Figure 12. 2015 commercial/industrial/institutional and mining/dewatering self-supply water use estimates and 2045 water demand projections in the NFRWSP

Landscape/Recreation

The LR category represents water use associated with the irrigation, maintenance, and operation of golf courses, cemeteries, parks, medians, attractions, and other large self-supplied irrigation areas. Landscape use includes the outside watering of plants, shrubs, lawns, ground cover, trees and other flora in such diverse locations as the common areas of residential developments and industrial buildings, parks, recreational areas, cemeteries, public rights-of-ways and medians. 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. Landscape irrigation using water from a public supply utility or a DSS well is included in the PS or DSS category based on best available information, as appropriate.

Demand

Water demand for the LR category was projected at the county level using a respective LR historic average gpcd. The average LR gpcd was applied to the additional population projected by BEBR (Rayer, 2020) for each five-year increment and the associated water demand was added to the 2015 base-year water use.

The Districts' total LR water demand for the NFRWSP area is expected to increase by 11 mgd (63% to approximately 30 mgd) by 2045 (Figure 13).

The Districts determined that historic data and net irrigation ratios are acceptable when calculating the 1-in-10 year LR water demand projection. In addition, agricultural irrigation models have supplemental irrigation values for LR that can also be used. A 1-in-10 year drought factor was developed for each county, using the highest year water use from 2014-2018 and the percent increase from the average 2014-2018 LR water use. For example, if water use in 2015 was five percent higher than the 2014-2018 average, five percent was applied to the average 2045 water demand to project a 2045 1-in-10 year water demand.

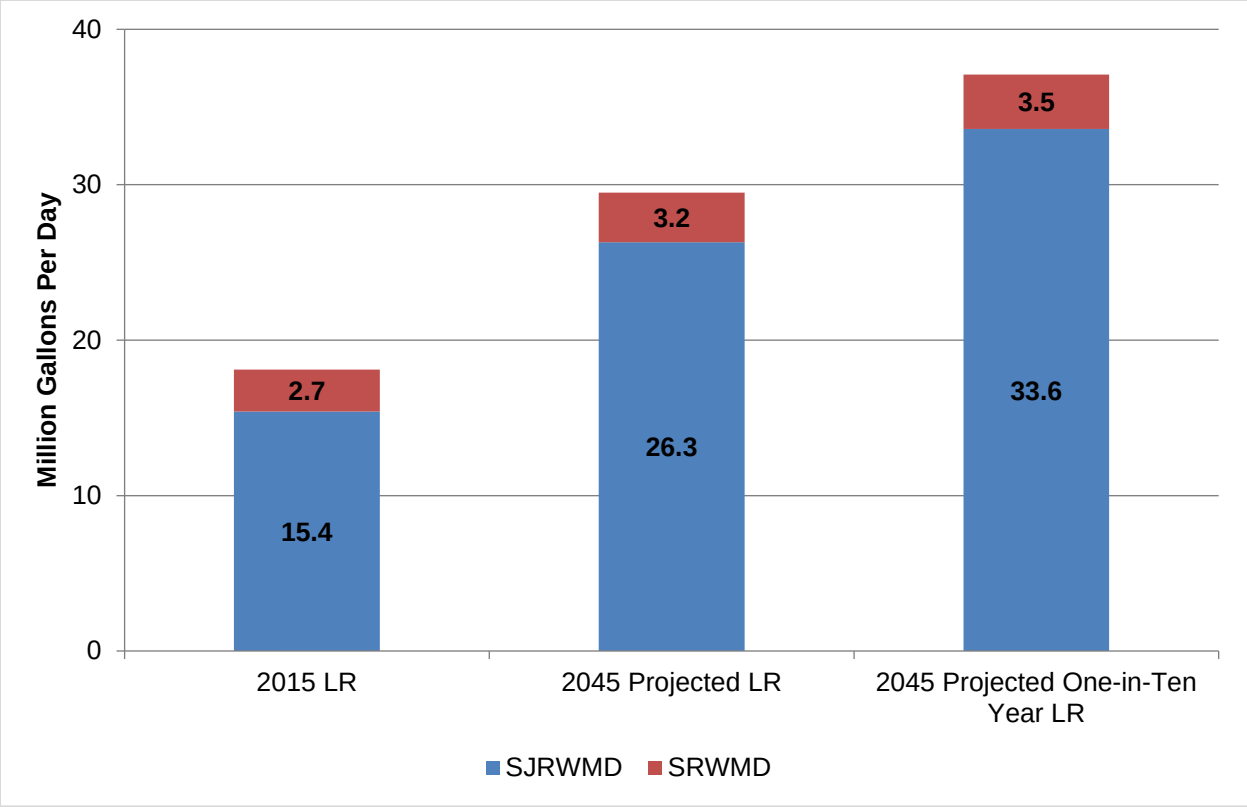

Figure 13. 2015 landscape/recreational self-supply water use estimates and 2045 water demand projections in the NFRWSP

Power Generation

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

Demand

Water demand was calculated for each PG facility and then summed to the county level for consumptive uses of water only. Non-consumptive uses, such as recycled surface water used for once-through cooling in power plants, were removed from the water demand calculation. For this NFRWSP, two percent of total surface water use by PG facilities is considered consumptive, to account for water loss due to evaporation.

The Florida Public Service Commission (PSC) requires that each PG entity produce detailed ten-year site plans for each of its facilities. These plans include planned facilities and generating capacity expansion, as well as the decommission of facilities and the reductions associated with more efficient processes. The 2020 ten-year site plans for each PG facility within the NFRWSP counties were used in developing the PG water demand projections (Florida PSC, 2020).

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 water 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 data and BEBR medium population projection rates (Rayer, 2020). In addition, the average daily gallon per megawatt use was estimated for 2014-2018 and used as a proxy to project future water demand beyond the ten-year site plans and when projected water demand (for the ten-year site plan period) was not included.

The Districts' total PG water demand for the NFRWSP area is expected to increase by six mgd (29% to approximately 28 mgd) by 2045 (Figure 14).

The Districts determined that drought events do not have significant impacts on water use in the PG category. Water use for this category is primarily related to processing and production needs.

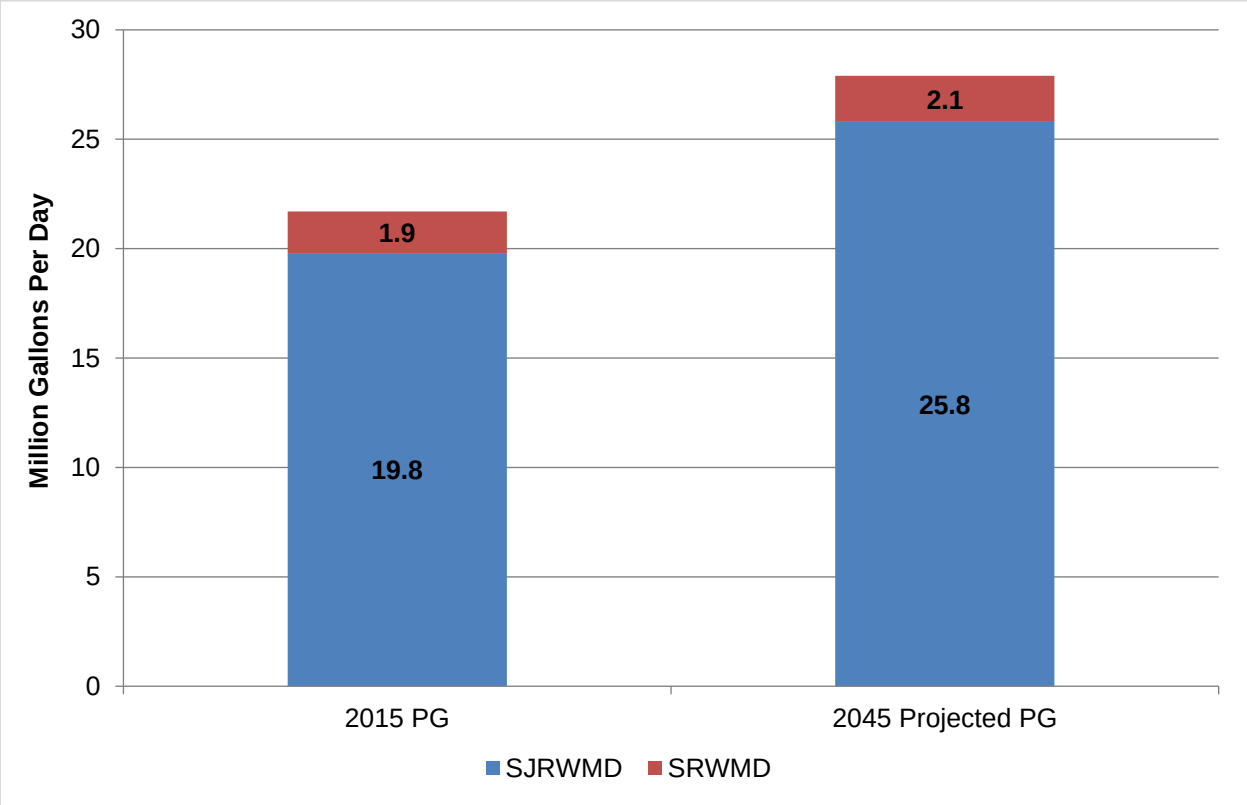

Figure 14. 2015 power generation self-supply water use estimates and 2045 water demand projections in the NFRWSP

Reclaimed Water Projections

Projections were made for domestic wastewater treatment facilities (WWTF) with 2018 permitted wastewater treatment capacities equal to or greater than 0.1 mgd. Detailed methodology for reclaimed water projections can be found in Appendix B.

Existing Flows

The Districts considered existing 2018 reclaimed water flows for future use that were not considered to be used beneficially. The Districts consider beneficial reuse to be only those uses in which reclaimed water takes the place of a preexisting 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 rapid infiltration basins are not considered beneficial reuse, unless located in recharge areas.

The DEP has a statewide reuse utilization goal of 75% (DEP, 2003). The potential existing additional reclaimed water that could be used for reuse was calculated by taking the difference between the 2018 WWTF flow at 75% utilization and 2018 beneficial reuse. This method ensured existing flows would not exceed the 75% utilization goal. It is recognized that each WWTF is unique and items such as system upgrades and treatment, additional storage, system expansion, customer availability, etc., must be taken into consideration.

Figure 15, below, reflects the most recent (2018) reclaimed water flows, both beneficial and disposal. The size of the pie charts represents the total flow. Green represents disposal and purple represents beneficial use of reclaimed water. Facility names and associated 2018 flows can be found in Appendix B. Lines in the graphic show the location of the WWTF for the respective pie chart.

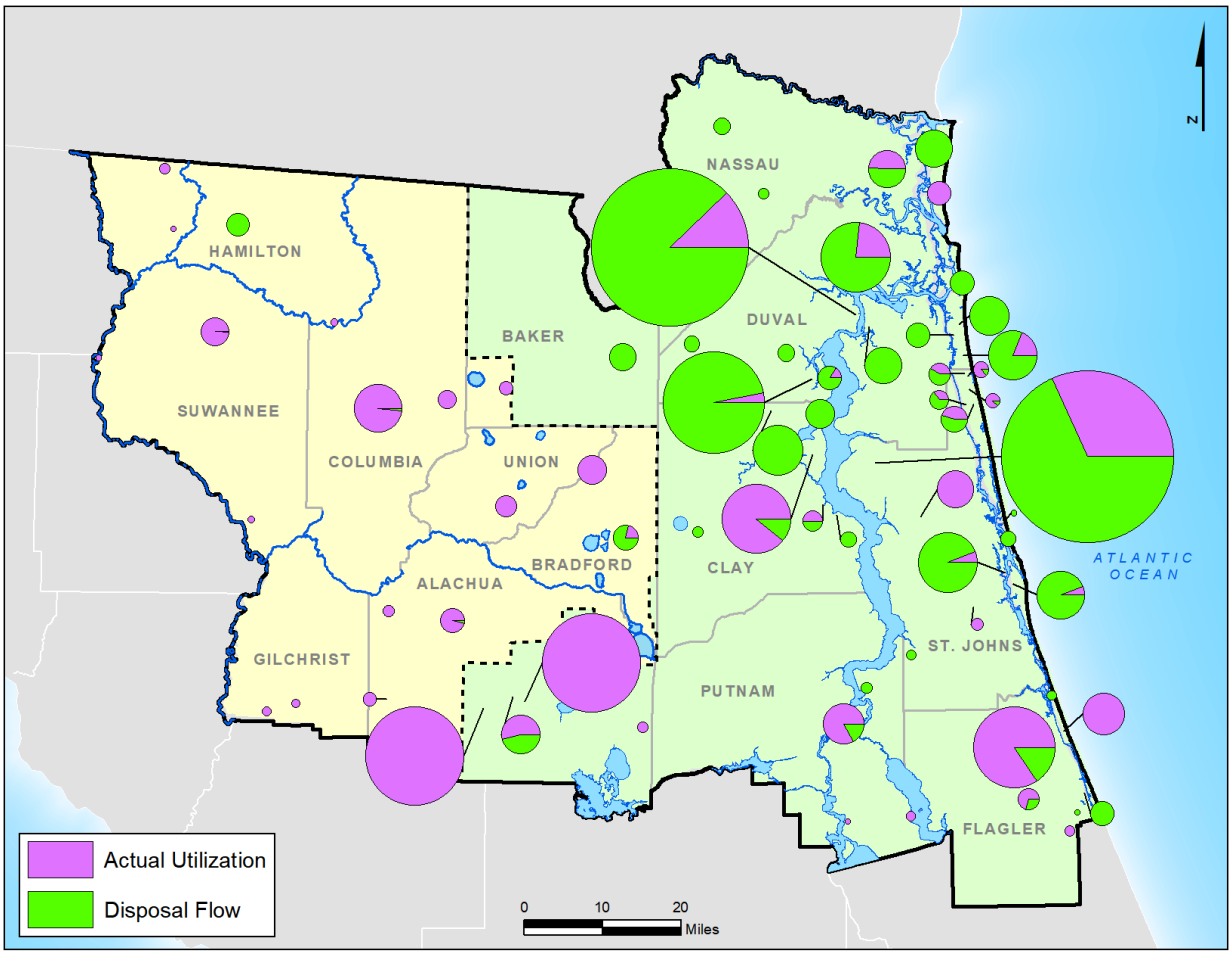

Figure 15. Summary of 2018 reclaimed water flows in the NFRWSP

Future Flows

The Districts identified WWTFs that could potentially receive additional sewered flow as a result of population growth. It was assumed that 95% of the population increase identified will receive sewer service and thereby return wastewater for treatment. It is acknowledged that the percentage of sewered population growth and resulting wastewater flows will vary for individual service providers due to a number of factors.

It was further assumed that the increased sewered population will generate approximately 73 gpcd of wastewater to the local WWTF (sources are identified in Appendix B). The estimated future flow was then multiplied by the DEP utilization goal of 75 % (DEP, 2003) to generate a 2045 quantity of potential new additional reclaimed water available for reuse.

The Districts recognize that only a portion of the existing and future wastewater treated for reuse is actually utilized to offset demands that would otherwise require the use of fresh groundwater. The amount of potable-offset that is typically achieved utility-wide is approximately 65% to 75% but can range from 50% to as much as 100%, depending on

the type of use being replaced. The projected wastewater flows do not represent an amount equal to the demand reduction due to system losses, inefficiencies of its reuse customers, and timing of availability relative to demand.

Reclaimed water systems are unique to each utility, and the potential WWTF flow estimated for this NFRWSP may not necessarily represent the reclaimed water that could be used in projects. Current treatment processes, WWTF capacities, storage, and infrastructure have to be considered, which could potentially have a financial impact associated with the utilization of additional or currently available reclaimed water. Likewise, the Districts realize that future and existing utilization may be higher than estimated if the WWTF provided reclaimed water for reuse to more efficient customers.

For the purposes of this NFRWSP, the Districts also created a future reclaimed water scenario using the 2018 percent beneficial reuse utilization for existing and future flows, which would assume that no changes to current treatment processes are made (e.g., WWTF upgrade). In addition, the Districts recognize potential future wastewater flow could be less if additional residential indoor water conservation is achieved. For example, the American Water Works Association has noted on their website (Drinktap.org) that if all residences installed more efficient water fixtures and regularly checked for leaks, daily indoor water use and associated wastewater flows could potentially be reduced to 45.2 gpcd (Vickers, 2001).

The Districts estimated that increased future reclaimed water flows between 55 mgd and 103 mgd, as described above, could be used for beneficial purposes, potentially offsetting withdrawals from traditional water sources and predicted impacts within the NFRWSP area.

Water Conservation and Irrigation Efficiency

Current water demand projections and the water conservation potential for the NFRWSP area were calculated in an effort to gauge the future impact of water conservation. It is important to note that reductions in water use resulting from current and historical water conservation efforts are reflected in the 2045 water demand projections that were calculated for this plan. Detailed methodology for water conservation can be found in Appendix B.

For this NFRWSP, the Districts created two scenarios of potential water conservation for the public supply and DSS categories. Irrigation efficiency estimates for agriculture can be found in the FSAID VII Final Report (FDACS, 2020). For the remaining water use categories, the Districts employed the methodology developed during the Central Florida Water Initiative (CFWI) RWSP process (CFWI, 2020).

For the first scenario (low conservation potential) for the public supply and DSS categories, as well as all other categories excluding agriculture, the Districts used the low-end estimates of percent savings of conservation from the 2020 CFWI RWSP. For

the first scenario, it is estimated that approximately 60 mgd of the projected demand for 2045 could be offset by water conservation.

For the second scenario (high conservation potential) for the public supply and DSS categories, the Districts analyzed the average 2014-2018 gross per capita rate for the entire NFRWSP area. If all public supply systems and DSS residents achieved the average 2014-2018 gross per capita rate for the NFRWSP area, water conservation could be increased by 23 mgd, from 60 to 83 mgd, potentially offsetting future demand (Table 2).

Table 2. 2045 water conservation and irrigation efficiency potential in mgd

Category	2045 Low Conservation Potential	2045 High Conservation Potential
Public Supply	20.2	38.9
Domestic Self-supply	1.6	5.8
Agriculture	30.2	30.2
Landscape/Recreation Self-supply	1.4	1.4
Commercial/Industrial/Institutional Self-supply	2.9	2.9
Power Generation Self-supply	3.8	3.8
Total	**60.1**	**82.9**

*Totals may be slightly different due to rounding of individual values.

Chapter 4: Assessment of Groundwater Conditions Associated with Future Water Demand Projections (NFSEG Modeling Simulations)

Purpose

The North Florida-Southeast Georgia regional groundwater flow model (NFSEG) is a modeling tool developed as a requirement of the Partnership (for more background information see: Charter for SJRWMD-SRWMD Cooperative Groundwater Model Development Project). For consistency in water supply planning, establishment and assessment of MFLs, and permitting decisions, the Partnership agreed to implement a joint regional groundwater flow model. The model covers the region depicted in Figure 16, which improves representation of the aquifer system on a regional basis. The current version of NFSEG is referred to as NFSEG v1.1 (Durden et al., 2019). More details about NFSEG v1.1 can be found in Appendix C. Model files are available for download and can be found at northfloridawater.com.

Hydrologic Assessment

NFSEG v1.1 represents the performance of a real system through a series of mathematical equations, which describe the physical processes that occur in that system; they represent a simplified version of the real world that may be used to predict the behavior of the modeled system under various conditions. Groundwater resources in the NFRWSP area include the SAS, the FAS, which is comprised of the UFA and LFA, and where present the ICU/IAS. See Chapter 1 for a description of these groundwater resources.

A primary controlling factor on flow within the FAS is the degree to which it is confined by the ICU. In the northeastern portion of the planning region, where the UFA is more confined, changes due to groundwater pumping are more likely to be expressed as cones of depression in the potentiometric surface. The UFA in the western portion of the planning region is very transmissive; therefore, as the geology transitions from confined areas to unconfined areas, changes due to groundwater pumping result in less drawdown and are expressed as reductions in spring flow.

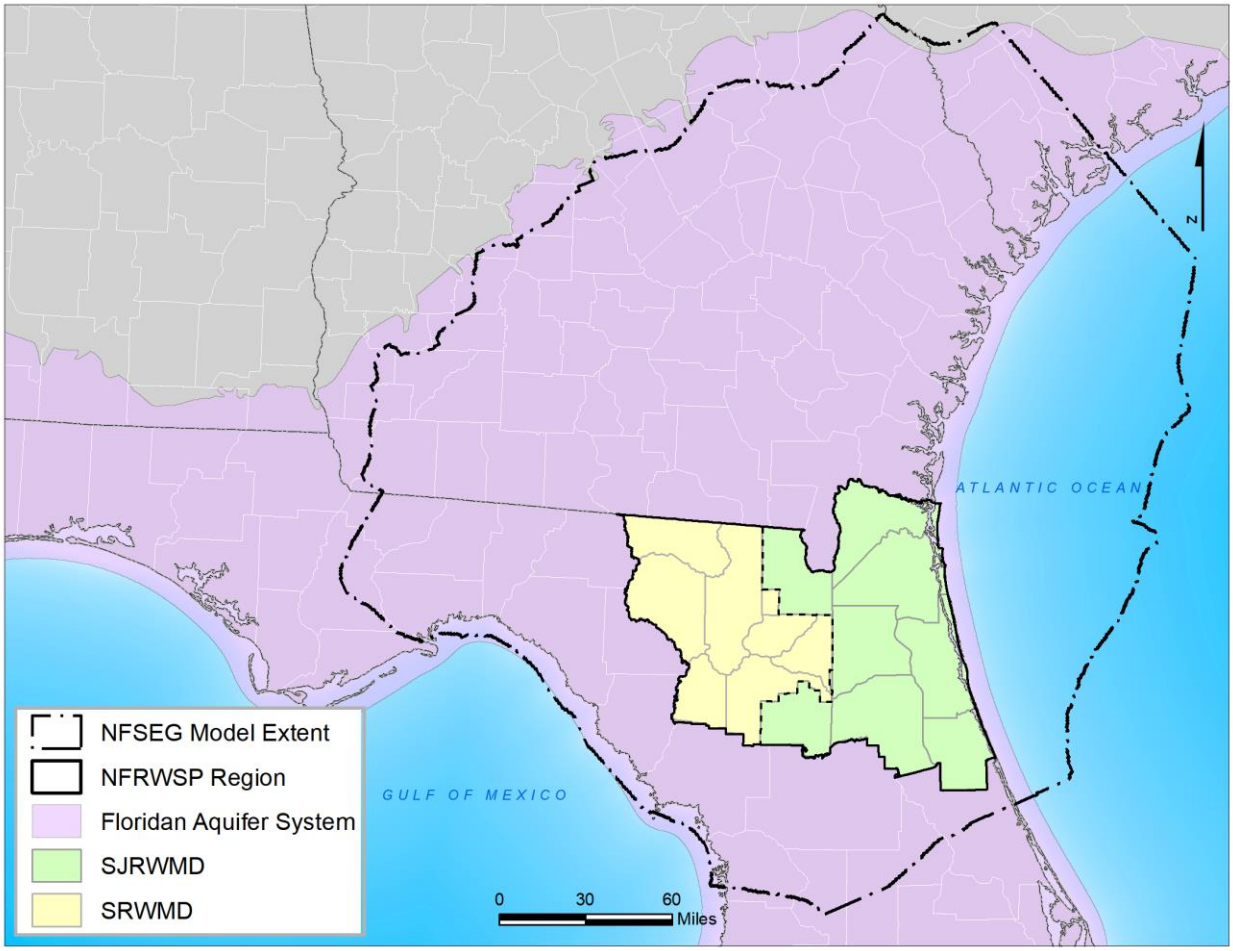

Figure 16. NFSEG model domain

Methodology

The Districts completed a water resource assessment using the NFSEG v1.1 to estimate the potential impacts of groundwater withdrawals on natural systems through the planning horizon. The assessment addressed the potential impacts of groundwater withdrawals with respect to wetlands, adopted MFLs (including OFSs), and waterbodies without MFLs in the NFRWSP area.

NFSEG v1.1 was used to simulate changes in groundwater levels and spring flows by comparing results between the simulated scenarios. Three scenarios were used for this assessment: “pumps off” (PO), the 2014-2018 average groundwater withdrawals, which is referred to as current pumping (CP), and 2045 projected groundwater withdrawals. The “pumps off” scenario does not represent a historic or predevelopment condition; rather, it approximates a condition where no groundwater pumping is taking place. The scenarios were utilized to estimate potential impacts of existing and projected groundwater withdrawals to natural systems.

Results

Figure 17 shows the change in potentiometric surface of the UFA from CP to the 2045 projection, which mostly indicates a decrease in UFA potentiometric surface. There are some small areas of rebound in Figure 17. In general, these rebounds are associated with reductions in pumping between CP and 2045. More information on the simulated change in groundwater levels can be found in Appendix C. The outputs from the modeled scenarios were used to assess potential impacts to water resources as described in Chapter 5.

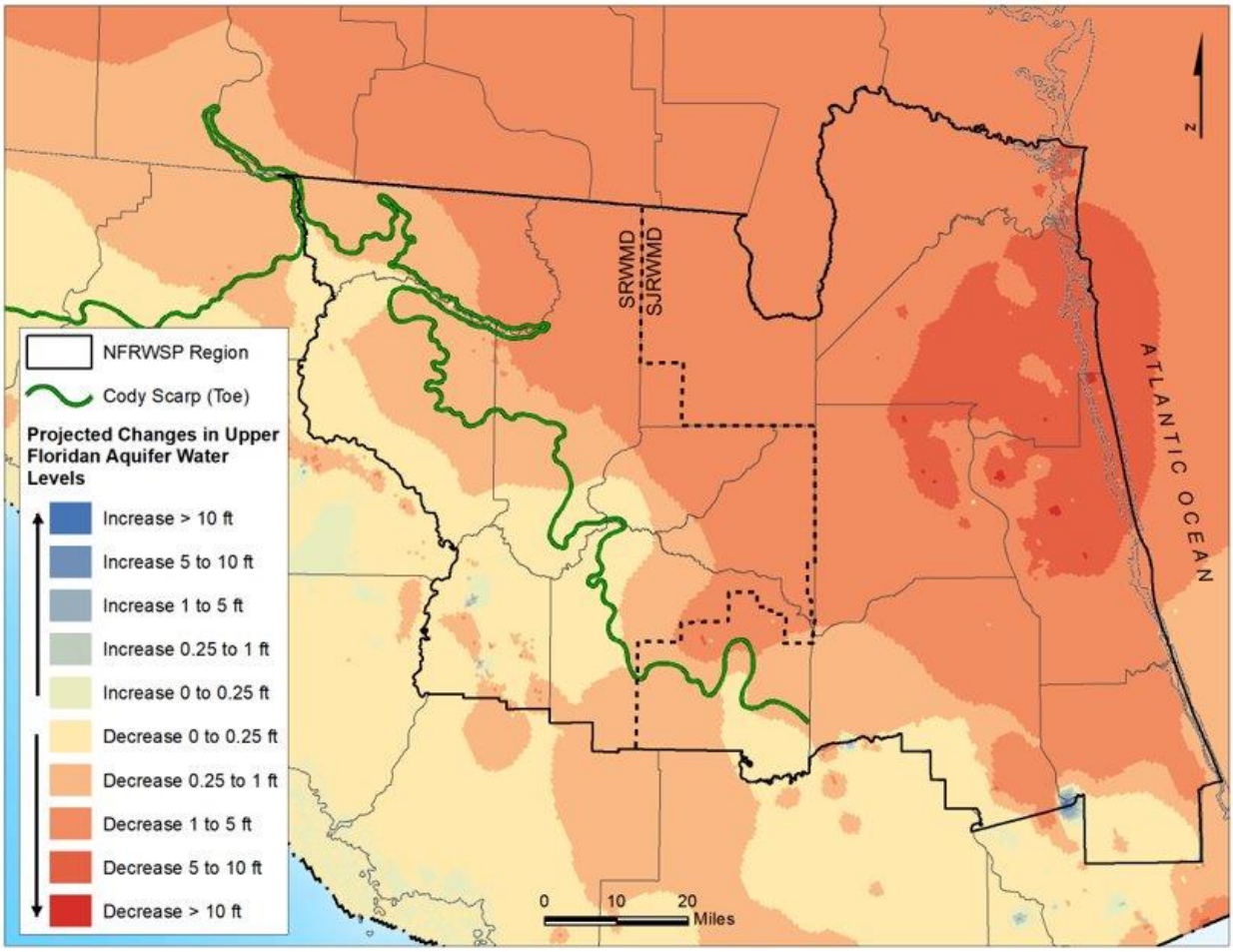

Figure 17. Changes in UFA water levels from CP to 2045 within the NFRWSP area

Chapter 5: Evaluation of Potential Effects of Projected Water Demand on Water Resources (Water Resource Assessment)

Purpose

The purpose of the NFRWSP water resource assessment is to evaluate the extent to which water resources and related natural systems may be impacted if 2045 projected future demands are met with groundwater within the NFRWSP area. The components that are evaluated in the NFRSWP water resource assessment include groundwater quality, MFLs, waterbodies without adopted MFLs, wetlands, and water reservations. Details regarding the water resource assessments can be found in Appendices D through H. The results of the assessment identified potential impacts that could occur absent implementation of projects and measures identified in Chapter 7 for the NFRWSP area. The results were also used to support the continued delineation of water resource caution areas (WRCA) in SJRWMD or water supply planning areas (WSPA) in SRWMD within the NFRWSP area (section 62-40.520(2), Florida Administrative Code (F.A.C.)).

Water Resource Assessment Methods and Results

Groundwater Quality (Saline Water Intrusion)

The FAS is the primary source of potable water in Northeast Florida. Groundwater withdrawals have resulted in lowering of water levels of the FAS within the region. Lower water levels in the aquifer create a potential for decreased water quality in the form of saltwater intrusion. Saltwater intrusion can occur from saltwater moving inland from the ocean (i.e., lateral intrusion) or from relic seawater migrating vertically (i.e., upconing).

An evaluation was conducted to assess the potential degradation of groundwater quality in the UFA from saltwater intrusion, resulting from groundwater withdrawals, which may constrain the availability of groundwater sources (see Appendix D for additional details). Saline water intrusion can affect the productivity of existing infrastructure, resulting in an increase in treatment costs and infrastructure costs. Although saline water intrusion poses a challenge for all affected water users, the issue is particularly acute for small public supply systems and self-supply water users that may have fewer options for infrastructure modifications.

The Florida Safe Drinking Water Act (sections 403.850 - 403.864, F.S.) directs DEP to develop rules that reflect national drinking water standards. Chapters 62-550, 62-555, and 62-560, F.A.C., were enacted to implement the requirements of the Florida Safe Drinking Water Act. More specifically, chapter 62-550, F.A.C., lists secondary drinking water standards (SDWS) for finished drinking water that include concentration limits for

chloride (250 mg/L). Increasing trends in chloride concentrations can be an indicator of saline water intrusion because it is one of the principal chemical constituents in seawater and is unaffected by ion exchange.

Recent Chloride Concentration Map of the Upper Floridan Aquifer

A generalized map of 2016-2020 average chloride concentrations in the upper portions of the UFA was developed using all available SJRWMD and SRWMD (Districts) monitoring data and SJRWMD CUP production well water quality data (Figure 18).

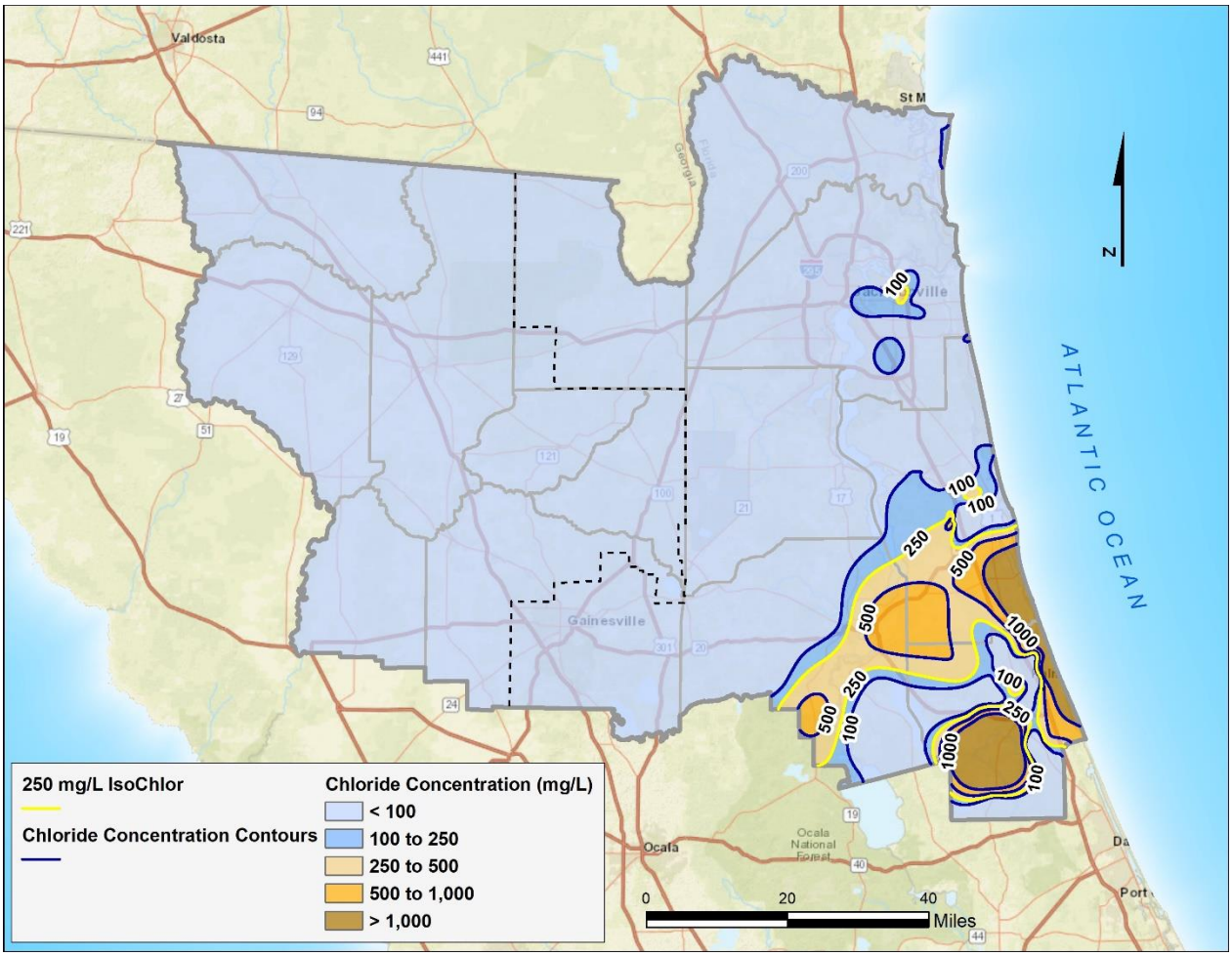

Figure 18. Average 2016-2020 chloride concentrations in UFA

Trends in Chloride Concentrations

In addition to the recent chloride concentration map of the region, which provides a regional representation of the current status of chloride concentrations in the UFA, trends in water quality data were also evaluated. Water quality trends indicate whether chloride concentrations are increasing or decreasing over time.

The movement of the saltwater interface was inferred by comparing the relative location of the 250 mg/L isochlor, a line of equal concentration, through time. Figure 19 below shows the average chloride concentration at five-year intervals from 2006 to 2020. The 250 mg/L isochlor is only present in the eastern portions of the NFRWSP area.

The status and trends in water quality were also considered using the Districts' 2021 annual assessment of groundwater quality from the regional monitoring well networks. The status and trends map shows the chloride concentration status in the UFA at the monitoring well locations (Figure 20).

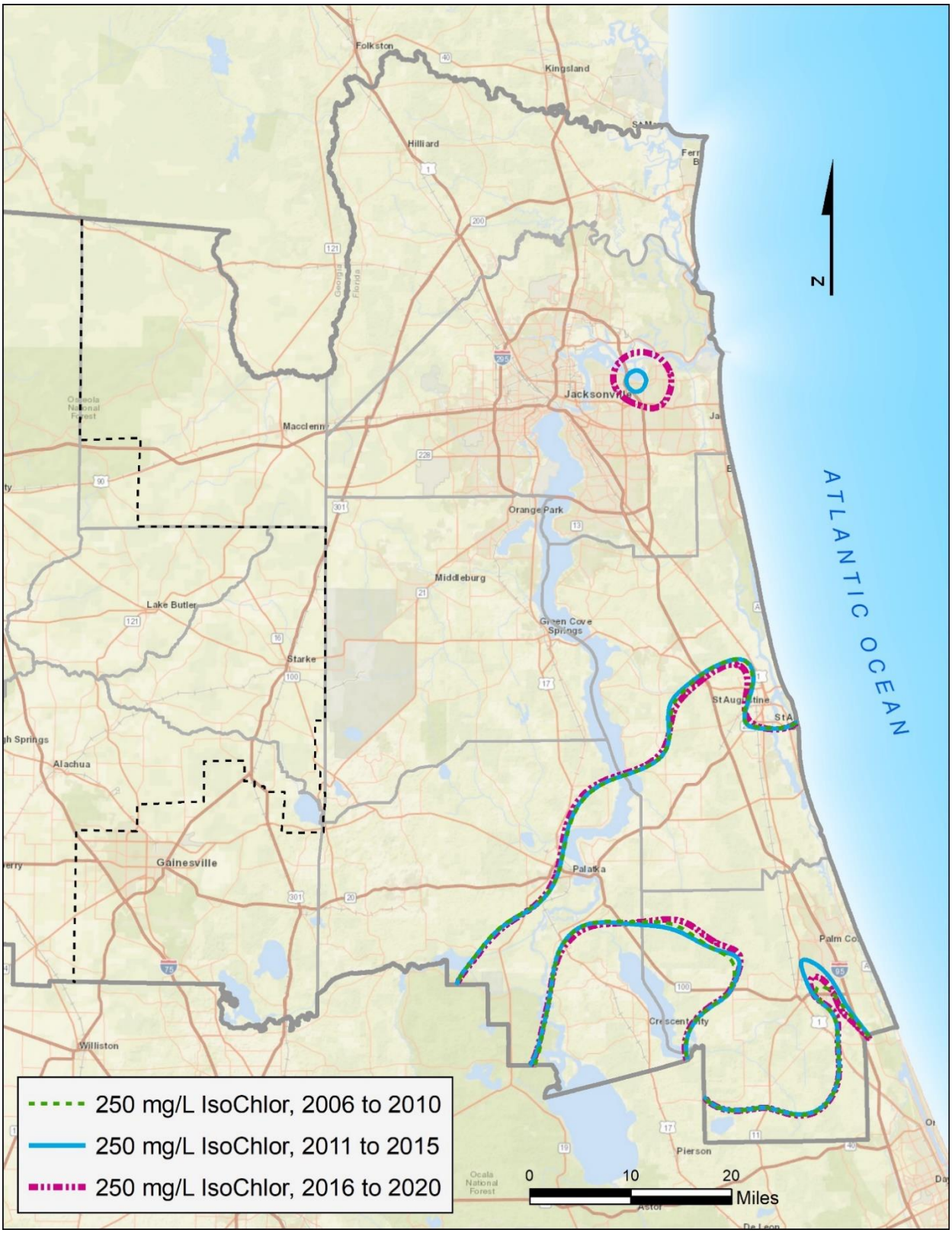

Figure 19. Movement of the saltwater interface in the UFA

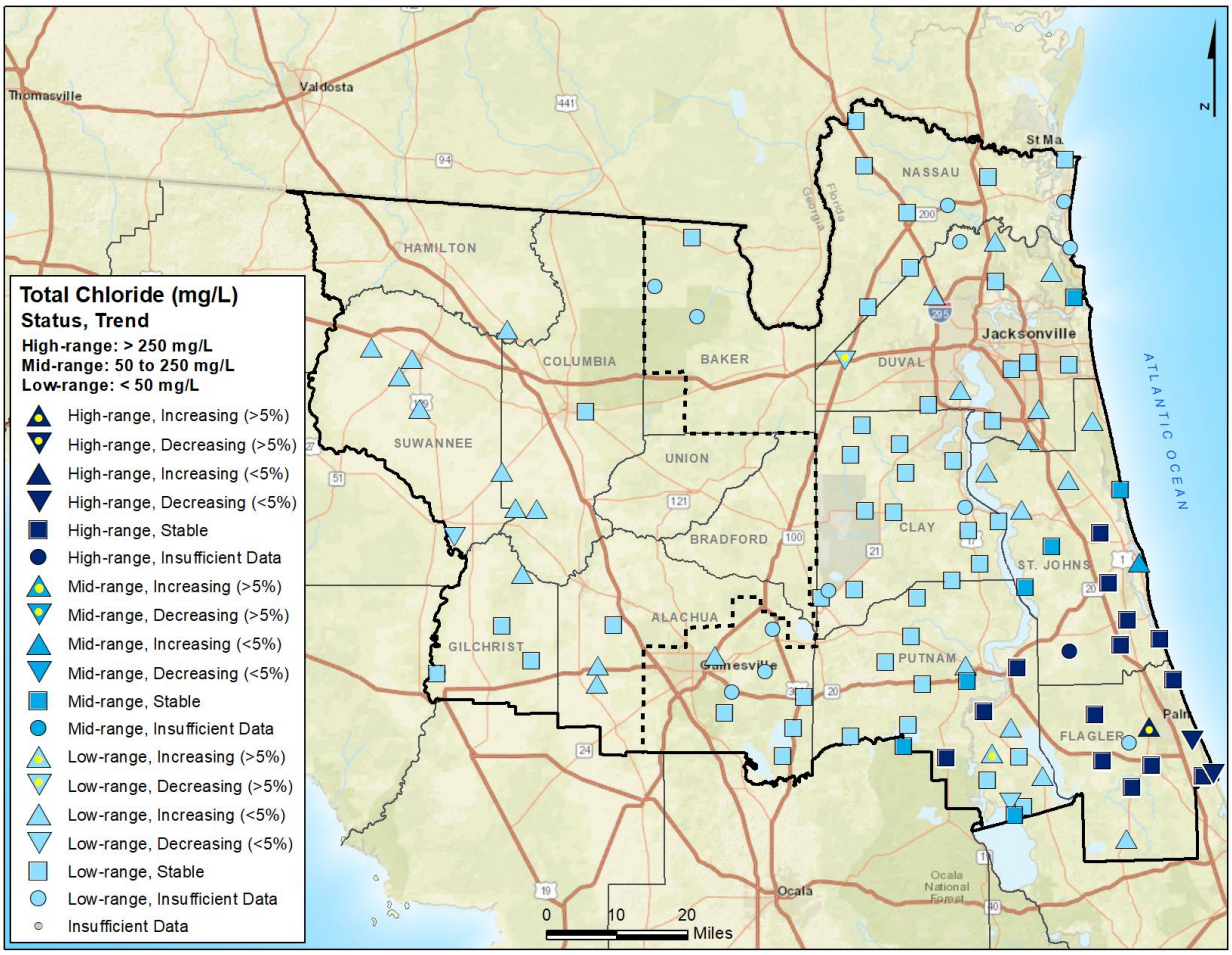

Figure 20. 2021 Annual assessment of Districts' monitoring networks – status and trends

Production Well Water Quality Assessment

Seventeen permitted production wells in the SJRWMD region were evaluated in the 2017 NFRWSP and were selected for reevaluation since they had shown statistically significant increasing trends in chloride concentrations.

Chloride concentrations from these wells were assessed over a period of record from 1998 to 2021. Of the 17 wells assessed, five wells showed an increasing trend, one well had a decreasing trend, and 11 wells were stable or showed no trend at all (Figure 21). Out of the five wells with increasing trends, four are located in central Duval County and one is located in southern Flagler County.

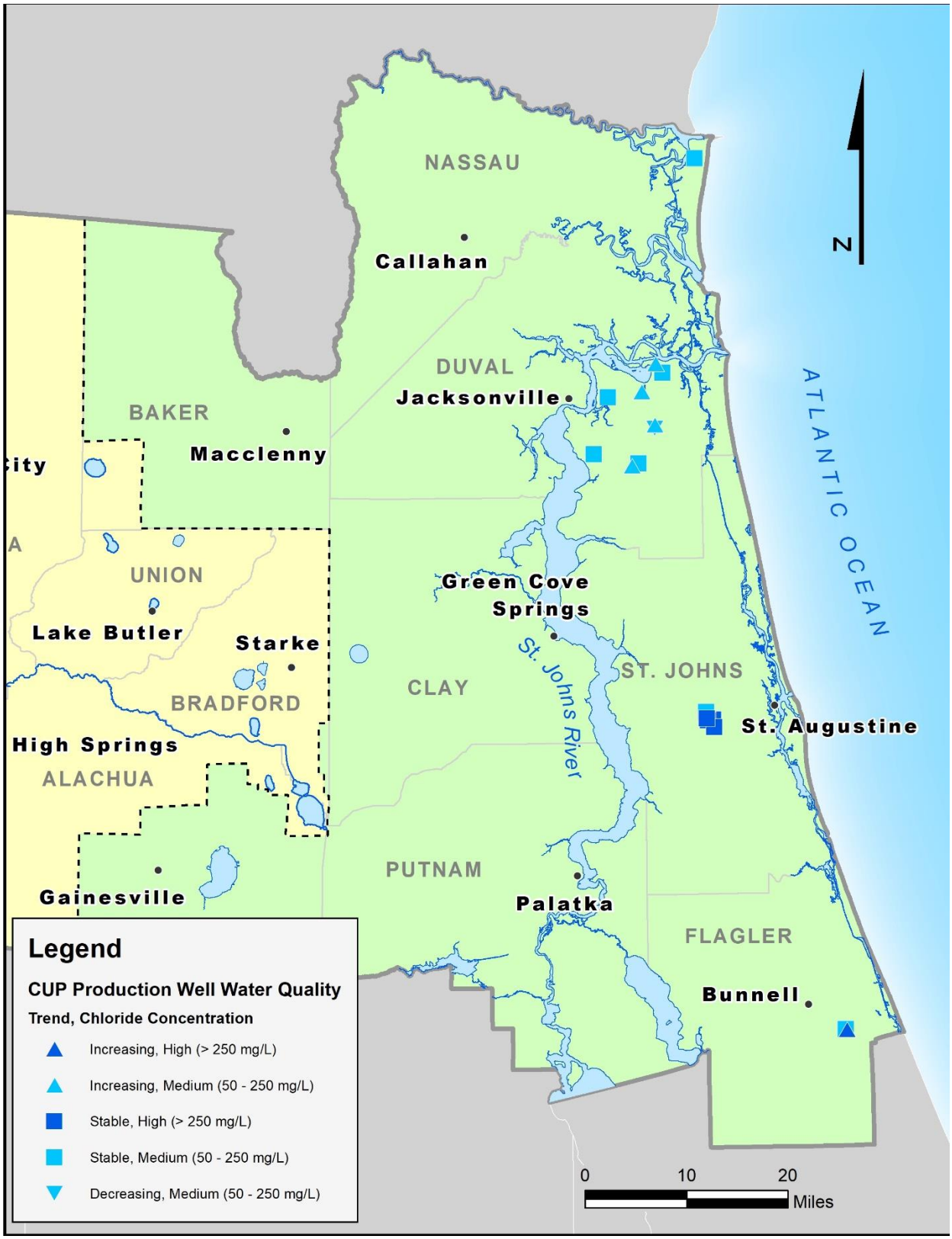

Figure 21. Production well water quality assessment – status and trends

Constraints and Recommendations

The results of the water quality assessment show that the majority of the NFRWSP area west of the St. Johns River had less than 100 mg/L of chloride and the majority of wells in the Districts' monitoring well networks showed no detectable change in chloride concentrations from 2006 to 2020. Areas of elevated chloride concentration were identified in the following counties: coastal Northeast Nassau, central Duval, southern St. Johns, eastern Putnam, and portions of Flagler. These areas of high chloride concentrations in the UFA are in areas of faulting and fracturing (Nassau and Duval counties) and areas of naturally occurring upward leakage of salty water through thin semi-confining units (St. Johns, eastern Putnam, and portions of Flagler counties) (Spechler, 2002).

A spatial analysis of movement of the 250 mg/L isochlor identified an area of potential upconing in central Duval County where isochlor results expanded from the 2011-2015 average as compared to the 2016-2020 average. Several CUP production wells in this region also showed increasing trends in chloride concentration which further suggests localized upconing. An assessment of the movement of the isochlor in southern St Johns, eastern Putnam and Flagler counties shows the isochlor has been stable since 2006 with no consistent movement in a landward direction near the coast. While the region is stable, one CUP production well in Flagler County showed an increasing trend in chloride concentrations.

When viewed in total, the primary conclusion of this analysis is that groundwater quality may constrain the availability of fresh groundwater in relatively limited geographic areas of the NFRWSP region east of the St. Johns River in portions of Duval, Nassau, St. Johns, Putnam, and Flagler counties. Results of the water quality analysis show that saltwater intrusion in Duval and St. Johns counties appeared to be localized due to upconing in response to withdrawals of groundwater from a single well and/or combined withdrawals from a wellfield. Flagler County showed indications of both localized upconing and possible lateral saltwater intrusion. Since the increasing chloride concentrations in Duval, St. Johns, and Flagler counties are at least partially related to upconing, these concerns are being managed through appropriate well construction, pumping operations, and reverse osmosis for treatment of brackish UFA water. The effectiveness of wellfield management is evident in the reassessment of the 17 CUP production wells that had increasing trends in the previous NFRWSP from 2017. Due to back-plugging and withdrawal reductions, only five of the 17 wells continue to have an increasing trend.

Wellfield management plans and the continued development of alternative water supplies such as reclaimed water, surface water, and brackish groundwater can reduce the potential for upconing and lateral intrusion. The SJRWMD Regulatory Program will continue to evaluate the potential for harmful upconing and lateral intrusion during CUP application review to ensure all permitting criteria are met prior to permit issuance. In addition, SJRWMD will investigate instances of unforeseen harmful water quality impacts potentially resulting from consumptive uses of water, and if verified, will require

mitigation by the responsible permittee(s). Additionally, a density-dependent water quality model will be developed for this region to assess saltwater intrusion due to sea level rise (SLR) and other climate change impacts such as rainfall and evapotranspiration (ET).

Minimum Flows and Levels

Section 373.042, F.S., directs DEP or the districts to establish MFLs for surface watercourses, groundwater levels, and surface water levels. This encompasses rivers, springs, and lakes in the NFRWSP area. MFLs represent the flow(s) and/or level(s) at which further withdrawals would be significantly harmful to the water resources or ecology of the area. As such, MFLs provide quantitative metrics for water resource assessments and criteria for evaluating CUP/WUP applications. If analyses determine that a waterbody is not currently meeting its MFLs and/or is projected to fall below its MFLs during a 20-year planning horizon, that waterbody is said to be in recovery or prevention, respectively, with regards to its MFL. In both cases, the districts are required to "expeditiously adopt a recovery or prevention strategy" and either achieve recovery to the established MFL "as soon as practicable" or prevent the flow or level from falling below the established MFL (subsection 373.0421(2), F.S.).

Each district is required to submit to DEP an annual priority list and schedule for the establishment of MFLs (subsection 373.042(3), F.S.) (SRWMD, 2022; SJRWMD, 2022). The priority lists are based on the importance of waters to the state or region and the existence of, or potential for, significant harm to the water resources or ecology of the region.

Information on all the adopted MFLs within the Districts can be found in chapters 40B-8 and 40C-8, F.A.C., rule 62-42.300, F.A.C., and emergency rule 40BER-17-01, F.A.C. Within the NFRWSP area, SJRWMD assessed the status of 20 lakes with MFLs and SRWMD assessed the status of three lakes, four river gages, and 20 springs (see Appendix E for additional details).

MFLs were evaluated to determine whether adopted river or spring flows and/or lake levels would be achieved if all projected future demands are met with groundwater. The evaluation assessed waterbodies at CP which is the average of 2014-2018 water use, and projected groundwater withdrawals at the planning horizon (2045). Spring flow, river flow, the potentiometric surface or lake levels were used as appropriate to evaluate the changes between the PO, CP, and the 2045 projected groundwater withdrawal scenario. More detailed information on the methodology and results can be found in Appendix F.

Rivers and Springs with MFLs

In the SRWMD, the Upper Santa Fe River MFLs were established in 2007 (rule 40B-8.061, F.A.C.). The predicted reductions in flow between the PO and the 2045 projection at both MFL reaches of the Upper Santa Fe River were evaluated. These flow

reductions were then compared to the available water as determined by the MFLs to determine whether the MFLs were achieved. The analysis indicates that the Upper Santa Fe River MFLs will be met at the 2045 planning horizon based on the projected increase in demand within the NFRWSP area (Table 3).

There are four OFS on the Suwannee River that are currently under an emergency rule (rule 40BER 17-01, F.A.C.) which went into effect in 2017. The springs covered under this emergency rule are Falmouth Spring, Lafayette Blue Spring, Peacock Springs, and Troy Spring. The existing emergency rule shows that these four MFLs are being met. The analysis conducted for the 2023 NFRWSP, identified that Lafayette Blue Spring and Falmouth Spring as being in prevention. However, these four OFS are on the SRWMD 2022 MFL Priority List, and technical work is underway to establish the updated MFLs (SRWMD, 2022). Upon finalization of the updated MFLs, the status of these OFS on the Suwannee River will be reassessed.

The minimum flows for the Lower Santa Fe and Ichetucknee Rivers and associated priority springs (LSFI) were evaluated in 2014 and ratified by the legislature in 2015. Based on that evaluation, the LSFI are in recovery (rule 62-42.300, F.A.C.). For planning purposes, the status as of 2015 for these MFL waterbodies is incorporated from the adopted Lower Santa Fe River Basin Recovery Strategy (LSFRB Recovery Strategy (Appendix L). Projected future demands, as indicated in the Sufficiency Analysis in Chapter 6, can be met with appropriate management, continued diversification of water supply sources, water conservation, and implementation of identified water supply and water resource development projects. The minimum flows for the LSFI are in the process of being reevaluated. The reevaluation may result in new or revised MFLs for the LFSI waterbodies which upon status assessment may be in prevention or recovery. In such a case, the project lists in the NFRWSP will be updated as appropriate, to include the projects identified in the newly adopted recovery or prevention strategy. Projects are continuing to be developed for implementation in the planning region.

The SJRWMD does not have any river or spring MFLs in the NFRWSP area.

Lakes with MFLs

There were 23 lakes with adopted MFLs assessed as part of this planning effort; three lakes are located in the SRWMD region, and 20 are located in the SJRWMD region. The analysis indicated that 20 of the lakes are currently meeting and are projected to meet their MFLs in 2045.

In the SRWMD, the Lake Butler MFL was established in 2021, and the Lake Hampton and Lake Santa Fe MFLs were established in 2023 (rule 40B-8.121, F.A.C.). The predicted reduction in water levels between PO to CP and PO to 2045 were evaluated. It was determined that all three lakes are currently meeting and are predicted to meet their MFLs in the future.

In the SJRWMD, Lakes Brooklyn and Geneva were determined to be in recovery in 2020 resulting in adoption of the Recovery Strategy for the Implementation of Lakes Brooklyn and Geneva Minimum Levels (B-G Recovery Strategy), in 2021 (Appendix M). The 10 mgd Black Creek WRD Project, identified in the B-G Recovery Strategy will provide regional water resource benefits in the NFRWSP area. The assessment of lakes with MFLs also shows that Lakes Brooklyn and Geneva will continue to be in recovery because they are currently not meeting their respective MFLs and are projected to not meet their MFLs in 2045. Lake Cowpen is in Prevention because although it is currently meeting its MFLs under the CP withdrawal condition, it is projected to not meet its MFLs by 2045. However, the impacts for Lakes Brooklyn, Geneva and Cowpen will be addressed by the Black Creek WRD Project, which is under construction. The remaining 17 lakes in the SJRWMD are meeting their MFLs and are projected to meet their MFLs in the future.

Table 3 shows a summary of the results of the MFLs assessment under the CP and 2045 withdrawal conditions. Figure 22 and Figure 23 below shows maps of the locations and names of the waterbodies assessed as well as the results for each waterbody.

Table 3. Status of assessed MFLs within the NFRWSP

Waterbody Type	Waterbody Name	County/Basin	WMD	Status at CP	Status in 2045
Lake	Banana	Putnam	SJR	Met	Met
Lake	Bell	Putnam	SJR	Met	Met
Lake	Brooklyn[2]	Clay	SJR	Recovery	Recovery
Lake	Broward	Putnam	SJR	Met	Met
Lake	Como	Putnam	SJR	Met	Met
Lake	Cowpen[2]	Putnam	SJR	Met	Prevention
Lake	Dream Pond	Putnam	SJR	Met	Met
Lake	Geneva[2]	Clay	SJR	Recovery	Recovery
Lake	Georges	Putnam	SJR	Met	Met
Lake	Gore	Flagler	SJR	Met	Met
Lake	Grandin	Putnam	SJR	Met	Met
Lake	Little Como	Putnam	SJR	Met	Met
Lake	Lochloosa	Alachua	SJR	Met	Met
Lake	Orio	Putnam	SJR	Met	Met
Lake	Silver	Putnam	SJR	Met	Met
Lake	Stella	Putnam	SJR	Met	Met
Lake	Swan	Putnam	SJR	Met	Met
Lake	Tarhoe	Putnam	SJR	Met	Met
Lake	Trone	Putnam	SJR	Met	Met
Lake	Tuscawilla	Alachua	SJR	Met	Met
Lake	Butler	Union	SR	Met	Met
Lake	Hampton	Bradford	SR	Met	Met
Lake	Santa Fe	Alachua	SR	Met	Met

Waterbody Type	Waterbody Name	County/Basin	WMD	Status at CP	Status in 2045
River	Ichetucknee River at U.S. Highway 27[1]	Ichetucknee River	SR	Recovery	Recovery
River	Santa Fe River at Worthington Springs	Upper Santa Fe River	SR	Met	Met
River	Santa Fe River near Ft. White[1]	Lower Santa Fe River	SR	Recovery	Recovery
River	Santa Fe River Near Graham	Upper Santa Fe River	SR	Met	Met
Spring	Blue Hole Spring (OFS)[1]	Ichetucknee River	SR	Recovery	Recovery
Spring	COL101974 – Unnamed Spring[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Devil's Ear Spring (OFS)[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Devil's Eye Spring (OFS)[1]	Ichetucknee River	SR	Recovery	Recovery
Spring	Falmouth Spring (OFS)	Middle Suwannee River	SR	Met	Prevention
Spring	Grassy Hole Spring (OFS)[1]	Ichetucknee River	SR	Recovery	Recovery
Spring	Hornsby Spring (OFS)[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Ichetucknee Headspring (OFS)[1]	Ichetucknee River	SR	Recovery	Recovery
Spring	July Spring[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Lafayette Blue Spring (OFS)	Middle Suwannee River	SR	Met	Prevention
Spring	Mill Pond Spring (OFS)[1]	Ichetucknee River	SR	Recovery	Recovery
Spring	Mission Spring (OFS)[1]	Ichetucknee River	SR	Recovery	Recovery
Spring	Peacock Springs (OFS)	Middle Suwannee River	SR	Met	Met
Spring	Poe Spring (OFS)[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Rum Island Spring[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Santa Fe River Rise[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Treehouse Spring (OFS)[1]	Lower Santa Fe River	SR	Recovery	Recovery
Spring	Troy Spring (OFS)	Middle Suwannee River	SR	Met	Met

[1]The status of the MFLs for the LSFI MFLs was incorporated from the recovery strategy adopted in 2015. All other MFL waterbodies were assessed using the PO, CP, and 2045 model scenarios.
[2]Impacts to Lakes Brooklyn, Geneva and Cowpen will be addressed by the Black Creek Project, which is under construction. When this project is fully implemented these lakes will no longer be in recovery or prevention, respectively.

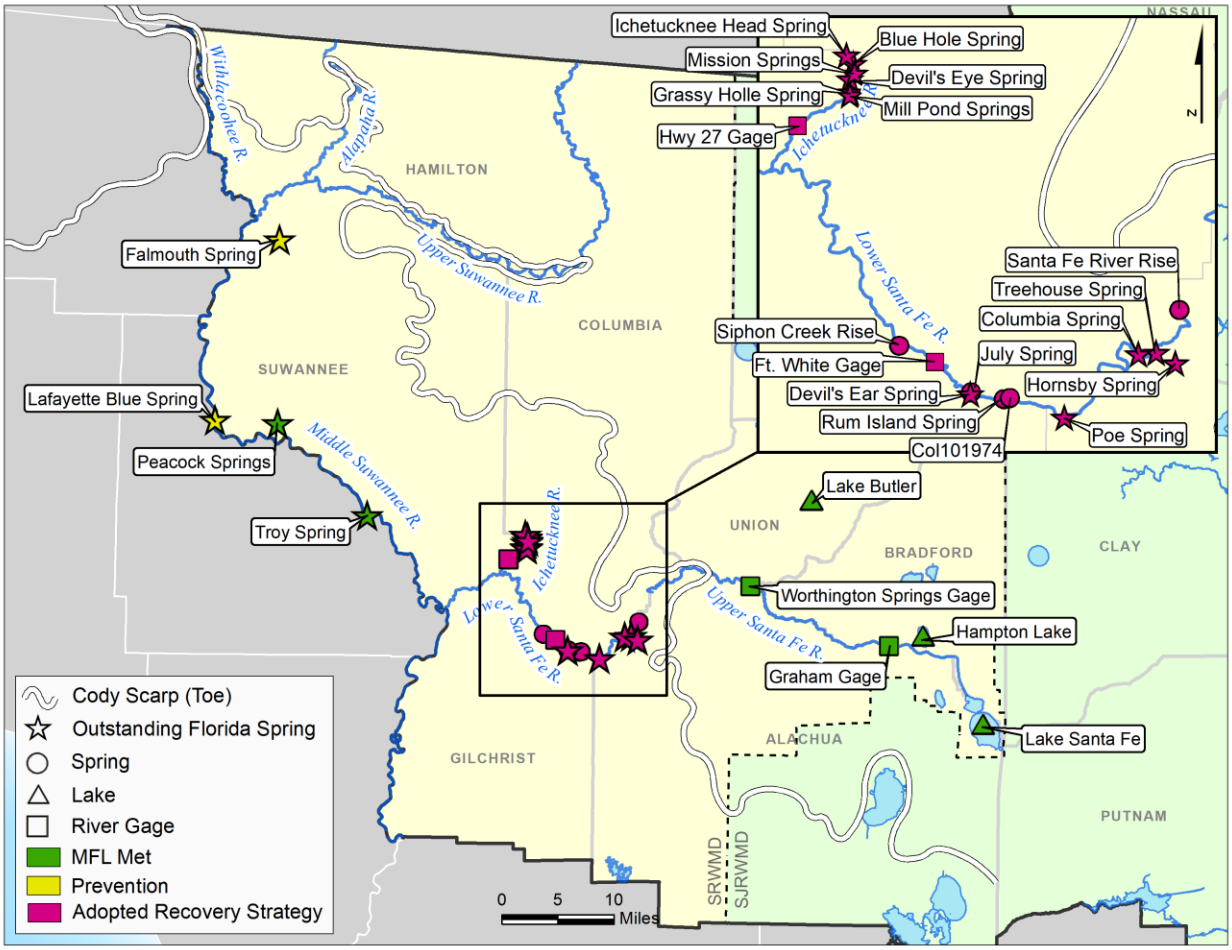

Figure 22. SRWMD MFL assessment results

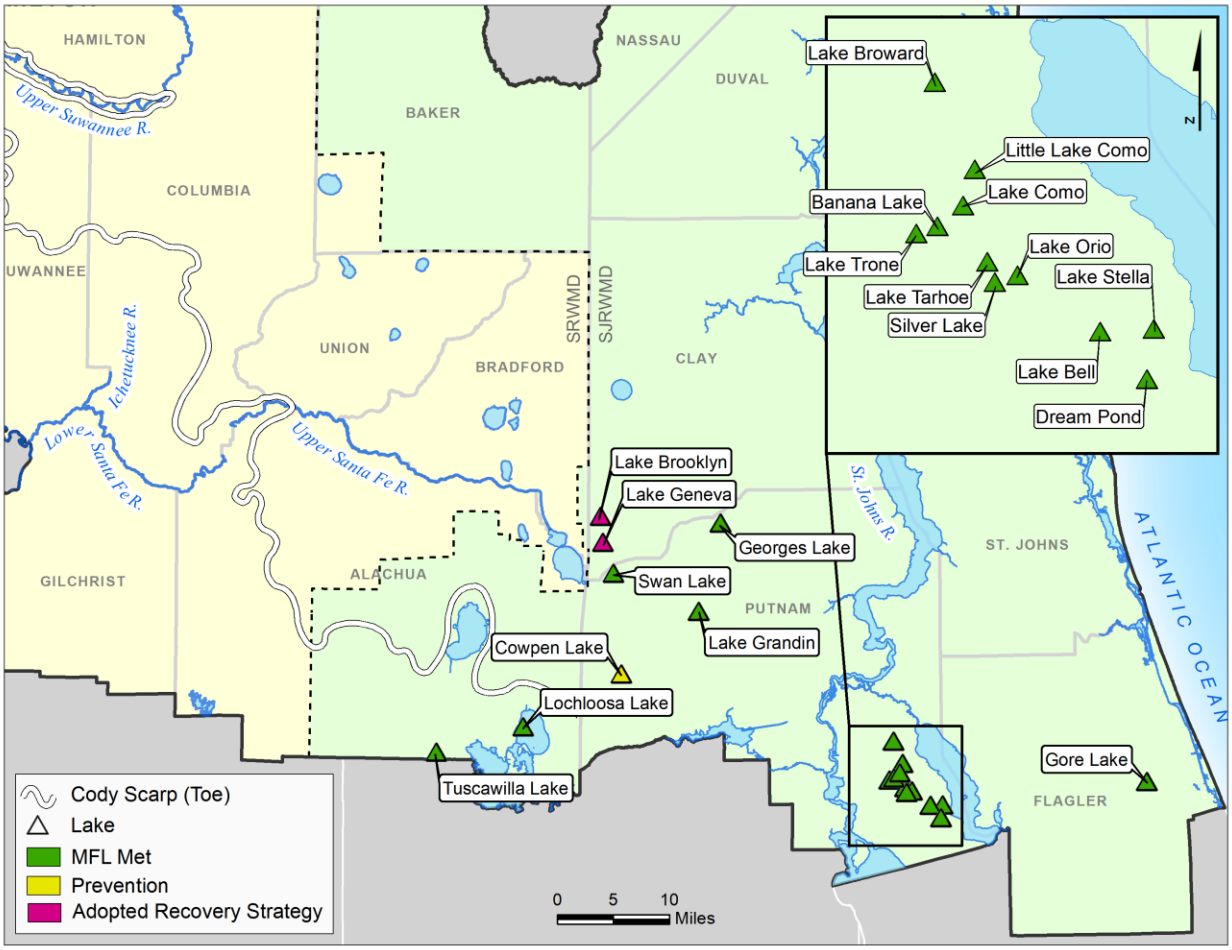

Figure 23. SJRWMD MFL assessment results

Minimum Flows and Levels Prevention and Recovery Strategies

Regional Water Supply Plans shall include prevention and recovery strategies which have been developed and approved pursuant to subsection 373.0421(2) and paragraph 373.709(2)(c), F.S.

The LSFRB Recovery Strategy was ratified by the Legislature in 2015 (rule 62-42.300 F.A.C.) (Appendix L). The minimum flows for the LSFI are in the process of being reevaluated. Upon completion of the reevaluation, any required recovery or prevention strategy will be appended to this Plan.

As mentioned above, the B-G Recovery Strategy, was approved by the SJRWMD Governing Board on July 13, 2021, and is included in Appendix M.

Waterbodies without Adopted Minimum Flows and Levels

The purpose of this assessment is to provide a screening evaluation of the potential for water resource impacts within the planning area where MFLs have not been adopted.

There are six river reaches and 36 springs assessed. More details on this analysis can be found in Appendix G.

Baseline conditions for the lakes, rivers and springs were calculated using the PO scenario. Flows and water levels under the baseline condition were compared to modeled flows and water levels under the 2045 scenario. If projected demands are met with groundwater, waterbodies that showed more than a 10% decrease in flow from a no-pumping condition were identified. The 10% reduction in flow does not necessarily correspond to an ecological threshold beyond which significant harm would occur, but it does highlight areas where resource constraints may occur. The MFL development process accounts for the unique hydrologic and ecological conditions of individual springs, and links changes in flow to a quantitatively significant harm threshold. Subsequent versions of the NFRWSP will include any newly adopted or reevaluated MFLs.

Rivers and Springs without Adopted MFLs

Of the 42 waterbodies assessed, there are 20 waterbodies that are meeting and 22 waterbodies that are exceeding the 10% screening criteria at 2045 (Table 4). Figure 24 & Figure 25 show the names and locations of the waterbodies assessed and displays the results of the assessment. Most of the waterbodies assessed in SRWMD are scheduled for MFL development. The timing of this development can be found in the most current, approved priority list (SRWMD, 2022).

In the SRWMD region, there are 15 springs and two river gages that are meeting the 10% screening criteria in 2045. Out of the 15 springs, 14 of the springs are located on the Middle Suwannee River system and one is on the Lower Santa Fe River. The two river gages are located on the Alapaha River and the Upper Suwannee River (Table 4).

Conversely, there are 16 springs and four river gages that exceed the screening criteria in 2045. Out of the 16 springs, 15 are located on the Suwannee River, with nine on the Upper Suwannee and six on the Middle Suwannee. There is one spring located on the Upper Santa Fe River. Three of the river gages are on the Suwannee River with one being on the Upper Suwannee and the other two located on the Middle Suwannee River. The fourth gage is located on the Lower Santa Fe River (Table 4).

Of the five springs assessed in the SJRWMD, three springs meet the screening criteria, which are Croaker Hole Spring, Satsuma Spring, and Welaka Spring. The two springs that exceed the screening criteria at 2045 are Beecher Spring and Green Cove Spring. The elevated spring pool levels resulting from retaining walls at both spring locations, coupled with limited discharge data, makes evaluation of impacts to these springs challenging (Rosenau et al., 1977 and Scott et al., 2004). During the implementation phase of the NFRWSP, additional investigations will be initiated to evaluate the impact of elevated spring pool levels on spring flows.

Lakes without Adopted MFLs

There were no lakes without adopted MFLs assessed in the NFRWSP area.

Table 4. Waterbodies without adopted MFLs assessment summary

Waterbody Type	Waterbody Name	County/Basin	WMD	Exceeds Screening Criteria at 2045
River	Alapaha River near Jennings	Alapaha River	SR	No
Spring	Alapaha River Rise	Upper Suwannee River	SR	Yes
Spring	Allen Mill Pond Springs	Middle Suwannee River	SR	No
Spring	Anderson Spring	Middle Suwannee River	SR	No
Spring	Beecher Spring	Putnam	SJR	Yes
Spring	Bell Spring	Middle Suwannee River	SR	No
Spring	Blue Sink Spring (Suwannee)	Upper Suwannee River	SR	Yes
Spring	Blue Spring at Boys Ranch	Upper Suwannee River	SR	Yes
Spring	Bonnet Spring	Middle Suwannee River	SR	No
Spring	Branford Spring	Middle Suwannee River	SR	Yes
Spring	Charles Spring	Middle Suwannee River	SR	Yes
Spring	Croaker Hole Spring	Putnam	SJR	No
Spring	Gilchrist Blue Spring	Lower Santa Fe River	SR	No
Spring	Green Cove Spring	Clay	SJR	Yes
Spring	Guaranto Spring	Middle Suwannee River	SR	Yes
Spring	Hamilton Unnamed Spring (Ham1023971)	Upper Suwannee River	SR	Yes
Spring	Hart Springs	Middle Suwannee River	SR	No
Spring	Holton Creek Rise	Upper Suwannee River	SR	Yes
Spring	Lime Sink Rise	Middle Suwannee River	SR	Yes
Spring	Lime Spring	Middle Suwannee River	SR	Yes
Spring	Little River Spring	Middle Suwannee River	SR	No
Spring	Otter Spring	Middle Suwannee River	SR	No
Spring	Pothole Spring	Middle Suwannee River	SR	No
Spring	Rock Bluff Springs	Middle Suwannee River	SR	No
Spring	Rock Sink Spring	Middle Suwannee River	SR	No
Spring	Royal Spring	Middle Suwannee River	SR	No
Spring	Ruth Spring	Middle Suwannee River	SR	No
River	Santa Fe River at US HWY 441 near High Springs	Lower Santa Fe River	SR	Yes
Spring	Santa Fe Spring	Upper Santa Fe	SR	Yes
Spring	Satsuma Spring	Putnam	SJR	No
Spring	Seven Sisters Spring	Upper Suwannee River	SR	Yes
Spring	Stevenson Spring	Upper Suwannee River	SR	Yes
Spring	Suwanacoochee Spring	Middle Suwannee River	SR	Yes
River	Suwannee River at Branford	Middle Suwannee River	SR	Yes

Waterbody Type	Waterbody Name	County/Basin	WMD	Exceeds Screening Criteria at 2045
River	Suwannee River at Ellaville	Middle Suwannee River	SR	Yes
River	Suwannee River at Suwannee Springs	Upper Suwannee River	SR	Yes
River	Suwannee River at White Springs	Upper Suwannee River	SR	No
Spring	Suwannee Springs	Upper Suwannee River	SR	Yes
Spring	Telford Spring	Middle Suwannee River	SR	No
Spring	Turtle Spring	Middle Suwannee River	SR	No
Spring	Welaka Spring	Putnam	SJR	No
Spring	White Sulphur Springs	Upper Suwannee River	SR	Yes

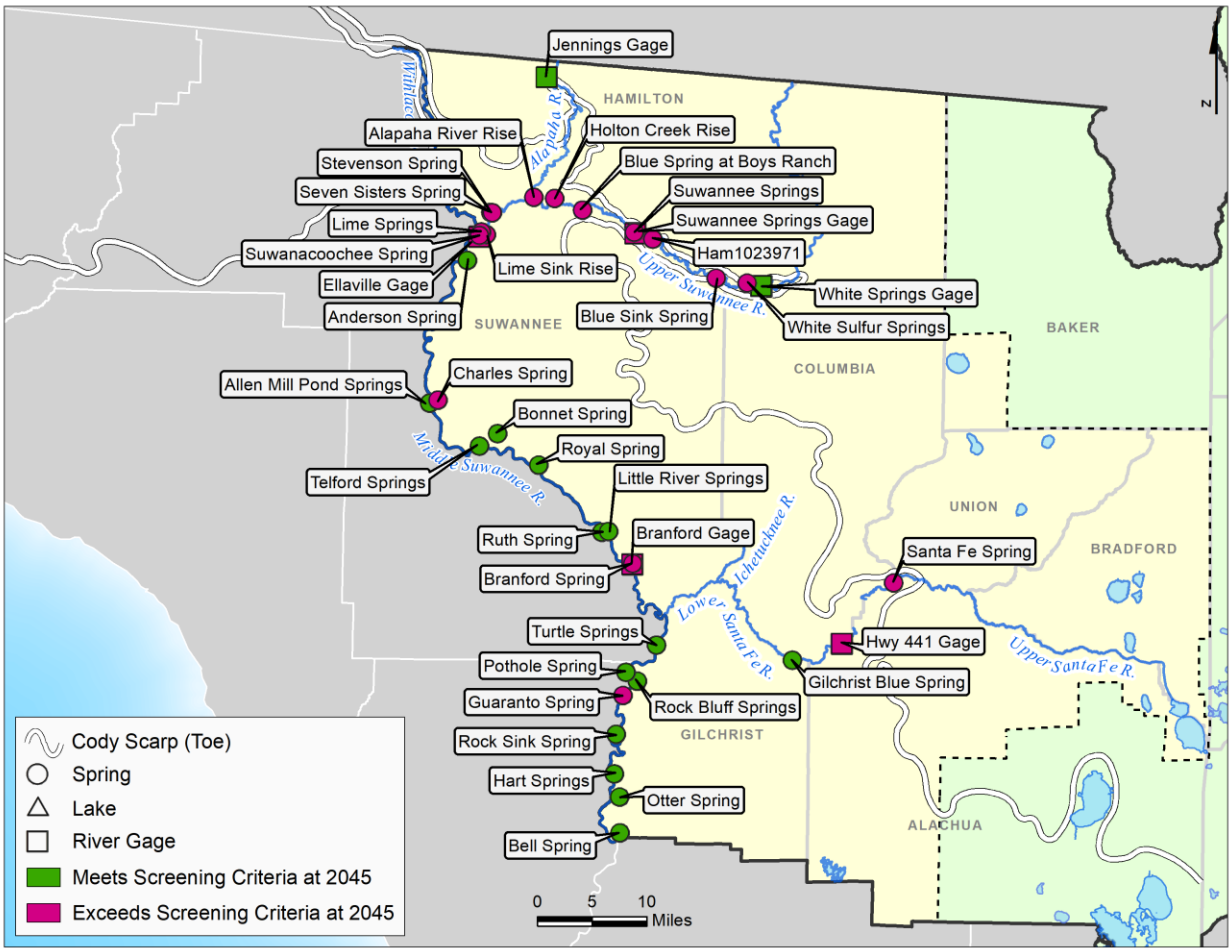

Figure 24. SRWMD waterbodies without adopted MFLs assessment results

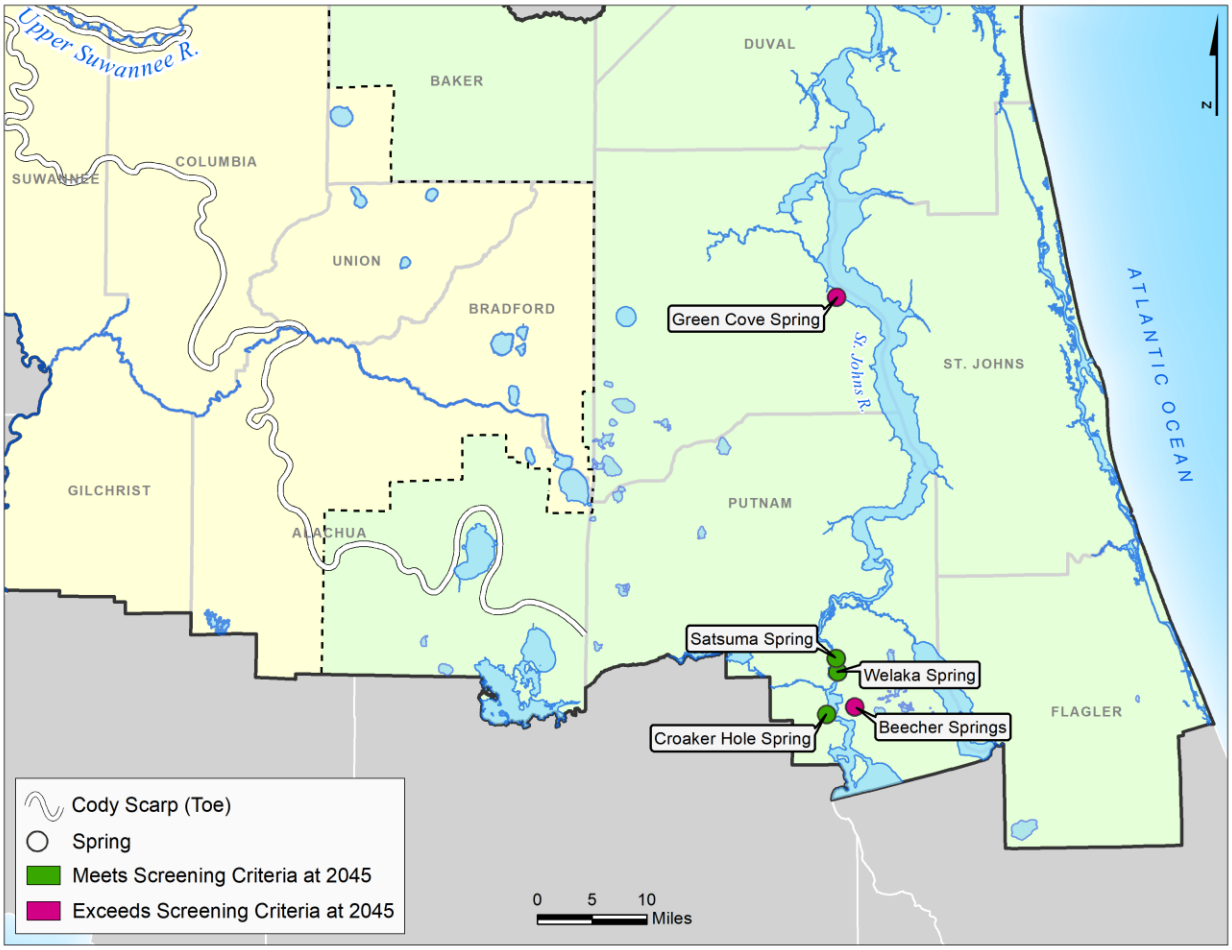

Figure 25. SJRWMD waterbodies without adopted MFLs assessment results

Wetlands

Wetland vegetative communities can be affected by water level changes in the SAS due to unique combinations of soil type, vegetation species and hydrogeology. The wetlands assessment estimated the potential for adverse change to wetlands that may occur due to the projected increase in groundwater withdrawal between CP and 2045 projections. Factors other than groundwater withdrawals (e.g. modification of surface water hydrology) can result in significant alterations of wetlands relative to predevelopment conditions, but this wetland analysis is focused exclusively on assessing the potential for adverse changes to existing wetlands resulting from projected increases in groundwater withdrawals. More information on this assessment can be found in Appendix H.

The potential for adverse change to wetlands in the NFRWSP was assessed using an updated version of the Kinser-Minno method (Kinser and Minno, 1995; Kinser et. al., 2003; Lort et. al., 2022). The Kinser-Minno method is a GIS-based model that forecasts the potential for adverse change to wetlands using soil permeability, sensitivities of plant communities to dewatering, depth to the UFA potentiometric surface (in unconfined

areas), depth to the water table or surficial aquifer system (in confined areas), and a digital elevation model. This method categorizes the potential for adverse wetland change as low, moderate, or high, but only the moderate and high potentials for adverse change were considered in the analysis because the low potential for adverse wetland change classification indicates that plants are drought tolerant or that soils are not susceptible to dewatering (Kinser & Minno,1995).

Out of over 900,000 acres assessed in the NFRWSP area, the wetland assessment identified 8,129 acres with a moderate or high potential for adverse change if projected demands are met with groundwater based on changes in groundwater levels between CP and 2045 projected withdrawals (Figure 26, Table 5). Changes to wetlands from groundwater pumping are primarily addressed via the Districts' regulatory programs and through the development of WSD and WRD projects.

Table 5. Wetland acreage identified as having moderate or high potential for adverse change to wetland function between CP and 2045 projected pumping

County	**District**	**Potential Adverse Wetland Change (acres)**
Alachua	SJR	557
Alachua	SR	168
Baker	SJR	0
Baker	SR	0
Bradford	SJR	0
Bradford	SR	0
Clay	SJR	494
Columbia	SR	68
Duval	SJR	0
Flagler	SJR	4,201
Gilchrist	SR	1,288
Hamilton	SR	157
Nassau	SJR	62
Putnam	SJR	309
St. Johns	SJR	680
Suwannee	SR	147
Union	SR	0
Total	NA	**8,129**

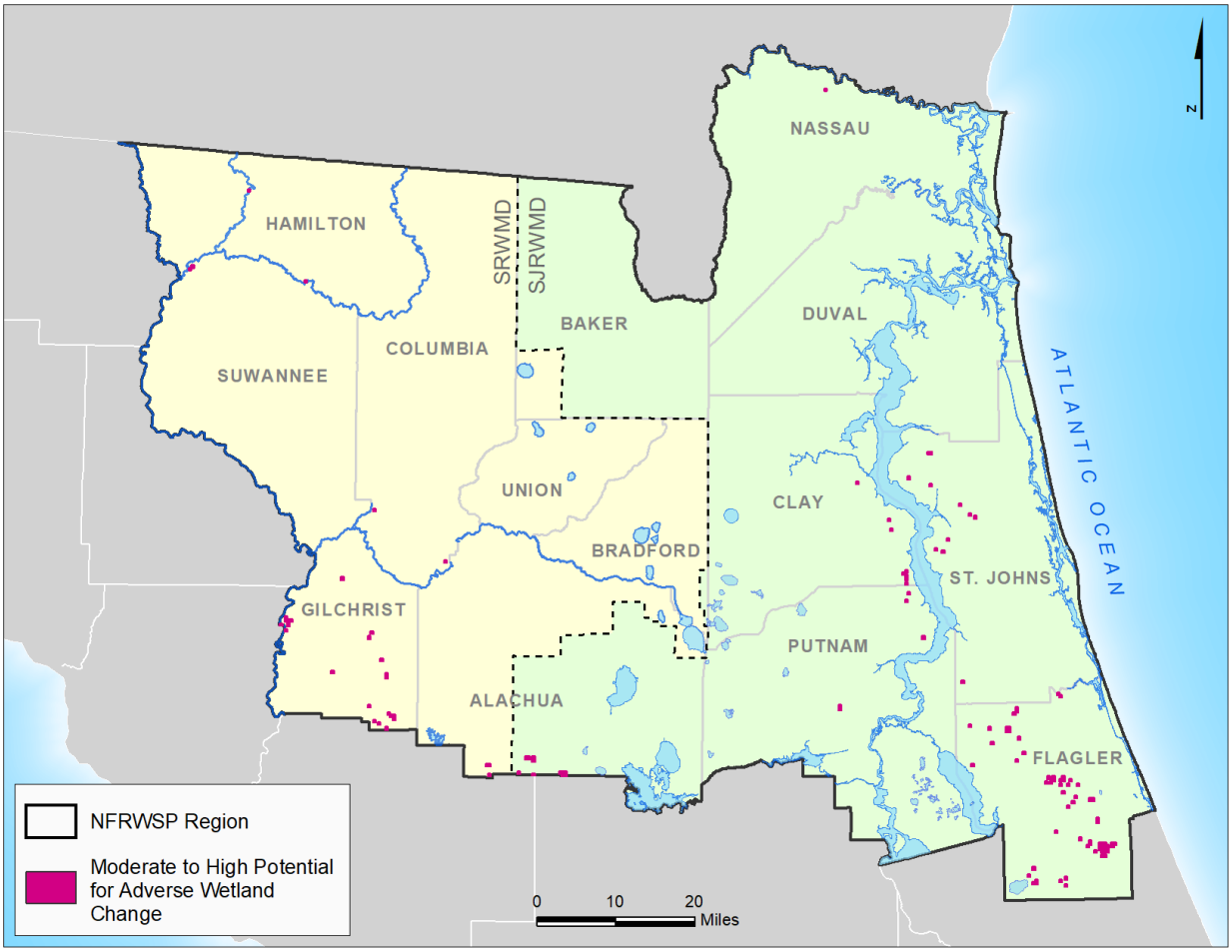

Figure 26. Locations with moderate to high potential for adverse change to wetlands

Reservations

Subsection 373.223(4), F.S., authorizes the Districts and DEP to reserve water from use by permit applicants for the protection of fish and wildlife or public health or safety. When a water reservation is in place, volume, and timing of water quantities at specific locations are protected and maintained for the natural system ahead of new consumptive uses. The only water reservation in the NFRWSP area was adopted by the SJRWMD Governing Board in 1994 (rule 40C-2.302, F.A.C.). A portion of flow in Prairie Creek was reserved to support fish and wildlife in Paynes Prairie. Historically, Prairie Creek discharged into Paynes Prairie. However, in the 1920's flow into Paynes Prairie was diverted through Camps Canal into Orange Lake to provide better conditions for grazing cattle. When the State of Florida purchased Paynes Prairie in the 1970s, the Camps Canal dike was breached to allow flow back into Paynes Prairie in Alachua County. The water reservation was adopted to balance the need to restore flow to Paynes Prairie while also retaining a portion of flow that was being artificially diverted to Orange Lake through Camps Canal. Approximately half of the flow from Prairie Creek is reserved for Paynes Prairie with the remainder allowed to divert to Orange Lake. In 2019, the District managed a project to replace the old structure on Camps Canal that

diverted water in Paynes Prairie. The new structure matches the capacity of the old structure and includes three new 54-inch aluminum culverts, gates, concrete headwalls and upgraded guardrails, handrails, and fencing.

Resiliency

Rising sea levels and changing climate pose a threat to natural and manmade systems, including infrastructure that supports access to fresh water. Florida is vulnerable to the effects of climate change and SLR due to its unique climate, hydrology, geology, topography, natural resources, and dense coastal populations. To better plan for the potential effects of these future changes, the Districts conducted a planning level assessment to determine if fresh water supplies in the NFRWSP region are likely to become constrained due to flooding from SLR throughout the planning horizon (Appendix I).

As noted previously in this chapter, localized saline water intrusion from upconing is already an issue for some coastal communities in North Florida. In the future, a density-dependent water quality model will be developed for the region to assess saltwater intrusion due to SLR and climate changes such as rainfall and evapotranspiration.

Based on guidance established in 2021 by the Resilient Florida Grant Program (section 380.093, F.S.), the assessment evaluated the effects of both intermediate-low and intermediate-high SLR projections reported by the National Oceanic and Atmospheric Administration (NOAA) for the year 2050 (Sweet et al., 2017). The spatial extent of mean higher high water (MHHW) surface inundation resulting from the two SLR scenarios, as modeled by the University of Florida's GeoPlan Center, was intersected with the locations of current water treatment plants (WTP), wastewater treatment plants (WWTP), and permitted consumptive use wells to identify vulnerable infrastructure (UF GeoPlan Center, 2020). A total of 2,591 wells, 518 WTPs, and 224 WWTPs were assessed in the counties with SLR projections.

The Resilient Florida Grant Program itself includes a selection of grants that are available to counties, municipalities, water management districts, flood control districts, and regional resilience entities. These grants are instrumental in addressing the challenges posed by flooding and SLR in the state. Eligible applicants have the opportunity to secure financial support for vulnerability assessments (VA) and the implementation of adaptation and mitigation projects (DEP, 2023e). It should be noted that each county in the region is developing a more detailed vulnerability assessment (VA) of critical infrastructure that includes WTPs and WWTPs. The assessments are a mandatory requirement for securing funding from the Resilient Florida Grant Program. Each VA will include a detailed analysis of each facility that considers compound flooding among other relevant factors.

In summary, eight CUP wells in the NFRWSP area may be affected by flooding due to SLR based on the intermediate-low and intermediate-high projections of SLR (Table 6-7 and Figure 27). At the intermediate-high SLR projection, an additional 11 CUP wells, for

a total of 19 CUP wells, one WWTP, and two WTPs could be constrained if the facilities do not implement adaptation actions.

Table 6. Summary of infrastructure potentially affected by intermediate-low projections of SLR

County	Wells	WTPs	WWTPs
Clay	0	0	0
Duval	0	0	0
Flagler	0	0	0
Nassau	1	0	0
Putnam	4	0	0
St. Johns	3	0	0

Table 7. Summary of infrastructure potentially affected by intermediate-high projections of SLR

County	Wells	WTPs	WWTPs
Clay	0	0	0
Duval	2	0	0
Flagler	0	1	0
Nassau	4	1	0
Putnam	8	0	1
St. Johns	5	0	0

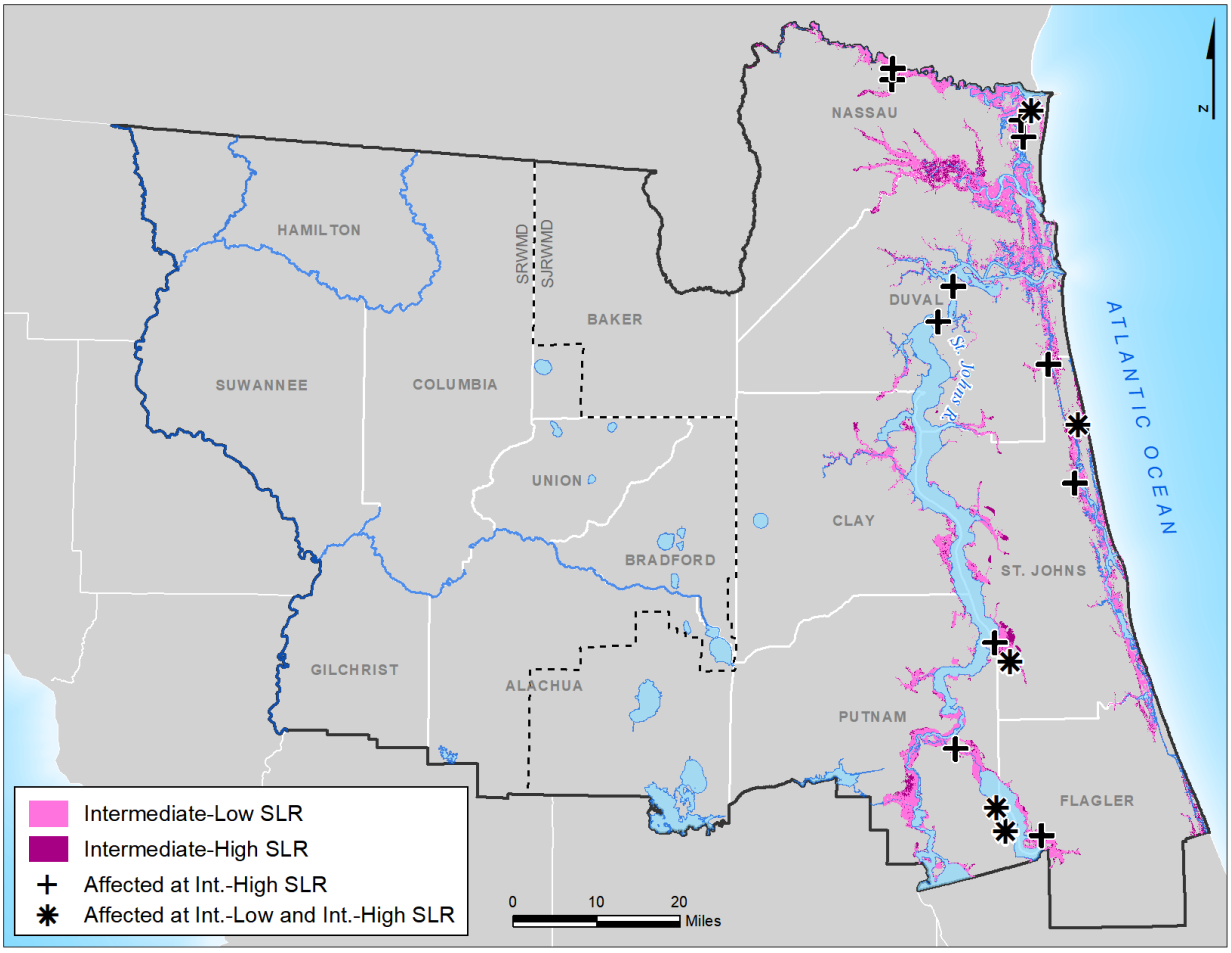

Figure 27. Water supply infrastructure in the NFRWSP that intersects with intermediate-low and intermediate-high SLR inundation surface projections

Based on this analysis, the Districts conclude that projected SLR may pose a challenge for existing or future water suppliers in coastal regions if adaptation actions are not taken. The timeframe and magnitude of enhanced management practices and/or infrastructure may need to be expedited to mitigate potential increases in SLR. Although solutions are available to some water suppliers experiencing the effects of SLR, such actions can increase the cost associated with providing potable water and wastewater treatment to existing and future users. Additionally, an increase in the intensity of rainfall events and the duration of drought are potential projected impacts of climate change that are of particular concern to water supply planning (IPCC, 2022).

Despite these challenges, many of the same practices that are implemented to address water resource constraints also mitigate the impacts of climate change. Some examples include:

- Decreased groundwater demand (e.g., increased utilization of reclaimed water; water conservation)

- Efficiency improvements (e.g., upgrade agricultural irrigation technology; replace aging public supply distribution systems to reduce losses)
- Improved infrastructure capacity and flexibility (e.g., interconnect water supply systems)
- Diversified water supply sources

Site-specific information can be used to determine the need for WSD or WRD projects to mitigate or prevent adverse impacts caused by projected SLR.

Collaboration will also be necessary to meet the challenges posed by climate change and provide reliable water supply for all water users. The State, through the DEP and The Florida Flood Hub, is providing money for adaptation planning and implementation to local governments and utilities, as well as providing Florida-specific data to better predict future challenges. The objectives of Florida Flood Hub, which is the State's scientific center for flood and resilience information and is located at the University of South Florida's College of Marine Sciences, are "to improve flood forecasting and inform science-based policy, planning, and management" (University of South Florida, 2023) The Flood Hub uses technical working groups and partnerships that consist of subject matter experts to research Florida-specific impacts of SLR and changes in rainfall patterns. Additionally, the Florida Water and Climate Alliance (FWCA) provides a venue for collaboration to address water supply challenges associated with climate change. The FWCA is a "stakeholder-scientist partnership committed to increase the relevance of climate science data and tools at relevant time and space scales to support decision-making in water resource management, planning and supply operations in Florida (floridawca.org)". FWCA collaborators include public water supply utilities, water management districts, academic institutions, and other stakeholders from throughout Florida. Collaborators share information, ideas, and current research that may help inform local and regional decisions regarding integration of climate science in water supply management. Although climate change poses significant challenges to water supply availability, local management actions and regional collaborations will help mitigate the associated impacts and enhance the continued reliability of water supply in North Florida.

Chapter 6: Alternative Water Supply Needs Assessment and Delineation of Water Resource Caution Areas (Sufficiency Analysis)

Purpose

Pursuant to subsection 373.709(2), F.S., a RWSP must include sufficient water supply development (WSD) and water resource development (WRD) project options to meet projected water demands while sustaining water resources and natural systems and must support MFLs recovery or prevention strategies. This chapter summarizes the approach used to demonstrate sufficiency of the NFRWSP project options and recovery strategies. In addition, this chapter identifies existing water resource caution areas (WRCAs) or water supply planning areas (WSPAs) pertinent to the NFRWSP (section 62-40.520(2), F.A.C.). The 2023 NFRWSP supports the continued designation of the Districts' portion of the NFRWSP area as a WRCA or WSPA.

Sufficiency Analysis

The water resource assessment discussed in Chapter 5 addressed the potential impacts of groundwater withdrawals with respect to wetlands, adopted MFLs (including OFSs), and waterbodies without MFLs in the NFRWSP area. The assessment identified existing and projected impacts to water resources in the NFRWSP area resulting from the 2015 base year groundwater use of 461 mgd and the 2045 projected groundwater demand scenario of 596 mgd. Groundwater demand is projected to increase by 135 mgd in the NFRWSP area. This projected increase is primarily due to growth in the public supply sector in the SJRWMD region and growth in the agricultural sector in the SRWMD region. While there are increases in surface water demand projected, the Districts determined that there are sufficient water sources to meet the projected demand since the majority of these increases are occurring in the LR water use category which typically utilizes on-site ponds to meet irrigation demand.

Since there are adopted recovery strategies for several MFL waterbodies in the NFRWSP area, the current distribution of groundwater use has already exceeded the fresh groundwater sustainable yield of the system. In addition, the analysis of waterbodies without MFLs, groundwater quality, and wetlands identified potential constraints on increased groundwater withdrawals during the planning horizon. Based on the results of the NFRWSP water resource assessment, the Districts determined that water supply planning pursuant to section 373.709, F.S., was necessary since traditional water sources alone cannot supply the projected 135 mgd increase in groundwater demand while at the same time sustaining water resources and related natural systems during the planning horizon.

Since traditional water sources alone are not sufficient to meet projected water demands through 2045, WSD and WRD projects must be developed and implemented.

The purpose of performing a sufficiency analysis is to determine whether the implementation of specific WSD and WRD project options will allow for projected water demands to be met while sustaining natural systems.

The Districts determined that the following options are sufficient to address the potential water resource constraints:

1) Associated projects and regulatory measures listed in the approved LSFRB Recovery Strategy and B-G Recovery Strategy;
2) Suite of potential project options identified in the 2023 NFRWSP which will create, replace, or save approximately 160 mgd.

Additionally, as part of the development of water use demand projections in Chapter 3, the Districts estimated a water conservation potential ranging from 60 to 83 mgd and a beneficial use of reclaimed water ranging from 55 to 103 mgd by 2045. While the water conservation or reclaimed water projects identified in options 1) or 2) above are included in these ranges, the water conservation and reclaimed water potential exceeds the estimated project benefits identified in Appendix K.

The reevaluation of the LSFI MFLs may result in new or revised MFLs, which upon status assessment may be in prevention or recovery. In such a case, the project lists in the NFRWSP will be updated as appropriate, to include the projects identified in the newly adopted recovery or prevention strategy.

Water Quality

The results of the water quality assessment showed areas of elevated chloride concentration, areas with potential for localized upconing and increasing chloride concentrations in several CUP production wells. Wellfield management plans that move withdrawals away from critical water resources and the further development of alternative water supplies such as reclaimed water, surface water, and brackish groundwater, will reduce the potential for upconing and lateral intrusion. Appropriate well construction, back-plugging and withdrawal reductions have already been effective in addressing increasing chloride concentrations in the areas identified above. Certain projects submitted for inclusion in the 2023 NFRWSP directly address potential water quality issues resulting from possible saltwater intrusion.

The SJRWMD Regulatory Program will continue to evaluate the potential for harmful upconing and lateral intrusion during CUP application review to ensure all permitting criteria are met prior to permit issuance. In addition, the SJRWMD will investigate instances of unforeseen harmful water quality impacts that potentially result from consumptive uses of water and, if verified, will require mitigation by the responsible permittee(s).

Minimum Flows and Levels

The MFLs evaluation determined that there are waterbodies that are currently not achieving and/or are projected to not achieve their MFLs during the planning horizon. Continued implementation of the approved LSFRB Recovery Strategy and B-G Recovery Strategy, along with the implementation of the projects summarized in Chapter 7 (and detailed in the Appendix K) are sufficient to ensure the achievement of the MFLs in the NFRWSP area at the 2045 planning horizon. As noted earlier, it is anticipated that the reevaluation and status assessment of LSFI MFLs will result in additional projects being developed in the NFRWSP area.

The LSFRB Recovery Strategy, as incorporated by rule 62-42.300, F.A.C., has important components that reference supplemental regulatory measures for the LSFI MFLs and specifically states that “Existing permitted uses shall be considered consistent with the Recovery Strategy provided the permittee does not exceed its permitted quantity. Such permits shall not be subject to modification during the term of the permit due to potential impacts to the MFL waterbodies unless otherwise provided for in rule revisions pursuant to paragraph 62-42.300(1)(e), F.A.C.”. The minimum flows for the LSFI are in the process of being reevaluated. Upon completion, the constraints associated with these priority waterbodies will be updated and any associated recovery or prevention strategy will be appended to this Plan.

Additionally, the four OFS on the Suwannee River are under emergency rule. While the results of the constraints analysis identified Lafayette Blue Spring and Falmouth Spring as being in prevention, there is technical work underway to establish updated MFLs for all four OFS. Once finalized, the status of these waterbodies will be reassessed.

In the SJRWMD, Lakes Brooklyn and Geneva were determined to be in recovery and Lake Cowpen in prevention. The B-G Recovery Strategy, approved in 2021, includes the Black Creek Project. This project, which is currently under construction, will address the impacts to Lakes Brooklyn, Geneva and Cowpen.

Waterbodies without Adopted Minimum Flows and Levels

The assessment of waterbodies without MFLs determined that there are waterbodies that exceed the screening criteria at 2045. These waterbodies are either on a MFL Priority list or have been identified for additional investigations during the implementation phase of the NFRWSP. Projects are continuing to be developed that will provide options to address these constraints. Additional details regarding waterbodies without adopted MFLs is provided in Chapter 5.

Wetlands

The assessment identified wetlands with a moderate or high potential for adverse change; however, it is important to note that this analysis is meant to be a screening tool for regional planning purposes. Since the potential for adverse change does not

necessarily correspond to realized adverse change, water supply and water resource project development did not focus on providing a benefit to wetlands with a moderate or high potential for adverse change identified in the NFRWSP area. Regardless, implementation of the projects specified in the NFRWSP can reduce the acreage of potentially adversely changed wetlands, although these benefits were not quantified as part of the plan.

The Districts' Regulatory Programs will continue to thoroughly evaluate the potential of harm to wetlands resulting from consumptive uses of water and will require mitigation where harm has occurred. Through their continued use of enhanced wetland assessment protocols in conjunction with the spatial review of wetland acreage identified in the NFRWSP, the Districts' regulatory staff will ensure the protection of wetland acreage throughout the planning region by preventing, or requiring mitigation for, adverse impacts to wetlands from both individual and cumulative permit-related groundwater withdrawals.

Water Resource Caution Areas

Water Resource Caution Areas (WRCA) are geographic areas identified by a district as having existing water resource problems or areas in which water resource problems are projected to develop during the next twenty years. WRCAs are established pursuant to section 62-40.520(2), F.A.C., which provides "[w]ithin one year of the determination that a regional water supply plan is needed for a water supply planning region, the region shall also be designated as a water resource caution area." Once a planning region is designated as a WRCA, domestic wastewater treatment facilities which are located within, serve a population located within, or discharge within a WRCA, shall be subject to the reuse requirements of section 403.064, F.S. These requirements mandate domestic wastewater treatment facilities to prepare detailed reuse feasibility studies, which help ensure the maximized reuse of reclaimed water in areas with limited traditional water supplies. Additionally, once a water supply planning region is identified as a WRCA for the purposes of section 403.064, F.S., affected parties may challenge the designation pursuant to section 120.569, F.S. Figure 28 below shows the WRCAs in the NFRWSP area.

SRWMD Water Resource Caution Areas

In the SRWMD, a WSPA meets the definition of a WRCA. The SRWMD's Eastern Planning Region, which is encompassed in the SRWMD portion of the NFRWSP area, was designated as a WSPA in the WSA 2015-2035. It was approved by the Governing Board in 2018 and became effective on December 4, 2019.

SJRWMD Water Resource Caution Areas

The 2017 NFRWSP designated the SJRWMD portion of the planning region as a WRCA (SJRWMD & SRWMD, 2017).

Since potential water resource constraints have been identified in the both the SRWMD and the SJRWMD portions of the NFRWSP area, including MFLs that are not being met and areas of potentially degrading water quality, the 2023 NFRWSP supports the continued designation of the Districts' portion of the NFRWSP area as a WRCA.

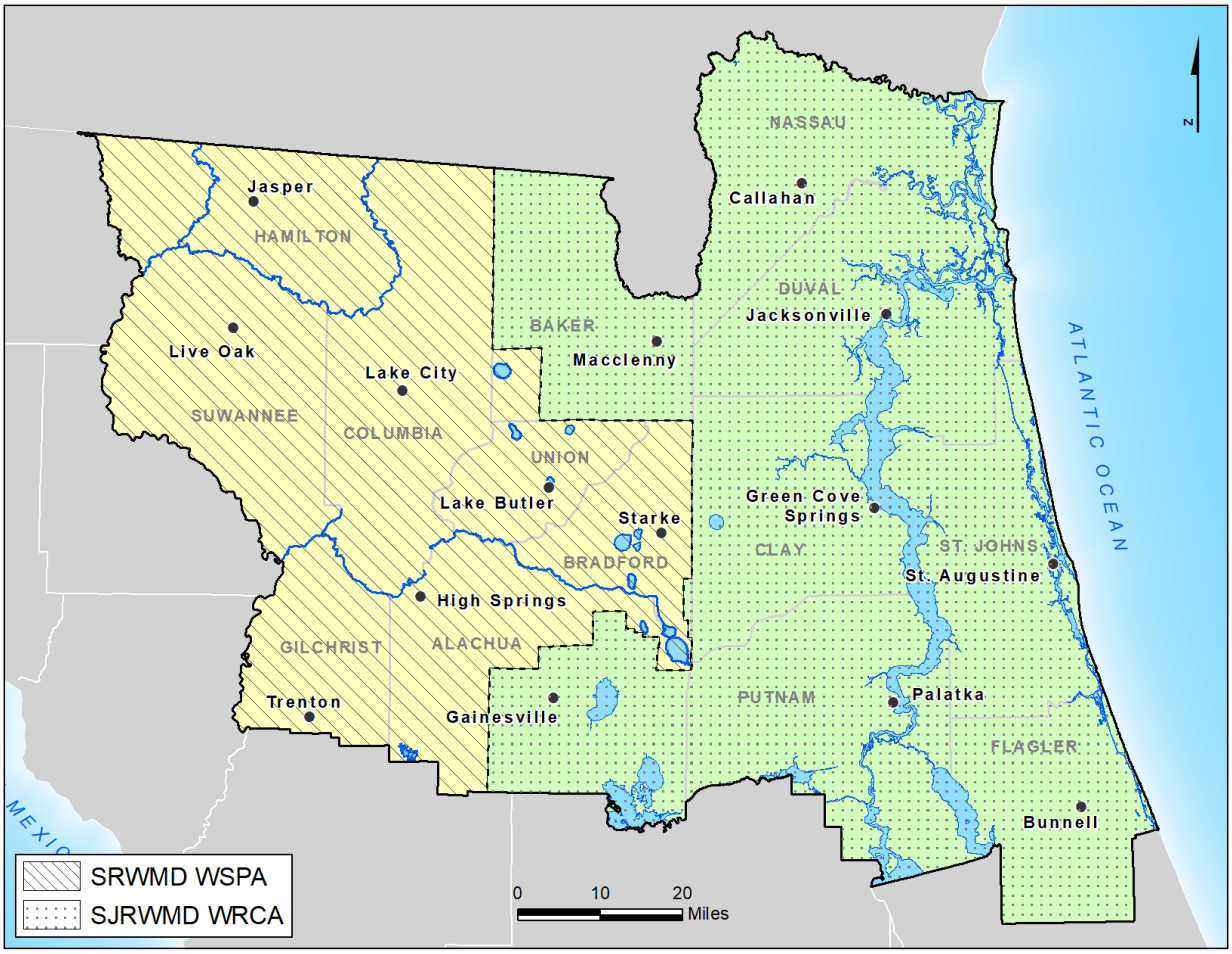

Figure 28. Existing WRCAs/WSPAs in the NFRWSP area

Chapter 7: Project Options

Purpose

An important part of the water supply planning process is to identify WSD and WRD project options that are necessary to meet current and future water demands. This chapter provides a progress update on projects that have been completed since the 2017 NFRWSP as well as an overview of the WSD, WRD, and water conservation projects and programs that are available to water users located within the NFRWSP area to avoid water resource impacts identified in Chapter 5. Where possible, planning-level estimates of the potential available yield for each source are provided. These estimates address a number of factors including consideration of any established MFLs, potential impacts to water and environmental resources, the results of previous water resource evaluations, permit feasibility, water source quality, consideration of existing legal uses, and known engineering limitations.

Groundwater demand for the NFRWSP area is projected to increase 29%, from 461 mgd in 2015 to an estimated 596 mgd in 2045. Because current and future groundwater withdrawals were found to be constrained due to environmental and resource concerns, development of AWS is necessary to meet water supply needs. Nontraditional or AWS sources in the NFRWSP area include brackish groundwater, surface water/stormwater, seawater, reclaimed water, and water stored in aquifer storage and recovery (ASR) systems and reservoirs, whereas fresh groundwater sources are considered the traditional water supply source. The NFRWSP focuses on water conservation and the implementation of AWS projects to meet future demand. The project options identified in this 2023 NFRWSP are sufficient and exceed current and projected water supply demands, providing numerous options for water users.

Progress Since 2017 NFRWSP

Following the approval of the 2017 NFRWSP, there have been intensive efforts to improve management of the water resources within the NFRWSP area. The Districts, DEP, FDACS, utilities, agricultural producers, and other stakeholders have collaboratively implemented numerous water supply initiatives to meet regional goals.

Table 8 and Figure 29 illustrate the scope of these efforts with approximately 1,294 completed projects that received cost-share funding from 2017 through 2022. Cumulatively, the Districts, DEP, FDACS, and the stakeholders in the region, have invested approximately $146.0 million in these projects (District/DEP cost-share funding $64.9 million and cooperating entity $81.1 million). This investment in projects has contributed to the availability or conservation of approximately 89.1 mgd of water within the NFRWSP area. It is important to note that the $146.0 million figure only includes projects that received cost-share funding, but entities also implement AWS and water conservation projects independent of cooperative funding programs. These investments were the most technically and economically feasible project options at the time they

were funded. Future projects will be prioritized for funding as they are developed. These efforts show the dedication and commitment of all stakeholders to effectively manage the water resources of the region and to sustain the natural system into the future.

Table 8. Summary of projects completed since 2017

Type	Number of Projects	Estimated Benefit (mgd)	Estimated Total Cost ($M)
Agricultural AWS	21	0.3	$4.5
Agricultural Conservation	1,188	25.2	$25.9
Groundwater Recharge	5	10.6	$5.6
Other	4	0.0	$2.7
PS/CII Conservation	27	2.0	$9.7
Reclaimed Water	42	40.0	$89.8
Stormwater Harvesting	4	8.1	$4.3
Wellfield Management	3	2.8	$3.3
Total	**1,294**	**89.1**	**$146.0**

*SRWMD AG projects are compiled by the number of contract items that have been completed since FY 2017-2018. Benefits are derived from an estimating tool based on the conservation practice implemented.
**Totals may be slightly different due to rounding of individual values.

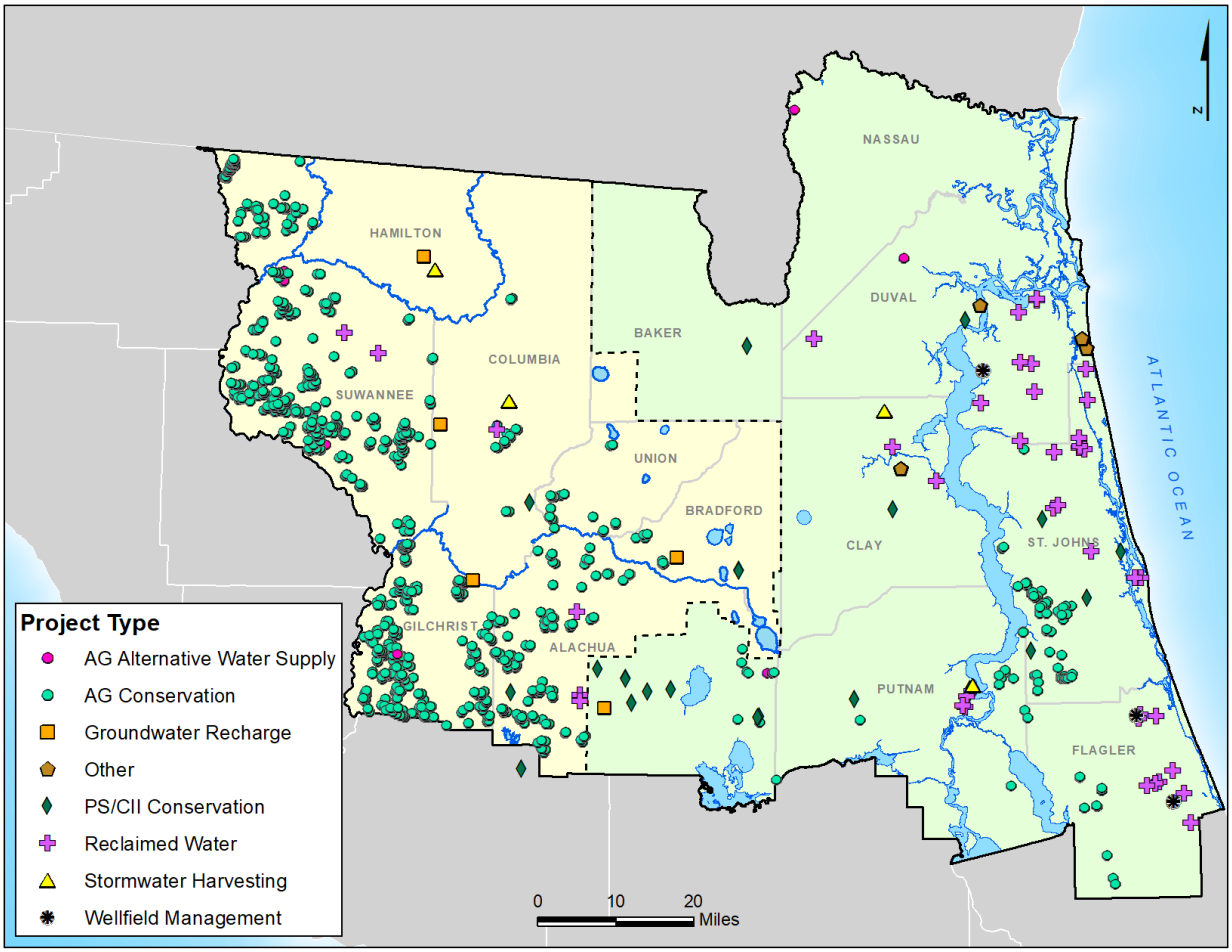

Figure 29. Completed cost-share projects in the NFRWSP area

2023 NFRWSP Potential Project Options

During the planning process, the Districts worked with stakeholders to update the status of project options listed in the 2017 NFRWSP and to identify new project options. When compiling the list of project options, there was consideration of how the public interest is served by the project or how the project will save costs overall by preventing the loss of natural resources or avoiding greater future expenditures for WRD or WSD. The development of projects will serve the public interest by providing, in an affordable manner, water to meet basic public health, safety, and welfare needs, water for agricultural, commercial/industrial/institutional, recreational, and other typical public supply system needs, and protection of the natural systems within the NFRWSP area.

Pursuant to subsection 373.709(7), F.S., nothing contained in the WSD component of a RWSP should be construed as a requirement for local governments, public or privately owned utilities, special districts, self-suppliers, regional water supply authorities, multi-jurisdictional entities, or other water suppliers to select an identified project merely because it was identified in the plan. If the projects identified in the NFRWSP are not selected by a water supplier, the entity will need to identify another AWS project option sufficient to meet its future needs and advise the Districts of the alternate project(s). In addition, the associated local government will need to include such project information in its water supply facilities work plan (see Chapter 2).

Water supply plans are not self-implementing. Projects included in this 2023 NFRWSP are options from which local governments, utilities, and other water users may choose in accordance with subsection 373.709(7), F.S. Budgetary constraints and uncertainties for both users and agencies also create hurdles to ensuring specific solutions will be economically feasible and affordable. Funding for the development of alternative water supplies is primarily the responsibility of water suppliers and users with potential funding assistance from the State of Florida and the Districts. This 2023 NFRWSP identifies sufficient funding mechanisms and sources to address the economic feasibility of projects in Chapter 8 (paragraphs 373.709(2)(b), 373.709(2)(d) and 373.709(6)(a)).

Project Cost and Volume Estimation Methodology

Pursuant to subparagraph 373.709(2)(a)2., F.S., the Districts considered the technical, financial, and permit feasibility of project options at a planning level when developing the 2023 NFRWSP. The projects that meet the criteria for inclusion in the NFRWSP are summarized into four categories: WSD, WRD, water conservation, and conceptual projects. The following information is provided for each project option identified:

- An estimate of the amount of water made available by the project;
- A timeframe for project implementation;
- An estimate of planning-level costs for capital investment and operating and maintaining the project; and

- Identification of the likely entity responsible for implementing each project.

The conceptual projects are included to provide additional potential project options. These projects may become feasible if they address environmental, technical, or permit criteria. Examples include projects where there was not an estimated water resource benefit, a fully developed cost estimate, or a timeline for implementation.

Table 9 presents a summary of project options aimed at addressing WSD, WRD, and water conservation efforts. There are 52 WSD projects with a total estimated benefit of 92.4 mgd and a total estimated cost of $1,061.4 million. For WRD projects, there are 23 projects with a total estimated benefit of 51.2 mgd and a total estimated cost of approximately $1,152.2 million. Notably, the WRD projects listed in the 2023 NFRWSP are proposed not only by the Districts, but also by multiple utilities, local governments, and other sponsoring agencies. Additionally, the 24 water conservation projects are estimated to have a total benefit of 16.8 mgd, incurring a total estimated cost of $57.5 million. The financial feasibility of an individual project option is inherently addressed during the development process. The estimated benefits and costs associated with project options are based on preliminary assessments and will be reviewed as projects are submitted for funding opportunities. Table 9 also includes 19 conceptual projects, where the estimated benefit and cost are yet to be determined (TBD). Because there are water resources showing constraints due to increased groundwater withdrawals, the Districts are continuing to develop conceptual project options that offset future water impacts.

Figure 30 displays the approximate locations of all project options, where locations were assigned during the project solicitation process. The locations of projects are not exact but are in general areas where projects are likely to be located. The projects that do not have locations assigned are not mapped. Indirect Potable Reuse (IPR) projects are shown at the location of the proposed IPR plant since the location of UFA recharge has not yet been determined.

Overall, these project options offer a comprehensive approach to water management and supply, providing 118 projects that lead to an estimated total benefit of 160.4 mgd and an estimated total cost of $2,271.1 million. There are sufficient project options for the development of water supplies to meet future demand while sustaining the natural systems in the NFRWSP area through 2045. Appendix K provides more detailed information on the listed project options.

Table 9. Summary of project options

Type	Number of Projects	Estimated Benefit (mgd)	Estimated Total Cost ($M)
Water Supply Development	52	92.4	$1,061.4
Water Resource Development	23	51.2	$1,152.2
Water Conservation	24	16.8	$57.5
Conceptual	19	TBD	TBD
Total	**118**	**160.4**	**$2,271.1**

*Totals may be slightly different due to rounding of individual values.

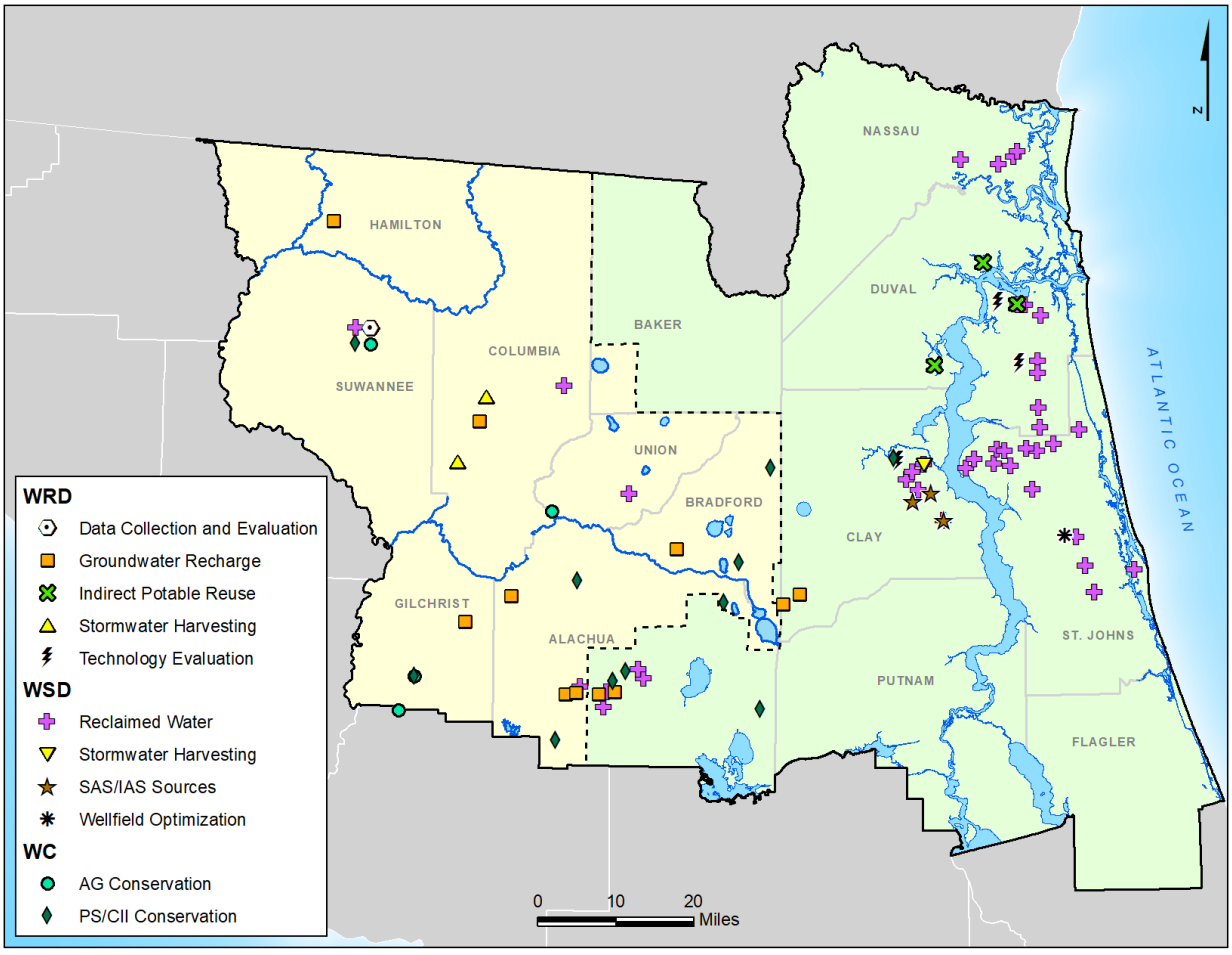

Figure 30. Project options in the NFRWSP area

Water Supply Development Project Options

Water supply development is defined in subsection 373.019(26), F.S., as the planning, design, construction, operation, and maintenance of public or private facilities for water collection, production, treatment, transmission, or distribution for sale, resale, or end use. Water supply development projects are generally the responsibility of water users, such as utilities or agricultural entities, to meet their needs (paragraph 373.705(1)(b), F.S.; section 62-40.531(4), F.A.C.).

An important part of the NFRWSP process is identifying WSD project options that are necessary to meet the anticipated water needs of the planning area through 2045 planning horizon. While water users are not limited to the projects listed in the NFRWSP plan, the list represents a set of projects that, if implemented, could supply a sufficient quantity of water to meet the projected water demands, if implemented.

Table 10, below, identifies 52 WSD project options for the NFRWSP area, which include reclaimed water (46 projects), SAS/IAS water sources (four projects), stormwater (one project), and wellfield optimization (one project) (Appendix K, Table K-2). The estimated benefit listed in the table expresses the project's ability to deliver "new" water as a result of project construction. The total estimated benefit from these projects amounts to 92.4 mgd. While there are no project options listed for aquifer storage and recovery or brackish groundwater, shown as "NA", their inclusion indicates the potential for these project options in the future. The listed projects have a total estimated cost of $1,018.2 million. Notably, the reclaimed water projects are estimated to contribute up to 87.2 mgd to the overall benefit.

Table 10. Summary of WSD project options

Type	Number of Projects	Estimated Benefit (mgd)	Estimated Total Cost ($M low range)
Aquifer Storage and Recovery	NA	NA	NA
Brackish Groundwater	NA	NA	NA
Reclaimed Water	46	87.2	$1,018.2
SAS/IAS Water Sources	4	5.0	$29.9
Surface Water	NA	NA	NA
Stormwater	1	0.2	$2.9
Wellfield Optimization	1	0.0	$10.5
Total	**52**	**92.4**	**$1,061.4**

*Totals may be slightly different due to rounding of individual values.

Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) is the underground injection and storage of water into an acceptable aquifer (typically the FAS). This water is stored for withdrawal at a later date to meet demands when traditional supplies are insufficient to meet demands. The aquifer acts as an underground reservoir for the injected water. ASR provides for storage of large quantities of water for both seasonal and long-term storage and ultimate recovery that would otherwise be unavailable due to land limitations, loss to tides, or evaporation. While ASR is not in itself a new supply source, it provides for system reliability allowing for increased development of other sources of water. Some sources of supply, including many surface water supply options, can be intermittent and therefore unreliable. Other supply options such as reclaimed water have variable demand issues but have relatively consistent supply. In these instances, ASR systems play an important role to store large quantities of water for distribution in cases where the source or demand is variable. While there are no proposed ASR projects listed in

the NFRWSP plan, this could be a potential option that may help meet future water demands.

Brackish Groundwater

Brackish groundwater, for AWS purposes, is generally defined as water with a TDS concentration of greater than 500 mg/L. Brackish groundwater exists in the FAS in portions of the NFRWSP area, specifically in coastal areas and near the St. Johns River Brackish groundwater is currently used to meet current water demands and could be expanded to meet future demands. The use of brackish groundwater may require treatment by methods such as low-pressure reverse osmosis (RO), or electrodialysis reversal (EDR). Treatment of brackish groundwater generally requires disposal of concentrate or reject water. Both RO and EDR treatment costs are higher than the treatment costs of fresh water sources. Additionally, the hydrologic connection between the brackish and fresh portions of the local aquifer horizons requires evaluation, and there may not be sufficient hydrologic confinement to protect overlying aquifer systems from possible drawdown and saline water intrusion. Currently, there are no brackish groundwater project options listed in the NFRWSP, however it could be a potential AWS source.

Reclaimed Water

Reclaimed water is wastewater that has received at a minimum secondary treatment and basic disinfection and is reused after leaving a domestic WWTF. Reuse is the deliberate application of reclaimed water, in compliance with DEP and the Districts' rules, for beneficial purposes. Reclaimed water utilization is a key component of water resource management in the NFRWSP area. Reclaimed water is used for non-potable purposes such as landscape irrigation, agricultural irrigation (where applicable), aesthetic uses, groundwater recharge, industrial uses, environmental enhancement, and fire protection purposes. Reclaimed water can also be utilized for potable reuse, which is the process of purifying reclaimed water to state and federal drinking water standards so that it can be utilized for recharge such as IPR or recycled for potable water supply uses, also referred to as direct potable reuse (DPR). Although DPR is not currently being implemented in the Districts, this method is being investigated in Florida and is being used in other states and countries to meet potable water demands.

Surficial Aquifer System/Intermediate Aquifer Water Sources

Historically, the UFA has been the traditional water source for public supply uses in the NFRWSP area. However, water resource constraints are projected to limit the availability of UFA withdrawals as water demand continues to increase as a result of population and agricultural growth. Water users may decide to pursue alternative sources as a means to meet increased future demand and avoid or lessen their impacts to water resources.

Surface Water

Opportunities exist for the development of water supplies from lakes and rivers in the NFRWSP area that could help supplement traditional groundwater supplies. Smaller, local lakes are generally considered a limited resource and often provide the local landowners with water for irrigation purposes. The capture and storage of water from river/creek systems and runoff can supply significant quantities of water which could be a component of multi-source WSD or WRD projects. Larger lakes may represent an opportunity for development of supplies, as they have larger, regional drainage basins to buffer the effects of withdrawals.

Stormwater

Section 62-40.210(37), F.A.C., defines “stormwater recycling” as the capture of stormwater for irrigation or other beneficial use. The DEP and the districts define stormwater as the flow of water which results from, and which occurs immediately following, a rainfall event and is normally captured in ponds, swales, or similar areas for water quality treatment or flood control. (See section 62-40.210(34), F.A.C.). Development of the natural landscape can result in significant changes to the characteristics of stormwater flows. When captured stormwater runoff can provide considerable volumes of water that can result 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 using 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 (i.e., conjunctive use) or implementing seasonal storage. Stormwater represents a potentially viable AWS at the local level, particularly for irrigation water uses. A major potential project opportunity is the ability for local governments and utilities to partner with the Florida Department of Transportation (FDOT) on stormwater capture and harvesting projects. Additionally, SJRWMD staff have been working with builders and consultants in Northeast Florida to promote stormwater harvesting in the design of surface water management systems for new developments and as a retrofit in existing developments where feasible.

Wellfield Optimization

Utilities employ different strategies to manage and optimize wellfield performance with the objective of maximizing water production while minimizing water losses or resource impacts. Examples of these strategies include well rotation, well deepening/back-plugging, and blending to maintain water quality.

Water Resource Development Project Options

The intent of WRD projects is to increase the amount of water available for water supply (subsection 373.019(24), F.S.). WRD projects include regional projects designed to create traditional or alternative sources from an identifiable and quantifiable supply of

water for existing and/or future reasonable-beneficial uses. While WRD projects are typically, but not always, implemented directly by the Districts or by the Districts in conjunction with other agencies or local governments (paragraph 373.705(1)(a), F.S.), there are multiple WRD projects included in this NFRWSP that are proposed by utilities or other entities (see Appendix K, Table K-2, Column G). WRD projects also encompass data collection and analysis activities that support WSD by local governments, utilities, regional water supply authorities, and others. This includes programs that collect and analyze data for natural system monitoring, groundwater monitoring, water supply planning, feasibility studies for new technologies, and ongoing regional water conservation programs.

The NFRWSP identifies a total of 22 WRD project options which are summarized in Table 11 (Appendix K, Table K-2). The projects include data collection and evaluation (one project), groundwater recharge (13 projects), IPR (four projects), stormwater/surface water (two projects), and technology evaluation (three projects). While there are no project options listed for reservoirs and seawater (shown as "NA") their inclusion indicates the potential for these project options in the future. The listed project options have an estimated total water supply benefit of 51.2 mgd. The estimated total cost for implementing these projects amounts to $1,152.2 million. Notably, groundwater recharge and IPR projects contribute significantly to the overall benefit, accounting for 32.7 mgd ($265.0 million) and 17.4 mgd ($788.3 million), respectively. The utility-led groundwater recharge and IPR projects are also typically reflected in the sponsoring utility's integrated water resource plans and/or their plans to eliminate non-beneficial surface water discharge per Florida Senate Bill 64 (Florida Senate, 2021).

Table 11. Summary of WRD project options

Type	Number of Projects	Estimated Benefit (mgd)	Estimated Total Cost ($M)
Data Collection and Evaluation	1	0.0*	$4.0
Groundwater Recharge	13	32.7	$265.0
Indirect Potable Reuse	4	17.4	$788.3
Reservoirs	NA	NA	NA
Seawater	NA	NA	NA
Stormwater/Surface water	2	0.03	$11.1
Technology Evaluation	3	1.0	$83.9
Total	**23**	**51.2**	**$1,152.2**

*Estimated benefits of projects that provide storage capacity of stormwater capture are not included in the estimated benefit.
**Totals may be slightly different due to rounding of individual values.

Data Collection and Evaluation

Data collection and evaluation projects include, but are not limited to, conducting AWS feasibility studies, which incorporates the analysis of various project options such as treatment wetlands, reclaimed water alternatives, and water/wastewater collection and distribution systems. Projects under this category are funded to evaluate alternatives to

address water supply and wastewater treatment needs, investigate the viability of the project, and determine if the project may be cost-effective. Additionally, these feasibility studies take into consideration natural resource concerns. An example of such project would involve studying the feasibility of constructing a regional water or advanced WWTF to address the needs of communities in a specific study area.

Groundwater Recharge

Groundwater recharge projects can be used to increase the amount of water in an aquifer to help offset declines caused by groundwater withdrawals. There are several methods that can be used for aquifer recharge including land application in a high recharge area, direct injection via recharge wells, or other recharge techniques such as rapid infiltration basins (RIBs), treatment wetlands, or changes in land management practices. Sources of water for aquifer recharge can include surface water, reclaimed water, or stormwater. For recharge through injection wells, stringent construction, operation, and permitting regulations must be adhered to as required by Florida's Aquifer Protection Program. In addition, if the water is injected into zones of an aquifer designated as an underground source of drinking water, additional treatment may be required to meet state and federal drinking water standards.

The 10 mgd Black Creek WRD Project, identified in the B-G Recovery Strategy, is the most feasible and best option to provide regional water resource benefits in the NFRWSP area. The project is in Southwest Clay County. The primary purpose is to recharge the UFA using environmentally sustainable flows from Black Creek. The project provides a secondary benefit to water levels in lakes Brooklyn and Geneva, which will help support their MFLs. The major construction phases of the Project are: 1) the pump station and intake structure at Black Creek, 2) the pipeline along State Roads 16 and 21, and 3) a treatment system in proximity to the recharge area.

At its July 2022 meeting, the SJRWMD Governing Board approved a bid of approximately $15.9 million for the construction of Phase 1. At the September 2022 meeting, the SJRWMD Governing Board approved a contract for $39.8 million for construction of Phase 2. Phase 3, the treatment system, which is located in proximity to the recharge area is being procured in two parts. The first part, the direct purchase of the treatment media for $23.2 million, was approved at the April 2023 SJRWMD Governing Board meeting. The second part of Phase 3, the contract for construction of the treatment system totaling $16,988,000, was approved at the August 2023 SJRWMD Governing Board meeting.

Funding for this project is comprised of a variety of sources. First, funding was provided in the St. Johns River and Keystone Heights Lake Region Projects legislative appropriations. The total appropriation was more than $48 million, of which nearly $43.4 million was allocated to the Black Creek project. Additionally, North Florida utilities are contributing $19.2 million toward the project through participation agreements that were approved by the Governing Board in July 2021. Those utilities include Clay County Utility Authority, Gainesville Regional Utilities, St. Johns County Utilities, and JEA. The

remaining balance will be provided from SJRWMD funds. Resolution 2022-04 to Commit Fund Balance was approved by the SJRWMD Governing Board at its July 2022 meeting. This action allowed for the allocation of funds to the Black Creek WRD Project in the amount of $56.1 million. In summary, there is approximately $118.7 million committed to the project to date.

Indirect Potable Reuse

Indirect potable reuse is the planned delivery or discharge of purified reclaimed water to ground or surface waters for the development of, or to supplement, potable water supply. This method has been implemented in Florida, nationally, and internationally. The potential for IPR via groundwater recharge in the NFRWSP area is significant, and interest in IPR implementation is growing among utilities in the area.

Reservoirs

Surface water reservoirs provide storage of water, primarily during wet weather conditions, which can be used in the dry season. Water is typically captured, pumped from rivers, canals, reclaimed water sources or stormwater, and stored in above or in-ground reservoirs. Small-scale (local) reservoirs/ponds that can hold several hundred thousand gallons or more are used by farms and golf courses to store recycled irrigation water or collect local stormwater runoff. These reservoirs may also provide water quality treatment before off-site discharge. Large-scale (regional) reservoirs may hold up to several billion gallons and are used for stormwater attenuation, water quality treatment in conjunction with stormwater treatment areas, and storage of seasonally available water for use during dry periods. The potential yield of such reservoirs is directly related to the size of the reservoir and the size of the surface water capture area. While the NFRWSP does not currently list any reservoir project options, they could be considered in the future as a potential option.

Seawater

The use of desalinated seawater from the Atlantic Ocean is an additional water source option in the NFRWSP area, although there are no proposed projects listed. Seawater is essentially an unlimited source of water. However, desalination is required before seawater can be used for water supply purposes, and the concentrate resulting from the desalination process must be managed to meet regulatory and environmental criteria. In addition to treatment facilities, pump stations and pipelines would be required to transport finished water from the coast to the interior portions of the NFRWSP area. The use of seawater to meet public supply demands requires advanced treatment of the water by desalination technologies, which include distillation, RO, or EDR as options. Significant advances in treatment and efficiencies in seawater desalination have occurred over the past decade. While seawater treatment costs are decreasing and capital costs are becoming competitive with above ground reservoir options, operational costs remain moderately higher than other viable water supply options within the region. The costs associated with seawater projects can be higher than other alternative water

supply options and, therefore, proposed seawater projects would benefit from partnerships with other water suppliers, Districts, and/or other state agencies.

Stormwater/Surface water

As mentioned above, there are opportunities to develop water supplies from stormwater harvesting to supplement reclaimed water sources or reduce groundwater demand through WRD or WSD projects.

Technology Evaluation

Interest in advanced treatment technologies has grown as traditional water supplies become limited. Research is being conducted on emerging technologies, such as Carbon-Based Advanced Treatment (CBAT) systems; Micro-Filtration and Reverse Osmosis (MFRO); and Ozone and Biologically Activated Carbon (Ozone-BAC), to treat reclaimed water to potable standards. CBAT is comprised of biologically activated carbon (BAC) filtration, ultrafiltration, granular activated carbon (GAC), and ultraviolet light (UV) disinfection. In addition to these pilot studies, demonstration facilities are being constructed to educate the public on the safety of these new technologies and to showcase the implementation of projects, such as IPR, that would utilize these technologies.

District Water Resource Management Programs

Each District maintains a variety of long-term programs and initiatives that provide for the protection, conservation, and development of water resources. Water resource management programs support activities such as MFL development, well plugging, and well abandonment. Each District maintains an annual Five-Year Water Resource Development Work Program (WRDWP) which fully details the various WRD programs operated by each District. These activities are integral components of each District in achieving their mission; however, they may vary in scope and magnitude of implementation between Districts. Some programs and/or initiatives that are important to ongoing NFRWSP WRD efforts include:

- Abandoned Well Plugging Program: The SJRWMD's abandoned artesian well plugging program assists property owners in properly abandoning or back-plugging unused, free-flowing wells, or substandard wells that impact groundwater quality. This program helps to conserve groundwater resources and improve groundwater quality. Since 1983, the SJRWMD has abandoned 440 wells in the NFRWSP area. The are no free-flowing wells in the SRWMD portion of the NFRWSP area.

- Conservation Program: The Districts have increased focus on water conservation by implementing programs to provide outreach and education to permit holders and other stakeholders to maximize conservation potential. To further this effort, the Districts have collaborated with DEP, the University of Florida's (UF) Institute

of Food and Agricultural Sciences (IFAS), and other state agencies on the quantification of conservation and the expansion of cost-share opportunities.

- Groundwater Modeling: Groundwater flow models are used to support the District's core missions of protecting water supply and related natural systems through regional water supply planning, MFLs, and for regulatory evaluation. NFSEG v1.1 was used to support development of the 2023 NFRWSP.

- Data Collection & Analysis: The data collection and analysis activities conducted by the Districts support the health of natural systems and the development of water supplies. Data collection programs allow the Districts to monitor the status of water resources, observe trends, identify and analyze existing or potential resource issues, and develop programs to support water resource projects that will assist in correcting existing problems and preventing future problems.

Water Conservation Project Options

Water conservation is an important element of water supply planning because it contributes to the sustainability of water supply sources. Subparagraph 373.709(2)(a)2, F.S., requires that water conservation be accounted for when determining if the total capacity of the WSD project options included in RWSPs exceeds the increase in projected water demands for the planning horizon. The Florida Legislature recognizes the importance of water conservation and declared the goal of water conservation for the state to be the prevention and reduction of the "wasteful, uneconomical, impractical, or unreasonable use of water resources" (section 373.227, F.S.). Water conservation includes any action that reduces the demand for water, including those that prevent or reduce wasteful or unnecessary uses and those that improve efficiency of use. All consumptive/water use permits must include a detailed water conservation plan. Utility water conservation plans must also analyze system water loss and remediation if the loss exceeds 10%. A water conserving rate structure is another required component for utility water conservation plans. These plans provide a structure for regional water use efficiency programming and are updated with each renewal of the permit. Achieving long-term improvements in water use efficiency will require a combination of advanced technologies, best management practices (BMPs) and behavioral changes. Education, outreach, and public engagement are essential for accomplishing a measurable increase in water conservation and maintaining a lasting commitment to efficient water use in North Florida.

Effective water conservation efforts have been implemented in the NFRWSP area, and the benefits of which are reflected in decreased historical 5-year average gross per capita use from 132 gpcd (2010-2014 average) to 122 gpcd (2014-2018 average). It should be noted that differences in population determination methodology, increased use of reclaimed water that offsets potable use, climate, the economy, and other factors are also expected to have contributed to this decreasing trend in gross per capita. Significant achievements are also evident in the efforts of the North Florida Utility Coordination Group (NFUCG) member utilities and other utilities in the NFRWSP area.

Through a combination of both cost-share and self-funded water conservation and reclaimed water projects, the NFUCG utilities have collectively experienced a reduction in water demand even while experiencing growth in their customer base. Continued investment in water conservation is critical to help the NFRWSP area meet its future water needs and avoid unacceptable water resource impacts.

Conservation strategies and projects are recognized as being the most economically feasible to help meet future growth and reduce existing demand Implementing projects to meet the high conservation potential for all water use categories (an additional 83 mgd of savings) as described in Chapter 3, Table 2, will likely be a more cost-effective option than implementing some of the WSD and WRD projects discussed above. As more AWS becomes available, efficient use of those more expensive sources makes water conservation critical to the region. Transitioning to better implementation of programs and messaging will help user groups in upcoming years. The Districts anticipate that a conservation-only strategy will not completely offset the predicted shortfall in fresh groundwater supplies, however conservation still needs to be part of the water supply solution for North Florida.

Table 12 provides a summary of water conservation projects submitted (Appendix K, Table K-3). In total, there are 24 projects, with 18 projects dedicated to PS/CII conservation and six projects focused on agricultural conservation. The total estimated benefit for these projects is 16.8 mgd, and the total cost for implementation is estimated to be $57.5 million.

Table 12. Summary of water conservation project options

Type	Number of Projects	Estimated Benefit (mgd)	Estimated Total Cost ($M low range)
Agricultural Conservation	6	9.4	$16.5
PS/CII Conservation	18	7.4	$41.0
Total	**24**	**16.8**	**$57.5**

*Totals may be slightly different due to rounding of individual values.

Public Supply & Commercial/Industrial/Institutional Water Conservation

In the public water supply category, a notable advancement in water conservation is the access to granular water use data through programs like advanced metering infrastructure (AMI) and the UF Water Savings, Analytics, and Verification (H_2OSAV) tool built by the Program for Resource Efficient Communities/Center for Land Use Efficiency (UF/IFAS Center for Land Use Efficiency, n.d.). These tools allow utilities to focus on high water users and to accurately measure the quantity of water saved over time resulting from conservation practices.
Water use data analysis allows direct notification to customers of high-water use along with rebate opportunities for irrigation system retrofit. Utility funded irrigation evaluations by several utilities have offered significant opportunities to increase efficiency by educating customers on scheduling irrigation, installing smart controllers, and locating irrigation leaks. Advanced metering infrastructure and H_2O SAV are essential tools to

implement targeted conservation programming for both new and existing customers. Outdoor water use (irrigation) remains the prime target for demand reduction, as 50–70% of newer home water use is for irrigation (Taylor, 2023).

The districts collaborate closely with the DEP-funded Florida Friendly Landscaping™ (FFL) program to assist in informing the public of the conservation message. The SJRWMD Florida Water Star™ (FWS) program has recently partnered with FFL on a Gold version that essentially blends both programs. In addition to data analysis, SJRWMD facilitates regional utility conservation coordinator training events where experts present all aspects of conservation and utility conservation coordinators share their successes and failures, so others may learn. SJRWMD has also launched a conservation program specifically for Homeowner Association Community Association Managers (HOA CAMs). These licensed professionals manage landscape irrigation maintenance contracts for hundreds of irrigated acres in North Florida. The training is focused on efficient irrigation system maintenance and provides free Continuing Education Units (CEU's) to all attending CAMs.

The SRWMD has partnered with Alachua County, with funding from the AWS program, on a Turf SWAP (Save Water Add Plants) project to reduce impacts from urban landscapes and focus on irrigation tune-ups or other methods to reduce water use on landscape irrigation. The goal of the Turf Swap Program is to encourage water savings through FFL and reducing or improving irrigation systems (The Master's Lawn Care, n.d.).

The following water conservation strategies have been, are, or can be implemented within the NFRWSP area by non-agricultural water providers:

- Tiered public supply billing rates: Tiered rates are an essential aspect of any successful program as they provide direct and clear feedback to individual water users who can then take action to improve efficiency. Analyses of historical billing rates and per capita use in North Florida demonstrate a reduction in gross and residential per capita use after implementation of tiered rate structures.

- Implementation of landscape irrigation restrictions: Local governments in both Districts have adopted ordinances to enforce the irrigation restrictions contained in chapter 40C-2, F.A.C. This local action encourages outdoor water conservation and provides for more consistent implementation of the rule. SJRWMD is in year three of a campaign called WaterLess which has the goal to increase awareness of the restrictions, especially with new residents. Email newsletters, social media posts, event handouts, new reporting apps, and irrigation industry trainings are all part of this campaign. Campaign materials are provided for use by water suppliers and local governments to expand the reach of this important effort. The SRWMD continues to highlight water conservation in the month of April and throughout the year utilizing social media, videos, graphics, handouts, and other traditional media sources. The SJRWMD recently

launched an overwatering reporting and education program to inform homeowners, especially newcomers to Florida, on the irrigation restriction rule.

- Landscape and irrigation design codes: Many jurisdictions in the NFRWSP area have land development codes with provisions that encourage efficient outdoor water use. As industry design and approaches evolve, District staff work to encourage updates to these design codes to maximize opportunities to reduce outdoor water use. Some examples include limiting in-ground irrigation to specific landscape areas, implementing efficient design with technologies like smart irrigation controllers and adherence to restrictions, managing an irrigation water budget through utility oversight and billing data, requiring compost for new landscapes to minimize establishment irrigation, retrofitting existing systems with homeowner education and enforcement, and amending landscape soils with compost to potentially reduce irrigation requirements (Bean & Radovanovic, 2021).

- Outreach and Education: Water conservation outreach is common throughout the NFRWSP area for both indoor and outdoor water use. Water conservation outreach occurs via websites, utility bill stuffers, events, and other approaches implemented by local governments, utilities, the Districts, and other partners. Outreach messages include general recommendations for efficient water use as well as advertising for existing programs such as FFL, FWS, and the Florida Green Building Coalition. Each year the districts partner with the Florida Section of the American Water Works association to mark April as Water Conservation month and to encourage water efficiency during one of the driest months of the year.

- Water use audits for residential and commercial customers: This strategy has been very effective in this region when employed by a public supply utility because it provides customized recommendations, includes direct contact with landowners, and can be targeted to water users with the greatest potential for savings. The UF H_2OSAV program has quantified that certain outdoor practices can yield meaningful water savings (Taylor, 2023). If such programs are implemented broadly, then the region could approach a per capita goal to reduce more expensive AWS options (Table 13).

Table 13. UF H_2OSAV quantified outdoor practices

Conservation Measure	Average Savings
Enforcing Irrigation Restrictions	36–44 gallons per day per property
Smart Irrigation Controllers	95–100 gallons per day per property
Irrigation Evaluations	50–155 gallons per day per property

- Meter reading technology: Automatic meter reading (AMR) and AMI are used by several utilities in the NFRWSP area to identify high-water users or unusual increases in water use relative to historical patterns for individual customers. This technology provides a significant opportunity for water conservation savings. It

has been used to identify individual homeowners/businesses that public supply utility staff can contact to provide technical assistance in identifying and resolving the cause(s) of high-water use and/or unusual increases. Referenced above, the UF H_2OSAV tool is another granular tool to assist in meaningful demand reduction.

- Water conservation rebate programs: This strategy offers customers either a reduced price or free replacement of a variety of indoor plumbing fixtures and outdoor irrigation devices (e.g., replacement rain sensors, smart irrigation controllers). Water savings is achieved one of two ways; either when the replacement fixtures and devices are more efficient than the older fixtures or when broken/malfunctioning fixtures and devices are replaced. Fixture replacement occurs in both residential households and commercial facilities.

- Innovative practices: Public supply utilities are also experimenting with utilization of new technology as well as data-driven approaches for targeted implementation of existing programs and technology to maximize their effectiveness.

Agricultural Water Conservation

In addition to the PS/CII water conservation programs and practices described above, water savings can also be gained by improving agricultural irrigation efficiency. This includes rainwater harvesting, tailwater recovery, center pivot and irrigation drain tile retrofits, and other irrigation efficiency practices and technologies. Throughout the NFRWSP area, there are agricultural operations enrolled in applicable FDACS BMP programs. In addition to water quality benefits, many BMPs implemented through the FDACS program also improve irrigation efficiency. For more information see fdacs.gov.

Within the SJRWMD region, the Tri-County Agricultural Area (TCAA) Water Management Partnership (WMP) consists of funding partners including SJRWMD, DEP and FDACS. UF IFAS and the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provide technical assistance to help growers implement projects to conserve water and reduce nutrient run-off. Growers within the TCAA, a row crop production region, continue to convert their seepage irrigation systems to more efficient irrigation methods such as center pivot and irrigation drain tile. These irrigation methods have been shown to reduce irrigation by up to 60% compared to seepage. Soil moisture sensors and weather stations are also becoming more widely adopted in this area and efforts to improve soil health and increase organic matter are expected to further increase conservation. In addition, 414 agricultural operations (91,610 acres) within the SJRWMD region are currently enrolled in applicable FDACS BMP programs.

The SRWMD is taking proactive steps to promote sustainable agricultural practices through its Agricultural Cost-Share Program. This program emphasizes the adoption of various water conservation measures to ensure responsible water use in the agricultural sector. Examples of supported conservation practices are center pivot retrofits, variable

rate irrigation, soil moisture probes, end gun shutoffs, remote controlling equipment, weather stations, and variable frequency drives (VFD). These enable producers to optimize their water efficiency and reduce overall water use. Additionally, Precision Agriculture Cost-Share incentivizes the implementation of grid soil sampling, variable rate nutrient application, and use of side dressing equipment to minimize nutrients and reduce water use. Currently, there are 657 agricultural producers with approximately 312,037 acres that are enrolled in FDACS BMP programs in the Eastern Planning Region.

The Suwannee River Partnership (SRP) was established in 1999 and is comprised of a diverse range of stakeholders from government entities at various levels, as well as farmers, residents, and environmental associations. The SRP works together to advocate for water quality and conservation to preserve the water resources in the Suwannee River Basin and Coastal Rivers Basin. The mission centers on implementing research-based solutions that protect and conserve the water resources, including voluntary and incentive-driven programs. More information on the SRP can be found at suwanneeriverpartnership.com.

Conceptual Project Options

The Districts are continuing to develop project options that offset future demands while protecting the natural systems because there are waterbodies with MFLs that are in prevention or recovery and waterbodies without MFLs that are showing constraints. The conceptual project options listed in the NFRWSP do not have water supply benefit estimates or cost evaluations. However, they may offer innovative approaches to address future water demands and ensure sustainable water supplies. The conceptual projects are included to provide more options of potential projects that may become feasible if they address and satisfy environmental, technical, or permit criteria.

The conceptual projects listed encompass a variety of options, such as enhancing aquifer recharge for silvicultural lands, utilizing surplus surface water, stormwater, or reclaimed water for groundwater recharge, and identifying locations for storage ponds to enhance groundwater recharge or serve as alternative water sources. Additionally, conceptual projects focus on implementing silvicultural management practices on forested lands to reduce forest evapotranspiration, leading to increased aquifer recharge, spring flows, and water yield to nearby streams and wetlands. These projects represent smaller-scale, potentially cost-effective ideas that could be implemented on a large scale to provide alternative water supplies and offset future water demands in the NFRWSP region. Table 14 provides a summary of conceptual project options (Appendix K, Table K-4).

Table 14. Summary of conceptual project options

Type	Number of Projects
Groundwater Recharge	16
Agricultural Conservation	1
PS and CII Conservation	2
Total	**19**

Mining Operation Land Reclamation Variances

Upon completion of mining operations, mines may provide an opportunity for WSD or WRD projects through the process of land reclamation (paragraphs 373.709(2)(j), 378.212(1)(g), and subsection 378.404(9), F.S.). These projects facilitate the development of water storage or recharge sites and may have the potential to contribute to MFLs prevention or recovery strategies. Mining operations and reclamation opportunities can be discussed with mining operators for mines whose locations may be advantageous for WRD or WSD.

The Districts completed a preliminary screening analysis to identify current mining sites in the NFRWSP area (Appendix J). This analysis did not consider the technical or financial feasibility of using mining sites for WSD or WRD projects. In summary, there were 112,823 acres of mining lands identified in the NFRWSP area. Individual mining sites will be evaluated, as needed, in areas where WSD or WRD projects may provide an improvement in water availability in the basin and do not cause adverse impacts to water resources. For these sites, the Districts may review the mine's Conceptual Reclamation Plan to understand the potential timeframe for ceasing mining operations and conceptual reclamation plans. Conceptual plans for reclaimed mining sites will be discussed with the DEP for WRD or WSD projects having the support of both the Districts and the mining operator or owner.

Chapter 8: Funding

Purpose

Subparagraph 373.709(2)(a)3.c., F.S., requires districts to include an analysis of the funding needs and to identify possible sources of funding for the projects in RWSPs. This chapter addresses potential funding sources for water supply and water resource development projects.

Florida water law identifies two types of projects to assist in ensuring an adequate water supply for reasonable and beneficial uses and to ensure that natural systems are protected. The two types of projects are WRD projects and WSD projects. Water resource development projects are generally the responsibility of districts, while water supply development projects are generally the responsibility of the local entities and/or water suppliers. However, there are multiple WRD projects included in this NFRWSP that are proposed by utilities or other entities (see Appendix K, Table K-2, Column G). Currently, the districts provide funding for both water resource and water supply development projects. In addition, the districts also provide funding for water conservation projects and strategies.

Water Supplier and User Funding Options

Funding for WSD and sponsor led WRD is the primary responsibility of water suppliers and users. Cost-share funding from water management districts, state, and federal funding programs can contribute to financing the cost of water supply development. Typically, the cost of water supply for water suppliers and users is included in the operation and maintenance program for producing the specific commodity and are generally reflected and recovered in the price and sale of the commodity. For water and sewer service, there are a variety of ways that have been implemented to recover costs, which are summarized below.

Water Utility Revenue Funding Sources

In general, increased water demand results from new customers which in turn can help finance source development through impact fees and utility bills. The financial structure of utility fees can be highly variable and reflect the needs of each utility. Water utilities draw from a number of revenue sources such as connection fees, tap fees, impact fees, base and minimum charges, and volume charges. Connection and tap fees generally do not contribute to water supply or water resource development or treatment capital costs; rather these fees recover the actual costs of tapping water mains and installing water service connection piping and water meters. Impact fees are restricted to the cost of designing and constructing new water resource components, treatment costs, and transmission facilities. Impact fees cannot be utilized for replacement and rehabilitation of existing facilities. Base charges generally contribute to fixed customer costs such as billing and meter replacement. However, a base charge (or a minimum charge), which

also covers the cost of the number of gallons of water used, may contribute to replacement and rehabilitation, source development (such as groundwater recharge or IPR), treatment costs, and transmission construction-cost debt service. Base charges are frequently established at amounts greater than the billing and meter replacement cost in order to ensure that the utility maintains a steady revenue stream that is not overly sensitive to seasonal demand variations. Volume charges contribute to both source development/treatment/transmission debt service and operation and maintenance.

Community development districts and special water supply and/or sewer districts may also develop non-ad valorem assessments for system improvements to be paid at the same time as property taxes. Community development districts and special district utilities generally serve a planned development in areas not served by a government-run utility. In general, all utilities have the ability to issue and secure construction bonds backed by revenues from fees, rates, and charges.

Regional water supply authorities are wholesale water providers to utilities. An authority's facilities are funded through fixed and variable charges to the utilities they supply, which are in turn paid for by the retail customers of the utilities. Funding is also obtained through state appropriations, federal and state grants, and funding from water management districts. As set forth in subsection 373.7313(1), counties, municipalities, and special districts have the legislative ability to create regional water supply authorities in a manner that is cost effective and reduces the environmental effects of concentrated groundwater withdrawals. Regional water supply authorities are granted multiple rights and privileges including the ability to levy taxes, issue bonds, and incur debt to develop water supplies. Authorities may also receive preferred funding assistance from the state and water management districts for the capital costs of new alternative water supplies and regional infrastructure.

Water Management District Funding Options

The districts provide financial assistance for water conservation, WSD, and WRD projects through cooperative (or cost-share) funding programs. Financial assistance is provided primarily to governmental entities, but private entities are also eligible to participate in these programs. Funding options and programs for the Districts are described below.

SRWMD Funding Options

The SRWMD promotes water conservation and the implementation of measures that produce significant water savings beyond those required in a CUP/WUP. Additionally, the SRWMD provides cost-share funding for projects that foster its core missions. The Regional Initiative Valuing Environmental Resources (RIVER) cost-share program provides funding assistance to water supply and/or wastewater utilities, government entities, and local entities for projects that decrease water consumption, implement

water savings programs, provide AWS, protect water supply, improve water quality, restore natural systems, and provide flood protection.

The SRWMD partners with other agencies and associations as part of the SRP to provide cost-share funding to agriculture producers to help implement BMPs that protect and conserve water. Cost-share funding is available to producers to maximize irrigation system efficiency, for tools to manage irrigation scheduling, and for irrigation system remote monitoring and control. The SRWMD also provides funding, along with FDACS, to support mobile irrigation lab services that deliver technical assistance to producers for evaluating system efficiency and make recommendations for improvements (SRWMD, 2023).

In addition, the Rural Economic Development Initiative (REDI) was established to better serve Florida's economically distressed rural communities (section 288.0656, F.S.). Counties or communities facing economic challenges are entitled to seek a "Match Waiver or Reduction" in relation to job or wage criteria, eligible company criterion, incentive prerequisites, and grant funding. The eligibility for a match waiver in grant programs is determined by individual state agencies, taking into account their yearly budget allocations and adherence to federal and state regulations (Florida Department of Economic Opportunity, n.d.). In the SRWMD's Eastern Planning Region, there are seven REDI counties (Baker, Bradford, Columbia, Gilchrist, Hamilton, Suwannee, and Union), which qualify for match waivers.

Water Resource Development Work Program

Annually, the SRWMD prepares and updates a Five-Year WRDWP following the approval of the annual budget. This WRDWP describes the implementation strategy and funding plan for WRD, WSD, and AWS components.

SJRWMD Funding Options

The SJRWMD primarily provides funding assistance through a competitive cost-share program, which is administered annually and supports AWS, WRD, water conservation, and agricultural related projects. Water resource development projects may also be funded solely by the SJRWMD or in cooperative arrangement with a local partner. When available, state funds can complement SJRWMD cost-share awards. In addition to the general cost-share program, funding opportunities have been available for innovative projects (i.e., projects that use emerging technologies or proven technologies in a unique way) and projects submitted by REDI communities. Since 2014, the SJRWMD has provided over $329 million in incentive-based funding assistance for a variety of AWS, water conservation, and other projects (agricultural and water quality) districtwide (SJRWMD, 2023b).

Water Resource Development Work Program

The SJRWMD annually updates its 5-year WRDWP, which describes the implementation strategy and funding plan for water resource, water supply, and AWS development components. The following projects are identified for potential funding opportunities: artesian well plugging, investigation of the augmentation of public supply systems with local surface water/stormwater sources, RWSP, Upper St. Johns River Basin Project, water conservation programs, water resource development components of WSD projects, WRD, MFLs prevention/recovery strategy projects, and water resources information.

State Funding Options

Agricultural Conservation

The FDACS' Office of Agricultural Water Policy (OAWP) works with multiple partners, including the Natural Resources Conservation Services (NRCS), DEP, water management districts, and Soil and Water Conservation Districts (SWCD), to provide funds that assist farmers in implementing BMPs. Cost-share programs through the FDACS OAWP vary regionally based upon the resource concerns and appropriate practices. Funds are provided to cost-share irrigation system efficiency improvements, and irrigation system management tools like soil moisture sensors.

The TCAA WMP is a collaborative effort between FDACS, DEP and SJRWMD as funding partners and UF/IFAS and NRCS as technical experts to address water quality and supply in the row crop growing regions of Putnam, Flagler, and St. Johns counties through cost-share funding (SJRWMD, 2023a).

Springs Protection

Since Fiscal Year (FY) 2014, the SJRWMD partnered with DEP, local governments, and public supply utilities to collectively invest approximately $373 million in over 169 springs protection and restoration projects districtwide. During this same period, the SRWMD received $135 million in 62 projects to help protect and restore natural systems districtwide.

These projects address either water quality or water quantity, although many often provide dual benefits. Typical water quality projects include WWTF upgrades, conversion of septic systems to central sewer and enhanced stormwater treatment. Typical water quantity projects include water conservation, reclaimed water system enhancements or expansions, and AWS development. The springs protection category also includes funding from DEP for crop, dairy, and nursery irrigation system efficiency improvements and enhanced water recycling components for dairies.

The future of springs funding looks particularly bright given the passage of the 2016 Legacy Florida legislation that earmarks $50 million per year from the Land Acquisition

Trust Fund for springs restoration for the next 20 years. It is anticipated that the districts, local governments, and public supply utilities will continue to partner with the state of Florida through DEP to aggressively implement projects well into the future (DEP, 2023a).

State of Florida Alternative Water Supply and Development Program

Since FY 2020, the governor and Florida Legislature have allocated funding statewide for WRD and WSD projects to help protect the state's water resources and ensure the needs of existing and future users are met. The funding supported the implementation of water conservation programs, AWS projects, and WRD projects. Priority funding was considered for regional projects in areas that were determined to have water resource constraints and that provide the greatest resource benefit. Projects in SJRWMD were awarded more than $30 million from this program, and projects in SRWMD were awarded almost $15 million, however future funding is not guaranteed (DEP, 2023b).

Drinking Water State Revolving Fund Program

The Drinking Water State Revolving Fund Program provides low interest loans to eligible entities for planning, designing, and constructing public water facilities. Cities, counties, authorities, special districts, and other privately owned, investor-owned, or cooperatively held public water systems that are legally responsible for public water services are eligible for loans. Loan funding is based on a priority system, which takes into account public health considerations, compliance, and affordability. Affordability includes the evaluation of median household income, the population affected, and consolidation of very small public water systems that serve a population of 500 people or fewer.

Funds are made available for pre-construction loans to rate-based public water systems, construction loans of a minimum of $75,000, and pre-construction grants and construction grants to small, financially disadvantaged communities. The loan terms include a 20-year (30-year for financially disadvantaged communities) amortization and low interest rates. Community assistance is available for small communities having populations less than 10,000. Fifteen percent of the annual funds are reserved exclusively for small communities. In addition, small communities may qualify for loans from the unreserved 85 percent of the funds (DEP, 2023d).

Florida Forever Program

The Florida Forever program is an initiative aimed at conserving and protecting natural areas and wildlife habitats throughout the state of Florida. The primary goal of Florida Forever is to acquire and manage critical lands including wetlands, forests, beaches, rivers, and other important ecological areas to ensure their long-term preservation. The program is administered by DEP and receives funding through the Florida Forever Trust Fund. The trust fund is primarily financed through a portion of the state's documentary stamp tax revenues, which are generated from real estate transactions. Subject to

annual appropriation, the Florida Forever Program could be a source of project funding (DEP, 2023c).

Water and Land Conservation Amendment

In 2014, the Water and Land Conservation Amendment was approved by voters to be added to the Florida Constitution. This amendment requires one third of documentary stamp revenue to be placed into the Land Acquisition Trust Fund. These funds are allocated for the acquisition/restoration of conservation lands, management of existing conservation lands, and the restoration of water resources, such as wetlands, springs, and rivers. Since 2016, the Legacy Florida legislation has allocated funds for springs protection in SJRWMD and SRWMD consistent with the Water and Land Conservation amendment (Florida Senate, 2015).

Resiliency Funding

In May 2021, Governor DeSantis signed Senate Bill 1954 into law creating the Resilient Florida Program to address statewide flooding and SLR. This comprehensive legislation ensures a coordinated approach to Florida's coastal and inland resilience. The program enhances the State's efforts to protect inland waterways, coastlines, and shores, which serve as invaluable natural defenses against SLR and flooding. The legislation is the largest investment in Florida's history with more than $100M annually, to prepare communities for the impacts of climate change, SLR, intensified storms, and flooding.

The Resilient Florida Program provides two separate grant opportunities, one for planning and the other for implementation of resilience projects that address flooding and SLR (DEP, 2023e). Resilient Florida Planning Grants provide 100% funding to local governments to complete comprehensive planning requirements related to flooding; VAs to identify or address risks of flooding and SLR; and develop projects, plans and policies to prepare or adapt to effects of flooding and SLR. The Statewide Flooding and Sea Level Rise Resilience Plan, known as the Resilience Plan, consists of ranked projects that address the risk of flooding and SLR to coastal and inland communities for critical assets, as defined in statute. Critical assets must be previously identified in a local or state developed VA. The DEP is required to submit the list of projects to the Legislature by December 1 annually for consideration of funding in the next state fiscal year. Projects included in the Resilience Plan will receive 50% cost-share funding from the State.

Federal Funding

Environmental Quality Incentive Program

The United States Department of Agriculture's NRCS provides technical and financial assistance to agricultural producers through the Environmental Quality Incentive Program (EQIP) for the installation or implementation of structural and management practices to improve environmental quality on agricultural lands. Water supply and

nutrient management through detention/retention or tailwater recovery ponds can also be implemented through this program (USDA, 2023).

State and Tribal Assistance Grants

Another partnership with states involves funding assistance through cooperative agreements, referred to as State and Tribal Assistance Grants. These funds are available through the Environmental Protection Agency, which historically required 45 percent in matching funds from local government cooperators (EPA, 2023b).

Water Infrastructure Finance and Innovation Act

The Water Infrastructure Finance and Innovation Act (WIFIA) established a new financing mechanism to accelerate investment in our nation's water infrastructure. The WIFIA program provides loans for up to 49 percent of eligible project costs for projects that cost at least $20 million for large communities and $5 million for small communities (population of 25,000 or less) (EPA, 2023a).

Public-Private Partnerships, Cooperatives and Other Private Investment

Public-private partnerships are gaining popularity as a potential source of funding to reduce the financial burden for public entities. However, these partnerships can require technical expertise and financial risk beyond the expertise and risk tolerance of many utilities and water supply authorities. There are a range of public/private partnership options that may provide the required expertise and reduce the financial risks. These options range from all-public ownership to all-private ownership of facility design, construction, and operation. Additionally, competition among private firms desiring to fund, build, or operate WSD projects with assistance from government entities could reduce project costs, potentially resulting in lower customer charges.

Summary of Funding Mechanisms

There are many potential institutions and sources of funding for water resource and water supply development, although some past sources are currently limited by economic conditions. A continuing challenge will be identifying cost-effective and economically efficient methods of meeting the needs of existing REDI communities and new self-supplied users (whose ability to pay ranges widely) when the traditional, lower cost sources of water are no longer readily available. Public supply utilities and water supply authorities will likely have the least difficulty in securing funding due to their large and readily identifiable customer bases and associated revenue streams to service any debt. Funding mechanisms are already established for many of the districts' water supply and water resource development projects. Ongoing investment in funding options for water resource development and water supply development projects will be required to meet projected future demands while sustaining natural systems.

Chapter 9: Conclusions

Summary

This 2023 NFRWSP was prepared by the Districts in coordination with stakeholders and is consistent with the water supply planning requirements of chapter 373, F.S. The NFRWSP concludes that fresh groundwater alone cannot supply the projected demand during the planning horizon without causing unacceptable impacts to water resources and related natural systems. Groundwater demands in all water use categories are projected to increase from 461 mgd in 2015 to approximately 596 mgd in 2045 (135 mgd increase). There are waterbodies that have adopted recovery strategies, which indicates the current distribution of groundwater use has already exceeded the fresh groundwater sustainable yield of the system. In addition, the analysis of waterbodies without MFLs, groundwater quality, and wetlands identified potential constraints on increased groundwater withdrawals during the planning horizon.

To meet current and future water demands while protecting water resources, the 2023 NFRWSP identifies water conservation, WSD, and WRD project options. With these project options, the Districts have identified 160 mgd of estimated benefit that is potentially available to offset the projected increase in groundwater demand of approximately 135 mgd by 2045. The breakdown of projects by type includes:

- 92.4 mgd of WSD
- 51.2 mgd of WRD
- 16.8 mgd of water conservation

The NFRWSP also recognizes the ongoing implementation of the LSFRB Recovery Strategy and the B-G Recovery Strategy for these MFL waterbodies. The Districts are continuing to develop conceptual project options that can be used to protect waterbodies with MFLs in prevention or recovery and those waterbodies without MFLs that are showing constraints.

Challenges in water resource development and natural resource protection require concerted efforts to monitor, characterize, and analyze current and projected hydrologic conditions. Successful implementation of the NFRWSP requires close coordination with regional and local governments, utilities, stakeholders in the agriculture, commercial, and industrial fields, and other water users. Collaboration among stakeholders is essential for implementing the recommendations and guidance in the NFRWSP. Public and private partnerships can ensure that water resources in the NFRWSP area are prudently managed and available to meet future demands.

Limited localized opportunities may exist for additional traditional groundwater withdrawals to meet future water demands through 2045. The few opportunities for increased traditional groundwater withdrawals generally include local areas where groundwater withdrawals have not been fully optimized. Options for obtaining new water

supplies to meet existing and future water demands from both conventional and alternative sources must comply with applicable CUP/WUP rules and conditions. While the NFRWSP may not be used in the review of CUPs/WUPs, the Districts are allowed to use data or other information used to establish the plan in reviewing CUPs/WUPs.

The primary solutions identified in the Plan to meet the future water demands include enhanced water conservation, groundwater recharge efforts, and the additional use and implementation of reclaimed water, surface water, and stormwater projects. The projects provided in this water supply plan were developed as a planning level assessment to show that sufficient options are available to address potential water resource impacts in the NFRWSP area. With appropriate management, continued diversification of water supply sources, water conservation, and implementation of identified water supply and water resource development projects, the 2023 NFRWSP concludes that the future demands can be met through the 2045 planning horizon while sustaining the water resources and related natural systems.

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