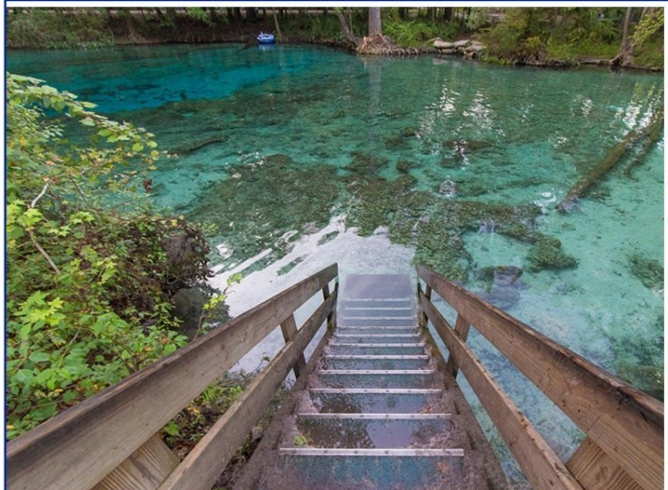
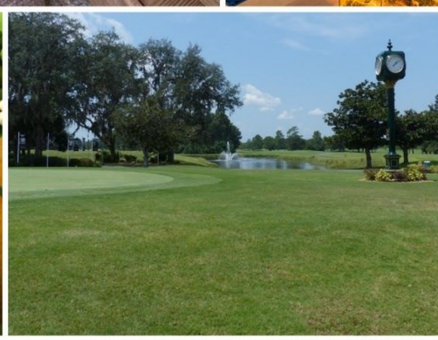
Central Florida Water Initiative

Planning Document




REGIONAL WATER SUPPLY PLAN 2020

A comprehensive plan for Orange, Osceola, Polk, Seminole, and southern Lake counties.

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This document is the Final 2020 Central Florida Water Initiative (CFWI) Regional Water Supply Plan (RWSP), Planning Document. Staff from the South Florida Water Management District, St. Johns River Water Management District, and Southwest Florida Water Management District worked together and in conjunction with members of various CFWI technical teams and other stakeholders to generate this 2020 CFWI RWSP. Section 373.709, Florida Statutes, details the components of regional water supply plans.

These documents are available at [cfwiwater.com.](http://cfwiwater.com)

The Final Draft is ADA compliant. If you need assistance, contact the following agencies or www.cfwiwater.com:

SJRWMD, 386-329-4500 or 800-451-7106

SFWMD, 562-686-8800 or 800-432-2045

SWFWMD, 352-796-7211 or 800-423-1476

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Acknowledgments

The Central Florida Water Initiative (CFWI) recognizes and thanks the utilities, state agencies, and other stakeholders for their contributions, comments, advice, information, and assistance throughout the development of this 2020 CFWI Regional Water Supply Plan.

Furthermore, the St. Johns River Water Management District, the South Florida Water Management District, and the Southwest Florida Water Management District express their appreciation to all staff who contributed to the development and production of this collaborative regional plan.

For further information about this document, please visit cfwiwater.com.

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Executive Summary

In Florida, the state's five water management districts develop regional water supply plans (RWSPs) to identify sustainable water supply for all water uses while protecting water resources and related natural systems. This 2020 Central Florida Water Initiative (CFWI) RWSP was jointly developed by the St. Johns River Water Management District (SJRWMD), South Florida Water Management District (SFWMD), and Southwest Florida Water Management District (SWFWMD) (Districts) in coordination with the Florida Department of Environmental Protection (FDEP) and Florida Department of Agriculture and Consumer Services (FDACS), representatives from utilities, agriculture, environmental, industry, and other stakeholders and input from the public. The CFWI Planning Area consists of all of Orange, Osceola, Seminole, and Polk counties and southern Lake County, covering approximately 5,300 square miles. The CFWI Planning Area was based predominantly on the public supply utility service areas in central Florida where the boundaries of the Districts converge.

In the past, the Districts worked independently to resolve water resource issues; however the decisions of one water management district can impact the water resources of another. The Districts agreed in 2006 to a Central Florida Coordination Area (CFCA) action plan; leading to the first joint evaluation of population and water demand projections in the CFWI Planning Area. The CFWI was created in 2009, building on the CFCA Action Plan and in November 2015, the Districts' respective governing boards approved the first ever joint RWSP, the 2015 CFWI RWSP (CFWI 2015b,c). After the 2015 CFWI RWSP was approved, legislation was passed and codified in Section 373.0465, F.S., that address water supply planning in the CFWI. The statute directs continuation of the collaborative process in the CFWI Planning Area among the state and regional agencies, regional public water supply utilities, and other stakeholders (**Chapter 1**). In addition, the Florida Springs and Aquifer Protection Act was enacted in 2016 (Section 373.801(3)(b), F.S.) providing for the protection and restoration of Outstanding Florida Springs (OFS), including minimum requirements for OFS recovery or prevention strategies.

This 2020 CFWI RWSP, based on a planning horizon through 2040, is consistent with the water supply planning requirements of Chapter 373, Florida Statutes (F.S.) and is an update to the 2015 CFWI RWSP Volumes I and II with their respective appendices. Similar to the 2015 CFWI RWSP, this 2020 CFWI RWSP concludes that traditional resources alone cannot meet future water demands or currently permitted allocations without resulting in unacceptable impacts to water resources and related natural systems. To meet current and future water demands while protecting the environment and water resources, this 2020 CFWI RWSP identifies water conservation efforts, water supply and water resource development project options, and recognizes prevention or recovery strategies for targeted minimum flows and minimum water levels (MFL) water bodies.

Since 2015, the Districts, FDEP, FDACS, utilities, and other stakeholders have collaboratively implemented numerous water supply initiatives to meet regional goals (**Chapter 2**). These initiatives have significantly enhanced the knowledge, analytical abilities and data available for development of this 2020 CFWI RWSP. These included major upgrades to the ECFT model used to support the 2015 CFWI RWSP consisting of expansion of the model, improved consistency with projected and historical water use data, consensus-based hydrogeology and model layering, incorporation of more recent data to support model calibration, and inclusion of an independent peer review panel during model development.

Several alternative water supply (AWS) projects were completed, increasing the volume of reclaimed water used and stormwater captured in the area. From FY2015 through FY2019, the Districts provided approximately $44.62 million for 39 AWS projects that have been completed or are under construction that will make available 94.3 mgd of AWS. Lower Floridan aquifer (LFA) investigations in Polk County and installation and testing of over 15 LFA wells throughout the CFWI Planning Area as part of the Data, Monitoring, and Investigations Team (DMIT) have been completed and are ongoing.

Water users in the CFWI Planning Area continue to implement water conservation. From FY2015 through FY2019, the Districts provided approximately $4.89 million for 39 water conservation projects that were completed or are being implemented that are estimated to save 4.35 mgd. A Water Conservation Implementation Strategy was approved by the Steering Committee in October 2019.

Regional cooperation has continued to expand to efficiently and effectively meet the water needs of the CFWI Planning Area. For example, the Polk Regional Water Cooperative (PRWC) was created in 2016 and includes Polk County and 15 municipal member governments. The PWRC provides for regional cooperation in the development of alternative water sources to meet future water demands within Polk County.

WATER DEMAND PROJECTIONS

The CFWI Planning Area, home to approximately 2.9 million people, supports a large tourism industry, a significant agricultural industry, and a growing industrial and commercial sector. The area's population is projected to reach 4.4 million by 2040, which is a 49 percent increase from the 2015 estimate. Total average (surface and ground) water use in the CFWI Planning Area is projected to increase 36 percent from 667 million gallons per day (mgd) in 2015 to 908 mgd in 2040. Of this amount, groundwater represents 635 mgd and 855 mgd, respectively. Public Supply (PS) constitutes the largest water use in the area, followed by Agricultural (AG) and Commercial/Industrial/Institutional (CII). Total PS water demands are projected to increase from 386 mgd in 2015 to 592 mgd in 2040 (**Table 1**). PS represents 65 percent of the 2040 projected water demand and 85 percent of the total increase in water demand within the CFWI Planning Area. AG represents the second largest water use and is projected to remain relatively stable at approximately 134,300 acres; however, water demand is projected to increase 3 percent from 159 mgd in 2015 to 163 mgd in 2040 due to crop intensification related to industry trends. Total CII water demands are projected to increase 29 percent from 54 mgd in 2015 to 69 mgd in 2040 (**Chapter 3**).

Table 1. Summary of 2015 total water use and 2040 total water demand projections by water use category in the CFWI Planning Area.

Water Use Category	Water Use and Demand Projections – Average Rainfall Conditions (mgd)			
	2015	2040	Change	Percent Change
Public Supply	385.97	592.28	206.31	53%
Domestic Self-supply	21.56	24.59	3.03	14%
Agriculture	159.38	163.49	4.11	3%
Landscape/Recreational	38.24	46.96	8.72	23%
Commercial/ Industrial/ Institutional	53.50	69.00	15.50	29%
Power Generation	8.47	11.27	2.80	33%
Total	**667.12**	**907.59**	**240.47**	**36%**

mgd = million gallons per day

WATER CONSERVATION

Water conservation by all water use categories will continue to be a priority to meet the CFWI Planning Area's future water demands. Historical gross per capita water use, as described in **Chapter 3,** has decreased from 182 gallons per person per day (GPCD) in 1995 to 140 GPCD in 2015. While water conservation measures have already been implemented in the CFWI Planning Area, additional water conservation has an important role in meeting future water supply demands. It is projected that a total of 50 to 56 mgd of water conservation savings could be achieved by 2040 for all water use categories (**Chapter 5, Table 19**). By 2040, projected PS water conservation savings could achieve between 42 to 44 mgd, AG water conservation savings could achieve 4 mgd, and all other projected water conservation savings could achieve between 5 to 8 mgd. These water conservation measures are influenced by several factors including, but not limited to, voluntary user actions, level of education and financial incentives, passive savings, and participation rates. Recommendations and Conclusions (**Chapter 9**) of this 2020 CFWI RWSP focus on evaluating options to accelerate and increase the implementation of water conservation measures.

WATER RESOURCES AND NATURAL SYSTEMS

The CFWI Planning Area contains extensive natural systems such as Econlockhatchee Swamp, Wekiva Swamp, Green Swamp, Reedy Creek Swamp, Davenport Creek Swamp, Big Bend Swamp, Cat Island Swamp, Boggy Creek Swamp, Shingle Creek Swamp, the Kissimmee Chain of Lakes (the headwaters to the Kissimmee River), the headwaters of the Peace River, 13 springs (including two Outstanding Florida Springs [OFS], Rock and Wekiwa), and over one million acres of wetlands.

In 2016, the Florida legislature identified 30 Outstanding Florida Springs, including Rock and Wekiwa, that require additional protection to ensure their conservation and restoration for future generations. Known as the Florida Springs and Aquifer Protection Act, it affords special status and protection to these historic springs (Section 373.801(3)(b), F.S.) Notably, the Act addresses both the water quantity and water quality in springs. Regarding water quantity, it directs the water management districts or FDEP to adopt a recovery or prevention strategy if a spring is below or is projected within 20 years to fall below the MFL for the spring.

MFLs have been established by the SJRWMD and SWFWMD for 54 water bodies within or that extend into the CFWI Planning Area. Forty-one of the 54 MFLs within or extending into the CFWI Planning Area are currently being met (**Appendix C, Table C-2, Figure C-2**). During the planning horizon five additional natural systems located in SJRWMD, two of which are OFS, are projected to fall below their MFLs prior to 2040 if projected demands are met with traditional fresh groundwater sources. Adverse impacts to wetlands from withdrawals are currently occurring in several areas; examination of modeled water levels in wetlands and water bodies without MFLs indicate that the occurrence of stress to wetlands is predicted to increase if projected demands are met with traditional fresh groundwater sources. The existence of adverse impacts to wetlands has been documented through extensive field work. Some wetlands impacts may be the result of multiple factors, including groundwater withdrawals, construction of drainage ditches, and other alterations to drainage basins. In some cases, where the cause has been determined, mitigation measures have been implemented.

GROUNDWATER ASSESSMENT

The primary tool used for the groundwater assessment is the East-Central Florida Transient Expanded (ECFTX) model. The ECFTX model is a regional tool used to evaluate groundwater withdrawals and their associated effects on the water resources and natural systems as well as to estimate groundwater availability (**Chapter 4**). Note that surface water is not included in the model simulations. The estimated groundwater availability reported in this 2020 CFWI RWSP is used by the Districts for planning purposes only and should not be viewed as regulatory constraints for specific Consumptive Use Permits/Water Use Permits (CUPs/WUPs). Decisions regarding CUPs/WUPs are made with additional information that is more site-specific and which may consider opportunities for water resource development, management strategies, and mitigation of impacts.

In some areas, fresh groundwater use is near, or has exceeded, the limits of groundwater availability. Therefore, adverse impacts to MFL water bodies and wetlands from withdrawals are already occurring. Based on the groundwater availability evaluation, it was estimated that regionally, the CFWI Planning Area could potentially sustain up to 760 mgd of fresh groundwater withdrawals, but local management strategies will be needed (e.g., wellfield optimization, aquifer recharge, and natural system enhancement) to address unacceptable impacts. Additional fresh groundwater withdrawals, beyond 760 mgd, are limited by water resource and natural system constraints. Based on the 2040 groundwater demand projections (855 mgd), the resulting groundwater shortfall is approximately 95 mgd (**Chapter 9**, **Appendix D**, **Table D-5**).

WATER SUPPLY PROJECT OPTIONS

Current water sources in the CFWI Planning Area include groundwater (fresh and brackish), reclaimed water, surface water, and stormwater. Fresh groundwater sources (i.e., surficial, intermediate, and Floridan aquifer systems) are considered traditional water sources; whereas, nontraditional or alternative water sources include brackish groundwater, surface water, stormwater, seawater, reclaimed water, and water stored in aquifer storage and recovery wells and reservoirs. The CFWI Planning Area has historically relied on traditional groundwater from the Floridan aquifer system (FAS) as a primary water source for PS, agricultural, and industrial uses. In addition, over 95 percent of the treated wastewater in the CFWI Planning Area is reused (212 mgd) for irrigation, industrial uses, groundwater recharge, and environmental enhancement (**Chapter 6**).

Several sources of water and storage options were identified to address future water demands. **Appendix E** identifies 85 potential water supply and water resource development project options, including 11 brackish/nontraditional groundwater, 48 reclaimed water, 17 surface water, 2 stormwater, and 7 management strategies. These project options have the potential to treat, store, or produce up to 539 mgd (approximately 514 mgd net water) of additional water supply or water resource benefit, exceeding the 2040 projected groundwater shortfall of 95 mgd. Most of the 17 surface water project options are associated with the St. Johns River and upper Peace River. Brackish water project options target the Lower Floridan aquifer and management strategies include wellfield optimization, aquifer recharge, and natural system enhancement (e.g., improving the ecological value of wetlands, other surface waters, or uplands in comparison to their current situation). **Appendix E** also includes 21 water conservation project options that are not captured in this total. Additional project information can be found in the 2035 Solutions Strategies (Volume II, 2015d) and the 2035 Solutions Strategies Appendices (Volume IIA, 2015e).

Water supply plans are not self-implementing. Projects included in this 2020 CFWI RWSP are options from which local governments, utilities, and other water users may choose in accordance with Section 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 2020 CFWI RWSP identifies funding mechanisms and sources to improve the economic feasibility of projects (**Chapter 8**).

CONCLUSION AND SUMMARY OF KEY FINDINGS

In some areas of the CFWI Planning Area, fresh groundwater is near or has exceeded the limits of groundwater availability. Alternative water sources will need to be developed along with additional water conservation efforts and local management strategies to meet the 2040 projected water demands or currently permitted allocations while not adversely impacting water resources and natural systems (**Chapter 4**).

- Based on the groundwater availability evaluation, it was estimated that regionally, the CFWI Planning Area could potentially sustain up to 760 mgd of fresh groundwater withdrawals, but local management strategies will be needed (e.g., wellfield optimization, aquifer recharge, and natural system enhancement) to address unacceptable impacts. Additional fresh groundwater withdrawals, beyond 760 mgd, are limited by water resource and natural system constraints.
- Water conservation is an important and cost-effective element in meeting future water demands. Potential water savings through the implementation of public supply, agricultural, and other self-supply water conservation measures is 50 to 56 mgd (**Chapter 5**). Additional savings could be possible through higher participation rates and the implementation of other water conservation measures not factored into the existing estimates (e.g., educational and outreach programs).
- There are sufficient project options for the development of water supplies to meet the CFWI Planning Area's needs through 2040. A total of 85 water supply and water resource development project options could potentially provide 514 mgd of additional net water supply or water resource benefit, exceeding the 2040 projected groundwater shortfall of 95 mgd (**Appendix E**). **Appendix E** also includes 21 water conservation project options that are not captured in this total.
- Stakeholder engagement will continue to be an important component of the extensive outreach efforts associated with the current implementation and development of future CFWI RWSPs. Successful implementation of this 2020 CFWI RWSP requires close coordination and collaboration with other regional and local governments, utilities, and other water users.
- Implementation of the strategies identified during the CFWI planning effort is critical to the long-term sustainability of the CFWI Planning Area's water supplies (**Chapter 7**).
- Future challenges in water resource development and natural resource protection in the CFWI Planning Area require concerted efforts to monitor, implement management measures, and characterize current and future hydrologic conditions.
- Evaluations indicate that the increased withdrawals from traditional groundwater sources associated with projected water demands through 2040 will increase the existing areas of water resource stress within portions of the CFWI Planning Area (**Chapter 4, Figures 9, 10,** and **11**).

This 2020 CFWI RWSP concludes that the future demands of the CFWI Planning Area can be met through the 2040 planning horizon, while sustaining the water resources and related natural systems, with appropriate management, continued diversification of water supply sources, water conservation, and implementation of identified water supply and water resource development projects.

RECOMMENDATIONS

This 2020 CFWI RWSP identifies recommendations that are critical to achieve water resource sustainability in the CFWI Planning Area, while protecting water resources and natural systems. The successful implementation of these recommendations will require the continued commitment and collaboration by the Districts and stakeholders to initiate and achieve the key findings and recommendations of this 2020 CFWI RWSP (**Chapter 9**). The following actions will guide future water supply solutions and will help ensure that future water demands are met without resulting in unacceptable impacts to water resources and related natural systems.

Recommended actions based on the results of the CFWI Planning effort include the following:

- **Expanded Implementation of Water Conservation Programs**

  Effective water conservation programs rely on the participation of local governments, residents, the agricultural community, and other users. Comprehensive water conservation programs should be expanded and include voluntary and incentive-based initiatives, research, education and outreach initiatives, and regulatory initiatives to achieve savings including prioritization of allocated funding to meet or exceed the estimated 2020 CFWI RWSP water conservation savings.

  These water conservation programs should support participation at local, CFWI Planning Area, and State levels, should identify and secure funding, and continue to implement comprehensive public education and outreach programs. Other conservation initiatives that could be expanded include programs to develop consistent year-round irrigation rules, use of smart irrigation controllers and soil moisture sensors, water use irrigation evaluations, and expand cost-share programs for AG water conservation.

- **Develop Specific Prevention or Recovery Strategies**

  Prevention or recovery strategies for MFL water bodies are critical to the protection and recovery of natural systems per Section 373.0421, F.S. The Districts are currently developing MFL prevention or recovery strategies and will continue to monitor, study, and evaluate water bodies without MFLs. As evaluations of stressed and threatened wetland systems are completed, management strategies and projects could be identified and implemented to mitigate the impact to these natural systems. The Districts should consider using CFWI-identified water supply and water resource development project options and management strategies and support continued coordination among all appropriate stakeholders to achieve resource recovery and protection.

- **Support Development and Implementation of Water Resource and Water Supply Development Projects**

  Regional projects should maximize sustainable yields, while minimizing impacts. Proposed groundwater sustainability actions should include monitoring, studying, and evaluating the Upper and Lower Floridan aquifers for maximum sustainable yields. Regional analysis should continue to explore appropriate uses and users for reclaimed water, including the use of reclaimed water for natural system enhancement, groundwater recharge, and indirect and direct potable reuse where appropriate.

The opportunities for additional surface water storage should continue to be explored, while ensuring that the environmental needs of surface water bodies are met. Stormwater projects should continue to be investigated for opportunities to provide natural system enhancement; groundwater recharge; optimize potential beneficial use of stormwater by evaluating existing drainage; and encourage coordination of watershed planning, water supply, water quality, natural systems restoration, and flood protection initiatives. Pilot projects could be developed to assist in demonstrating the feasibility and effectiveness of these projects.

- **Support Additional Alternative Water Supply Projects**

  This 2020 CFWI RWSP identified 85 water supply and water resource development projects and 21 water conservation project options. These options have the potential to generate significant water to meet future needs and could be supported through financial and regulatory incentives.

- **Improve Water Resource Assessment Tools and Supporting Data**

  The ECFTX model was used to simulate the hydrologic response to current and future groundwater withdrawals. It is recommended this model be updated in the future with additional hydrogeologic data from new well installations and wetland monitoring sites. Continued implementation of the DMIT Ten Year Work Plan for UFA and LFA well installation and wetland monitoring sites (wetland transects and well installation).

- **Continued Communication and Outreach**

  The CFWI is a collaborative process that depends on the active engagement and participation of the stakeholders. The Communications Team will continue to be critical to keep all stakeholders informed and engaged as programs and projects develop.

- **Identify Options for Future CFWI Framework to Support Implementation Strategies**

  Implementation of this 2020 CFWI RWSP relies on the continued collaboration among the responsible entities and appropriate agencies and conducting a 5-year assessment and update of this 2020 CFWI RWSP.

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Acronyms and Abbreviations

AFSIRS	Agricultural Field Scale Irrigation Requirements Simulation
AG	Agriculture
ASR	aquifer storage and recovery
AWE	Alliance for Water Efficiency
AWE tool	Alliance for Water Efficiency's Water Conservation Tool
AWS	alternative water supply
BEBR	University of Florida's Bureau of Economic and Business Research
BMPs	best management practices
CII	commercial/industrial/institutional
cfs	cubic feet per second
CFWI	Central Florida Water Initiative
CUP/WUP	consumptive use permit/water use permit
DMIT	Data, Monitoring, and Investigations Team
DSS	domestic self-supply and small public supply systems
ECFT	East Central Florida Transient Groundwater Model
ECFTX	East Central Florida Transient Groundwater Expanded Model
EMT	Environmental Measures Team
F.A.C.	Florida Administrative Code
FAS	Floridan aquifer system
FDACS	Florida Department of Agriculture and Consumer Services
FDOT	Florida Department of Transportation
FDEP	Florida Department of Environmental Protection
FFL	Florida-Friendly Landscaping™
FGUA	Florida Government Utility Authority
F.S.	Florida Statutes

FSAID IV	FDACS Florida Statewide Agricultural Irrigation Demand version 4
FY	Fiscal Year
GAT	Groundwater Assessment Team
GIS	Geographic Information System
gpcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
HAT	Hydrologic Assessment Team
IPR	indirect potable reuse
KCOL	Kissimmee Chain of Lakes
LFA	Lower Floridan aquifer
LR	landscape/recreational
MFL(s)	Minimum Flow(s) and Minimum Water Level(s)
MFLRT	Minimum Flows and Levels and Reservations Team
mgd	million gallons per day
MIL	mobile irrigation laboratory
MODFLOW	Modular groundwater flow model
N/A	Not applicable
NAVD	North American Vertical Datum of 1988
NGVD	National Geodetic Vertical Datum of 1929
NRCS	Natural Resource Conservation Service
OCU	Orange County Utilities
OFS	Outstanding Florida Spring
OUC	Orlando Utility Commission
PRMRWSA	Peace River Manasota Regional Water Supply Authority
PRWC	Polk Regional Water Cooperative
PS	Public Supply
RCID	Reedy Creek Improvement District

RIB	Rapid Infiltration Basin
RO	reverse osmosis
RWSP	Regional Water Supply Plan
SAS	surficial aquifer system
SC	Steering Committee
SFR	single-family residential
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SWFWMD	Southwest Florida Water Management District
SWIMAL	Saltwater Intrusion Minimum Aquifer Level
SWUCA	Southern Water Use Caution Area
TBW	Tampa Bay Water
TDS	total dissolved solids
TECO	Tampa Electric Company
TWA	Tohopekaliga Water Authority
UF	University of Florida
UFA	Upper Floridan aquifer
USGS	United States Geological Survey
WDPS	Water Demand Projections Subgroup
WPCG	Water Planning Coordination Group
WRAT	Water Resource Assessment Team
WSIS	Water Supply Impact Study
WTP	water treatment plant
WWTP	wastewater treatment plant

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Introduction

In Florida, the water management districts develop regional water supply plans (RWSPs) to identify sources and projects to meet current and future reasonable-beneficial uses while sustaining the water resources and related natural systems. This 2020 Central Florida Water Initiative (CFWI) RWSP quantifies existing and projected water demands and water sources required to meet these needs through 2040 in the CFWI Planning Area. The CFWI Planning Area is home to an extensive agricultural industry, large urban communities, an active tourism industry, and valued ecosystems.

TOPICS

- Statutory Requirements
- Goal and Guiding Principles
- Description of the CFWI Planning Area
- Water Supply Sources
- Preparation and Coordination with Partners
- Linkage to Regional and Local Planning

This 2020 CFWI RWSP serves as the 5-year update to the 2015 CFWI RWSP and 2035 Water Resources Protection and Water Supply Strategies (Solutions Strategies, Volume II). Regional water supply plans provide the following information:

- Water use estimates and demand projections for all water use categories through 2040
- Quantification of potential water conservation savings
- An evaluation of existing water sources
- Identification of regional water supply-related issues
- Water supply and water resource development project options, including funding strategies
- Future guidance for meeting projected water demands in the CFWI Planning Area

This 2020 CFWI RWSP also includes a discussion of Minimum Flows and Minimum Water Levels (MFLs) and Water Reservations that have been established or are proposed to be established, including MFL recovery or prevention strategies.

STATUTORY REQUIREMENTS

The legal authority and requirements for water supply plans are primarily found in Chapter 373, Florida Statute (F.S.). Additional direction about water supply plans is provided in Chapters 163, 187, 403, and 570, F.S.

As identified in the 2015 CFWI RWSP and verified by this 2020 CFWI effort, the CFWI Planning Area remains a Water Resource Caution Area for the purposes of Section 403.064, F.S., and affected parties may challenge the designation pursuant to Section 120.569, F.S.

In 2016, legislation was passed and codified in Section 373.0465, F.S., that address water supply planning in the CFWI. The statute directs continuation of the collaborative process among the state and regional agencies, regional public water supply utilities, and other stakeholders. Key requirements include:

> **LAW/CODE**
>
> The governing board of each water management district shall conduct water supply planning for any water supply planning region within the district identified in the appropriate district water supply plan under Section 373.036, F.S., 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. (Section 373.709(1), F.S.)

- Develop and implement a single multidistrict regional water supply plan, including any needed recovery or prevention strategies and a list of water resource or supply development projects; and
- Provide for a single hydrologic planning model to assess the availability of groundwater;
- Consider limitations on groundwater use together with opportunities for new, increased, or redistributed groundwater uses;
- Establish a coordinated process for the identification of water resources requiring new or revised conditions;
- Consider existing recovery or prevention strategies;
- Include a list of water supply options sufficient to meet the water needs of all existing and future reasonable-beneficial uses; and
- Identify the preferred water supply sources.
- The statute directs the FDEP, in consultation with the Districts and FDACS, to adopt certain uniform rules regarding CUP/WUPs and MFLs.

In 2016, the Florida Springs and Aquifer Protection Act was enacted (Section 373.801(3)(b), F.S.) and provides for the protection and restoration of Outstanding Florida Springs (OFS). Minimum requirements for OFS recovery or prevention strategies include:

- A list of all specific projects identified for implementation of the plan;
- A priority listing of each project;
- For each project, the estimated cost and date of completion;
- The source and amount of financial assistance from the water management districts for each project which may not be less than 25 percent of the total cost unless there are funding sources that provide more than 75 percent of the total cost of the project;
- An estimate of each project's benefit to an OFS; and
- An implementation plan designed with a target to achieve the adopted MFL within 20 years or less after the adoption of a recovery or prevention strategy.

GOAL AND GUIDING PRINCIPLES

The goal for this 2020 CFWI RWSP is to ensure sufficient water supply sources and future projects to meet existing and future reasonable-beneficial uses during a 1-in-10 year drought condition through 2040 while sustaining water resources and related natural systems (CFWI CFWI 2017 – Guiding Document). This goal will be accomplished by:

- Identifying the sustainable quantities of fresh groundwater sources available for water supplies that can be used without causing harm to the water resources and associated natural systems
- Identifying water conservation savings which may be achievable by water users during the planning horizon
- Identifying water supplyand water resource development options to meet reasonable and beneficial water demands that are in excess of the sustainable yield of fresh groundwater sources
- Protecting and enhancing the environment, including the natural resource areas and systems
- Providing information to support local government comprehensive plans
- Achieving compatibility and integration with other state and federal regional resource initiatives

In addition, Section 373.0465(2)(d), F.S., requires rulemaking by the Florida Department of Environmental Protection (FDEP) to provide uniform rules for consumptive use and water use permitting (CUP/WUP), including MFLs and water reservations.

DESCRIPTION OF THE CFWI PLANNING AREA

History

Addressing the short-term and long-term development of water supplies jointly in the central Florida area has been the focus of the St. Johns River Water Management District (SJRWMD), South Florida Water Management District (SFWMD), and Southwest Florida Water Management District (SWFWMD) (Districts) since 2006 as described in the 2015 CFWI RWSP.

The CFWI was created in 2011 and is a collaborative effort among the Districts, FDEP, Florida Department of Agriculture and Consumer Services (FDACS), water supply authorities, local government utilities, agricultural and industrial communities, environmental organizations, and other interested parties. The intent of the CFWI is to implement effective and consistent water resource planning, development, and management throughout the CFWI Planning Area. The first CFWI RWSP was approved by the Districts' Governing Boards in November 2015 and had a planning horizon of 2035. The 2015 CFWI RWSP estimated that total water demands would increase by 300 mgd in 2035. In addition, it concluded that fresh groundwater resources alone could not meet the future water demands or currently permitted allocations without resulting in additional unacceptable impacts to the water resources and related natural systems. It was estimated that an additional 50 mgd of fresh groundwater use could potentially be sustained but coordinated management strategies would be needed to address existing and projected unacceptable impacts. To meet the estimated 250 mgd future shortfall, water conservation, management strategies, and alternative water supplies options were identified.

Planning Area Description

The CFWI Planning Area consists of all of Orange, Osceola, Seminole, and Polk counties and southern Lake County (**Figure 1**), covering approximately 5,300 square miles. The CFWI Planning Area is based on the utility service areas in central Florida where the boundaries of the three Districts converge.

The area is characterized by 50 local and county governments with a growing population and substantial urban sector. The City of Orlando has the largest municipal population in the CFWI Planning Area. However, the residential areas with the largest growth rates are north and south of Orlando along the I-4 corridor and other major transportation routes. This area supports a large tourist industry and a growing industrial and commercial sector. Agriculture is a significant industry in the CFWI Planning Area, with citrus and cattle as the major commodities.

Population and Water Demands

The total population in the CFWI Planning Area is projected to increase by 49 percent from 2.9 million in 2015 to 4.4 million in 2040. Irrigated agricultural acreage is projected to remain relatively unchanged at approximately 135,000 acres. Overall, the total water demand is expected to increase by 36 percent from 667 million gallons per day (mgd) in 2015 to 908 mgd in 2040 for average rainfall conditions. Additional information for these water demands can be found in **Chapter 3**.

Natural Features

The CFWI Planning Area contains the headwaters for seven major river systems (Alafia, Hillsborough, Kissimmee, Ocklawaha, Peace, St. Johns, and Withlacoochee rivers). There are four distinct groundwater basins and over a million acres of wetlands. Regional wetland systems include Econlockhatchee Swamp, Wekiva Swamp, Green Swamp, Reedy Creek Swamp, Davenport Creek Swamp, Big Bend Swamp, Cat Island Swamp, Boggy Creek Swamp, and Shingle Creek Swamp (**Appendix D**). In addition, there are 13 second and third magnitude springs (Stamm 2016), including 2 Outstanding Florida Springs (OFS)(Rock Springs and Wekiwa Springs).

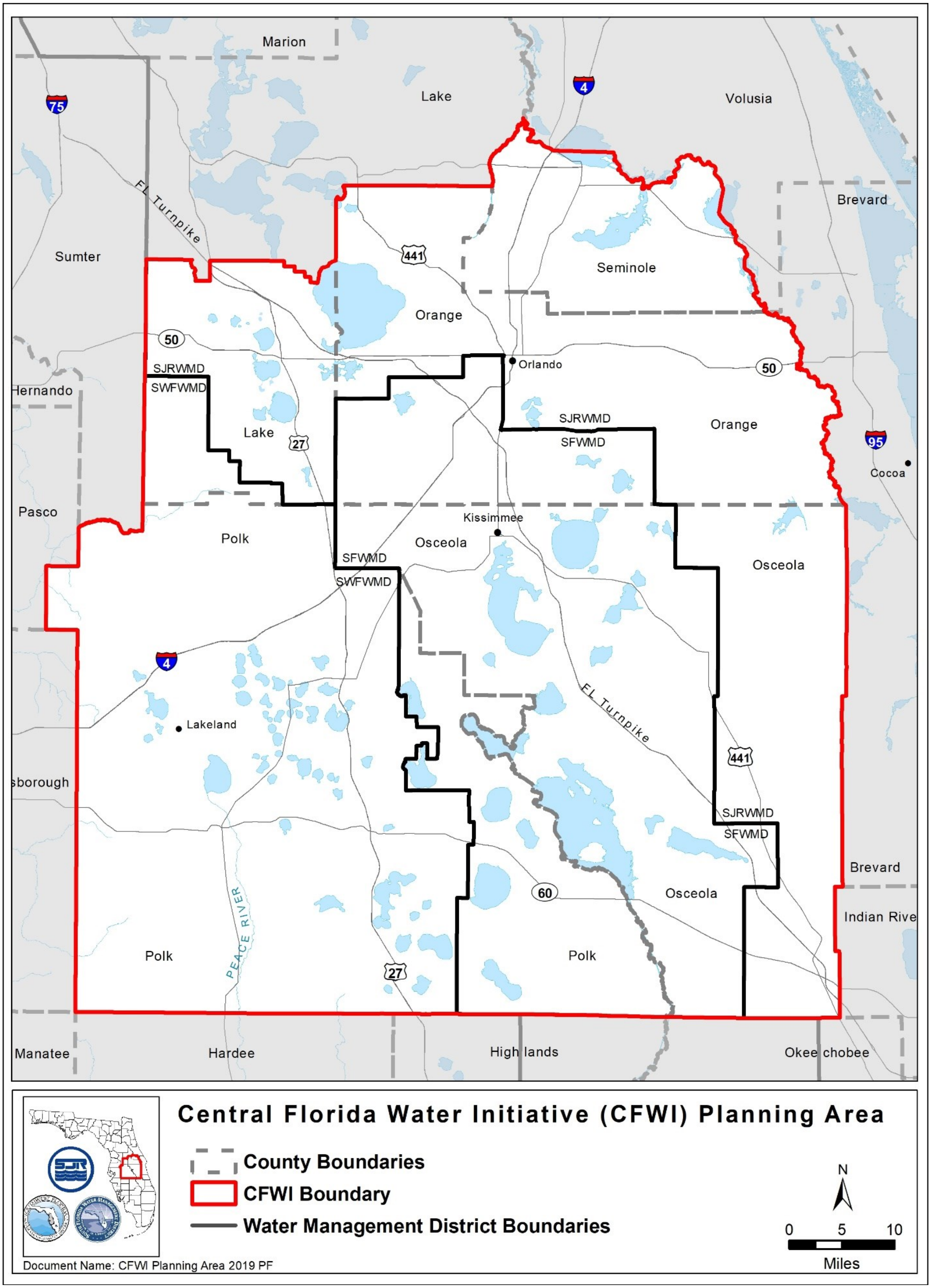

Figure 1. Map of the Central Florida Water Initiative (CFWI) Planning Area.

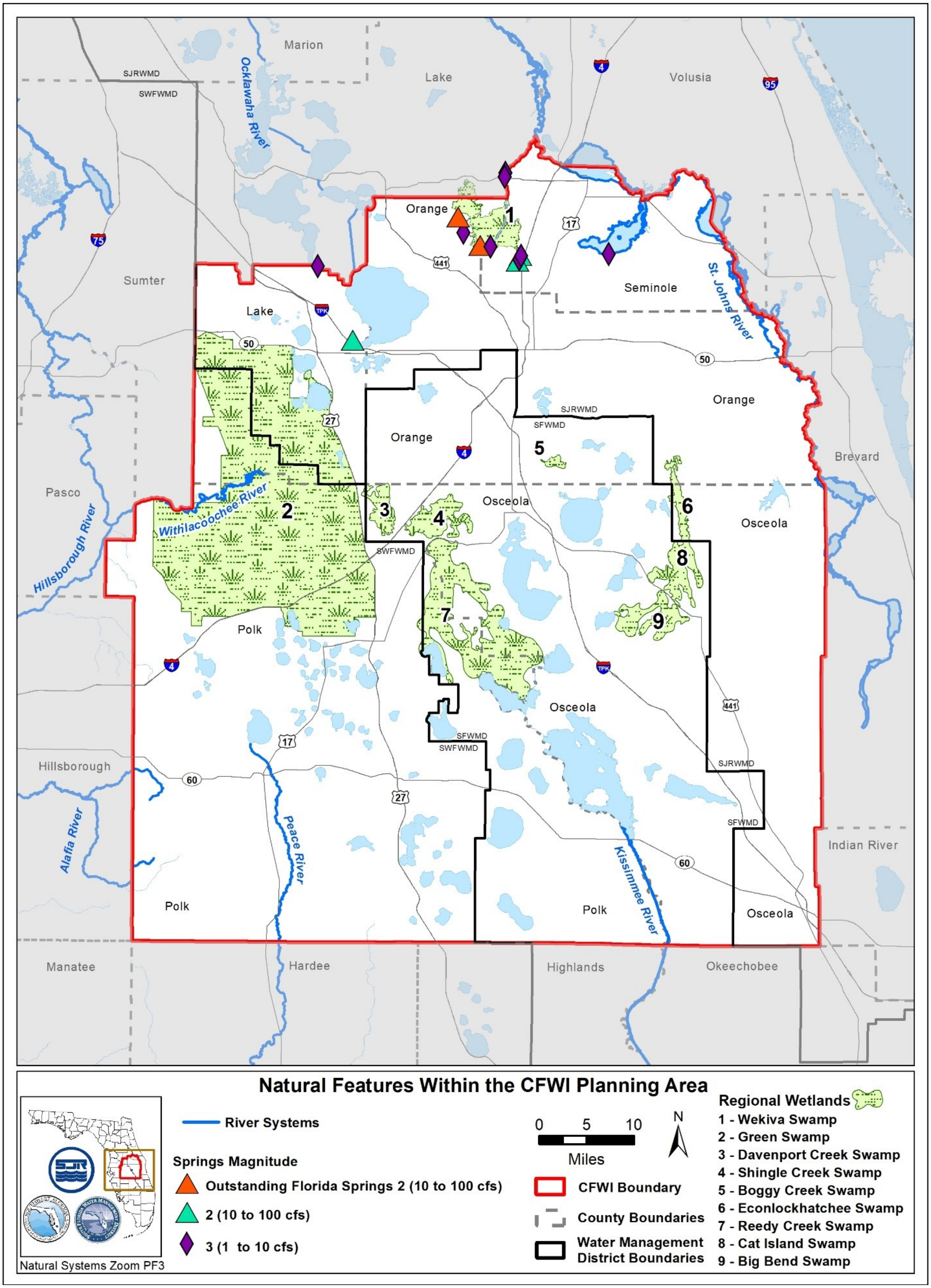

Figure 2. Natural Features in the Central Florida Water Initiative (CFWI) Planning Area.

WATER SUPPLY SOURCES

Water supply sources in the CFWI Planning Area primarily include groundwater (fresh and brackish), surface water, and reclaimed water.

Groundwater

Groundwater is supplied from the surficial, intermediate, and Floridan aquifer systems (SAS, IAS, and FAS). The Upper Floridan aquifer (UFA) has historically been the primary source of water supply throughout the CFWI Planning Area. However, declines in groundwater levels, spring flows, river flows, lake levels, and wetlands have occurred as a result of groundwater development and in some areas groundwater resources have experienced increases in groundwater chloride concentrations due to the movement of lower quality groundwater. Therefore, additional alternatives to fresh groundwater need to be developed and implemented to meet the projected water demands in the CFWI Planning Area. Traditional, nontraditional or alternative water supply (AWS) sources are presented and described in **Chapter 6**. In many areas the Lower Floridan aquifer (LFA) is considered an alternative water source, and several studies and projects are in progress to evaluate and develop this source regarding water quality and aquifer productivity.

Surface Water

The CFWI Planning Area has hundreds of lakes, including the interconnected Alligator and Kissimmee Chains of Lakes, and several major rivers, including the St. Johns, Ocklawaha, Peace, Kissimmee, and Withlacoochee. Despite the abundance of surface water features in the CFWI Planning Area, a relatively small amount is currently withdrawn for public supply or other uses. Lakes, rivers, and creeks support significant ecological resources, which must be protected from harmful impacts of any proposed withdrawals or capture of flows from these systems. Capturing flows from these surface water bodies for water supply may be effective but can be expected to have varying levels of reliability, depending on climatic conditions.

Reclaimed Water

Utilities within the CFWI Planning Area are leaders in developing reclaimed water systems, reusing 95 percent of all domestic wastewater flows (**Appendix A, Tables 13** and **14**). In 2015, 212 mgd of the 224 mgd of treated wastewater generated was reused for beneficial purposes, as described in **Chapter 6**. Reclaimed water has played a critical role in meeting the current water demands and will continue to support water demands through 2040.

PREPARATION AND COORDINATION WITH PARTNERS

This 2020 CFWI RWSP was developed in a dynamic and collaborative public process, in coordination and cooperation with the Districts, FDEP, FDACS, water supply authorities, local government utilities, agricultural and industrial communities, environmental organizations, and other interested parties. Various methods and forums were used to notify and solicit input from stakeholders. A technical methods workshop was held in April 2019. In addition, two public workshops were held via Zoom webinar in April 2020 to present the draft 2020 CFWI RWSP. Originally four in-person public workshops were scheduled for April 2020; however, due to COVID-19 the Districts followed the Governor's directive for social distancing and were able to host the workshops via an online format. Participants were able to review and provide input on water supply issues, the condition of regional water resources, water source options, and other key aspects of the draft 2020 CFWI RWSP. Water demand projections were coordinated through individual meetings with local government planning departments, utilities, and agricultural industry representatives.

Over 15 presentations were made before regional planning councils, stakeholder and interest groups, advisory committees, professional organizations, and numerous city councils and county commissions. The CFWI website (www.cfwiwater.com) is used to disseminate information, provide draft documents, advertise all public meetings, and solicit comments from interested parties, including the general public. Input received from stakeholders and the public was considered for potential incorporation into this 2020 CFWI RWSP and will continue to shape and guide water supply development in the CFWI Planning Area.

REGIONAL AND LOCAL PLANNING COORDINATION

The CFWI RWSP process is closely coordinated with the water supply planning of local governments and utilities. Within 6 months following approval of the water supply plan, water management districts are required to notify each public supply utility of the projects identified in this 2020 CFWI RWSP for that utility to consider and incorporate into its corresponding local government required water supply facilities work plan in meeting future water demands (Section 373.709(8)(a), F.S).

In addition to these utility requirements, local governments are required to adopt water supply facilities work plans, covering at least a 10-year planning period, and related amendments to their comprehensive plans within 18 months following approval of this 2020 CFWI RWSP, Section 163.3177(6)(c)(3), F.S. The work plans contain information to update the comprehensive plan's capital improvements element, which outlines specifics about the need for, and the location of, public facilities, principles for construction, cost estimates, and a schedule of capital improvements. More detailed information on these requirements is contained in **Chapter 7**.

CLIMATE CHANGE

Because a reliable and economical supply of water is necessary for a strong Florida economy, climate change and its effects on hydrologic conditions are considered in water supply planning. Climate change has the potential to significantly impact the sustainability of water supplies throughout the state. While climate change is occurring across the globe, impacts or effects vary and the degree and rate of change remains uncertain. However, long-term data do indicate changes in parameters such as temperature, rainfall, and sea level. Increased air temperatures, changes in precipitation regimes, and storm frequency associated with climate change could result in greater evaporation, longer drought periods, and higher risk of flooding.

Recent predictions from multiple climate models summarized by the Intergovernmental Panel on Climate Change indicate global mean surface temperatures likely will increase over the next 20 years, leading to longer and more frequent heat waves over land areas (Southeast Florida Regional Climate Change Compact 2015). This could increase evapotranspiration (ET), resulting in lower surface water levels, and increased irrigation demand, as well as impacts to stormwater runoff, soil moisture, aquifer recharge, and water quality. More frequent, intense rainfall events with longer interim dry periods could increase total annual rainfall but decrease effective rainfall (i.e., aquifer recharge) as more water may be lost to runoff, prompting the need for increased storage alternatives. Increased capture and storage of rainfall and stormwater in the CFWI Planning Area could address water resource constraints and help mitigate the impacts of climate change related to increased flooding events. Improvements in infrastructure capacity, flexibility and redundancy (e.g., interconnected water supply systems) could assist in mitigating the uncertainty in local and regional climate prediction (e.g., changing drought cycles). Local aquifer storage and recovery (ASR) projects could offset predicted decreases or variability in effective rainfall.

Future water supply and stormwater management analyses require the use of rainfall pattern estimates. The Districts, in coordination with partners in the private sector and academia, are developing future rainfall intensity-duration-frequency scenarios, rainfall probability analyses, and extreme weather event projections that should be considered in future updates of the CFWI RWSP.

As part of a collaborative effort to address climate and water resource issues, the Florida Water and Climate Alliance (Alliance) is a stakeholder-scientist partnership focused on increasing the relevance of climate science data and tools for water resource planning and supply operations. (http://floridawca.org). 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 the CFWI Planning Area. To plan and prepare for regional climate change, the Districts should coordinate with other resource management entities and governments to ensure a common approach to developing effective adaptation strategies for the future.

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Progress Since 2015 CFWI RWSP

Since completion of the 2015 CFWI RWSP, intensive efforts have been undertaken to further enhance management of the water resources within the CFWI Planning Area. The Districts, the FDEP, FDACS, utilities, and other stakeholders have collaboratively implemented numerous water supply initiatives to meet regional goals. This section describes the water resource and supply planning activities undertaken since approval of the 2015 CFWI RWSP.

TOPICS

- Intergovernmental and Public Coordination
- Alternative Water Supply Development
- Water Conservation
- Regulatory Protection and Monitoring Efforts
- Planning Consistency
- Studies and Modeling
- Cooperative Funding
- Water Storage and Restoration Projects

INTERGOVERNMENTAL AND PUBLIC COORDINATION

- **Polk Regional Water Cooperative (PRWC)** – The PRWC was created in 2016 through an Interlocal Agreement and consists of Polk County and 15 municipal member governments. The PRWC provides for regional cooperation on the development of water resources to meet future water demands within Polk County. While the entirety of its jurisdiction is located within the CFWI Planning Area, the majority of the PRWC jurisdiction is located within the SWFWMD's Southern Water Use Caution Area (SWUCA). In 2017, the Florida Legislature passed the Heartland Headwaters Protection and Sustainability Act (Act) (Section 373.463(3), F.S.) to recognize the critical importance of Polk County's aquifers to the economic and ecological health of the CFWI Planning Area as headwaters for six of Florida's major river systems. The Act requires the development of a comprehensive annual report to be completed by the PRWC by December 1 of each year, as well as coordination with the appropriate water management district to provide a status report on projects receiving priority state funding for inclusion in the appropriate water management district's Consolidated Annual Report.
- **St. Johns River/Taylor Creek Reservoir (TCR) Partnership** – This is a proposed regional AWS project to withdraw surface water from the TCR and the St. Johns River. In 2017, the TCR project partners, including the City of Cocoa, East Central Florida Services, Inc., Orange County, Orlando Utilities Commission, Tohopekaliga Water Authority, and Farmland Reserve, Inc., entered into a General Implementation Agreement that governs the overall development, implementation and operation of the TCR project. Now that a governance structure is in place, the project partners will proceed in accordance with the General Implementation Agreement with regards to the proposed project.
- **CFWI Newsletter** – In 2017, the CFWI Communications Team shifted its focus from distributing monthly releases to the news media to developing a newsletter aimed at key

stakeholders. The CFWI newsletter was launched in January 2018 and is distributed quarterly to nearly 10,000 stakeholders and the general public via email. The newsletter features engaging videos, infographics, and articles that highlight the work of the CFWI teams and informs stakeholders about innovative water resources projects and programs taking place within the CFWI Planning Area.

ALTERNATIVE WATER SUPPLY DEVELOPMENT

Source diversification using AWS projects to supplement traditional water sources is critical to meet current and future water demands in the CFWI Planning Area. The Districts encourage development of AWS sources and implementation of water conservation measures through cooperative funding programs, which have helped water users develop reclaimed water distribution projects, water reclamation facilities, brackish/nontraditional water wellfields, reverse osmosis (RO) treatment facilities, stormwater capture systems, and high efficiency water fixtures. The Districts have provided cost-share funding for many projects from 2015 through 2019 as indicated in **Figure 3**.

COOPERATIVE FUNDING

For nearly two decades, the Districts have provided funding to local governments, special districts, utilities, homeowners' associations, and other public and private water users for AWS, water conservation, and stormwater projects that are consistent with each of the District's core missions.

- **AWS** – From Fiscal Year (FY) 2015 through FY2019, the Districts provided approximately $44.62 million for 39 AWS projects that have been completed or are under construction in the CFWI Planning Area that will make available 94.3 mgd of AWS.
- **Water Conservation** – From FY2015 through FY2019, the Districts provided approximately $4.89 million for 39 water conservation projects that were completed or are being implemented in the CFWI Planning Area. The projects are estimated to save 4.35 mgd.

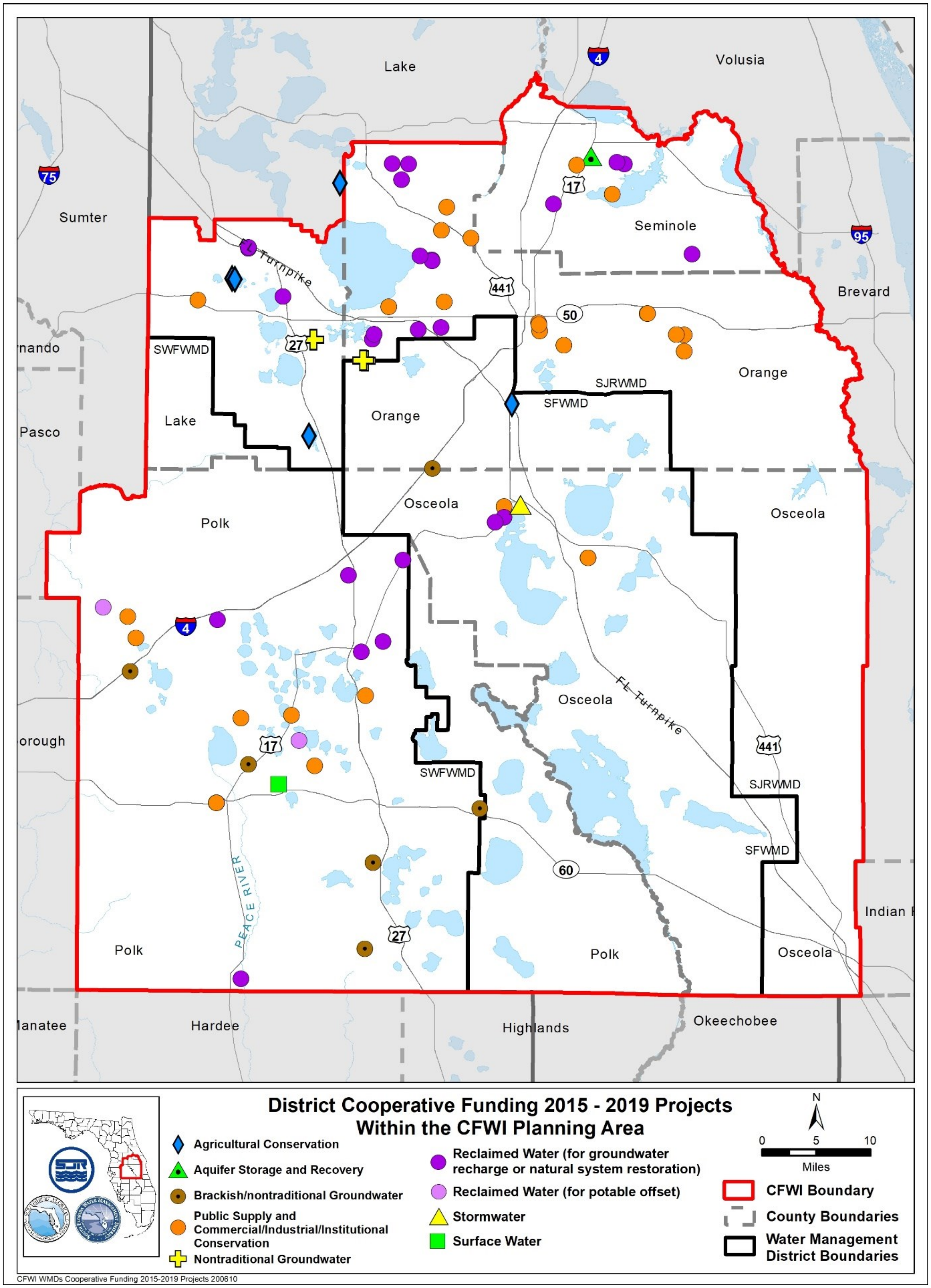

Figure 3. District Cooperative Funding 2015-2019 projects within the CFWI Planning Area (PS = Public Supply; CII = Commercial/Industrial/Institutional).

Brackish/Nontraditional Groundwater

- **Lower Floridan Aquifer (LFA) Investigations** – To support the development of brackish groundwater in the CFWI Planning Area, the Districts have led or participated in significant hydrogeological investigations of the LFA to better understand its potential for water supply development.
  - Hydrogeologic Investigation of LFA in Polk County – This project involves exploration of the LFA at three sites (Crooked Lake, Frostproof, and Lake Wales) in Polk County to better understand the aquifer characteristics, water quality, and the viability as an AWS source.
  - Cypress Lake Wellfield Project – The preliminary design and water use permitting and the installation of two supply wells for the Cypress Lake Project, located in central Osceola County, have been completed.
  - Southeast Polk Wellfield – Since 2015, the PRWC, in cooperation with the SWFWMD, has completed two phases of hydrogeologic investigations for the Southeast Polk Wellfield near Lake Wales. The investigation included the drilling of several monitoring wells to better define the LFA for future water supply use, and aquifer performance testing to define the aquifer parameters in that area.
  - West Polk Wellfield – The PRWC is also conducting hydrogeologic investigations at the West Polk Wellfield site in Lakeland, with similar work expected to be completed by the spring of 2020.
  - Data, Monitoring, and Investigations Team (DMIT) – Through 2018, the DMIT has installed and tested 15 LFA wells to collect data on regional geology, aquifer characteristics, and water quality. These efforts provide valuable data to better assess the potential of the LFA for water supply and have contributed directly to the development of potential water supply projects in the CFWI Planning Area.

- **PRWC Projects** – As noted above, the PRWC currently has two LFA brackish groundwater projects underway, cooperatively funded by the SWFWMD, that provide for the development of alternative water supplies. These projects include the Southeast Polk Wellfield project, proposing development of up to 30 mgd of water supply (37.5 mgd raw water), and the West Polk Wellfield project, proposing development of up 15 mgd of finished water supply. The preliminary design of the wellfields, treatment plants and processes, and pipeline configurations are underway and are expected to be completed by 2021.

Reclaimed Water

- **Altamonte Springs Potable Reuse Demonstration Pilot Project** – Altamonte Springs proactively created pureALTA to address their community's future water demands and diversify the City's water portfolio. The City implemented pureALTA as a demonstration pilot project to investigate potable reuse as a locally available alternative option to augment the City's water supply. In operation between 2016 and 2018, this award-winning pilot project used cutting-edge technology to purify reclaimed water to meet or exceed all drinking water quality standards to demonstrate that reclaimed water could be treated to potable water standards, or better, without RO. The pureALTA pilot project consistently produced reliable water that meets or exceeds all drinking water quality standards without using RO, which reduces cost and energy use (www.altamonte.org/754/pureALTA).

- **Winter Garden Reclaimed Water and Stormwater Recharge** – The City of Winter Garden, with cost-share assistance from SJRWMD and FDEP, completed a project in 2018 to help reduce total nitrogen and phosphorus discharges to Lake Apopka and provide additional reuse water to the region. This project included construction of storage ponds for stormwater and reclaimed water at multiple sites to increase aquifer recharge and provide additional water for reuse irrigation.
- **TECO Lakeland/Mulberry/Polk Reuse Project** – This project is a large regional reclaimed water project previously identified in the Solutions Strategies document (CFWI 2015c) and included 19 miles of reclaimed water transmission mains, 12 mgd of pumping infrastructure, 10 mgd of advanced treatment (filtration and membranes), a storage tank, and a concentrate deep disposal well. This infrastructure allows the TECO Polk Power Station to use reclaimed water from the City of Lakeland, Polk County, and the City of Mulberry. The project was completed in 2017 and is currently using over 5 mgd of reclaimed water. Planned expansions through 2045 will progressively increase reclaimed water usage to 14-17 mgd.
- **Other Reuse Projects** – Eight other reclaimed water projects were also cooperatively funded by the SWFWMD and developed since the 2015 CFWI RWSP. These projects included six with Polk County providing a total of 1.97 mgd of reuse flow, one project with the City of Auburndale providing a total of 1.5 mgd of reuse flow at buildout, and one project with the City of Winter Haven providing an initial 0.3 mgd of reuse flow and enabling long-term expansion of their reuse system.
- **Potable Reuse Commission (PRC)** – In 2018, the PRC was established for development of a consensus driven policy and regulatory framework for the implementation of potable reuse as a water supply to meet Florida's future water demands. The PRC is a partnership between utilities, agriculture, environmental, public health, and academic professionals. Other stakeholders that have actively participated in the PRC initiative with the FDEP and Districts served as ex officio participants. In 2020, the PRC published their final report and have been working on communication and outreach efforts (http://www.watereuseflorida.com).

Stormwater

- **Judge Farms Reservoir and Impoundment (CFWI Solutions ST1/RWSP#128)** – Phase 1 of this project was completed and included the construction of a surface water/stormwater pond with a storage capacity of approximately 400 million gallons. The reservoir and impoundment were permitted as an 8.2 mgd supplemental source that will be available to meet future reclaimed water demands in Osceola County and Central Florida. The reservoir and impoundment will also capture and treat stormwater runoff before discharge to Lake Tohopekaliga, the Kissimmee River, and other downstream areas.
- **Altamonte Springs-Florida Department of Transportation (FDOT) Integrated Reuse and Stormwater Treatment (A-FIRST)** – The A-First is a partnership made up of the FDOT and the City of Altamonte Springs, along with the FDEP, the SJRWMD, and the City of Apopka. This project captures, treats, and redirects stormwater from Interstate 4 into the City's reclaimed water system and is reused for irrigation. The project also reduces impacts to area springs and improves water quality in the Little Wekiva River.

Surface Water

- **PWRC Peace River Land Use Transition Treatment Facility and Reservoir Project** – This project involves the development of an AWS source from the upper Peace River in southern Polk County. A feasibility study is underway to develop a conceptual potable water supply plan that identifies potential project capacity, treatment, storage, and permitability. Conceptual quantity estimates identify a potential for development of up to 11 mgd of surface water from the upper Peace River. The project also includes a land use transition evaluation of industrial or agricultural WUPs on lands in the vicinity that may have retired uses in the future, presenting an opportunity for additional quantities for public supply.
- **PRWC Peace Creek Project** – This project involves the development of a water supply or recharge project utilizing water from the Peace Creek. A feasibility study is underway to determine viable options to increase water supply. The study will look at several potential aquifer recharge and water storage sites to increase groundwater recharge. Conceptual quantity estimates identify a potential for development of up to 10 mgd of surface water from the Peace Creek, although quantities may be revised based on analysis and results of ongoing modeling.

WATER CONSERVATION

The water conservation efforts implemented in the CFWI Planning Area are described in **Chapter 5**. The per capita water use reduction (**Chapter 3**) demonstrates that using a variety of water conservation programs offers the opportunity to influence future water demand. Since approval of the 2015 CFWI RWSP, the following actions have occurred:

- The Conservation Implementation Strategy was approved by the Steering Committee in October 2019.
- Estimated regional passive water conservation for Public Supply (PS) and Domestic Self-Supply (DSS) using the Alliance for Water Efficiency (AWE) Tool.
- Coordinated efforts with the Florida Golf Course Superintendents Association in creating a Golf Course Survey, which helps to identify water conservation measures for this industry in the future.
- Quantified PS water conservation measures, such as utility sponsored irrigation enforcement programs, Florida Water Star Program, and Florida Green Building Coalition.

REGULATORY PROTECTION AND MONITORING EFFORTS

Rulemaking Overview

Both the water supply planning and the CUP/WUP programs are tools that the Florida Legislature has provided to the Districts to protect water resources. In 2016, the legislature supported regulatory consistency in the CFWI Planning Area and set forth rulemaking requirements for the FDEP (Section 373.0465(2)(d), F.S.). The FDEP published a notice of rule development on December 30, 2016. The FDEP held numerous workshops, in coordination with the Districts, FDACS, and other stakeholders, to adopt uniform rules for application within the CFWI Planning Area, that effort is currently underway.

Minimum Flows and Minimum Water Levels (MFLs), Water Reservations

- New MFL rules were adopted for five lakes (Aurora, Easy, Eva, Hancock, and Lowery).
- Minimum water levels were re-evaluated, and new revised rules were adopted for six lakes (Clinch, Crooked, Eagle, McLeod, Starr, and Wales).
- Draft rules and technical documents addressing proposed water reservations for the Kissimmee River and Floodplain, Headwater Revitalization Lakes (Cypress, Hatchineha, Kissimmee, and Tiger) and Upper Chain of Lakes (Alligator, Brick, Coon, East Tohopekaliga, Gentry, Hart, Joel, Lizzie, Mary Jane, Myrtle, Preston, Tohopekaliga, and Trout) were developed and rule development is ongoing.
- The Districts hosted joint public workshops within the CFWI Planning Area for the annual update of each District's priority list and schedule for establishment of MFLs.
- In 2018, the FDEP, in coordination with the water management districts, developed a method to identify the status of all adopted MFLs statewide, including water bodies within the CFWI Planning Area. These are published annually in the FDEP's "Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies" (STAR Report).
- A second, five-year progress assessment of the SWUCA Recovery Strategy was completed by the SWFWMD in 2018.
- In 2018, the SJRWMD hosted two public workshops (including a field site visit and technical meeting) and one teleconference as part of the peer review of the models being developed in support of MFLs for the Wekiva River at SR 46, Wekiwa Springs, Rock Springs and the Little Wekiva River.
- In 2019, the SJRWMD hosted a public workshop (including a field site visit and technical meeting) and one teleconference in 2020 as part of the peer review of the surface water model being developed in support of MFLs for Lake Apshawa South.
- In 2019, the SJRWMD hosted a public workshop (including a field site visit and technical meeting) and one teleconference in 2020 as part of the peer review of the surface water model being developed in support of MFLs for Sylvan Lake.
- In 2018 and 2019, the SWFWMD hosted a public meeting (including a field site visit) and technical teleconferences as part of the peer review of a proposed reservation for Lake Hancock and Lower Saddle Creek. A public workshop on the proposed reservation was held in early 2019.

Water Bodies Without MFLs

- **Environmental Measures** – The Districts conducted hydrologic stress assessments of 60 water bodies without MFLs, including lakes and wetlands. Fifty-three of these water bodies were selected for inclusion in the dataset for the wetlands analysis in support of this 2020 CFWI RWSP. These 53 lakes and wetlands include 41 of 44 water bodies that were included in the wetlands analysis dataset in support of the 2015 CFWI RWSP and 12 of the 16 potential new water bodies. Establishment of new, long-term, monitoring sites in locations that may be affected by water withdrawals, have been identified as being hydrologically stressed, or have been determined to be at risk from future withdrawals.

Water Resource Monitoring Programs

Water level and water quality monitoring at existing monitoring wells provides critical information to develop groundwater models, assess groundwater conditions, and manage groundwater resources.

- **Floridan Aquifer System (FAS) Monitoring Network** – The Districts continue to maintain and update an extensive FAS monitoring network with 938 wells, which includes 113 wells located within the CFWI Planning Area. Water level data from the monitoring wells help manage use of the FAS as a water supply source. In addition, water quality sampling and analyses are conducted periodically to observe any trends in groundwater levels or quality.
- **United States Geological Survey (USGS)/District Cooperative Monitoring** – The Districts maintain extensive groundwater monitoring networks and partners with the USGS to provide additional support and funding for new and ongoing monitoring. Data from sites are archived in USGS and District databases for public use.

PLANNING COORDINATION

Consistency and coordination in planning among the Districts was a key component of the Guiding Principles approved by the Steering Committee (SC) in April 2016. The Districts, FDEP, FDACS, and various stakeholders collaborated on numerous regional and statewide planning efforts.

- **Projection Methodologies** – For this 2020 CFWI RWSP, the Districts implemented consistent water demand projection methodologies for all water use categories (**Appendix A**).
- **DMIT Implementation** – The Districts completed construction of 33 wetland surficial wells, 27 general SAS/IAS wells, 23 UFA wells, and 15 LFA wells and established 49 wetland monitoring sites.
- **East Central Florida Transient Expanded (ECFTX) Model** – Major upgrades were made to the East-Central Florida Transient (ECFT) model used to support the 2015 CFWI RWSP resulting in the ECFTX model. These upgrades included 1) expansion of the model so that east and west boundaries coincide with hydrologic boundaries (i.e., Atlantic Ocean and Gulf of Mexico); 2) improved consistency with projected and historical water use data used in the CFWI RWSP; 3) review and incorporation of comments by an independent peer review panel during model development; 4) consensus-based hydrogeology and model layering; and 5) incorporating more recent data to support model calibration and verification.
- **Beneficial Use of Reclaimed Water, Stormwater, and Excess Surface Water Report** (Senate Bill 536) – The water management districts participated in this study that produced recommendations to increase the beneficial use of alternative water sources (FDEP 2015).

WATER STORAGE AND RESTORATION PROJECTS

- **Lake Hancock** – The SWFWMD completed its Lake Hancock Lake Level Modification and Lake Hancock Outfall Treatment projects that address MFLs and water quality for the Upper Peace River. The SWFWMD is currently monitoring the performance of both projects and working towards adoption of a water reservation in 2020 for water stored in the lake and released to Lower Saddle Creek for upper Peace River recovery.

- **Lake Apopka** – The SJRWMD initiated an evaluation of water management practices on Lake Apopka to improve flood protection, water quality, water supply, and habitat conditions. Additional water management practices may include changes to the lake's regulation schedule, water storage on the SJRWMD's North Shore properties and aquifer recharge projects.
- **Taylor Creek Reservoir** (TCR) – The SJR/TCR project partners include the City of Cocoa, East Central Florida Services, Inc., Orange County, Orlando Utilities Commission, Tohopekaliga Water Authority, and Farmland Reserve, Inc. This is a regional AWS project to withdraw surface water from the Taylor Creek Reservoir and the St. Johns River. Major components include intake structure, reservoir, treatment, storage, and transmission facilities.
- **Kissimmee River Restoration Project** – The United States Army Corps of Engineers, in a cost-share partnership with SFWMD, has completed three of five phases of the Kissimmee River Restoration Project. Work on the final two phases is scheduled to be complete in 2020. The SFWMD is integrating the restoration project with various management strategies for the Kissimmee Basin and Northern Everglades region. Upon completion of construction, the Kissimmee River Restoration Project will culminate with the implementation of a new regulation schedule, the Headwaters Revitalization Schedule, to guide operation of the S-65 structure.

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Population and Water Demands

TOPICS

- Population Projections
- Public Supply
- Domestic Self-Supply
- Agriculture
- Landscape/Recreational
- Commercial/Industrial/Institutional
- Power Generation
- Stakeholder Review
- Summary of Demands
- Comparison to 2015 CFWI RWSP

The Districts develop water demand projections to estimate future water demands, identify existing and reasonably anticipated sources of water, identify water resource development options, and identify water conservation potential. The water demand projections are based on the best information available and developed in coordination with various stakeholder groups. The projected increase in water demand is used in water resource assessments for this 2020 CFWI RWSP. This chapter summarizes the water use estimates and water demand projections for an average year for the CFWI Planning Area for 2015 and 2040. In addition, projections for a 1-in-10 year drought event were developed for 2040. A 1-in-10 year drought event represents a year in which below normal rainfall occurs that would have a 10 percent probability of occurring during any given year. A detailed discussion of data collection, analysis, and projection methods is provided in **Appendix A**, including 5-year incremental projections.

Water use estimates and projected water demand are grouped into six water use categories for water supply planning:

- Public Supply (PS)
- Domestic Self-supply (DSS)
- Agricultural (AG)
- Landscape/Recreational (LR)
- Commercial/Industrial/Institutional (CII)
- Power Generation (PG)

In addition to the six water use categories, savings projections for water conservation measures and the use of reclaimed water supplies and demands are estimated. These two options can potentially offset future water demand and are described in **Chapters 5** and **6**, respectively.

Total water demand in the CFWI Planning Area is anticipated to increase 36 percent from 667 mgd in 2015 to 908 mgd in 2040. For 2040, the PS category represents the largest demand in the CFWI Planning Area (65%), followed by AG (18%), and CII (8%)(**Figure 4**). In the case of a 1-in-10 year drought event, it is estimated that total water demand in 2040 could increase by an additional 11 percent (103 mgd). Water use and water demand described in this chapter includes surface and groundwater and does not include reclaimed water use. The use of reclaimed water is described in **Chapters 6** and **7**. Guidance and minimum requirements for developing water demand and population projections are described in Section 373.709, F.S., and Rule 62-40.531, Florida Administrative Code (F.A.C.).

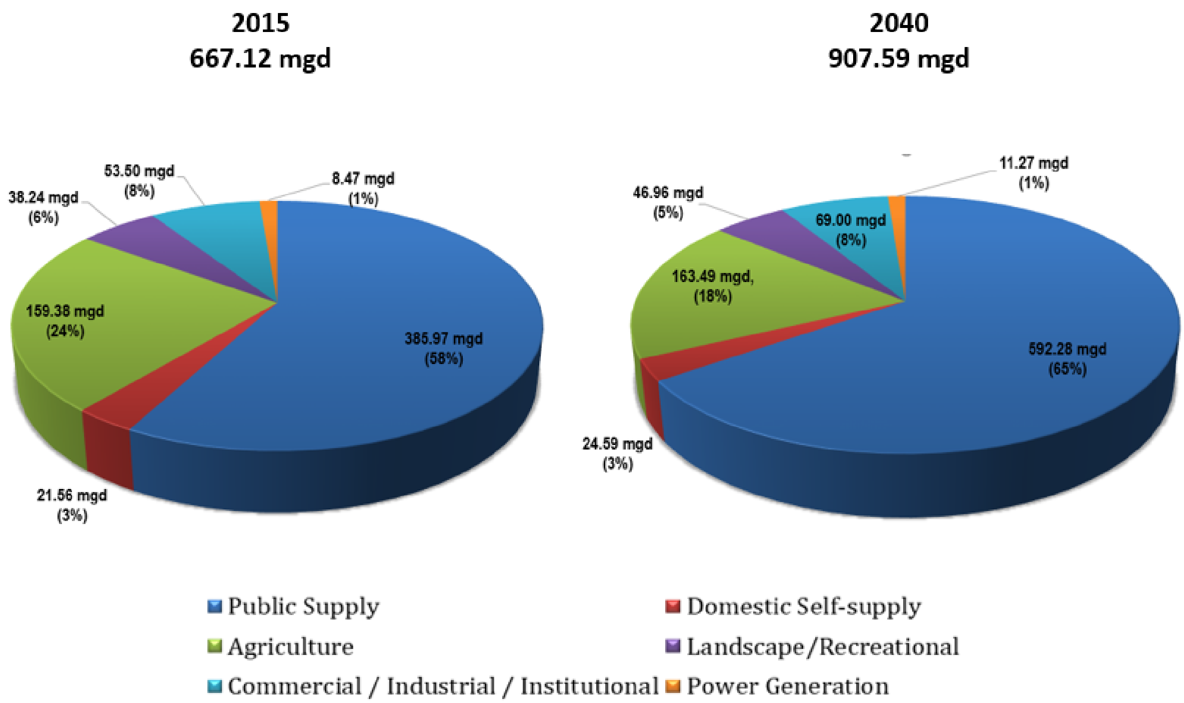

Figure 4. The water use for 2015 and projected 2040 water demand by category of use in the CFWI Planning Area.

POPULATION PROJECTIONS

The Districts contracted with the Bureau of Economic and Business Research (BEBR) to develop a parcel-level population distribution from 2015 to 2040, as described in **Appendix A** (BEBR 2017).

Total population for the CFWI Planning Area is expected to increase 49 percent from 2.9 million people in 2015 to 4.4 million people by 2040, which includes the population of the City of Cocoa (**Table 2**). Although the City of Cocoa is not located in the CFWI Planning Area, it has groundwater well facilities in the CFWI Planning Area and is, therefore, included in the PS population and water demand projections.

In the CFWI Planning Area, it is estimated that 95 percent of the total population will be served by PS, and the remaining 5 percent by DSS (**Table 3**). The population served by PS is expected to increase by 51 percent from 2.7 million people in 2015 to 4.2 million people in 2040. The DSS population is expected to increase by 17 percent from 185,897 people in 2015 to 217,000 people in 2040.

Table 2. 2015 population and 2040 projected PS and DSS population by county in the CFWI Planning Area.

City/County	2015 Population			2040 Projected Population		
	PS	DSS	Total	PS	DSS	Total
City of Cocoa	178,704	N/A	178,704	215,987	N/A	215,987
Southern Lake	106,058	12,466	118,524	177,652	12,470	190,122
Orange	1,132,306	114,862	1,247,168	1,772,761	112,995	1,885,756
Osceola	305,960	6,094	312,054	592,481	20,730	613,211
Polk	590,775	42,277	633,052	833,195	63,205	896,400
Seminole	434,215	10,198	444,413	563,962	7,871	571,833
CFWI Planning Area	**2,748,018**	**185,897**	**2,933,915**	**4,156,038**	**217,271**	**4,373,309**

Note: DSS = Domestic Self-supply and Small Public Supply Systems; PS = Public Supply

Table 3. 2015 total population and 2040 projected PS and DSS total population by category in the CFWI Planning Area.

Category	2015	2040	Change	Percent Change
Public Supply (PS)	2,748,018	4,156,038	1,408,020	51%
Domestic Self-supply (DSS)	185,897	217,271	31,374	17%
Total CFWI Planning Area Population	**2,933,915**	**4,373,309**	**1,439,394**	**49%**

PUBLIC SUPPLY

The PS category includes water use provided by any 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, which have CUPs/WUPs to withdraw an annual average of 0.1 mgd or more. Potable systems less than 0.1 mgd, “small public supply systems,” are included in the DSS category. Water use estimates and water demand projections for all systems can be found in **Appendix A**.

Total PS water demand for the CFWI Planning Area is expected to increase 53 percent from 386 mgd in 2015 to 592 mgd in 2040 (**Figure 4**). The PS category represents 65 percent of the 2040 projected water demand and 85 percent of the total increase in water demand in the CFWI Planning Area. For a 1-in-10 year drought event, total water demand in 2040 could increase by an additional 6 percent (36 mgd) from average conditions (**Table 4**).

Table 4. 2015 estimated water use and 2040 projected water demands for public supply in the CFWI Planning Area.

Area	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
CFWI Planning Area	385.97	592.28	206.31	53%	627.83

mgd = million gallons per day

One important factor that can impact PS demands is per capita water use trends. As shown in **Figure 5**, gross per capita (as defined in **Appendix A**) has decreased from 182 gallons per person per day (gpcd) in 1995 to 140 gpcd in 2015, directly reducing PS demands. Reductions in per capita water use are attributable to numerous water conservation measures and programs (**Chapter 5**) and the increased use of reclaimed water to offset potable use. Additionally, external forces, such as climate and weather patterns, the economy, the installation of private irrigation wells, and other factors can affect PS per capita water use. For this 2020 CFWI RWSP, the average per capita water use for the last five years (2011 through 2015) for each utility was used to project future water demands.

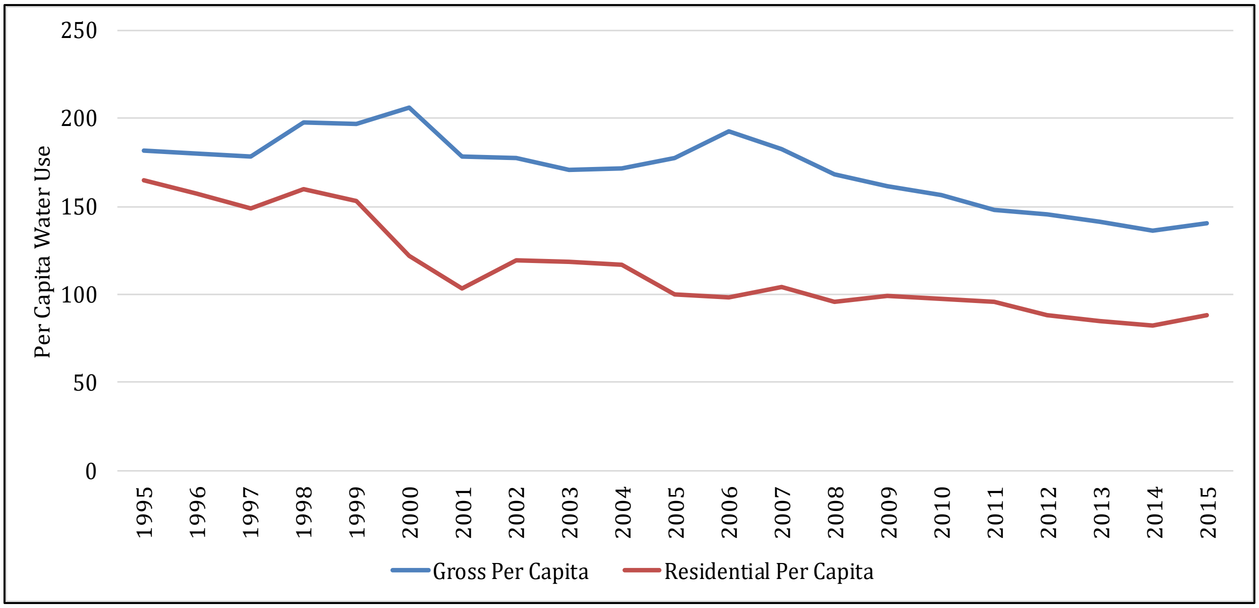

Figure 5. Per capita water use for public supply in the CFWI Planning Area.

DOMESTIC SELF-SUPPLY

The DSS category consists of residential dwellings served by small public supply systems (annual average withdrawals of less than 0.1 mgd) or self-supplied by private wells. DSS water demand is expected to increase 14 percent from 22 mgd in 2015 to 25 mgd in 2040 (**Table 5**). For a 1-in-10 year drought event, total water demand in 2040 could increase by an additional 6 percent (1 mgd) from average conditions.

Table 5. 2015 estimated water use and 2040 projected water demands for domestic self-supply in the CFWI Planning Area.

Area	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
CFWI Planning Area	21.56	24.59	3.03	14%	25.90

mgd = million gallons per day

AGRICULTURE

The AG category includes self-supplied water for 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, melons, berries, field crops, greenhouse/nursery, sod, and pasture. In addition, projected water demands associated with other agriculture uses were estimated for aquaculture, dairy, and livestock.

The FDACS' Florida Statewide Agricultural Irrigation Demand (FSAID IV) (FDACS 2017) Report was used as the basis for acreage and water use estimates and water demand projections for this 2020 CFWI RWSP (Section 373.709(2)(a)1.b., F.S.). Osceola County estimates and projections were revised to incorporate the demands identified in the approved North Ranch Sector Plan (Section 163.3245(4)(b), F.S.) (**Appendix A**, **Table A-7**).

Irrigated AG acreage is expected to decrease 1 percent from 135,700 acres in 2015 to 134,300 acres in 2040. However, total AG water demand for the CFWI Planning Area is expected to increase 3 percent from 159 mgd in 2015 to 163 mgd in 2040 (**Tables 6** and **7**) due to more intensive production. For a 1-in-10 year drought event, FSAID IV estimated that total water demand in 2040 could increase by an additional 33 percent (55 mgd) from average conditions.

Table 6. 2015 agriculture acreage and 2040 acreage projections in the CFWI Planning Area.

Area	2015	2040	Change	Percent Change
CFWI Planning Area	135,725	134,342	-1,383	-1%

Table 7. 2015 estimated water use and 2040 projected water demand for agriculture in the CFWI Planning Area.

Area	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
CFWI Planning Area	159.38	163.49	4.11	3%	218.13

mgd = million gallons per day

LANDSCAPE/RECREATIONAL

The LR category represents self-supplied water use associated with the irrigation, maintenance, and operation of golf courses, cemeteries, parks, medians, attractions, and other large green areas.

- Landscape use includes the outside watering of plants, shrubs, lawns, ground cover, and trees in areas, such as the common areas of residential developments and industrial buildings, parks, recreational areas, cemeteries, and public rights-of-way.
- Recreational use includes the irrigation of golf courses, athletic fields, and playgrounds. Water-based recreation use is also included in this category.

LR water demand is expected to increase 23 percent from 38 mgd in 2015 to 47 mgd in 2040. For a 1-in-10 year drought event, total water demand in 2040 could increase by an additional 25 percent (12 mgd) from average conditions, **Table 8**.

Table 8. 2015 estimated water use and 2040 projected water demand for landscape/recreational in the CFWI Planning Area.

Area	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
CFWI Planning Area	38.24	46.96	8.72	23%	58.87

mgd = million gallons per day

COMMERCIAL/INDUSTRIAL/INSTITUTIONAL

The CII category represents self-supplied water use associated with the production of goods or provisions of services by CII establishments.

- Commercial uses include general businesses, office complexes, commercial cooling and heating, and other commercial facilities.
- Industrial uses include manufacturing and chemical processing plants and other industrial facilities.
- Institutional use includes hospitals, group home/assisted living facilities, churches, prisons, schools, universities, and military bases.
- Mining and long-term dewatering uses are included in the CII category.

CII water demands are projected to increase 29 percent from 54 mgd in 2015 to 69 mgd in 2040 (**Table 9**). Drought events (1-in-10 year) do not have significant impacts on water use in the CII category as water use is related primarily to processing and production needs, and no additional demand during a 1-in-10 year drought event is projected.

Table 9. 2015 estimated water use and 2040 projected water demand for commercial/industrial/institutional in the CFWI Planning Area.

Area	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
CFWI Planning Area	53.50	69.00	15.50	29%	69.00

mgd = million gallons per day

POWER GENERATION

The PG category represents the self-supplied water use associated with power generation facilities. PG water use includes the consumptive use of water for steam generation, cooling, and replenishment of cooling reservoirs. PG water demand is projected to increase 33 percent from 8 mgd in 2015 to 11 mgd in 2040 (**Table 10**). Drought events (1-in-10 year) do not have significant impacts on water use in the PG category as water use is related primarily to processing and cooling needs; during a 1-in-10 year drought event, no additional demand is projected.

Table 10. 2015 estimated water use and 2040 projected water demand for power generation in the CFWI Planning Area.

Area	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
CFWI Planning Area	8.47	11.27	2.80	33%	11.27

mgd = million gallons per day

STAKEHOLDER REVIEW

The development of the water demand projections for this 2020 CFWI RWSP underwent a thorough review by the CFWI RWSP Team, which consisted of representatives from the Districts, FDEP, FDACS, utilities, agriculture, environmental organizations, and other stakeholders. Water use estimates and water demand projections were distributed to stakeholders in each water use category for review and comment. Changes and comments were incorporated where appropriate, and all comments with changes received during the development of the water demand projections can be found in **Appendix A**, **Table A-14**.

SUMMARY OF DEMANDS

Total water demands under average rainfall conditions in the CFWI Planning Area are projected to be 908 mgd in 2040, a 36 percent increase from 2015 demands (667 mgd) as shown in **Table 11**. For a 1-in-10 year drought event, total water demand in 2040 could increase by an additional 11 percent (103 mgd) from average conditions.

Table 11. Summary of 2015 water use and 2040 water demand projections by water use category in the CFWI Planning Area.

Water Use Category	Demand – Average Rainfall Conditions (mgd)				2040 1-in-10 Year Demand (mgd)
	2015	2040	Change	Percent Change	
Public Supply	385.97	592.28	206.31	53%	627.83
Domestic Self-supply	21.56	24.59	3.03	14%	25.90
Agriculture	159.38	163.49	4.11	3%	218.13
Landscape/Recreational	38.24	46.96	8.72	23%	58.87
Commercial/ Industrial/ Institutional	53.50	69.00	15.50	29%	69.00
Power Generation	8.47	11.27	2.80	33%	11.27
Total	**667.12**	**907.59**	**240.47**	**36%**	**1,011.00**

mgd = million gallons per day

COMPARISON TO 2015 CFWI RWSP

Water demand projections presented in this 2020 CFWI RWSP are based on the best available information at the time this 2020 CFWI RWSP was approved. The projections reflect growth and population trends and economic circumstances that change over time. **Table 12** shows the 2035 water demands projected in the 2015 CFWI RWSP compared to the 2040 water demands projected in this 2020 CFWI RWSP. Water demand projections in this 2020 CFWI RWSP for 2040 are 176 mgd or 16 percent lower than the 2035 water demand projected in the 2015 CFWI RWSP. Contributing factors to this difference are updated projection methodologies for all water use categories, the change in base year, and representative years of data used. This included:

- Base Year and Planning Horizon (2010-2035 versus 2015-2040)
- PS Population Methodology (District methodologies versus BEBR parcel-level projections)
- Per Capita Water Use (2006-2010 average versus 2011-2015 average)
- AG Methodology (District methodologies versus FSAID report)

There are several factors that contribute to a change in per capita water use including implementation of water conservation projects and practices, reclaimed water availability, utility rate structures, economic conditions, and climate variability. For example, the 5-year average gross per capita water use has decreased from 168 gpcd in the 2015 CFWI RWSP to 142 gpcd in this 2020 CFWI RWSP, resulting in lower PS projections.

In the 2015 CFWI RWSP, the AG demand methodologies differed among the Districts. Each District reported AG demands based on varied rainfall conditions (i.e., 1-in-10 year versus average year), and in this 2020 CFWI RWSP, all AG demands are reported on an average year basis using the same methodology as identified in the FDACS FSAID report. Additionally, AG demands changed due to a projected decrease in irrigated agricultural lands.

Table 12. Comparison of water demand projections under average rainfall conditions for 2035 in the 2015 CFWI RWSP and for 2040 in this 2020 CFWI RWSP.

Water Use Category	2015 RWSP 2035 Demands (mgd)	2020 RWSP 2040 Demands (mgd)	Change (mgd)	Percent Change
Public Supply	654.34	592.28	-62.06	-9%
Domestic Self-supply	24.42	24.59	0.17	1%
Agriculture	214.84	163.49	-51.35	-24%
Landscape/Recreational	72.18	46.96	-25.22	-35%
Commercial/Industrial/ Institutional	95.85	69.00	-26.85	-28%
Power Generation	22.41	11.27	-11.14	-50%
Total	**1,084.04**	**907.59**	**-176.45**	**-16%**

mgd = million gallons per day

4

Water Resource Assessment

INTRODUCTION

After approval of the 2015 CFWI RWSP, the Water Resources Assessment Team (WRAT) was established as one of five technical teams tasked with identifying sustainable quantities of traditional groundwater sources available for water supplies that can be used without causing unacceptable harm to the water resources and associated natural systems. For this 2020 RWSP, the WRAT's goals and objectives include:

- Review of any needed recovery or prevention strategies
- Update the East Central Florida Transient model, creating the East Central Florida Transient Expanded (ECFTX) model

TOPICS

- Introduction
- Data, Monitoring, and Investigations
- Hydrologic Assessment
- Environmental Measures
- Minimum Flows and Minimum Water Levels and Reservations
- Groundwater Availability

The WRAT is comprised of five subteams: Data, Monitoring, and Investigations Team (DMIT), Environmental Measures Team (EMT), Minimum Flows and Minimum Water Levels, and Reservations Team (MFLRT), Hydrologic Assessment Team (HAT), and Groundwater Availability Team (GAT), described in this Chapter.

DATA, MONITORING, AND INVESTIGATIONS

The DMIT was responsible for developing and maintaining an inventory of available sources of hydrologic, environmental, and other pertinent data to ensure they are accessible to support the CFWI goals and regulatory activities. A DMIT Work Plan was developed in 2015, which described the schedule for the construction and testing of existing and new data collection sites. This Work Plan also included tasks for updating the existing data monitoring inventory and Geographic Information System efforts for identification of proposed, wetland and surficial aquifer monitoring locations. The Work Plan has been updated annually to include a review of site prioritization, update costs for well construction, update monitoring and testing proposed for each fiscal year, and document work completed in preceding fiscal years. The Work Plan is reviewed and approved by the Steering Committee each year. Ongoing tasks include:

- Developing minimum standards for water resource data collection, site establishment, and field data collection protocols
- Maintaining an inventory of existing sources of monitoring data (links to sources/data)

- Reviewing monitoring data needs and establishing new data collection sites (e.g., wetland, SAS, UFA, and LFA monitoring wells) proposed through FY2025

The Work Plan includes the establishment of 107 wetland monitoring sites and the construction of 222 monitoring wells. As of 2019, the Districts have established 47 wetland monitoring sites and constructed 96 monitoring wells of which 15 were LFA monitoring wells. Twenty-one additional LFA monitoring wells are proposed for FY2020 through FY2025 for a total of 36 LFA monitoring wells.

HYDROLOGIC ASSESSMENT

The primary tool used for the regional groundwater assessment is the ECFTX model, which evaluated groundwater withdrawals and their associated effects on the water resources and natural systems. Using the USGS's finite-difference groundwater flow modeling program, MODFLOW, the ECFTX model area is divided into 1,250-foot by 1,250-foot cells using a grid defined by a series of rows and columns. The model simulates transient groundwater flow in the SAS and the FAS and hydrologic processes, including recharge, runoff, ET, lakes, rivers, springs, wetlands, recharge wells, rapid infiltration basins, and production wells. The ECFTX model generates two principal types of output for each model cell: computed head (water levels) and water budgets. The water budgets characterize the inflows and outflows for each model cell. Detailed information on the ECFTX model is provided in the ECFTX model documentation report (CFWI 2020b) and **Appendix D**.

The ECFTX model was used to predict potential impacts on wetland water levels, lake water levels, spring flows, and groundwater levels in the FAS and SAS caused by current and projected groundwater withdrawals. The ECFTX model 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.

Figure 6 shows the domains of the previous ECFT and current ECFTX models. Improvements to the ECFT model were identified and implemented regarding model boundaries, consistency in water use, updated hydrostratigraphic framework, and simplified rainfall-runoff partitioning. An independent scientific Peer Review Panel of three groundwater modeling experts was convened at the conceptual model phase and provided comments through calibration and documentation.

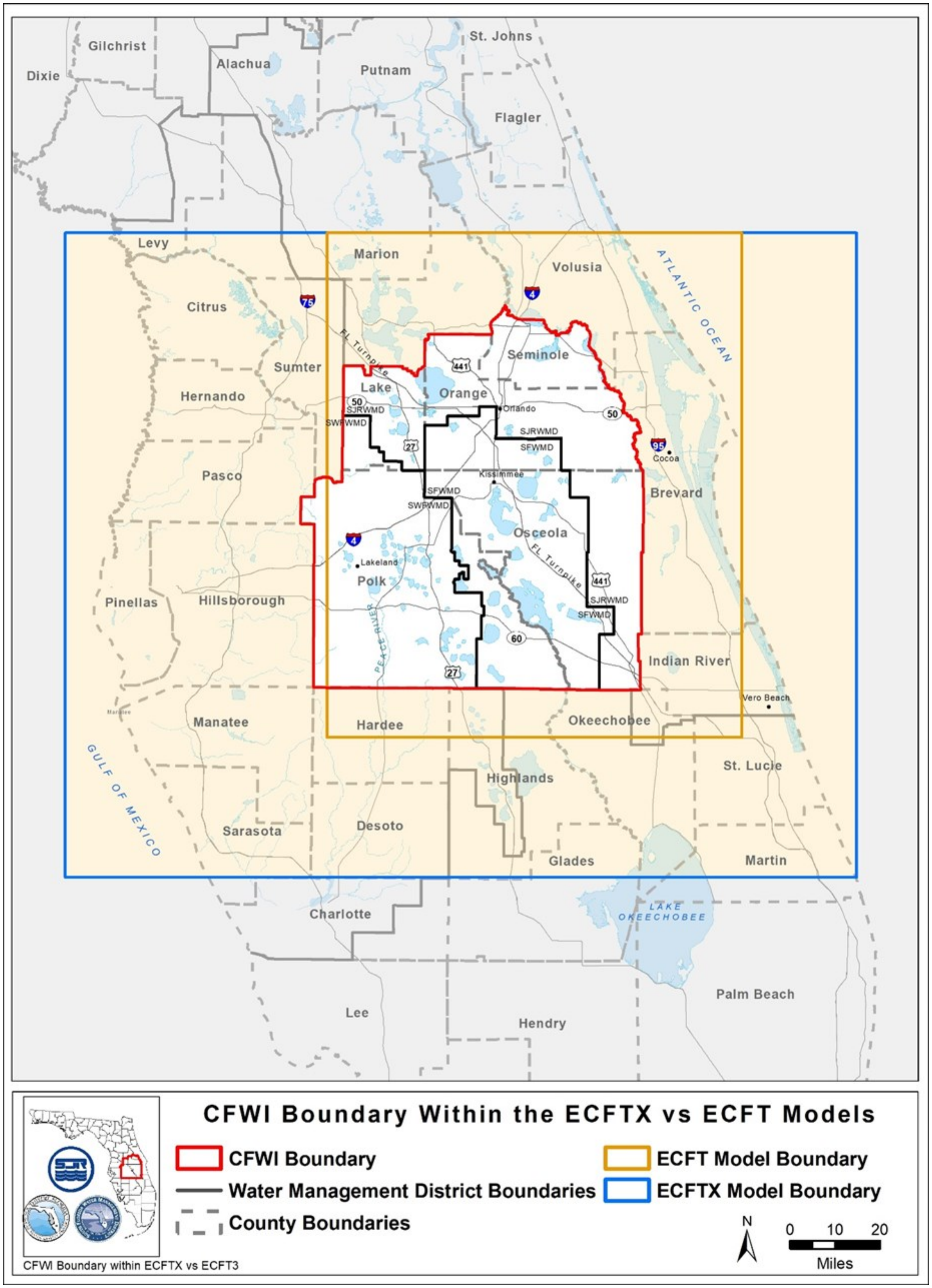

Figure 6. Model boundaries for the ECFT and expanded ECFTX models.

Vertically, the ECFTX model includes eleven hydrostratigraphic units as shown in **Figure 7**. Each of these hydrostratigraphic units is treated as a separate layer in the ECFTX model.

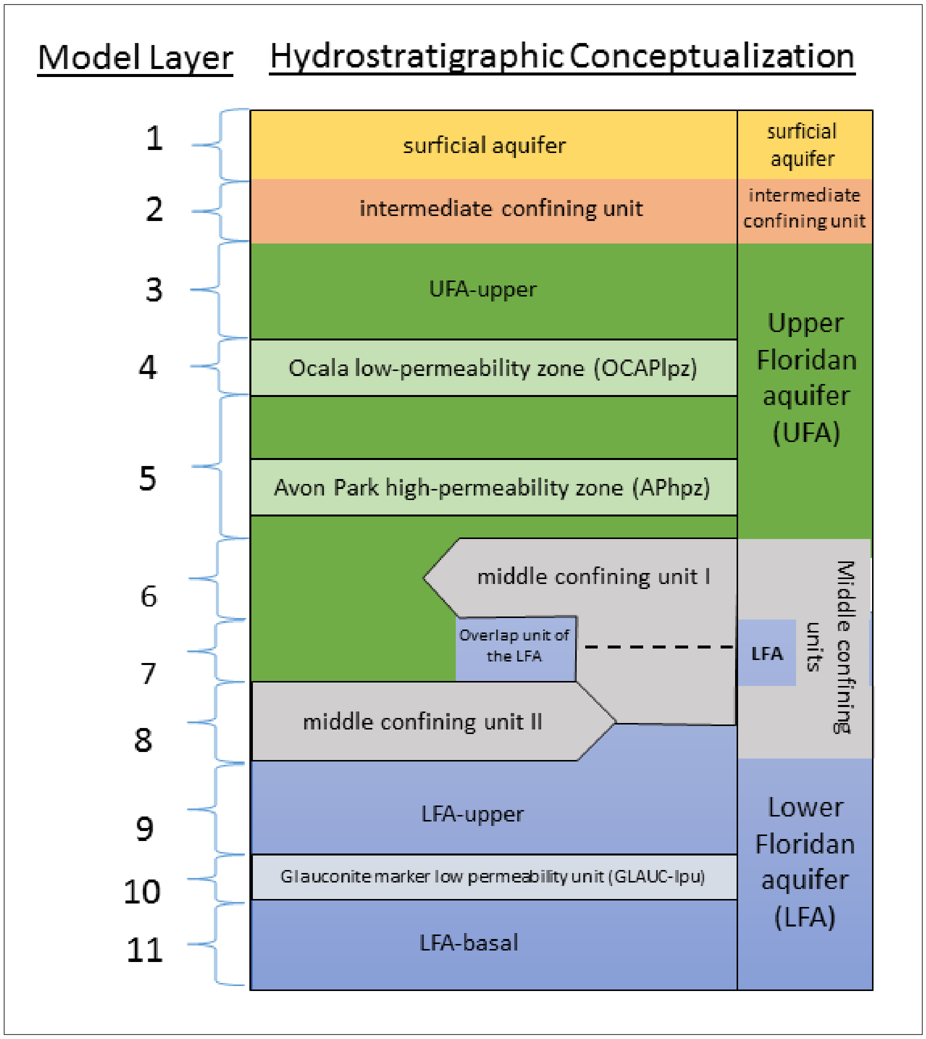

Figure 7. Hydrostratigraphic conceptualization and associated model layers of the ECFTX model.

Model Input

The collection of data and the assembly of input datasets is one of the most important and time-consuming parts of model development, particularly for a model with a large geographic extent and complex hydrostratigraphy, such as the ECFTX model. Numerous types of hydrologic data are required to develop a numerical model; five specific categories include:

- Hydraulic conductivities and storage coefficients
- Groundwater withdrawal rates
- Recharge rates
- Boundary conditions
- Initial conditions

The first category is directly related to aquifer properties and hydraulic data, while the other four categories represent aquifer stresses and observed conditions. Data collection procedures generally require that data be collected both from within and outside the model area to define conditions along the model boundaries as accurately as possible (CFWI 2020b).

Initial Conditions

A transient groundwater flow model requires the specification of initial conditions. In the case of the ECFTX model, this means defining the head at every active cell for the beginning of the scenario, which is 2003. Establishing initial conditions for the transient model is important from the standpoint of providing reference heads from which changes in head over time will be calculated. These changes are used in the process of evaluating the reasonableness of the model calibration, and it is imperative that the initial heads are consistent with the aquifer parameters. This ensures that modeled changes in heads are in response to changes in modeled stresses and not in response to inconsistent aquifer parameters.

Calibration and Verification

Calibration represents the culmination of model parameter and input adjustments for the scenario results to match measured and calculated field conditions, such as aquifer water levels, spring flows, aquifer flows, and water budgets. The calibration period is intended to represent the hydrologic conditions from 2003 through 2012. The calibration process is preceded by identifying calibration goals describing reasonable tolerance limits for the goodness of fit of the scenario results to the measured and calculated field conditions. In the case of a transient groundwater flow model, the comparisons are made spatially and temporally. Multiple adjustments are made to aquifer hydraulic property types, values, water recharge-related, and discharge-related inputs during calibration. These adjustments are applied in a focused, trial-and-error process until the scenario results reasonably match the calibration goals. Model verification is the process of running the calibrated model through a different set of conditions than in the calibration. In this case, 2013 through 2014 was the calibration period. The resulting calibrated model is then used to simulate baseline and future aquifer conditions within the limits of calibration and model construction.

Because MODFLOW is not a coupled groundwater/surface water model, these interactions are modeled through use of iterative techniques. Surface water/groundwater interaction primarily occurs through ET/recharge, and surface water features (lakes and canals) interaction with aquifers and the associated parameters were calibrated manually through an iterative process.

Model Scenarios

The ECFTX model was used to calculate changes in water levels and spring flows by comparing the scenario results of various future Withdrawals Conditions to a baseline or Reference Condition (RC). To determine the potential effects of projected water demands on the water resources and related natural systems, a series of ECFTX model runs were performed and evaluated for different scenarios. Scenarios used for the model runs were developed to correspond with Withdrawal Conditions (demands) estimated or projected for 2014, 2025, 2030, 2035, and 2040 (**Appendix D**). For brevity, only the 2014 RC and the 2040 Withdrawals Condition are discussed below.

Each Withdrawals Condition was developed to simulate water levels resulting from groundwater withdrawals needed to serve the demands that either existed or were projected to occur in the year identified for that scenario (**Table 13**). Groundwater withdrawals were varied from month to month for each Withdrawals Condition based on peaking factors. The peaking factors were based on the monthly rainfall amounts and changes of demands observed from 2004 through 2014. This concept assumed that the same water use response to variations of rainfall from that period will persist into the future. Due to the application of these peaking factors, the average of the period for each Withdrawals Condition will vary slightly from the water demand projections presented in **Chapter 3**.

Table 13. Simulated Groundwater Use/Demand within the CFWI Planning Area of the ECFTX model (mgd).

Water Use Category	2014	2014RC	2020	2025	2030	2035	2040
Public Supply	373.51	374.88	434.91	482.66	515.96	549.17	574.36
Domestic Self-Supply	16.56	16.90	18.60	19.48	21.73	21.23	23.16
Agriculture	119.67	140.08	139.98	140.93	142.96	145.05	146.81
Landscape/Recreational	28.05	33.99	35.18	36.32	37.34	38.32	39.24
Commercial/Institutional/ Industrial, Power Generation, Mining/Dewatering	50.98	52.53	71.28	72.83	77.63	70.75	77.47
Other	0.57	1.24	0.68	0.68	0.68	0.68	0.68
TOTAL	**590.02**	**619.31**	**700.62**	**752.90**	**796.29**	**825.20**	**861.72**

mgd = million gallons per day

The Withdrawals Conditions were constructed by adjusting dependent, input variables based on observed and calculated relationships with independent variables. Rainfall is a primary independent variable that is used to spatially and temporally adjust the dependent variables. The dependent input variables that were modified between scenarios based on rainfall included withdrawals, irrigation, runoff and infiltration, ET, and recharge. Land use is an independent variable that is unaffected by rainfall; however, it affects runoff, infiltration, and ET and was used to modify these dependent variables for the calibration run and Withdrawals Conditions.

The Withdrawals Conditions were run for 12 years using monthly stress periods and observed daily rainfall amounts that occurred between 2004 and 2014. ET and recharge for the Withdrawals Conditions were generated using two land use maps representing 2004/2005 conditions and 2008/2009 conditions. Based on this approach, the principal differences between scenarios were changes in withdrawal volumes and the corresponding irrigation quantities. The differences in model input for the model calibration period and the Withdrawals Conditions evaluated are summarized in **Appendix D**.

2014 Reference Condition

The 2014 RC was developed as the basis to consistently compare the results of other Withdrawals Conditions to one another. The 2014 RC was developed to represent aquifer conditions that would be expected if 2014 water demands were repeatedly realized over the 12-year simulation period. Dependent water input variables were adjusted based on monthly changes of rainfall using observed and calculated relationships between rainfall and specific variables. Modeled groundwater withdrawals for the 2014 RC represent the pumping required to meet the demands for water as they occurred in 2014 given the rainfall that occurred over the period from 2003 through 2014. The use of the 2014 water use as the RC does not imply that 2014 is considered a base year for acceptable environmental conditions. Rather, it is simply a period for which modeled environmental conditions were characterized for a common period with relatively well-known hydrologic conditions. Potential areas of concern were identified based on the response of various environmental criteria to groundwater level drawdown between the 2014 RC and each of the other Withdrawals Conditions.

2040 Withdrawals Condition

The 2040 Withdrawals Condition was developed to assess modeled hydrologic conditions at the end of the 20-year planning horizon required for this 2020 CFWI RWSP. The 2040 Withdrawals Condition was constructed in a manner similar to that of the 2014 RC using the projected withdrawals for 2040 instead of the withdrawals for 2014. The results of the 2040 Withdrawals Condition represent the modeled hydrologic system for the projected water demands of 2040 subjected to the rainfall conditions of 2003 through 2014.

The patterns of change between the 2014 RC and the 2040 Withdrawals Condition in the SAS, UFA, and LFA water levels are shown in **Figures 8**, **9,** and **10,** respectively. Although the water level changes are mostly related to differences in withdrawal quantities, some changes are due to differences in the locations of withdrawal points between the 2014 RC and the 2040 Withdrawals Condition. Differences in SAS water levels for the two Withdrawals Conditions were most pronounced in the Ridge areas located east of US Highway 27 and south of Lake Apopka and Lakeland. Increases in SAS levels are due to the effects of return flow to the SAS from UFA (and to a lesser extent surface water) withdrawals. Differences in the UFA water levels for the two Withdrawals Conditions are most pronounced in north-central Osceola County, southwestern Orange County, and Southwest Polk County. Differences in LFA water levels are centered near the predominant LFA withdrawal locations in southern Orange County.

Wellfield Water Quality Criteria

Portions of the UFA within the CFWI Planning Area are known to have poor-quality water. Wells and wellfields (production centers) operating near these regions are subject to the possible upward, vertical migration of this water as a result of their proximity to underlying poor quality water or due to local geologic conditions, like fractures or solution channels that provide preferential conduits for the water to travel to the wells when they are pumped.

The locations where these conditions are observed within the CFWI Planning Area include production centers for the City of Winter Springs, City of Oviedo, City of Sanford, Seminole County, and the Town of Chuluota operated by Florida Governmental Utility Authority. These locations currently produce potable quality water for their customers, but all show a history of at least one or more wells producing water with trends of water quality degradation. This condition is known by the utilities and the SJRWMD CUPs for these utilities contain the requirement to monitor, analyze the data for trends, and report groundwater quality that may change because of wellfield operations. These CUPs/WUPs also include the requirement for the utilities to develop and implement wellfield management plans to avoid unnecessary water quality degradation locally occurring in these wellfields.

Given that the ECFTX model simulates groundwater flow only (i.e., it does not consider density-dependent flow or fracture flow) and that it is a regional-scale model, vertical conduits that can lead to potential upward movement of poor quality water cannot be explicitly simulated. However, the results of the ECFTX modeling can provide insight on the potential of water level differences that would drive additional upward, vertical groundwater movement. An aquifer drawdown map between the 2014 RC and the 2040 Withdrawals Condition for the UFA (Model Layer 3) showing the locations of the production centers with this condition (**Figure 11**) reveals that these production centers lie in an area that is projected to experience between 1 and 3 feet of additional drawdown. This relatively small amount of additional drawdown is not considered to lead to unacceptable additional water quality degradation given the monitoring and management plans that are implemented through the CUPs/WUPs associated with the wellfields.

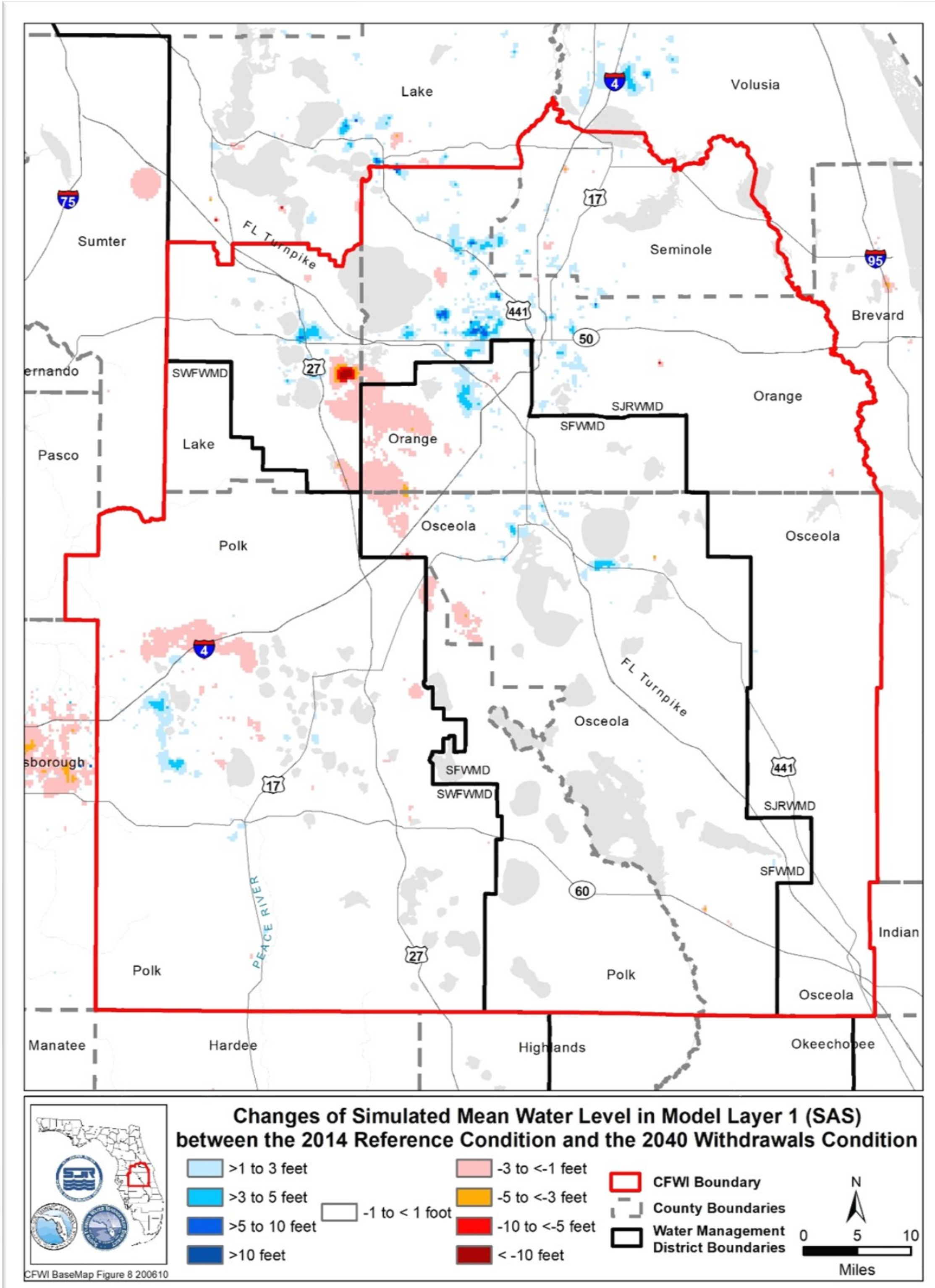

Figure 8. Changes of simulated mean water levels in Model Layer 1 (surficial aquifer system) between the 2014 Reference Condition and the 2040 Withdrawals Condition in the CFWI Planning Area.

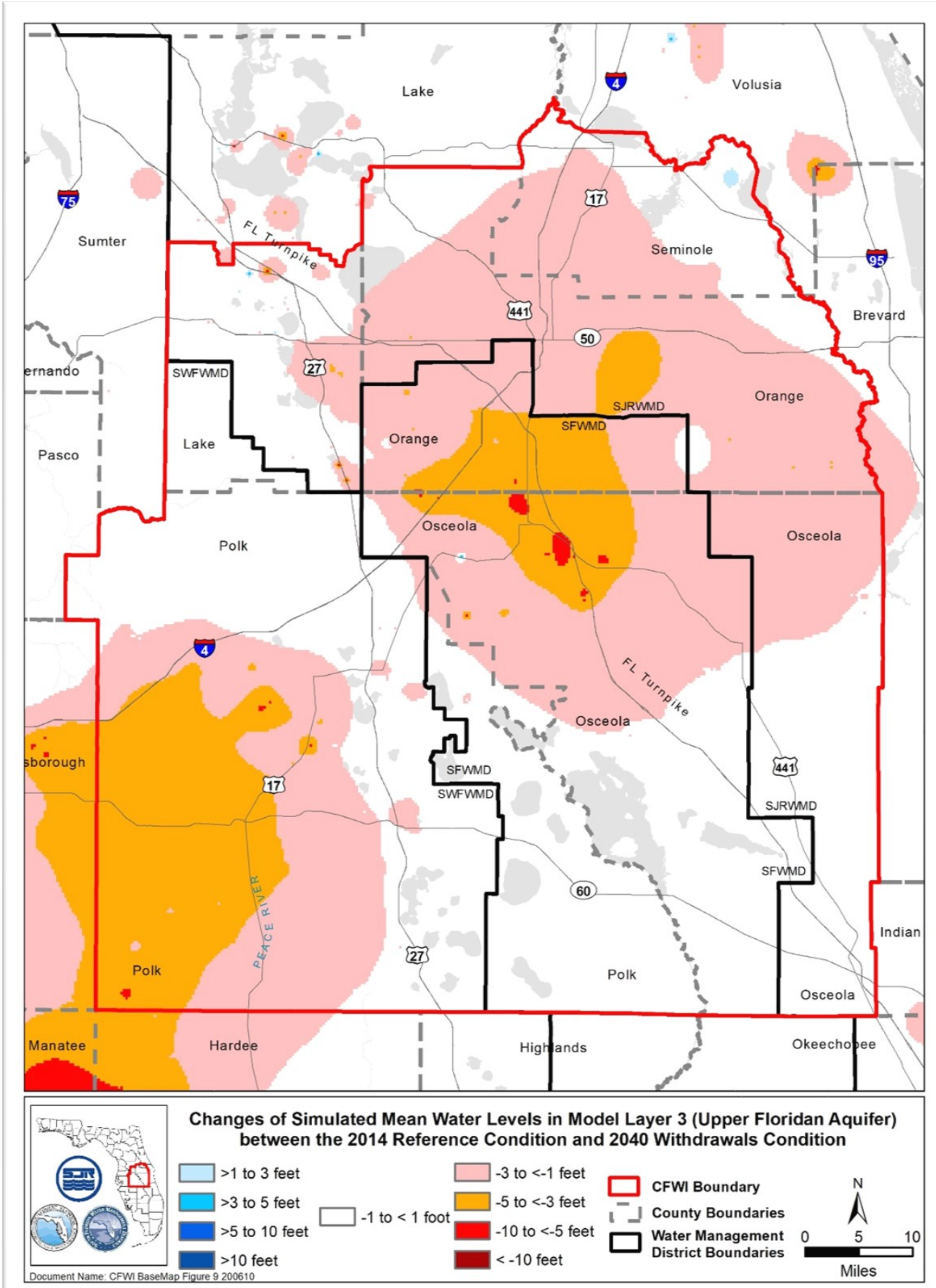

Figure 9. Changes of simulated mean water levels in Model Layer 3 (Upper Floridan aquifer) between the 2014 Reference Condition and 2040 Withdrawals Condition in the CFWI Planning Area.

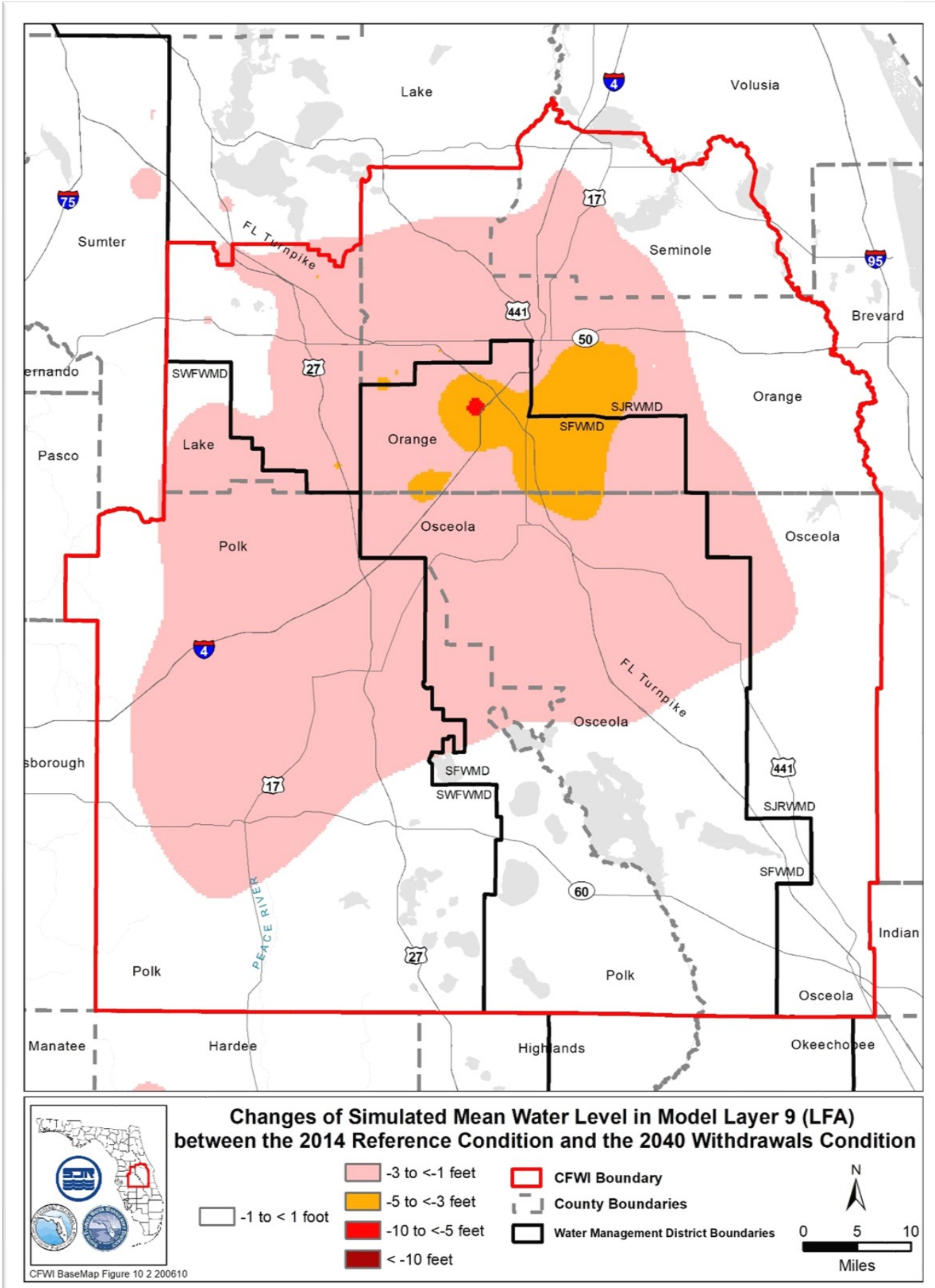

Figure 10. Changes of simulated mean water levels in Model Layer 9 (Lower Floridan aquifer) between the 2014 Reference Condition and the 2040 Withdrawals Condition in the CFWI Planning Area.

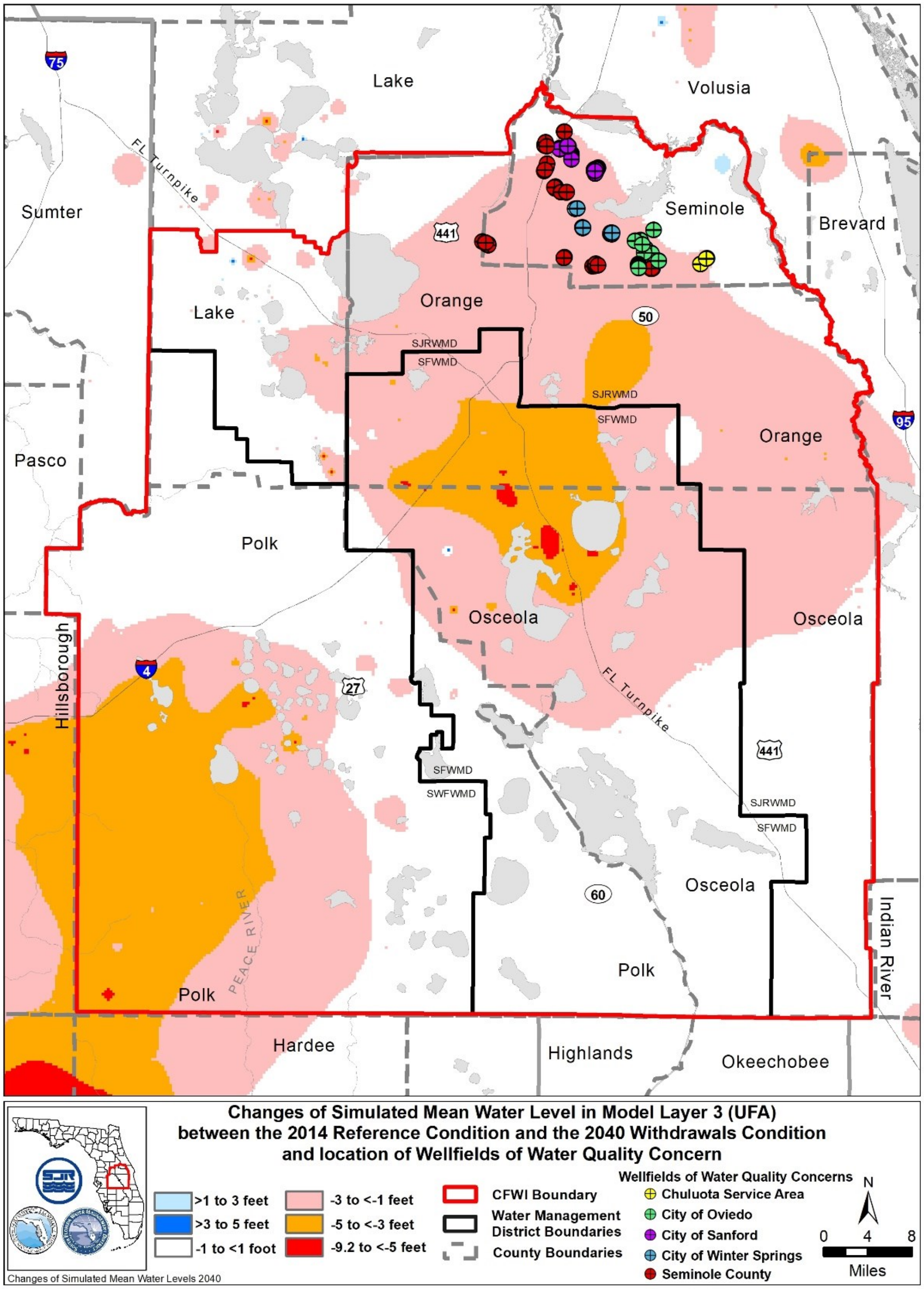

Figure 11. Changes of Simulated Mean Water Levels in the Upper Floridan aquifer (Model Layer 3) between the 2014 Reference Condition and the 2040 Withdrawals Condition within the CFWI Planning Area and location of Wellfields of Water Quality Concern.

ENVIRONMENTAL MEASURES

The current state of wetlands without MFLs and surface waters was evaluated, and methodologies were developed for analysis of quantitative relationships between observed wetlands condition and hydrology. Field visits assessed the current status of wetlands and lakes. In addition, geospatial and statistical analyses were used to evaluate potential impacts to wetlands and surface water bodies on a regional basis. These analyses supported the determination of groundwater availability. Detailed methodologies and results of these analyses can be found in the EMT technical report (CFWI 2020a).

With more than one million acres of wetlands in the CFWI Planning Area, the focus of the wetlands risk assessment was on primarily groundwater-dominated lake and wetland systems that did not have significant hydrologic alteration. Groundwater-dominated wetlands make up less than 20 percent of the total wetland acreage. Groundwater-dominated wetlands are those wetlands whose water budget is largely driven by the exchange (both inflow and outflow) of groundwater due to their connectivity to an aquifer. Approximately 189,000 acres of wetlands were included in the analysis, which consisted of about 139,000 acres of wetlands located in Plains physiographic provinces and approximately 50,000 acres of wetlands located in Ridge physiographic provinces (**Figure 12**).

Forty-four Class 1 wetlands were revisited and 16 new Class 1 wetlands were evaluated for potential addition to the statistical analysis dataset. Class 1 wetlands are defined as wetlands or lakes with available long-term water level data, known wetland edge elevations, and known hydrologic stress conditions. Analysis completed during the development of the 2015 CFWI RWSP demonstrated that these wetlands were representative of primarily groundwater-dominated wetlands within the CFWI Planning Area. Similar to work completed in support of the 2015 CFWI RWSP, other classes of wetlands were defined based on the availability of water level data and hydrological stress condition information and the same wetlands risk assessment methodology from the 2015 CFWI RWSP was used for those wetlands.

The final Class 1 wetlands dataset used for the wetlands risk assessment included 41 of the original 44 sites and 12 of the 16 potential new sites for a total of 53 sites. An analysis of water level data from 2009 through 2017 for these Class 1 wetlands was used to develop a statistical relationship between observed water level variations and hydrologic stress. This statistical relationship was used to estimate the probability (or risk) of future changes in wetland stress occurring throughout the CFWI Planning Area based on the modeled water level changes between the 2014 RC and the 2025, 2030, and 2040 Withdrawals Conditions.

Primarily groundwater-dominated wetlands and lakes in Plains and Ridge physiographic provinces were evaluated separately, since wetland hydrologic conditions in these systems are different as a result of underlying soils, geology, physiography, typical depths, and other factors.

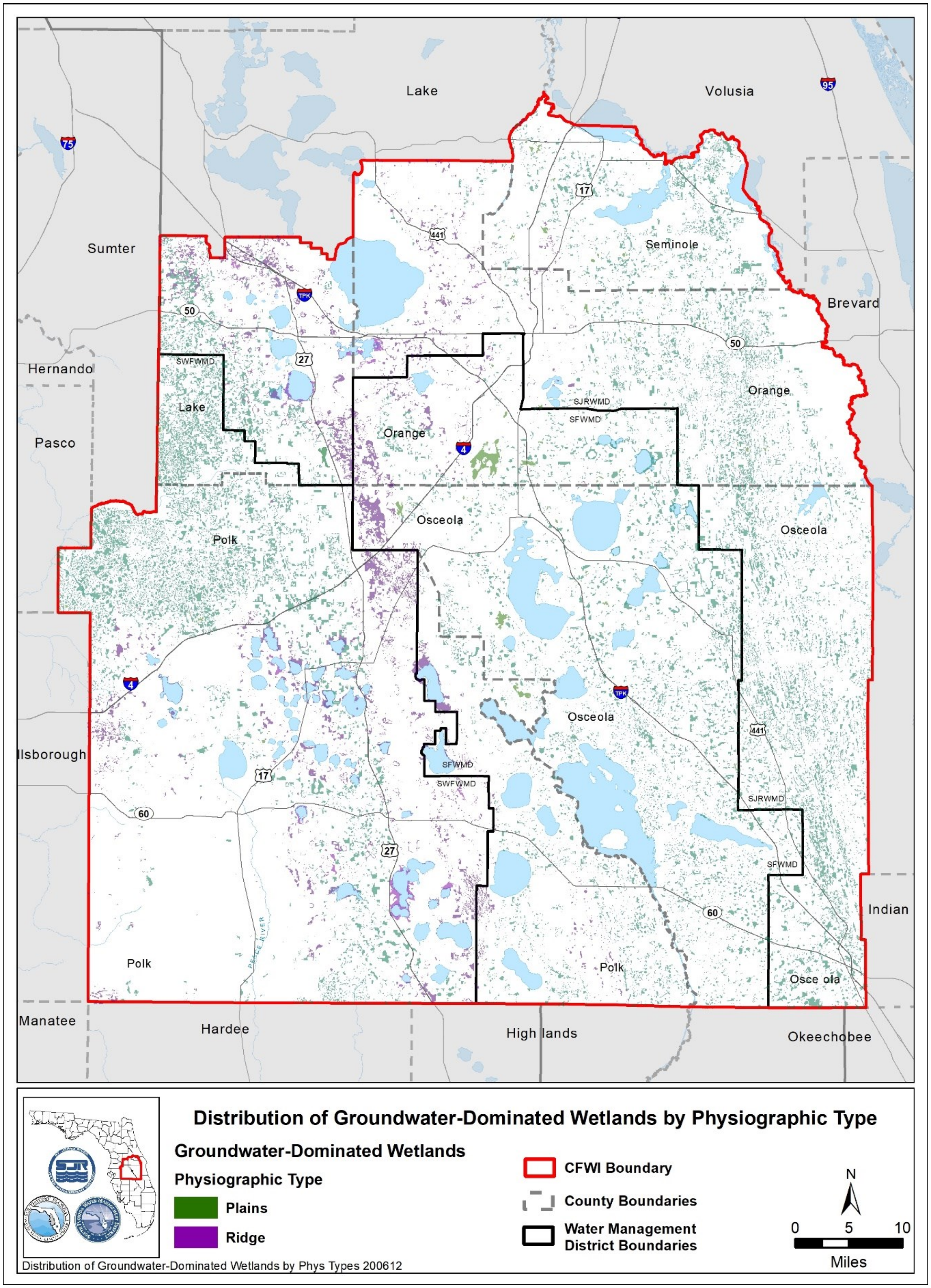

Figure 12. Distribution of Plains and Ridge wetlands within the CFWI Planning Area included in the wetlands analysis.

For the Plains wetlands risk assessment, ECFTX model results for Model Layer 1 (SAS) were used to determine the potential for stress since Plains physiographic provinces are typically characterized by regionally consistent confining conditions where there is reduced exchange of water between the SAS and the underlying FAS.

For the Ridge wetlands risk assessment, a range of potential for stress was developed using ECFTX model results for Model Layer 1 (SAS) and Model Layer 3 (UFA), since most of the Ridge physiographic provinces are typically characterized by less confining conditions that vary considerably. This range provided an estimate of low and high potential of future changes in Ridge wetlands water levels from which to estimate corresponding probabilities of changes in wetland stress conditions.

Table 14 shows the potential acres of stressed Plains and Ridge wetlands for the 2025, 2030, and 2040 Withdrawals Conditions compared to the 2014 RC. Some existing wetlands impacts and predicted future stress may be the result of multiple factors, including groundwater withdrawals, construction of drainage ditches, and other alterations to drainage basins. The results of the analysis assessed the probability of wetland stress occurring at a regional scale and should not be applied at the local scale. Refer to **Appendix D** for additional details.

Table 14. Potential Acres of stressed Plains and Ridge wetlands for the 2025, 2030, and 2040 Withdrawals Conditions compared to the 2014 Reference Condition.

Wetlands Class	Total Acres	Acres of Stressed Wetlands in the 2014 RC	Increase in Acres of Stressed Wetlands from RC to 2025 Withdrawals Condition	Increase in Acres of Stressed Wetlands from RC to 2030 Withdrawals Condition	Increase in Acres of Stressed Wetlands from RC to 2040 Withdrawals Condition
surficial aquifer system (Model Layer 1)					
Plains	140,000	17,000	770	1,000	1,400
Ridge	50,000	19,000	500	700	1,000
Upper Floridan aquifer (Model Layer 3)					
Ridge	50,000	19,000	2,750	3,600	4,700

MINIMUM FLOWS AND MINIMUM WATER LEVELS

The status of existing MFLs and developed MFLs and MFL-related environmental criteria were evaluated to be applied consistently across the CFWI Planning Area. These criteria were used to evaluate the effect of existing and proposed water withdrawal conditions on MFLs. These efforts assisted with the determination of groundwater availability.

A subset of the existing or currently proposed MFL sites and MFL-related regulatory wells within the SWFWMD and SJRWMD in the CFWI Planning Area and ECFTX model domain area were identified for use as environmental criteria for evaluation of regional groundwater availability. Thirty-nine MFLs and MFLs-related environmental criteria were evaluated, including MFLs adopted for 29 lakes and wetlands, six springs (including two OFSs), one river segment, the SWIMAL, and target well water levels below the Lake Wales Ridge and Upper Peace River areas that are associated with the SWUCA Recovery Strategy (**Table C-4** and **Figure C-5** in **Appendix C**).

Changes in groundwater levels or surface water flows that could be associated with potential change in the status of the assessed environmental criteria were characterized as freeboard or deficit values. For these analyses, freeboard is defined as the magnitude of drawdown of the potentiometric surface of the UFA or flow reduction in the vicinity of an MFL or MFL-related site that can occur without causing violation of an adopted MFL or MFLs-related environmental criterion. Conversely, the magnitude of rebound in the potentiometric surface of the UFA or increase in flow in the vicinity of a site that would be necessary to recover or meet established MFLs or MFLs-related criteria is referred to as a deficit.

Twenty-eight of the 39 MFLs and MFL-related environmental criteria evaluated for the 2014 RC were predicted to be met (i.e., exhibited predicted freeboard values greater than or equal to zero) (**Table 15**, **Figure 13**; also, **Table C-8** and **Table C-9** in **Appendix C**). Eleven criteria, including MFLs established for eight lakes (Lake Aurora, Crooked Lake, Eagle Lake, Easy Lake, Lake Eva, Lake McLeod, Lake Starr, and Lake Wales/Wailes), two springs (Palm Springs and Starbuck Springs), and the adopted SWUCA SWIMAL were predicted to not be met under the 2014 RC. Two additional criteria, Wekiwa Springs (an OFS) and the Wekiva River at State Road 46, changed predicted status from met to not met under the 2030 Withdrawals Condition (**Table C-8** and **Figure C-13** in **Appendix C**), and two more criteria, Rock Springs (an OFS) and Lake Prevatt, were predicted to not be met under the 2040 Withdrawals Condition (**Table 15**, **Figure 14**).

Table 15. Predicted summary results for MFLs and MFL-related environmental criteria identified for the 2014 Reference Condition and 2025, 2030, and 2040 Withdrawals Conditions assessed with the ECFTX model (MFLs status varies from the STAR report).

MFLs and MFL-Related Environmental Criteria	ECFTX Model Withdrawals Conditions			
	2014 Reference Condition	2025 Withdrawals Condition	2030 Withdrawals Condition	2040 Withdrawals Condition
Number Met	28	28	26	24
Number Not Met	11	11	13	15

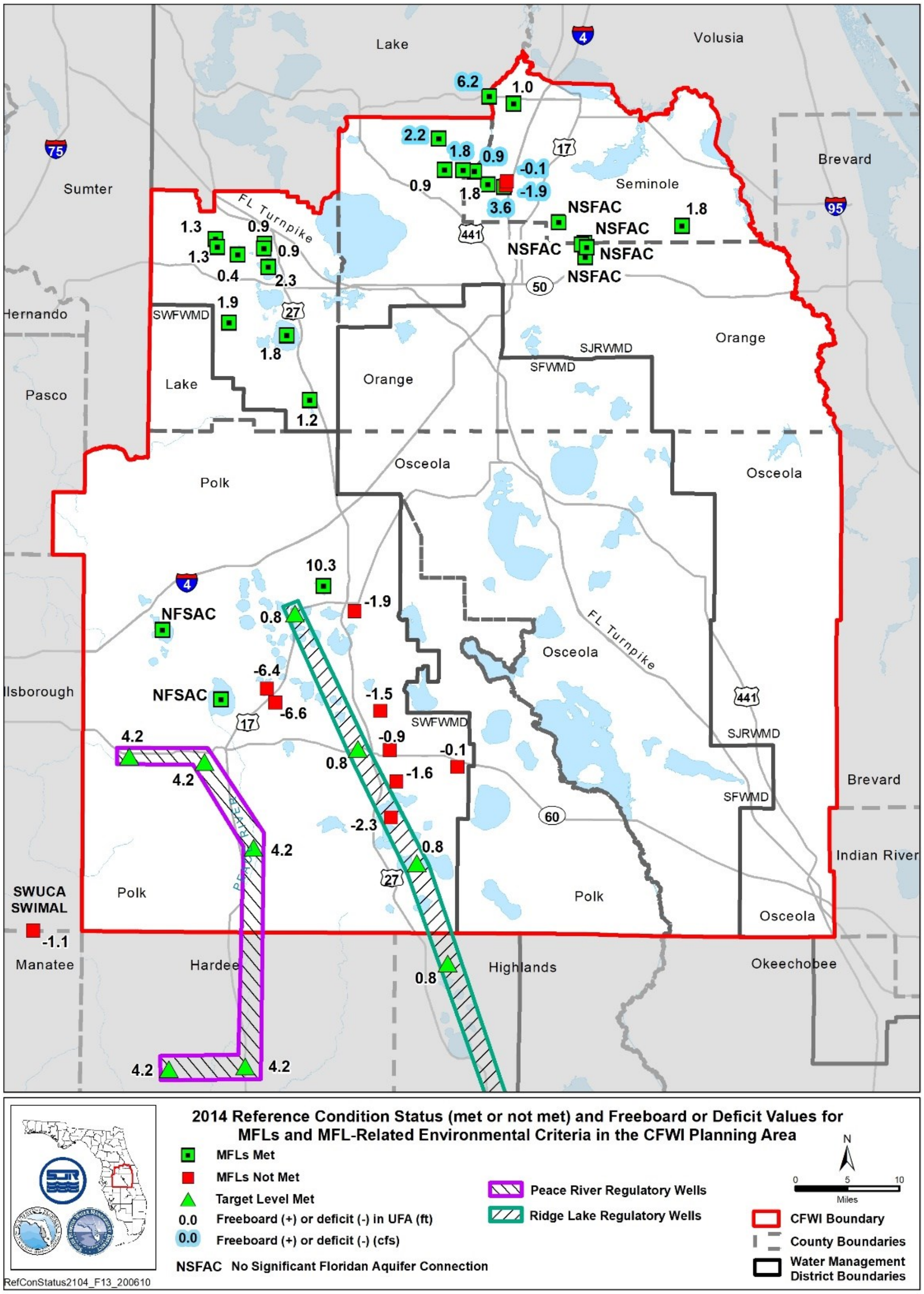

Figure 13. 2014 Reference Condition status (met or not met) and freeboard or deficit values for MFLs and MFL-related environmental criteria.

Note: Freeboard and deficit values expressed in feet (non-highlighted values) or cubic feet per second (highlighted values). NSFAC indicates that a freeboard or deficit value was not established due to no significant aquifer connection at the site.

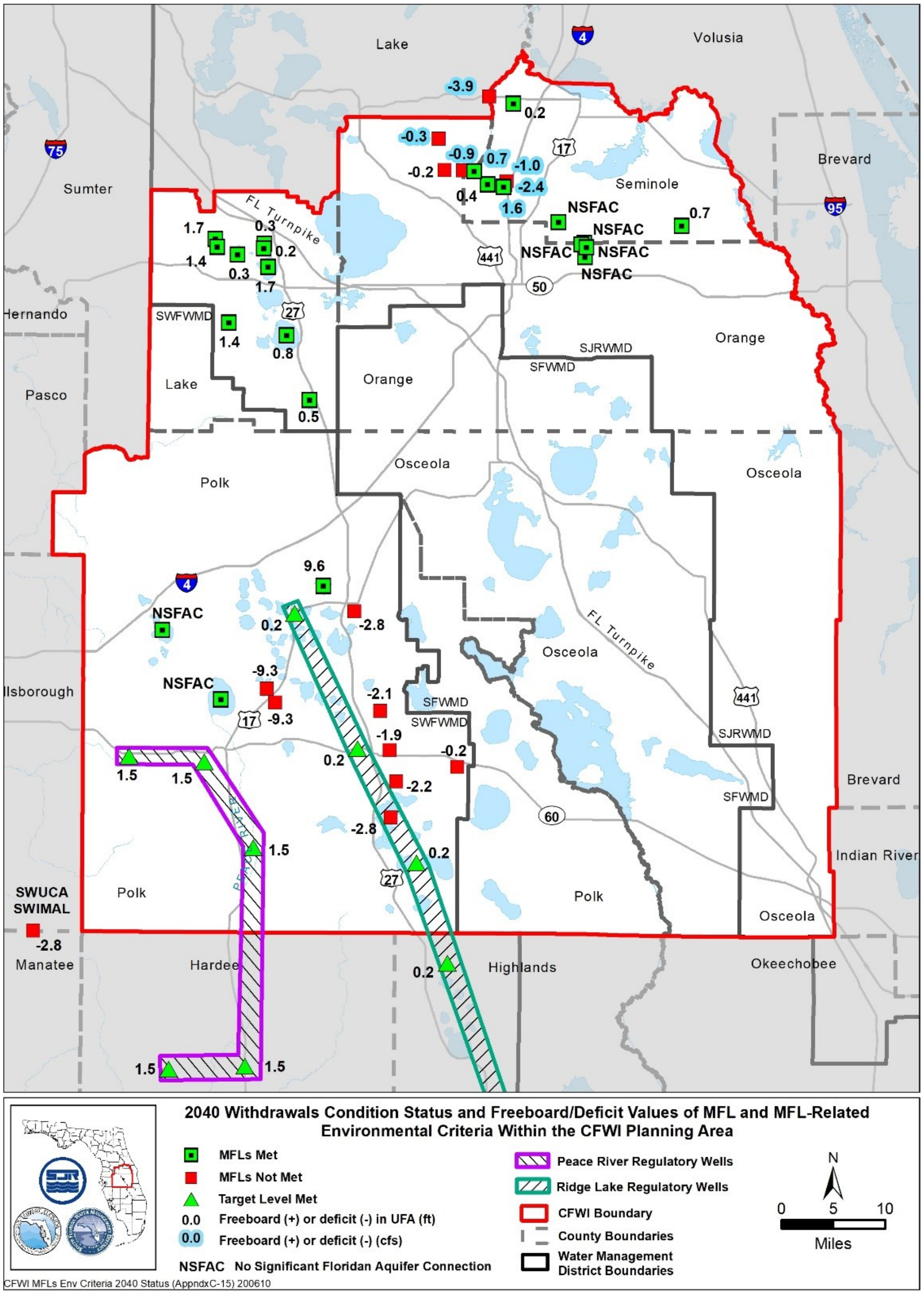

Figure 14. Predicted 2040 Withdrawals Condition status (met or not met) and freeboard or deficit values for MFLs and MFL-related environmental criteria.

Note: Freeboard and deficit values expressed in feet (non-highlighted values) or cubic feet per second (highlighted values). NSFAC indicates that a freeboard or deficit value was not established due to no significant aquifer connection at the site.

Although the status changed for only four assessed criteria between the 2014 RC and the 2040 Withdrawals Condition, most of the MFLs and MFLs-related criteria exhibited a predicted decrease in freeboard or an increase in deficit (**Figure C-16** in **Appendix C**).

Results of the analyses (**Table C-10** in **Appendix C**) indicated the MFLs for the Wekiva River at State Road 46 were predicted to shift from being met to not met at a withdrawal rate in the range of 762 and 770 mgd. Wekiwa Springs, an OFS, was predicted to shift status from being met to not met at a withdrawal rate between 779 and 787 mgd. Based on results from the 2030 and 2035 Withdrawals Conditions, the status of Rock Springs, another OFS, and Lake Prevatt was predicted to shift from being met to not met at withdrawals between 796 and 825 mgd.

The status of each water body with an adopted MFL is determined each year for the STAR report as described in **Appendix C**. Assessments in the 2017 STAR report and other assessments indicated that adopted MFLs are currently being met at 41 of the 54 water bodies within and extending into the CFWI Planning Area (**Table C-2** and **Figure C-2** in **Appendix C**). However, adopted MFLs are not currently being met for 13 water bodies, including nine lakes, one spring, two river segments, and the Salt Water Intrusion Minimum Aquifer Level (SWIMAL) established for the Most Impacted Area within the SWUCA of the SWFWMD in coastal Hillsborough, Manatee, and Sarasota counties. Sites within the CFWI Planning Area where MFLs are not being met are clustered in southwest Polk County, with the exception of one site in southwest Seminole County. It should be noted that modeled Withdrawals Conditions from the ECFTX model were not used to complete these recent status assessments in the STAR report.

GROUNDWATER AVAILABILITY

Planning-level groundwater availability assessment results were based on the Withdrawals Conditions scenarios using the ECFTX model. The number, location, and magnitude of impact on MFLs and MFL-related criteria, wetlands without MFLs, and groundwater quality, along with the quantities and spatial distribution of potential acres of stressed wetlands, were used to determine the potential extent of groundwater withdrawal impacts in the CFWI Planning Area.

The modeling results indicated that, as groundwater withdrawals increased, there was a corresponding predicted increase in hydrologic stress on environmental systems. Groundwater withdrawal impacts can generally be characterized by the spatial extent and magnitude of the impacts based on areas of environmental sensitivity. Primary areas or features that appear to be more susceptible to the effects of groundwater withdrawals, and thus may limit additional groundwater development, are shown in **Figure 15** and include:

- Wekiwa Springs/Wekiva River System,
- West Seminole County/West Orange County,
- South Lake County,
- Lake Wales Ridge,
- Upper Peace River Basin,
- East Osceola County, and
- Central Polk County (north of I-4).

The withdrawal volumes and status of environmental criteria evaluated in the groundwater availability assessment are summarized in **Table 16**.

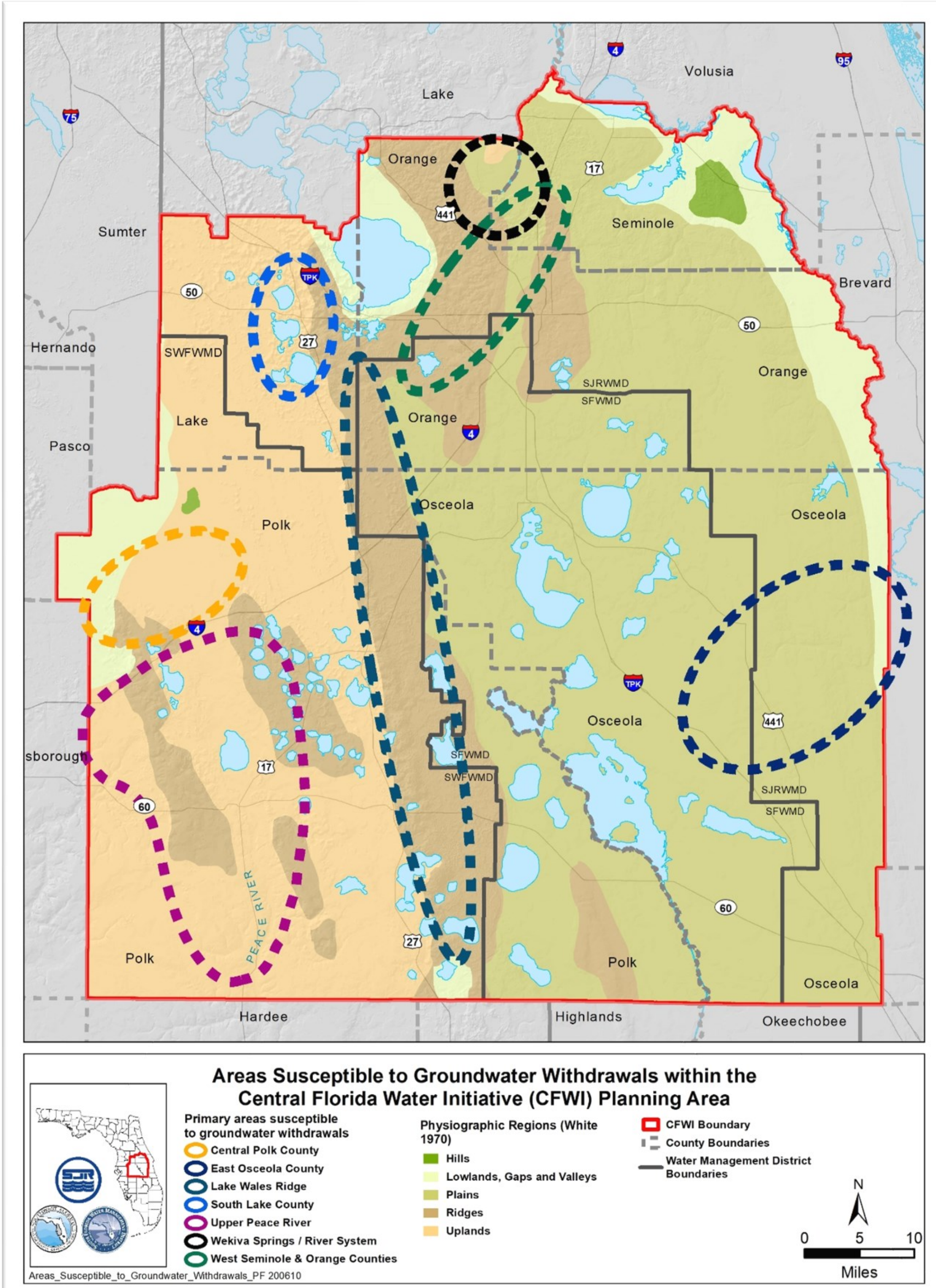

Figure 15. Primary areas susceptible to groundwater withdrawals.

Table 16. CFWI Planning-Level Groundwater Availability Assessment.

Environmental Criteria	Withdrawals Condition Volumes			
	619 mgd (2014 Reference Condition)	760 mgd	796 mgd	862 mgd
MFLs and MFL-related Criteria	28 Met	No Change in Status	26 Met	24 Met
	11 Not Met		13 Not Met	15 Not Met
Stressed Plains Wetlands	17,000 acres	+770 acres	+1,000 acres	+1,400 acres
	12%	0.50%	0.70%	1%
Stressed Ridge Wetlands	19,000 acres	+ 500 to 2,750 acres	+700 to 3,600 acres	+1,000 to 4,700 acres
	37%	+ 1 to 5%	+1.5 to 7%	+2 to 9%

mgd = million gallons per day

Given that there are existing impacts under the 2014 RC, it was determined that the planning-level groundwater availability should be limited to no more than the volume of groundwater under which no additional MFLs would be exceeded. This occurs at an estimated withdrawal volume of 760 mgd. The Wekiva River is projected to fall below its adopted MFL at volumes greater than 760 mgd through the use of a linear interpolation method for estimating freeboard changes for the Wekiva River. Limiting the planning-level groundwater availability to this volume takes into consideration that Wekiwa Springs and Rock Springs, both OFSs, are shown as not meeting their currently adopted MFLs under groundwater withdrawal volumes exceeding 800 mgd and 825 mgd, respectively. Legislation passed since the approval of the 2015 CFWI RWSP emphasizes protection of OFSs and impacts to these springs are predicted to increase at greater groundwater withdrawals (**Chapter 1**). Additionally, trending freeboard reductions/deficit increases were noted for other MFL criteria and acres of potential stressed wetlands expanded under greater groundwater withdrawals. Under the 2030 Withdrawals Condition, there is a 1 to 5 percent potential increase in stressed Ridge wetland acres (700 to 3,600 acres) and an approximately 1 percent potential increase in stressed Plains wetland acres (1,000 acres) relative to the 2014 RC.

Based on the groundwater availability evaluation, it is estimated that regionally, the CFWI Planning Area could potentially sustain up to 760 mgd of fresh groundwater withdrawals, but local management strategies will be needed (e.g., wellfield optimization, aquifer recharge, and natural system enhancement) to address unacceptable impacts. Additional fresh groundwater withdrawals, beyond 760 mgd, are limited by water resource and natural system constraints.

The 760 mgd limit of groundwater availability is not anticipated to be reached until after the next CFWI RWSP update in 2025. Additionally, the MFL water bodies in the Wekiva Basin, including Wekiwa and Rock Springs and the Wekiva River at SR 46, are scheduled for re-evaluation in 2020. If it is determined that a recovery or prevention strategy is still needed following the re-evaluation effort, detailed modeling of resource benefit to these MFL water bodies due to implementation of specific projects and management strategies will be conducted.

5

Water Conservation

INTRODUCTION

Water conservation is an important element of water supply planning and entails reducing the quantity of water required to meet regional demands through efficiency improvements and the prevention or reduction of unnecessary uses or losses of water. Water conservation contributes to the sustainability of water supply sources. Section 373.709(2)(a)2, F.S., requires that water conservation be accounted for when determining if the total capacity of the water supply development project options included in RWSPs exceeds the increase in projected water demands for the planning horizon.

TOPICS

Achieving long-term improvements in water use efficiency will require a combination of advanced technologies, best management practices, and other water conservation measures. Coordinated education, outreach, and public engagement are essential for the promotion of water conservation and the development of a water conservation ethic in the CFWI Planning Area. The 2015 CFWI RWSP identified 37 mgd of water conservation savings for all water use categories, the estimated costs to achieve these water savings, and recommendations for a future scope of work to implement water conservation programs. It also described the tools, resources, and initiatives available to individuals, commercial and agricultural water users, local governments, utilities, and Districts to foster water conservation and water use efficiency. After approval of the 2015 CFWI RWSP, the Steering Committee directed the Conservation Team to prepare a comprehensive Conservation Implementation Strategy that would help achieve and exceed the water conservation projection. The resulting Conservation Implementation Strategy, approved by the Steering Committee in October 2019 (www.cfwiwater.com), quantified water conservation savings from 2010 to 2019 and identified next steps to further evaluate the effectiveness of water conservation activities.

LAW/CODE

The overall water conservation goal of the state is to prevent and reduce wasteful, uneconomical, impractical, or unreasonable use of water resources (Section 373.227(1), F.S.).

Methods and trends identified in the Conservation Implementation Strategy were used to develop water conservation projections for this 2020 CFWI RWSP. These water conservation projections are based on historical levels of funding and participation.

WATER CONSERVATION PROJECTIONS

For this 2020 CFWI RWSP, it is projected that 50 to 56 mgd of water conservation savings could be achieved by 2040 for all water use categories as shown in **Table 17**. Water conservation projection methodologies for each water use category are briefly described in this chapter and in detail in **Appendix B**.

Table 17. Projected 2040 water demand and water conservation savings by water use category in the CFWI Planning Area.

Category	Projected 2040 Water Demand (mgd)	Projected 2040 Water Conservation Savings (mgd)
Public Supply	592.28	41.50 – 44.16
Domestic and Small Public Supply	24.59	0.86
Agriculture	163.49	4.19
Landscape/Recreational	46.96	2.22
Commercial/Industrial/Institutional	69.00	1.55 – 4.40
Power Generation	11.27	
Total	**907.59**	**50.32 – 55.83**

mgd = million gallons per day

Projected water conservation savings may not directly reduce total water demands, as many water conservation measures focus on improved efficiency which may allow such savings to meet increasing water demands; however, water conservation and demand management can reduce, defer, or eliminate the need to develop new water supply sources.

Public Supply

Projected PS water conservation savings were calculated for two types of water conservation: passive and active. It is estimated that the PS water use category could achieve between 42 and 44 mgd of projected water conservation savings by 2040 (**Table 18, Figure 16**).

Table 18. Total Public Supply projected water conservation savings by 2040 in the CFWI Planning Area.

Type	Low Range (mgd)	High Range (mgd)
Passive Water Conservation	17.07	17.07
Active Water Conservation	24.43	27.09
Total	**41.50**	**44.16**

mgd = million gallons per day

Outdoor water use typically constitutes the largest component of residential use. Outdoor water conservation measures may yield the largest water savings and should be implemented throughout the CFWI Planning Area.

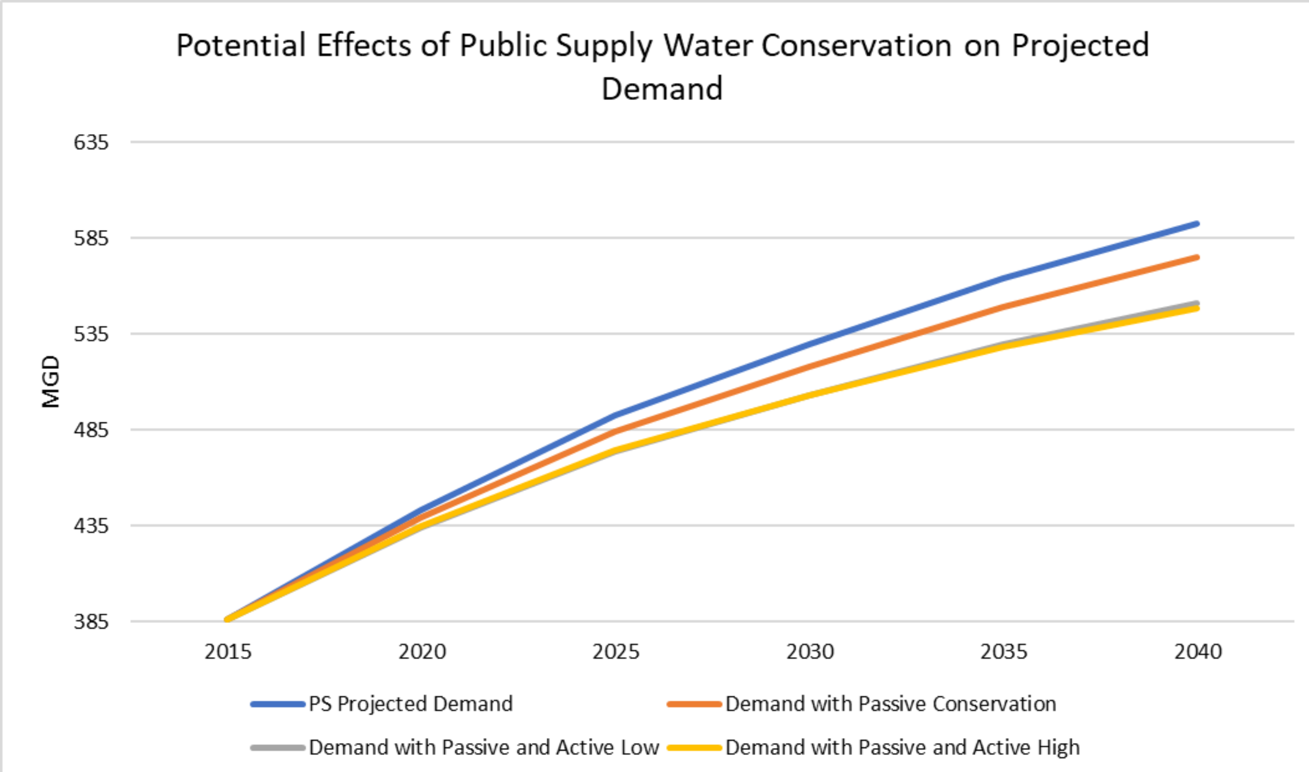

Figure 16. Potential effects of Public Supply water conservation on projected demand in the CFWI Planning Area.

Passive Water Conservation

Passive water conservation savings refer to water savings that occur as a result of users implementing water conservation measures in the absence of PS utility programs. These are typically the result of property renovations, or codes and ordinances that require the installation of high-efficiency plumbing fixtures and appliances in new construction and renovations. Passive water conservation savings have been observed as a major contributor to reducing per capita water use across the country. Passive water conservation savings are projected to be 17 mgd by 2040 (**Table 19**).

Passive water conservation projections were developed using the Alliance for Water Efficiency's Water Conservation Tracking Tool (AWE Tool) and information from property appraiser databases and census data. The AWE Tool calculates passive water conservation savings for toilets, shower heads, clothes washers, and dishwashers. Natural replacement savings (which occurs when devices are replaced by homeowners) and water savings adjustment factors by county (which accounts for newer homes having more efficient fixtures) were used to develop the total passive water conservation projections (**Appendix B**).

Table 19. Public supply passive water conservation by county/city by 2040 in the CFWI Planning Area.

County/City	Percentage of homes built pre-1994	Natural Replacement Savings (mgd)	Water Savings Adjustment Factor (mgd)	Total Passive Water Conservation Projection (mgd)
Cocoa	65%	1.04	0.24	1.28
Lake	21%	0.37	0.14	0.51
Orange	55%	4.90	2.13	7.03
Osceola	38%	1.18	0.59	1.77
Polk	60%	2.61	1.02	3.63
Seminole	67%	2.18	0.66	2.84
CFWI total	**N/A**	**12.28**	**4.78**	**17.06**

mgd = million gallons per day

Housing stock data, used to calculate passive savings, reveals that PS utilities in Osceola and southern Lake counties may have fewer opportunities for active indoor water conservation savings compared to other counties because the majority of homes in these counties were built after 1994, when higher efficiency fixtures were required for new construction (**Table 19**). PS utilities in Orange, Seminole, and Polk counties, and the City of Cocoa may have more opportunities for active indoor water conservation savings, as these areas have a higher percentage of homes built before 1994.

Active Water Conservation

Active water conservation encompasses a variety of measures, practices, and programs sponsored or encouraged by PS utilities, local governments, and the Districts which result in water use reductions. By their nature, active water conservation programs are typically funded and administered by PS utilities or other regional entities. For this 2020 CFWI RWSP, the projected active water conservation savings is 24 to 27 mgd by 2040.

Historical Water Conservation Savings

The active water conservation projections are based on the water savings rates in the Conservation Implementation Strategy, which used the best available data from several sources to quantify the active water conservation occurring in the CFWI Planning Area from 2010 to 2019. This resulted in an estimated savings between 8 and 10 mgd. These savings were based on data gathered from District cost-share programs, a survey of PS utilities (with 12 respondents representing approximately 67 percent of the PS water utilities), and some individually quantified water conservation measures. Enforcement of irrigation ordinances and rules makes up the largest source of water conservation savings based on the data collected and, to date, has been quantified by only a few large PS utilities. Quantified water conservation savings are shown in **Figure 17.**

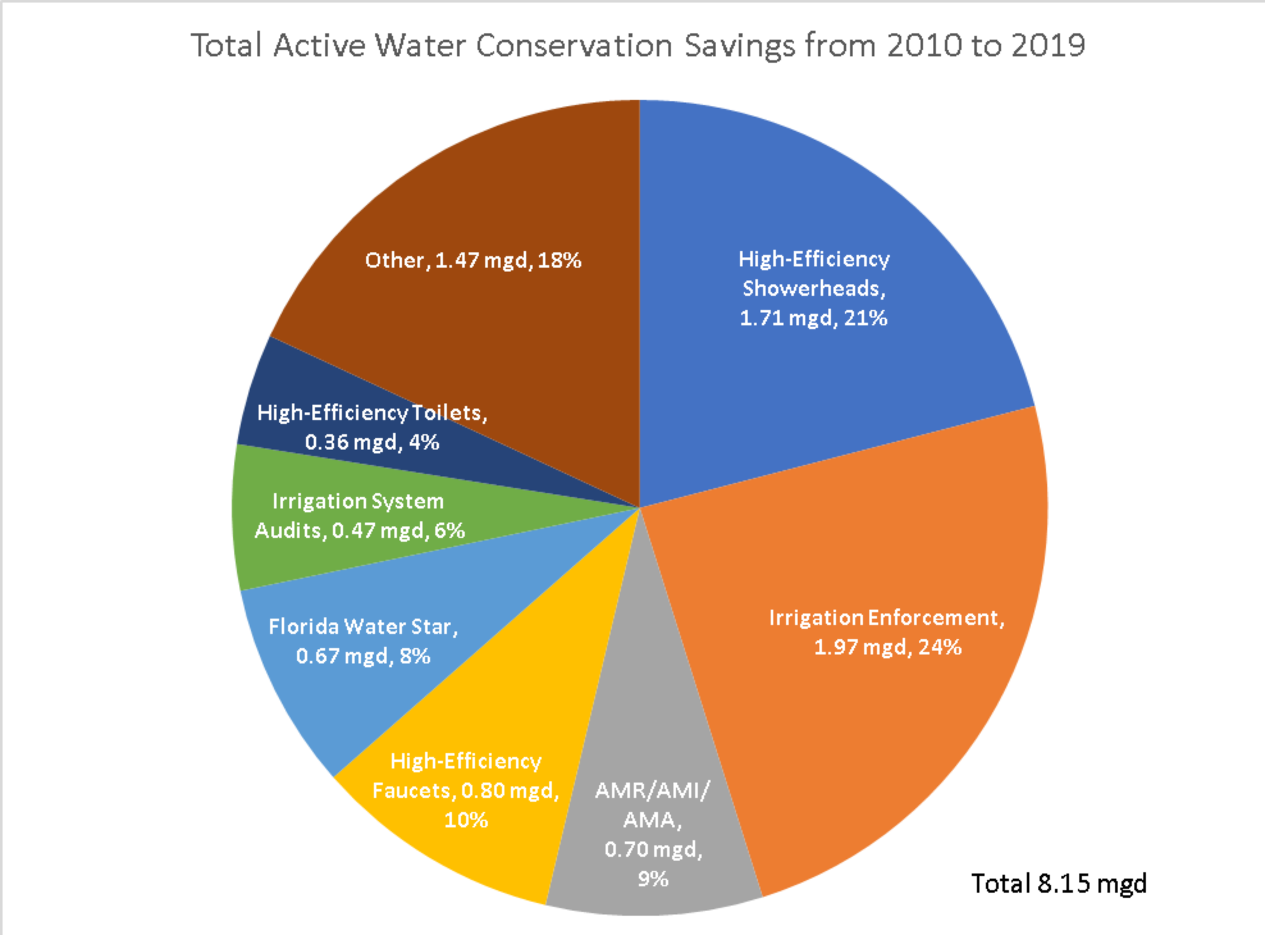

Figure 17. Total active water conservation savings from 2010 to 2019 in the CFWI Planning Area.

Active Water Conservation Projection Methodology

The active water conservation savings projections through 2040 are presented as a range (**Table 18**). These projections were based on historical water savings data from existing water conservation programs included in the Conservation Implementation Strategy. Two methods were used to assess the range of projected active water conservation savings. The first method, the low range, was based on the historical savings rates from 12 PS utilities that reported their water conservation efforts and was applied to all remaining PS utilities along with water conservation savings achieved through District cost-share projects. Under the assumption the historic water conservation savings rate of 0.98 mgd per year (4.89 mgd per 5 years) would be maintained through 2040. This resulted in a projected savings of 24 mgd. The second method, the high range, assumed that the calculated water conservation savings rate would increase through 2040 proportional to water demand growth. This resulted in a projected savings of 27 mgd. Minor adjustments to align the passive and active water conservation savings are discussed in **Appendix B.**

Future Public Supply Water Conservation Opportunities

There are many factors that can affect future water conservation efforts, such as the maintenance of water conservation activities to sustain savings rates, funding levels, new technologies, and future regulatory measures. The projected water conservation savings for the PS water use category are conservative, as they are based on quantified water conservation measures implemented within the CFWI Planning Area. There is potential for increased water conservation savings beyond the projected water conservation savings with increased participation rates and implementation of other water conservation measures not factored into the existing estimates, including more educational and outreach programs.

Continual evaluation, quantification, and adaptive management of water conservation measures are necessary to maximize water conservation savings. Data should be continually collected and analyzed to ensure cost-effective water conservation measures are being implemented and to assist in identifying additional water conservation measures that could be implemented. Outdoor water use typically constitutes the largest component of residential use. Outdoor residential irrigation measures may yield the largest water savings for PS. Public supply utilities and the Districts plan to continue work on quantifying and implementing water conservation measures, such as irrigation enforcement, water loss reduction, behavior change resulting from Advanced Metering Infrastructure/Advanced Metering Analytics (AMI/AMA) customer portal usage, landscape efficiency ordinance adoption, water conservation rate structures, advanced irrigation technology, and education outreach, which will provide a better understanding of the water conservation occurring in the CFWI Planning Area.

Agriculture Self-Supply

The Conservation Implementation Strategy, using the best available data from several sources, estimated that 3 mgd of AG water conservation savings has occurred from 2010 to 2017. Water conservation efforts in the AG water use category are often focused on improving irrigation efficiency. For this 2020 CFWI RWSP, the projected AG water conservation savings is 4 mgd by 2040.

Historical implementation rates of cost-share projects were used to develop water conservation savings projections based on the practices listed below (**Appendix B, Table B–5**):

- Irrigation Conversion refers to the practice of converting a less efficient water delivery system (or system components) to a more efficient one(s).
- Precision Irrigation refers to the practice of using devices such as automated pump control, soil moisture sensors, and weather sensing devices, to improve irrigation control and scheduling efficiency. This technology can also be applied to systems that are already operating delivery systems considered highly efficient.
- Mobile Irrigation Labs are staffed by trained specialists who conduct field audits of agricultural irrigation systems. During these audits, system design, maintenance, efficiency, uniformity, and/or operation costs are evaluated. Specific recommendations for efficiency improvements on reducing water applications are also given to the user.

However, not all water conservation achieved by AG will result in reduced water use. In some cases, producers may implement more efficient practices while expanding or intensifying operations, as may be the case with other water uses. The projected water conservation savings for the AG water use category are conservative. There is potential for increased water conservation savings beyond the projected water conservation savings with increased participation rates and implementation of other water conservation measures not assessed in this 2020 CFWI RWSP.

Potential for water conservation savings in the SWUCA portion of the CFWI Planning Area may be limited. Previous regulatory constraints and funding programs have resulted in increased water use efficiency that limits future water conservation savings potential. For example, in the SWUCA, the SWFWMD has adopted a 75 percent irrigation efficiency requirement in its AG WUP program, which has already resulted in considerable water conservation savings among AG operations.

Domestic Self-Supply

The water conservation savings projection for DSS is assumed to be directly proportional to that of the passive water conservation projection calculated in the PS water use category. In the development of that passive water conservation projection, the AWE tool provided county-level data, which was then proportioned out to PS and DSS individually based on the population projections for 2040. Based on this methodology, the projection for DSS water conservation savings is 0.9 mgd by 2040. Additional water conservation savings may be achieved through active water conservation measures, public education, and outreach; however, those potential water conservation savings cannot be calculated at this time.

Landscape/Recreational Self-Supply

Water conservation measures for the LR water use category focus mainly on improving the efficiency of irrigation through retrofitting existing irrigation systems with more efficient models. The use of smart irrigation controllers will also optimize irrigation while maintaining adequate landscape aesthetics. Using historic data and participation rates, the projected water conservation savings for the LR water use category is 2 mgd by 2040.

Commercial/Industrial/Institutional and Power Generation Self-Supply

Water conservation projections for these two water use categories are between 2 and 4 mgd by 2040. The low end of the range applied a 15 percent savings rate attributable to facility audits. The high end of the range was developed using the historical annual water savings rate of 0.18 mgd per year from the Conservation Implementation Strategy.

SUMMARY

Water conservation extends the available supply of traditional water sources to support growth and maintain natural resources. In aggregate, it is estimated the water conservation savings in the CFWI Planning Area range between 50 to 56 mgd by 2040 for all water use categories. These estimates reflect water conservation savings as a result of current and future activities.

Total water conservation savings in the 2015 CFWI RSWP were projected to be 37 mgd by 2035. The difference between estimated savings of the 2015 CFWI RWSP for 2035 and this 2020 CFWI RWSP for 2040 is attributed to additional conservation measures being quantified, inclusion of passive savings, and methodology changes in both in the way water demand and water conservation projections were calculated.

The projected water conservation savings for all water use categories in this 2020 CFWI RWSP are conservative. There is potential for increased water conservation savings beyond the projected water conservation savings with increased participation rates and implementation of additional water conservation measures, including more educational and outreach programs. Outdoor water use typically constitutes the largest component of residential use. Coordinated education, outreach, and public engagement are essential for the promotion of water conservation. The continuation of the water conservation ethic and discussion of these topics is included in the Conservation Implementation Strategy. Water conservation programs often are among the lowest cost solutions to meet future water demands and can reduce costs over the long term if properly planned and implemented. Water conservation in all water use categories continues to be a priority to meet future water demands, and is an important component of water supply planning that contributes to the sustainability of water supply sources.

6

Water Source Options

Within the CFWI Planning Area, water users have primarily relied on groundwater derived from the FAS and reclaimed water to meet water supply needs, with minor uses from the SAS and IAS and surface water from rivers, streams, and lakes. As water demands increase and withdrawals approach sustainable limits of traditional water supply resources, it is important to identify options for diversifying water supply sources. This chapter provides an overview of the water source options available to water users within the CFWI Planning Area.

TOPICS

- Groundwater
- Reclaimed Water
- Surface Water
- Stormwater
- Seawater
- Storage Capacity – ASR and Reservoirs

In the CFWI Planning Area, fresh groundwater sources (i.e., surficial, intermediate, and Floridan aquifers) are considered traditional water sources; whereas, nontraditional or alternative sources include brackish/nontraditional groundwater, surface water, seawater, reclaimed water, and water stored in aquifer storage recovery wells and reservoirs.

GROUNDWATER

Fresh groundwater is a water supply source for all six water use categories in the CFWI Planning Area. In 2015, an estimated 667 mgd of water was used, of which 95 percent came from groundwater, with the UFA as the predominant source. While increased groundwater withdrawals are projected to be limited regionally, groundwater use is expected to remain the largest source of water. Groundwater sources in the CFWI Planning Area include the UFA, LFA, the locally present IAS, and the sandy sediments of the SAS. Below is a brief description of each of the aquifers, including the potential availability of groundwater supply for future use.

Floridan Aquifer System

The FAS underlies the entire State of Florida and is the primary source of water in the CFWI Planning Area because of good water quality, high productivity, and wide-spread accessibility. The FAS is composed of sequential layers of limestone and dolomite and is traditionally subdivided into the Upper and Lower Floridan aquifers, which are separated by less productive horizons called the middle confining unit (**Figure 18**). Both the UFA and LFA are composed of multiple highly permeable zones, which can be very productive for water supply development. **Figure 19** shows a generalized hydrogeologic cross-section that displays the relationship between the SAS, IAS, and the FAS. The degree of confinement between the Upper and Lower Floridan aquifers is variable across the CFWI Planning Area (Miller 1986).

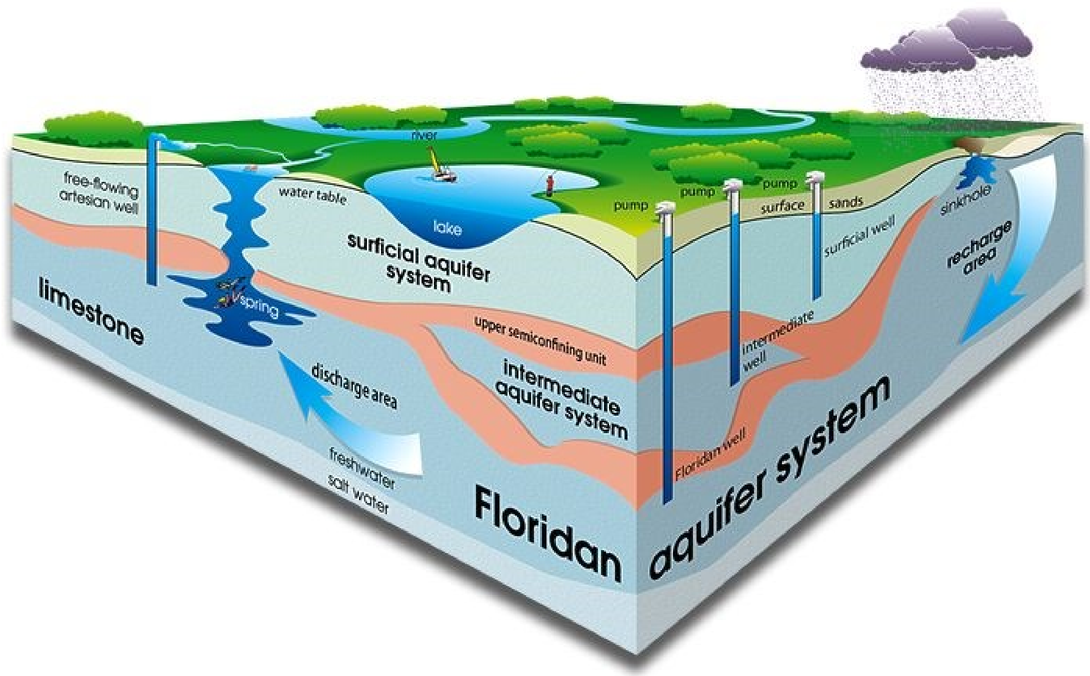

Figure 18. Representative diagram of the Floridan aquifer system.

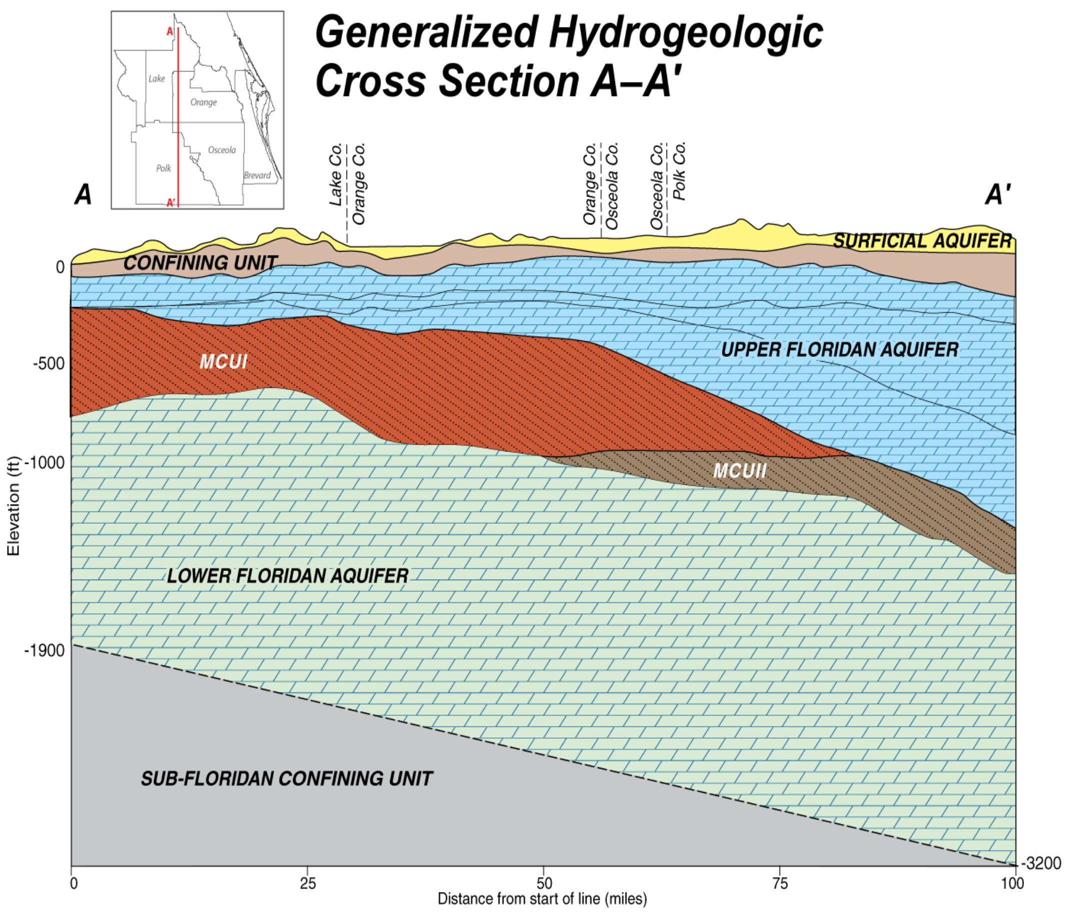

Figure 19. Generalized hydrogeologic cross section of the Floridan aquifer system through the CFWI Planning Area (Miller 1986).

MCU = middle confining unit

The amount of additional potential fresh groundwater development (availability), as described in **Chapter 4**, is limited and highly dependent on the location and rates of the withdrawals. The UFA plays a key role in supporting regional surface water systems including wetlands, lakes, springs, and streams. Excessive withdrawals from the FAS can adversely impact these systems by lowering water levels, which is referred to as drawdown. Opportunities exist to offset certain drawdown impacts locally, but future fresh groundwater development within the CFWI Planning Area will require evaluation during the CUP/WUP review process to determine if unacceptable impacts to wetlands, established MFLs, existing legal users, and water quality are projected to occur.

Brackish/Nontraditional Groundwater

Brackish/nontraditional groundwater in the CFWI Planning Area is a viable source for water supply. Numerous brackish groundwater treatment facilities exist in Florida; and brackish/saline groundwater in the FAS represents a key potential alternative source for regional water supply development. In many areas the LFA is considered an alternative water source, and several studies and projects are in progress to evaluate and develop this source for water quality and aquifer productivity. Potentially viable brackish aquifer zones exist in areas beneath eastern and southern Osceola County, eastern Polk County, eastern and southern Orange County, and northern Seminole County. Brackish water, for alternative water supply planning purposes in the CFWI Planning Area for the SJRWMD and SWFWMD, is generally defined as water with a total dissolved solids (TDS) concentration of greater than 500 milligrams per liter (mg/L). The SFWMD defines saline water, which includes brackish water, as water with chloride concentrations greater than 250 mg/L.

Development of brackish/nontraditional groundwater supplies generally requires desalination or blending with other freshwater sources to reduce TDS concentrations to acceptable levels. Typical membrane treatment methods such as reverse osmosis (RO) or electrodialysis reversal (EDR) both require the disposal of concentrated salt waste (concentrate). Desalination of brackish or saline water sources has higher treatment costs than treatment of freshwater sources, and concentrate disposal can pose a challenge to brackish/nontraditional water supply development.

An additional constraint in developing brackish/nontraditional groundwater supplies is the hydrogeologic connection between the brackish and freshwater portions of the FAS and the need to protect against harmful saline water intrusion. Investigation is needed to properly site brackish/nontraditional groundwater development projects in locations with sufficient hydrogeologic confinement to protect overlying fresh aquifer systems from possible drawdown and upconing of saline water. These investigations also ensure sufficient yields, hydrologic separation from currently used freshwater aquifers, and assess potential options for concentrate water disposal.

Although it has not yet been developed for production-scale water supply projects in the CFWI Planning Area, brackish water from the LFA is currently a permitted source of future water for the Water Cooperative of Central Florida (WCCF), the Reedy Creek Improvement District (RCID), and the Polk Regional Water Cooperative (PRWC). Since approval of the 2015 CFWI RWSP, the SWFWMD has partnered with the PRWC to conduct hydrogeologic investigations in several locations in Polk County to better define the location, depth, and quality of brackish groundwater from the LFA and perform aquifer performance tests to assess water supply yields in future potential wellfields. These efforts are ongoing and part of the assessment of feasibility of several water supply projects is discussed in **Chapter 7**.

Surficial Aquifer System

The SAS is composed primarily of sandy sediments ranging in thickness from just a few feet to nearly 200 feet in the Lake Wales Ridge. Water supply availability from this aquifer typically has a limited yield and is best suited for small-scale domestic and landscape irrigation use. The sandy sediments of the SAS are thickest in the Lake Wales Ridge region in eastern Polk County and are locally more favorable for water supply development. In this area, there are a significant number of permitted withdrawals from the SAS, primarily for AG irrigation. Water quality in the SAS typically contains elevated levels of iron, organic compounds, and sulfur (sulfate), and often requires additional treatment if used for drinking water. Additional water supply development from this aquifer system is likely to be local in nature and generally limited to irrigation-type water uses.

Intermediate Aquifer System

The IAS, where it exists, is located between the SAS and the FAS. The IAS has limited yield but has sufficient quality and quantity for DSS and LR uses. In recent years, average annual water use from the IAS has averaged 3.5 mgd in the CFWI Planning Area. Water quality in the IAS may require treatment for iron, organic compounds, and sulfur (sulfate) if used for drinking water. Due to its comparatively low yields and limited spatial extent, the IAS will have only a limited role in meeting future water demands.

RECLAIMED WATER

Reclaimed water is wastewater that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility. Reclaimed water for public access use has a high-level disinfection requirement. The reuse of reclaimed water utilization for beneficial purposes is a key component of water resource management in the CFWI Planning Area, with current reclaimed water use exceeding 95 percent. Reclaimed water is used for many purposes such as landscape irrigation, agricultural irrigation, power generation, groundwater recharge, industrial uses, and environmental enhancement (e.g., wetlands rehydration). Reclaimed water is also being investigated for potable reuse, which is the process of treating reclaimed water to state and federal drinking water standards so that it can be recycled for potable water supply uses.

Current Reuse in the CFWI Planning Area

In the CFWI Planning Area, wastewater generation has steadily increased along with population growth. In 2015, there were 77 wastewater treatment plants in the CFWI Planning Area with permitted capacities over 0.1 mgd. These providers generated 218 mgd of treated wastewater collectively (FDEP Reuse Inventory 2016), up from 193 mgd in 2010. Of that quantity, 212 mgd of reclaimed water was reused for beneficial purposes, an increase of over 30 mgd in five years. Of the volumes reused, 90 mgd was treated and reused for irrigation, 34 mgd for industrial uses, 74 mgd was reused for aquifer recharge and environmental enhancement, and 14 mgd for other uses. An additional 5 mgd of groundwater and stormwater was used to supplement reclaimed water supplies. Based on a general assessment of reuse in the CFWI Planning Area, it is estimated that the reuse of reclaimed water offset or replaced approximately 85 mgd of potable quality water use in 2015.

Future Potential Reuse in the CFWI Planning Area

Wastewater flows are projected to increase by 55 percent to an estimated 339 mgd by 2040 of which 333 mgd is estimated to be reused for beneficial purposes. Based on planning-level information provided by utilities, the use of reclaimed water is expected to approach 348 mgd by 2040. This includes approximately 15 mgd of reclaimed water supplementation identified by utilities to improve seasonal availability and maximize reclaimed water use. Reuse is expected to continue to be a key strategy in meeting regional water demands throughout the planning horizon. Irrigation is expected to be the largest use for reclaimed water, accounting for more than 60 percent of future beneficial reuse. Reuse methods and 2040 projections are summarized in **Appendix A, Tables A-13a, 13b, and 13c.**

Potable Reuse

Potable reuse is the augmentation of a drinking water supply with advanced treated reclaimed water, either indirectly or directly. Nationally, potable reuse of reclaimed water is an emerging water source for meeting public supply demands and several successful demonstration projects have been implemented in Florida. Potable reuse could be a viable long-term source of water for meeting water supply demands in the CFWI Planning Area.

In 2018, the Florida Potable Reuse Commission (PRC) was established to develop a policy and regulatory framework for the implementation of potable reuse as a water supply to meet Florida's future water demands. The PRC is a partnership between state agencies, utilities, and a diverse group of environmental, industry, and public health stakeholders. In 2020, the PRC published their final report (FPRC 2020) and initiated communication and outreach efforts. Active engagement of the community and education will be required to gain public acceptance of potable reuse.

Indirect Potable Reuse

Indirect potable reuse (IPR) is the planned delivery or discharge of reclaimed water to ground or surface waters for the development of, or to supplement, potable water supply and has been implemented locally, nationally, and internationally. Although IPR has not yet been identified as a large-scale future use of reclaimed water, the potential for IPR via groundwater recharge in the CFWI Planning Area is significant, and interest in IPR implementation is growing over time among area utilities.

Direct Potable Reuse

Direct potable reuse (DPR) is the introduction of advanced treated reclaimed water into a raw water supply immediately upstream of a drinking water treatment facility or directly into a potable water supply distribution system. The reclaimed water has undergone extensive treatment and monitoring to meet or exceed potable water quality requirements. Although DPR is not currently being implemented within the CFWI Planning Area, there is increasing interest and consideration of the concept as a viable future water supply option. There are several potable reuse pilot projects in the state, including one completed by the City of Altamonte Springs (pureALTA) within the CFWI Planning Area.

SURFACE WATER

The CFWI Planning Area includes the headwaters for seven river systems: the Alafia, Peace, Hillsborough, Withlacoochee, Kissimmee/Chain of Lakes, Ocklawaha, and St. Johns. **Figure 20** shows the watersheds of these river basins within the CFWI Planning Area and surrounding areas. Opportunities exist for the development of water supplies from the lakes and rivers in or near the CFWI Planning Area that could supplement fresh groundwater supplies. The capture and storage of water from surface water systems can supply significant quantities of water and could be a component of multi-source water supply development projects. The following discussion focuses on the potential for the development of supplemental surface water supplies from the larger regional systems. The Hillsborough River is not discussed in detail, as only a small portion of the watershed is within the CFWI Planning Area.

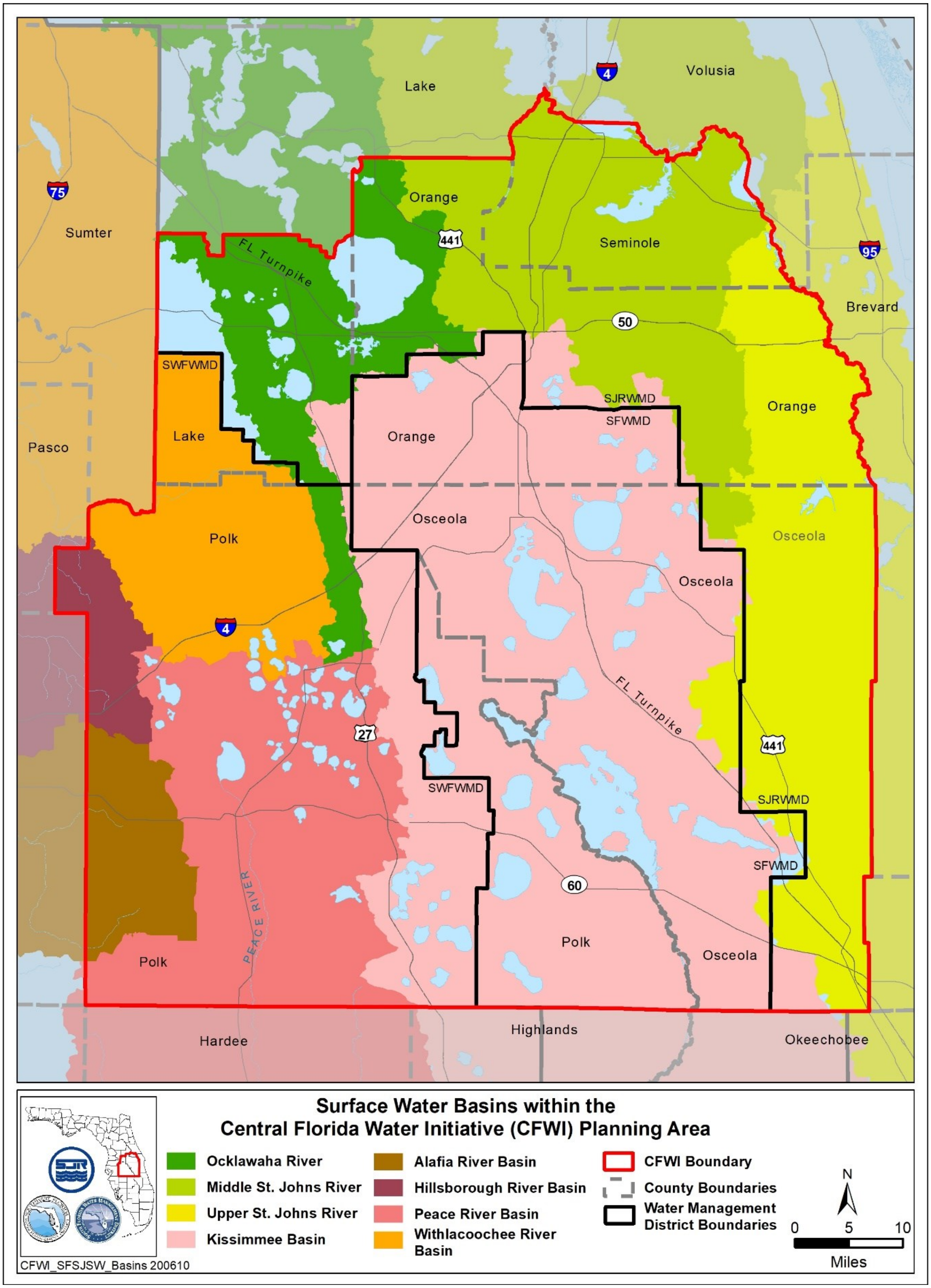

Figure 20. Surface water basins within the CFWI Planning Area.

St. Johns River System

The St. Johns River, approximately 310 miles long, is the longest river in Florida. It is one of the few rivers in the United States that flows north. Major tributaries that flow into the St. Johns River, include the Wekiva, Econlockhatchee, and Ocklawaha rivers. Within the St. Johns River watershed, surface water is currently used to meet PS, landscape irrigation, and AG irrigation needs. Water supply projects on the St. Johns River have already been implemented by Seminole County at Yankee Lake, the City of Cocoa at TCR, the City of Sanford at Lake Monroe, and the City of Winter Springs at Lake Jesup. Although the St. Johns River can supply a large volume of raw water, this water varies in both quantity and quality throughout the year. The St. Johns River, like most rivers, is subject to high and low flows. To accommodate these water level fluctuations of availability, significant amounts of raw water, finished water storage, or conjunctive use of surface water with groundwater may be required to provide a reliable water supply at some locations. Additionally, during low-flow periods, water in the St. Johns River is slightly to moderately brackish, requiring higher levels of treatment to remove these dissolved salts and naturally occurring organic matter.

The SJRWMD has conducted multiple studies to evaluate the potential for additional water supply projects on the river. The Water Supply Impact Study (WSIS) assessed the potential environmental impacts associated with increased surface water withdrawals along the St. Johns River (SJRWMD 2012). The study confirms that the St. Johns River is a viable alternative water supply source, with combined withdrawals of up to 155 mgd from three locations, would result in minimal to negligible environmental impacts to both surface and groundwater resources.

Peace River System

The Peace River is the most prominent river system in Polk County and has two major tributaries. Opportunities for developing water supply projects on the Peace River may be available and are being investigated by the Polk Regional Water Cooperative (PRWC). A complicating factor in developing potential water supplies from the Peace River is that river flows can be unreliable. The upper Peace River, between Bartow and Zolfo Springs, often does not meet its established MFL in the dry season and has occasionally ceased flowing entirely. The SWFWMD has implemented projects to capture and store river flows during high-flow periods and to reestablish minimum flows in the upper Peace River during low-flow periods. In association with these projects, a water reservation for Lake Hancock and Lower Saddle Creek in the headwater area of the Peace River is under development to support minimum flow recovery. Restoration projects and related efforts may have benefits which could improve reliability in flow for PS capture. Several AWS project options have been identified for the Peace River and are presented in **Appendix E**.

The Peace River is also currently a major source of water for the Peace River Manasota Regional Water Supply Authority (PRMRWSA) which is located outside the CFWI Planning Area within the SWFWMD's Southern Planning Region. A large share of available surface water in the Peace River is allocated to the PRMRWSA, although it is estimated that some water may be available for Polk County in the future. In 2019, the PRWC and the PRMRWSA entered into agreements providing for the shared use of the Peace River.

Ocklawaha River System

The Ocklawaha River watershed covers 2,769 square miles, from the Green Swamp in Polk County and Lake Apopka sub-basins north through the Rodman Reservoir to the river's discharge into the St. Johns River near the Town of Welaka. The Ocklawaha River emerges from Lake Griffin in the upper Ocklawaha Chain of Lakes and flows north until it is impounded as Rodman Reservoir, also known as Lake Ocklawaha, prior to ultimately flowing into the St. Johns River. The Ocklawaha River is not used as a water supply source, and no water supply projects are proposed.

Alafia River System

Although most of the Alafia River watershed is in Hillsborough County, the headwaters are in western Polk County where the land has been mined extensively for phosphate ore. The Alafia River is currently a source of water for local mining operations, as well as Tampa Bay Water (TBW), a regional water supply authority downstream in Hillsborough County. Due to the small portion of the Alafia watershed that is in the CFWI Planning Area, local water supply development may be limited. Partnerships with TBW represent a potential mechanism to develop additional regional water supplies from the Alafia River for the CFWI Planning Area.

Kissimmee River and Chain of Lakes

A water reservation for the Kissimmee River and Chain of Lakes (KCOL) is under development by the SFWMD. The Kissimmee River system is undergoing a major restoration effort and is anticipated to be completed in 2020. When fully implemented, it is anticipated to require water to be stored in and released from the KCOL and its tributaries as part of a management strategy balancing flood control and environmental restoration. The KCOL Water Reservation area is 172,500 acres and spans portions of the SFWMD's Upper Kissimmee Basin Planning Area (part of the CFWI) as well as the SFWMD's Lower Kissimmee Basin Planning Area. The KCOL (Upper Chain of Lakes and the Headwaters Revitalization Lakes) is the primary source of water for the Kissimmee River (**Figure 21**).

Withlacoochee River System

The Withlacoochee River originates in the Green Swamp in Polk County and flows northward for 157 miles where it discharges into the Gulf of Mexico near Yankeetown, Florida. The Withlacoochee River is not currently used as a significant water supply source and no water supply projects are currently proposed in the CFWI Planning Area. Any development of surface water from the Withlacoochee River in the CFWI Planning Area is expected to be local in nature.

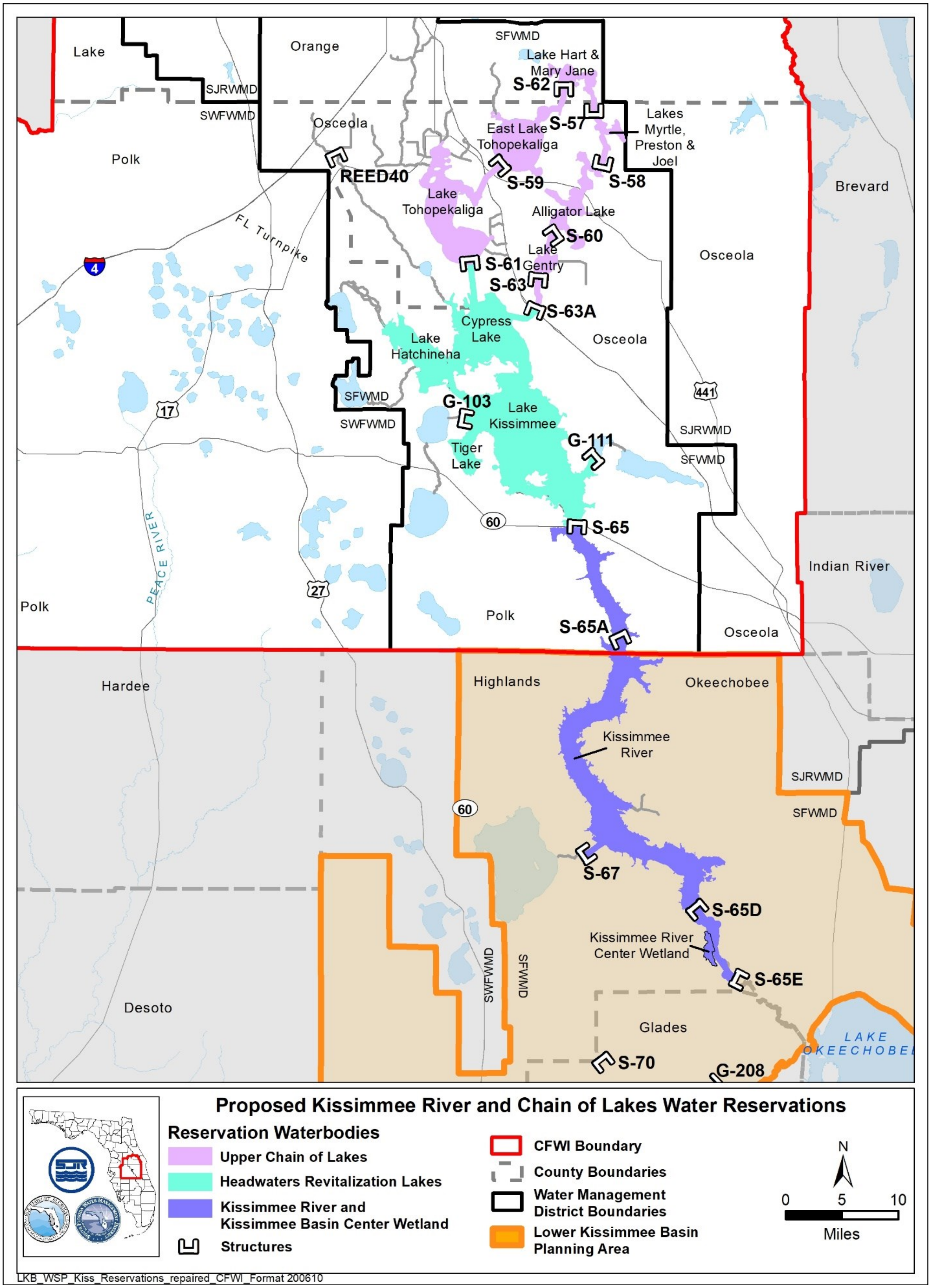

Figure 21. Proposed Kissimmee River and Chain of Lakes water reservation waterbodies.

STORMWATER

Rule 62-40.210(37), F.A.C., defines "stormwater recycling" as the capture of stormwater for irrigation or other beneficial use. The FDEP and the water management districts define stormwater as the flow of water which results from, and which occurs immediately following, a rainfall event and which is normally captured in ponds, swales, or similar areas for water quality treatment or flood control. Development of the natural landscape can result in significant changes to the characteristics of stormwater flows. Stormwater runoff can provide considerable volumes of water that can be captured and beneficially used, resulting in water supply, aquifer recharge, water quality, and natural system benefits. The reliability of stormwater can vary considerably, depending upon climatic conditions and storage capability. Therefore, the feasibility of effectively 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 FDOT on stormwater capture and harvesting projects. The SJRWMD and FDOT participate in quarterly meetings throughout the year to discuss several topics, including project ideas with potential for stormwater harvesting, multiple benefits, and partnership development. In addition, the FDOT's Efficient Transportation Decision Making Process gives the water management districts and other agencies an opportunity to provide comments during the Planning Screen phase of a project. When FDOT projects advance to the Project Development and Environment phase, the FDOT uses Environmental Look Arounds (ELAs) to proactively look for cooperative and regional stormwater management opportunities. ELAs can assist the water management districts, other agencies, and local utilities with identifying sources of stormwater.

SEAWATER

The use of desalinated seawater from the Atlantic Ocean and Gulf of Mexico is an additional water source option in the CFWI Planning Area. Seawater is an unlimited source of water. However, desalination is required before seawater can be used for water supply purposes. While seawater treatment costs are decreasing and capital costs are becoming competitive with other AWSs, operational costs remain moderately higher than other water supply options. Co-locating seawater desalination plants with power generation facilities can help to make this option more feasible in terms of cost effectiveness. In assessing the potential for seawater development, it must be noted that the CFWI Planning Area is landlocked, and development of coastal seawater supplies would require significant investment in transmission infrastructure.

Seawater is currently used in Tampa Bay and surrounding regions. Tampa Bay Water (TBW) operates a seawater desalination facility with up to 20 million gallon per day (mgd) capacity as a portion of its regional water supply system. Potential future partnerships or interconnects between TBW and the PRWC could supply desalinated seawater to the CFWI Planning Area as a portion of the finished water mix produced by TBW.

The SJRWMD has previously investigated the feasibility of co-locating seawater desalination facilities with power generation facilities (Beck 2004; Applied Technology 2006). This investigation identified two potential 10 mgd water supply projects that would be beneficial to the CFWI Planning Area via the transport of treated seawater inland to central Florida from the Atlantic coast area.

STORAGE CAPACITY – ASR AND RESERVOIRS

Florida's rainfall patterns exhibit strong seasonality, with distinct dry and wet seasons. When developing certain types of water sources, such as reclaimed water and surface water supplies, a seasonal mismatch of water source availability and water demands can constrain the potential for water supply development. When developing these water supplies, storage capacity must be developed to balance supplies and demands. Two key strategies for achieving regional storage solutions are listed below and constitute an AWS pursuant to 373.019(1), F.S.:

- Aquifer storage and recovery (ASR) is the underground injection and storage of water into a subsurface formation for withdrawal for beneficial purposes in the future. 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.
- Reservoirs provide a more traditional, above ground storage option for large volumes of water on a seasonal basis. Regional reservoirs require careful siting, and can require significant land availability for construction, but provide an established solution for long-term water storage. An existing regional reservoir in the CFWI Planning Area is the Taylor Creek Reservoir (TCR) on the St. Johns River (**Figure 22**).

Figure 22. Taylor Creek Reservoir looking south.

7

Water Supply and Water Resource Development Options

INTRODUCTION

TOPICS

- Introduction
- Water Supply Project Options and Initiatives
- Water Resource Development

An important part of the water supply planning process is to identify water supply and water resource development project options necessary to meet current and future water demands. This chapter provides a summary of the water supply development and water resource development projects and programs that contribute to water supply efforts. Pursuant to Section 373.709(2)(a)2., F.S., the technical and financial feasibility and permittability of the water supply development project options were considered (at a planning level of analysis) when developing this 2020 CFWI RWSP.

Total water demand for the CFWI Planning Area is projected to increase 36 percent, from 667 mgd in 2015 to an estimated 908 mgd in 2040. As the availability of fresh groundwater is limited regionally due to environmental and resource concerns, development of AWS is necessary to meet water supply needs. It is expected that key sources to be developed will include the increased use of reclaimed water and the development of brackish/nontraditional groundwater and surface water supplies. Water conservation and other demand management techniques are also expected to play an important role in meeting future water demands.

During the planning process, the Districts worked with stakeholders to update the status of project options listed in the 2015 CFWI RWSP and identify new project options. As summarized in **Appendix E,** 85 potential water supply and water resource development project options were identified to meet future water supply needs and 21 water conservation project options. The projects, if implemented, could supply sufficient quantities of water to meet projected water demands. **Figure 23** provides a map showing the location of the identified project options (**Appendix E, Table E-1**).

Since the development of the 2015 RWSP, the Districts and area water users have made extensive progress on AWS development, water resource development, and water conservation. From FY2015 through FY2019, the Districts invested approximately $44.62 million in 39 AWS projects that have been completed or are under construction or investigation in the CFWI Planning Area, making available 94.30 mgd of AWS. Additionally, the Districts provided approximately $4.89 million for 39 water conservation projects that were completed or are being implemented. The projects are estimated to have saved 4.35 mgd and are summarized in **Chapter 2**, **Figure 3**.

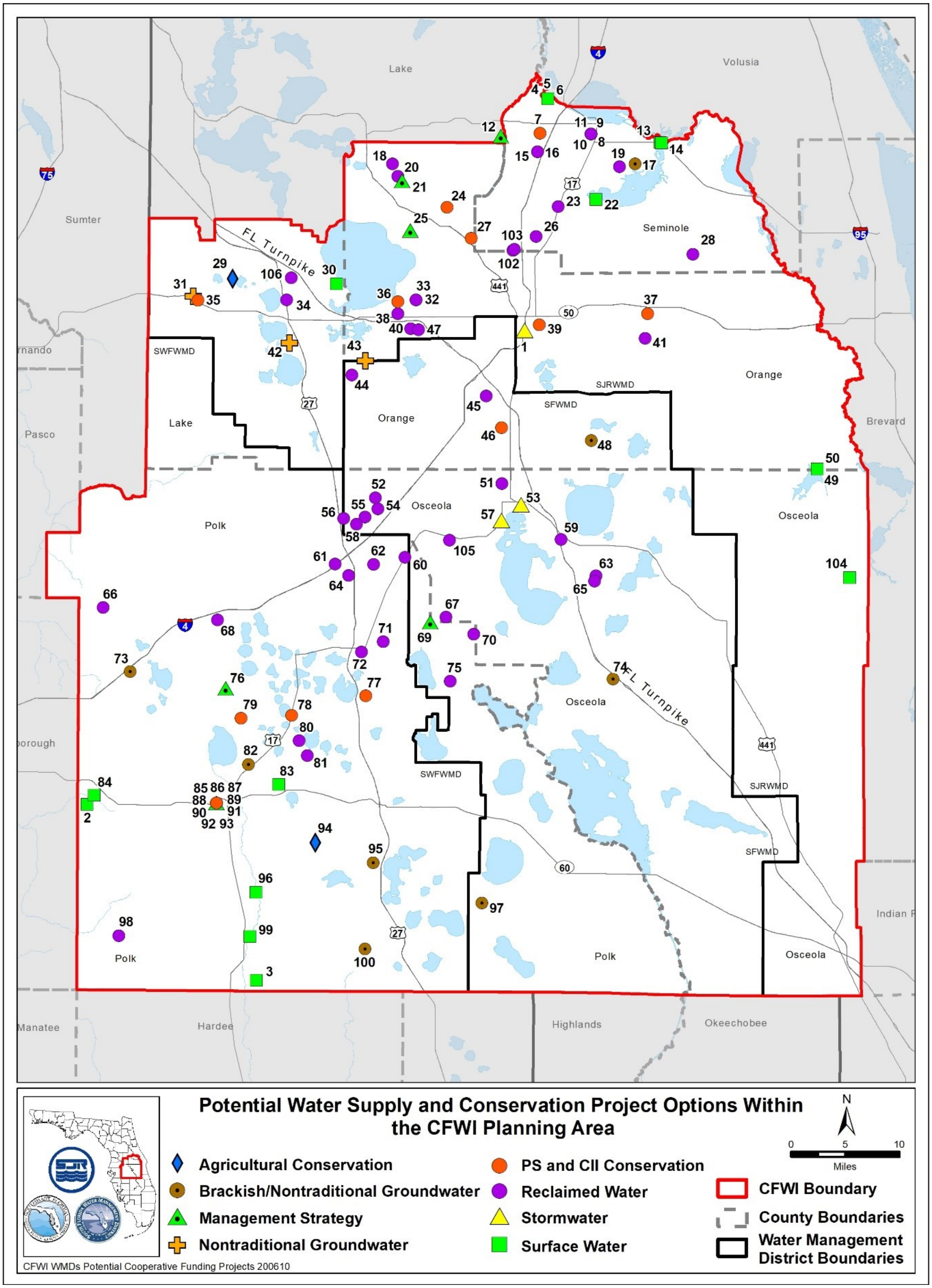

Figure 23. Map of potential water supply and conservation project options within the CFWI Planning Area.

Table 20 summarizes the suite of water supply and water resource development project options by county and category identified by water suppliers and the Districts to meet the 2040 projected water demands and management strategies. The groundwater availability analysis discussed in **Chapter 4** suggests that up to 760 mgd of fresh groundwater may be available, but local management strategies will be needed (e.g., wellfield optimization, aquifer recharge, and natural system enhancement) to address unacceptable impacts. Additional fresh groundwater withdrawals, beyond 760 mgd, are limited by water resource and natural system constraints. This suggests that AWS, in an amount up to 95 mgd, may need to be developed by 2040 to meet future water demands. The project options identified in this 2020 CFWI RWSP are sufficient to meet and exceed current and projected water supply demands, providing numerous options for water users.

Table 20. Summary of 2020 – 2040 net water supply and water resource development project options by county and category (mgd) in the CFWI Planning Area.

County	Brackish/ Nontraditional Groundwater	Management Strategies	Reclaimed Water	Surface Water	Stormwater	Total
Lake	13.70	0.00	3.80	5.00	0.00	22.50
Orange	24.00	5.00	31.97	71.00	0.00	131.97
Osceola	30.00	0.00	0.00	120.00[a]	5.90	160.90
Polk	45.00	6.00	11.35	46.10	0.00	108.45
Seminole	1.00	0.00	7.03	82.20	0.00	90.23
Total	**113.70**	**11.00**	**59.15**	**324.30**	**5.90**	**514.05**

[a] Includes the Grove Land Reservoir Project located in Okeechobee and Indian River counties.
mgd = million gallons per day

WATER SUPPLY PROJECT OPTIONS AND INITIATIVES

Water supply development is defined in Section 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, and use the water source options as described in **Chapter 6** to meet their needs (Section 373.705(1)(b), F.S.; Rule 62-40.531(4), F.A.C.).

A list of water supply project options for the CFWI Planning Area was developed in coordination with water suppliers and users. The core of this list represents projects or concepts that were developed in the 2015 CFWI RWSP. Many of these projects have continued to be investigated and developed in greater detail since 2015. The Districts solicited new projects for this 2020 CFWI RWSP, and reached out to PS utilities, AG, and other water users regarding water supply projects to meet water demands through 2040. In addition, pursuant to Section 373.709(2)(a)2., F.S., the technical and financial feasibility and permittability of the water supply development project options were considered (at a planning level of analysis) when developing this 2020 CFWI RWSP.

Appendix E identifies 85 potential water supply and water resource development project options, 11 brackish/nontraditional groundwater, 48 reclaimed water, 17 surface water, 2 stormwater, and 7 management strategies as well as 21 water conservation project options. The estimated water supply generated, or water resource benefit, is listed for each project, as well as the project capacity, an implementing entity, and a schedule for project completion. The project list also provides information on the planning level costs of the proposed projects. In general, these costs were developed by the sponsor of the proposed project, so the basis of these cost estimates vary. For projects included from the 2015 CFWI RWSP, the Districts made efforts to update the project details and costs via outreach to the project sponsor. In cases where no updated cost information was available, the project costs were updated from 2014 to 2019 dollars based on federal inflation data (Chained Consumer Price Index) developed by the Bureau of Labor Statistics.

Projects identified in this 2020 CFWI RWSP may not necessarily be selected for development by the water supplier. In accordance with Section 373.709(7), F.S., nothing contained in the water supply component of a RWSP should be construed as a requirement for water users to implement a particular project. If the projects identified in this 2020 CFWI RWSP are not selected by a water supplier, the water user may need to identify another source to meet its needs, advise the Districts of the alternate project(s), and a local government will need to include such information in its Water Supply Facilities Work Plan.

Groundwater Supply Development

The primary source of water supply in the CFWI Planning Area is groundwater. Groundwater is supplied from the surficial, intermediate, and Floridan aquifer systems, which are described in more detail in **Chapter 6**. The FAS is subdivided into the Upper and Lower Floridan aquifers. The UFA is a semi-confined, highly productive aquifer and has historically been the primary source of water supply throughout the CFWI Planning Area (averaging over 500 mgd of supply from 2011-2014). The LFA is also being used in some areas (averaging about 120 mgd of use from 2011-2014).

Fresh Groundwater

The majority of the 2015 water use in the CFWI Planning Area was met by fresh groundwater from the surficial, intermediate, and Floridan aquifer systems, with most of the withdrawals occurring from the UFA. As part of this 2020 CFWI RWSP, it was confirmed that water resource concerns have limited the availability of future water supply development of the UFA. As such, there are no water supply projects identified using the UFA. The LFA contains fresh groundwater in the northwest portions of the CFWI Planning Area (central Lake, western-central Orange, and southwestern Seminole counties) and is brackish elsewhere. The LFA as a potential AWS option continues to be evaluated and developed as described below.

Brackish/Nontraditional Groundwater

The water supply potential of brackish/nontraditional groundwater from the LFA is being extensively investigated in the CFWI Planning Area. Brackish water from the LFA is expected to be a significant regional solution for meeting regional water supply needs. Eleven potential brackish/nontraditional groundwater projects have been identified to develop AWS within portions of the CFWI Planning Area (**Appendix E, Table E-2**). This 2020 CFWI RWSP identifies over 100 mgd of brackish/nontraditional groundwater projects and concepts.

The brackish/nontraditional groundwater supply projects range from local projects providing 1 mgd of water supply to regional projects that could provide up to 30 mgd of water supply. One notable example of a regional project, the Cypress Lake Wellfield project, is being developed in central Osceola County by the WCCF and the RCID. This project (included in the AWS estimates above) has been permitted by the SFWMD and is anticipated to provide new potable supply of up to 30 mgd through development of the LFA. Two test production wells and preliminary design of a RO water treatment plant have been completed. Construction of the RO plant is being planned in two phases; the first phase will deliver 15 mgd of finished water with the second phase at the 30 mgd build-out capacity.

Since approval of the 2015 CFWI RWSP, the SWFWMD has partnered with the PRWC to conduct hydrogeologic investigations in several locations in Polk County to better define the availability and quality of brackish groundwater from the LFA and perform aquifer performance tests to assess water supply yields in future potential wellfields. The Southeast Polk County Wellfield project (included in the AWS estimates above) has been permitted by the SFWMD and is anticipated to provide new potable supply of up to 30 mgd from the LFA. The PRWC and the SWFWMD are also actively investigating the potential for LFA development in western Polk County under the West Polk LFA Deep Wells Project. If implemented at full scale, these two projects represent options for up to 45 mgd of new finished water supply from the LFA in Polk County.

Water Conservation

Twenty-one water conservation projects have been identified by water users and are included in the regional project options list in **Appendix E, Table E-3.** This includes 19 PS water conservation projects and 2 AG water conservation projects totaling 1.6 mgd of water savings. In addition to these specific projects, the Districts' ongoing cooperative funding programs are expected to continue to lead to the implementation of new water conservation projects and play an important role in meeting regional water supply needs.

Reclaimed Water

In 2015, approximately 218 mgd of wastewater was generated by 55 service providers from a combined 77 wastewater plants (with permitted capacities over 0.1 mgd) within the CFWI Planning Area (FDEP 2016). Wastewater flows are projected to increase by 55 percent, to an estimated 339 mgd, by 2040 of which 333 mgd is estimated to be reused for beneficial purposes. Based on planning-level information provided by utilities, use of reclaimed water is expected to approach 348 mgd by 2040. This includes approximately 15 mgd of reclaimed water supplementation identified by utilities to improve seasonal availability and maximize reclaimed water use. The method for determining the projected availability of wastewater and reuse supplied is described in **Appendix A**.

Forty-six projects have been identified that distribute and use reclaimed water within the CFWI Planning Area as listed in (**Appendix E, Table E-4**). Projects identified include construction of treatment facilities, pipelines, use of surface/stormwater to supplement and increase the total reclaimed water availability during peak use periods, the interconnection of reuse systems to increase reclaimed water utilization and improve reliability, and potable reuse.

In addition to identifying potential reclaimed water projects, the Districts also worked with utilities to develop an estimate of the potential future uses of reclaimed water in the CFWI Planning Area. Through 2040, landscape irrigation for residential, golf courses, and other public access areas is expected to remain the primary use of reclaimed water, followed by recharge and industrial uses (**Figure 24**).

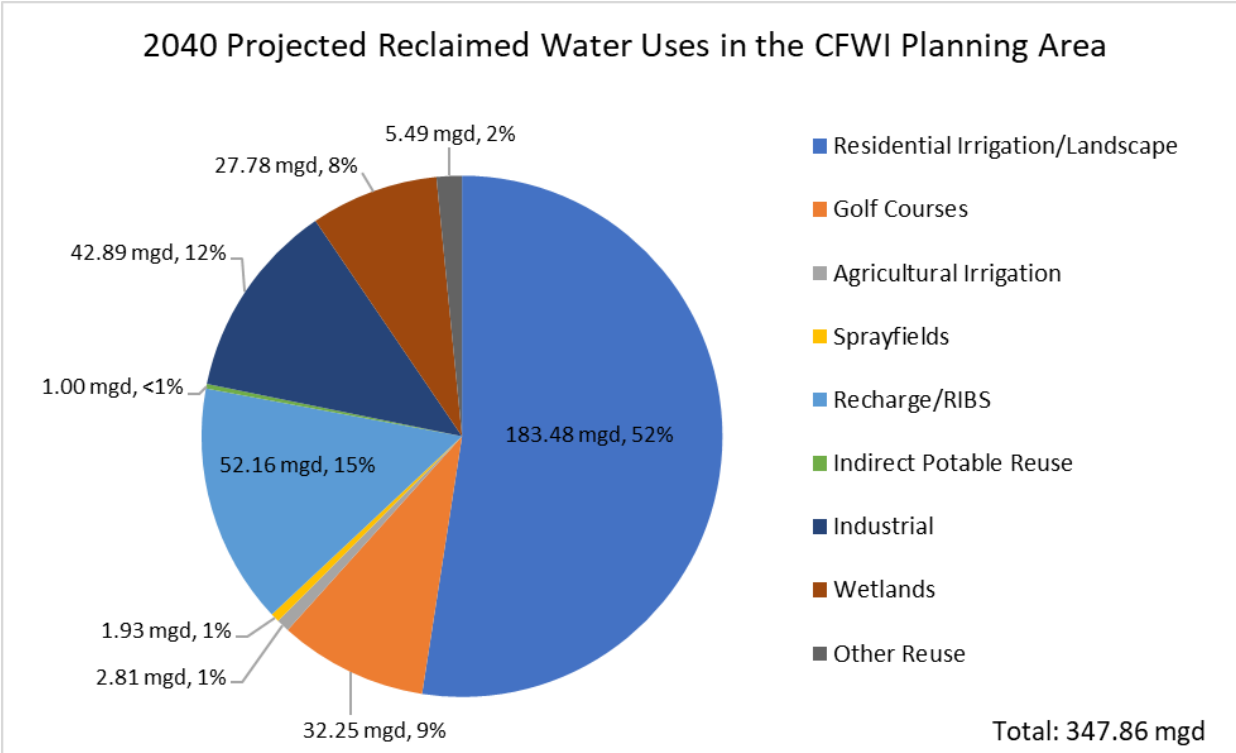

Figure 24. 2040 projected reclaimed water uses in the CFWI Planning Area.

Role of Reuse in Meeting CFWI Planning Area Water Supply Needs

Only a portion of reuse quantities actually offset water demands that would otherwise use fresh groundwater. Utility data have shown that the amount of potable fresh groundwater offset typically achieved is approximately 65 to 75 percent; however, actual fresh groundwater offset can range from 50 to 100 percent, depending on the type of use being replaced. While the amount of fresh groundwater offset that is achieved by reuse is dependent upon the demographics of a particular wastewater treatment facility's service area, the projected wastewater flows do not represent an amount equal to the water demand reduction due to system losses and inefficiencies of reuse by customers. Several factors could modify this estimate significantly, including changes in the planned types of reuse, local reclaimed water billing rates, and changes in customer demands. For this 2020 CFWI RWSP, fresh groundwater water offsets are only considered for irrigation and industrial uses and do not include recharge and environmental enhancement.

The PS water demand projections compiled in **Chapter 3** were developed assuming that future rates of reclaimed water use will be similar to current rates. This means some future growth in reclaimed use will be needed to serve new customers to maintain current average per capita rates of potable water consumption as population grows. To reduce or offset projected water demands, it would be necessary to expand reclaimed water service so that a higher proportion of PS customers have reclaimed water service available in the future as population grows. Overall, the reuse of reclaimed water will be essential to meeting current and future water demands in the CFWI Planning Area.

Surface Water

The CFWI Planning Area contains hundreds of lakes and the headwaters for seven river systems. Despite the abundance of surface water features, a relatively small amount of surface water is currently withdrawn for PS or other uses. These lakes, rivers, and creeks support significant ecological resources, including several listed by the FDEP as Outstanding Florida Waters, which must be protected from harmful impacts of proposed withdrawals from these systems. Capturing flows from these surface water bodies for water supply, particularly to support conjunctive use projects, may be effective, but can be expected to have varying levels of reliability depending on seasonal rainfall patterns.

A total of 17 potential surface water supply projects have been identified within the CFWI Planning Area (**Appendix E, Table E-5**). The surface water project options identified represent options exceeding 300 mgd of potential AWS development.

The St. Johns River projects are the St. Johns River/TCR, the St. Johns River near SR 46, the St. Johns River near Yankee Lake (3 options), and Grove Land Reservoir. Within Polk County, the PRWC and SWFWMD are actively investigating the Peace River Land Use Transition Treatment Facility and Reservoir Project, the Peace Creek Integrated Water Supply Project, and the Winter Haven Peace Creek Surface Water Storage Project. These projects include the potential development of seasonally available surface water flows in the Peace River watershed. The project options list also includes potential project concepts for partnerships between the PRWC and other regional water supply authorities in the SWFWMD, as well as an option for an off-stream reservoir at the Alafia River.

The Grove Land Reservoir and Stormwater Treatment Area (GLRSTA) Project is proposed to be an approximately 5,000-acre reservoir capable of storing 75,000 ac-ft of water and a 2,000-acre stormwater treatment area to improve water quality, located outside the CFWI Planning Area in Okeechobee and Indian River counties. The FDEP funded the recently completed project development and environmental study. The GLRSTA may be able to deliver up to 100 mgd to the headwaters of the St. Johns River and ultimately to the CFWI Planning Area after water availability determinations have been calculated and regulatory issues resolved.

The North Ranch Sector Plan (NRSP), adopted by Osceola County, includes the Pennywash/Wolf Creek Reservoir (PWR) as a potential water supply project option. This project is not anticipated to be needed until after 2040, but since it is listed in the NRSP, Section 163.3245(4)(b), F.S., requires this water supply option be incorporated into the applicable RWSP. This conceptual project would be a new surface water reservoir near the junction of Pennywash and Wolf creeks. The PWR is estimated to yield 20 mgd at a cost ranging from $52 to $136 million depending on how the reservoir is designed and operated and the available yield of the St. Johns River.

Stormwater

Stormwater is normally captured and/or conveyed by maintained ponds, swales, or similar features for water quality treatment or flood control. Limited water availability in many areas has led to rapid advances in the use of stormwater as a water supply strategy. Central Florida utilities have begun embracing this concept, primarily for augmenting reclaimed water supplies for residential irrigation or other non-potable uses. Two water supply projects being implemented in central Florida (**Appendix E, Table E-6**) involve the impoundment of stormwater to supplement reclaimed water supplies.

One project currently under construction is the Judge Farms Reservoir and Impoundment in Kissimmee. This impoundment will have a capacity of approximately 400 million gallons, which will be available for supplementation in Tohopekaliga Water Authority’s (TWA’s) reuse system. The other stormwater water supply project, also in Kissimmee, is the West Ditch Reuse Augmentation Project. This project will collect stormwater from the West Ditch Canal and route it through a series of interconnected ponds for supplementation of the reuse system at TWA's South Bermuda Wastewater Treatment Facility.

Other project opportunities include local governments and utilities partnering with the FDOT on stormwater capture and harvesting projects. A placeholder for such conceptual FDOT projects has been identified in **Appendix E, Table E-7**.

WATER RESOURCE DEVELOPMENT

The intent of water resource development components described in this Chapter is to enhance the amount of water available for water supply development. Water resource development projects can be categorized into two broad categories. The first category includes regional projects designed to create from traditional or alternative sources an identifiable, quantifiable supply of water for existing and/or future reasonable-beneficial uses. Water resource development projects are typically implemented directly by the Districts or by the Districts in conjunction with other agencies or local governments. These include projects that increase the amount of water available for water supply. The second category encompasses data collection and analysis activities that support water supply development 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.

This section summarizes projects and District programs that are regional in nature and are expected to significantly contribute to water supply development in the CFWI Planning Area. Water Resource Development projects included in this 2020 CFWI RWSP are included in **Appendix E, Table E-1**.

Surface Water Storage Projects

The seasonal storage of surface water is a water resource development option that may increase the quantity of water available to meet future growth in the CFWI Planning Area. The Districts conducted feasibility studies to determine the benefits, costs, and potential environmental effects of these projects.

An example of a surface water storage project is the TCR Improvement Project (**Appendix E, Table E-4**). This project consists of levee improvements to the TCR to support increased water levels in the reservoir. Raising the water level in the reservoir would increase the water supply yield from the reservoir.

The PRWC is also investing in three projects with water supply and water resource development components, including the: Winter Haven Peace Creek Surface Water Storage Project, Peace Creek Integrated Water Supply Project, and Peace River Land Use Transition Treatment Facility and Reservoir Project. These projects focus on water resource improvements in the upper Peace River watershed and include potential water supply benefits.

Aquifer Recharge and Enhancement Projects

Aquifer recharge projects can be used to increase the amount of water in an aquifer to help offset declines caused by groundwater withdrawals. Methods for aquifer recharge include land application in a high recharge area, using recharge wells to inject water into an aquifer, or using other recharge techniques such as RIBs. Sources of water for aquifer recharge can be surface water, reclaimed water, or stormwater. 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. Examples of aquifer recharge/enhancement projects are described below (**Appendix E**, **Table E-7**).

In 2009, the SJRWMD entered into an agreement with the City of Apopka for the acquisition of land for a reclaimed water storage and aquifer recharge enhancement project in Orange County. It is estimated that this project, Golden Gem Road Reclaimed Water Storage Pond (or West Reuse Plant), could support storage capacity ranging from 200 to 400 million gallons. The geotechnical evaluation is underway to accurately evaluate the recharge potential at the site.

The SJRWMD is also investigating the feasibility of an aquifer recharge project called the Lake Apopka North Shore Recharge Well project. This project conceptually would use infrastructure owned by the City of Apopka to withdraw excess water from the Lake Apopka North Shore for aquifer recharge via a recharge well.

Wekiva Falls RV Resort, located in east-central Lake County, is currently evaluating several management strategies related to aquifer enhancement that could result in improvements to spring flows in the Wekiva River Basin through possible future reductions in water use.

MFL Recovery or Prevention Strategy Projects

Presently, only the SWFWMD has developed recovery or prevention strategies for MFL water bodies within or extending into the CFWI Planning Area. Historical development of groundwater supplies from the UFA in the southern and central portions of the SWFWMD has resulted in significant declines in the water level of the UFA, resulting in saltwater intrusion near the Gulf Coast, lowered lake levels along the Highlands Ridge recharge area, and loss of flow in the upper Peace River. These issues are addressed in the SWUCA Recovery Strategy, which applies to portions of the SWFWMD within the CFWI Planning Area. Water resource development projects for recovery strategies are described below. Projects included in the SWUCA Recovery Strategy for entities within the CFWI Planning Area are incorporated into this 2020 CFWI RWSP per section 373.0421(3), F.S.

The Lake Hancock Lake Level Modification project is part of an MFL recovery strategy for the upper Peace River. The flows in the upper Peace River have been severely impacted historically, and at times the river has stopped flowing. The goal of the Lake Level Modification Project is to store water by raising the control elevation of the existing outflow structure on Lake Hancock and to slowly release the water during the dry season to help meet the minimum flow requirements in the upper Peace River between Bartow and Zolfo Springs. This project was combined with the Lake Hancock Outfall Treatment Project, which uses a wetland treatment system to improve lake water quality prior to discharge. This series of projects is now complete and will restore several hundred acres of wetlands contiguous to Lake Hancock and provide recharge to the UFA through exposed sinkholes along the upper Peace River. A reservation for the water stored in Lake Hancock and released to Lower Saddle Creek through implementation of these projects for recovery of the upper Peace River is under development.

This 2020 CFWI RWSP project options list also includes the Winter Haven Reuse Interconnect and Aquifer Recharge project. This project is currently in the feasibility stage and will evaluate the potential to use 0.5 mgd of reclaimed water from the City of Winter Haven for aquifer recharge to improve aquifer levels and lake levels in the Winter Haven area, supporting the SWUCA Recovery Strategy goals.

District Regional Programs

Each of the Districts maintain a variety of long-term programs and initiatives that provide for the protection, conservation, and development of water resources. Many of these programs operate throughout each District, not only within the CFWI Planning Area. Each District maintains an annual Five-Year Water Resource Development Work Program, which fully details the various water resource development 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 which are important to ongoing CFWI water resource development efforts include:

- **Cooperative Funding Programs** – These provide financial assistance on a cost-share basis to utilities, local governments, and other entities for AWS and water conservation projects that help create sustainable water resources.
- **Agricultural Water Resource Programs** – Currently, both the SWFWMD and SJRWMD operate cooperative funding programs to assist in the development of projects to implement AWS or improve water use efficiency for AG operations.
- **Abandoned Well Plugging Programs** – Currently, both the SWFWMD and the SJRWMD have active programs to properly abandon or back-plug unused, free-flowing wells or substandard wells that impact groundwater quality. These programs can help to improve local groundwater quality and conserve groundwater resources.

Hydrologic Data Collection and 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 prevent future problems. Data collection also supports the CUP/WUP programs and compliance, MFL status evaluation, recovery strategies, and modeling of surface and groundwater systems.

Groundwater Modeling

The ECFTX model underwent a peer review effort that supports the results in this 2020 CFWI RWSP. At the time of peer review, the best available data sets were used to update the ECFTX model. Future revisions to the ECFTX model for the 2025 CFWI RWSP will incorporate new data and analyses such as:

- Updated model layering and aquifer parameters associated with new monitoring data and wells principally installed as part of the DMIT Work Plan
- Updated water use data from 2015
- Updated water level data from 2015 for wells, lakes, and wetlands and spring flows
- Re-calibration of the peer reviewed ECFTX model
- Updated ECFTX model documentation

Lower Floridan Aquifer Investigations

Construction of new data collection sites for the LFA is an important component of the DMIT Work Plan (www.cfwiwater.com). The Districts have constructed 15 LFA sites and proposed to construct 21 additional sites during FY2020-FY2025 for a total of 36 LFA sites. The Districts will continue to maintain and update the monitoring inventory which includes LFA monitoring. These LFA investigations will provide the necessary data to update the ECFTX model aquifer parameters described above. In addition, these investigations will provide insight on the potential water supply availability and constraints, including water quality characteristics.

Groundwater, Surface Water, and Wetlands Monitoring

Ongoing efforts include supporting water supply and water resource development project options and management strategies. The Districts will continue to develop monitoring sites pursuant to the DMIT Work Plan (2020). Prior to the next CFWI RWSP update, the Districts are proposing to establish 57 wetland monitoring sites and construct 127 wells for additional monitoring and will continue to maintain and update the monitoring inventory.

In addition, the Districts and other stakeholders (via the EMT) will maintain ongoing coordination to evaluate if potential updates to the wetlands analysis methodology are needed. This evaluation will include analyzing the data collected from the long-term wetlands monitoring program and identify any necessary enhancements to wetlands data collection.

MFLs and Water Reservation Establishment and Management Activities

Twenty-three water bodies within or extending into the SJRWMD and SWFWMD portions of the CFWI Planning Area are scheduled for MFLs adoption or reevaluation within the next five years. Five water bodies or groups of water bodies (that include 17 lakes and two river segments) within the SFWMD and SWFWMD are scheduled for adoption of a reservation (**Appendix C, Figure C-1** and **Table C-2**).

Section 373.709(2)(c), F.S., requires that RWSPs include recovery and prevention strategies that are needed pursuant to Section 373.0421(2), F.S. One recovery strategy, the SWUCA Recovery Strategy, has been adopted within a portion of the CFWI Planning Area. The results in **Chapter 4** indicate 11 MFL priority water bodies are currently not being met under the 2014 RC in the SWFWMD and SJRWMD. Four additional MFLs are projected not to meet their adopted MFLs in SJRWMD by 2040. As such, recovery or prevention strategies will need to be developed and adopted for these MFL priority water bodies which do not already have a recovery or prevention strategy. There are no adopted or proposed MFLs in the SFWMD portion of the CFWI Planning Area, and as such no recovery or prevention strategies are needed.

A water reservation for the Kissimmee River and Chain of Lakes (KCOL) is under development by the SFWMD. The Kissimmee River system is undergoing a major restoration effort and is anticipated to be completed in 2020.When fully implemented, is anticipated to require water to be stored in and released from the KCOL and its tributaries as part of a management strategy balancing flood control and environmental restoration. The KCOL Water Reservation area is 172,500 acres and spans portions of the SFWMD's Upper Kissimmee Basin Planning Area (part of the CFWI) as well as the SFWMD's Lower Kissimmee Basin Planning Area. The KCOL (Upper Chain of Lakes and the Headwaters Revitalization Lakes) is the primary source of water for the Kissimmee River. The SWFWMD is developing a water reservation for water stored in Lake Hancock and released through Saddle Creek to support minimum flows recovery in the upper Peace River. Rule development for this proposed reservation is anticipated to be completed in 2020.

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Funding Options

TOPICS
Water Supplier and User Funding Options
Water Management District Funding Options
State Funding Options
Federal Funding Options
Public Private Partnerships, Cooperatives, and Other Private Investment

Section 373.709, F.S., identifies two types of projects to meet water demands: water resource development projects and water supply development projects (**Chapter 7**). As described in this chapter, RWSPs are required to include an analysis of funding needs and sources of possible funding options for these projects.

Funding for water supply development and water conservation at the local level is the shared responsibility of water suppliers and users. The State of Florida and the Districts may provide funding assistance to local water suppliers developing AWS and measurable water conservation programs. Identification of an AWS project in this 2020 CFWI RWSP makes that project eligible for future funding (subsection 373.707(8)(h), F.S.), although funding is not guaranteed. Projects that are not listed in this 2020 CFWI RWSP but are consistent with the goals of the RWSP and meet the program requirements also may be eligible for funding. Funding determinations for individual projects are made by the District's Governing Boards based on statutory and other considerations.

Section 373.705, F.S., in pertinent part, describes the roles and responsibilities of the Districts, local governments, regional planning authorities, and utilities concerning funding water supply and water resource development projects. Specifically, the legislation found:

- The proper role of the water management districts in water supply is primarily planning and water resource development, but this does not preclude them from providing assistance with water supply development. Section 373.705(1)(a), F.S.
- The proper role of local government, regional water supply authorities, and government-owned and privately owned water utilities in water supply is primarily water supply development, but this does not preclude them from providing assistance with water resource development. Section 373.705(1)(b), F.S.
- Water management districts take the lead in identifying and implementing water resource development projects, and be responsible for securing necessary funding for regionally significant water resource development projects, including regionally significant projects that prevent or limit adverse water resource impacts, avoid competition among water users, or support the provision of new water supplies in order to meet a minimum flow or minimum water level or to implement a recovery or prevention strategy or water reservation. Section 373.705(2)(b), F.S.
- Local governments, regional water supply authorities, and government-owned and privately owned water utilities take the lead in securing funds for and implementing

water supply development projects. Generally, direct beneficiaries of water supply development projects should pay the costs of the projects from which they benefit, and water supply development projects should continue to be paid for through local funding sources. Section 373.705(2)(c), F.S.:

Subsection 373.707(2)(c), F.S., describes the responsibilities of the local governments and water providers in regard to providing funding for the development of AWS:

- Funding for the development of AWSs shall be a shared responsibility of water suppliers and users, the State of Florida and the water management districts, with water suppliers and users having the primary responsibility and the State of Florida and the water management districts being responsible for providing funding assistance.

The water management districts, water providers, and the State of Florida previously funded several water conservation and AWS development projects. Potential sources of funding for water supply and water resource development projects are described in the next sections.

WATER SUPPLIER AND USER FUNDING OPTIONS

Funding for water supply development 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 to produce 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 funding methods available to address utility costs which are summarized below.

Water Utility Revenue Funding Sources

Increased demand generally results from new customers that help to finance source development through impact fees and utility bills. The financial structure of utility fees can be highly variable and reflects 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 development or treatment capital costs. Impact fees are generally devoted to the construction of source development, treatment, and transmission 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 source development, treatment, and transmission construction cost debt service. Volume charges contribute to both source development/treatment/transmission debt service and operation and maintenance.

Community development districts (CDDs) 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. Typically, CDDs and special district utilities 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 and do not have retail customers. An authority's facilities are funded through fixed and variable charges to the utilities they supply, which are in turn paid by the retail customers of the utilities. Counties, municipalities, and special districts are encouraged by the legislature to create regional water supply authorities under Section 373.701(3), F.S., 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 pursuant to Section 373.713, F.S., 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 Districts for the capital costs of new AWS and regional infrastructure.

There are several methods available to mitigate the impact of higher costs to customers. Many of these are addressed in various publications by the American Water Works Association, Florida Rural Water Association, Florida Public Service Commission, Water Research Foundation, and others.

WATER MANAGEMENT DISTRICT FUNDING OPTIONS

The Districts provide financial assistance for water conservation and alternative source development projects through cost-share 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 and CFWI Planning Area details are included in **Chapter 2**.

South Florida Water Management District

Cooperative Funding Program

For nearly two decades, the SFWMD has provided funding to local governments, special districts, utilities, homeowners' associations, water users, and other public and private organizations for AWS, water conservation, and stormwater projects consistent with the SFWMD's core mission. Historically, the SFWMD has provided funding for AWS and water conservation projects through its AWS Program and Water Savings Incentive Program (WaterSIP). In FY2016, these efforts were combined under the Cooperative Funding Program (CFP), which provides financial incentives for local projects that complement ongoing regional restoration, flood control, water quality, and water supply efforts within the SFWMD's 16-county jurisdiction. Since 1997, the SFWMD has provided over $200 million in incentive-based funding assistance for a variety of AWS and water conservation projects.

Each FY, the SFWMD's Governing Board determines the amount of funding, if any, to allocate to the CFP, the project priorities for that year, and the cost-share to be allocated. The SFWMD's Governing Board establishes the priorities and guidelines for evaluation of the projects under consideration for funding.

Water Resource Development Work Program

The FY2018-FY2019 through FY2022-FY2023 implementation schedule and projected expenditures (including salaries, benefits, and operating expenses) for water resource development activities reflect the SFWMD's continued commitment to ensuring adequate water resources are available to meet existing and future reasonable-beneficial needs and natural systems. The SFWMD has allocated $118 million in FY2018-FY2019 for water resource development projects district-wide and anticipates spending $567 million on these projects through FY2022-FY2023.

In addition to SFWMD funded projects, potable water supply utilities district-wide have tentatively identified 24 projects they plan to construct between FY2018-FY2019 through FY2022-FY2023 with local funding as part of their annual progress report required by subsection 373.709(8)(b), F.S. The 24 projects will create 61 mgd of AWS capacity and 20 mgd of reclaimed water distribution capacity.

St. Johns River Water Management District

Cost-share Program

The SJRWMD primarily provides funding assistance through a competitive, cost-share program, which is administered annually and supports AWS, water resource development, water conservation, and AG-related projects. Water resource development projects may be funded solely by the SJRWMD or in a cooperative arrangement with a local partner or partners. Additionally, the SJRWMD accepts water supply funding from state sources for implementation through cost-share programs. Financial assistance is provided primarily to governmental entities, but private entities are also eligible to participate in these programs. Since 2002, the SJRWMD has provided over $215 million in incentive-based funding assistance for a variety of AWS, water conservation, and other projects.

A number of water utility conservation initiatives have been partially funded through the Districts including a program known as Orange County Utilities Waterwise Neighbor which included installation or retrofit of indoor plumbing and irrigation systems for new and existing homes. This was a multi-year cost-share program developed by Orange County Utilities and partially funded through SJRWMD.

Water Resource Development Work Program

The SJRWMD annually updates its 5-year Water Resource Development Work Program (Work Program), 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 or stormwater sources, Upper St. Johns River Basin projects, water conservation programs, water resource development components of water supply development projects, water resource development, MFLs prevention or recovery strategy projects, and water resources information (formerly hydrologic data collection).

In total, this Work Program outlines projects that, upon completion, will make available approximately 93 mgd of water. These benefits are associated with approximately $33 million budgeted for FY2018-FY2019. The proposed funding for the five-year Work Program is approximately $127 million through FY2022-FY2023.

In addition, this program sets forth a commitment to develop projects associated with implementation of MFLs, potential prevention or recovery strategies, and potential water reservations. The projects benefitting MFLs are anticipated to make available nearly 38 mgd of water upon completion.

Southwest Florida Water Management District

Facilitating Agricultural Resource Management Systems Program

The SWFWMD Facilitating Agricultural Resource Management Systems (FARMS) Program assists agricultural operations in offsetting groundwater withdrawals for irrigation and frost/freeze protection through use of tailwater recovery, irrigation efficiency, and other practices. The FARMS Program also supports water resource development projects by providing financial incentives to private agricultural operations to implement production-scale agricultural best management practices (BMPs). The FARMS Program has funded numerous projects within the SWFWMD that enhance surface water quality and reduce the amount of groundwater used for irrigation and frost/freeze protection.

Cooperative Funding Initiative

The SWFWMD's primary funding mechanism for water supply development is the Cooperative Funding Initiative (CFI) Program, which provides funding for AWS and water conservation projects. The SWFWMD jointly participates with local governments and other entities to ensure proper development, use, and protection of the regional water resources. The CFI Program is a matching grant program that funds projects of mutual benefit, generally at 50 percent by the SWFWMD and 50 percent by the public or private cooperators. Any state and federal funds received for the projects are applied directly against the project costs, with both parties benefitting equally. Since 1988, the CFI Program has provided over $1 billion in incentive-based funding assistance for a variety of projects addressing water supply, natural systems, flood protection, and water quality. The SWFWMD grant funding for AWS projects (averaging $31.7 million annually over the past ten fiscal years) is anticipated to continue.

Water Resource Development Work Program

The FY2018-FY2019 SWFWMD budget for Water Resource Development Data Collection and Analysis activities was approximately $36 million and is expected to remain constant over the next five years. Additionally, the SWFWMD has allocated $14.6 million in the FY2018-FY2019 budget for AWS and environmental restoration projects. The total cost of these projects, including cooperator funding contributions, is $132 million. Although the SWFWMD anticipates that current phases of the Hydrogeologic Investigation of the LFA in Polk County will be completed by FY2019-FY2020, future funding may be available for water resource development projects in Polk County. The SWFWMD's Governing Board has made a funding commitment of $65 million in funding for PRWC-priority projects through FY2022-FY2023. The SWFWMD plans to continue implementing FARMS projects at a cost of approximately $6 million each year through FY2022-FY2023. The proposed funding for the five-year Work Program is approximately $30 million through FY2022-FY2023.

SWFWMD District Initiatives Program

Through the SWFWMD District Initiatives Program, funding is provided outside the CFI Program for projects of great importance or regional priority. Funding may be provided cooperatively up to 50 percent cost-share for regional water supply development projects. In some cases, the SWFWMD may increase its percentage match or provide total funding for the project.

Water Incentives Supporting Efficiency Program

The SWFWMD has developed a new water conservation program to incentivize utilities, institutions, and commercial water users to reduce their water use. This 50 percent cost-share reimbursement program, known as the Water Incentives Supporting Efficiency (WISE) Program, will support water conservation efforts. The WISE Program will award applicants up to $20,000 to implement projects that help reduce water use. This program offers a funding opportunity to small utilities, hospitals, schools, prisons, homeowner's associations, golf courses, hotels, manufacturers, food processing facilities, and other commercial users who do not typically take part in the SWFWMD's CFI Program.

STATE FUNDING OPTIONS

State of Florida Water Protection and Sustainability Program

The Water Protection and Sustainability Program (WPSP) was created by the Florida Legislature in 2005. The program provides funds for several environmental programs including AWS development and water conservation. In the WPSP, AWS include reclaimed water, brackish/nontraditional water, seawater, and surface water captured during wet season flows (described in **Chapter 6**). With any WPSP funding, the Legislature has established a goal for the Districts to annually contribute funding equal to 100 percent of the state funding for AWS development assistance, of which the Districts have exceeded this annual amount (Section 373.707(6)(a), F.S.). Pursuant to Section 373.707(8)(e), F.S., applicants that receive funding assistance pursuant to the WPSP shall, at a minimum, be required to pay 60 percent of the project's construction costs.

Alternative Water Supply and Development Appropriation

In FY2019-FY2020, the Governor and Legislature allocated $40 million state-wide for water resource development and water supply projects to help protect the state's water resources and ensure the needs of existing and future users are met. The funding will support implementation of water conservation programs, AWS projects, and water resource development projects. Priority funding will be considered for regional projects in areas that have been determined to have water resource constraints and that provide the greatest resource benefit.

Drinking Water State Revolving Fund Program

The Florida Drinking Water State Revolving Fund Program provides low-interest loans to eligible entities to plan, design, and build or upgrade drinking water systems (Section 403.8532, F.S.). Discounted assistance (e.g., very low interest rates, grants, etc.) for disadvantaged communities is available. Interest rates on loans are below market rates and vary based on the economic wherewithal of the community. The FDEP receives requests for funding throughout the year. The information is used to establish the project priority list for the following annual cycle. More information may be found on FDEP's website at https://floridadep.gov.

Florida Forever Program

Florida Forever is Florida's statewide conservation and recreation lands acquisition program. The Florida Forever Act (Section 259.105, F.S.) authorizes land acquisition, land and water body restoration, ASR facilities, surface water reservoirs, and other capital improvements.

Springs Restoration Funding

The Florida Legislature has recognized the critical importance of Florida's freshwater springs and identified a long-term funding source for the restoration, recovery, protection, and management of these unique natural resources. The FDEP coordinates the development of springs project funding with the Districts. Eligible projects are categorized in the following high-level project types: AG BMPs, water conservation, hydrologic restoration, land acquisition, reuse, wastewater collection and treatment, stormwater, other water quality, and other water quantity.

Between FY2011-FY2012 through FY2017-FY2018, state funding totaling $191 million has been appropriated for restoration projects to specifically benefit springs. These funds have been leveraged with local match funding for a total investment of more than $355 million to protect Florida's springs. The 2016 Legacy Florida legislation earmarks $50 million per year from the Land Acquisition Trust Fund for springs restoration for the next 20 years (Section 375.041(3)(b)2., F.S.). It is anticipated that the Districts, local governments, and PS utilities will continue to partner with the state of Florida through FDEP to implement projects.

Agricultural Best Management Practices

The FDACS' Office of Agricultural Water Policy (OAWP) works with multiple partners, including the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), FDEP, the Districts, and Soil and Water Conservation Districts, 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. Typical BMP practices include:

- Nutrient management to determine nutrient needs and sources and manage nutrient applications to minimize impacts to water resources.
- Irrigation management to address the method and scheduling of irrigation to reduce water and nutrient losses to the environment.
- Water resource protection using buffers, setbacks and swales to reduce or prevent the transport of sediments and nutrients from production areas to water bodies.

FEDERAL FUNDING OPTIONS

Environmental Quality Incentive Program

The Environmental Quality Incentive Program (EQIP) provides technical and financial assistance through the NRCS to eligible farmers and ranchers for the installation or implementation of structural and management practices to improve environmental quality on agricultural lands. Workgroups, convened by the local Soil and Water Conservation Districts, identify the specific resource concerns to be addressed, set priority area goals, select cost-share practices, establish ranking criteria for evaluating applications, and set their own schedule for approving applications. The EQIP provides assistance to farmers and ranchers to comply with federal, state, and tribal environmental laws. The EQIP is implemented primarily in priority areas, such as watersheds, regions, and/or multistate areas where significant resource concerns exist. Water supply and nutrient management through detention/retention or tailwater recovery ponds can also be implemented through the EQIP (https://www.nrcs.usda.gov).

State and Tribal Assistance Program

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 (https://www.epa.gov/grants).

Water Infrastructure Finance and Innovation Act

The Water Infrastructure Finance and Innovation Act (WIFIA) establishes a new financing mechanism to accelerate investment in our nation's water infrastructure. The WIFIA program will provide loans for up to 49 percent of eligible project costs for projects that will cost at least $20 million for large communities and $5 million for small communities (population of 25,000 or less) (https://www.epa.gov/wifia).

United States Department of Agriculture's Rural Utilities Service

One program area of the United States Department of Agriculture's Rural Utilities Service, the Water and Environmental Program (WEP), provides loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste, and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Public bodies, non-profit organizations, and recognized Indian tribes may qualify for assistance. The WEP also makes grants to non-profit organizations to provide technical assistance and training to help rural communities with their water, wastewater, and solid waste problems.

PUBLIC PRIVATE PARTNERSHIPS, COOPERATIVES, AND OTHER PRIVATE INVESTMENT

Another source of funding that is becoming more common, as well as a means to reduce financial burden for public entities, is public-private partnerships. These partnerships can require technical expertise and financial risk beyond the expertise and risk tolerance of many utilities and water supply authorities. A range of public-private partnerships and risk options is available to provide this expertise. These options range from all-public ownership to all-private ownership of facility design, construction, and operation. Competition among private firms desiring to fund, build, or operate water supply development projects with assistance from government entities could reduce project costs, potentially resulting in lower customer charges.

9

Conclusion and Recommendations

This 2020 CFWI RWSP was jointly developed by the SJRWMD, SFWMD, and SWFWMD (Districts) in coordination with other state agencies and stakeholders to be consistent with the water supply planning requirements of Chapter 373, F.S. This 2020 CFWI RWSP is an update to the 2015 CFWI RWSP and builds upon previous work that was completed by the Districts, FDEP, FDACS, and other stakeholders. It identifies programs and projects to ensure that adequate and sustainable water supplies are available to meet future water supply needs while protecting the environment and water resources. This 2020 CFWI RWSP is based on a planning horizon extending through 2040 and provides projected water demands, an evaluation of traditional groundwater sources to support these demands, an estimation of groundwater availability from the UFA, identification of water conservation measures, and water supply and water resource development project options needed to meet the growing water demands.

TOPICS

- Conclusion
- Recommendations
- Water Conservation
- Project Options
- Regulatory
- Intergovernmental, Stakeholder, and Public Coordination
- Demand Projections
- Resiliency to Climate Change

Total water demand in the CFWI Planning Area is anticipated to increase 36 percent from 667 mgd in 2015 to 908 mgd in 2040. For 2040, the PS category represents the largest demand (65 percent), followed by AG (18 percent), and CII (8 percent) (**Chapter 3**, **Figure 4**).

Current water sources in the CFWI Planning Area include groundwater (fresh and brackish), reclaimed water, surface water, and stormwater. Fresh groundwater sources (i.e., SAS, IAS, FAS) are considered traditional water sources; whereas, nontraditional or alternative water sources include brackish/nontraditional groundwater, surface water, stormwater, seawater, reclaimed water, and water stored in ASR wells and reservoirs.

CONCLUSION

This 2020 CFWI RWSP concludes that fresh groundwater resources alone cannot meet future water demands or currently permitted allocations without resulting in unacceptable impacts to water resources and related natural systems. Evaluations indicate that expansion of fresh groundwater withdrawals to meet the projected water demands through 2040 will increase the existing areas of water resource stress within the CFWI Planning Area. Primary areas that appear to be more susceptible to the effects of groundwater withdrawals include the Wekiva Springs/River System, western Seminole and Orange Counties, southern Lake County, the Lake Wales Ridge, the Upper Peace River Basin, eastern Osceola County, and the central Polk County area (north of Interstate 4).

Total water demands for all water use categories are projected to increase 36 percent from 667 mgd in 2015 to 908 mgd in 2040. Of this, the amount of groundwater represents 635 mgd and 855 mgd, respectively (**Appendix A**). These groundwater values in **Appendix A** vary slightly from the modeled demands in **Chapter 4** as it was necessary to develop monthly trends and peaking factors for the ECFTX transient modeling effort (**Appendix D**). The ECFTX model results predict that increased withdrawal from groundwater sources will be insufficient to meet the entire 2040 projected water demands and current CUP/WUP allocations based upon the current and proposed withdrawal locations. Groundwater availability is highly dependent on withdrawal location, aquifer zones and associated permeability, source limitations, and proximity and hydraulic connection to natural systems, including MFL water bodies and wetlands without MFLs.

Based on the groundwater availability evaluation (**Chapter 4**), it was estimated the CFWI Planning Area could potentially sustain up to 760 mgd of fresh groundwater withdrawals, but local management strategies will be needed (e.g., wellfield optimization, aquifer recharge, and natural system enhancement) to address unacceptable impacts. Additional fresh groundwater withdrawals, beyond the 760 mgd, is limited by water resource and natural system constraints. Based on the 2040 groundwater demand projections, the resulting groundwater shortfall is approximately 95 mgd.

Appendix E identifies 85 potential water supply and water resource development project options, including 11 brackish/nontraditional groundwater, 48 reclaimed water, 17 surface water, 2 stormwater, and 7 management strategies project options. Cumulatively, the 85 project options have the ability to treat, store, or produce up to 539 mgd (approximately 514 mgd net water) of additional water supply or water resource benefit, exceeding the 2040 projected groundwater shortfall of 95 mgd. The majority of the 17 surface water project options are associated with the St. Johns River or upper Peace River. Brackish/nontraditional water project options target the LFA and management strategies include wellfield optimization, aquifer recharge, and natural system enhancement (e.g., improving the ecological value of wetlands, other surface waters, or uplands in comparison to their current situation). **Appendix E** also includes 21 water conservation project options that are not captured in this total. This 2020 CFWI RWSP also identified areas that may require recovery or resource protection and areas where regulatory and water resource protection strategy consistency may be needed.

This 2020 CFWI RWSP concludes that the current and future water demands can be met through the 2040 planning horizon, while sustaining the water resources and related natural systems, through water conservation, implementation of management strategies and measures, and implementation of project options identified in this 2020 CFWI RWSP.

RECOMMENDATIONS

This 2020 CFWI RWSP identifies programs and projects to ensure that adequate and sustainable water supplies are available to meet current and future water supply needs while protecting the environment and water resources. For water resource sustainability to be realized and certainty of water supply to users, many actions by the Districts and stakeholders will have to occur. This requires an integrated approach that includes:

- Continued implementation and expansion of water conservation measures and other demand management strategies,
- Development of alternative water supplies,
- Optimization of groundwater withdrawals through a cooperative approach between water users,
- Continuation of hydrogeologic investigations to better understand the hydrogeology of the CFWI Planning Area,
- Continuation of development of consistent rules and regulations that support sustainability of water resources and related natural systems and certainty to water users,
- Additional evaluation and modeling of identified projects to implement the most cost-effective options, and
- Continue to pursue funding for identified water resource and water supply development projects.

Recommended actions for implementation and future direction for this 2020 CFWI RWSP are included under the following categories:

- Water Conservation
- Project Options
  - Brackish/Nontraditional Groundwater
  - Reclaimed Water
  - Surface Water
  - Stormwater
  - Seawater
  - Storage Capacity and Recharge – ASR and Reservoirs
  - Water Resource Development Projects
- Regulatory
- Minimum Flows and Minimum Water Levels
- Water Reservations
- Water bodies without MFLs
- Intergovernmental, Stakeholder, and Public Coordination
- Resiliency to Climate Change

WATER CONSERVATION

Water conservation by all water use categories will continue to be a priority to meet the CFWI Planning Area's future water demands. The Districts' water conservation programs, as well as existing and future water conservation practices in the CFWI Planning Area, are identified and discussed in **Chapter 5** for AG, PS, DSS, and other self-supply uses. While water conservation efforts have been implemented in the CFWI Planning Area, additional water conservation is critical. It is projected that a total of 50 to 56 mgd of water conservation savings could be achieved by 2040 for all water use categories (**Chapter 5**, **Table 17**).

The projected water conservation savings for all water use categories in this 2020 CFWI RWSP are conservative. There is potential for increased water conservation savings beyond the projected water conservation savings with increased participation rates and implementation of additional water conservation measures, including more educational and outreach programs. For additional information refer to the Conservation Implementation Strategy at www.cfwiwater.com.

PROJECT OPTIONS

For this 2020 CFWI RWSP, a total of 85 water supply and water resource development project options were identified. If implemented, these options have the ability to treat, store, or produce up to 539 mgd (approximately 514 mgd net water) of additional water supply or water resource benefit (**Appendix E**). **Appendix E** also includes 21 water conservation project options that are not captured in this total.

Brackish/Nontraditional Groundwater

A number of brackish/nontraditional groundwater projects from the LFA have been proposed and are included in **Appendix E**. The LFA appears to be a viable alternative source for additional potable water but little is known about long-term water quality impacts and drawdowns in the UFA due to sustained withdrawals from the LFA.

Proposed recommendations to support the sustainable development of brackish/nontraditional groundwater include the following options:

- Continue to monitor, study, and evaluate the LFA as a sustainable source of water.
- Continue data collection, investigations, and evaluation to better understand the relationship between the LFA and UFA, as well as the overlying SAS.
- Collaborate with local water users and utilities developing FAS well drilling programs with the appropriate District. Sharing water quality, water level, and hydrogeologic data from these wells can increase the understanding of the FAS and be used in improving groundwater models and predictive capabilities.
- Continue coordination of monitoring between the Districts, the USGS, utilities, and other governmental agencies to ensure resource protection and sustainable use of the FAS.

- Evaluate local and regional wellfield management options that minimize or reduce existing and projected impacts on the water resources, wetlands, water quality, and MFLs.
- Investigate options for brackish groundwater development in appropriate locations as a means to avoid or minimize future environmental impacts.
- Encourage establishment of regional partnerships among users to optimize use of the UFA and LFA.

Reclaimed Water

Future reclaimed water flows are anticipated to continue to play an important role in meeting future water demands. Proposed recommendations have been identified as additional actions that should continue to be undertaken to enhance the beneficial use of reclaimed water, including:

- Conduct further investigation and maximize development of natural system enhancement/recharge projects (Indirect Potable Reuse).
- Conduct further investigation and development of demonstration or pilot projects for Direct Potable Reuse.
- Continue regional analysis and implementation of beneficial reuse.
- Promote the efficient use of reclaimed water.

Surface Water

There are opportunities for the development of surface water supplies from lakes and rivers in or near the CFWI Planning Area. The following recommendations have been identified as additional actions that could be undertaken to enhance the use of surface water.

- Evaluate the potential and locations for storage, such as reservoirs and ASR systems, to store excess water to recharge aquifers, provide additional water to wetlands and MFL lakes, and provide water supply.
- Create opportunities for conjunctive use of surface water with other water sources such as stormwater or reclaimed water.
- Conduct analyses to ensure that hydrologic functions of lakes and downstream environmental needs are maintained when attempting to identify potentially available quantities of surface water.
- Initiate/continue/complete work associated with MFLs and water reservations pursuant to each District's annual priority list.

Stormwater

Stormwater management is anticipated to play an increasing role in meeting future water demands. The following recommendations have been identified as additional actions that could be undertaken to increase the beneficial use of stormwater.

- Conduct further investigation and development of natural system enhancement/recharge projects.

- Continue regional analysis of beneficial use of stormwater.
- Ensure required treatment levels for SAS recharge, conjunctive use opportunities with reclaimed water, and direct injection to the FAS.
- Evaluate existing drainage well use and expansion to increase the beneficial use of stormwater.
- Encourage coordination of watershed planning, water supply, water quality, natural systems restoration, and flood protection initiatives to achieve greater return on investment for stormwater projects.

Seawater

The Atlantic Ocean and the Gulf of Mexico are unlimited sources of seawater. Desalination is required before seawater can be used for water supply purposes. Use of desalinated seawater would require a transmission pipeline from the coast to the CFWI Planning Area. Where appropriate, utilities should consider the feasibility of desalinated seawater as an additional water source option.

Storage Capacity and Recharge – ASR and Reservoirs

Potential types of water storage include reservoirs, ASR wells, and smaller onsite surface water impoundments. Proposed projects that develop new storage and create additional water supply may be considered alternative water sources.

Proposed recommendations for new storage capacity include the following:

- Evaluate the potential for construction of new or retrofitted surface water reservoirs to provide additional supply, natural system enhancement, or aquifer recharge.
- Continue to evaluate and expand the use of ASR, reservoirs, and other storage options to capture wet weather flows.
- Continue studies and develop strategies, as appropriate, to address regulatory requirements for the implementation of ASR.

Water Resource Development Projects

In addition to strategies and recommendations, programs and/or initiatives important to ongoing CFWI water resource development efforts include cooperative funding programs, agricultural water resource programs, and abandoned well plugging programs. 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. Data collection and analysis tasks include or support:

- LFA investigations
- Monitoring of wetlands, surface and groundwater levels
- Establishment of and activities related to MFLs and water reservations

- CUP/WUP programs and compliance
- MFL status evaluation, recovery strategies, and
- Modeling of surface and groundwater systems

REGULATORY

Both the water supply planning and CUP/WUP programs are tools that the Florida Legislature has provided to the Districts to protect water resources. In 2016, the Legislature supported regulatory consistency in the CFWI Planning Area and set forth rulemaking requirements for the FDEP (Section 373.0465(2)(d), F.S.). The FDEP published a notice of rule development on December 30, 2016. The FDEP held numerous workshops in coordination with the Districts, FDACS, and other stakeholders to adopt uniform rules for application within the CFWI Planning Area; this process is currently underway. The Districts should continue to take a coordinated approach for any issuance or modification of CUP/WUPs within the CFWI Planning Area.

MFLs

The Districts' MFLs programs are described in **Chapter 4 and Appendix C**. Analyses conducted for this 2020 CFWI RWSP indicate that 15 MFLs are currently not meeting or are projected to not be met under the 2040 Withdrawals Condition. For these MFLs, the Districts will need to develop and implement a recovery or prevention strategy if one has not already been established. These strategies will identify, and may include, the development of water supply and water resource development projects, in addition to those included in this 2020 CFWI RWSP, when needed to achieve recovery to the established MFLs as soon as practicable or prevent the existing flow or level from falling below the established MFL. Upon completion, these additional water supply and water resource development projects will be added to the next update of the CFWI RWSP. In addition, the Districts should continue to collaborate with stakeholders on the development or reevaluation of MFLs as identified in the Districts' priority list.

Water Reservations

A water reservation for the KCOL is under development by the SFWMD. The Kissimmee River system is undergoing a major restoration effort and is anticipated to be completed in 2020. When fully implemented, is anticipated to require water to be stored in and released from the KCOL and its tributaries as part of a management strategy balancing flood control and environmental restoration. The KCOL Water Reservation area is 172,500 acres and spans portions of the SFWMD's Upper Kissimmee Basin Planning Area (part of the CFWI) as well as the SFWMD's Lower Kissimmee Basin Planning Area. The KCOL (Upper Chain of Lakes and the Headwaters Revitalization Lakes) is the primary source of water for the Kissimmee River.

The SWFWMD is developing a water reservation for Lake Hancock and lower Saddle Creek to support minimum flows recovery in the upper Peace River. Rule development for this proposed reservation is anticipated to be completed in 2020.

Water Bodies Without MFLs

Water bodies without MFLs include lakes, wetlands, and springs. The Districts' programs regarding these water bodies are described in **Chapter 4** and **Appendix D** and the EMT Technical Report (CFWI 2020a). It is recommended that the Districts continue to monitor, study, and evaluate water bodies without MFLs, including wetlands, lakes, and springs within the CFWI Planning Area and include wetlands studied during this planning process and those that may be affected by CUP/WUP withdrawals. Evaluation of needed enhancements related to wetland data collection or assessment methodology will be ongoing.

INTERGOVERNMENTAL, STAKEHOLDER, AND PUBLIC COORDINATION

The Districts recognize the need for continued collaboration and propose continuation of the following:

- Continue active participation in statewide and regional reclaimed water (e.g., Potable Reuse Commission) and water conservation coordination groups.
- Continue encouragement of local coordination and collaboration in future development of regional public water supplies.
- Continue to seek funding for identified water resource and water supply development projects as described in **Chapter 8**.
- Continue to review and assist local governments and utilities with the development of Water Supply Facilities Work Plans and comprehensive plan amendments.
- Continue outreach and messaging to encourage implementation of water conservation measures to reduce demands.

DEMAND PROJECTIONS

For future updates to the CFWI RWSP, the Districts should continue to collaborate and further enhance the consistent methodologies that were used in development of the population and water demand projections. Items to consider include:

- PS – The methodology should be adaptable to changing utility service area demographics.
- LR – The methodology should consider projection consistency for miscellaneous use (additional irrigation demand).
- Re-evaluate the relationship between reclaimed water use and the projection methods of new water demands for PS residential irrigation, golf course, and large landscape irrigation projects.

RESILIENCY TO CLIMATE CHANGE

Because a reliable and economical supply of water is necessary for a strong Florida economy, climate change and its effects on hydrologic conditions are considered in water supply planning. Climate change has the potential to significantly impact the sustainability of water supplies throughout the state. While climate change is occurring across the globe, impacts or effects vary and the degree and rate of change remain uncertain. However, long-term data do indicate changes in parameters such as temperature, rainfall, and sea level. Increased air temperatures and changes in precipitation regimes and storm frequency associated with climate change could result in greater evaporation, longer drought periods, and higher risk of flooding.

As part of a collaborative effort to address climate and water resource issues, the Alliance is a stakeholder-scientist partnership focused on increasing the relevance of climate science data and tools for water resource planning and supply operations (http://floridawca.org). 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 the CFWI Planning Area. To plan and prepare for regional climate change, the Districts should coordinate with other resource management entities and governments to ensure a common approach to developing effective adaptation strategies for the future.

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Glossary

1-in-10 year drought A drought of such intensity that it is expected to have a return frequency of once in 10 years. A drought in which below normal rainfall occurs and has a 90 percent probability of being exceeded over a twelve-month period. A drought event that results in an increase in water demand to a magnitude that would have a 10 percent probability of being exceeded during any given year.

Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) A water budget model for estimating irrigation demands that estimates demand based on basin-specific data. The AFSIRS model calculates both net and gross irrigation requirements for average and 1-in-10 year drought irrigation requirements. A crop's net irrigation requirement is the amount of water delivered to the root zone of the crop, while the gross irrigation requirement includes both the net irrigation requirement and the losses incurred in the process of delivering irrigation to the crop's root zone.

Alternative water supply (AWS) "Salt water; brackish surface and groundwater; surface water captured predominately during wet-weather flows; sources made available through the addition of new storage capacity for surface water or groundwater, water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reclaimed water; stormwater; and, any other water supply source that is designated as nontraditional for a water supply planning region in the applicable regional water supply plan" (Section 373.019(1), F. S.).

Aquifer A geologic formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield significant quantities of water to wells and springs.

Aquifer storage and recovery (ASR) The underground storage of stormwater, surface water, groundwater or reclaimed water, which is appropriately treated to potable standards and injected into an aquifer through wells during wet periods. The aquifer acts as an underground reservoir for the injected water, reducing water loss to evaporation. The water is stored with the intent to retrieve it later as needed.

Aquifer system A heterogeneous body of (interbedded or intercalated) permeable and less permeable material that functions regionally as a water yielding hydraulic unit and may be composed of more than one aquifer separated at least locally by confining units that impede groundwater movement, but do not greatly affect the hydraulic continuity of the system.

Artesian A commonly used expression, generally synonymous with "confined," referring to subsurface (ground) bodies of water, which, due to underground drainage from higher elevations and confining layers of soil material above and below the water body (referred to as an Artesian aquifer), result in groundwater at pressures greater than atmospheric pressures.

Available supply The maximum amount of reliable water supply including surface and groundwater, and purchases under secure contracts.

Basin (groundwater) A hydrologic unit containing one large aquifer or several connecting and interconnecting aquifers.

Basin (surface water) A tract of land drained by a surface water body or its tributaries.

Brackish water Brackish water, for alternative water supply planning purposes in the CFWI for SJRWMD and SWFWMD, is generally defined as water with a total dissolved solids (TDS) concentration of greater than 500 mg/L. SFWMD defines saline water, which includes brackish water, as water with chloride concentrations greater than 250 mg/L.

Capacity Capacity represents the ability to treat, move, or reuse water. Typically, capacity is expressed in millions of gallons per day.

Central Florida Water Initiative (CFWI) This is a collaborative effort among the SJRWMD, SFWMD, and SWFWMD and other state agencies and stakeholders that builds on the prior work of the Central Florida Coordination Area. The goal is to implement effective and consistent water resource planning, development, and management in the central Florida area.

Confined aquifer (1) Water-bearing stratum of permeable rock, sand, or gravel overlaid by a thick, impermeable stratum. An aquifer that contains groundwater that is confined under pressure and bounded between significantly less permeable materials such that water will rise in a fully penetrating well above the top of the aquifer. In cases where the hydraulic head is greater than the elevation of the overlying land surface, a fully penetrating well will naturally flow at the land surface without means of pumping or lifting. (2) Also known as artesian or pressure aquifer, the confined aquifer exists where the groundwater system is between layers of clay, dense rock, or other materials with very low permeability. Water is under more pressure in a confined aquifer than in an unconfined aquifer. Thus, when tapped by a well, water is forced up, sometimes above the soil surface. This is how a flowing artesian well is formed.

Confining unit A body of significantly less permeable material than the aquifer, or aquifers, that it stratigraphically separates. The hydraulic conductivity may range from nearly zero to some value significantly lower than that of the adjoining aquifers and impedes the vertical movement of water.

Conjunctive use Using and combining surface water and ground water supplies, or any other use of multiple sources such as fresh or brackish groundwater, surface water, or desalination of sea water to better manage and prevent environmental impacts, improve system reliability, operational flexibility, and emergency backup capability.

Consumptive use Any use of water that reduces the supply from which it is withdrawn or diverted.

Cubic feet per second (cfs) A rate of flow (e.g., in streams and rivers) equal to a volume of water 1 foot high and 1 foot wide flowing a distance of 1 foot in 1 second. One cfs is equal to 7.48 gallons of water flowing each second.

Demand management Also known as water conservation, demand management involves reducing the demand for water through activities that alter water use practices, improve efficiency in water use, reduce losses of water, reduce waste of water, alter land management practices, and/or alter land uses.

Desalination A process that treats saltwater to remove or reduce chlorides and dissolved solids, resulting in the production of fresh water.

Discharge The rate of water movement past a reference point, measured as volume per unit of time (usually expressed as cubic feet per second or cubic meters per second).

Disinfection The process of inactivating microorganisms that cause disease. All potable water requires disinfection as part of the treatment process prior to distribution. Disinfection methods include, but are not limited to, chlorination, ultraviolet radiation, and ozonation.

Disposal Effluent disposal involves the wasteful practice of releasing treated effluent back to the environment using ocean outfalls, surface water discharges, or deep injection wells.

Drainage basin Land area where precipitation runs off into streams, rivers, lakes, and reservoirs. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. The drainage basin is a part of the earth's surface that is occupied by a drainage system, which consists of a surface stream with all its tributaries and impounded bodies of water. It is also known as a watershed, a catchment area, or a drainage area.

Drawdown (1) The vertical distance between the static water level and the surface of the cone of depression. (2) A lowering of the groundwater surface caused by pumping.

Drought A long period of abnormally low rainfall, especially one that adversely affects growing or living conditions.

East-Central Florida Transient Groundwater Expanded Model (ECFTX) a groundwater model for the CFWI Planning Area that simulates transient groundwater flow in the surficial aquifer system and the Floridan aquifer system.

Ecology The study of the inter-relationships of plants and animals to one another and to their physical and biological environment.

Ecosystem Biological communities together with their environment, functioning as a unit.

Effective rainfall The portion of rainfall that infiltrates the soil and is stored for plant use in the crop root zone.

Effluent Treated water that is not reused after flowing out of any plant or other works used for treating, stabilizing, or holding wastes.

Electrodialysis Dialysis that is conducted with the aid of an electromotive force applied to electrodes adjacent to both sides of the membrane.

Elevation The height in feet above mean sea level according to the National Geodetic Vertical Datum of 1929. May also be expressed in feet above mean sea level as reference datum.

Evapotranspiration (ET) The total loss of water to the atmosphere by evaporation from land and water surfaces and by transpiration from plants.

Existing legal use of water A water use authorized under a consumptive water use permit or existing and exempt from permit requirements.

Finished water Water that completed a purification or treatment process; water that passed through all the processes in a water treatment plant and is ready to be delivered to consumers.

Fiscal Year (FY) The fiscal year for state agencies begins on October 1 and ends on September 30 the following year.

Florida Administrative Code (F.A.C.) The Florida Administrative Code is the official compilation of the administrative rules and regulations of state agencies.

Florida Statutes (F.S.) The Florida Statutes are a permanent collection of state laws organized by subject area into a code made up of titles, chapters, parts, and sections. The Florida Statutes are updated annually by laws that create, amend, or repeal statutory material.

Floridan aquifer system (FAS) An aquifer system composed of sequential layers of limestone and dolomite and is traditionally subdivided into the Upper and Lower Floridan aquifers which are separated by less productive horizons called the middle confining unit.

Flow The actual amount of water flowing by a particular point over some specified time. In the context of water supply, flow represents the amount of water being treated, moved, or reused.

Freeboard For lake or wetland MFLs, freeboard is expressed as the potential or allowable drawdown in the UFA in feet. For spring or river MFLs, it is expressed as a flow rate (in cubic feet per second or cfs).

Fresh water For water supply planning purposes, an aqueous solution with a total dissolved solids concentration less than or equal to 500 mg/L.

Gross irrigation (AFSIRS model) The amount of water that must be withdrawn from the source in order to be delivered to the plant's root zone. Gross irrigation demand includes both the net irrigation requirement and the losses incurred irrigating the plant's root zone.

Groundwater Water beneath the surface of the ground, whether or not flowing through known and definite channels. Specifically, that part of the subsurface water in the saturated zone, where the water is under pressure greater than the atmosphere.

Headwaters The waters at the highest upstream point of a natural system that are considered the major source waters of the system.

Hydrogeology The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Hydrologic condition The state of an area pertaining to the amount and form of water present.

Hydrology The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Impoundment Any lake, reservoir, or other containment of surface water covering a depression or bed in the earth's surface and having a discernible shoreline.

Infiltration The movement of water through the soil surface into the soil under the forces of gravity and capillarity.

Inflow (1) The act or process of flowing in or into. (2) The measured quantity of water that moved into a specific location.

Injection well A well constructed to inject water directly into the ground. Injection wells are generally drilled below freshwater levels, or into unused aquifers or aquifers that do not deliver drinking water.

Intermediate aquifer system (IAS) An aquifer system consisting of five zones of alternating confining and producing units. The producing zones include the Sandstone and Mid-Hawthorn aquifers.

Irrigation efficiency A measure of the effectiveness of an irrigation system in delivering water to a plant for irrigation and freeze protection purposes.

Marsh A frequently or continually inundated unforested wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions.

Million gallons per day (mgd) A rate of flow of water equal to 133,680.56 cubic feet per day, or 1.5472 cubic feet per second, or 3.0689 acre-feet per day. A flow of one million gallons per day for one year equals 1,120 acre-feet (365 million gallons).

Minimum Flows and Minimum Water Levels (MFLs) The point at which additional withdrawals will result in significant harm to the water resources or the ecology of the area (Sections 373.042, F.S.).

MFL recovery strategy Developed when a water body currently exceeds the MFLs criteria. The goal of a recovery strategy is to achieve the established MFLs as soon as practicable (Section 373.042(2)(a), F.S).

MFL prevention strategy Developed when the MFLs criteria are not currently violated but are projected to be exceeded within the next 20 years. The goal of a prevention strategy is for the water body to continue to meet the established MFLs in the future (Section 373.042(2)(b), F.S).

Mitigation The action of lessening in severity or intensity.

Mobile irrigation laboratory A vehicle furnished with irrigation evaluation equipment that is used to carry out on-site evaluations of irrigation systems and to provide recommendations on improving irrigation efficiency.

Model A computer model is a representation of a system and its operations and provides a cost-effective way to evaluate future system changes, summarize data, and help understand interactions in complex systems.

MODFLOW A modular, three-dimensional, finite-difference groundwater modeling code created by the United States Geological Survey, which is used to simulate the flow of groundwater through aquifers.

Monitoring well A well to monitor fluctuations in groundwater levels, quality of underground waters, or the concentration of contaminants in underground waters.

North American Vertical Datum of 1988 (NAVD 88) The North American Vertical Datum of 1988 (NAVD 88) is the vertical control datum established in 1991 by the minimum-constraint adjustment of the Canadian-Mexican-U.S. leveling observations. It held fixed the height of the primary tidal bench mark, referenced to the new International Great Lakes Datum of 1985 local mean sea level height value, at Father Point/Rimouski, Quebec, Canada. Additional tidal bench mark elevations were not used due to the demonstrated variations in sea surface topography (i.e., the fact that mean sea level is not the same equipotential surface at all tidal bench marks). North American Vertical Datum of 1988 (NAVD 88) consists of a leveling network on the North American Continent, ranging from Alaska, through Canada, across the United States, affixed to a single origin point on the continent. In 1993, NAVD 88 was affirmed as the official vertical datum in the National Spatial Reference System (NSRS) for the Conterminous United States and Alaska (Federal Register Notice (FRN)). Although many papers on NAVD 88 exist, no single document serves as the official defining document for that datum.

Natural system A self-sustaining living system that supports an interdependent network of aquatic, wetland-dependent, and upland living resources.

Natural system enhancement Activities conducted to improve the habitat value of wetlands or surface waters for fish and wildlife by eliminating harmful drainage, improving water quality, preventing erosion, stabilizing eroding shorelines, planting wetland vegetation, removing spoil, removing exotic and nuisance vegetation, providing structural habitat, and restoring dredged holes to elevations before they were dredged.

Per capita use The average amount of water used per person per day.

Permeability The capacity of a porous rock, sediment, or soil for transmitting a fluid.

Planning Area The CFWI Planning Area is in central Florida and consists of all of Orange, Osceola, Seminole, and Polk counties and southern Lake County. The SJRWMD, SFWMD, and the SWFWMD each contain portions of the CFWI Planning Area.

Potable water Water that is safe for human consumption.

Potable reuse Augmentation of a drinking water supply with advanced treated water from a municipal wastewater source.

Potentiometric surface A surface that represents the hydraulic head in an aquifer and is defined by the level to which water will rise above a datum plane in wells that penetrate the aquifer.

Rapid infiltration basin (RIB) A method by which treated wastewater is applied in deep and permeable deposits of highly porous soils for percolation through deep and highly porous soil.

Raw water Water that is direct from the source(ground or surface water)without any treatment.

Reasonable-beneficial use Use of water in such quantity as is needed for economic and efficient use for a purpose, which is both reasonable and consistent with the public interest.

Recharge (groundwater) The natural or intentional infiltration of surface water into the ground to raise groundwater levels.

Recharge (hydrologic) The downward movement of water through soil to groundwater; the process by which water is added to the zone of saturation; or the introduction of surface water or groundwater to groundwater storage, such as an aquifer. Recharge or replenishment of groundwater supplies consists of three types: 1) natural recharge, which consists of precipitation or other natural surface flows making their way into groundwater supplies; 2) artificial or induced recharge, which includes actions specifically designed to increase supplies in groundwater reservoirs through various methods, such as water spreading (flooding), ditches, and pumping techniques; 3) incidental recharge, which consists of actions, such as irrigation and water diversion, which add to groundwater supplies, but are intended for other purposes. Recharge may also refer to the amount of water so added.

Reclaimed water Water that received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility (Rule 62-610.200(48), F.A.C.).

Reference Condition Reference Condition was established and used to compare modeled results from several projected future withdrawal conditions.

(Regional) Water supply plan Detailed assessment report of water demands, sources and projects to meet those demands developed by the Water Management Districts under Section 373.709, F.S., providing an evaluation of available water supply and projected demands at the regional scale. The planning process projects future demand for at least 20 years and recommends projects to meet identified needs.

Retention The prevention of stormwater runoff from direct discharge into receiving waters; included as examples are systems that discharge through percolation, exfiltration, filtered bleed-down, and evaporation processes.

Retrofit (1) Indoor: the replacement of existing water fixtures, appliances, and devices with more efficient fixtures, appliances, and devices for the purpose of water conservation. (2)

Outdoor: the replacement or changing out of an existing irrigation system with a different irrigation system, such as a conversion from an overhead sprinkler system to a microirrigation system (Applicants Handbook SFWMD 2015).

Reverse osmosis (RO) A membrane process for desalting water using applied pressure to drive the feed water (source water) through a semipermeable membrane.

Runoff That component of rainfall, which is not absorbed by soil, intercepted and stored by surface water bodies, evaporated to the atmosphere, transpired and stored by plants, or infiltrated to groundwater, but which flows to a watercourse as surface water flow.

Saltwater intrusion The invasion of a body of fresh water by a body of saltwater due to its greater density. It can occur either in surface water or groundwater bodies. The term is applied to the flooding of freshwater marshes by seawater, the upward migration of seawater into rivers and navigation channels, and the movement of seawater into freshwater aquifers along coastal regions.

Saltwater Intrusion Minimum Aquifer Level (SWIMAL) Minimum aquifer levels adopted by the SWFWMD pursuant to Sections 373.042 and 373.0421, F.S.

Seawater or **saltwater** Seawater is defined by the SJRWMD and SFWMD as water with a chloride concentration at or above 19,000 mg/L and by the SWFWMD as water with a total dissolved solids concentration greater than or equal to 10,000 mg/L.

Semi-confined aquifer A completely saturated aquifer that is bounded above by a semi-pervious layer, which has a low, though measurable permeability, and below by a layer that is either impervious or semi-pervious.

Service area The geographical region in which a water supplier has the ability and the legal right to distribute water for use.

Solutions Strategies The CFWI 2035 Water Resources Protection and Water Supply Strategies document, was developed by the Solutions Planning Team and is Volume II and Volume IIA of the CFWI RWSP. The Solutions Strategies provides relevant project information to further develop specific water supply project options through partnerships with water users. The document includes project cost estimates, potential sources of water, feasibility and permitability analysis, and identification of governance structure options.

Southern Water Use Caution Area (SWUCA) Established by the SWFWMD in 1992 due to environmental concerns related to groundwater withdrawals in the southern and central regions of the SWFWMD. The primary areas of resource concern within the SWUCA include lake levels along the Lake Wales Ridge, flows in the upper Peace River, and saltwater intrusion into the UFA from the Gulf of Mexico.

Stormwater Water that does not infiltrate but accumulates on land as a result of storm runoff, irrigation runoff, or drainage from areas, such as roads and roofs.

Surface water Water above the soil or substrate surface, whether contained in bounds, created naturally or artificially, or diffused. Water from natural springs is classified as surface water when it exits from the spring onto the earth's surface.

Surficial aquifer system (SAS) An unconfined aquifer consisting of varying amounts of limestone and sediments that extend from the land surface to the top of an intermediate confining unit.

Treatment facility Any facility or other works used for the purpose of treating, stabilizing, or holding water or wastewater.

Upconing Process by which saline water underlying fresh water in an aquifer rises upward into the freshwater zone as a result of pumping water from the freshwater zone.

Utility Any legal entity responsible for supplying potable water for a defined service area.

Wastewater The combination of liquid and water carried pollutants from residences, commercial buildings, industrial plants, and institutions together with any groundwater, surface runoff, or leachate that may be present.

Water budget An accounting of total water use or projected water use for a given location or activity.

Water conservation Policies, strategies, and activities to manage water as a sustainable resource to protect the water environment and to meet current and future demand.

Water conservation rate structure A water rate structure designed to conserve water. Examples of water conservation rate structures include, but are not limited to, increasing block rates, seasonal rates, and quantity-based surcharges.

Water Protection and Sustainability Program (WPSP) Florida trust fund created by the legislature to provide Districts with state matching funds to support the development of alternative water supplies by local governments, water supply authorities, and other water users.

Water quality (1) A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose. (2) The physical, chemical, and biological condition of water as applied to a specific use. Federal and state guidelines set water quality standards based on the water's intended use, whether it is for recreation, fishing, drinking, navigation, shellfish harvesting, or agriculture.

Water reservation Water set aside for the protection of fish and wildlife or the public health and safety. Reserved water is not allocated to consumptive uses (Subsection 373.223(4), F.S.).

Water resource development The formulation and implementation of regional water resource management strategies, including collection and evaluation of surface water and groundwater data; structural and nonstructural programs to protect and manage the water resources; development of regional water resource implementation programs; construction, operation and maintenance of major public works facilities to provide for flood control, surface and groundwater storage, and groundwater recharge augmentation; and related technical assistance to local governments and to government-owned and privately owned water utilities (Section 373.019, Florida Statutes).

Watershed A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water. Watersheds conform to federal hydrologic unit code standards and can be divided into sub watersheds and further divided into catchments, the smallest water management unit recognized by SFWMD operations. Unlike drainage basins, which are defined by rule, watersheds are continuously evolving as the drainage network evolves.

Water supply development 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. (Section 373.019, F.S.)

Water use Any use of water that reduces the supply from which it is withdrawn or diverted.

Wellfield One or more wells producing water from a subsurface source.

Wetland An area that is inundated or saturated by surface or groundwater with vegetation adapted for life under those soil conditions (e.g., swamps, bogs, and marshes).

Withdrawal Water removed from a groundwater or surface water source for use.

Yield The quantity of water (expressed as rate of flow or total quantity per year) that can be collected for a given use from surface or groundwater sources.

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A collaborative regional
water supply endeavor
to protect, conserve, and restore
our water resources.

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