2025
Regional Water Supply Plan

Southern Planning Region
December 2025

Draft Final

Southwest Florida
Water Management District

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Southwest Florida Water Management District

2025 Regional Water Supply Plan

This report is produced by the Southwest Florida Water Management District

December 2025

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List of Abbreviations

AG	Agriculture
AMO	Atlantic Multidecadal Oscillations
AR	Aquifer Recharge
ASR	Aquifer Storage and Recovery
AWE	Alliance for Water Efficiency
AWEP	Agriculture Water Enhancement Program
AWS	Alternative Water Supply
AWWA	American Water Works Association
BEBR	Bureau of Economic and Business Research
BMP	Best Management Practice
CAR	Consolidated Annual Report
CFI	Cooperative Funding Initiative
CFS	Cubic Feet Per Second
CFWI	Central Florida Water Initiative
CGWQMN	Coastal Ground Water Quality Monitoring Network
DO	Dissolved Oxygen
DPCWUCA	Dover/Plant City Water Use Caution Area
DPR	Direct Potable Reuse
DSS	Domestic Self-Supply
DWRM	Districtwide Regulation Model
ECFT	East-Central Florida Transient
ECFTX	East-Central Florida Transient Expanded
EDR	Electrodialysis Reversal
ENSO	El Nino Southern Oscillations
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ET	Evapotranspiration
ETB	Eastern Tampa Bay
ETBWUCA	Eastern Tampa Bay Water Use Caution Area
F	Fahrenheit
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FARMS	Facilitating Agricultural Resource Management Systems
FAS	Floridan Aquifer System
FAWN	Florida Automated Weather Network
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FF	Florida Forever
FFL	Florida-Friendly Landscaping™
FIRM	Flood Insurance Rate Map
FSAID	Florida Statewide Agricultural Irrigation Demand
FTMR	Focused Telescopic Mesh Refinement
FWS	Florida Water Star℠
FY	Fiscal Year

GIS	Geographic Information System
GOES	Geostationary Operational Environmental Satellites
GPD	Gallons Per Day
GPF	Gallons Per Flush
GPM	Gallons Per Minute
HET	High-Efficiency Toilets
HPR	Heartland Planning Region
HRWUCA	Highlands Ridge Water Use Caution Area
I	Interstate
I/C	Industrial/Commercial
IFAS	Institute of Food and Agricultural Sciences
IFASMN	Inland Floridan Aquifer System Monitoring Network
IPCC	Intergovernmental Panel on Climate Change
IPR	Indirect Potable Reuse
L/R	Landscape/Recreation
LFA	Lower Floridan Aquifer
LiDAR	Light Detection and Ranging
M/D	Mining/Dewatering
MCU	Middle Confining Unit
MFL	Minimum Flow and Level
MG/L	Milligrams Per Liter
MGD	Million Gallons Per Day
MIA	Most Impacted Area
MIL	Mobile Irrigation Lab
MSF	Multi-stage Flash Distillation
NEP	National Estuary Program
NHARP	North Hillsborough Aquifer Recharge Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPR	Northern Planning Region
NRCS	Natural Resources Conservation Service
NTB	Northern Tampa Bay
NTBWUCA	Northern Tampa Bay Water Use Caution Area
O&M	Operation and Maintenance
OFW	Outstanding Florida Water
OPPAGA	Office of Program Policy Analysis and Governmental Accountability
PG	Power Generation
PRF	Peace River Facility
PRIM	Peace River Integrated Model
PRMRWSA	Peace River Manasota Regional Water Supply Authority
PRWC	Polk Regional Water Cooperative
PS	Public Supply
PSI	Pounds Per Square Inch
QWIP	Quality of Water Improvement Program
RC&D	Florida West Coast Resource Conservation and Development Council
RIB	Rapid Infiltration Basin
RO	Reverse Osmosis
ROMP	Regional Observation and Monitor-well Program
RWSP	Regional Water Supply Plan

SFWMD	South Florida Water Management District
SHARP	Southern Hillsborough Aquifer Recharge Program
SIMLAS	Saltwater Intrusion Model for Layered Aquifer Systems
SJRWMD	St. Johns River Water Management District
SLIP	Sea-Level Impact Projection
SLR	Sea Level Rise
SPJC	Shell, Prairie, and Joshua Creek
SPR	Southern Planning Region
SR	State Road
STAG	State and Tribal Assistance Grants
SWCFGWB	Southern West-Central Florida Groundwater Basin
SWFWMD	Southwest Florida Water Management District
SWIM	Surface Water Improvement and Management Program
SWIMAL	Saltwater Intrusion Minimum Aquifer Level
SWUCA	Southern Water Use Caution Area
TBC	Tampa Bypass Canal
TBPR	Tampa Bay Planning Region
TBW	Tampa Bay Water
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Loads
UF	University of Florida
UFA	Upper Floridan Aquifer
UFANMN	Upper Floridan Aquifer Nutrient Monitoring Network
UG/L	Micrograms Per Liter
UMRW	Upper Myakka River Watershed
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geologic Survey
WISE	Water Incentives Supporting Efficiency
WISKI	Kister's Water Information System
WMD	Water Management District
WMP	Watershed Management Plans
WPSPTF	Water Protection and Sustainability Program Trust Fund
WRAP	Water Resource Assessment Project
WRD	Water Resource Development
WSD	Water Supply Development
WTF	Water Treatment Facility
WTP	Water Treatment Plant
WUCA	Water Use Caution Area
WUE	Water Use Efficiency
WUP	Water Use Permit
WUWPD	Water Use Well Package Database
WWTP	Wastewater Treatment Plant

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Chapter 1. Introduction

The Regional Water Supply Plan (RWSP) for the Southwest Florida Water Management District (SWFWMD or District) is an assessment of projected water demands and potential sources of water to meet these demands for the period from 2025 through 2045. The RWSP has been prepared in accordance with the Florida Department of Environmental Protection's (FDEP) 2019 Format and Guidelines for Regional Water Supply Planning. The RWSP consists of four geographically based volumes that correspond to the District's four designated water supply planning regions: Northern, Tampa Bay, Southern, and Heartland (Figure 1-1). This volume is the 2025 RWSP update for the Southern Planning Region, which includes DeSoto, Manatee, and Sarasota counties and the portion of Charlotte County within the District. The District previously completed five RWSPs since 2001 that included the Southern Planning Region (SWFWMD, 2001, 2006b, 2011, 2015, 2020b).

The purpose of the RWSP is to provide a framework for future water management decisions in the District. The RWSP for the Southern Planning Region shows that sufficient alternative water sources (i.e., other than fresh groundwater from the upper Floridan aquifer [UFA]) exist to meet future demands and replace some of the current fresh groundwater withdrawals causing hydrologic stress.

The RWSP also identifies potential options and associated costs for developing fresh groundwater and alternative sources. These options are not intended to represent the District's most preferable for water supply development (WSD); however, they are provided as reasonable concepts that water users in the planning region may pursue to meet their water supply needs. Water users can select a water supply option as presented in the RWSP or combine elements of different options that suit their water supply needs, provided such options are consistent with the intent and direction of the RWSP. Additionally, the RWSP provides information to assist water users in developing funding strategies to implement water supply projects.

The requirement for regional water supply planning originated from legislation passed in 1997 that significantly amended Chapter 373, Florida Statutes (F.S.). Regional water supply planning requirements are codified in Part VII of Chapter 373 (373.709), F.S., and this RWSP was prepared pursuant to these provisions. Key components of this legislation include:

- Designation of one or more water supply planning regions within the District.
- Preparation of a Districtwide water supply assessment.
- Preparation of a RWSP for areas where existing and reasonably anticipated sources of water were determined to be inadequate to meet future demand, based upon the results of the water supply assessment.

Regional water supply planning requirements were amended with the passage of Senate Bill 444 during the 2005 legislative session. The bill substantially strengthened requirements for the identification and listing of WSD projects. In addition, the legislation intended to foster better communication among water planners, local government planners, and local utilities. Local governments are now permitted to develop their own water supply assessments, which the water management districts (WMDs) are required to consider when developing their RWSPs. Finally, a trust fund was created to provide WMDs with state matching funds to support the development of alternative water supplies (AWS) by local governments, water supply authorities, and other water users.

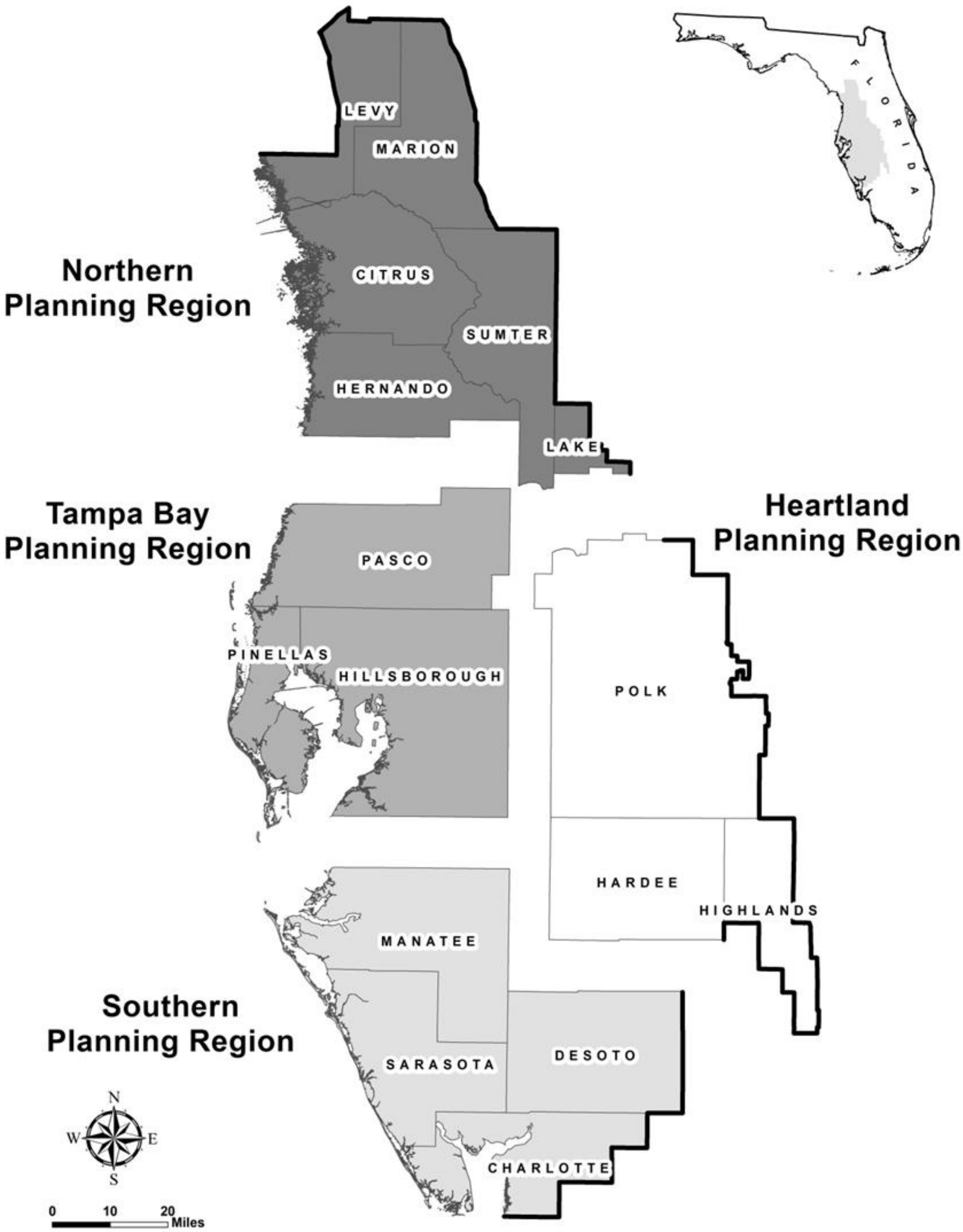


Figure 1-1. *Location of the District's four water supply planning regions*

Part A. Introduction to the Southern Planning Region Regional Water Supply Plan

The RWSP for the Southern Planning Region contains:

- Chapter 1, Introduction, provides an overview of water supply planning accomplishments in the planning region prior to development of this RWSP; a description of the land use, population, physical characteristics, hydrology, geology/hydrogeology of the region; and a description of the technical investigations that provide the basis for the District's water resource management strategies.
- Chapter 2, Resource Protection Criteria, addresses the resource protection strategies that the District has implemented or is considering implementing, including water use caution areas (WUCAs) and the District's minimum flows and levels (MFLs) program.
- Chapter 3, Demand Estimates and Projections, quantifies existing and reasonably projected water supply demand through the year 2045 for the public supply (PS), agricultural (AG), industrial/commercial (I/C), mining/dewatering (M/D), power generation (PG), and landscape/recreation (L/R) water use sectors.
- Chapter 4, Evaluation of Water Sources, evaluates the future water supply potential of traditional and alternative sources.
- Chapter 5, Overview of Water Supply Development Options, presents a list of WSD options for local governments and utilities, including surface water, reclaimed water, water conservation, brackish groundwater, and aquifer storage and recovery (ASR).
- Chapter 6, Water Supply Projects Under Development, provides an overview of WSD projects that are recently completed or in progress and have received District funding assistance.
- Chapter 7, Water Resource Development Component, inventories the District's ongoing data collection and analysis activities and water resource projects that are classified as water resource development (WRD).
- Chapter 8, Overview of Funding Mechanisms, provides an estimate of the capital cost of water supply and WRD projects proposed by the District and its cooperators to meet the water supply demand projected through 2045 and to restore MFLs to impacted natural systems. An overview of mechanisms available to generate the necessary funds to implement these projects is also provided.

Part B. Accomplishments since Completion of the 2020 RWSP

This section summarizes the District's major accomplishments in implementing the planning region's RWSP objectives since the Governing Board approved the 2020 update in November 2020.

Section 1. Alternative Water Supply, Conservation, and Reuse Development

1.0 Alternative Water Supply

The Peace River Manasota Regional Water Supply Authority (PRMRWSA) provides regional planning to its four member counties. They are also a wholesale water supplier to Charlotte, DeSoto, and Sarasota counties, the City of North Port, and, in the future, to Manatee County. The PRMRWSA's services are critical to the District's Southern Water Use Caution Area (SWUCA) Recovery Strategy, which promotes the use of AWS to meet growing PS demands while reserving limited groundwater supplies for agriculture and other inland users.

The PRMRWSA continues to expand its Regional Integrated Loop System to meet future demands and ensure reliability of water supply in the four-county region. The District is cooperatively funding two ongoing loop system projects: the Phase 2B Interconnect crossing the Myakka River in northern Charlotte County and the Phase 3C Interconnect in northern Sarasota County. As future demands necessitate, the loop system may extend further north to allow deliveries of PRMRWSA water supply to Manatee County. Future segments may also extend into rapidly developing portions of Charlotte and Sarasota counties.

The PRMRWSA's water supply is provided by the 51 million gallons per day (mgd) Peace River Facility (PRF) in DeSoto County. The facility has a 6.5 billion-gallon off-stream reservoir system and a 6.0 billion-gallon ASR wellfield storage system. The PRMRWSA is currently developing a third, 9-billion-gallon reservoir and second river intake to ensure drought reliability as customer demands increase. In 2019, the PRMRWSA's water use permit (WUP) was increased, allowing for future facility expansions to meet most of the region's PS demands. A surface water treatment expansion of 18 mgd is also under design.

In 2022, the PRMRWSA's WUP was modified to include a proposed brackish groundwater wellfield for conjunctive use with the existing surface water sources. Preliminary (30 percent) design and permitting of a 9.2 mgd (annual average finished water) brackish groundwater reverse osmosis (RO) facility has been completed. Of this, 8 mgd is expected to be allocable to PRMRWSA customers, while 1.2 mgd will be held in reserve for meeting regional water supply during peak demand, thus providing redundancy and increased system reliability to the overall facility. Additionally, the PRMRWSA received an Underground Injection Control permit from the FDEP in 2023 for a partially treated surface water ASR system, which will allow excess treatment plant capacity that is currently reserved for ASR storage to be reallocated toward meeting customer demands. A feasibility study is currently underway to evaluate the technical, economic, and regulatory feasibility of implementing this system at the PRMRWSA's ASR Wellfield 2.

In addition to these regional-scale activities, several other AWS projects have been initiated or completed since the 2020 RWSP. The Punta Gorda brackish groundwater addition to the Shell Creek Water Treatment Plant (WTP) was completed in 2020 along with its regional interconnection via the PRMRWSA's Phase 1 pipeline. In 2023, the City of North Port commenced operation of their southwest brackish RO facility, which was funded through a partnership with a developer. Sarasota County also renovated the T. Mabry Carlton Water Treatment Facility (WTF) and transferred WUP allocations from other wellfields to the facility.

2.0 Water Conservation

The District continues to promote and cooperatively fund water conservation efforts to more efficiently use existing water supplies. In the PS sector, for fiscal years (FYs) 2020 to 2024, this includes cooperatively-funded projects for toilet rebates, line looping to reduce flushing, and conservation kits. In the Southern Planning Region, the District has co-funded conservation projects undertaken by Manatee County and the cities of Venice, North Port, and Palmetto.

In the agricultural water use sector, the District's primary initiative for water conservation is the Facilitating Agricultural Resource Management Systems (FARMS) Program. Established in 2003 in partnership with the Florida Department of Agriculture and Consumer Services (FDACS), FARMS is a cost-share reimbursement program for production-scale best management practices (BMPs) to reduce groundwater use and improve water quality. To date, more than 215 operational projects Districtwide are providing a groundwater offset of more than 29 mgd. An additional four projects in the planning, design or construction phase are expected to yield another 0.37 mgd of offset. Within the Southern Planning Region, FARMS has funded 132 projects. One hundred and thirteen of these projects are operational, providing nearly 18.6 mgd of offset. Fifteen projects have been retired, meaning they have come to the end of their operational life or the property has been sold for a non-agricultural purpose.

3.0 Reclaimed Water

The District has continued its highly successful program to cooperatively fund projects that make reclaimed water available for beneficial reuse. These include 390 projects between FY1987 and FY2023 for the design and construction of transmission, distribution, recharge, natural system enhancement, storage and pumping facilities, metering, feasibility studies, reuse master plans, and research projects. As a consequence of District and utility cooperation, reuse projects have been developed that resulted in the 2020 Districtwide utilization of more than 196 mgd and a water resource benefit of almost 142 mgd. Utilities are on their way to achieving the 2040 Districtwide goal of 75 percent utilization.

Within the Southern Planning Region in 2020, utilities were utilizing approximately 62 percent or 44 mgd of the almost 72 mgd available wastewater treatment plant (WWTP) flows, resulting in an estimated 35 mgd of water resource benefits. There are six reclaimed water supply projects and one feasibility study under development that are estimated to supply more than 5 mgd of reclaimed water and result in 4 mgd of potable-quality water benefits at a total cost of approximately $24.7 million.

Section 2. Support for Water Supply Planning

The District provides technical support to local governments as they prepare statutorily required Water Supply Facilities Work Plans and related updates as part of their comprehensive plans. Staff also provides ad hoc assistance to local governments and utilities with planning, permitting, and information/data needs.

Section 3. Minimum Flows and Levels Establishment

1.0 Established Minimum Flows and Levels

Minimum flows and water levels (MFLs) reevaluated or established in the planning region during or since 2020 include four river segments, which are listed in Table 1-1 and Appendix 2-1. The MFLs established for lower Shell Creek, the upper Little Manatee River, and Horse Creek represent the first adopted into the District's Water Levels and Rates of Flow Rules (Chapter 40 D-8, Florida Administrative Code [F.A.C.]) for these water bodies. The MFL for the lower Peace River was also reevaluated in 2021. The District continues to reevaluate and establish MFLs per its annually updated Priority List and Schedule for the Establishment of Minimum Flows, Minimum Water Levels, and Reservations (Chapter 2, Part B and Appendices 2-1 and 2-2).

Table 1-1. *Minimum flows and levels (MFLs) established or reevaluated in the Southern Planning Region since 2020.*

MFL Rivers/Creeks
Horse Creek
Little Manatee River (upper segment)
Peace River (lower segment)
Shell Creek (lower segment)

2.0 Minimum Flows and Levels Recovery Initiatives

All of the Southern Planning Region lies within the SWUCA (Figures 1-1 and 2-1). The SWUCA Recovery Strategy (Rule 40D-80.074, F.A.C.; SWFWMD, 2006a), approved in 2006 with effective rules in 2007, was established to address several MFLs in the region that were not being met. The strategy relies on a variety of regulatory and non-regulatory activities that are collectively focused on achieving MFLs for all priority water resources in the SWUCA by 2025.

Since 2020, the District has reported on progress made toward achieving the SWUCA Recovery Strategy. This includes notable progress made in the Most Impacted Area (MIA) of the SWUCA where the established saltwater intrusion minimum aquifer level (SWIMAL) was met for the first time in 2023, based on the aquifer water level associated with the SWIMAL being equaled or exceeded from 2018 through 2022. The SWUCA also extends into the District's Heartland Planning Region, where operation of the Lake Hancock Lake Level Modification project and implementation of the Lake Hancock/Lower Saddle Creek Reservation adopted in 2020 (Rule 40D-2.302(3), F.A.C.) continues. The Lake Hancock Lake Level Modification project raised the lake level using a new structure (P-11) to increase storage capacity in the lake for release to lower Saddle Creek to augment dry season flows and help achieve minimum flows in the upper Peace River. The Lake Hancock/Lower Saddle Creek Reservation reserves from consumptive use specified quantities of water stored in Lake Hancock and released to lower Saddle Creek for conveyance to the upper Peace River. Implementation of the project and reservation have contributed to achievement of minimum low flows established at all three sites on the upper Peace River since 2020.

In 2023, the District completed the third five-year comprehensive assessment addressing progress achieved from FY2017 through FY2021 (SWFWMD, 2023). In addition, the District has continued annual assessments of all established MFLs, including those within the SWUCA. While these assessments highlight the substantial progress in SWUCA recovery that has occurred, some lake MFLs in the Heartland Planning Region continue to not be met. Reevaluation of these MFLs by 2025 using new, updated lake-level methods and wetland criteria peer reviewed in 2023 will support future assessment of recovery needs.

Section 4. Quality of Water Improvement Program and Well Back-Plugging

Since the 1970s, the Quality of Water Improvement Program (QWIP) has prevented waste and contamination of surface and groundwater resources by reimbursing landowners for plugging abandoned or improperly constructed artesian wells. The program focuses on the southern portion of the District where the UFA is under artesian conditions, creating the potential for mineralized water to migrate upward and contaminate other aquifers or surface waters. The program reimburses approximately 200 well-pluggings per year and, Districtwide, more than 7,700 well-pluggings have been reimbursed since inception. In the Southern Planning Region, 5,258 well-pluggings have been reimbursed since the QWIP program began.

A related effort, now part of the FARMS Program, involves the rehabilitation (or back-plugging) of agricultural irrigation wells to improve water quality in surface and groundwaters and improve crop yields. The program initially targeted the Shell Creek, Prairie Creek, and Joshua Creek watersheds to decrease the discharge of highly mineralized water into Shell Creek, the City of Punta Gorda's municipal water supply. The program has rehabilitated 85 wells as of September 2024, with 63 of these in the target watersheds. Seventy-nine of these wells were in the Southern Planning Region.

Part C. Description of the Southern Planning Region

Section 1. Land Use and Population

The Southern Planning Region is characterized by diverse land-use types (Table 1-2), ranging from urban built-up areas, such as the cities of Bradenton, Palmetto and Longboat Key in Manatee County; the cities of Sarasota, Venice and North Port in Sarasota County; and Punta Gorda in Charlotte County, to predominantly agricultural land uses in the inland portions of these counties and in most of DeSoto County. Significant phosphate mining activities, primarily in Manatee County, also occur in the region. However, mining operations are moving southward into DeSoto County as phosphate reserves at existing mines are depleted.

The population of the planning region is projected to increase from an estimated 1,247,747 in 2020 to 1,614,977 in 2045 (Appendix 3-3). This is an increase of 367,230 new residents, a 29 percent increase over the base year population. The majority of this population growth will be due to net migration. Citrus is the most prominent crop type in the region, with a slight increase in demand (54.03 mgd in 2020 to 55.30 in 2045). This is followed by fresh market vegetables, with a slight decrease in demand (45.17 mgd in 2020 to 43.29 mgd in 2045).

Table 1-2. *Land use/land cover in the Southern Planning Region (2023)*

Land-Use/Land-Cover Types	Acres	Percent
Urban and Built-up	366,550.00	23.23%
Agriculture	469,496.35	29.75%
Rangeland	144,915.38	9.18%
Upland Forest	164,242.49	10.41%
Water	71,327.62	4.52%
Wetlands	295,857.92	18.75%
Barren Land	1,612.24	0.10%
Transportation, Communication and Utilities	31,415.47	1.99%
Industrial and Mining	32,804.43	2.08%
Total	**1,578,221.89**	**100.00%**

Summation and/or percentage calculation differences may occur due to rounding
Source: Southwest Florida Water Management District (SWFWMD) 2023 Land-Use Land-Cover GIS layer (SWFWMD, 2025).

Section 2. Physical Characteristics

Land surface elevations in the planning region gradually increase from sea level at the gulf coast to a high of 136 feet in northeastern Manatee County. This change in topography is evidence of former marine shorelines, called terraces. Each terrace consists of poorly drained flatlands with many swamps, ponds, and lakes. Over large areas of Charlotte and Manatee counties, canals were constructed to drain some of these swampy areas for agriculture. Further to the east, DeSoto County is topographically very similar to Charlotte and Manatee counties, with poorly drained marine terraces increasing in elevation to the east. Most of the undeveloped sections of the planning region are pine flatwoods, saw palmetto, and prairie grassland.

Section 3. Hydrology

1.0 Rivers

The Southern Planning Region contains all or part of several major drainage basins defined by the U.S. Geological Survey (USGS), including the Little Manatee River, Manatee River (including its tributary Braden River), Sarasota/Lemon Bay, Myakka River (including its tributary Myakkahatchee Creek), Peace River (including its tributaries Horse, Joshua, and Shell creeks), and Charlotte Harbor drainage. There are many smaller tributaries to these larger systems, as well as several coastal watersheds drained by many small tidally influenced or intermittent streams. The Braden, Manatee, and Peace rivers and the Myakkahatchee and Shell creeks are used as public water supply sources. Figure 1-2 shows the major hydrologic features in the planning region including rivers, lakes, and springs.

2.0 Lakes

There are few named lakes in the planning region. The largest, Lake Parrish, is an off-stream reservoir in Manatee County that was constructed to store water diverted from the Little Manatee River. Lake Manatee, another large reservoir in Manatee County, was created through impoundment of the Manatee River. Other large lakes in the region include Upper Myakka Lake and Lower Myakka Lake in Sarasota County, which are flow-through systems in the Myakka River drainage where water levels are partially controlled by constructed dams. Evers Reservoir is a smaller, impounded portion of the Braden River in Sarasota County. Most small lakes in the planning region occur in shallow depressions that are connected to the surficial aquifer and hydraulically separated from the underlying confined aquifers. Many of the lake systems are connected to river systems through natural streams or constructed canals.

3.0 Springs

There are no first-magnitude (discharge exceeding 100 cubic feet per second [cfs]) or second-magnitude springs (discharge between 10 and 100 cfs) within the planning region. Warm Mineral Springs is a third-magnitude spring (discharge between 1 and 10 cfs) located in and owned by the City of North Port in Sarasota County. The warm temperature and mineralized quality of the spring water indicates that its source is much deeper in the Floridan aquifer system (FAS) than springs further to the north, which tend to have shallow flow systems formed by karst geology. Another third-magnitude spring, Little Salt Spring, is also located in the City of North Port and has a long history of human-use, based on artifacts collected at the site.

4.0 Wetlands

Prior to significant development, approximately 54 percent of Florida was covered by wetlands. However, due to drainage and development, only approximately 30 percent of the state currently remains covered by wetlands. Although not depicted in Figure 1-2, nearly 19 percent of the Southern Planning Region is classified as wetlands (Table 1-2).

Estuarine and tidal wetlands occur in coastal areas of the planning region where freshwater and seawater mix. Saltmarsh grasses and mangroves are common in Charlotte Harbor, Sarasota Bay, and the southernmost portion of Tampa Bay within the Southern Planning Region, which are all estuaries of national significance that have been included in the National Estuary Program (NEP).

Freshwater wetlands, including hardwood-cypress swamps, marshes, and wet prairies, occur throughout the planning region. These wetlands commonly occur at lakes and within river corridors and are also found as isolated wetland habitats. Hardwood-cypress swamps are forested systems with water at or above land surface for a considerable portion of the year, whereas marshes are typically shallower systems vegetated by herbaceous plants rather than trees. Wet prairies are populated by a variety of mesic, herbaceous species and shrubs and are typically inundated during the wettest times of the year.

Flatford Swamp

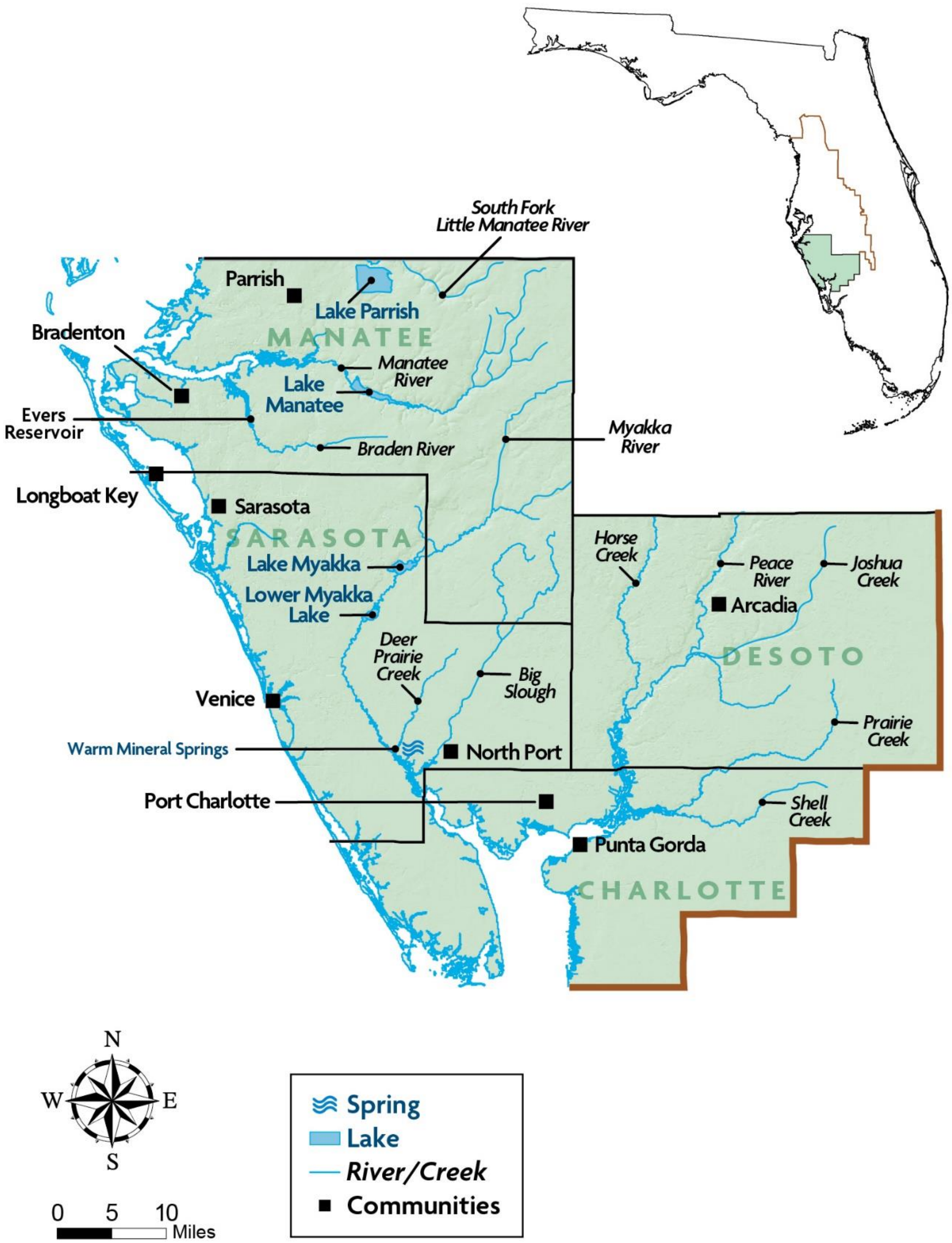


Figure 1-2. *Major hydrologic features in the Southern Planning Region*

Section 4. Geology/Hydrogeology

The principal aquifers present in the planning region and used for water supply include the surficial aquifer, Hawthorn aquifers, and the UFA. Figures 1-3 and 1-4 are north-south cross sections through the western and eastern portions of the District showing the generalized hydrogeology. Figure 1-5 shows the west-central Florida groundwater basins. The Southern West-Central Florida Groundwater Basin (SWCFGWB) encompasses the southern half of the District where the Hawthorn aquifer system (formerly intermediate aquifer system) and its associated confining units separate the surficial aquifer and UFA. This causes the UFA to be well-confined across the Southern Planning Region.

The surficial aquifer is contained within near-surface deposits consisting of undifferentiated sands, clayey sand, silt, shell, and marl. The aquifer produces relatively small quantities of water, which are generally used for low-volume irrigation or domestic water supply. Surficial deposits range in thickness from 10 feet in coastal areas to greater than 100 feet further east near the Lake Wales Ridge (SWFWMD, 1993b).

Underlying the surficial aquifer is the Hawthorn aquifer system, which includes up to three aquifers in the region: the Peace River aquifer, the upper Arcadia aquifer, and the lower Arcadia aquifer. This aquifer system predominantly consists of discontinuous sand, gravel, shell, limestone, and dolomite beds that characterize the Hawthorn Group. The aquifers are separated by low-permeability sandy clays, clays, and marls. The thickness of the Hawthorn aquifer system increases from north to south and varies from approximately 50 feet in northern Manatee County to about 300 feet in its southernmost portion within the District (LaRoche and Horstman, 2024). The Hawthorn aquifer system is used extensively for public water supply, agricultural irrigation, and recreational, domestic and industrial water uses, especially in the southern coastal portions of the planning region where its water quality is better than the UFA.

The UFA is an important source of groundwater in the planning region. Its stratigraphy consists of thick, stratified sequences of limestone and dolomite units that include (in order of increasing geologic age and depth) the Suwannee Limestone, Ocala Limestone, and part of the Avon Park Formation. The aquifer is confined throughout the planning region by the low-permeability sediments of the overlying Hawthorn aquifer system. Two zones are mapped within the UFA of the planning region: the Ocala low-permeability zone and Avon Park high-permeability zone. The Ocala low-permeability zone occurs exclusively in the UFA and coincides mostly with the less permeable Ocala Limestone. It separates the more permeable Suwannee Limestone above (where present) from the even more permeable Avon Park Formation below. The Ocala low-permeability zone simply represents a less permeable layer within the aquifer that is hydraulically connected and does not provide confinement (LaRoche and Horstman, 2024). The highly transmissive portion of the Avon Park Formation is the result of the mapped fractures and cavities that distinguish the Avon Park high-permeability zone. Within the planning region, the Avon Park high-permeability zone is exclusive to the UFA (LaRoche and Horstman, 2024).

In the planning region, there is generally no recharge to the UFA along the coast, southern DeSoto County, and Charlotte County because the area is a zone of discharge. Further inland, recharge to the aquifer system increases from zero to a few inches per year (Sepulveda, 2002). This low recharge rate is due to the thick Hawthorn Group clay-confining layers that overlie the aquifer. These clay layers restrict the vertical exchange of water from the surficial aquifer to the underlying UFA. Groundwater is highly mineralized throughout much of the UFA in the southern portions of the planning region. In these areas, groundwater from the shallower Hawthorn aquifers are used extensively for water supply.

The middle confining unit (MCU) II of the FAS occurs in the lower portion of the Avon Park Formation and forms the base of the UFA in the region (Miller, 1986). It contains evaporate minerals such as gypsum and anhydrite, which occur as thin beds or as nodules within dolomitic limestone that overall has very low permeability. The MCU II is generally considered to be the lower limit of freshwater production, except in coastal areas of Manatee and Sarasota counties, southern DeSoto, and Charlotte counties. In this area, water quality within the Avon Park Formation is mineralized or saline with sulfate or chloride concentrations exceeding 1,000 milligrams per liter (mg/L). The MCU I is a shallower confining unit that extends from Florida's east coast and overlaps MCU II in central Florida but tapers out westward. The MCU I has not been identified within the planning region.

There is limited exploration data available below MCU II within the planning region. However, the permeable rock below MCU II (where present) is the lower Floridan aquifer (LFA) II, which occurs near the bottom of the Avon Park Formation. Deeper exploration in recent decades shows another MCU to be present in central and southern Florida, MCU VIII of Miller (1986). The MCU VIII forms the base of LFA II, typically occurs in the upper portion of the Oldsmar Formation and is commonly associated with a 'glauconite marker horizon' described in Williams and Kuniansky (2016). The permeable rock below MCU VIII is the LFA below MCU VIII (LFA VIII), which is the deepest aquifer of the FAS and commonly contains fractures. Groundwater in this aquifer is often nonpotable but can be less than 10,000 mg/L total dissolved solids (TDS) in some areas. The base of the FAS is the sub-Floridan confining unit near the top of the Cedar Keys Formation, which dips from 2,000 feet to 3,000 feet or more southward within the planning region. For more information on the FAS within the District, please refer to LaRoche and Horstman, 2024.

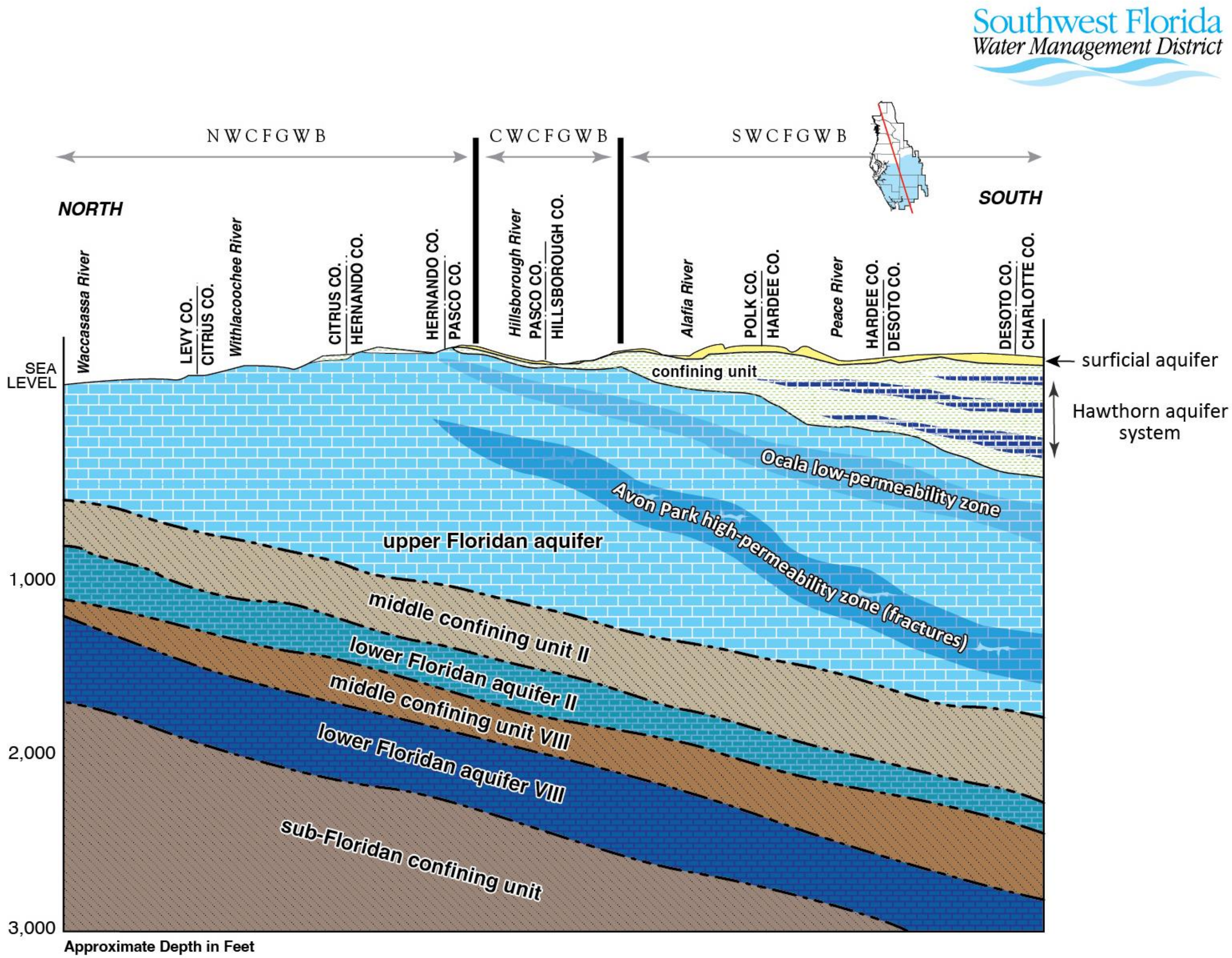


Figure 1-3. *Generalized north-south hydrogeologic cross section through the western District*

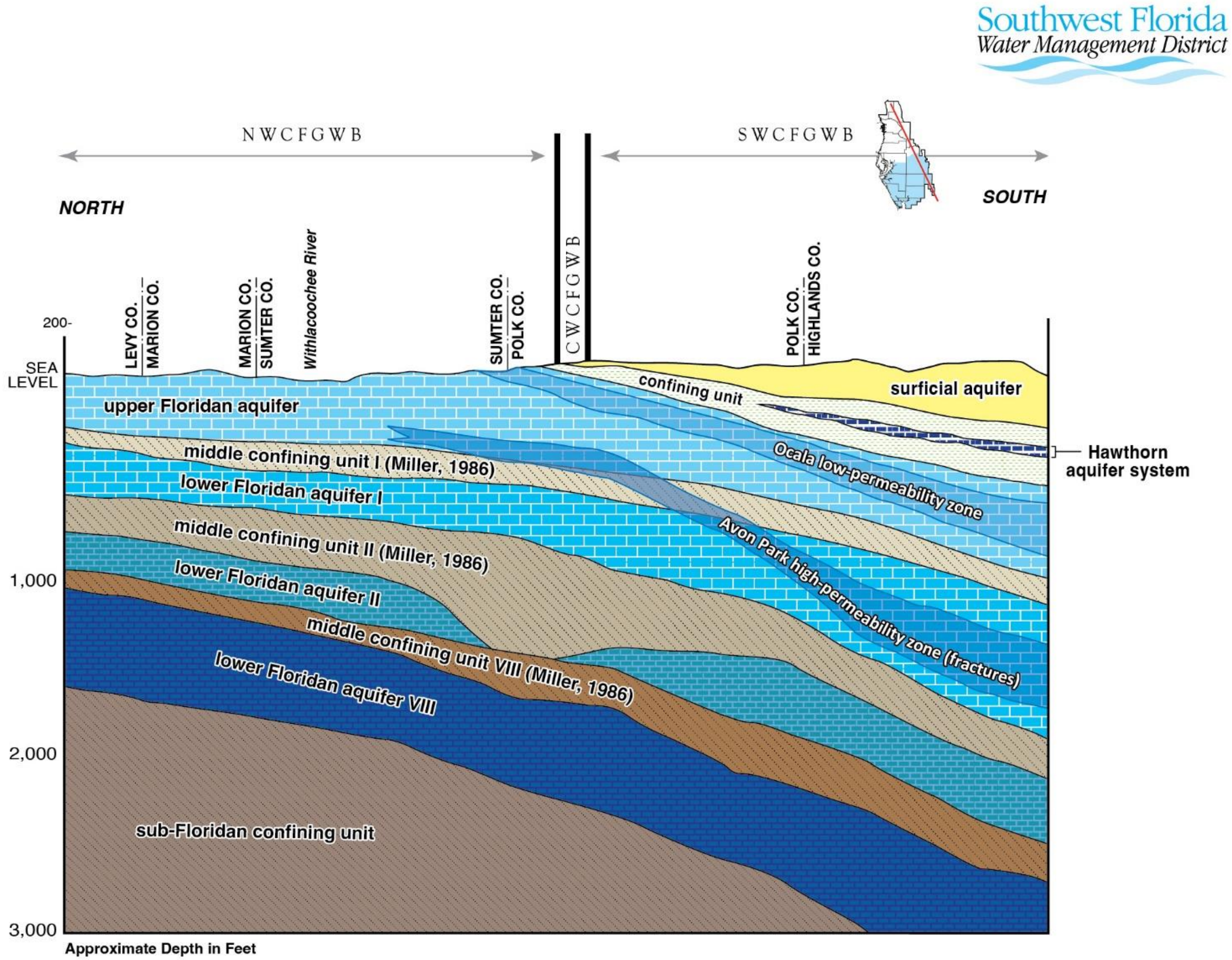


Figure 1-4. *Generalized north-south hydrogeologic cross section through the eastern District*

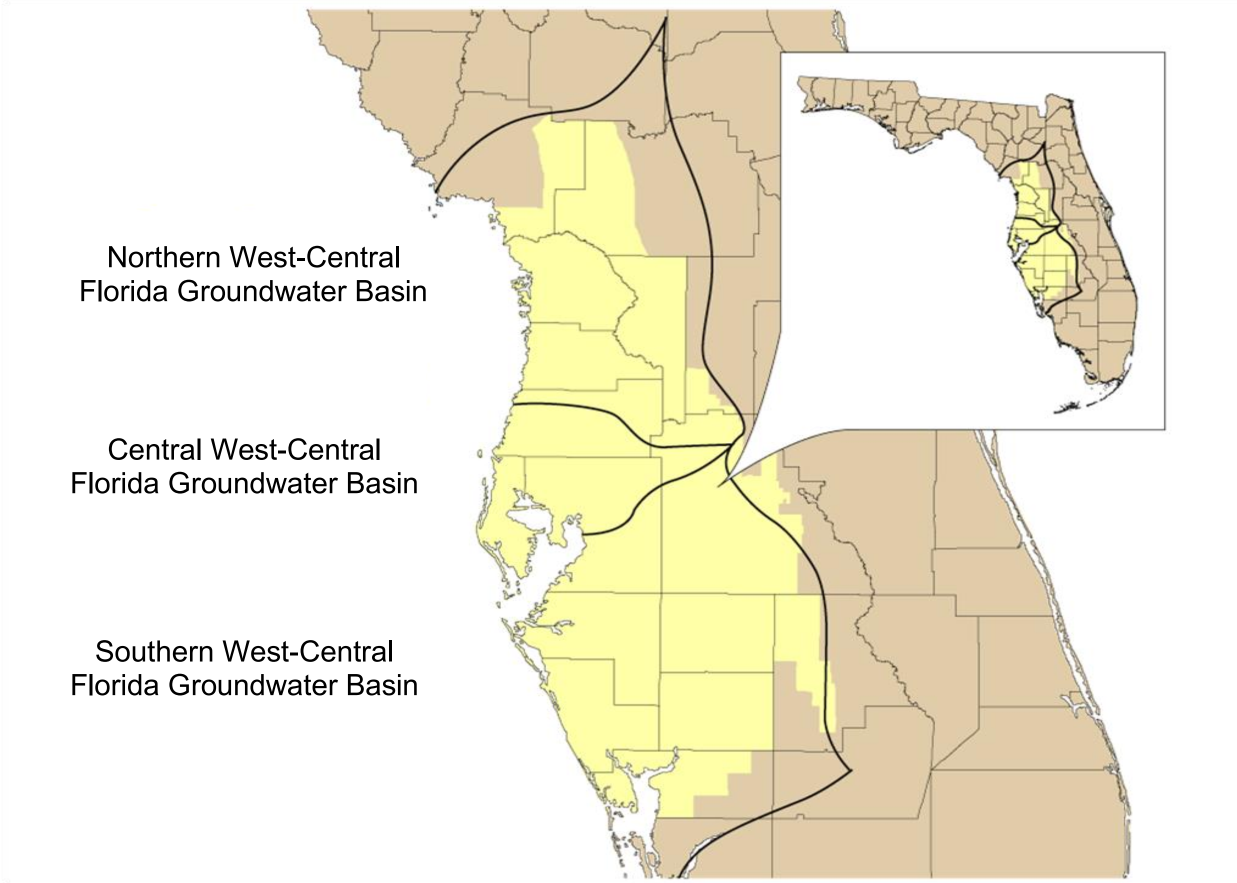


Figure 1-5. *The District and the West-Central Florida Groundwater Basins*

Part D. Previous Technical Investigations

The 2025 RWSP builds upon a series of cornerstone investigations undertaken by the District and the USGS beginning in the 1970s. These studies enhanced the District's understanding of the complex relationships between human activities (i.e., surface and groundwater usage and large-scale land-use alterations), climatic cycles, aquifer and surface water hydrology/ interactions, and water quality. Investigations conducted in the Southern Planning Region and adjacent areas are grouped by category and briefly summarized below.

Section 1. Water Resource Investigations

Following passage of the Florida Water Resources Act of 1972, numerous water resource investigations were initiated by the District to collect and evaluate critical information on Districtwide water resources. As a result, the District's Regional Observation and Monitor-well Program (ROMP) was established in 1974 to construct monitor wells and perform aquifer testing to better characterize groundwater resources and surface water and groundwater interactions. Approximately a dozen wells were drilled annually, and by the 1980s, data collected from these wells began to be used in hydrologic assessments that clearly identified regional resource concerns.

In 1978, the Peace River Basin Board directed District staff to assess the causes of lake level declines that had been occurring along the Lake Wales Ridge in Polk and Highlands counties since the 1960s. The investigation, referred to as Ridge I, was completed in 1980 and concluded that the water level declines were due to below-normal rainfall and groundwater withdrawals (Geraghty & Miller, Inc., 1980). In 1987, the District initiated the Ridge II investigation to further assess lake level declines and implement the data collection activities recommended in the Ridge I study. The Ridge II report also concluded that lake level declines were caused by below-average rainfall and aquifer withdrawals (Barcelo et al., 1990). In addition, it demonstrated that groundwater withdrawals from other areas of the groundwater basin contributed to the water level declines along the Lake Wales Ridge, noting that water level fluctuations in some lakes had been affected by surface water drainage alterations.

In the late 1980s, the District initiated water resource assessment projects (WRAPs) for the Eastern Tampa Bay (ETB) and Northern Tampa Bay (NTB) areas to address water supply availability and resource concerns, including lowered lake and wetland levels in the NTB and saltwater intrusion into the UFA in the ETB. The final ETB WRAP report concluded that the lowering of the potentiometric surface in coastal areas south of Tampa Bay was caused not only by groundwater withdrawals within these areas but also by withdrawals from other, more distant portions of the SWCFGWB (SWFWMD, 1993a). The need for a basin-wide approach to water resource management was also identified. The final NTB WRAP report (SWFWMD, 1996a; 1996b; 1996c) indicated that additional, future groundwater withdrawals would be expected to exacerbate existing adverse impacts.

Based on the preliminary findings of the Ridge II investigation and WRAP studies, as well as continued concern about water resource impacts, the District established the Highlands Ridge, ETB, and NTB WUCAs in 1989 (Chapter 2, Part A). The District implemented a strategy to address the resource concerns and facilitated public work group meetings to develop management plans for the three WUCAs (SWFWMD, 1989, 1990a, 1990b, 1990c, 1990d, 1990e). These deliberations led to major revisions of the District's water use permitting rules to add special conditions specific to each WUCA. In October 1992, the SWUCA was established, encompassing both the ETB and Highlands Ridge WUCAs which were subsequently no longer identified as distinct WUCAs. The remainder of the SWCFGWB was also encompassed by the newly established SWUCA.

The District established MFLs for aquifer water levels and several water bodies within the SWUCA and adopted the SWUCA Recovery Strategy (Rule 40D-80.074, F.A.C.; SWFWMD, 2006a), which became effective in 2007. The goal of these efforts was to achieve full recovery in the region by 2025 and address depressed aquifer levels causing saltwater intrusion along the coast, reduced flows in the upper Peace River, and lowered lake levels in portions of Polk and Highlands counties. Three five-year assessments addressing recovery status from FY2007 through FY2021 (SWFWMD 2013, 2018, 2023) have been completed along with annual status assessments of all established MFLs. These assessments have documented substantial progress toward achieving SWUCA Recovery Strategy goals.

The SWUCA Five-Year Assessment for FY2017-FY2021, completed in 2023, describes the continued achievement of MFLs established for all three sites on the upper Peace River and increased dry-season flows in the lower Peace River since 2020. Rainfall conditions and the

District's continued implementation of the Lake Hancock Lake Level Modification project and the Lake Hancock/Lower Saddle Creek Reservation contributed to these successes. This five-year assessment also describes the significant progress made toward achieving the SWIMAL established for the MIA of the SWUCA, and an annual status assessment subsequently completed in 2023 documented the first time the SWIMAL has been met since its establishment in 2007. However, some challenges to full recovery in the region remain. While lake water levels in the ridge area of the SWUCA have increased several feet since the 1990s, MFLs for some of these lakes continue to not be met. Reevaluation of these MFLs by 2025 using new, updated lake-level methods and wetland criteria peer reviewed in 2023 will support future assessment of recovery needs.

The District continues to work with key stakeholders and the public on development and implementation of recovery options within the SWUCA. Completion of a comprehensive evaluation of progress made toward addressing the major recovery goals identified for achievement by 2025 is anticipated in 2026 or 2027. Findings from the evaluation will be used to determine the need for continued implementation or modification of the SWUCA Recovery Strategy and for additional five-year progress assessments.

Section 2. U.S. Geological Survey Hydrologic Investigations

The District maintains a long-term cooperative program with the USGS to conduct hydrogeologic investigations intended to supplement work conducted by District staff. The projects focus on improving the understanding of cause-and-effect relationships and developing analytical tools for resource evaluations. Funding for this program is generally on a 50/50 cost-share basis with the USGS. However, this varies based on whether other cooperators are involved in the project and if requests for non-routine data collection or special project assignments are implemented. The District's cooperative investigations with the USGS have typically focused on regional hydrogeology, water quality, and data collection. Over the years, several groundwater and surface water cooperative projects have been completed in and around the Southern Planning Region. In addition, some projects and data collection activities are in progress. Completed and ongoing cooperative District/USGS investigations and data collection activities are listed in Table 1-3.

Table 1-3. *District/USGS cooperative hydrologic investigations and data collection activities applicable to the Southern Planning Region*

Investigation Type	Description
Completed Investigations	
Groundwater	Regional Groundwater Flow System Models of the SWFWMD, Highlands Ridge WUCA, and Hardee and DeSoto Counties
	Hydrogeologic Characterization of the Intermediate Aquifer System
	Hydrogeology and Quality of Groundwater in Highlands County
Surface Water	Effect of Kart Development on Peace River Flow
	Hydrologic Assessment of the Alafia River
	Primer of Hydrogeology and Ecology of Freshwater Wetlands in Central Florida
	Methods to Define Storm Flow and Base Flow Components of Total Stream Flow in Florida Watersheds
	Charlie Creek Watershed Hydrologic Characterization
Groundwater and Surface Water	Effects of Using Groundwater for Supplemental Hydration of Lakes and Wetlands
	Effects of Development on the Hydrologic Budget in the SWUCA
Data Collection	Statewide Light Detection and Ranging (LiDAR) Mapping
	Mapping Actual Evapotranspiration Over Florida Model Support
Ongoing Investigations/Data Collection Activities	
Data Collection	MFLs Data Collection
	Surface Water Flow, Level, and Water Quality Data Collection
	Statewide Geostationary Operational Environmental Satellites (GOES) Evapotranspiration (ET) Project

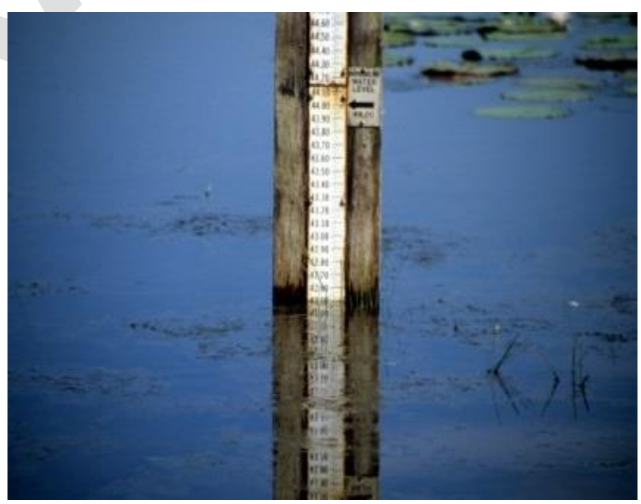
Section 3. Water Supply Investigations

Water supply investigations for the planning region were initiated in the 1960s as part of the U.S. Army Corps of Engineers (USACE) Four River Basins project. The Four River Basins project began as a flood control project developed in response to severe coastal and inland flooding caused by Hurricane Donna in September 1960. The District was formed in 1961 to help implement this federal project, which led to development of several large control structures including the Tampa Bypass Canal (TBC), the Lake Tarpon and Tsala Apopka Outfalls, and the Masaryktown Canal.

Following a period of drought conditions in the mid-1960s that led to numerous dry well complaints, along with findings of project-related ecological studies, there was an apparent need for a broader-based approach to water management than just flood control. The scope of the Four River Basins project was expanded into a more comprehensive effort to assess water resources in the region and determine ways to use excess surface and groundwater for regional water supply solutions. The revised approach led to changes for the TBC design to allow surface water transfers to the City of Tampa, the use of land preservations for water recharge and natural flood attenuation, and the cancellation of other structural projects that would have greatly altered environmental resources.

Since the 1970s, the District conducted numerous hydrologic assessments designed to assess the effects of groundwater withdrawals and determine the availability of groundwater in the region. In the late 1980s, the Florida Legislature directed the WMDs to conduct a Groundwater Basin Resource Availability Inventory (Section 373.0395, F.S.) covering areas deemed appropriate by the WMDs' Governing Boards. The District completed inventory reports for the 13 counties predominantly located within its jurisdiction. These reports described the groundwater resources of the individual counties and respective groundwater basins.

Based on the hydrologic assessments and the District's continuous hydrologic and biologic monitoring programs, the District established three WUCAs in the late 1980s in response to observed impacts of groundwater withdrawals. The District subsequently prepared the Water Supply Needs & Sources: 1990-2020 study (SWFWMD, 1992) to assess future water demands through the year 2020 and groundwater supply limitations in some areas. One objective of the study was to optimize resource management to provide for reasonable-beneficial uses without causing unacceptable impacts to water resources, natural systems, and existing legal users. Major recommendations of the study included reliance on local sources to the greatest extent practicable before pursuing more distant sources, requiring users to increase their water use efficiency (WUE), and pursuing a regional approach to water supply planning and future development.



Water level gage

In 1997, the Florida Legislature significantly amended Chapter 373, F.S., to include specific regional water supply planning requirements for the WMDs. The statutes were revised to require the preparation of a Districtwide Water Supply Assessment, the designation of one or more water supply planning regions within each district, and the preparation of a RWSP for any planning regions where sources of water were determined to be inadequate to meet future demands. The statute requires the reassessment of the need for a RWSP every five years and that each RWSP shall be based on a minimum 20-year time frame (Section 373.0361, F.S.). In response to the amended statutes, the District completed a Water Supply Assessment in 1998 that quantified water supply needs through the year 2020 and identified areas where future demand could not be met with traditional groundwater sources (SWFWMD, 1998). The District published its first RWSP in 2001 for the 10 counties located in the SWUCA and Northern Tampa Bay Water Use Caution Area (NTBWUCA) (SWFWMD, 2001), which was updated in 2006. It concluded that fresh groundwater from the UFA would be available to meet future demands on a limited basis only and that sufficient alternative sources existed in the 10-county planning region to meet projected demands through 2025 (SWFWMD, 2006b). It also concluded that a regional approach to meeting future water demands, including regional transmission systems, was required for some areas that had limited access to AWS.

Beginning with the 2010 RWSP update through this 2025 5-year update, the District included four regional volumes covering all District counties. For the Southern Planning Region, several AWS project options have been adopted by the PRMRWSA. These options have either been implemented or are under development (SWFWMD, 2010; SWFWMD, 2015; SWFWMD, 2020).

Section 4. Minimum Flows and Levels Investigations

Extensive field-data collection and analysis is typically required to support MFLs development. This includes measurement of water levels and flows, assessment of aquatic and semi-aquatic plant and animal species or communities and their habitats, water quality characterization, and assessment of current and projected withdrawal-related impacts. While most of this work is completed by the District, some data collection is conducted with key cooperators such as the USGS. Ultimately, ecological and hydrological information are linked using some combination of conceptual, statistical, and numerical models to assess environmental changes associated with potential flow or water level reductions. Goals for these analyses include identifying sensitive criteria that can be used to establish MFLs and prevent significant harm to a wide range of human-use and natural system values.

Section 5. Modeling Investigations

Since the 1970s, the District has developed numerous computer models to support resource evaluations and water supply investigations. These models have been subdivided into groundwater flow models for general resource assessments and solute transport models to assess past and future saltwater intrusion. In recent years, the District has begun to support the use of integrated hydrologic models that simulate the entire hydrologic cycle and include information on both the surface water and groundwater flow systems. These models are used to address issues where the interaction between groundwater and surface water is significant.

Many of the early groundwater flow models were developed by the USGS through the cooperative studies program with the District. Over time, as more data was collected and computers became more sophisticated, models developed by the District included more details about the hydrologic system. The end results of the modeling process are tools that can be used to assess the effects of current and future withdrawals and better understand hydrologic relationships.

1.0 Groundwater Flow Models

The early groundwater models developed for the SWUCA were completed by the USGS. In the early 1990s, the District developed the ETB model (Barcelo and Basso, 1993) that simulated flow within the SWCFGWB. Although this model was originally designed to evaluate groundwater withdrawals for the ETB WRAP, it has been used to evaluate effects of various proposed and existing withdrawals across the SWUCA in the SWCFGWB. Results of the modeling effort have confirmed the regional nature of the groundwater basin in the SWUCA. Following completion of the ETB model, the USGS was contracted to develop a model of the Lake Wales Ridge area (Yobbi, 1996), which has been used to assess the effects of regional groundwater withdrawals on surficial aquifer water levels in the Ridge area.

The East-Central Florida Transient (ECFT) groundwater model is a transient numerical model of the surficial aquifer, intermediate (Hawthorn) aquifer system, and FAS in east-central Florida (Sepulveda et al., 2012). The hydrogeology of east-central Florida was evaluated and used to develop and calibrate the groundwater-flow model which simulates the regional fresh groundwater-flow system. The model is used to simulate transient groundwater flow from 1995 to 2006 using monthly stress periods. The ECFT model footprint was recently expanded and includes about 25,000 square miles from coast to coast across the Florida peninsula from southern Marion County to the Charlotte-DeSoto County line. This expanded model, the East-Central Florida Transient Expanded (ECFTX), was constructed and calibrated by the South Florida Water Management District (SFWMD), St. Johns River Water Management District (SJRWMD), and the SWFWMD. The ECFTX model was calibrated to 2003 steady-state conditions and a monthly transient period from 2004 through 2014. The focus of the model calibration was the Central Florida Water Initiative (CFWI) Planning Area in the central part of the state.

The ECFTX model is fully three dimensional and composed of 11 distinct layers. From top to bottom, the layers represent the surficial aquifer (model layer 1), intermediate confining unit/intermediate aquifer system (model layer 2), Suwannee permeable zone (model layer 3), Ocala low-permeable zone (model layer 4), Avon Park permeable zone (model layer 5), MCUs I/II (model layers 6-8), and LFAs (model layers 9-11). Horizontally, the model area is divided into grid cells sizing 1,250 by 1,250 feet (CFWI, 2020).

The ECFTX model is a regional tool used to evaluate groundwater withdrawals, their associated potential effects on water resources and natural systems, and groundwater availability. The ECFTX model was used to predict potential impacts on wetland water levels, lake water levels, spring flows, and groundwater levels in the surficial, UFA, and LFAs caused by current and projected groundwater withdrawals. Recent developments of the ECFTX model include the recalibration of ECFTX v2.0 with improved model performance within its focus area and the creation of the regulatory tool for evaluating WUPs in the CFWI Planning Area.

The Districtwide Regulation Model (DWRM) was initially developed in 2003 (Environmental Simulations, Inc., 2004) to produce a regulatory modeling platform that is technically sound, efficient, reliable, and capable of addressing cumulative impacts. It is mainly used to evaluate whether requested groundwater withdrawal quantities in WUP applications have the potential to cause unacceptable impacts to existing legal users, off-site land uses, and environmental systems on an individual and cumulative basis. The DWRM Versions 1, 2, 2.1, 3, and 4 (Environmental Simulations, Inc., 2004, 2007, 2011, 2014, 2022) incorporate Focused Telescopic Mesh Refinement (FTMR), which enables DWRM to be used as a base model for efficient development of smaller scale sub-models (FTMR models). The FTMR uses a fine grid around a well or group of wells and increasing grid spacing out to the edge of the model. The DWRM supports current regulatory functions as a core business process addressed in the District's Strategic Plan.

The DWRM Version 4 simulates groundwater flow of the entire District using a fully three-dimensional geologic model coupled with a new version of MODFLOW called MODFLOW-USG, which is the USGS's modular hydrologic model. The DWRM Version 4 simulates groundwater flow in the surficial aquifer, Hawthorn aquifer system, UFA, and LFAs with 13 vertical layers and a lateral grid spacing of 2,500 feet. It has been calibrated to 2005 steady-state conditions and a monthly transient period from 1996 to 2015 (Environmental Simulations, Inc., 2022).

2.0 Saltwater Intrusion Models

There have been three major models developed to simulate historical and future saltwater intrusion in the SWUCA. The first of these models was a series of three, two-dimensional, cross-section models capable of simulating density-dependent flow known as the Eastern Tampa Bay Cross-Section Models (HydroGeoLogic, Inc., 1994). Each model was designed as a geologic cross section located along flow paths to the Gulf of America or Tampa Bay, and the models were used to make initial estimates of movement of the saltwater-freshwater interface in the former Eastern Tampa Bay WUCA (ETBWUCA). To address the three-dimensional nature of the interface, a sharp interface code, known as the Saltwater Intrusion Model for Layered Aquifer Systems (SIMLAS), was developed in 1993 by HydroGeoLogic, Inc., for the District. The code was applied to the ETB area, creating a sharp interface model of saltwater intrusion. Subsequently, the cross-sectional models were refined and the results were compared to those of the sharp interface model, with the results comparing well (HydroGeoLogic, Inc., 1994).

In support of establishing a MAL to protect against saltwater intrusion in the MIA of the SWUCA, a fully three-dimensional, solute transport model of the ETB area was developed in 2002 by HydroGeoLogic, Inc. (HydroGeoLogic, Inc., 2002). The model encompassed all of Manatee and Sarasota counties, as well as the southern half of Hillsborough and Pinellas counties. It simulated flow and transport in the UFA and was calibrated from 1900 to 2000 (including start-up period), although only water quality data was available for the period from 1990 to 2000. The model was used to estimate the number of wells and amount of water supply at risk for future saltwater intrusion under different pumping scenarios.

In 2022, HydroGeoLogic, Inc.'s model was updated and converted from MODHMS to SEAWAT Version 4, a public domain software product produced by USGS. The consultant made several additional changes to improve the model and use more recent data. Updates included incorporation of newer hydraulic conductivity arrays to more closely match arrays used in the ECFTX and DWRM. Hydrostratigraphic layer surface elevations were also adjusted to match the ECFTX and DWRM more closely.

Currently, an updated three-dimensional, solute transport model is being developed with GSI Environmental, Inc., and Environmental Simulations, Inc., to support the reevaluation of the SWUCA SWIMAL. MODFLOW-USG-Transport will be used in place of SEAWAT, as there are improvements in solver efficiencies that may help reduce model run times. Parameters from the ECFTX and DWRM will again be used in the development of this model to help define flow patterns and lateral boundary conditions. The updated model will use data through 2016, which is the extent of conditions currently incorporated in the ECFTX model. Model development and calibration efforts are currently projected to be completed in early 2026.

3.0 Integrated Groundwater/Surface Water Models

The Peace River Integrated Model (PRIM) is an integrated surface water and groundwater model of the entire Peace River Basin (HydroGeoLogic, Inc., 2011). The PRIM was developed using MODHMS®, which is a proprietary model code by HydroGeoLogic, Inc. The model was later updated to PRIM2 and recalibrated using daily data from 2003 to 2018. The calibrated PRIM2 model, which was completed in 2023, accurately reproduced observed high and low patterns of streamflow, lake levels, and groundwater potentiometric elevations (HydroGeoLogic, Inc., 2023). The surface water component of the model is grid-based. The PRIM was used to understand the effects on river flows from historical changes and to simulate the effects of future resource management options. The model is used to examine potential effects on wetlands, lakes, springs, and rivers from rainfall variation and regional groundwater withdrawals in the SWUCA.

The Myakka River Watershed Initiative was a comprehensive watershed study and planning effort to address environmental damage caused by excess water attributed to agricultural operations and land-use alterations in the watershed. The Myakka River Watershed Water Budget Model was a component of this initiative. The objectives of the model were to estimate quantities and timing of excess flows in the upper Myakka River; investigate linkages between land-use practices and excess flows; develop time-series of flow rates sufficient for pollutant load modeling; evaluate alternative management scenarios to restore natural hydrology; and simulate hydroperiods for the Flatford Swamp under historic, existing, and proposed flow conditions. The model is complete and has been calibrated and verified, and it will be updated as knowledge of the system expands.

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Chapter 2. Resource Protection Criteria

This chapter addresses the primary strategies the District employs to protect water resources, including WUCAs, MFLs, prevention and recovery strategies, reservations, and consideration of the potential effects of climate change.

Part A. Water Use Caution Areas

Section 1. Definitions and History

Water use caution areas (WUCAs) are areas where the District's Governing Board has determined that regional action is necessary to address cumulative water withdrawals that are causing or may cause adverse impacts to the water and related natural resources or the public interest (Rule 40D-2.801, F.A.C.). Currently established WUCA locations are shown in Figure 2-1.

District regional water supply planning is the primary tool for ensuring water resource sustainability in WUCAs. Florida Statutes (F.S.) requires regional water supply planning in areas where it has been determined that existing sources of water are not adequate for all existing and projected reasonable-beneficial uses while sustaining the water resources and related natural systems. Regional water supply planning quantifies the water needs for existing and projected reasonable-beneficial uses for at least 20 years and identifies water supply options, including traditional and alternative sources. In addition, MFLs, established for priority water bodies pursuant to Chapter 373, F.S., identify the limit (i.e., surface or groundwater level) at which further withdrawals would be significantly harmful to the water resources or ecology of the area. If the existing flow or level of a water body is below or projected to fall below the applicable minimum flow or level within 20 years, a recovery or prevention strategy must be implemented.

As outlined in Rule 40D-2.801(2), F.A.C., to determine whether an area should be declared a WUCA, the Governing Board must consider the following:

- The quantity of water available for use from groundwater sources, surface water sources, or both.
- The quality of water available for use from groundwater sources, surface water sources, or both, including impacts such as saline water intrusion, mineralized water upconing or pollution.
- Environmental systems, such as wetlands, lakes, streams, estuaries, fish and wildlife, or other natural resources.
- Lake stages or surface water rates of flow.
- Off-site land uses.
- Other resources as deemed appropriate by the Governing Board.

In the late 1980s, the District determined that certain interim resource management initiatives could be implemented to help prevent worsening of existing problems in WRAP areas prior to WRAP completion (Chapter 1, Part D, Section 1). As a result, in 1989, the District established three WUCAs: NTBWUCA, ETBWUCA, and Highlands Ridge (HRWUCA). For each of the initial WUCAs, a three-phased approach to water resource management was implemented, including: (1) immediate, short-term actions, (2) mid-term actions that could be implemented concurrent with the ongoing WRAPs, and (3) long-term actions based upon the results of the WRAPs. The District developed management plans for each WUCA to stabilize and restore the water resources in each area through a combination of regulatory and non-regulatory efforts. This included development of conservation plans, cumulative impact analysis-based permitting, and requiring withdrawals from stressed lakes to cease within three years.

Implementation of the management plans led to designation of the MIA in the ETBWUCA. The MIA consists of the coastal portion of the SWUCA in southern Hillsborough, Manatee, and northern Sarasota counties. A SWIMAL was established to stabilize regional water level declines so that long-term management efforts could slow the rate of regional saltwater intrusion in the MIA. Within this area, no increases in permitted groundwater withdrawals from the UFA were allowed, and withdrawals from outside the area could not cause further lowering of UFA levels within the area.

The ETBWUCA and HRWUCA were superseded in 1992 by the establishment of the SWUCA, which encompasses the entire southern portion of the District. The NTBWUCA was expanded in 2007 to include an additional portion of northeastern Hillsborough County and the remainder of Pasco County. In 2011, the District established the Dover/Plant City WUCA (DPCWUCA) in eastern Hillsborough and western Polk counties following impacts from intense frost/freeze protection withdrawals. The District has not declared a WUCA in the Northern Planning Region; however, the SJRWMD has declared a priority water resource caution area adjacent to the District boundary in Lake and Marion counties.

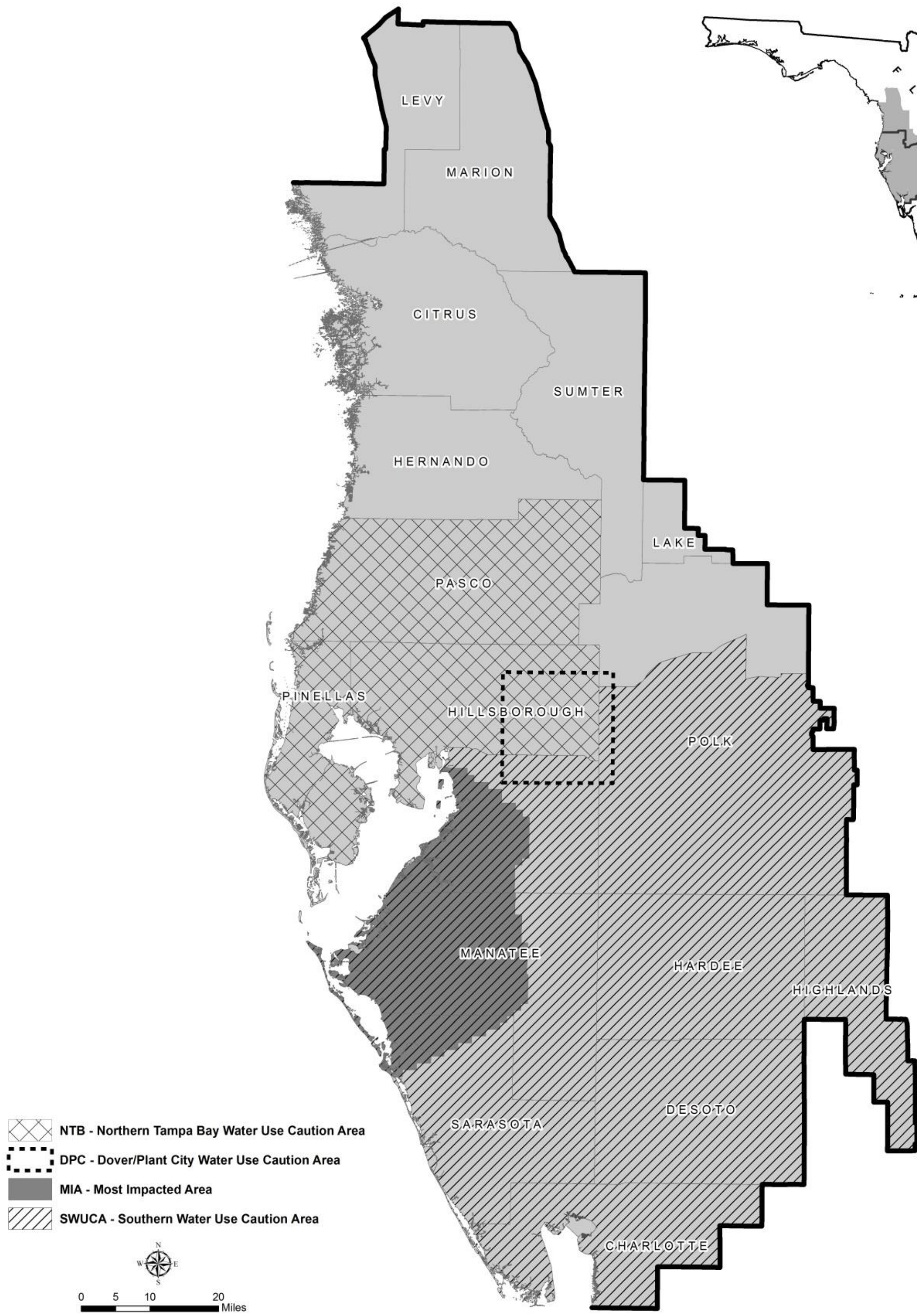

Figure 2-1. *Location of the District's water use caution areas and the Most Impacted Area of the Southern Water Use Caution Area*

1.0 Southern Water Use Caution Area

Since the early 1930s, groundwater withdrawals have steadily increased in the SWCFGWB in response to growing demands for water from the M/D and AG industries and later from PS, PG, and L/R uses. Before peaking in the mid-1970s, these withdrawals resulted in declines in UFA levels that exceeded 50 feet in some areas of the groundwater basin. These depressed aquifer levels led to saltwater intrusion in the coastal portions of the UFA, reduced flows in the upper Peace River, and lowered water lake levels in some lakes within upland areas of Polk and Highlands counties. In response to these resource concerns, the District established the SWUCA in 1992. The SWUCA encompasses all or part of eight counties in the southern portion of the District and the MIA within these counties. Although groundwater withdrawals in the region have stabilized over the past few decades due to management efforts, area water resources continue to be impacted by the historic decline in aquifer water levels.

In 1994, the District initiated rulemaking to modify its water use permitting rules to better manage water resources in the SWUCA. The main objectives of the rules were to (1) significantly slow saltwater intrusion into the confined UFA along the coast, (2) stabilize lake levels in Polk and Highlands counties, and (3) limit regulatory impacts on the region's economy and existing legal users. The principal intent was to establish a MAL and allow renewal of existing permits while gradually reducing permitted quantities as a means to recover aquifer levels to the established minimum level. Several parties filed objections to parts of the rule, and an administrative hearing was conducted. In March 1997, the District received the Final Order upholding the MAL, the science used to establish it, and the phasing in of conservation. However, in October 1997, the District appealed three specific components of the ruling and withdrew the MAL. It was withdrawn because parts of the rule linked the level to the provisions for reallocation of permitted quantities and preferential treatment of existing users over new permit applications, both of which were ruled to be invalid.

In 1998, the District initiated a reevaluation of the SWUCA management strategy and, in March 2006, adopted minimum flows for the upper Peace River, minimum levels for eight lakes along the Lake Wales Ridge in Polk and Highlands counties, and a SWIMAL for the UFA in the MIA, all of which became effective in 2007. Since most of these water resources were not meeting their established MFLs, the District adopted a recovery strategy for the SWUCA in 2006 (Rule 40D-80.074, F.A.C.; SWFWMD, 2006a) that became effective in 2007. At the time, it was estimated that recovery could be achieved if total groundwater withdrawals were reduced to approximately 600 mgd. The status of District monitoring efforts is reported to the Governing Board annually, and every five years a comprehensive review of the strategy is performed. These assessments and the associated long-term monitoring help identify progress toward achieving recovery goals and adjustments to the strategy that may be necessary.

In 2013, the District completed its first five-year assessment of the recovery strategy (SWFWMD, 2013) that addressed the period from FY2007 through FY2011. The assessment indicated that recent groundwater withdrawals in the region had declined to less than 600 mgd; however, the upper Peace River, 16 lakes, and the MIA aquifer level all remained below adopted MFLs. As a result, the District initiated a series of stakeholder meetings to review results of the technical assessments and identify potential recovery options. Ultimately, the Governing Board voted to support five options for the MIA and directed staff to gather more information on the exploration of aquifer recharge (AR) and ASR. Three options were supported by the Governing Board for the Ridge Lakes area as shown in Table 2-1.

Table 2-1. *Southern Water Use Caution Area recovery options supported by the Governing Board*

Most Impacted Area (MIA)	Ridge Lakes Area
Continue monitoring	Continue monitoring
Update analytical tools	Reevaluate established minimum lake levels
Promote water conservation initiatives	Evaluate options for individual lakes
Expand FARMS, including increasing the District's share of costs	
Expand beneficial reuse	

The second SWUCA Recovery Strategy Five-Year Assessment for the period FY2012 through FY2016 evaluated recovery in terms of trends in water resources, permitted quantities, and development of projects and initiatives (SWFWMD, 2018). This assessment concluded that the District was continuing to make progress toward recovery, but challenges to achieving full recovery by 2025 continued to exist. It was anticipated that recovery would ultimately be achieved through a combination of maintaining existing withdrawals at or below current levels and implementing WRD projects designed to augment or preserve levels and flows.

The third SWUCA Recovery Strategy Five-Year Assessment for FY2017 through FY2021 (SWFWMD, 2023), along with annual status assessments of all established MFLs, documented continued progress toward achieving SWUCA recovery goals. The three MFLs established for the upper Peace River have been met since 2020, and this recovery has also led to improvements in low-flow conditions in the lower Peace River. The SWIMAL established for the SWUCA MIA was met for the first time in 2023. Lake water levels within the Ridge Lakes area of the SWUCA have increased several feet since the 1990s, but MFLs for some of these lakes continue to not be met. Reevaluation of these MFLs using new, updated lake-level methods and wetland criteria will support future assessment of recovery needs.

In 2026 or 2027, the District anticipates completing a comprehensive evaluation of progress made toward addressing the major recovery goals identified for achievement by 2025. Findings from the evaluation will be used to determine the need for continued implementation or modification of the SWUCA Recovery Strategy and need for additional five-year comprehensive recovery progress assessments.

Part B. Minimum Flows and Levels

Section 1. Definitions and History

Section 373.042 of the Florida Water Resources Act of 1972 (Chapter 373, F.S.), directs the FDEP or the WMDs to establish MFLs for priority water bodies using the best available information. The minimum flow for a given watercourse is defined by statute as the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. The minimum water level of an aquifer or surface water body is similarly defined by statute as the level of groundwater in an aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources or ecology of the area.

Section 373.0421, F.S., provides that if, at the time an MFL is initially established or revised for a water body, the existing flow or water level in the water body is below or is projected to fall below the applicable MFL within 20 years, the FDEP or the WMDs shall concurrently adopt or modify and implement a recovery or prevention strategy as part of the RWSP. However, if an MFL is in the process of being established or revised when the RWSP is developed, then any necessary recovery or prevention strategy will be adopted or modified with the established or revised MFL.

Minimum flows and levels (MFLs) are established and used by the District for water resource planning; for evaluating WUP applications; and for the design, construction, and use of surface water management systems. Water bodies with MFLs benefit from District funding of water resource and WSD projects that are part of a recovery or prevention strategy identified for achieving an established MFL. The District's MFLs program addresses all MFLs-related requirements expressed in the Florida Water Resources Act, the Water Resource Implementation Rule (Chapter 62-40, F.A.C.), and the Central Florida Water Initiative Area Uniform Process for Setting Minimum Flows and Minimum Water Levels and Water Reservations Rule 62-41.304 within the FDEP's Regulation of the Consumptive Use Rules (Chapter 62-41, F.A.C.). A brief history of the District's MFLs program is provided by Hancock and Leeper (2023).

Section 2. Priority Setting Process

In accordance with Sections 373.036(7) and 373.042(2), F.S., the District annually updates its Priority List and Schedule for the Establishment of Minimum Flows, Minimum Water Levels, and Reservations. As part of determining the priority list and schedule, which also identifies water bodies scheduled for development of reservations, the following factors are considered:

- Importance of the water bodies to the state or region.
- Existence of or potential for significant harm to the water resources or ecology of the state or region.
- Required inclusion of all first-magnitude springs and all second-magnitude springs within state or federally owned lands purchased for conservation purposes.
- Availability of historic hydrologic records (flows and/or levels) sufficient to allow statistical analysis and calibration of computer models when selecting particular water bodies in areas with many water bodies.
- Proximity of MFLs already established for nearby water bodies.
- Possibility that the water body may be developed as a potential water supply in the foreseeable future.
- Value of developing MFLs for regulatory purposes or permit evaluation.
- Stakeholder input.

The updated priority list and schedule is submitted to FDEP for approval by November 15 of each year and, as required by statute, is published in the District's Consolidated Annual Report (CAR). The District's current priority list and schedule is also posted on the District's website and is included in the Chapter 2 Appendix to this RWSP.

Section 3. Technical Approach to Minimum Flows and Levels Establishment

District methods used to establish MFLs for wetlands, lakes, rivers, springs, and aquifers are briefly summarized in the Chapter 2 Appendix. Additional details regarding MFLs methods are provided in District rules (Chapter 40D-8, F.A.C.) and within MFLs reports that are developed for individual priority water bodies and posted on the District's website. Refinement and development of new MFLs methods and ongoing and new data collection efforts ensure that MFLs are established and reevaluated, as necessary, using the best available information.

The District's technical approach for MFLs development assumes that alternative hydrologic regimes may exist that differ from historic conditions but are sufficient to protect water resource features from significant harm. For example, consider a historic condition for an unaltered river or lake system with no groundwater or surface water withdrawal impacts. A new hydrologic regime for the system would be associated with each increase in water use, from small withdrawals that have no measurable effect on the historic regime to large withdrawals that could substantially alter the regime. A threshold hydrologic regime may exist that includes water levels or flows that are lower or less than those of the historic regime, but which protects the water resources and ecology of the system from significant harm. This threshold regime could conceptually allow for water withdrawals while protecting the water resources and ecology of the area. Minimum Flows and Levels (MFLs) established based on such a threshold hydrologic regime may therefore represent minimum acceptable, rather than historic or potentially optimal, hydrologic conditions.

1.0 Scientific Peer Review

Section 373.042(4), F.S., permits affected parties to request independent scientific peer review of the scientific and technical data and methodologies used to establish MFLs. In addition, the District or FDEP may decide to voluntarily subject MFLs to independent scientific peer review, based on guidelines provided in Rule 62-40.473, F.A.C.

Currently, the District voluntarily seeks independent scientific peer review of methods used to develop MFLs for all water body types. Similarly, the District voluntarily seeks peer review of MFLs proposed for all flowing water bodies and aquifer systems, based on the unique characteristics of the data and analyses used for the supporting analyses.

Section 4. Established and Proposed Minimum Flows and Levels

There are nine river segments and one aquifer site with established or proposed MFLs within or partially within the Southern Planning Region. This includes the SWUCA SWIMAL, which is scheduled for reevaluation in 2026. Figure 2-2 depicts the priority MFLs water resources within or partially within the region. The rivers with adopted minimum flows in the region include upper Braden River, Dona Bay/Shakett Creek System, Horse Creek, upper Little Manatee River, upper and lower Myakka River, the lower and middle Peace River, and Shell Creek. A complete list of water resources with established or proposed MFLs throughout the District is provided in Appendix 2-1.

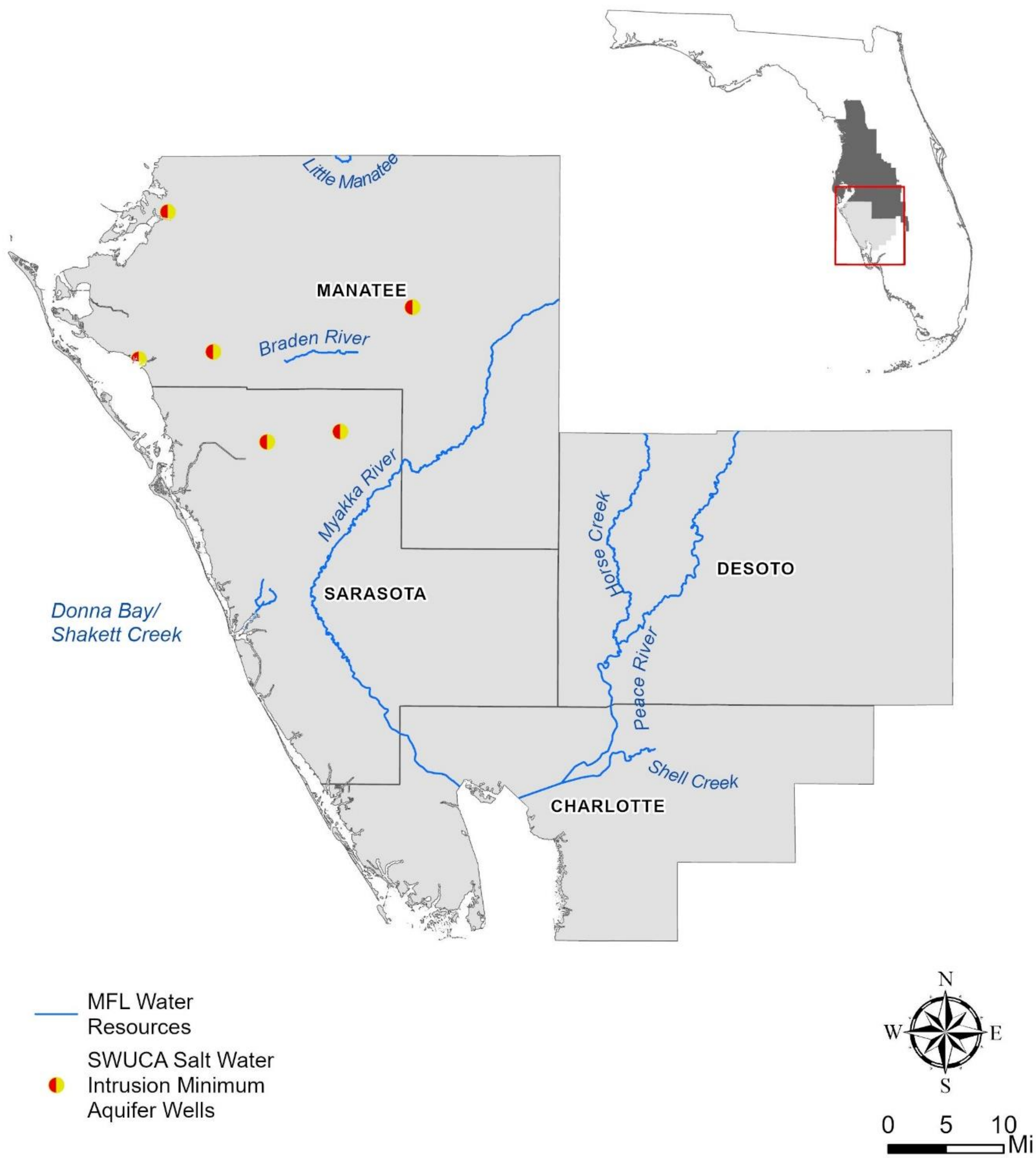

Figure 2-2. *Minimum flows and levels priority water resources in the Southern Planning Region*

Part C. Prevention and Recovery Strategies

Section 1. Prevention Activities

Section 373.0421(2), F.S., requires that a prevention strategy be adopted or modified, and implemented if within 20 years the flow or level in a water body is projected to fall below an applicable MFL. Adoption of a prevention strategy has not been necessary for any MFLs established within the District. However, to promote continued achievement of established MFLs, the District continues to implement a three-point approach that includes: (1) monitoring water levels and flows for water resources/sites with established MFLs to evaluate the need for prevention strategies; (2) assessment of potential water supply/resource problems as part of the regional water supply planning process; and (3) implementation of the water use permitting program, which ensures that water use does not cause violation of established MFLs.

In addition to water supply planning activities initiated by the District, other entities are engaged in planning efforts that are coordinated with and complement those of the District. One example in the region is the PRMRWSA’s Integrated Regional Water Supply Plan, which was recently updated in June 2025 (Carollo Engineers, Inc., 2025). A shared goal of these efforts is to ensure that future water supply demands will be met without adversely impacting proposed or established MFLs.

Section 2. Recovery Strategies

Section 373.0421(2), F.S., requires that a recovery strategy be adopted or modified, and implemented if the existing flow or level in a water body is below an applicable MFL. The District has established recovery strategies by rule in Chapter 40D-80, F.A.C. When an MFL for a water resource is not being met or, as part of the recovery strategy, is not expected to be met for some time in the future, the District will first evaluate the established MFL in light of any newly obtained scientific data or other relevant information to determine whether or not it should be revised. If no revision is necessary, management tools that may be considered include:

- Developing AWS.
- Implementing structural controls and/or augmentation systems to raise levels or increase flows in water bodies.
- Reducing water use permitting allocations (e.g., through water conservation).

The District has developed one recovery strategy in the Southern Planning Region: the SWUCA Recovery Strategy. Regulatory components of the recovery strategy are incorporated into District rules (Chapters 40D-80 and 40D-2, F.A.C.) and described in District reports. Please see Chapter 1, Parts B and D and Chapter 2, Part A for additional information.

1.0 Southern Water Use Caution Area Recovery Strategy

The purpose of the SWUCA Recovery Strategy (Rule 40D-80.074, F.A.C.; SWFWMD, 2006a) is to provide a plan for reducing the rate of saltwater intrusion and restoring MFLs to the upper Peace River and priority lakes in the Ridge Lakes area by 2025, while ensuring sufficient water supplies for existing and projected reasonable-beneficial uses. The strategy has six basic components: (1) regional water supply planning, (2) use of existing rules, (3) enhancements to existing rules, (4) financial incentives, (5) projects to achieve MFLs, and (6) resource monitoring.

Regional water supply planning allows the District and its communities to strategize on how to address growing water needs while minimizing impacts to the water resources and natural systems. Existing rules and enhancements to those rules provide regulatory criteria to address recovery strategy goals. Financial incentives to conserve and develop AWS help meet water needs, while implementation of WRD projects help reestablish minimum flows to rivers and enhance recharge. Finally, resource monitoring, reporting, and cumulative impact analysis also provide data to analyze the success of recovery. Resource recovery projects, such as the Lake Hancock Lake Level Modification project, are actively being implemented and considered.

The success of the SWUCA Recovery Strategy is evaluated through continued monitoring of area resources. The District uses an extensive monitoring network to compare actual versus anticipated trends in water levels, flows, and saltwater intrusion. Additionally, the District assesses the cumulative impacts of factors affecting recovery. Information developed as part of these monitoring and assessment efforts is provided to the Governing Board annually and on a five-year basis. Results from three five-year assessments of the SWUCA Recovery Strategy (SWFWMD, 2013, 2018, 2023) and annual assessments of MFLs status indicate the District continues to make progress toward recovery, but challenges to achieving full recovery by 2025 remain. Recovery will ultimately be achieved through a combination of maintaining existing withdrawals at or below current levels and implementing WRD projects designed to augment or preserve levels and flows.

Part D. Reservations

Reservations of water are established by rule and authorized as follows: “The governing board or the department, by regulation, may reserve from use by permit applicants, water in such locations and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety…” (Section 373.223(4), F. S.).

There are currently no plans to establish a reservation in the Southern Planning Region. The District has, however, established a reservation within the SWUCA located within the Heartland Planning Region. The reservation (Rule 40D-2.202(2), F.A.C.) was established in 2020 for water stored in Lake Hancock and released to Saddle Creek. This reservation aids in the recovery of MFLs established at three sites in the upper Peace River. Studies undertaken in support of the original MFLs development indicate that flows in the upper Peace River between Bartow and Zolfo Springs were often below the established MFLs during the dry season. During this period, the entire flow of the river may drain underground through sinkholes and other karst features.

Implementation of the reservation is associated with the District’s Lake Hancock Lake Levels Modification project, which became operational in 2016 and involved replacing the water control structure at the lake outlet to increase lake storage. To help meet the river MFLs during the dry season, water stored in the lake is released to Saddle Creek, which at its confluence with the Peace Creek Canal forms the Peace River. Use of the new water control structure (P-11) was anticipated to provide an annual average flow of 2.7 out of the estimated 5.0 mgd needed for river recovery. A recent status assessment indicates, however, that the MFLs established for the upper Peace River have been met since 2020, based on rainfall conditions and implementation of the Lake Hancock Lake Level Modification Project and the Lake Hancock/Lower Saddle Creek Reservation (SWFWMD, 2023).The District will continue to monitor the success of the project and reservation and has prioritized reevaluation of the reservation in 2025 in conjunction with the reevaluation of MFLs established for the upper Peace River.

Part E. Climate Change

Section 1. Overview

Climate variations have been a growing global concern for several decades. Such variations are driving a slow but persistent increase in sea levels and are altering precipitation regimes. These conditions will likely result in local impacts including changes to natural habitats, encroachment of seawater into surface and groundwater resources, risk to public infrastructure, warmer temperatures that increase evaporation and impact agriculture, and changes to seasonal and annual rainfall patterns.

The FDEP's Office of Resilience and Coastal Protection has provided direction for climate adaptation in recent years. Quarterly resilience forums hosted by the FDEP since 2018 have improved communication among government entities, utilities, academia, and other organizations and stakeholders. The FDEP Resilient Florida Program was established in 2021 to develop a statewide, coordinated approach to coastal and inland resilience planning. The program provides funding to counties, municipalities, and certain special districts for efforts to mitigate risks to water supplies and resources. The FDEP has also standardized a sea-level impact projection (SLIP) study to assess the risk of infrastructure projects to flooding, inundation, and wave damage. The SLIP studies became required in 2024 for certain State-financed projects in coastal zones.

This section of the RWSP addresses climate issues for water supply planning, identifies current management strategies in place to address these concerns, and considers future strategies necessary to adaptively manage water supply resources.

Section 2. Possible Effects

The District's water supply planning efforts may be affected by a changing climate in three primary ways: sea level rise (SLR), air temperature rise, and changes in precipitation regimes.

1.0 Sea Level Rise

Trends and magnitude of SLR are variable throughout the world and our region. Data from the National Oceanic and Atmospheric Administration (NOAA) tide gauge in St. Petersburg shows that mean water levels have increased on average 1.22 inches per decade since 1946 and accelerated in recent decades. The NOAA intermediate-high projection for this gauge, which is the standard for SLIP studies, suggests an increase of 12.2 inches from 2020 to 2050 (USACE, 2024).

Sea level rise (SLR) may stress the District's water resources in a variety of ways. The inundation or upward migration of coastal wetlands could affect their ability to improve the quality of stormwater runoff and provide natural habitats. Estuarine water encroachment in coastal rivers could reduce the viable withdrawal periods at non-isolated freshwater intakes of water treatment facilities. Saltwater intrusion reduces water quality in aquifers that supply urban, agricultural, and industrial water users. Aging municipal sewer systems can experience infiltration that reduces the quality of reclaimed water currently used to offset freshwater demands.

Sea level rise (SLR) occurs relatively slowly, although persistently. This allows time to evaluate impacts to natural resources and public infrastructure, plan and implement adaptation strategies, and continue using most existing coastal infrastructure through planned lifespans. The cost of initiating SLR planning or incorporating it into cyclical renewal/replacement efforts is relatively low compared to disaster recovery efforts.

2.0 Air Temperature Rise

The Intergovernmental Panel on Climate Change (IPCC) estimates that current greenhouse emission levels will cause mean global air temperatures to reach or stabilize at approximately 2.7 degrees Fahrenheit (°F) above pre-industrial levels (1850-1900) by the end of this century, with greatest warming at inland and polar regions (IPCC, 2023). The impacts to Southwest Florida will likely be more hot days and fewer cold days seasonally. Evaporation increases with a warmer climate, which could result in lower surface water levels and increased irrigation demand. Increased evaporation is likely to impact stormwater runoff, soil moisture, groundwater recharge, and reservoir storage losses (Bates et al., 2008). Additionally, higher air temperatures may exacerbate algal blooms and declines in reservoir water quality that could raise treatment costs for potable water supply.

3.0 Precipitation Regimes and Storm Frequency

Increasing temperatures are expected to change global precipitation patterns, although changes will likely be more pronounced in tropical and temperate zones. Southwest Florida, being sub-tropical, has climatic precipitation patterns largely influenced by Atlantic multidecadal oscillations (AMO) of ocean sea surface temperatures, along with shorter-term El Niño southern oscillations (ENSO). The AMO warm periods tend to make the region's summer-fall seasons wetter, while strong ENSO phases, caused by warming in the eastern Pacific, make the region's winter and spring seasons wetter (Cameron, 2018). An AMO has been in a warm phase since the mid-1990s and currently appears to be decreasing.

Warming temperatures in the Atlantic Ocean and Gulf of America can increase the likelihood of intense tropical storms and hurricanes that can generate storm surge, strong winds, and heavily concentrated rainfall. Hurricane activity near Southwest Florida is statistically more common during AMO warm periods. Higher summer temperatures and humidity may also increase the frequency of local convective weather events, resulting in thunderstorms, higher peak surface water flows, and increased flooding in some areas (Groisman et al., 2005).

Section 3. Current Management Strategies

The District has taken several steps to address water resource management which will also aid in planning and preparing for climate change impacts. First, the District's data collection and monitoring activities are likely to provide information critical to monitoring and responding to local climate change. Long-established networks of rainfall and streamflow gauge stations, many with real-time electronic reporting, provide continuous streams of data that will enable the District to monitor changes in local hydrology. In addition to monitoring rivers, lakes, springs, and wetlands to ensure adequate water for natural systems and human use, the District has an extensive network of coastal and inland surface and groundwater monitoring sites to collect and analyze water quality data, including information about saltwater intrusion. In those places where water quantity and quality issues become evident, the District implements programs, projects, and regulations to address them. The District also participates in local, state, and national discussions on these issues in order to accommodate timely and effective responses to climate changes as they become evident.

The Coastal Groundwater Quality Monitoring and WUP networks are the largest and longest ongoing well sampling networks of their kind in the District. The networks currently have a combined total of more than 350 wells that cover 13 counties, and new wells have been added to the networks at a rate of 5 to 10 wells per year. Having long-term water quality data will become increasingly important with continued demands for groundwater withdrawals. Although the entire coastal region of the District is included in the monitoring effort, much emphasis is placed on the SWUCA. District staff are currently working with outside consultants on the development of a saltwater intrusion and solute transport model to support reevaluation of the SWUCA SWIMAL. Development of the model is also aimed at improving our ability to predict density and water-level driven changes to aquifers used for water supply.

The District also encourages maximizing the use of diverse water supply sources and establishing system redundancies to ensure a resilient water supply. The District promotes water conservation across all use sectors, including agricultural and industrial uses, which not only saves supplies for the future but also reduces chemical and energy use. Through partnerships, the District continues to increase the availability and use of reclaimed water, the development of wet-weather storage facilities, and enhanced water efficiencies. Additionally, the District supports and co-funds projects to interconnect water supply systems to ensure adequate supplies from dispersed sources and redundancy for emergencies. The District also helps fund environmentally sustainable and drought-resistant water supply options such as reclaimed water, stormwater reuse, brackish groundwater treatment, surface water reservoirs, ASR, AR, and seawater desalination.

Section 4. Future Adaptive Management Strategies

While ongoing District efforts can provide critical information and allow flexibility to accommodate future changes in water supply, local governments and industries are principally tasked with developing and communicating the appropriate risk assessment and adaptation strategy for their municipalities or other significant users. Community adaptation strategies for SLR and surges can be grouped into three generalized approaches: armament, accommodation, or organized retreat. The District is able to provide a supporting role during the planning and implementation for each of these approaches.

- Armament. An armament strategy involves the erection of defensive barriers such as dykes, stormwater backflow prevention, and dewatering systems to protect existing infrastructure. Armament may be preferred for dense urban and commercial areas since it can maintain a community's existing water supply infrastructure and demand centers. Downsides to armament are maintenance expenses, creation of a tipping point for inundation that requires risk management, and that structures may limit the transition of natural habitats.
- Accommodation. An accommodation strategy uses improved infrastructure such as elevated roads and buildings and canal systems that allow coastal inundation to occur. Accommodation strategies may suit growing municipalities that can apply innovative community planning to ensure longevity. Accommodation can be encouraged through floodplain mitigation plans for vulnerable areas and building codes applied during storm recovery phases. The District's water supply planning efforts may involve AWS technology including AR systems, direct and indirect reuse, and desalination treatment options for these communities. The District would also have a role in assuring the transitional health of water bodies.

- Organized Retreat. An organized retreat strategy may involve the rezoning of property threatened by inundation, or transfer to public ownership, potentially through rolling easements or post-disaster development plans. Retreat strategies typically include ecological engineering projects to assist the transition of natural habitats that will also provide shelter to upland infrastructure.

Climate change may affect water supply sources through saltwater inundation and seasonal precipitation; therefore, it should be factored into evaluations of the adequacy of supplies to meet future demand. It also has the potential to change centers of population, which in turn may impact demand projections. The District accounts for adaptive management strategies through its five-year RWSP updates. These updates allow sufficient time to anticipate transitional changes to population centers in the water demand projections and to develop appropriate water supply options for the next 20 years. Continued development of regionally interconnected water systems also allows large-scale water treatment facilities to adjust distribution to new demand locations. The routine assessments of MFLs and other natural resource protections also use a monitor and adapt approach toward protection from climate change.

Chapter 3. Demand Estimates and Projections

This chapter provides an analysis of water demands for all use categories in the Southern Planning Region for the 2020 to 2045 planning period. This includes the methods and assumptions used to project water demand for each county, the demand projections in five-year increments, and an analysis of important trends in the data. The District projected water demand for the PS, AG, I/C, M/D, PG, and L/R sectors for each county in the planning region. The methodologies described below are presented in greater detail in the Chapter 3 appendices.

The demand projections represent those reasonable-beneficial uses of water that are anticipated to occur through the year 2045. The District determined 5-in-10 (average condition) and 1-in-10 (drought condition) demands for each five-year increment from 2020 to 2045 for each sector. Demand projections for Charlotte County, located partially in the District, reflect anticipated demands in the portion of the county located within the District's boundaries.

Key demand estimates and projection parameters include:

- Establishment of a base year: The year 2020 was used as a base year for the purpose of developing and reporting water demand projections. Base year data consists of reported and estimated usage for 2020; whereas data for the years 2025 through 2045 are projected demands.
- Water use reporting thresholds: Minimum thresholds of water use within each water use category were used as the basis for projection.
- 5-in-10 versus 1-in-10: For reporting demand in average versus drought conditions, specific parameters were prescribed for at least a portion of the demand related to all water supply categories except I/C, M/D, and PG. In general, demand is reported for a 5-in-10 average annual effective rainfall condition and a 1-in-10 drought year condition (an increase in water demand having a 10 percent probability of occurring during any given year).

The projected demand represents the total amount of water required to meet reasonable and beneficial water needs through 2045. Total demand does not account for reductions that could be achieved by additional demand management measures. Water conservation and other sources are accounted for separately in Chapter 4 as a means by which demand can be met.

Part A. Water Demand Projections

Demand projections were developed for five sectors: (1) PS, (2) AG, (3) I/C, M/D, (4) PG, and (5) L/R. The categorization provides for the projection of demand for similar water uses under similar assumptions, methods, and reporting conditions.

Section 1. Public Supply

1.0 Definition of the Public Supply Water Use Sector

The PS sector is composed of four subcategories: (1) large utilities (permitted for 0.1 mgd or greater), (2) small utilities (permitted for less than 0.1 mgd), (3) domestic self-supply (DSS) (individual private homes or businesses that are not utility customers and receive their water from small wells that do not require a WUP), and (4) additional irrigation demand (water from domestic wells that do not require a WUP and is used for irrigation by residences that rely on a utility for indoor and other non-irrigation water needs).

2.0 Population Projections

2.1 Base Year Population

Projections were determined using 2020 as the base year. The District calculated the 2020 population by extrapolating back from GIS Associates, Inc.'s 2021 population estimate, where available (GIS Associates, Inc., 2022). Utilities with permitted quantities less than 0.1 mgd are not required to report population or submit service area information; subsequently, population was obtained from the last issued permit for these utilities.

2.2 Methodology for Projecting Population

The population projections developed by the University of Florida Bureau of Economic and Business Research (UF/BEBR) are generally accepted as the standard throughout Florida. However, these projections are made at the county level only, and accurate projections of future water demand require more spatially precise data. Therefore, the District's projections are BEBR projections disaggregated to land parcel level, which is the smallest area of geography possible for population studies. In turn, these parcel-level projections are normalized to the BEBR medium projection for each county. Using this methodology, the District contracted with GIS Associates, Inc. to provide small-area population projections for the 16 counties entirely or partly within the District.

Potable water pumping station

3.0 2020 Base Year Water Use and Per Capita Rate

3.1 Base Year Water Use

The 2020 PS base year water use for each large utility is derived by multiplying the average 2016 to 2020 unadjusted gross per capita rate by the 2020 estimated population for each individual utility. For small utilities, per capita information was found in the last issued permit. If no per capita information was available, the per capita was assumed to equal the average county per capita. Base year water use for small utilities was obtained by multiplying the per capita from the current permit by the 2020 estimated population from the last issued permit. The DSS base year was calculated by multiplying the 2020 DSS population for each county by the average 2016 to 2020 residential countywide per capita water use.

4.0 Water Demand Projection Methodology

4.1 Public Supply

Water demand is projected in five-year increments from 2025 to 2045. To develop the projections, the District used the 2016 to 2020 average per capita rate multiplied by the projected population for that increment. An additional component of water demand is water derived from domestic wells for irrigation. These wells have a diameter of less than 6 inches, do not require a WUP, and are used for irrigation at residences that receive potable water for indoor use from a utility. The District estimates that approximately 332 gallons per day (gpd) are used for each well (Dukes and Boyer, 2018).

4.2 Domestic Self-Supply

Domestic Self-Supply (DSS) is any portion of the county population not served by a utility. County DSS population estimates and projections were calculated as the difference between the total county population estimate or projection and the total population served by the utilities. For counties that are in multiple districts, only that portion of the population within the District was included.

5.0 Water Demand Projections

Table 3-1 presents the projected PS demand for the planning period. The table shows that PS demand is projected to increase by 32.17 mgd for the 5-in-10 condition. These projections are higher than those in the District’s 2020 RWSP, which can be attributed to higher than anticipated regional population growth.

Table 3-1. *Projected demand for public supply, domestic self-supply, and private irrigation wells in the Southern Planning Region (5-in-10 and 1-in-10) (mgd)*

County	2020 Base		2025		2030		2035		2040		2045		Change 2020-2045		% Change	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10
Charlotte	21.41	22.70	23.00	24.38	24.36	25.83	25.45	26.97	26.35	27.93	27.16	28.79	5.75	6.09	26.84%	26.84%
DeSoto	2.58	2.73	2.62	2.78	2.64	2.80	2.65	2.81	2.67	2.83	2.68	2.84	0.10	0.10	3.81%	3.81%
Manatee	44.45	47.12	49.06	52.00	52.91	56.09	56.09	59.45	58.87	62.40	61.33	65.01	16.88	17.89	37.98%	37.98%
Sarasota	44.91	47.61	47.57	50.42	49.80	52.78	51.56	54.66	53.07	56.26	54.36	57.62	9.45	10.01	21.03%	21.03%
Total	**113.35**	**120.15**	**122.24**	**129.58**	**129.71**	**137.49**	**135.75**	**143.89**	**140.96**	**149.42**	**145.53**	**154.26**	**32.17**	**34.10**	**28.38%**	**28.38%**

Note: Summation and/or percentage calculation differences may occur due to rounding. See Appendix 3-3 for source values.

6.0 Stakeholder Review

Population and water demand projection methodologies, results, and analyses were provided to public water use stakeholders for review. Changes suggested by stakeholders were incorporated only if supported by sufficient documentation.

Section 2. Agriculture

1.0 Description of the Agricultural Water Use Sector

Agriculture (AG) represents the second largest water use sector in the District after PS. This category includes irrigated crops and other miscellaneous water uses associated with agricultural commodity production within the District. Irrigation demand was determined for each of the following major categories of irrigated crops: (1) citrus, (2) field crops, (3) fruits (non-citrus), (4) greenhouse/nursery, (5) hay, (6) potatoes, (7) sod, and (8) fresh market vegetables. Some of these crop categories include several crops which are grouped together for reporting purposes by the FDACS. The fruits category includes several prominent crops in the District, such as strawberries, and blueberries, and the fresh market vegetables category includes tomato production along with cucumbers, peppers, and other vegetables and row crops. Water demands associated with non-irrigated AG such as aquaculture and livestock were also estimated and projected.

Linear irrigation system

2.0 Water Demand Projection Methodology

The FDACS developed acreage and agricultural water demand projections through 2045 as part of the Florida Statewide Agricultural Irrigation Demand (FSAID) 10 (The Balmoral Group, 2023). For the 2025 RWSP, the District modified the published FSAID 10 data to calculate agricultural demand projections based on historical pumpage data. Acreage projections were maintained from the FSAID 10 report. To calculate a 2020 base year from which to project demands, the District used a 5-year average of metered and estimated water use data from 2017 to 2021. Projections were then calculated using the FSAID 10 growth rates, by county and crop type. For non-irrigation demand (i.e., aquaculture and livestock), the FSAID 10 and therefore this 2025 RWSP projected steady demand throughout the planning period.

The District elected to use its modified FSAID 10 approach to meet the statutory directive to use the best available data in developing AG water use projections. The District has extensive metered data on agricultural water use at the permit level, which provides a more accurate assessment of local water use than modeled water use. This allows the District projections to capture permit-level and regional variations in agricultural irrigation practices. The projections are also reflective of progress made in agricultural conservation through the District's FARMS Program and other regional efforts such as the SWUCA Recovery Strategy. The methodologies and data are provided in more detail in Appendix 3-1.

3.0 Water Demand Projections

Trends indicate that agricultural activities are expected to slightly decrease in the Southern Planning Region during the planning period. Irrigated acreage is expected to decrease by about 3.6 percent, from 142,115 acres in 2021 to nearly 137,030 acres in 2045. This projection indicates a stabilization for the region, which has experienced a dramatic change in water use from peak levels in the early 2000s. Total agricultural water use in this region has fallen from more than 160 mgd to 260 mgd annually in the late 1990s and early 2000s to an estimated 117.83 mgd in 2021.

The District estimates that the projected decrease in irrigated acreage by 2045 will result in a 1.4 percent decrease in water demands to 115.99 mgd. Most of the decrease in acreage will be in fresh market vegetables, with a small decrease in citrus acreage. FDACS forecasts that DeSoto and Manatee counties will experience a decline in irrigated acreage of about 5,085 acres, while Sarasota County is expected to have no change in irrigated acreage. Citrus represents the largest or second largest crop by acreage in each of these counties, and the long-term response of the industry to citrus greening disease will likely drive water use trends in the Southern Planning Region. Table 3-2 displays projected combined agricultural irrigation and non-irrigation demands for the 5-in-10 (average) and 1-in-10 (drought) conditions for the planning period.

4.0 Stakeholder Review

The adjusted FSAID methodology developed by the District was supported by the Agricultural and Green Industry Advisory Committee as part of the 2020 RWSP stakeholder review process. This methodology was carried forward for use in this 2025 RWSP. District staff solicited feedback on the draft AG demand projections from the District’s Agricultural and Green Industry Advisory Committee and FDACS staff.

Table 3-2. *Projected irrigated and non-irrigated agricultural demand in the Southern Planning Region (5-in-10 and 1-in-10) (mgd)*

County	2020 Base		2025		2030		2035		2040		2045		Change 2020-2045		% Change	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10
Charlotte	8.96	12.24	9.10	12.45	9.17	12.54	9.17	12.54	9.20	12.59	9.18	12.55	0.22	0.31	2.41%	2.52%
DeSoto	54.51	78.99	55.75	80.86	56.13	81.44	55.81	80.98	55.50	80.49	55.03	79.79	0.52	0.80	0.96%	1.01%
Manatee	50.93	66.44	50.59	66.64	50.37	66.78	49.69	66.29	49.04	66.13	48.51	66.00	-2.42	-0.44	-4.75%	-0.66%
Sarasota	3.21	4.04	3.23	4.07	3.23	4.09	3.26	4.09	3.26	4.10	3.27	4.10	0.05	0.06	1.66%	1.48%
Total	**117.62**	**161.71**	**118.67**	**164.02**	**118.90**	**164.84**	**117.93**	**163.90**	**117.00**	**163.31**	**115.99**	**162.44**	**-1.63**	**0.73**	**-1.38%**	**0.45%**

Note: Summation and/or percentage calculation differences may occur due to rounding. See Appendix 3-1 for source values.

Section 3. Industrial/Commercial and Mining/Dewatering

1.0 Description of the Industrial/Commercial and Mining/Dewatering Water Use Sectors

The I/C and M/D uses within the District include chemical manufacturing, food processing, and miscellaneous I/C uses. Much of the water used in food processing is for citrus and other AG commodities. Chemical manufacturing is associated with phosphate mining and consists mainly of phosphate processing. The M/D water use is associated with a number of products mined in the District, including phosphate, limestone, sand, and shell.

2.0 Demand Projection Methodology

Demand projections were developed by multiplying the 2020 amount of water used for each I/C and M/D facility by growth factors based on Woods & Poole Economics' gross regional product forecasts by county in five-year increments (Woods and Poole Economics, Inc., 2022). For example, if an I/C facility used 0.30 mgd in 2020 and the county calculated growth factor from 2020 to 2025 was three percent, the 2025 demand projection for that facility would be 0.31 mgd. Similarly, if the 2025 to 2030 growth factor was four percent, the 2030 projection would be 0.32 mgd. Projected use for 2025 and 2030 were calculated as follows:

2025 projected use = 0.30 times 1.03 = 0.31 mgd
2030 projected use = 0.31 times 1.04 = 0.32 mgd

Water use for 2020 is derived from the District's 2021 Water Use Well Package Database (WUWPD) (SWFWMD, 2022). This database includes metered use for individual/general permits and estimated use for small general permits. These quantities are for consumptive use of groundwater and fresh surface water.

This methodology was used for all institutional, I/C, and M/D permits with one exception. As with the 2020 RWSP, the District used mining plans for the Mosaic Company to develop projections of I/C and M/D water demands associated with each of its processing facilities and mining operations. The objective was to better reflect the movement of pumpage across counties as their mines and demands shifted locations during the RWSP 20-year period of analysis. Please see Appendix 3-2 for more details.

3.0 Water Demand Projections

Table 3-3 shows the projected I/C and M/D water demand for the planning period, with an increase in demand of 2.05 mgd, or 40 percent, due primarily to a projected increase in mining activities in Manatee County. For several years, the permitted quantity in the I/C and M/D sectors has been declining, in large part due to revisions in how M/D permitted quantities are allocated by the District. Non-consumptive dewatering uses are no longer included in permitted quantities. Starting with the 2010 RWSP, demand projections have been made for all 16 counties, whereas earlier RWSPs included demand projections for only the 10 southern counties.

Additionally, since 2010, mining quantities permitted for product entrainment have not been included in the demand projections because the District considers such quantities incidental to the mining process and not part of the actual water demand (i.e., the quantities necessary to conduct mining operations).

In accordance with the 2019 Format and Guidelines, the 5-in-10 and 1-in-10 demands are the same. The uses "are assumed to be reasonably the same in a 1-in-10-year drought event as in an average year (i.e., no significant demand variation)" (FDEP et al., 2019).

Table 3-3. *Projected industrial/commercial and mining/dewatering demand in the Southern Planning Region (5-in-10 and 1-in-10) (mgd)*

County	2020 Base	2025	2030	2035	2040	2045	Change 2020-2045	% Change
Charlotte	0.16	0.08	0.09	0.09	0.09	0.09	-0.07	-44.26%
DeSoto	0.66	0.66	0.67	0.68	0.69	0.70	0.04	6.15%
Manatee	4.11	6.15	6.16	6.16	6.17	6.18	2.07	50.32%
Sarasota	0.15	0.15	0.15	0.15	0.16	0.16	0.02	10.72%
Total	**5.08**	**7.04**	**7.06**	**7.08**	**7.11**	**7.13**	**2.05**	**40.43%**

Note: Summation and/or percentage calculation differences may occur due to rounding. Changes in small demand numbers across time can represent a large percent change in demand over time that is not readily seen from the rounded values in the table. Source values are available in Appendix 3-2.

4.0 Stakeholder Review

The demand projection methodology, results, and analyses were presented to the District's Industrial Advisory Committee for review and comment.

Section 4. Power Generation

1.0 Description of the PG Water Use Sector

The PG uses within the District include water for cooling, boiler make-up, or other purposes associated with the generation of electricity. The PG quantities have previously been grouped with I/C and M/D quantities but are provided separately in this section per the 2019 Format and Guidelines (FDEP et al., 2019).

2.0 Demand Projection Methodology

Demand projections for PG were developed using a combination of historic water use and the 2023 10-year site plans for each PG facility. These plans include historic number of customers and megawatt production, as well as projections of future customers and megawatts produced through 2032. Using data for 2016 to 2020, a 5-year average water use per megawatt was calculated. This value was then applied to the projection of future megawatts by PG facility. The 20-year (2013-2032) average customer growth rate was used to extend the projections of customers through 2045. A calculation of megawatt use per customer was then applied to the projection of customers to arrive at a projection of megawatts by PG facility. Future groundwater demand for 2025-2045 is calculated by applying the 2016-2020 average water use per megawatt to the projected megawatts specific to each PG facility.

3.0 Water Demand Projections

Table 3-4 shows the projected PG water demand for the planning period, with an increase in demand of 3.96, or about 163 percent. The demand projections do not include reclaimed, seawater, or non-consumptive use of fresh water. In accordance with the 2019 Format and Guidelines, the 5-in-10 and 1-in-10 demands are the same. Power generation (PG) uses "are assumed to be reasonably the same in a 1-in-10-year drought event as in an average year (i.e., no significant demand variation)" (FDEP et al., 2019).

Table 3-4. *Projected power generation demand in the Southern Planning Region (5-in-10 and 1-in-10)) (mgd)*

County	2020 Base	2025	2030	2035	2040	2045	Change 2020-2045	% Change
Charlotte	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
DeSoto	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Manatee	2.43	4.89	5.23	5.61	5.99	6.40	3.96	163.08%
Sarasota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
Total	**2.43**	**4.89**	**5.23**	**5.61**	**5.99**	**6.40**	**3.96**	**163.08%**

Note: Summation and/or percentage calculation differences may occur due to rounding. Changes in small demand numbers across time can represent a large percent change in demand over time that is not readily seen from the rounded values in the table. Source values are available in Appendix 3-2.

4.0 Stakeholder Review

The demand projection methodology, results, and analyses were presented to the District's Industrial Advisory Committee for review and comment.

Section 5. Landscape/Recreation

1.0 Description of the Landscape/Recreation Water Use Sector

The L/R sector includes self-supplied water use associated with irrigation of golf courses, cemeteries, parks, medians, attractions, and other large self-supplied green areas. Golf courses are the major user within this category.

2.0 Demand Projection Methodology

Landscape/Recreation (L/R) baseline use data is from the WUWPD (SWFWMD, 2022). This database includes metered use for active individual/general permits and estimated use for General Permits by Rule. The projection methodologies are divided into those for golf and those for other L/R demand. A more detailed description of the methodologies used is in Appendix 3-4.

Water demand from L/R is positively correlated with population growth. However, golf course water demands are tied to facility closures, conservation, and reclaimed water use, as well as changing future demographic characteristics. Therefore, golf and other L/R are forecasted separately.

Demands for other (non-golf) L/R are based on population growth within each county. Water use for this sector is assumed to grow at the projected county-level percentage change in population. The five-year population percentage changes were calculated and then applied to the previous five-year period's pumpage, beginning with the baseline pumpage.

3.0 Water Demand Projections

Table 3-5 provides total projected L/R water demands for the planning period for both golf and other L/R demand. The table indicates an increase in demand of 4.33 mgd for the 5-in-10 condition by 2045, an increase of nearly 22 percent from the baseline 2020 demand.

Reclaimed water has positively impacted water use, and this trend should continue. Most L/R water use occurs near major population centers, which is also where large quantities of reclaimed water are located that can be used to offset potable water use for this category. Large developments tend to have higher demands for L/R uses such as landscape and golf course irrigation. Many utilities in the region offset L/R demand by providing reclaimed water for irrigation of parks, playing fields, and school grounds.

4.0 Stakeholder Review

The demand projection methodology, results, and analyses were presented to the Agricultural and Green Industry Advisory Committee for review and comment.

Table 3-5. *Projected landscape/recreation demand in the Southern Planning Region (5-in-10 and 1-in-10) (mgd)*

County	2020 Base		2025		2030		2035		2040		2045		Change 2020-2045		% Change	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10
Charlotte	1.84	2.36	1.90	2.44	1.96	2.51	2.00	2.57	2.04	2.61	2.08	2.66	0.24	0.30	12.96%	12.74%
DeSoto	0.18	0.23	0.18	0.23	0.18	0.23	0.18	0.23	0.18	0.23	0.18	0.23	0.00	0.00	1.79%	1.76%
Manatee	9.86	12.50	10.68	13.53	11.36	14.40	11.93	15.10	12.42	15.73	12.86	16.27	2.99	3.77	30.36%	30.17%
Sarasota	8.00	10.22	8.30	10.59	8.55	10.91	8.76	11.17	8.94	11.40	9.09	11.59	1.09	1.37	13.64%	13.45%
Total	**19.88**	**25.30**	**21.06**	**26.79**	**22.05**	**28.05**	**22.87**	**29.07**	**23.58**	**29.97**	**24.20**	**30.76**	**4.33**	**5.45**	**21.76%**	**21.54%**

Notes: Summation and/or percentage calculation differences may occur due to rounding. See Appendix 3-4 for source values. Quantities do not include reclaimed water, re-pumped groundwater from ponds, or stormwater.

Section 6. Summary of Projected Demands

Tables 3-6 summarizes the projected change in demand for the 5-in-10 and 1-in-10 conditions for all use categories in the planning region. It shows that 40.89 mgd of additional water supply will need to be acquired from permitted reserves, developed, and/or existing use retired to meet demand in the planning region through 2045. Public supply (PS) water use will increase by 32.17 mgd over the planning period. Table 3-6 also shows an increase of 2.05 mgd in I/C and M/D water use, 3.96 mgd in PG water use, and 4.33 mgd in L/R water use. Agricultural (AG) water uses will decrease by 1.63 mgd. Table 3-7 summarizes the projected demands for each county in the planning region for the 5-in-10 condition.

Table 3-6. *Summary of projected demand in the Southern Planning Region (5-in-10 and 1-in-10) (mgd)*

Water Use Category	2020 Base		2025		2030		2035		2040		2045		Change 2020-2045		% Change	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10
PS	113.35	120.15	122.24	129.58	129.71	137.49	135.75	143.89	140.96	149.42	145.53	154.26	32.17	34.10	28.38%	28.38%
AG	117.62	161.71	118.67	164.02	118.90	164.84	117.93	163.90	117.00	163.31	115.99	162.44	-1.63	0.73	-1.38%	0.45%
I/C & M/D	5.08	5.08	7.04	7.04	7.06	7.06	7.08	7.08	7.11	7.11	7.13	7.13	2.05	2.05	40.43%	40.43%
PG	2.43	2.43	4.89	4.89	5.23	5.23	5.61	5.61	5.99	5.99	6.40	6.40	3.96	3.96	163.08%	163.08%
L/R	19.88	25.30	21.06	26.79	22.05	28.05	22.87	29.07	23.58	29.97	24.20	30.76	4.33	5.45	21.76%	21.54%
Total	**258.36**	**314.68**	**273.91**	**332.32**	**282.96**	**342.68**	**289.23**	**349.56**	**294.63**	**355.80**	**299.25**	**360.97**	**40.89**	**46.30**	**15.83%**	**14.71%**

Notes: Summation and/or percentage calculation differences may occur due to rounding. Changes in small demand numbers across time can represent a large percent change in demand over time that is not readily seen from the rounded values in the table.

Table 3-7. *Summary of projected demand for counties in the Southern Planning Region (5-in-10) (mgd)*

Water Use Category	Planning Period						Change 2020-2045	
	2020	2025	2030	2035	2040	2045	mgd	%
Charlotte								
PS	21.41	23.00	24.36	25.45	26.35	27.16	5.75	26.84%
AG	8.96	9.10	9.17	9.17	9.20	9.18	0.22	2.41%
I/C & M/D	0.16	0.08	0.09	0.09	0.09	0.09	-0.07	-44.26%
PG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
L/R	1.84	1.90	1.96	2.00	2.04	2.08	0.24	12.96%
Cumulative Total	**32.38**	**34.08**	**35.57**	**36.71**	**37.69**	**38.51**	**6.13**	**18.93%**
DeSoto								
PS	2.58	2.62	2.64	2.65	2.67	2.68	0.10	3.81%
AG	54.51	55.75	56.13	55.81	55.50	55.03	0.52	0.96%
I/C & M/D	0.66	0.66	0.67	0.68	0.69	0.70	0.04	6.15%
PG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
L/R	0.18	0.18	0.18	0.18	0.18	0.18	0.00	1.79%
Cumulative Total	**57.92**	**59.21**	**59.62**	**59.32**	**59.03**	**58.59**	**0.66**	**1.15%**
Manatee								
PS	44.45	49.06	52.91	56.09	58.87	61.33	16.88	37.98%
Ag	50.93	50.59	50.37	49.69	49.04	48.51	-2.42	-4.75%
I/C & M/D	4.11	6.15	6.16	6.16	6.17	6.18	2.07	50.32%
PG	2.43	4.89	5.23	5.61	5.99	6.40	3.96	163.08%
L/R	9.86	10.68	11.36	11.93	12.42	12.86	2.99	30.36%
Cumulative Total	**111.79**	**121.37**	**126.03**	**129.47**	**132.49**	**135.28**	**23.49**	**21.01%**
Sarasota								
PS	44.91	47.57	49.80	51.56	53.07	54.36	9.45	21.03%
Ag	3.21	3.23	3.23	3.26	3.26	3.27	0.05	1.66%
I/C & M/D	0.15	0.15	0.15	0.15	0.16	0.16	0.02	10.72%
PG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%
L/R	8.00	8.30	8.55	8.76	8.94	9.09	1.09	13.64%
Cumulative Total	**56.27**	**59.24**	**61.73**	**63.73**	**65.42**	**66.88**	**10.61**	**18.85%**
Region Total	**258.36**	**273.91**	**282.96**	**289.23**	**294.63**	**299.25**	**40.89**	**15.83%**

Note: Summation and/or percentage calculation differences may occur due to rounding. Changes in small demand numbers across time can represent a large percent change in demand over time that is not readily seen from the rounded values in the table. Additional water quantities may be required over the planning period to address environmental restoration needs for water bodies discussed in Chapter 2.

Section 7. Comparison of Demands between the 2020 Regional Water Supply Plan and the 2025 Regional Water Supply Plan

There are several notable differences between the 2020 and 2025 RWSP Southern Planning Region demand projections. The 2020 baseline numbers are reduced in the PG, I/C, and M/D sectors from the 2020 projected numbers used in 2020 RWSP, whereas the PS, LR, and AG use sectors include increases in demands when compared with the 2020 RWSP. For the PS category, differences are largely attributable to higher regional population growth. The 2020 RWSP projected an increase in PS demands of 30.78 mgd for the 2015 to 2040 planning period, while the 2025 RWSP projects a larger increase of 32.17 mgd from 2020 to 2045.

Chapter 4. Evaluation of Water Sources

This chapter presents the results of investigations by the District to quantify the amount of water that is potentially available from all sources of water within the planning region to meet demands through 2045. Sources of water that were evaluated include surface water, stormwater, reclaimed water, seawater desalination, brackish groundwater desalination, fresh groundwater, and conservation. Aquifer storage and recovery (ASR) is also discussed as a storage option with great potential to maximize the utilization of surface water and reclaimed water. Aquifer recharge (AR) is discussed as a method to increase water supply, restore aquifer levels, and manage saltwater intrusion. The amount of water that is potentially available from these sources is compared to the demand projections for the planning region presented in Chapter 3, and a determination is made as to the sufficiency of the sources to meet demand through 2045.

Part A. Evaluation of Water Sources

Fresh groundwater from the UFA is currently the primary source of supply for all use categories except PS in the planning region. Public supply (PS) users acquire approximately 61 percent of their supply from surface water facilities, and brackish water treatment facilities are also prevalent in the region. It is assumed that sources other than fresh groundwater will meet much of the projected demands during the planning period. This assumption is based largely on the impacts of groundwater withdrawals on water resources in the SWUCA, as discussed in Chapter 2, and previous direction from the Governing Board. Limited additional fresh groundwater supplies will be available from the surficial and Hawthorn aquifers and possibly from the UFA, subject to a rigorous, case-by-case permitting review.

Water users throughout the region are increasingly implementing conservation measures to reduce their water demands. Such conservation measures will enable water supply systems to support more users with the same quantity of water. However, the region’s continued growth will require development of additional alternative sources such as reclaimed water, brackish groundwater, seawater, and surface water with off-stream reservoirs or ASR systems for storage. To facilitate the development of these projects, the District encourages partnerships between neighboring municipalities and counties for developing regionally coordinated water supplies. The following discussion summarizes the evaluation and development of various water supply sources and the potential for those sources to be used to meet projected water demand in the planning region.

Section 1. Fresh Groundwater

Fresh groundwater is the principal source of water supply for most use categories (excluding I/C and PS) in the planning region. In 2023, approximately 178.2 mgd of groundwater (including DSS) was withdrawn for use in the planning region, of which approximately 96.8 and 46.8 mgd were for AG and PS, respectively. Fresh groundwater from the UFA accounts for most of this use, but the surficial and Hawthorn aquifer systems are also used for water supply in much smaller quantities. The following is an assessment of the availability of fresh groundwater in the planning region.

1.0 Surficial Aquifer

The surficial aquifer is mostly composed of fine-grained sand that is generally less than 50 feet thick. In Charlotte, southern DeSoto, and Sarasota counties, the surficial aquifer may be greater than 100 feet thick and include a significant shell bed that make the aquifer more productive. Small-diameter, low-yield wells can be constructed in the surficial aquifer almost anywhere, and thicker areas are more favorable for development.

Permitted surficial aquifer withdrawals are for PS and AG uses. For example, the Gasparilla Island Water Association in Charlotte County has maintained a surficial aquifer wellfield near Placida for PS use for over 30 years. In addition to some permitted withdrawals, small, unpermitted quantities are also withdrawn from the aquifer for lawn watering or DSS uses. Agriculture is also a substantial user in Charlotte, southern DeSoto, and southern Sarasota counties, where significant shell beds have been identified in the surficial aquifer. In most cases, these withdrawals will supplement or replace withdrawals of poor-quality water from the UFA. Additional exploratory drilling and testing would greatly expand knowledge of the ultimate water-producing potential of these beds. It is difficult to quantify the potential future availability of water from the surficial aquifer on a regional basis due to the uncertainty in hydraulic capacity of the aquifer, local variations in geology, and existing water use that may limit supply.

2.0 Hawthorn Aquifer System

The Hawthorn aquifer system (formerly the intermediate aquifer system) is located between the surficial aquifer and the UFA. It exists over much of the planning region and is most productive in Charlotte, DeSoto, and Sarasota counties. Use of the aquifer increases in the southern portion of the region where the water-bearing zones increase in permeability and UFA water quality is poor. The upper portion of the Hawthorn aquifer system is characterized by low permeability and is of limited extent. Water in this part of the aquifer is generally of sufficient quality and quantity for DSS indoor water use, outdoor irrigation, and recreational uses. In addition to some permitted withdrawals, small, unpermitted quantities are also withdrawn from the aquifer for lawn watering or individual household use. However, since limited additional fresh groundwater supplies will be available from the Hawthorn aquifer system as a result of the SWUCA Recovery Strategy, current unpermitted availability was not assessed for this 2025 RWSP.

3.0 Upper Floridan Aquifer

The SWUCA Recovery Strategy anticipated that development of new water supplies from the UFA in the region would be limited due to existing impacts to MFL water bodies. Requests for new groundwater supplies are not allowed to cause further lowering of water levels in impacted MFL water bodies.

The SWUCA Recovery Strategy emphasizes implementation of conservation measures and development of AWS as much as possible to meet future additional demands. Per capita demand reductions from conservation efforts, increased reclaimed water availability, land-use changes, and improved rainfall over the last decade have helped reduce demands on the UFA from the SWUCA Recovery Strategy's original projections (SWFWMD, 2023); however, accelerated population growth will still increase demands. Some reductions in the use of groundwater are also anticipated to be achieved from the District's comprehensive AG water conservation initiatives and the permanent retirement of WUPs on lands purchased for conservation. These reductions could be used to help further SWUCA Recovery Strategy goals.

4.0 Permitted/Unused Quantities

A few PS utilities in the planning region are not currently using their entire permitted allocation of groundwater. The District anticipates these utilities will eventually grow into their unused quantities to meet future demand. Based on a review of the unused, permitted quantities of fresh groundwater associated with PS WUPs in 2023, an estimated 2.93 mgd are available to PS in the planning region. It is important to consider current impacts to MFL water bodies and other environmental features; therefore, it is possible that, in the future, some portion of currently permitted demands will need to be met using AWS.

Section 2. Water Conservation

1.0 Non-Agricultural Water Conservation

Non-agricultural water conservation is defined as the beneficial reduction of loss, waste, or other inefficient uses of water accomplished through the implementation of mandatory or voluntary BMPs that enhance the efficiency of both the production and distribution of potable water (supply-side measures) and indoor or outdoor water use (demand-side measures). The implementation of a comprehensive portfolio of conservation measures creates the following benefits:

- Infrastructure and Operating Costs. Water conservation allows utilities to defer expensive expansions of potable water and wastewater systems while limiting operation and maintenance (O&M) costs at existing treatment plants, (e.g., use of electricity for pumping and treatment, expensive water treatment chemicals).
- Fiscal Responsibility. Most water conservation measures are more cost-effective than other AWS sources such as reclaimed water or desalination. Cost-effectiveness is defined as the cost of each measure compared to the amount of water expected to be conserved over the measure's lifetime.
- Environmental Stewardship. Proper irrigation designs and practices, including Florida-Friendly Landscaping™ (FFL), can provide natural habitat for native wildlife and reduce unnecessary runoff from properties into water bodies. This can reduce nonpoint-source pollution, particularly from operations that use fertilizers, pesticides or fungicides, which, in turn, may assist with meeting total maximum daily load (TMDL) restrictions within local water bodies and maintaining spring water quality health.

Since the 1990s, the District has provided financial and technical assistance to water users and suppliers in the Southern Planning Region for the implementation of local and regional water conservation efforts. The District has a long history of successful water use reduction projects, which encourages water users to seek assistance by working with District staff when implementing water-saving and educational water conservation programs.

Water conservation can be achieved through installation of high-efficiency fixtures like faucet aerators

Water savings have been achieved in the Southern Planning Region through a combination of regulatory and economic measures, as well as incentive-based outreach and technical assistance for the development and promotion of the most recent technologies and conservation activities. Regulatory measures include WUP conditions, year-round water restrictions, and municipal codes and ordinances that require water-efficiency standards for new development and existing areas. For example, the National Energy Policy Act of 1992 requires all new construction built after 1994 to be equipped with low-flow plumbing fixtures. In Florida, Senate Bill 494, which took effect in July 2009, requires all automatic irrigation systems to use an automatic shutoff device. Senate Bill 2080 prohibits contractual and/or local government ordinance restrictions on the implementation of FFL. Periodically, WMDs in Florida issue water shortage orders that require short-term mandatory water conservation through situational BMPs and other practices.

Economic measures, such as inclining block rate structures, are designed to promote conservation by providing price signals to customers of public water supply systems to reduce inefficient use. Incentive programs include rebates, utility bill credits, or giveaways of devices and fixtures that will replace older, less water-efficient models. Such equipment includes high-efficiency toilets (HET), low-flow faucet aerators, high-efficiency showerheads, smart irrigation controllers, rain sensors, and soil moisture sensors.

The District's Utilities Services Group provides guidance and technical expertise to PS water utilities and helps identify and reduce water loss. The non-regulatory assistance and educational components of the program maximize PS water conservation and improve both local utility system efficiency and regional water resource benefits. Among the services provided upon request are leak detection surveys and water audit guidance and evaluation. Since the program's inception, 164 leak detection surveys have been conducted throughout the District, locating 1,645 leaks of various sizes and totaling an estimated 5.96 mgd. In the Southern Planning Region, 15 leak detection surveys have been conducted, locating 83 leaks totaling an estimated 0.18 mgd.

The District also promotes conservation through a variety of education and outreach programs. While quantifiable water savings are not always available, education and outreach greatly increase the success of conservation programs by raising awareness and changing attitudes and behaviors regarding water use. Public education is a necessary facet of every water conservation program, and, when accompanied by other conservation measures, can be an effective supplement to a long-term water conservation strategy.

The District administers the statewide Florida Water Star℠ (FWS) program, which is a water conservation certification program for new residential and commercial construction and existing home renovation. The program encourages water efficiency in appliances, plumbing fixtures, irrigation systems, and landscapes. On average, a FWS homeowner with outdoor irrigation can save up to 48,000 gallons per year. District staff have also had great success working with local governments and utilities to incorporate FWS certification or criteria into local building codes through ordinance or mandate. As of July 2024, there are 14 municipalities, two counties, and one water utility requiring FWS standards in the District. This is anticipated to result in more than 7.4 mgd of water saved at projected build out. In addition, FWS offers installation and BMPs training for landscapers and irrigation contractors, providing an opportunity to become FWS accredited professionals.

In FY2020, the District launched the Conservation Education Program, which partners with utilities, UF Institute of Food and Agricultural Sciences (IFAS) Extension offices, and homeowners associations to support educational projects that enhance existing efforts to reduce residential water use. The District also shares water conservation messaging through both traditional news media and social media. This includes several campaigns, such as, “Water 101,” “Skip a Week,” “Water Conservation Month,” and “Watch the Weather, Wait to Water.” Additionally, free water conservation publications are available for order or download on the District’s website for residents within the District’s boundaries, and District staff are available for water conservation speaking engagements. The District also provides funding to school districts to support water conservation through field trips, teacher trainings, project materials, and the Splash! school grant program. Small grants are also provided for water schools, which are attended by elected officials, community leaders, and other decision-makers and often include water conservation content.

In addition to education and outreach, the District provides cost-share funding to entities in support of water conservation projects, as described in Chapter 8. On a Districtwide scale, water conservation efforts have contributed to relatively steady unadjusted gross per capita use rates from 2010 to 2020 despite increasing population growth (Figure 4-1). The per capita use rate for the District is the lowest of all five WMDs.

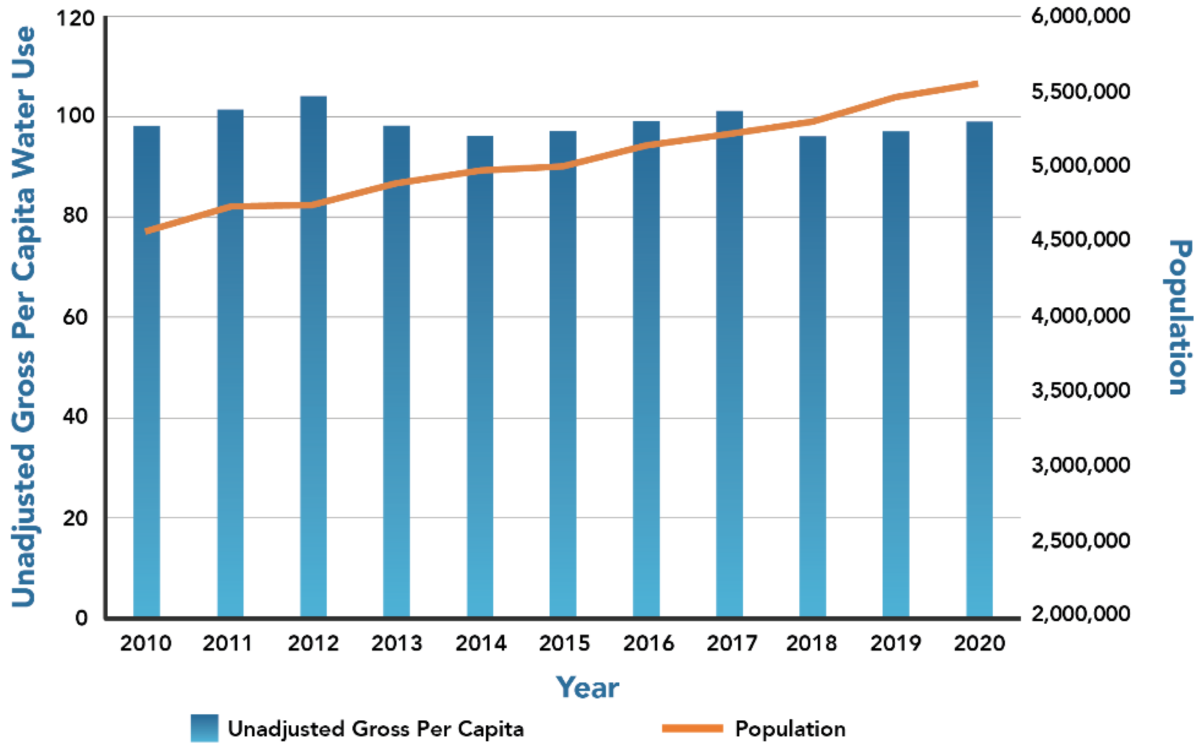

Figure 4-1. *Districtwide unadjusted gross per capita water use versus population, 2010-2020*

1.1 Water Conservation Potential for Public Supply and Domestic Self-Supply

The PS sector includes all water users that receive water from public or private water systems and utilities and may include non-residential customers that are connected to a utility potable distribution system. Public supply (PS) water conservation will continue to be the primary source of water savings in the District. Public supply (PS) systems lend themselves most easily to the administration of conservation programs since each customer's water use is measured, allowing for focus, evaluation, and adjustment of the program to maximize savings potential. The success of the District's water conservation programs for PS systems to date is demonstrated by the 16.6 mgd in Districtwide savings that has been achieved since programs began in 1991.

The DSS sector is a subset of PS and includes individual private homes and businesses that are not utility customers but instead receive water from a well or surface water for uses such as irrigation. Domestic self-supply (DSS) wells do not require a WUP and are commonly not metered; therefore, changes in water use patterns are less measurable than in the remainder of the PS sector. Only passive conservation was estimated for DSS systems in this 2025 RWSP.

1.1.1 Public Supply and Domestic Self-Supply Assessment Methodology

For the Southern Planning Region, passive and active water conservation potential was calculated using the Alliance for Water Efficiency Water Conservation Tracking Tool (AWE Tool) (Alliance for Water Efficiency, 2019), which is a tool to assist utilities in determining costs and benefits for conservation. Calculations were made on a countywide basis; however, due to the nature of the countywide data needed to run the AWE Tool, DSS parcels and demands were unable to be differentiated from the PS parcels and demands and therefore combined.

Passive Conservation

Passive water conservation savings are those that result from users implementing water conservation measures in the absence of utility incentive programs. These are typically the result of building codes, manufacturing standards, and ordinances that require installation of high-efficiency plumbing fixtures and appliances in new construction and renovations. Passive water conservation is a major contributor to decreasing per capita water use across the country.

The AWE Tool was used to calculate passive savings based on property appraiser data, Public Supply Annual Reports, and census data. Savings from all four counties were combined to yield estimated savings for the Southern Planning Region and included both PS and DSS.

The AWE Tool calculates passive water conservation for toilets, showerheads, clothes washers, and dishwashers. There are two components in the AWE Tool's passive water conservation savings calculation:

- Natural Replacement Savings: This accounts for water savings that occur as a result of natural fixture and appliance replacements during the planning horizon. This occurs as older devices reach the end of their service lives or are otherwise replaced by newer, more efficient models.
- Water Savings Adjustment Factor: Newer homes built over the planning horizon are more efficient in their indoor water use than existing older homes. When newer homes are combined with existing homes, the ratio of high-efficiency to low-efficiency fixtures and appliances will increase as compared to the ratio in the 2020 baseline from which demands were based.

Active Conservation

Active water conservation encompasses measures, practices, and programs sponsored or encouraged by utilities and municipal governments 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. Therefore, active water conservation potential was not calculated for DSS.

The AWE Tool along with data from Public Supply Annual Reports, previously co-funded local conservation projects, and several studies (Dukes and Boyer, 2018; Boyer and Dukes, 2018; DeOreo et al., 2016; A & N Technical Services, Inc., 2005) was used to estimate active conservation and associated costs. The following conservation activities were evaluated for potential implementation:

- HET (Residential)
- Smart Irrigation Controllers
- HET (Industrial/Commercial)
- High-efficiency Showerheads
- Landscape and Irrigation Evaluations/Audits
- Rain Sensors

- Soil Moisture Sensors

For indoor BMPs, the AWE Tool estimates the number of older, inefficient fixtures available for replacement in a given year after factoring in passive replacement. A participation rate is applied to this number, and the result is divided over the number of years in the planning period to calculate the estimated annual number of replacements. Subsequently, the annual savings and costs are determined. For outdoor BMPs, the annual number of replacements is based on a subset of the number of dwelling units within a given service area (i.e., an estimated number of high water users that are likely over-irrigating). A participation rate is then applied to the number of high users and divided by the number of years in the planning period to obtain the number of implementations for each outdoor activity. The participation rate was set to 30 percent for all activities, and the high water user rate was set to 4 or 15 percent, dependent on activity (Dukes and Boyer, 2018).

The countywide data used within the AWE Tool included both PS and DSS demands and dwelling units; however, there is no water utility to implement active conservation programs for the DSS sector. To obtain active savings for only PS, the ratio of projected 2045 demands for DSS out of total PS and DSS demands was used. For example, for Sarasota County, 2045 demand for DSS (4.57 mgd) was divided by 2045 demand for PS and DSS combined (46.45 mgd) to yield 10 percent. Therefore, Sarasota County active savings for PS and DSS was reduced by 10 percent to yield the savings only for PS. Figure 4-2 and Table 4-1 include active savings potential for PS only.

1.1.2 Results

The conservation activities selected for analysis were chosen for their proven effectiveness in conserving water, overall cost-effectiveness, and ease of implementation. It is estimated that 7.07 mgd of combined passive and active savings could be achieved in the planning region by 2045 (Table 4-1). This equates to an over five percent reduction in projected 2045 demand.

The majority of savings are attributable to passive conservation (5.15 mgd), representing nearly 73 percent of total savings potential in the region. Active savings represent approximately 27 percent of total regional savings, which is a more than one percent reduction in 2045 PS and DSS demand. To achieve the projected active savings, more than 313,000 program implementations would need to be completed during the planning horizon at an estimated, overall cost-effectiveness of $1.13 per 1,000 gallons. The total estimated cost for these implemented programs is approximately $14.1 million. Figure 4-2 below depicts the potential change in demand over the planning period for the Southern Planning Region due to conservation. This demonstrates how water conservation can reduce and delay the need for more expensive AWS projects.

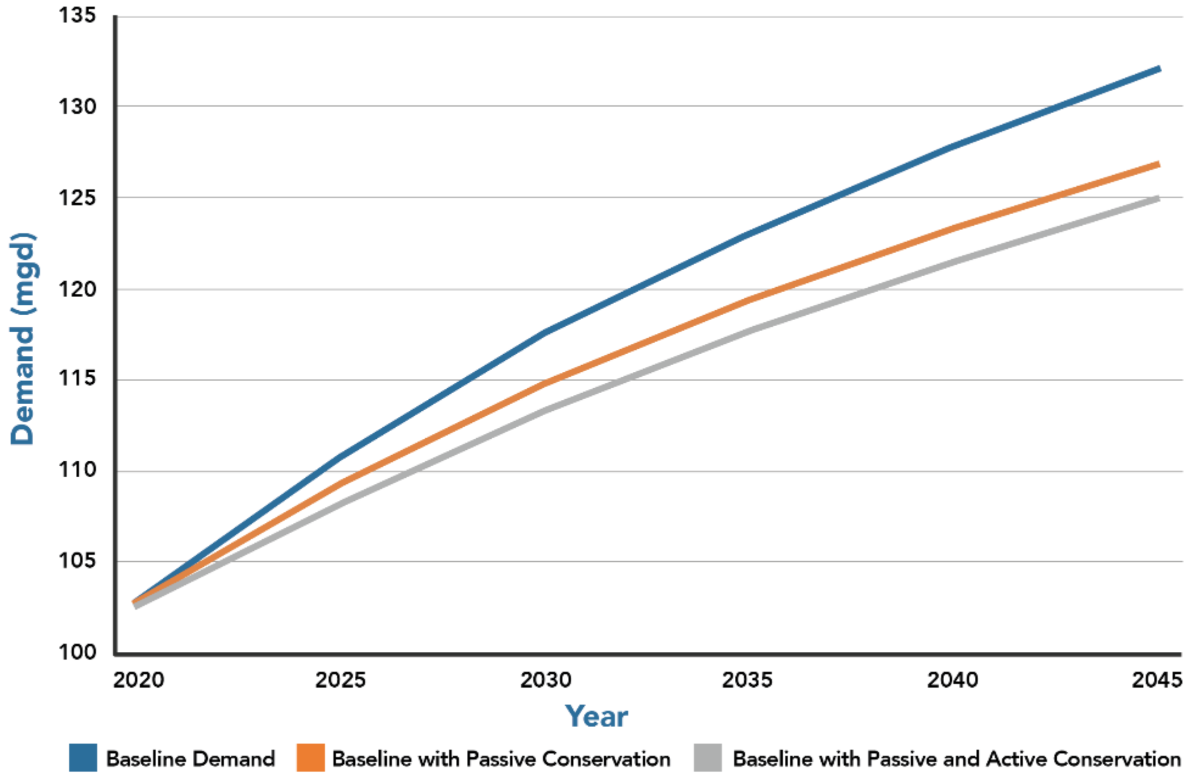

Figure 4-2. *Potential effects of conservation on projected public supply and domestic self-supply demand*

1.1.3 Additional Considerations

The active conservation analysis builds on the passive analysis as it considers only the inefficient stock not already replaced passively. However, this is a conservative analysis as there are many other activities that could result in substantial water savings. Over time, new technologies will emerge and fixtures will gain additional efficiencies. Additionally, for those activities that were modeled, higher participation rates could be achieved. It should also be noted that for those items with short life expectancies (e.g., rain sensors), repetitive implementations and reoccurring costs are required to maintain savings.

The 2020 gross per capita water use of the Southern Planning Region is lower than that of any other District planning region, so it is to be expected that potential conservation savings is not as great as other areas of the District. More savings could be achieved with higher indoor efficiency standards and modifications to land development regulations that promote conservation. Additionally, more conservation can be achieved through replacement of 1.6 gallons per flush (gpf) toilets with 0.8 gpf toilets, which is not currently captured in these projections.

1.2 Water Conservation Potential for Industrial/Commercial Self-Supply

This I/C water use sector includes factories and other industrial enterprises that obtain water directly from surface water and/or groundwater sources through a WUP. Businesses try to minimize water use to reduce pumping, purchasing, treatment, and disposal costs. To date, the District has focused efforts on education, indoor and outdoor surveys, and commercial fixtures, such as spray valves and HET. The industrial processes used in this category present unique opportunities for water savings and are best identified through site-specific assessments of water use at each (or a similar) facility. It is estimated that I/C sector savings could be 0.03 mgd by 2045 (Table 4-1).

1.2.1 Industrial/Commercial Assessment Methodology

The I/C savings estimate used the same methodology as the 2020 RWSP and does not include M/D quantities. This methodology was based on a study by Dziegielewski et al. (2000) that examined the impact of water audits on improving water efficiency within this sector. The lower-bound savings determined in this study was 15 percent, and this number was used in lieu of the higher estimate to be more conservative. The 15 percent participation rate used in the 2020 RWSP was also assumed. Therefore, the self-supplied I/C 2045 demand (1.27 mgd) multiplied by both the savings and participation rates (15 percent for both) yields the estimated water savings over the planning horizon for the self-supplied I/C sector within the Southern Planning Region (0.03 mgd).

1.3 Water Conservation Potential for Landscape/Recreation Self-Supply

The L/R water use sector includes golf courses and large landscapes (e.g. cemeteries, parks, playgrounds) that obtain water directly from surface and groundwater rather than from a PS system. The use of efficient irrigation practices and technology has achieved some water savings in this use sector. Within the region, it is estimated that L/R sector savings could be 1.38 mgd by 2045 (Table 4-1).

1.3.1 Landscape/Recreation Assessment Methodology

As with the self-supplied I/C sector, the water conservation potential for the L/R sector was derived using the same methodology as the 2020 RWSP. Conservation in this sector primarily comes from updating inefficient sprinkler heads and installing smart irrigation controller technology, such as soil moisture sensors or weather-based controllers. Based on two studies by UF, it was determined that the lower-bound savings from retrofits and smart irrigation controllers are 10 percent and 20 percent, respectively. These values were used along with the 15 percent savings rate also assumed in the 2020 RWSP to estimate self-supplied L/R water conservation. In other words, the 2045 L/R demand (30.76 mgd) was multiplied by the participation rate (15 percent), and this product was multiplied by each of the savings rates (10 percent and 20 percent). The sum of these final two numbers equates to the total L/R savings over the planning horizon (1.38 mgd). The 1-in-10 2045 demand projections were used instead of the 5-in-10 projections in an effort to be more conservative.

1.4 Summary of the Potential Water Savings from Non-Agricultural Water Conservation

Table 4-1 summarizes potential non-agricultural water conservation savings in the Southern Planning Region. This table shows that, through implementation of all conservation measures listed above for the PS, DSS, I/C, and L/R water use sectors, an estimated 8.48 mgd could be saved by 2045 at a total projected cost of $14.1 million. This is an approximately five percent reduction in total demand.

Table 4-1. *Potential non-agricultural water conservation savings in the Southern Planning Region*

Sector	2045 Demand (mgd)	Savings (mgd)	Potential Reduction in Demand (%)	Average Cost-Effectiveness (Cost per 1,000 gallons saved)
PS and DSS Total	132.02	7.07	5.36%	-
PS and DSS Passive	-	*5.15*	*3.90%*	-
PS Active	-	*1.93*	*1.46%*	*$1.13*[1]
I/C	1.27	0.03	2.36%	-
L/R	30.76	1.38	4.49%	-
Total	**164.05**	**8.48**	**5.17%**	**-**

Summation and/or percentage calculation differences may occur due to rounding
[1]Total cost-effectiveness is weighted by each project's percent share of total savings in relation to the cost.

2.0 Agricultural Water Conservation

The FDACS develops conservation projections as part of the FSAID projections. A limitation is that it does not completely account for existing regulatory constraints (e.g., SWUCA rules) that have resulted in increased WUE thus limiting future water conservation savings potential. However, future savings could still come from developing new technology, sensor-based automation, and scheduling changes.

The county-level savings percentages derived from FSAID 10 were applied to the 2045 agricultural irrigated crop demands shown in Appendix 3-1, which are District-specific demand projections. Results are shown below in Table 4-2.

Table 4-2. *Potential agricultural water conservation savings in the Southern Planning Region*

County	Projected 2045 Irrigated Crop Demand (mgd)	Conservation Savings (%)[1]	Agricultural Conservation Potential by 2045 (mgd)
Charlotte	9.18	6.52%	0.60
DeSoto	54.44	1.11%	0.60
Manatee	48.02	4.03%	1.94
Sarasota	3.21	8.60%	0.28
Total	**114.84**	**2.97%**	**3.42**

Summation and/or percentage calculation differences may occur due to rounding
[1]Derived from FSAID 10.

These should be considered potential conservation estimates and should not be treated as water supply or directly removed from agricultural water demand estimates. Substantial investments will be necessary to realize these savings. District investment paired with other government assistance programs from the FDACS and Natural Resources Conservation Service (NRCS) could accelerate the rate at which these savings occur. Water resource benefits from the FARMS Program can be categorized as WRD or water conservation. Benefits associated with WRD (primarily tailwater recovery) projects are estimated at 9.19 mgd during the planning horizon.

Additional information on the FARMS Program and its potential impact on water resources is within Chapters 5 and 7.

Section 3. Reclaimed Water

Reclaimed water is defined by the FDEP as water that is beneficially reused after being treated to at least secondary wastewater treatment standards by a WWTP. Reclaimed water can be used to accomplish a number of goals, including decreasing reliance on potable water supplies, increasing groundwater recharge, and restoring natural systems. Appendix 4-1 provides information on 2020 actual and 2045 projected reclaimed water utilization. Additional information and resources related to reclaimed water use within the District, including a map viewer of reclaimed lines and facilities, is available at https://www.swfwmd.state.fl.us/projects/reclaimed-water.

Benefits that can be obtained from the use of reclaimed water are governed by the concepts of utilization and water resource benefit. Utilization is the percent of treated wastewater from a WWTP that is used in a reclaimed water system. The utilization rate of a reclaimed water system varies by utility. Typically, only 50 to 70 percent of treated wastewater flows go to reclaimed water customers. The highest utilization rates occur in utilities in urban areas where large industries and numerous residential customers can be supplied. Utilization is also limited by seasonal supply and storage. A utility cannot expand its reuse system beyond peak flow demand, which occurs during dry periods when demand is highest, without experiencing shortages. For example, a reclaimed water system with a 1.0 mgd average annual flow normally is limited to supplying 0.5 mgd (50 percent utilization) on an annual basis. This is because during the dry season, demand for reclaimed water for irrigation can more than double.

The six main options to increase utilization beyond 50 percent include potable reuse, seasonal storage, system interconnects, an interruptible customer base, environmental enhancement/recharge, and supplementing reclaimed water supplies with other sources.

- Potable reuse involves purifying reclaimed water to a quality for it to be used as a water source for potable supplies. In February 2025, the FDEP published Rules for potable reuse in Chapter 62-565, F.A.C.
- Seasonal storage is the storage of excess reclaimed water in surface reservoirs or ASR systems during the wet season when demand is low. This stored reclaimed water can be used to augment daily reclaimed water flows to meet peak demand in the dry season.
- System interconnects involve the transfer of reclaimed water from areas of excess supply to areas of high demand. This transferred reclaimed water can be used to augment daily reclaimed water flows to meet peak demand in the dry season.
- An interruptible customer base is where a utility has golf course, recreational, commercial, agricultural, industrial, and other bulk customers that have multiple sources of irrigation or process water. Reclaimed water is supplied to these customers during certain times of the day and during certain seasons, but they may be requested to go “offline” and switch to backup sources during peak demand times or seasons. This enables a utility to develop a much larger customer base and maximize the utilization of reclaimed water while avoiding the negative consequences of running out of reclaimed water during peak irrigation times/seasons.

- Environmental enhancement and recharge involve using excess reclaimed water to enhance wetland habitat, meet MFLs, or recharge the UFA to achieve water resource benefits.
- Supplementing reclaimed water supplies with other water sources such as stormwater and groundwater for short periods to meet peak demand enables systems to serve a larger customer base.

Water resource benefit is the amount of potable-quality groundwater or surface water that is replaced by reclaimed water usage or the amount of reclaimed water used for environmental enhancement. Most reclaimed water utilities provide service to a wide variety of customers and, as a result, the average reclaimed water offset is approximately 65 percent. The District is actively cooperating with utilities to identify ways to increase reclaimed water utilization and benefit. For example, efficiency can be further enhanced with practices such as individual metering coupled with storage, water-conserving rates, efficient irrigation design, and irrigation restrictions.

Reclaimed water is an important alternative source for meeting demands.

The District's goal is to achieve a 75 percent utilization rate of all WWTP flows by the year 2040. This goal is intended to further the use of reclaimed water, thereby increasing benefits to potable and groundwater resources. Opportunities may exist for even greater utilization through methods such as customer base selection (e.g., large industrial), project type selection (e.g., recharge) and implementation of developing technologies.

1.0 Potential for Water Supply from Reclaimed Water

Table 4-3 provides information on the current and future availability of reclaimed water in the planning region and the potential to achieve potable-quality water benefits through 2045. In 2020, WWTPs in Manatee, Sarasota, Charlotte and DeSoto counties collectively produced approximately 71 mgd of treated wastewater. Of that quantity, approximately 44 mgd was reused to benefit traditional water supplies. This represents approximately 62 percent of the available wastewater produced in the planning region being used for irrigation, cooling, or other beneficial purposes. By 2045, it is projected that approximately 57 mgd of the more than 83 mgd of wastewater produced in the planning region will be reused.

Table 4-3. *2020 actual versus 2045 projected reclaimed water availability and utilization (mgd) in the Southern Planning Region*

County	2020 Actual		2045 Projected		Total Utilization Increase
	Wastewater Treatment Plant Flows	Reclaimed Utilization	Wastewater Treatment Plant Flows	Reclaimed Utilization	
Charlotte	10.51	4.91	13.45	8.38	3.48
DeSoto	1.12	0.23	1.16	0.31	0.08
Manatee	32.20	20.96	38.17	26.93	5.97
Sarasota	27.51	18.03	30.64	21.73	3.69
Total	**71.34**	**44.13**	**83.42**	**57.35**	**13.22**

Summation differences may occur due to rounding

Section 4. Surface Water

Within the Southern Planning Region, major river/creek systems include the Braden, Manatee, Myakka and Peace rivers; Myakkahatchee, Shell, Horse and Joshua creeks; and Cow Pen Slough. Major PS utilities use the Braden, Manatee, and Peace rivers, as well as the Myakkahatchee and Shell creeks. The Braden and Manatee rivers and Shell Creek have in-stream dams that form reservoirs for storage. The potential yield for all rivers will ultimately be determined by their minimum flows once they are established; however, yields associated with rivers that have in-stream impoundments also depend on the degree of structural alteration that has occurred and the habitat that is supported by the flows.

The City of Bradenton uses the Evers Reservoir on the Braden River for PS, diverting an average of 5.8 mgd per year from 2011 to 2023. Manatee County withdrew an average of 29.2 mgd from 1982 to 2023 from Lake Manatee, which is an in-stream impoundment on the Manatee River. The City of Punta Gorda's average withdrawal from the Shell Creek reservoir from 2011 to 2023 was 3.8 mgd.

1.0 Criteria for Determining Potential Water Availability

The available yield for each river was calculated using its established minimum flow and/or hydrodynamic modeling (if available) and its current permitted allocation. If the minimum flow was not yet established for a river/creek, planning-level minimum flow criteria were used. The five-step process used to estimate potential surface water availability included: (1) estimation of unimpacted (adjusted) flow, (2) selection of the period used to quantify available yield, (3) application of minimum flow or planning level criteria, (4) consideration of existing legal users, and (5) application of engineering limitations. The amount of water that can be developed in the future will depend on adopted minimum flows and the permitting process. The methodology is further detailed in Appendix 4-2.

2.0 Overview of River/Creek Systems

2.1 Manatee River

The Manatee River watershed is located almost completely within Manatee County and encompasses nearly 330 square miles, including 83 square miles of the Braden River system. The river originates in northeast Manatee County and flows 45 miles to its mouth at the southern end of Tampa Bay. A dam was constructed on the river in 1966, impounding approximately six miles of the river's middle reach, forming Lake Manatee. Withdrawals from the reservoir began soon after construction. Since tidal influences reach approximately 20 miles upstream from the mouth of the river nearly to the dam, no stream-gauging stations are in place downstream of the dam. Lake Manatee is operated as a public water supply reservoir by the Manatee County Utility Department. The adjusted annual average flow for the period from 1982 to 2023 was 134.45 mgd (208.1 cfs). However, this value might not be completely reliable. The utility holds water in the reservoir during the dry season and releases large quantities during the wet season due to the limited storage capacity of the reservoir. This skews the flow distribution and affects the calculated potential withdrawal amounts. A citrus grove is permitted to withdraw 0.06 mgd from the East Fork of the Manatee River. Total average annual diversions from 1982 to 2023 were 29.19 mgd. Based on existing withdrawals and the planning-level minimum flow criteria, an additional 2.57 mgd may potentially be available from the river.

2.2 Braden River

The Braden River discharges to the tidal reaches of the Manatee River approximately eight miles south of Tampa Bay. From its confluence with the Manatee River, it extends seven miles southeasterly and then approximately 12 miles easterly to its headwaters. The upper reaches consist of channelized tributaries in central Manatee County. A water supply reservoir, Ward Lake (38 acres), was created in 1938 by damming the river just south of State Road (SR) 70. The reservoir was enlarged in 1985 and renamed the Bill Evers Reservoir (230 acres). The river is tidally influenced below the dam. The adjusted average annual discharge from 1993 to 2018 at the Braden River was 63.68 mgd (98.6 cfs). The City of Bradenton is permitted to withdraw an average of 6.95 mgd. Based on existing withdrawals and planning-level minimum flow criteria, an additional 2.40 mgd may potentially be available from the river.

The Braden River

2.3 Cow Pen Slough

The Cow Pen Slough watershed encompasses approximately 63 square miles in Sarasota County and 9.5 square miles in Manatee County. Land use in the upper part of the watershed is primarily agricultural, but the lower part is primarily urban. Runoff from the watershed is conveyed through 14 miles of improved channel and outfalls into Dona Bay. Historically, a large portion of the upper watershed discharged into the Myakka River; however, in the 1960s, the slough was channelized to improve conditions for agricultural development. This alteration resulted in the diversion of flows from the Myakka River and has contributed to excess freshwater flows entering Dona Bay, which has disrupted the natural freshwater/saltwater regime in the estuary. Two flood control structures are located on Cow Pen Slough, one just north of Laurel Road and the other just south of SR 72.

It is anticipated that future environmental restoration efforts in the watershed will focus on preventing the excess freshwater flows from entering Dona Bay. Through the diversion and capture of these excess flows, opportunities for WSD will be created, which will help advance environmental restoration efforts. There is limited flow data available on Cow Pen Slough, but as part of the District's efforts to establish MFLs, flow measurements on the slough were initiated in 2003. Flows from 1995 to 2023 were estimated to average 38.16 mgd (59.1 cfs) and were based on a MIKE SHE model calibrated to the flows in the Myakka River. No permitted withdrawals exist on Cow Pen Slough. The peer review panel for the Cow Pen Slough MFL recommended against direct withdrawals from the Dona Bay/Shakett Creek System until such time that additional studies can be conducted in the small tributaries (Salt Creek and Fox Creek) that provide the majority of flow to the original 16-square-mile watershed below Cow Pen Slough Canal. Minimum flows established for Cow Pen Slough prohibit withdrawals from Dona Bay/Shakett Creek below the CPS-2 flood control structure; however, it allows for diversion of the channelized flows from Cow Pen Slough above CPS-2. Based on the established MFL, 38.16 mgd of water supply is potentially available; however, available quantities could be reduced if excess flows are redirected during future environmental restoration efforts.

2.4 Myakka River

The Myakka River extends 69 miles from its mouth at Charlotte Harbor, northeast to its origins in northeast Manatee County, and has a watershed of approximately 598 square miles. Major tributaries are Myakkahatchee Creek (Big Slough Canal), Deer Prairie Slough/Creek, and Owen Creek. Two lakes of significant size, the Upper and Lower Myakka lakes, are located along the Myakka River and have a combined surface area of 1,380 acres. A portion of the river has been designated an Outstanding Florida Water (OFW), and the segment through Sarasota County was designated a Florida Wild and Scenic River.

The Myakka River watershed has undergone extensive hydrologic alteration. Over the past few decades, inflows from irrigation water applied to agricultural lands are believed to have contributed to excess water entering Flatford Swamp and other areas of the river. Along the middle portion of the river, small dams were constructed on the Upper and Lower Myakka lakes. Other flow alterations, including those at Tatum Sawgrass, Vanderipe Slough, Clay Gully, Cow Pen Slough, and the Blackburn Canal, have shifted the timing of flows, drastically reduced storage areas, and diverted large quantities of water out of the watershed. Seventy-three percent of the river's annual flow occurs during the wet season, and the river has a broad, seasonally inundated floodplain. Historically, during the drier periods of the

Lower Myakka Lake

year, there was no flow in the upper Myakka River. However, in the last several decades, inflows from irrigated agricultural lands have significantly increased the dry-season flow of the river, and it no longer ceases flowing in the dry season. The adjusted annual average flow from 1995 to 2023 at the Myakka River near Sarasota is 169.53 mgd (262.4 cfs). This includes up to an average of 45.5 mgd (70.4 cfs) of excess flow that has been estimated to occur during the year as a result of irrigation of agricultural lands and other land-use changes.

As part of efforts to restore environmentally impacted areas in the upper Myakka River watershed (UMRW), it will be necessary to prevent excess surface water flows from entering Flatford Swamp. The District is looking at the diversion and capture of these excess flows before the Myakka River enters Flatford Swamp and use it as recharge to help recover the SWIMAL in the SWUCA. There are currently no permitted withdrawals from the river. Based on the lower Myakka River minimum flow, an additional 32.66 mgd of water supply is potentially available from the river; however, implementation of a Flatford Swamp hydrologic restoration project would reduce future surface water flows.

2.5 Myakkahatchee Creek (Big Slough Canal)

The Myakkahatchee Creek (Big Slough Canal) is a tributary to the lower Myakka River. The Myakkahatchee Creek watershed covers approximately 195 square miles, with the largest segments in Manatee and Sarasota counties. Smaller portions of the watershed are also located in DeSoto and Charlotte counties. A tributary of the Myakka River, Myakkahatchee Creek is a channelized drainageway for more than 20 miles, with the lower portion of the watershed situated in the City of North Port. In the upper reaches, land use is predominantly pasture. Near the outlet, land use is urban and residential, and the many canals draining the urban areas are fitted with control structures.

The annual average flow in Myakkahatchee Creek from 1981 to 2023, which was derived and measured at the structure near the withdrawal point upstream of the US 41 crossing, was 31.92 mgd (49.4 cfs). The City of North Port is permitted to withdraw 4.4 mgd annual average and up to 6 mgd on a peak month from the creek. Total average withdrawals on the Myakkahatchee Creek from 2010 through 2018 were 1.89 mgd, and the City of North Port may also withdraw up to 2.4 mgd from the Cocoplum Waterway tributary as a backup supply. The City's treatment facility is equipped with ASR storage and a brackish groundwater RO system used to maintain finished water quality.

2.6 Peace River

The Peace River begins in the Green Swamp and flows south to Charlotte Harbor. The Peace River watershed encompasses 1,800 square miles, and there are two major tributaries in the upper watershed. Peace Creek drains approximately 230 square miles in the northeast part of the watershed, serving as an outlet for several lakes near the cities of Lake Alfred and Haines City. The Saddle Creek Canal drains 144 square

The Peace River is a major source of public supply for the Peace River Manasota Regional Water Supply Authority.

miles in the northwest portion of the watershed in Polk County, where the dominant drainage feature is Lake Hancock. Numerous lakes are present in the area north of Bartow, ranging in size from a few acres to approximately 4,600 acres. In this area, surface water drainage is ill-defined. South of Bartow to near Fort Meade, the land surface has been considerably altered by phosphate mining activities. Major tributaries south of Fort Meade include Payne, Bowlegs, Horse, Joshua, and Charlie creeks.

The only major withdrawal from the Peace River is for PS by the PRMRWSA. The PRMRWSA operates a regional water supply facility in southwest DeSoto County. The facility has two off-stream reservoirs and 21 ASR wells that provide a combined 13 billion gallons of storage for seasonal and drought period reliability. Consistent with minimum flow methodology, annual flow was calculated by summing flow at the Peace River at Arcadia, Horse Creek near Arcadia, and Joshua Creek at Nocatee for the reference period 1950 through 2023. Adjusted annual flow was 843.1 mgd (1,305 cfs). The PRMRWSA permit is flow-dependent and allows withdrawals ranging from 13 to 28 percent when the river flow is above 130 cfs. However, the daily maximum withdrawal is limited to 258 mgd. Based on the permit criteria, the permitted average withdrawal water is estimated to average 120 mgd from 1950 through 2023. Total average annual withdrawals from 2011 to 2023 were an estimated 28.71 mgd. Surface water availability in Table 4-4 was calculated using revised flow criteria that were adopted by the District's Governing Board in 2020.

The District completed the Lake Hancock Lake Level Modification Project in 2013, as well as an outfall treatment project in 2014. These were completed as part of the SWUCA Recovery Strategy for meeting minimum flow requirements in the upper Peace River, improving water quality in the Peace River, and protecting Charlotte Harbor. The Lake Hancock/Lower Saddle Creek Reservation does not adversely affect minimum flows established for the middle and lower Peace River, flows to the Charlotte Harbor Estuary, or existing permitted withdrawals by the PRMRWSA from Peace River.

All available surface water in the Peace River is allocated to the Southern Planning Region (Table 4-4) because more water is physically present and available downstream; however, future withdrawals from the river in the Heartland Planning Region are being explored by the Polk Regional Water Cooperative (PRWC). To maximize development of additional water supplies from the river, future withdrawals will need to be closely coordinated with the PRMRWSA and other users, as well as consider minimum flow requirements. Based on the minimum flow criteria, an additional 7.33 mgd of water supply may potentially be available from the lower river on an annual average basis.

2.7 Shell Creek

The Shell Creek/Prairie Creek watershed encompasses 400 square miles and empties into the lower Peace River near where the river enters Charlotte Harbor. It is the largest subbasin in the Peace River watershed. In 1964, a dam was constructed on Shell Creek which created an 835-acre in-stream reservoir used for municipal supply by the City of Punta Gorda. The adjusted annual average discharge from 1972 to 2023 at the reservoir was 222.47 mgd (344.4 cfs). Punta Gorda Utilities is permitted for average annual withdrawals of approximately 8.1 mgd. Several withdrawals for agricultural irrigation are permitted on Shell Creek for a total annual average withdrawal of 0.50 mgd. Average annual diversions from 1972 to 2023 were 3.25 mgd. Based on existing withdrawals and minimum flows adopted by the District's Governing Board in 2021, an additional 78.14 mgd of water is potentially available on an annual average basis from the lower creek.

3.0 Potential for Water Supply from Surface Water

Table 4-4 summarizes the potential availability of water from rivers in the planning region. The estimated additional surface water that could potentially be obtained from rivers in the planning region ranges from 105.48 mgd to 266.74 mgd. The lower end of the range is the amount of surface water that has been permitted but is currently unused (174.34 mgd minus 68.86 mgd), and the upper end includes permitted but unused quantities (105.48 mgd) plus the estimated remaining unpermitted available surface water (161.26 mgd). Additional factors that could affect the quantities of water that are ultimately developed for water supply include the future establishment of minimum flows, the ability to develop sufficient storage capacity, variation in discharges to the river from outside sources, and the ultimate success of adopted recovery plans. It is also important to note that, for some water bodies, quantities may only be available during high flow periods. Although Table 4-4 depicts available water quantities at the more downstream gauges, it is possible and likely that some of the water will be developed in upstream portions of the watersheds.

Table 4-4. *Summary of current average withdrawals and potential availability of water from rivers/creeks in the Southern Planning Region (mgd) based on planning-level minimum flow criteria (p85/10 percent) or the proposed or established minimum flow*

Water Body	In-stream Impoundment	Adjusted Annual Average Flow[1]	Potentially Available Flow Prior to Withdrawal[2]	Permitted Average Withdrawal Limits[3]	Current Withdrawal[4]	Unpermitted Potentially Available Withdrawals[5]	Days/Year New Water Available[6]		
							Avg	Min	Max
Manatee River @ Dam	Yes	134.45	37.47	34.90	29.19	2.57	310	212	365
Braden River @ Dam	Yes	63.68	9.35	6.95	5.82	2.40	310	174	365
Cow Pen Slough @ I-75[7]	Yes	38.16	38.16	0.00	0.00	38.16	352	276	365
Myakka River @ Sarasota[8]	No	169.53	32.66	0.00	0.00	32.66	264	163	346
Myakkahatchee Creek upstream of Diversion	Yes	31.92	4.22	4.40	1.89	0.0	NA	NA	NA
Peace River @ Treatment Plant[9]	No	843.06	127.33	120.00	28.71	7.33	41	9	87
Shell Creek @ Dam	Yes	222.47	86.23	8.09	3.25	78.14	225	4	334
Total			**335.42**	**174.34**	**68.86**	**161.26**			

Summation differences may occur due to rounding

[1] Mean flow based on recorded USGS flow plus reported WUP withdrawals added back in when applicable. Maximum period of record used for rivers is 1950 to 2023. Flow records for Manatee River (1982 to 2023), Braden River (1993 to 2023), Myakkahatchee Creek (1981 to 2023), and Shell Creek (1972 to 2023) are shorter. Flow records for Peace River are from 1950 to 2023, and Cow Pen Slough was estimated based on flow data for watersheds of similar areas (1985 to 2023).

[2] Based on 10 percent of mean flow for all water bodies with the following exceptions: minimum flow criteria were used to calculate potentially available quantities for Cow Pen Slough, Peace River, Shell Creek, and Myakka River.

[3] Based on individual WUP conditions, which may or may not follow current 10 percent diversion limitation guidelines.

[4] Based on average reported withdrawals.

[5] Equal to remainder of 10 percent of total flow after permitted uses allocated, with minimum flow cutoff for new withdrawals of P85 and maximum system diversion capacity of twice median flow (P50) with these exceptions: Peace River, Myakka River, Shell Creek, and Cow Pen Slough estimated by subtracting permitted withdrawal limits from estimated available flow prior to withdrawal.

[6] Based on estimated number of days that any additional withdrawal is available considering current permitted quantities and withdrawal restrictions. The minimum and maximum are the estimated range of days that additional withdrawals would have been available in any particular year.

[7] Dona Bay/Shakett Creek flows have been increased significantly through channelization (Cow Pen Slough Canal) of upland wetlands that used to flow to the Myakka into the headwaters of Shakett Creek. Adjusted average annual flow is for the channelized portion of Cow Pen Slough above the CPS-2 structure. Potentially available flow quantities allow for withdrawal of all flows above CPS-2, which would reduce unnatural discharges to the Dona Bay/Shakett Creek system. Excess flows may be redirected as part of environmental restoration efforts, which could reduce surface water flows.

[8] Myakka River flows have increased over time due to augmentation resulting from agricultural irrigation and watershed alterations. Potentially available flow prior to withdrawal equals the sum of the daily excess flows (capped at 130 cfs) and 10 percent of the remaining daily flows at the Myakka River near Sarasota gauge from June 21 to the end of February. From March 1 through June 20, withdrawals from the river are limited to the excess flows capped at 130 cfs. Implementation of the Flatford Swamp Hydrologic Restoration project could reduce future surface water flows.

[9] All available surface water is shown in Southern Planning Region, because the calculation was based on flows at the furthest downstream gauge; however, future withdrawals in the Heartland Planning Region are possible.

Section 5. Brackish Groundwater

Brackish groundwater is defined as groundwater having impurity concentrations greater than drinking water standards (i.e., TDS concentration greater than 500 mg/L), but less than seawater, which has a TDS concentration of approximately 35,000 mg/L (SWFWMD, 2001). Brackish groundwater suitable for water supply is available from three general sources within the District: (1) the UFA along coastal areas, (2) the Hawthorn aquifer system located above the UFA, and (3) inland at greater depths within LFA II and LFA VIII. For a detailed description of the Southern Planning Region's geology and hydrogeology, please see Chapter 1, Part C, Section 4.

Coastal brackish groundwater is found in a depth-variable chloride transition between fresh and saline waters. Figure 4-3 depicts the generalized location of the freshwater/saltwater interface, as defined by the 1,000 mg/L isochlor in the Avon Park high permeability zone of the UFA in the southern and central portions of the District. Much of the UFA within the planning region has brackish water quality. Generally, water quality declines to the south and west within the District. Groundwater also becomes saline at greater depths in all locations, so withdrawals require management to prevent upwelling that may deteriorate water quality.

Brackish water sources in the LFA exist below MCU II (Miller, 1986), which is present in west-central Florida and much of the District. The MCU II consists of dolostones and evaporites of very low permeability, creating reasonable confinement from the UFA to limit resource impacts. The brackish water quality occurs from mixing with relic seawater or contact with the evaporitic strata. High sulfide levels are typically present. The MCU I is leaky in the vicinity overlapping MCU II in Polk County, so long-term withdrawals between the two units may impact the UFA and are not recommended.

Below the MCU VIII, which was recently found to extend further north within the District below MCU II (LaRoche and Horstman, 2024), water quality may be brackish or saline. The existence of viable water-bearing aquifers between any of the MCUs is inconsistent and can only be confirmed through exploratory drilling and testing.

Brackish water treatment facilities typically use source water that slightly or moderately exceeds potable water standards. Raw water with TDS values less than 6,000 mg/L is preferred for treatment due to recovery efficiency and energy costs. Groundwater with TDS greater than 10,000 mg/L requires high-pressure pumps and RO membranes that are more costly to operate. Many treatment facilities will blend fresher water or recirculate some RO permeate to maintain consistent raw water quality for efficient operation. Pure RO permeate has a very low mineralization that can corrode pipe metals and prior mineral deposits, so bypass blending of some raw water into the RO permeate is common for buffering, while increasing total yield.

While RO is the most common brackish desalination technology, electrodialysis reversal (EDR) systems may also be viable. The T. Mabry Carlton WTF in Sarasota County is an EDR system. The EDR method uses an electrical current to pull ionic minerals outward from water flowing through a gel membrane, and the electrical current is frequently reversed to prevent buildup in the membrane. It is recommended that both RO and EDR systems be considered in brackish water supply project feasibility studies.

Both RO and EDR treatment systems generate a concentrate byproduct that must be disposed of through methods that may include surface water discharge, deep-well injection, or dilution at a

WWTP. Surface water discharges require a National Pollutant Discharge Elimination System (NPDES) permit and may be constrained by TMDL limitations. Some brackish water treatment facilities have been required to run below their potential treatment efficiencies to reduce the strength of the concentrate being discharged to surface waters. Due to these environmental considerations, deep-well injection is prevalent. Deep wells are expensive to construct, and injection may not be permittable in some areas with unsuitable geologic conditions.

The Florida Legislature declared brackish groundwater an AWS in 2005 (Senate Bill 444). However, it remains a groundwater withdrawal and must occur in a manner consistent with applicable rules, regulations, and District water use management strategies. Factors affecting the permitting of supplies include the hydrologic properties and water quality of the aquifer, rates of groundwater withdrawal, and well configurations. The groundwater models used in permitting have recently been updated to include conceptual layers of the LFAs, factor more calibration points based on LFA drilling investigations, and consider the denser properties of brackish and saline water.

In 2007, the District revised its Cooperative Funding Initiative (CFI) policy to recognize brackish groundwater as an AWS, allowing for assistance with construction projects. Since then, the District has assisted funding seven completed and ongoing brackish groundwater treatment projects, two of which are in the planning region. The funding is intended to incentivize the development of integrated, robust, multijurisdictional systems that are reliable, sustainable, and use diverse water sources.

While the District's primary objective for regional WSD has traditionally been to meet increasing water demands, brackish groundwater projects have also been supported for other utility needs, such as to blend RO permeate with treated surface water to meet finished water quality standards, to maintain viability of existing wellfields with deteriorating source water quality, and to provide a seasonal source substitution to meet MFLs. Future projects may incorporate potable reuse, as the treatment processes are similar. The District recognizes the importance of maintaining the viability of existing supplies but also encourages the consideration of alternative options based on economics and long-term regional benefit. A phased approach to brackish groundwater development is recommended that includes hydrogeologic evaluations to determine project viability, design phases that help refine economic and permitting feasibility, and construction procured through a competitive bidding process.

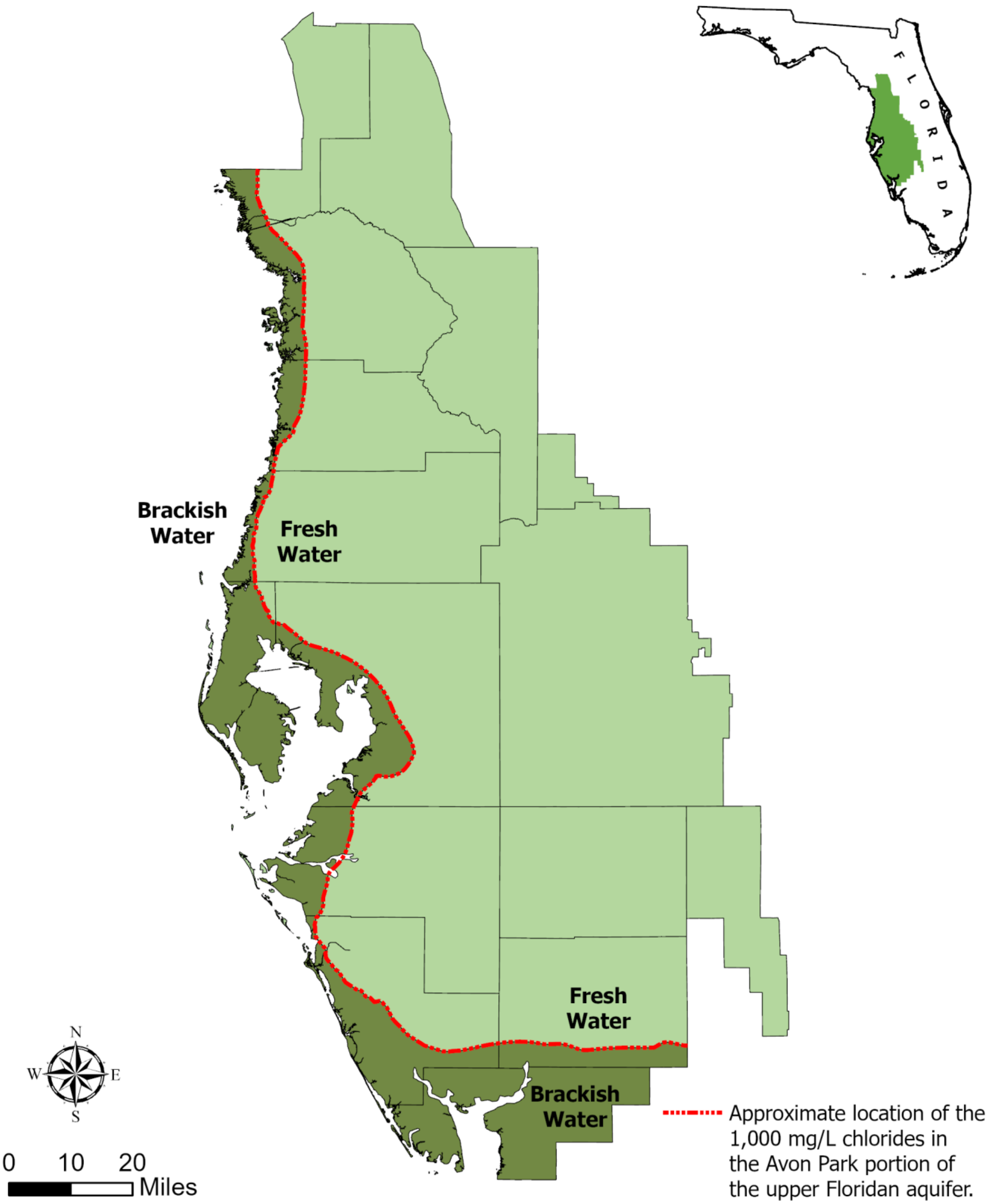

Figure 4-3. *Generalized location of the freshwater/saltwater interface*

1.0 Potential for Water Supply from Brackish Groundwater

Brackish groundwater withdrawals from the UFA in the SWUCA have the potential to exacerbate saltwater intrusion. Requests for brackish groundwater will be evaluated similarly to requests for fresh groundwater withdrawals. Additionally, SWUCA rules (Chapter 40D-2, F.A.C.) state that proposed withdrawals, either fresh or brackish, cannot impact UFA water levels in the MIA of the SWUCA. Groundwater withdrawals have been evaluated by this criterion since the early 1990s and, since that time, there has been no net increase in quantities of water permitted from the UFA in the MIA. Requests for new withdrawals outside the MIA will be granted only if it is demonstrated that the withdrawals have no effect on groundwater levels in the UFA in the MIA, nor impacts to MFL water bodies.

As discussed in the SWUCA Recovery Strategy (SWFWMD, 2006a), if a proposed withdrawal impacts groundwater levels in the MIA or impacts other MFL water bodies, it may be possible to receive a permit for the requested quantity if a net benefit can be achieved. A net benefit is an action an applicant can take to offset the projected effects of the withdrawal by an amount equal to the effect plus a 10 percent improvement. A net benefit can be achieved through means such as retiring existing groundwater withdrawals. Until recovery is achieved and any need for additional recovery is determined, entities seeking additional water in coastal areas should consider brackish groundwater from the UFA as an option only after other sources of water, including conservation, have been fully explored and implemented.

One of the benefits of brackish groundwater in the Southern Planning Region is the potential to use it conjunctively with existing surface water sources within a regional system. During normal or excess rainfall years, the region should make use of its abundant surface water sources. Production from brackish groundwater wellfields would be reduced during these periods to minimize environmental impacts. During drought periods when river flows are below minimums and storage within reservoir and ASR storage facilities are reduced, brackish groundwater production can help meet demands.

There are 14 brackish groundwater desalination facilities operated by utilities in the Southern Planning Region that report water use to the District. In 2022, the combined withdrawal of these reporting facilities was approximately 30 mgd, with a finished supply of 22 mgd. The withdrawals occur from the Hawthorn and upper Floridan aquifers. An additional two facilities are permitted but not yet developed within the region: Manatee County's Buffalo Creek Wellfield and the PRMRWSA Regional RO Facility, planned for co-location at their Peace Creek Facility. Both projects are described in Chapter 5.

The largest brackish groundwater facility is at the T. Mabry Carlton WTF in Sarasota County. As previously described, it is an EDR system with a 12 mgd treatment capacity. The county retired brackish wells at its University Wellfield, transferring allocations to the Carlton Wellfield. In 2023, the City of North Port commenced operation of a second, 2 mgd brackish facility in their rapidly developing southwest service area. The City of Punta Gorda's 4 mgd RO facility, co-located at the Shell Creek WTF, began production in 2020 and blends permeate with seasonally variable surface water. The location of these facilities and other existing and proposed brackish groundwater desalination facilities in the region and District are shown in Figure 4-5.

The availability of brackish groundwater at new facilities or expansion of existing ones must be determined on a case-by-case basis through the same permitting process as fresh groundwater. As a result, separate analysis to determine the total amount of brackish groundwater available for future water supply in the planning region has not been undertaken. As an alternative, the availability of brackish groundwater for water supply planning was estimated by the unused capacity at existing facilities and facilities under development. The unused capacity was calculated by subtracting the permittee's 2023 water withdrawals from either the permit capacity or treatment capacity, whichever was less. Using the lower value helps account for utilities that have more than one wellfield or have additional fresh groundwater available. Each utility's treatment efficiency was also factored to determine water available to meet demands. The values of each facility are shown in Table 4-5.

Table 4-5. *Brackish groundwater desalination facilities that exist or are under development in the Southern Planning Region*

Name of Utility	County	Brackish GW Treatment Capacity (mgd)	Annual Average Permitted Withdrawal (mgd)[1]	2023 Total GW Withdrawals (mgd)	2023 Finished Supply (mgd)	Estimated Available Supply (mgd)[2]	Source Aquifer[3]	Concentrate Discharge Type[4]
CCU/Burnt Store	Charlotte	1.10	3.17	0.97	0.76	0.10	HAS	Surface
Charlotte Harbor	Charlotte	0.75	0.91	0.61	0.46	0.23	HAS	Surface
City of Punta Gorda	Charlotte	4.00	4.04	2.78	2.22	1.01	UFA	Deep Well
Gasparilla Island	Charlotte	1.85	1.54	1.62	1.23	0.00	HAS	Deep Well
DeSoto Correctional Facility	DeSoto	0.75	0.86	0.31	0.22	0.39	HAS	WWTP
PRMRWSA Regional RO (permitted, not developed)	DeSoto	TBD	11.20	NA	NA	8.00	HAS/UFA	Deep Well
Manatee Buffalo Creek (permitted, not developed)	Manatee	TBD	3.95	NA	NA	3.00	HAS/UFA	WWTP
Camelot Communities	Sarasota	0.20	0.36	0.12	0.10	0.19	HAS	SWP
City of North Port, Myakkahatchee Creek	Sarasota	1.5	2.00	0.64	0.51	0.69	HAS	WWTP/ Deep Well
City of North Port, Southwest RO	Sarasota	2.00	2.70	0.86	0.69	0.91	HAS	WWTP/ Deep Well
City of Sarasota, Verna Wellfield	Sarasota	6.00	6.00	3.01	2.26	2.24	HAS/UFA	Surface
City of Sarasota, Downtown RO	Sarasota	6.00	6.00	5.40	4.05	0.45	HAS/UFA	Surface
City of Venice	Sarasota	4.50	6.86	4.41	2.33	0.05	HAS	Surface
Englewood Water District	Sarasota	3.00	5.36	4.11	3.06	0.00	HAS	Deep Well
Sarasota County, Carlton Wellfield	Sarasota	12.00	19.99	5.36	4.41	5.47	HAS/UFA	Deep Well
Sun-N-Fun Resort	Sarasota	0.20	0.19	0.16	0.13	0.03	HAS	Surface

[1]The WUP annual average quantity is the total permit quantity and may include additional sources from fresh groundwater wells under the permit.
[2]Estimated Available Supply is calculated subtracting the 2022 withdrawals from either the Brackish Treatment Capacity or Permit Capacity (whichever is less), then deducting the treatment efficiency (Finished Supply/Withdrawal).
[3]HAS: Hawthorn aquifer system, UFA: upper Floridan aquifer.
[4]WWTP: wastewater treatment plant, SWP: surface/stormwater pond. The utilities shown have WUPs with the District. Other small reverse osmosis (RO) systems exist for self-supplied users.

Section 6. Aquifer Storage and Recovery

Aquifers are reservoirs and conveyance systems that can provide tremendous storage capabilities, enabling rapid storage or recharge of captured excess wet season flows. Aquifer storage and recovery (ASR) and AR projects enable the District to balance wet and dry cycles and better manage droughts, which are already challenging and could become even more difficult to manage as the impacts from climate change become more pronounced and population increases. Use of the aquifer system's reservoir potential is accomplished through either an ASR, direct AR, or indirect AR system. Each of these methods has different levels of regulatory constraints that are largely based on source water quality and water quality of the receiving aquifer. Each method offers unique opportunities that match up with the various sources and qualities of available water.

Aquifer Storage and Recovery (ASR) is the process of storing water in an aquifer when water supplies exceed demand and subsequently withdrawing the water when supplies are low and/or demands are high. Water injected into ASR wells must meet Florida's drinking water quality standards. The locations of ASR projects in the District are shown in Figure 4-4. Aquifer Storage and Recovery (ASR) may be used for potable, reclaimed, groundwater, or partially treated surface water. If water stored in the aquifer is for potable supply, it is disinfected and retreated if necessary before incorporating into the distribution system. Some ASR facilities use the same well to inject and withdraw water, while others use two separate locations.

Aquifer Storage and Recovery (ASR) offers several significant advantages over conventional water storage methods including the ability to store large volumes of water at relatively low cost with little environmental impact and no evaporative losses. The success of an ASR project is generally measured in terms of recovery efficiency, which is the percentage of the original injected water recovered from the storage zone before water quality or impacts from the recovery phase (withdrawal) become unacceptable. Since brackish aquifers may be used for storage, mixing of injected water with native water is generally the limiting factor for recovery efficiency.

Within the District, there are multiple fully permitted ASR projects/facilities. Recent advancements in pretreatment technologies and Underground Injection Control regulations addressing arsenic mobilization issues in the aquifer (which were previously limiting) provide a viable means for successful completion of ASR projects.

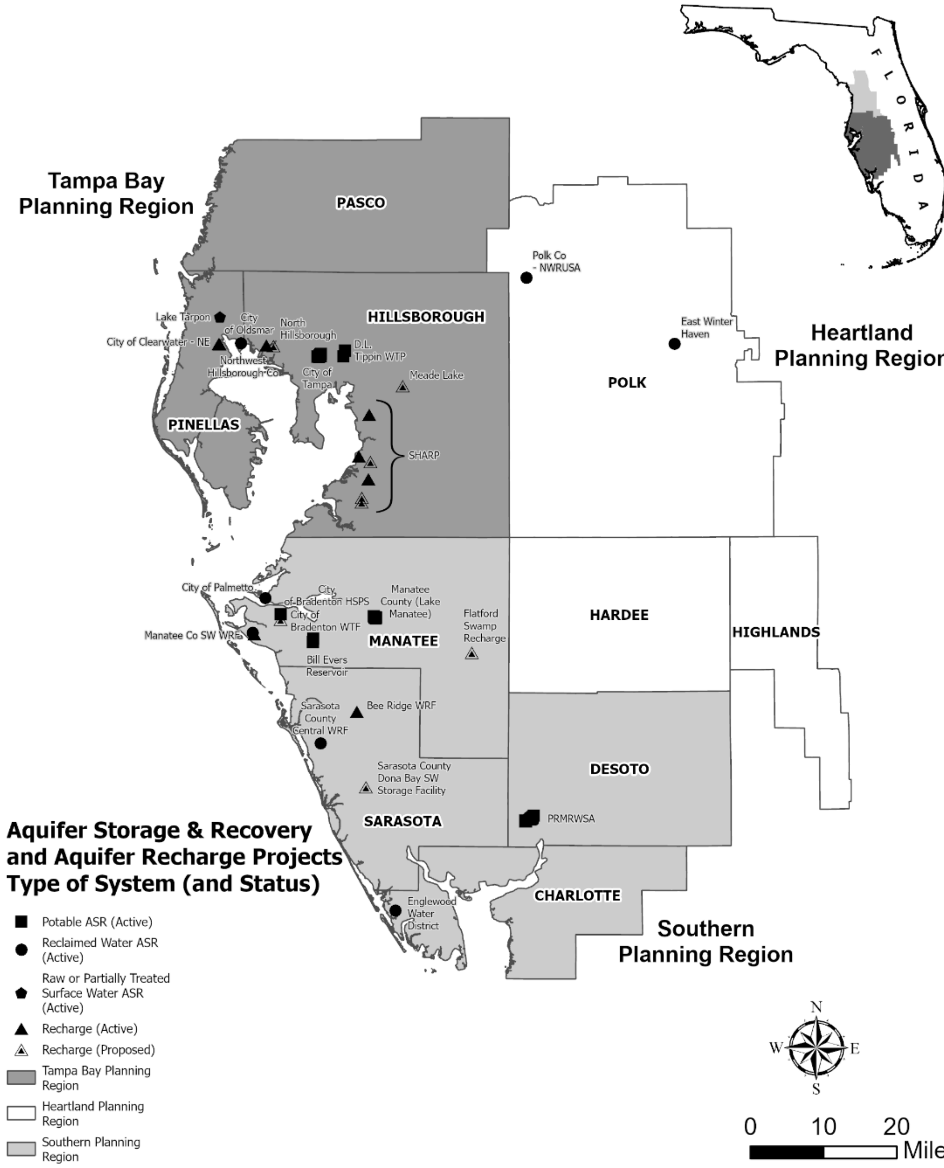

Figure 4-4. *Location of aquifer storage and recovery and aquifer recharge projects in the District*

1.0 Aquifer Storage and Recovery Hydrologic and Geochemical Considerations

The science behind ASR has advanced significantly over the years. The focus initially was on the hydrologic conditions that control the rate of injection/recovery and degree of mixing with elevated TDS in the receiving zone. Early studies of ASR geochemical processes focused on the liberation of low concentrations of naturally occurring radionuclides at the Lake Manatee ASR site. Since the concentrations were below drinking water standards, these ASR projects proceeded while continuing to check for this issue. None of the ASR projects checked ever exceeded the radionuclide standards.

While checking the radionuclides for the City of Tampa ASR project, the first incidence of arsenic at concentrations greater than drinking water standards were found, and geochemical processes became important to understand. Extensive research efforts to understand the cause of arsenic mobilization and methods to control it were successful, and multiple strategies are now available. Geochemical considerations have led to the reduction of oxidants such as dissolved oxygen (DO) and chlorine in injection water, either through physical or chemical methods.

Hydrologic conditions that maximize the recoverability of injected water include a moderately permeable storage zone that is adequately confined above and below by less permeable layers and that contains fairly good to moderate water quality. The permeability of the storage zone is important, since low permeability would limit the quantity of water that could be injected, while very high permeability would allow the injected water to migrate further and mix more with native water. The presence of confinement is necessary to limit or prevent the injected water from migrating upwards (a significant issue where density differences exist between the injected water and native water). Confinement also serves to keep poorer quality water in adjacent zones from being captured during recovery. Poor native water quality in the storage zone will limit the percentage of usable water that can be recovered by degrading the injected water faster as a result of mixing processes. Additionally, the higher density of poor-quality water in the aquifer tends to cause the lower density injected water to migrate upwards and “float” in the upper portions of the storage zone.

In the District, the recoverable percentage of injected water is typically 70 to nearly 100 percent when the concentration of native groundwater in the ASR storage zone is less than 1,000 mg/L. Recovery can be less when the TDS concentration of native groundwater is higher. It is possible, depending on hydrologic conditions, for the recoverable volume of water to be greater than the volume originally stored. This generally results when native water quality is good to fairly good and mixing of the injected water and native water provides additional water of acceptable quality. In some cases, it may be desirable to leave behind a portion of injected water to restore depleted groundwater reserves. This also forms a buffer zone between the stored water and surrounding brackish or poor-quality native water to increase recovery percentage and minimize adverse geochemical reactions between waters with different chemistries. Buffer zones are considered an investment of water that improves performance and results in reserves for future recovery during extreme droughts or emergencies.

2.0 Aquifer Storage and Recovery Permitting

Permits to develop ASR systems must be obtained from the District, the FDEP, the Florida Department of Health (FDOH) and possibly the U.S. Environmental Protection Agency (EPA) if an aquifer exemption is requested. The District is responsible for permitting the quantity and rate of recovery, including potential impacts to existing legal users (e.g., domestic wells), off-site land uses, and environmental features. The FDEP is responsible for permitting the injection and storage portion of the project to ensure that requirements are met for parameters such as disinfection byproducts, coliform bacteria, and arsenic. Finally, the FDOH is responsible for overseeing the quality of water delivered to the public.

Significant clarifications of ASR regulations were issued by the EPA in 2013 as they apply to public water supply systems storing treated drinking water underground. The 2013 guidance allows the FDEP to evaluate ASR systems on a case-by-case basis to determine if mobilization of arsenic and subsequent recovery and treatment of the water can be done in a manner that does not endanger the aquifer. The facility would need to verify that no existing user would be impacted through either property ownership or use of institutional controls such as local ordinances prohibiting wells within a specified area around the ASR wells. Retreatment of ASR water upon recovery may be necessary to remove arsenic prior to distribution. Retreatment to remove arsenic has been successfully implemented by several public drinking water systems and, to date, arsenic concentrations have been within drinking water standards prior to distribution to the public.

3.0 Aquifer Storage and Recovery and Arsenic

When the 2015 RWSP was under development, permitting of potable water ASR facilities in Florida was hindered by the mobilization of naturally occurring arsenic in the aquifer. The interaction of DO and other oxidants in injected water with the aquifer's limestone matrix can release arsenic contained as a trace mineral. However, permitting was possible on a case-by-case basis under a zone of discharge approach. Reclaimed water ASR projects, however, cannot have a zone of discharge for any primary drinking water standards; therefore, the issue of using a similar zone of discharge for arsenic mobilization has not been decided by FDEP. Since that time, effective solutions to arsenic mobilization have been implemented and continue to be developed.

The City of Palmetto successfully managed arsenic mobilization using a chemical oxygen scavenger. Additionally, the City of Bradenton ran a pilot project that removed DO from injection water via a vacuum degasification tower prior to injection, successfully eliminating the mobilization of arsenic. Arsenic concentrations in the recovered water were well below the drinking water standard of 10 micrograms per liter (ug/L), allowing the City of Bradenton to recover directly to the distribution system after standard disinfection requirements were met. At least one other site has duplicated this same technology. Dissolved oxygen (DO) control offers one method of achieving an operation permit for ASR and recharge facilities. Dissolved Oxygen (DO) control can be achieved through physical removal, chemical scavenging, or direct use of groundwater as a source for injection. Projects are currently testing chemical scavenging as a method for arsenic control.

Another method of achieving an operation permit is the attenuation of arsenic through removal during successive cycles of operation. The City of Tampa has seen arsenic concentrations consistently diminish over the years since start-up in 1996. Most of the City of Tampa's wells are now within the drinking water standard for arsenic, and those that exceed it are just barely over the limit for a brief period during recovery. In 2013, the City of Tampa received their operation permit and is now fully permitted. All sites have shown similar attenuation with cycling, suggesting that this may be an option to achieve an operation permit. Facilities that pursue this path will need to be capable of re-treating the water upon recovery to remove the mobilized arsenic. This option also requires control of the area adjacent to the ASR wells, either through ownership or through institutional controls, such as an existing ordinance prohibiting wells from withdrawing from the ASR storage zone.

Most ASR projects in the District are in coastal areas where water in the UFA is brackish. In much of this area, the aquifer is not used for potable supply, and the recovered water from ASR systems is treated to remove arsenic prior to distribution. Therefore, there has been no known exposure to arsenic above the current drinking water standard from water injected into the aquifer as a result of ASR operations.

Section 7. Aquifer Recharge

Aquifer levels are primarily maintained by natural recharge via rainfall infiltration to the surficial aquifer and underlying aquifers. Aquifer recharge (AR) is the process of beneficially using excess water to directly or indirectly recharge aquifers to achieve improved aquifer levels or water quality improvements (reduced saltwater intrusion). Aquifer recharge (AR) may be accomplished by using wells or rapid infiltration basins (RIBs). To maximize environmental and water supply benefits, AR projects will generally target freshwater portions of the aquifer.

Successful AR projects will improve groundwater levels, which in turn may (1) improve local groundwater quality, (2) mitigate or offset existing drawdown impacts due to withdrawals, (3) provide storage of seasonally available waters, thereby augmenting water supplies, and (4) potentially allow additional new permitted groundwater withdrawals in areas of limited water supply. Aquifer recharge (AR) project success criteria can include demonstration of the level to which aquifers have been restored, improvements to aquifer water quality, and/or increases in available water supply for existing and future users.

Sources of water for use in AR projects are often available seasonally and may include high-quality reclaimed water, surface water, and stormwater. A total volume of 884 mgd of reclaimed water was used statewide in 2020, with approximately 80 mgd used for groundwater recharge (FDEP, 2021). Each individual AR project will have different construction specifications, regulatory requirements, and operational maintenance considerations. The hydrogeologic setting of an area often determines which AR approach can be used.

1.0 Direct Aquifer Recharge

Direct AR uses wells to inject water meeting applicable FDEP water quality standards into an aquifer. Direct AR water recovery may occur through other wells constructed in the area. However, direct AR projects are often designed to improve aquifer conditions.

Characterization of the targeted aquifer for direct AR is fundamental to design, operation, and maintenance of a direct AR system. Understanding the permeability and the degree of aquifer confinement above and below the injection interval is critical to project success. Also important is characterization of differences in water quality between injection source water, ambient groundwater in the injection interval and adjacent intervals, or aquifers above and below. Direct AR system designs must address the potential for mobilization of naturally occurring arsenic on a site-specific basis. If not addressed in the design of a direct AR project, the related and undesirable geochemical reactions may occur when injection water reacts with the aquifer. Properly designed projects can avoid or manage these reactions through adjustment of injection water chemistry, such as removal of DO.

Recent operational ASR projects that incorporate oxygen degasification systems and post treatment stabilization have proven that metals mobilization can be minimized and controlled by reducing DO content in the injection source water and maintaining a negative oxygen reduction potential. Aquifer recharge (AR) projects need to function in the same manner. Groundwater flow resulting from injection combined with the natural groundwater flow pattern has the potential to move dissolved metals down gradient. For this reason, it will be important to establish necessary aquifer monitoring and institutional controls to guard against public access to potentially contaminated groundwater, if metals are mobilized.

2.0 Indirect Aquifer Recharge

Indirect AR occurs when water is applied to land surfaces where it can infiltrate and recharge the aquifer. Indirect AR can be accomplished by using a variety of techniques, including spray fields, recharge wetlands, large-scale drain fields, and RIBs. This recharge approach is used in areas where there is a good connection between the surface and source aquifer for water supply. Water applied to the surface must meet minimum water quality standards approved by the FDEP. Infiltration capacity and permeability of the soil, presence of drainage features, depth to the water table, local hydrogeology, locations of nearby drinking water wells, as well as locations of nearby wetlands and lakes are all important to identify, test, and characterize to determine the feasibility of indirect AR. In favorable regions, indirect AR can provide additional natural water quality treatment to the water as it percolates through sediments during infiltration, in addition to subsequently increasing aquifer levels. It is estimated by the District that nearly 17 mgd of available reclaimed water Districtwide was being applied through RIBs for indirect AR as of 2020 (FDEP, 2021).

Section 8. Seawater

Seawater is defined as water in any sea, gulf, bay, or ocean having a TDS concentration of 35,000 mg/L or more (SWFWMD, 2001). Seawater desalination is a costly water supply source but may merit consideration as availability of other sources diminish and advances in technology and efficiency improve. There are five elements to a seawater desalination system that require design considerations: (1) source water intake structure, (2) pretreatment to remove organic matter and suspended solids, (3) desalination by high-pressure RO or distillation, (4) post-treatment to stabilize and buffer product water and prepare it for transmission, and (5) concentrate disposal management (National Research Council, 2008). Each of these elements is discussed below.

The intake structures must be designed to withdraw large amounts of source water while minimizing environmental impacts. The volume of water withdrawn may significantly exceed the amount treated if dilution is necessary for concentrate discharges. Intake design and operation must address ecological concerns, such as risk of impingement and entrainment of aquatic life at the intake, entrainment of sediments and oils, and perturbation to seagrasses and hard-bottom communities. Much of the District's near-shore areas have been designated as either OFWs or aquatic preserves. Globally, many seawater plants have long offshore intakes in deep water, but the local gulf coast is relatively shallow. Industrialized harbors and existing seawater cooling intakes may provide permittable locations at the expense of raw water quality.

Pretreatment of source water is imperative to protect the sensitive RO membranes from premature fouling due to organic carbon and particulates. Local near-shore waters have relatively high levels of organic matter, especially during the summer. Pretreatment systems may require coagulation and/or microfiltration technology similar to the treatment of fresh surface water to maintain long-term viability of the facility.

City of Punta Gorda reverse osmosis water production facility.

High-pressure RO membrane treatment is the most common seawater desalination technology in Florida, Texas, and California. These RO systems pressurize saline water above the osmotic pressure of the solutes and then pass it through a network of semi-permeable membranes. Fresh water passes through the membranes while a constant flow of raw water prevents the dissolved minerals from fouling the membrane's surface. This pressurization step is energy intensive, as seawater treatment requires pressures ranging from 600 to 1,000 pounds per square inch (psi), compared to brackish groundwater systems operating at 30 to 250 psi (FDEP, 2010). Large-capacity RO facilities have energy recovery systems that use turbines or pressure exchange devices to boost pressure to the pumps feeding the source water. Energy recovery systems reduce electrical demands, alleviate redundant pumping capacities, lower operational costs, and reduce the facility's carbon footprint.

Internationally, the largest desalination systems use multi-stage flash distillation (MSF). The MSF process involves the evaporation and condensation of water by heating and cooling in 20 or more stages, with each stage occurring at a successively lower vacuum to enhance vaporization (Prajapati et al., 2021). This process is widely used in the Middle East where heating fuels are accessible and is usually coupled with power plants that use the steam produced in the process to drive electrical turbines. Existing MSF facilities produce more than 200 mgd of fresh water, but greater economies of scale may be required to increase their feasibility compared to that of RO facilities.

Post-treatment of RO product water is necessary to protect infrastructure from corrosion and liberation of metals in piping. Reverse osmosis (RO) permeate has low hardness and alkalinity, so chemical post-treatment using lime or caustic soda is needed for buffering and pH adjustment. A settling system may be necessary to reduce turbidity generated by chemical treatment, and degassing systems are used to remove hydrogen sulfide.

Most seawater desalination facilities worldwide dispose of concentrate by surface water discharge, which entails significant environmental considerations. The salinity of concentrate can be 50 percent higher than that of the source water, and the increased density of the concentrate may cause it to sink and impact benthic communities (National Research Council, 2008). A NPDES permit from the EPA and other local permits may be required to discharge concentrate into surface waters. Technological approaches to avoid impacts to aquatic organisms may include diffusion using widely dispersed multiple outlets and pumping large volumes of additional water to dilute the concentrate to safe levels prior to discharge.

Co-location of desalination facilities with coastal electric power stations enhances their financial feasibility. Co-location produces cost and environmental compliance benefits by using existing intake structures and blending concentrate with the power station's high-volume cooling water discharge. Additionally, the complex infrastructure for the intake and outflow is already in place and source water heated by the power station's boilers can be more efficiently desalinated.

However, many coastal power stations are reducing or retiring their once-through seawater outlets and switching to more efficient closed-recirculation cooling systems. Future desalination systems might still use existing intakes, but the large outflow volumes won't be available for concentrate dilution, so deep well injection may be more feasible.

1.0 Potential for Water Supply from Seawater Desalination

Seawater desalination projects in Manatee and Sarasota counties were proposed in previous versions of the RWSP. Since then, more feasible and cost-effective project options have been selected to meet regional demands through 2045. Therefore, seawater desalination has not been assessed for this 2025 RWSP. The locations of existing and proposed seawater and brackish groundwater desalination facilities in the District are shown in Figure 4-5.

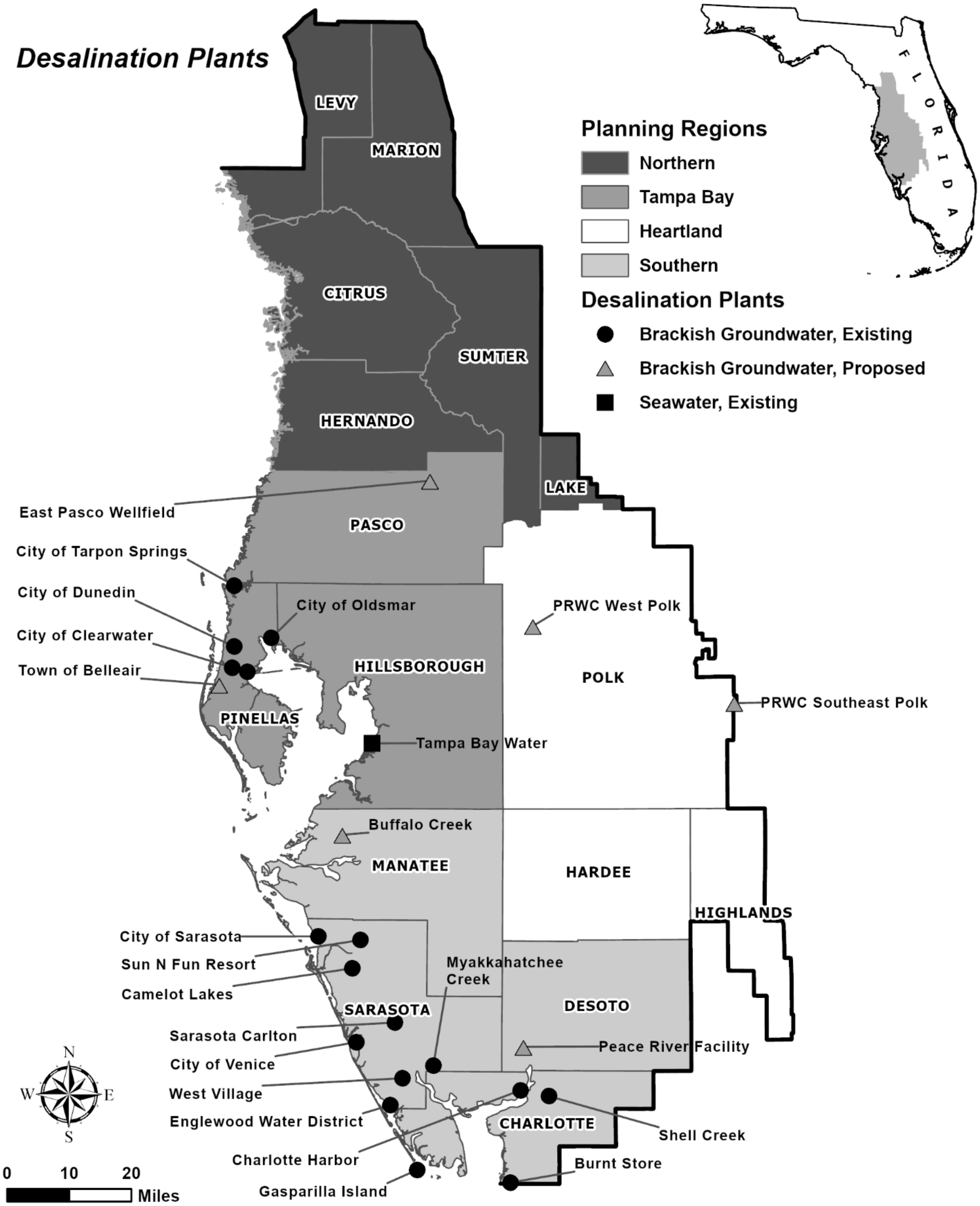

Figure 4-5. *Location of existing and potential seawater and brackish groundwater desalination facilities in the District*

Section 9. Stormwater

The FDEP and the WMDs 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, AR, water quality, and natural system benefits. Chapter 62-40, F.A.C., defines stormwater recycling as the capture of stormwater for irrigation or other beneficial use. 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) to decrease operational vulnerability to climatic variability (i.e., conjunctive use). Stormwater represents a potentially viable AWS at the local level, particularly for reclaimed water supplementation and irrigation.

In the SWUCA, the FARMS Program has had much success in developing tailwater recovery systems for AG operations to use stormwater supplies to reduce fresh groundwater demands. A major future opportunity for stormwater development is the ability for local governments and utilities to partner with the Florida Department of Transportation (FDOT) on stormwater capture and harvesting projects. Presently, FDOT's Efficient Transportation Decision Making Process gives the WMDs 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, FDOT uses Environmental Look Arounds to proactively look for cooperative and regional stormwater management opportunities. Environmental Look Arounds can assist the WMDs, local utilities, and other agencies with identifying sources of stormwater for activities such as reclaimed water augmentation and MFL recovery.

Section 10. Summary of Potentially Available Water Supply

Table 4-6 is a summary of the additional quantity of water that will potentially be available from all sources of water in each county in the planning region from 2020 through 2045. The table shows that the total quantity available could be as high as 316.14 mgd.

Part B. Determination of Water Supply Deficits/Surpluses

Future water supply deficits/surpluses in the planning region were calculated as the difference between projected demands for 2045 and demands calculated for the 2020 base year (Table 3-7). The projected additional water demand in the planning region for the 2020 to 2045 planning period is estimated at 40.89 mgd.

As shown in Table 4-6, up to an additional 316.14 mgd is potentially available from water sources in the planning region to meet the overall additional projected demand of 40.89 mgd. Based on a comparison of projected demands and available supplies, it is concluded that sufficient sources of water are available within the planning region to meet projected demands through 2045.

Table 4-6. *Potential additional water availability in the Southern Planning Region through 2045 (mgd)*

County	Surface Water		Reclaimed Water	Desalination		Fresh Groundwater	Water Conservation		Total
	Permitted Unused	Available Unpermitted[1]	Reuse	Seawater	Brackish Groundwater (Permitted Unused)	Permitted Unused[2]	Public Supply and Domestic Self-Supply	Agricultural	
Charlotte	4.84	78.14	3.48	-	1.34	0.02	1.66	0.60	90.08
DeSoto	91.29	7.33	0.08	-	8.39	0.00	0.16	0.60	107.85
Manatee	6.84	4.97	5.97	-	3.00	1.21	2.29	1.94	26.22
Sarasota	2.51	70.82	3.69	-	10.03	1.70	2.95	0.28	91.98
Total	**105.48**	**161.26**	**13.22**	**-**	**22.76**	**2.93**	**7.07**	**3.42**	**316.14**

Summation differences may occur due to rounding
[1]All available surface water from the Peace River is shown in DeSoto County, because the calculation was based on flows in DeSoto County; however, future withdrawals from the Peace River in Hardee and Polk counties are possible.
[2] Groundwater that is permitted but unused for public supply, based on the 2023 Estimated Water Use Report (Ferguson, 2024).

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Chapter 5. Overview of Water Supply Development Options

The WSD component of the RWSP requires the District to identify water supply options from which water users in the planning region can choose to meet their individual needs. In addition, the District is to determine the associated costs of developing these options. As discussed in Chapter 4, the sources of water potentially available to meet projected water demand in the planning region include fresh groundwater, water conservation, reclaimed water, surface and stormwater, and brackish groundwater desalination. Reasonable options for developing each of the sources have been and continue to be identified, including planning level analyses and costs. The RWSP Executive Summary presents statutory guidance on how water supply entities are to incorporate WSD options from the District's RWSP into their water supply planning and comprehensive plan development.

Part A. Water Supply Development Options

This section identifies WSD project options, including reasonable estimates of the quantity of water that could be developed and the associated costs, where available, that could be implemented over the planning period. Some of the options included in the 2020 RWSP that continue to be viable are presented in this chapter and updated accordingly. Where applicable, water supply options developed through the work of additional regional planning efforts are incorporated into this chapter. These options are not necessarily the District's preferred options but are provided as reasonable concepts that water users in the region may pursue in their water supply planning. A number of the options are of such a scale that they would likely be implemented by either the PRMRWSA or a group of users. Other options, such as those involving reclaimed water and conservation, could be implemented by individual utilities or a group of users. It is anticipated that users will choose an option or combine elements of different options that best fit their needs for WSD, provided they are consistent with the RWSP. Following a decision to pursue an option identified in the RWSP, it will be necessary for the parties involved to conduct more detailed engineering, hydrologic, and biologic assessments to provide the necessary technical support for developing the option and to obtain all applicable permits.

Section 1. Fresh Groundwater Options

The development of additional fresh groundwater from the UFA in the planning region will be limited as a result of environmental impacts from excessive withdrawals and planned reductions in withdrawals that are part of the SWUCA Recovery Strategy. In particular, groundwater withdrawals cannot impact water levels in the SWUCA MIA. Priority will be given to reducing groundwater withdrawals, when possible, to contribute to water level recovery in the area.

Future requests for groundwater from the UFA and Hawthorn aquifer system will be evaluated based on the projected impacts of the withdrawals on existing legal users and water resources, including those with established MFLs. Requests for withdrawals of groundwater from the UFA for new uses will be considered only if the requested use is reasonable and beneficial, incorporates maximum use of conservation, and there are no available alternative sources of water. If all these conditions are met and the withdrawals are projected to impact water levels in the MIA, it will be necessary for those impacts to be offset prior to issuance of a WUP.

Section 2. Water Conservation Options

1.0 Non-Agricultural Conservation

The District identified potential conservation activities for implementation by the PS sector. However, while this analysis only estimates active conservation savings and costs for PS, some of these activities can also be implemented by the DSS, I/C, and L/R water use sectors. A complete description of the criteria used in selecting these activities and the methodology for determining their water savings potential are described in Chapter 4.

Some readily applicable and effective conservation activities are not addressed in this RWSP due to the wide variance in implementation costs and the site-specific nature of their implementation (e.g., water-conserving rate structures). The District strongly encourages these measures and, when properly designed, they can be effective at conserving water. In addition, permittees are required to address these measures in their water conservation plan, which is required as part of WUP applications or renewals.

Below is a description of each non-agricultural water conservation option analyzed for the Southern Planning Region in this RWSP. Savings and costs for each are summarized in Table 5-1. It is understood that over time the breakout will change, but this is considered the best available information. Cost-effectiveness was calculated using the cost, savings, and expected life of a single implementation of a given activity. However, this cost-effectiveness does not incorporate the cost of repeated implementations that may be needed to maintain water savings.

Table 5-1. *Conservation activity options for public supply*

Conservation Activity	2045 Public Supply Savings (mgd)[1]	Average Cost-Effectiveness (Cost per 1,000 gallons saved)	Total Cost
Residential			
High-efficiency Toilets (Residential)	0.33	$2.32	$3,027,193.14
High-efficiency Showerheads	0.33	$1.08	$2,301,804.53
Landscape and Irrigation Evaluations/Audits	0.27	$0.94	$1,737,050.37
Smart Irrigation Controllers	0.36	$1.07	$2,312,359.94
Rain Sensors	0.09	$2.35	$1,621,138.70
Soil Moisture Sensors	0.36	$0.94	$2,023,314.94
High-efficiency Toilets (Industrial/Commercial)	0.18	$1.60	$1,141,415.55
Total Public Supply	**1.93**	**$1.13[1]**	**$14,164,277.17**

Summation differences may occur due to rounding
[1]Total cost-effectiveness is weighted by each project's percent share of total savings in relation to the cost.

1.1 Description of Non-Agricultural Water Conservation Options

1.1.1 High-Efficiency Showerheads

This practice involves installing EPA WaterSense® labeled, high-efficiency showerheads. This is an easy to implement, low-cost conservation option for both residential and I/C users. Savings occur when showerheads are upgraded from higher flow models to WaterSense labeled versions that use a maximum of 2.0 gallons per minute (gpm), with some more efficient models at 1.25 gpm. The high-efficiency showerhead savings potential in this RWSP reflect replacing 2.5 gpm showerheads with 2.0 gpm, WaterSense labeled versions.

1.1.2 High-Efficiency Toilets Rebates (Residential and Industrial/Commercial)

High-efficiency toilet (HET) rebate programs offer financial incentives for replacement of inefficient high-flow toilets with more water-efficient models. High-efficiency toilets (HET) use 1.28 gpf or less, as opposed to older, less efficient models that use 3.5 gpf or more, depending on the age of the fixture. Savings estimated in this plan are based on converting a 3.5 gpf to a 1.28 gpf model. High-efficiency toilets (HET) and dual-flush toilets are WaterSense labeled by the EPA. Also becoming more popular in the marketplace are 0.8 gpf models, which offer a 50 percent savings compared to 1.6 gpf models currently required by building code.

High-efficiency toilet installation can yield substantial water savings.

1.1.3 Landscape and Irrigation Evaluations/Audits

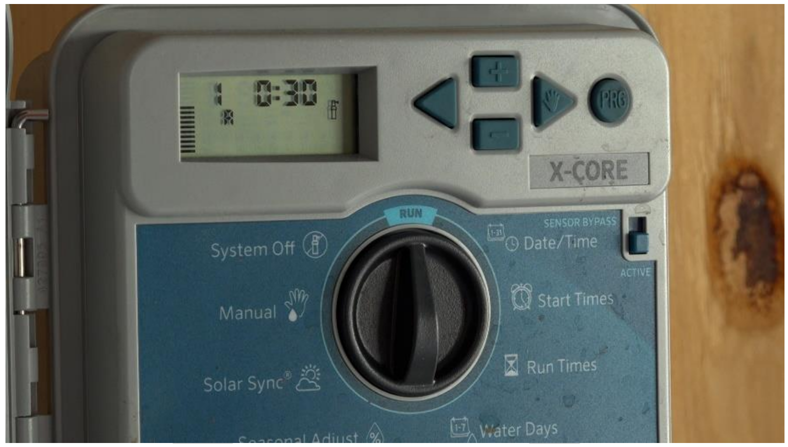
Water-efficient landscape and irrigation evaluations/audits generate water savings by assessing individual irrigation systems to provide expert guidance on opportunities to increase water efficiency in three areas: operation, repair, and design. Such guidance may include optimization of run times, suggested repair of broken heads and leaks, and offering rebates or incentives for water-efficient system enhancements. Evaluations are normally only available to high-use accounts that have inground irrigation systems and are likely over-watering.

1.1.4 Rain Sensors

Section 373.62, F.S., requires all new automatic landscape irrigation systems to be fitted with properly installed automatic shutoff devices. This is typically a rain sensor, which is an easily implemented, low-cost conservation option. They are often paired with a landscape and irrigation evaluation/audit but can also be given away to homeowners with irrigation systems.

1.1.5 Smart Irrigation Controllers

Smart irrigation controllers go a step further than rain sensors by automatically adjusting irrigation runtimes according to local landscape needs. Adjustments are often based on temperature, climate, rainfall, soil moisture, wind, slope, soil, plant type, and other factors. This data is obtained by an on-site evapotranspiration (ET) sensor or through the internet. Some units can be operated by smartphone and can incorporate a weather forecast to anticipate coming rain. As an example, winter season run times may be automatically dialed down 30 percent from summer run times.



Irrigation technology, such as smart irrigation controllers, can improve irrigation water use efficiency.

1.1.6 Soil Moisture Sensors

Soil moisture sensors override (prevent) scheduled irrigation events when enough moisture is present at the site, thus reducing water usage by skipping irrigation cycles. These devices have been available on the market for more than 10 years, and costs have come down considerably since they were first released.

2.0 Agricultural Water Conservation Options

The District has a comprehensive strategy to significantly increase agricultural WUE over the next 20 years. A key component of this strategy is the cooperative programs the District has established with other agencies to provide the agricultural community with a wide array of technical and financial assistance programs to facilitate increases in WUE. For more than 20 years, the District has administered programs that have provided millions of dollars to fund 255 projects that have helped farmers increase WUE and improve water quality. Water conservation options for which the District will provide assistance are described below.

2.1 Facilitating Agricultural Resource Management Systems

The District, in cooperation with the FDACS, initiated the FARMS Program in 2003. The FARMS Program provides cost-share reimbursement for implementation of agricultural BMPs that involve both water quantity and water quality aspects. It is intended to expedite the implementation of production-scale agricultural BMPs that will help farmers become more efficient in their water use, improve water quality, and restore and augment natural systems. The FARMS Program is a public/private partnership among the District, FDACS, and private agriculturalists. Reimbursement cost-share rates for agriculturalists are based on the degree to which they implement both water quantity and water quality BMPs, with resource benefits achieved through either AWS or conservation (e.g., precision irrigation). The goal for the FARMS Program is to offset 40 mgd of groundwater use for agriculture within the SWUCA.

2.2 Facilitating Agricultural Resource Management Systems Conservation Potential

Districtwide, FARMS has funded 255 projects with agricultural cooperators, for a total estimated reduction in groundwater use of more than 32 mgd. In the Southern Planning Region, FARMS has funded 132 projects with an estimated reduction in groundwater use of about 24.2 mgd. While the rate of FARMS participation has varied over time, difficulties within the citrus industry have generally decreased participation. Historical funded project information (2013 to 2023) was used to develop a long-term trend line for estimating potential future program activity. Despite decreasing participation, if current trends in agriculture and District cooperation continue, the FARMS Program has the potential to reduce groundwater use by an estimated 36.78 mgd over the planning period. Of this amount, it is estimated that 31.46 mgd would come from development of AWS, while 5.32 mgd would be saved through conservation efforts, such as precision irrigation. Within the Southern Planning Region, the District projects that FARMS AWS and conservation projects could save approximately 9.2 and 1.6 mgd, respectively, over the planning horizon (Table 5-2). There are additional conservation savings that could be achieved within the agricultural community apart from the FARMS Program. Please see Chapter 4, Part A, Section 2 for more information on the planning region's agricultural water conservation potential.

Table 5-2. *FARMS conservation potential in the Southern Planning Region*

Project Type	Potential Resource Benefit (mgd)	Estimated Costs	Cost Benefit (Cost per 1,000 gallons saved)
Alternative Water Supply (tailwater recovery)	9.19	$41,404,376	$0.85
Conservation	1.63	$4,763,910	$0.55

Tailwater Recovery

Tailwater recovery has proven to achieve both water quality improvements and groundwater conservation. Tailwater ponds are typically excavated below ground level at the low end of a farm to collect excess irrigation water and stormwater runoff. Water, pumps, filters, and other appurtenances are needed to connect the pond to the existing irrigation system. The use of these ponds for irrigation offsets a portion of the groundwater used to irrigate the commodity and can improve water quality of the downstream watershed by reducing the concentration of mineralized groundwater applied to fields.

Examples of tailwater recovery projects are those associated with Symon Grove in DeSoto County. There were three projects with this grove, one in the eastern portion of the grove with DeSoto Land Investment and two in the western portion with Symon Grove, LLC. The farm is permitted to withdraw up to 0.68 mgd of groundwater for citrus irrigation. The goal of the projects was to reduce groundwater withdrawals using a tailwater recovery/surface water collection reservoir. They included two surface water reservoirs, four pump stations, filtration, and infrastructure necessary to operate and connect the reservoir to an existing irrigation system. The projected reduction in groundwater withdrawals is 52 percent (0.36 mgd) of its permitted quantities. Actual reduction in groundwater use is 87 percent for an average of 0.59 mgd over the life of the projects.

Precision Irrigation Systems

Precision irrigation systems allow for automatic remote control of irrigation pumps using soil moisture sensors that measure and monitor discrete sub-surface moisture levels. The system enables the grower to maintain soil moisture within optimized ranges, thus reducing the potential for overwatering and preventing underwatering to avoid reduction in crop yields. Irrigation efficiencies can also be achieved through the use of automatic valves and on-off timers. These devices can be programmed to start and stop irrigation pumps to achieve maximum efficient irrigation durations. Without automatic valves and timers, the pumps must be manually turned off, which may not occur at the most optimum time. Several different types of electronic systems that increase irrigation system efficiency have been implemented through the FARMS Program.

An example of precision irrigation in the Southern Planning Region is at A&A Blueberries. They are a 50-acre blueberry farm just north of Arcadia and permitted for approximately 0.20 mgd for supplemental irrigation. The FARMS Program funded a precision irrigation project that included automated pump control, weather stations with soil moisture sensors, and automated valve control. It is estimated that the project will reduce groundwater use by approximately 10 percent (0.02 mgd).

Because the District classifies FARMS projects as WRD, additional information pertaining to the program, status of project implementation, and water savings achieved to date is provided in Chapter 7.

2.3 Mobile Irrigation Laboratory

The mobile irrigation lab (MIL) program is a cooperative initiative between the District and the U.S. Department of Agriculture (USDA) NRCS. The NRCS conducts efficiency and conservation evaluations of agricultural irrigation systems. Since 1986, the MIL service has evaluated irrigation systems at more than 900 sites in the District and recommended management strategies and/or irrigation system adjustments.

2.4 Best Management Practices

Best management practices (BMPs) are individual agricultural practices or combinations of practices that, based on research, field testing, and expert review, have been determined to be the most effective and practical means for maintaining or improving the water quality of surface and groundwaters and conserving groundwater resources. Best management practices (BMPs) typically are implemented in combination to prevent, reduce, or treat pollutant discharges off-site. Best management practices (BMPs) must be based on sound science, be technically feasible, and be economically viable. In Florida, agricultural BMPs are detailed in crop-specific BMP manuals developed by the FDACS in cooperation with a wide spectrum of stakeholders within the community specific to that crop. Best management practice (BMP) manuals are available on the FDACS website and are used to evaluate a farm's intent to implement practices that conserve groundwater, protect water quality, reduce nutrient impacts, control erosion, and implement integrated pest management to reduce environmental impacts.

Section 3. Reclaimed Water Options

The planning region's diverse mix of rural and urban land uses provide opportunities for urban, industrial, and agricultural reclaimed water use. In addition, opportunities for storage of excess reclaimed water in brackish aquifers in coastal areas and in old mine pits in the wet season for use during dry periods are abundant in the region. Listed below are the different types of reclaimed water options that are compatible with the geology, hydrology, geography, and available reclaimed water supplies in the planning region:

- **Augmentation with Other Sources:** introduction of another source (stormwater, surface water, or groundwater) into the reclaimed water system to expand available supply
- **ASR/AR:** injection of reclaimed water into an aquifer during times of excess supply and the recovery of that same water for use during high demand (ASR) and beneficial use of excess water to directly or indirectly recharge aquifers (AR)
- **Indirect Potable Reuse (IPR):** introduction of reclaimed water to create/restore natural systems and enhance aquifer levels, otherwise known as natural system enhancement/recharge
- **Direct Potable Reuse (DPR):** purification of reclaimed water to meet drinking water standards prior to introduction into a potable raw water source or distribution system.
- **Research:** the study of how utilities can maximize efficiency and offset potential of reclaimed water systems to conserve water (rate structures, telemetry control, watering restrictions, metering, and others) and research on water quality and future uses
- **Streamflow Augmentation:** introduction of reclaimed water downstream of water withdrawal points as replacement flow to enable additional utilization of the surface water supply
- **System Expansion/Interconnects:** construction of multiple components (transmission, distribution, and storage) necessary to deliver reclaimed water to more customers and system interconnections to enhance supply and better use the resource.

The beneficial utilization of reclaimed water has been a key component of water resource management within the District for decades. For the past several years, Districtwide use of reclaimed water has been more than 50 percent for nonpotable purposes such as landscape and agricultural irrigation, aesthetic uses, groundwater recharge, industrial uses, environmental enhancement, and fire protection.

Reclaimed water is being investigated as a potable source as a result of drought and long-term water shortages occurring within other states and countries. The unintentional use of reclaimed water as an indirect potable source is not new, as many surface water sources used for potable raw water supplies have upstream wastewater/reclaimed water discharges. However, what is relatively new is the discussion of direct potable reuse with little to no lag time between discharge of purified water from a reclamation facility and use as raw water by a potable water facility.

Several high-profile projects have been investigated in western states and in other countries which involve treating reclaimed water to state and federal drinking water standards so that it can be recycled for potable water supply uses. Three notable potable reuse projects that have been implemented using purified water are the Big Springs Texas Water Supply Project, the Las Vegas/Southern Nevada Water Supply Authority augmentation of Lake Meade, and the Singapore NEWater Project. Direct potable reuse is currently being investigated by several utilities within the District, as there is increasing interest in the concept, and it is recognized as a viable future water supply option in this RWSP.

There are currently no proposed reclaimed water options for the planning region.

Section 4. Surface Water/Stormwater Options

As shown in Chapter 4, Table 4-4, capturing and storing water from river/creek systems during times of high flow has the potential to meet 2045 demand. Based on planning level criteria, an estimated 161.26 mgd could be developed for water supply if all the rivers/creeks in the planning region described in Chapter 4 were developed to their full potential. A number of rivers of significant size, including the Peace, Braden, Manatee, and Myakka rivers, as well as Shell Creek, are located partially or completely within the planning region. All of these rivers except for the Myakka are currently used for water supply. The Peace River is the most prominent, and its watershed covers portions of Polk, Hardee, DeSoto and Charlotte counties. It has the highest flow of all the rivers in the region with an adjusted annual flow of 843.06 mgd (1,305 cfs) using the period of record 1950 through 2023. Although portions of the Myakka River have been designated an OFW and a Wild and Scenic River, the watershed has experienced numerous alterations that have affected flows. These alterations include agricultural activities, drainage projects, and flood control projects. It is possible that water supply projects could be developed on the Myakka River that would help to restore the river and surrounding natural systems.

1.0 Surface Water/Stormwater Options

New Flatford Swamp Net Benefit Groundwater Recovery

- Entities Responsible for Implementation: PRMRWSA, District

The District has progressed in planning a concept to passively recharge excess flows within the UMRW at Flatford Swamp, which is estimated to be approximately 10 mgd annual average daily flow from the upper Myakka system at buildout. Excess flows from Coker/Ogelby Creek, Myakka River at Taylor Road, and Maple Creek will be diverted from Flatford Swamp to the UFA's Avon Park High-Permeability Zone. The District has completed construction and begun operation on the up to 2 mgd AR system from the Myakka River at Taylor Road pilot study location. This system includes treatment comprising of chloramines for disinfection and sodium bisulfite for DO removal. Operational testing was recently completed, and evaluation of all testing results is underway.

Once the pilot study is finalized by the District, groundwater modeling should be completed to confirm the percent of recharge water achievable for groundwater credits. Discussions with the District would be required to fully understand the methodology to be developed for quantifying the net benefit that could be realized from this AR project coupled with public water supply.

2.0 System Interconnect/Improvement Options

System interconnect/improvement options are critical components of water supply distribution systems that involve the construction of pipelines and booster pumping stations. Development of these options will facilitate the regionalization of potable water supply systems by providing transmission of water from points of supply to areas of demand. These options will also increase rotational and reserve capacity and provide redundancy of water supplies during emergency conditions.

The PRMRWSA is developing the Regional Integrated Loop System as a series of transmission pipelines to regionally transfer existing and future AWS to demand centers within the PRMRWSA's service area. Seven of the loop system phases are complete or under construction as of 2025 (Phases 1, 1A, 2, 2B, 3A, 3B, and 3C). The PRMRWSA revisited their loop system in their Integrated Water Supply Master Plan Update (2020), with phasing updated to develop segments over the current or future planning horizons. The future phases are listed in no particular order of implementation in Table 5-3, based on the PRMRWSA's Integrated Regional Water Supply Plan 2025 Update (Carollo Engineers, Inc., 2025).

Table 5-3. *Regional integrated loop system future phases*

Regional Integrated Loop System Phase	Project Description	Estimated Capital Cost
Phase 3C Extension	Approximately 7 miles from the terminus of Phase 3C to a Sarasota-Manatee County interconnect near Lakewood Ranch Boulevard & University Parkway. Also included is storage and pumping.	$55,910,000
Phase 2C	Approximately 21 miles from the Carlton WTP to the Gulf Cove ground storage tanks located in Charlotte County. Also included is storage and pumping.	$213,440,000
Phase 2D	Approximately 4 miles from the West Villages WTP to Englewood Water District's system.	$18,130,000
Phase 4	Approximately 10 miles from the Phase IA Pump Station to Charlotte County's Burnt Store service area.	$33,500,000

Additionally, PRMRWSA could potentially partner with Tampa Bay Water (TBW) to develop an interconnect to TBW's system in southern Hillsborough County, as described in TBW's 2023 Long-Term Master Water Plan (Black & Veatch, 2023). Similarly, PRMRWSA could also potentially interconnect with the PRWC; however, this option is still conceptual, with quantity produced and costs to be determined (CFWI, 2025).

Section 5. Brackish Groundwater Desalination Options

Options proposing to withdraw brackish groundwater from the UFA may not be permittable in many areas of the planning region due to their potential to exacerbate existing resource problems from historical groundwater withdrawals. Requests for brackish groundwater withdrawals will be evaluated similarly to requests for fresh groundwater because all withdrawals, regardless of quality, cannot impact or delay recovery of stressed water resources, including the SWUCA SWIMAL. Brackish groundwater obtained from the Hawthorn aquifer system may be a more viable source of water supply. The LFAs are less explored in the region and are at deeper depths in the southern counties.

The PRMRWSA and PS utilities have identified brackish groundwater project options despite source availability issues because the projects typically allow a phased expandability and can work conjunctively with more seasonal AWS. The options identified include the following:

PRMRWSA Brackish RO Facility

- Entity Responsible for Implementation: PRMRWSA

This project would be located at the Peace River WTF and provide 8 mgd of safe yield to the regional system, as well as add drought resiliency to the regional water supply network. Brackish groundwater would be withdrawn from the Suwannee Limestone and/or the upper Avon Park Formation in the UFA. Reverse osmosis (RO) concentrate would be disposed of via a deep injection well. This project also includes two 2-million-gallon water tanks for blending control. In 2022, the PRMRWSA's WUP was modified to include brackish groundwater withdrawals as a conjunctive use. Table 5-4 summarizes this option's potential costs as presented in PRMRWSA's 5-Year Capital Improvement Plan and 20-Year Capital Needs Assessment, Fiscal Period: 2026-2045 and Integrated Regional Water Supply Plan 2025 Update (PRMRWSA, 2025 and Carollo Engineers, Inc., 2025).

Table 5-4. *Peace River brackish reverse osmosis facility*

Quantity Produced (mgd)	Capital Cost	Cost per mgd	Annual O&M/1,000 Gallons
8.0	$274,968,750	$34,371,094	$3.07

Shell Creek Water Treatment Plant RO Wellfield Expansion

- Entity Responsible for Implementation: City of Punta Gorda

The City of Punta Gorda's Shell Creek RO facility and brackish wellfield were constructed in 2020 next to their surface water facility, and the finished water from both plants is typically blended before distribution. The RO facility had an initial capacity of 4 mgd finished water and was designed to accommodate a 4 mgd expansion within the existing building. This project option would include additional supply wells on the City of Punta Gorda's property and additional RO process equipment to increase the capacity. The City of Punta Gorda's Shell Creek facilities are interconnected with the PRMRWSA's Regional Loop System for freshening and reliability. Table 5-5 summarizes this option based on PRMRWSA's Integrated Regional Water Supply Plan 2025 Update (Carollo Engineers, Inc., 2025).

Table 5-5. *Shell Creek water treatment plant reverse osmosis wellfield expansion*

Quantity Produced (mgd)	Capital Cost	Cost per mgd	Annual O&M/1,000 Gallons
4.0	$37,710,000	$9,425,000	$1.53

Manatee County Buffalo Creek RO WTP

- Entity Responsible for Implementation: Manatee County

This project is for the design and construction of a 3 mgd RO facility, wellfield, and concentrate disposal system located adjacent to the Buffalo Creek golf course. The proposed wells are included in Manatee County's consolidated WUP. Brackish groundwater will be withdrawn from the Hawthorn aquifer system and the UFA, with RO concentrate disposal in injection well IW-2 at the adjacent North Regional Water Reclamation Facility. The costs shown in Table 5-6 below are from Manatee County's FY2026-FY2030 Capital Improvement Plan (Manatee County, 2024).

Table 5-6. *Buffalo Creek reverse osmosis water treatment plant*

Quantity Produced (mgd)	Capital Cost	Cost per mgd	Annual O&M/1,000 Gallons
3.0	$165,788,000	$55,262,667	TBD

Section 6. Seawater Desalination Options

There are currently no proposed seawater desalination options for the planning region.

Section 7: Aquifer Storage and Recovery and Aquifer Recharge Options

PRMRWSA Partially Treated Surface Water ASR

This project would involve the partial treatment of raw water from PRMRWSA's reservoirs to recharge the UFA at their ASR facility. Water will subsequently be delivered back to the raw water reservoir system. Currently, the ASR facility injects fully treated potable water from the WTF. This project would increase PRMRWSA's drinking water supply by freeing WTF capacity used for the ASR system, as well as potentially improve water levels in the SWUCA. Yield was previously conceptualized at 3 mgd; however, a study is under way to determine any potential changes to this quantity. The costs shown below in Table 5-7 are from PRMRWSA's 5-Year Capital Improvement Plan and 20-Year Capital Needs Assessment, Fiscal Period: 2026-2045 (PRMRWSA, 2025).

Table 5-7. *Partially treated surface water aquifer storage and recovery*

Quantity Produced (mgd)	Capital Cost	Cost per mgd	Annual O&M/1,000 Gallons
TBD	$23,227,600	TBD	TBD

Chapter 6. Water Supply Projects Under Development

This chapter is an overview of water supply projects under development in the Southern Planning Region. Projects under development are those the District is co-funding and are either (1) actively in the planning, design, or construction phase, or (2) not yet in the planning phase, but have been at least partially funded through FY2024, or (3) have been completed since the year 2020 and are included to report on the status of implementation since the previous RWSP.

The demand projections presented in Chapter 3 show that an estimated 40.89 mgd of new water supply will need to be developed during the planning period to meet demand for all use sectors in the planning region. As of 2024, it is estimated that approximately 17 percent of that demand (7.01 mgd) has either been met or will be met by projects that meet the above definition of being under development. In addition, it is probable that additional water supplies are being developed by various entities in the planning region outside of the District's funding programs.

Section 1. Fresh Groundwater Projects

The development of additional fresh groundwater from the UFA in the planning region will be limited as a result of environmental impacts from excessive withdrawals and planned reductions in withdrawals that are part of the SWUCA Recovery Strategy. For more information, please see Chapter 5, Section 1.

Section 2. Water Conservation Projects

1.0 Non-Agricultural Water Conservation Projects

1.1 Cooperatively-Funded Water Conservation Projects

Since 2020, the District has cooperatively funded multiple outdoor and indoor water conservation projects in the Southern Planning Region. These projects include toilet rebates, line looping, and installation of advanced irrigation systems. These programs are expected to cost the District and cooperating local governments a combined $1,935,023 and yield an estimated potable water savings of 180,194 gpd.

1.2 Water Incentives Supporting Efficiency Conservation Projects

The Water Incentives Supporting Efficiency (WISE) Program was created in 2019 to provide funding and incentivize conservation for nonagricultural users. Projects may include both indoor and outdoor conservation in various sectors including multifamily, I/C, and L/R. In the Southern Planning Region, a total of 10 projects have been funded saving an estimated 75,281 gpd with total project costs of $360,232. Table 6-1 details water conservation projects recently completed or under development in the planning region.

Table 6-1. *Water conservation projects under development in the Southern Planning Region*

Cooperator	Project Number	General Description	Savings (gpd)	Total Cost[1]	District Cost	Cost per 1,000 Gallons Saved
Cooperative Funding Initiative (CFI) Water Conservation Projects						
City of Palmetto	Q073	Toilet Rebate	6,681	$19,040	$9,520	$0.78
Manatee County	Q111	Toilet Rebate	18,783	$146,821	$73,411	$2.18
City of Venice	Q126	Toilet Rebate	1,905	$24,579	$12,289	$3.31
Manatee County	Q168	Toilet Rebate	10,024	$50,595	$25,297	$1.41
City of Venice	Q179	Toilet Rebate	1,940	$12,911	$6,455	$3.25
City of Palmetto	Q214	Toilet Rebate	6,681	$18,077	$9,037	$0.74
Manatee County	Q319	Toilet Rebate	17,403	$100,000	$50,000	$1.47
City of Venice	Q304	Toilet Rebate	5,293	$33,000	$16,500	$1.93
Longboat Key Club	Q145	Advanced Irrigation System	94,600	$1,115,000	$508,516	$3.29
City of North Port	Q185	Line Looping	16,884	$415,000	$207,500	$5.98
		CFI Total	**180,194**	**$1,935,023**	**$918,525**	
Water Incentives Supporting Efficiency (WISE) Conservation Projects[2]						
Ringling School of the Arts	1	Cooling Tower Pre-treatment	4,356	$63,500	$20,000	$5.95
Las Palmas of Sarasota Condominiums, Inc.	18	Smart Irrigation Controller	2,192	$15,608	$7,804	$3.02
Greyhawk Landing Community Development District	25	Reclaimed Water Connection	14,838	$26,430	$13,215	$1.22
Queens Harbour Owners Association, Inc	30	Irrigation Retrofit	10,980	$13,928	$6,964	$0.52
Positano Condominium Association, Inc.	32	Smart Irrigation Controller	1,804	$6,975	$3,488	$1.58
Island Walk at the West Villages	48	Smart Irrigation Controller	11,446	$54,619	$20,000	$1.95
Coral Creek Anglers Club Owners Association, Inc.	50	Irrigation Retrofit	5,398	$29,512	$14,756	$3.75
La Mirada Gardens, Ltd.	53	Toilet Retrofit	7,250	$92,160	$15,195	$1.29
Island Walk at the West Villages	55	Irrigation Retrofit	15,005	$47,500	$20,000	$1.29
City of Palmetto	64	Toilet Rebate	2,012	$10,000	$5,000	$1.42
		WISE Total	**75,281**	**$360,232**	**$126,422**	
		Conservation Total	**255,475**	**$2,295,255**	**$1,044,947**	

Summation differences may occur due to rounding
[1]Total project cost may include variable project-specific costs including marketing, education, and administration.
[2]WISE project list is from program conception in 2019 through approved projects in April 2024

2.0 Agricultural Water Conservation Projects

The following provides information on agricultural water conservation projects that are under development in the planning region. The District's FARMS, Mini-FARMS, and well back-plugging programs are not included in this section because the District classifies them as WRD. These program details, including projects under development, are within Chapter 7, Water Resource Development.

2.1 Institute of Food and Agricultural Sciences Research and Education Projects

The District provides funding for IFAS investigations on a variety of agriculture and urban landscape irrigation issues that involve BMPs including water conservation. These include development of tailwater recovery technology, determination of crop water use requirements, evaluation of alternative irrigation methods, field irrigation scheduling, frost/freeze protection, residential irrigation, and urban water use. Research is conducted by IFAS, who then promotes the results to the agricultural community. The District has funded research on strawberries, citrus, tomatoes, potatoes, peaches, biofuel grasses, turfgrass, peppers, blueberries, and various landscape and nursery ornamental plants and trees. Of the 67 research projects, 62 have been completed. Completed projects include 14 projects on urban landscape issues and 48 pertaining to agricultural commodities. While the research projects are not specific to each planning region, they are specific to a commodity group that has a strong presence in each region. The research will help develop BMPs that will conserve water Districtwide. Specific benefits to the planning region are dependent on the dominant commodities in that planning region. The five ongoing projects are listed in Table 6-2.

Table 6-2. *Water conservation research projects*

Project	Total Project Cost (District + Cooperator)	Total Project and Land Cost	Funding Source	Planning Region(s)
Compact Bed Geometries for Watermelon in Southwest Florida	$282,460	$282,460	District	All
Florida Automated Weather Network (FAWN) Data Dissemination and Education*	$100,000	$100,000	District	All
Micro-irrigation for Reducing Water Use for Bare-root Strawberry Establishment and Freeze Protection	$301,629	$301,629	District	All
Water-Nutrient Smart Production Systems with Compact Bed Geometry Technology: Water, Production and Economics	$299,000	$299,000	District	All
Top Dressing Lawns for Reducing Irrigation	$58,000	$58,000	District	All
Total	**$1,041,089**	**$1,041,089**		

*This is an annual, recurring project. Costs reflect the annual budget through FY2024. In FY2025, the District increased its annual contribution to $125,000.

Section 3. Reclaimed Water Projects

1.0 Reclaimed Water Projects: Monitoring and Education

Continued support of reclaimed water research and monitoring is central to maximizing reclaimed water use and increasing benefits. The District assists utilities in exploring opportunities for increased utilization of reclaimed water. Table 6-3 lists seven reclaimed water projects currently under development or recently completed, as well as another with anticipated future supply growth. The District has also committed to developing a comprehensive reclaimed water education strategy. All reclaimed water construction projects funded by the District require education programs that stress the value and benefits of efficient and effective water use regardless of the water source. To provide reclaimed water information to a broader audience, the District has developed a webpage that is one of the top Internet sources of reuse information including Geographic Information System (GIS) and other data. The District also produces reclaimed water publications that are offered to residents, utilities, engineering firms, environmental agencies, and other parties interested in developing and expanding reclaimed water systems.

Reclaimed water pipe

Table 6-3. *Reclaimed water projects under development in the Southern Planning Region*

Entity	General Project Description	Reuse (mgd)			Customer (#)		Costs	
		Produced	Benefit	Storage	Type	Total	Total	District[1]
Charlotte								
Charlotte County	Transmission/Pumping (N556)	2.23	1.34	NA	Multiple	TBD	$9,430,000	$4,715,000
Riverwood	Growth of Flows	0.12	0.09	NA	Residential, Golf Course	TBD	Prior	Prior
DeSoto								
City of Arcadia	Transmission/Storage (N881)	0.10	0.09	0.60	Golf Course	1	$300,000	$225,000
Manatee								
City of Bradenton, Braden River Utilities	Transmission (N711)	1.00	1.00	11.40	Multiple	TBD	$4,600,000	$2,300,000
Braden River Utilities	Transmission (Q268)	1.57	1.18	NA	Residential	2,400 RDUs[2], 1 Golf Course	$7,100,000	$3,550,000
Sarasota								
Sarasota County	Transmission (Q160)	0.53	0.40	NA	Residential	1,066 RDUs[2]	$3,000,000	$1,500,000
City of North Port	Direct Potable Reuse Study (Q139)	NA	NA	NA	NA	NA	$250,000	$125,000
Total		**5.55**	**4.10**	**12.00**		**3,468**	**$24,680,000**	**$12,415,000**

Summation differences may occur due to rounding
[1] Costs include all revenue sources budgeted by the District.
[2] Residential Dwelling Units

Section 4. Surface Water/Stormwater Projects

The PRMRWSA is currently undertaking surface water/stormwater projects to assist in meeting demands for its members. These projects are described below and include additional reservoir storage capacity and continued development of a regional integrated loop system.

The Regional Integrated Loop System projects are a series of transmission pipelines and associated storage and pumping stations being developed to regionally transfer and deliver existing and future AWS to demand centers within the PRMRWSA's four-county service area. The system also provides reserve capacity for emergency transfers and maximizes the use of surface water in the SWUCA. Five phases of the loop system were completed prior to 2022, and two are under construction and scheduled for completion by 2026. The layout, timing, and conceptual costs of future phases are discussed in Chapter 5.

PRMRWSA Peace River Regional Reservoir No.3

The Peace River Regional Reservoir No.3 will be a 9-billion-gallon off-stream reservoir constructed within the RV Griffin Preserve, west of the PRMRWSA's other two reservoirs. The project includes a second river intake pump station to harvest seasonally available flows from the river, a reservoir pump station, and conveyance pipelines to transport water from the river intake to the reservoir and treatment facility. Design and permitting were conducted through 2024. Construction is expected to begin in 2025, with the reservoir filled by 2028. Table 6-4 contains project details as per the FY2026 CFI program cycle.

Table 6-4. *Peace River regional reservoir No. 3*

Quantity Produced (mgd)	Capital Cost	Capital Cost (District's Share)	Cost per mgd
NA	$375,077,000	$115,700,000	NA

A companion project, the PRF Treatment Expansion, is also planned for construction from 2025 through 2028. This 24 mgd max day expansion of the PRF WTP would increase the surface water facility's total capacity to 75 mgd. The PRMRWSA will allocate 18 mgd to customers as annual average capacity quantities. Total project costs are estimated at $214.94 million, with an annual O&M cost of $2.57 per 1,000 gallons of treated water (PRMRWSA, 2025). Due to funding constraints as the District co-funds other regional prioritized AWS project options, the District is currently unable to provide funding for this surface WTP expansion. However, it is a critical project for meeting growing demands in the region.

PRMRWSA Regional Integrated Loop System Phase 2B

The Regional Loop System Phase 2B project consists of 13 miles of 42-inch diameter pipeline running from the current terminus of the Phase 2A pipeline in Port Charlotte westward, crossing the Myakka River and terminating at the Charlotte County Gulf Cove Water Booster Pump Station. This segment of the regional integrated loop system will boost regional resiliency, bi-directional water transfer capability, and lay the groundwork for the southern regional loop with future pipeline projects. This project is under construction and scheduled for substantial completion in March 2026.

Regional Integrated Loop System Phase 3C

The Regional Loop System Phase 3C project consists of approximately 8 miles of 42-inch diameter pipeline installed between Clark Road (SR-72) northward to the vicinity of Fruitville Road and Lorraine Road in northern Sarasota County. Also included are pumping/storage improvements at the T. Mabry Carlton WTF. This project will extend the regional transmission main system northward toward Manatee County and serve growing water needs in northeastern Sarasota County. This project is under construction and scheduled for completion in 2026. Table 6-5 contains details for the PRMRWSA's ongoing Regional Integrated Loop System projects as per the FY2026 CFI program cycle.

Table 6-5. *Regional integrated loop system*

Interconnect Project Name	Total Capital Cost	District Share	Description
PRMRWSA Regional Integrated Loop System Phase 2B	$87,440,545	$36,150,000	42-inch diameter pipeline running from the current terminus of Phase 2A in Port Charlotte westward, crossing the Myakka River and terminating at the Charlotte County Gulf Cove Water Booster Pump Station.
PRMRWSA Regional Integrated Loop System Phase 3C	$70,801,836	$26,550,000	42-inch diameter water main installed between Clark Road (SR-72) northward to the vicinity of Fruitville Road and Lorraine Road in northern Sarasota County, as well as pumping/storage improvements at the T. Mabry Carlton WTF.

Section 5. Brackish Groundwater Desalination Projects

The City of Punta Gorda Brackish Groundwater project and City of North Port West Village Brackish Wellfield project were completed in 2021 and 2022, respectively. There are currently no new brackish groundwater projects under development within the Southern Planning Region.

Section 6. Aquifer Storage and Recovery Projects

There are currently no new ASR projects under development in the Southern Planning Region.

Chapter 7. Water Resource Development Component

This chapter addresses the legislatively required WRD activities and projects that are conducted primarily by the District. The intent of WRD projects is to enhance the amount of water available for reasonable-beneficial uses and for natural systems. Section 373.019, F.S., defines WRD as: *"…the formulation and implementation of regional water resource management strategies, including the collection and evaluation of surface water and groundwater data; structural and nonstructural programs to protect and manage water resources; the development of regional water resource implementation programs; the construction, operation, and maintenance of major public works facilities to provide for flood control, surface and underground water storage, and groundwater recharge augmentation; and related technical assistance to local governments and government-owned and privately owned water utilities"* (Subsection 373.019 [24], F.S.). The District is primarily responsible for implementing WRD; however, additional funding and technical support may come from state, federal, and local entities. For more information on the District's WRD efforts listed in this chapter, please refer to the 2025 Five-Year Water Resource Development Work Program (SWFWMD, 2024).

Part A. Overview of Water Resource Development Efforts

The District classifies WRD efforts into two categories: (1) data collection and analysis activities that support WSD by local governments, utilities, regional water supply authorities, and others, and (2) regional projects designed to create an identifiable supply of water for existing and/or future reasonable-beneficial uses. Activities within each of these categories are discussed below in Section 1 and Section 2, respectively.

Section 1. Data Collection and Analysis Activities

The District budgets significant funds annually to implement WRD data collection and analysis activities to monitor natural systems and support WSD. Table 7-1 displays the FY2025 budget and anticipated five-year funding levels for Districtwide data collection and analysis activities. Approximately $24.5 million will be allocated toward these activities annually for a five-year total of approximately $117.9 million. Budgets are developed annually and are projected to be more-or-less constant; therefore, future funding estimates for activities are set equal to FY2025 funding. These activities are funded by the Governing Board's allocation of ad valorem revenue collected within the District along with additional funding from water supply authorities, local governments, and the USGS. The activities listed in Table 7-1 are described in subsections 1.0 through 5.0, as follows.

Table 7-1. *Water resource development data collection and analysis activities (Districtwide)*

	WRD Data Collection and Analysis Activities	FY2025 Funding	Anticipated 5-Year Funding	Funding Partners
1.0	**Research, Data Collection, and Analysis Activities**			
1.1	Surface Water Flows and Levels	$4,616,759	$23,083,795	SWFWMD, Local Cooperators, USGS
1.2	Geohydrologic Data (includes ROMP)	$5,682,667	$28,413,335	
1.3	Meteorological Data	$269,204	$1,346,020	
1.4	Water Quality Data	$791,634	$3,958,170	
1.5	Groundwater Levels Data	$990,812	$4,954,060	
1.6	Biologic Data	$1,051,788	$5,258,940	
1.7	Data Support	$4,683,423	$23,417,115	
2.0	**Minimum Flows and Levels Program**			
2.1	Technical Support	$931,421	$4,657,105	SWFWMD
2.2	Establishment/Evaluation	$655,827	$3,279,135	
3.0	**Watershed Management Planning**	$3,586,610	$11,586,610	SWFWMD, Local Cooperators, FDEP
4.0	**Quality of Water Improvement Program**	$808,604	$4,043,020	SWFWMD
5.0	**Stormwater Improvements: Implementation of Storage and Conveyance BMPs**	$404,421	$3,904,421	SWFWMD
	Total	**$24,473,170**	**$117,901,726**	

1.0 Hydrologic Data Collection

The District has a comprehensive scientific data monitoring program that includes the assembly of information on key indicators such as rainfall, surface water and groundwater levels, water quality, hydrogeology, and stream flows. The program includes data collected by District staff as well as data collected as part of the District's cooperative funding program with the USGS. Data collected allows the District to gauge changes in the health of water resources, monitor trends in conditions, identify and analyze existing or potential resource problems, and develop programs to correct existing problems and prevent future problems from occurring. The data collection activities support District structure operations, water use and environmental resource permitting and compliance, MFLs evaluation and status assessments, the Surface Water Improvement and Management (SWIM) Program, the NTBWUCA, the SWUCA, the DPCWUCA, water supply planning in the District and CFWI Planning Area, modeling of surface water and groundwater systems, cooperative and district initiative project development and monitoring, and many resource evaluations and reports.

The categories of hydrologic data that are collected and monitored by District staff are discussed below. In addition to data collection completed or contracted by the District, hydrologic data submitted by WUP holders are also considered to assess compliance with permit conditions.

1.1 Surface Water Flows and Levels

This includes data collection at approximately 798 surface water level gauging sites and cooperative funding with the USGS for discharge and water-level data collection at 131 river, stream, and canal sites. The USGS data are available to District staff and the public through the District's Environmental Data Portal and through the USGS National Water Dashboard.

1.2 Hydrogeologic Data

The Geohydrologic Data Section collects hydrogeologic data and oversees monitor well construction activities for the District. Lithologic, hydraulic, and water quality data are collected during exploratory coring and testing and during the construction of monitor wells. Projects supported by these geohydrologic activities include the CFWI, WRAPs, MFLs, SLR, and development of AWS. The ROMP has been the District's primary source of hydrogeologic data since the program was established in 1974.

1.3 Meteorologic Data

The meteorologic data monitoring program consists of measuring rainfall totals at 171 rain gauges, all of which provide near real-time data. The funding is for costs associated with measurement of rainfall including sensors, maintenance, repair, and replacement of equipment. Funding allows for the operation of one District ET station for reference near Lake Hancock and for District participation in a cooperative effort between the USGS and all five Florida WMDs to map statewide potential and reference ET using data measured from the Geostationary Operational Environmental Satellites (GOES). Funding also includes a collaborative effort between the five WMDs to provide high-resolution gauge adjusted radar rainfall data that are used for hydrologic conditions reporting and modeling purposes.

1.4 Water Quality Data

The District collects data from water quality monitoring networks for springs, streams, lakes, wells, and coastal and inland rivers. The well monitoring networks include the Coastal Groundwater Quality Monitoring Network (CGWQMN), Inland Floridan Aquifer System Monitoring Network (IFASMN), and the Upper Floridan Aquifer Nutrient Monitoring Network (UFANMN). Data from monitor well sites are used to evaluate seasonal and long-term changes in groundwater levels and quality, as well as the interaction and connectivity between groundwater and surface water bodies. The CGWQMN, which involves sample collection and analysis from approximately 380 wells across the District, monitors saltwater intrusion and/or the upwelling of mineralized waters into potable aquifers. The USGS collects water quality data at 17 sites, which is available from their website.

1.5 Groundwater Levels

The funding provides for the maintenance and support of about 1,655 monitor wells in the data collection network. Data may be collected in 15-minute intervals, hourly, daily, or monthly. The

District also uses funding to contract with the USGS to obtain continuous and monthly water levels at 15 sites. The data are available to the public through the District and USGS websites.

1.6 Biologic Data

The District monitors ecological conditions as they relate to both potential water use impacts and changes in hydrologic conditions. Funding for biologic data collection includes support for routine monitoring of approximately 150 wetlands annually and a five-year assessment of almost 400 wetlands to document changes in wetland health and assess level of recovery in impacted wetlands. Funding also supports SWIM Program efforts for mapping of seagrasses every two years along the Suncoast (Tampa Bay south to Charlotte Harbor), and every four years along the Springs Coast (Anclote Key to Waccasassa Bay).

1.7 Data Support

This item provides administrative and management staff support for the hydrologic, water quality, meteorologic, and hydrogeologic data programs as well as the chemistry laboratory, surveying, and the District's LoggerNet data acquisition system and Kister's Water Information System (WISKI) and associated Environmental Data Portal used for database management, storage, and reporting.

2.0 Minimum Flows and Levels Program

Section 373.042, F.S., requires the WMDs or the FDEP to establish MFLs for aquifers, surface watercourses, and other surface water bodies to identify the water level or limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. Minimum flows for rivers, streams, estuaries, and springs and minimum water levels for lakes, wetlands, and aquifers are adopted into District Water Levels and Rates of Flow rules, Chapter 40D-8, F.A.C., and are used in the District's WUP and water supply planning programs.

Reservations are rules that reserve water from use by permit applications, as necessary for the protection of fish and wildlife or public health and safety. Reservations are adopted into District Consumptive Use of Water rules, Chapter 40D-2, F.A.C., pursuant to Section 272.223, F.S., and are also used for water use permitting and water supply planning.

The District's processes for establishing MFLs and reservations include opportunities for interested stakeholders to review and comment on proposed MFLs or reservations and participate in public meetings. A publicly-noticed independent scientific peer review process is used to support establishment of MFLs for flowing systems and aquifers, for establishing MFLs for other system types that are based on methods that have not previously been subjected to peer review, and for establishing reservations. Stakeholder input and peer review findings are considered by the Governing Board when deciding whether to adopt proposed MFLs and reservations. District monitoring programs provide data for evaluating compliance with the adopted MFLs and reservations, determining the need for MFLs recovery or prevention strategies, assessing the recovery of water bodies where significant harm has occurred, and also support MFLs and reservation reevaluations.

As of June 2024, the District has planned to monitor and assess the status of 207 adopted MFLs, including MFLs for 28 river segments, 10 springs or spring groups, 126 lakes, 34 wetlands, and

9 aquifer sites, including seven UFA wells in the NTBWUCA, the UFA in the MIA of the SWUCA, and the UFA in the DPCWUCA. The District also plans to monitor and assess the status of 2 adopted reservations, including a reservation for water stored in Lake Hancock and released to lower Saddle Creek for recovery of MFLs adopted for the upper Peace River and a reservation for water from Morris Bridge Sink for recovery of MFLs adopted for the lower Hillsborough River. In addition, the District is scheduling the establishment or reevaluation of 26 MFLs and one reservation through calendar year 2027.

The District's annual MFL Priority List and Schedule and Reservations List and Schedule is approved by the Governing Board in October, submitted to FDEP for review in November, and published in the CAR the following March. The currently approved and proposed priority lists and schedules are also posted on the District's Minimum Flows and Levels Documents and Reports webpage at: https://www.swfwmd.state.fl.us/projects/mfl/documents-and-reports.

3.0 Watershed Management Planning

The District addresses flooding problems in existing areas by preparing and implementing Watershed Management Plans (WMPs) in cooperation with local governments. The WMPs define flood conditions, identify flood level of service deficiencies, and evaluate BMPs to address those deficiencies. The WMPs include consideration of the capacity of a watershed to protect, enhance, and restore water quality and natural systems while achieving flood protection. The plans identify effective watershed management strategies and culminate in defining floodplain delineations and constructing selected BMPs.

Local governments and the District combine their resources and exchange watershed data to implement the WMPs. Funding for local elements of the WMPs is provided through local governments' capital improvement plans and the District's CFI. Additionally, flood hazard information generated by the WMPs is used by the Federal Emergency Management Agency (FEMA) to revise flood insurance rate maps (FIRM). This helps better define flood risk and is used extensively for land-use planning by local governments and property owners. Since the WMPs may change based on growth and shifting priorities, the District also cooperates with local governments to update the WMPs when necessary, giving decision-makers opportunities throughout the program to determine when and where funds are needed.

4.0 Quality of Water Improvement Program

The QWIP was established in 1974 through Chapter 373, F.S., to restore groundwater conditions altered by well drilling activities for domestic supply, agriculture, and other uses. Its primary goal is to preserve groundwater and surface water resources by reimbursing landowners for the cost to properly plug abandoned or deteriorating artesian wells on their property. Thousands of wells constructed prior to current well construction standards were often deficient in casing, which interconnected aquifers and enabled poor-quality mineralized water to migrate into aquifers containing potable-quality water. Plugging abandoned artesian wells eliminates the waste of water at the surface and prevents mineralized groundwater from contaminating other aquifers and surface water bodies. Historically, this program has proven to be a cost-effective method to promote the plugging of such wells.

The region of emphasis for the QWIP is the SWUCA where the UFA is confined. Plugging abandoned wells, which involves filling them from the bottom to the top with cement and/or bentonite, re-establishes the natural isolation between aquifers, preventing the mixing of varying water qualities and the free flow of water at the surface. Before an abandoned well is plugged, QWIP staff collect geophysical logs that measure several hydrologic and geologic properties for inclusion in the District's database. While this is done primarily to determine the eligible reimbursement, the data can also be used to ensure the appropriate amount of material is used to properly plug the well. The QWIP benefits landowners, water well contractors, and the water resources of the District.

5.0 Stormwater Improvements: Implementation of Storage and Conveyance Best Management Practices

The District's WMPs and SWIM programs implement stormwater and conveyance BMPs for preventative flood protection to improve surface water quality, particularly in urban areas, and to enhance surface and groundwater resources. The BMPs involve construction of improvements identified and prioritized in the development of WMPs. Most of the activities are developed through cooperative funding with a local government entity, FDEP, or other state funding. As stormwater is a primary contributor of water quality degradation in older urban areas, the District seeks opportunities to work with local cooperators to retrofit or improve these systems to reduce impacts to receiving waters.

Section 2. Water Resource Development Projects

As of FY2025, the District has budgeted for 12 WRD projects that are ongoing. The projects are listed in Table 7-2 along with their funding to date, total costs, participating cooperators, estimated water quantity to be become available, and the planning region benefited by the project. District funding for a number of these projects is matched to varying degrees by local cooperators including municipalities, state agencies, private agricultural operations, and others. The total cost of these projects, including the cooperator shares, is approximately $130 million. The O&M costs for developed infrastructure will be the responsibility of local cooperators, unless otherwise noted in the project descriptions provided in this section. It's estimated that approximately 49.3 mgd of additional water supply will be produced or conserved. The WRD projects are organized into three groups that are detailed below: ASR Feasibility and Pilot Testing, FARMS, and Environmental Restoration and MFL Recovery Projects.

Table 7-2. *Water resource development projects, costs, and District funding*

	Water Resource Development Projects	Prior District Funding through FY2024	Total Project Cost (District + Cooperator)	Funding Source	Water to Become Available	Planning Region of Benefit
1) Aquifer Storage and Recovery Feasibility and Pilot Testing						
1.1	Southern Hillsborough Aquifer Recharge Program (SHARP) Phase 2 (N855)	$4,058,820	$8,217,640	SWFWMD, Hillsborough County	4 mgd	TBPR
1.2	Hydrogeologic Investigation of Lower Floridan Aquifer in Polk County (P280)	$12,000,000	$12,000,000	SWFWMD	NA	HPR
1.3	Optical Borehole Imaging Data Collection from LFA Wells (P925)	$100,200	$167,000	SWFWMD, USGS	NA	HPR
1.4	Sources/Ages of Groundwater in LFA Wells (P926)	$368,300	$736,600	SWFWMD, USGS	NA	HPR
1.5	Direct Aquifer Recharge-North Hillsborough Aquifer Recharge Program Phase 2 (Q064)	$750,000	$1,500,000	SWFWMD, Hillsborough County	NA	TBPR
1.6	Sarasota County - Bee Ridge Water Reclamation Facility Aquifer Recharge (Q159)	$915,511	$1,831,022	SWFWMD, Sarasota County	5 mgd	SPR
2) Facilitating Agricultural Resource Management Systems (FARMS)						
2.1	FARMS Projects	$54,558,138	$92,997,636	SWFWMD, FDACS, state of Florida, private farms	32.5 mgd	All
2.2	Mini-FARMS Program	$2,128,157	$3,125,718	SWFWMD	1.88 mgd	All
3) Minimum Flows and Minimum Water Levels (MFL) Recovery						
3.1	MIA Recharge SWIMAL Recovery at Flatford Swamp (H089)	$6,635,702	$6,635,702	SWFWMD	2 mgd	SPR, HPR
3.2	Pump Stations on Tampa Bypass Canal (H404-1)	$1,174,982	$2,024,982	SWFWMD	3.9 mgd	TBPR
3.3	Third Five-Year Assessment of the Lower Hillsborough River Recovery Strategy (H400-7)	$263,944	$263,944	SWFWMD	NA	TBPR
3.4	Lower Hillsborough River Biological Data Collection (H400-13)	$0	$40,000	SWFWMD	NA	TBPR

Note: Tampa Bay Planning Region (TBPR); Southern Planning Region (SPR); Heartland Planning Region (HPR)

1.0 Aquifer Storage and Recovery Feasibility and Pilot Testing

The following projects are research and/or pilot projects designed to further the development of the innovative AWS described in the RWSP. The projects for investigation of the LFA are primarily District-led initiatives. The ASR and AR projects may involve both technical and financial assistance from the District.

1.1 Southern Hillsborough Aquifer Recharge Program (SHARP) Phase 2 (N855)

This project is a continuation of Hillsborough County's program to develop AR of reclaimed water into the nonpotable zone of the UFA along the coast in the southern portion of Hillsborough County. The goal of the project is to improve water levels within the MIA of the SWUCA and possibly slow the rate of inland movement of saltwater intrusion in the area, with future consideration of IPR. The project includes transmission mains, two reclaimed water recharge wells (2 mgd each), monitoring wells, and associated appurtenances.

1.2 Hydrogeologic Investigation of LFA in Polk County (P280)

This project explores the LFAs in Polk County to assess their viability as an AWS source and to improve understanding of LFA characteristics and groundwater quality. Three sites have been identified. At each site, if the tests on the initial exploration monitor well drilled are positive, a test production well may be constructed to conduct an aquifer performance test to obtain transmissivity and leakance information and to determine the quality of the formation water. The data gathered from the wells will improve the District's understanding of this potential AWS source, enhance groundwater modeling of the LFAs, and determine the practicality of developing the LFAs as an AWS source in areas facing future water supply deficits. Data from this project will also add to the geologic inputs in the DWRM and ECFTX for the LFAs to assess potential withdrawal-related impacts to water resources in the District.

1.3 Optical Borehole Imaging Data Collection from LFA Wells (P925)

This project collects optical borehole imaging data from LFA wells in Polk County to aid in understanding aquifer characteristics and groundwater quality. The USGS is testing and providing the processed data to the District. Currently, nine LFA well sites have been identified for testing.

1.4 Sources/Ages of Groundwater in LFA Wells (P926)

This project collects isotope data from LFA wells from various sites in Polk County. The groundwater analysis will determine the sources and ages of water from the LFAs and lower portions of the UFA. This data will aid in understanding LFA characteristics, including flow paths and groundwater quality in Polk County. The USGS is testing and providing the processed data to the District. Currently, six LFA well sites have been identified for testing.

1.7 Direct Aquifer Recharge-North Hillsborough Aquifer Recharge Program Phase 2 (Q064)

This project includes completion of a direct AR feasibility study, which includes construction and testing of three exploratory wells necessary to evaluate recharge locations for the North Hillsborough Aquifer Recharge Program (NHARP). The study will aid in determining the hydrogeological characteristics and water quality of the targeted Avon Park Formation of the UFA and the approximate depth of the base of the underground source of drinking water in the general vicinity of NHARP.

1.8 Sarasota County - Bee Ridge Water Reclamation Facility Aquifer Recharge (Q159)

This project includes the construction of two recharge and three monitor wells, pump station, interconnecting piping, and appurtenances for the recharge of reclaimed water meeting high-level disinfection standards into the UFA for SWUCA/MIA recovery.

2.0 Facilitating Agricultural Resource Management Systems Projects

The FARMS Program is an agricultural BMP cost-share reimbursement program. The program is a public/private partnership developed by the District and FDACS. The program provides incentives to the agricultural community within the District to implement agricultural BMPs that will provide resource benefits including the reduction of groundwater withdrawals from the UFA, improvement of ground and surface water quality impacted by groundwater withdrawals, and improvement of natural-system functions within wetlands and priority watersheds.

The FARMS Program operates under District Governing Board Policy to fund projects that provide these benefits while assisting in the implementation of the District's RWSP. This plan identifies strategic initiatives and regional priorities to meet the District’s water management goals. These goals are based on improving and/or maintaining the water resource conditions of several regions within the District. Five primary goals for the FARMS Program are to:

1. Improve surface water quality which has been impacted by groundwater withdrawals with priority given to projects in the Shell, Prairie, and Joshua Creek, or Horse Creek watersheds;
2. Conserve, restore or augment the water resources and natural systems in the UMRW;
3. Reduce groundwater use in the SWUCA;
4. Reduce groundwater use for frost/freeze protection within the DPCWUCA;
5. Reduce UFA groundwater use and nutrient loading impacts in the Northern District.

The FARMS projects implement FDACS-approved BMPs that offset groundwater use with surface water and/or increase the overall efficiency of irrigation water use. Many projects have the added benefit of reducing agricultural impacts to surface water features. Properly implemented BMPs protect and conserve water resources and may increase crop production.

2.1 FARMS Cost-Share Projects.

Facilitating Agricultural Resource Management Systems (FARMS) projects employ many of the agricultural water conservation strategies described in the RWSP to reduce groundwater withdrawals by increasing the WUE of agricultural operations. The projects have the added benefit of reducing agricultural impacts to surface water features. The projects are public/private partnerships where the District provides financial incentives to farmers to increase the WUE of their operations. Each project’s performance is tracked to determine its effectiveness toward program goals. Since actual use of permitted quantities is dependent on hydrologic conditions, one of the objectives of FARMS projects is to reduce groundwater use regardless of hydrologic conditions. Facilitating Agricultural Resource Management Systems (FARMS) projects not only offset groundwater use with surface water but also increase the overall efficiency of irrigation water use. The District has routinely budgeted approximately $4 million annually for these projects.

A listing of cost-share projects within the planning region that have been Board-approved from FY2020 to FY2024 is provided in Table 7-3. Since FARMS Program inception and as of September 2024, there were 255 approved FARMS projects including 132 in the Southern Planning Region. These projects are projected to have a cumulative groundwater offset of 32.5 mgd Districtwide and 24.2 mgd for the planning region.

Table 7-3. *FARMS cost-share projects in the Southern Planning Region (FY2020-FY2024)*

Project Description	District Budget FY2020 to FY2024	Benefit (mgd)	Priority Area[1]
Doe Hill Citrus - Phase 3	$40,125.00	0.03	SPJC
Bermont Properties, LLC - Section 34	$166,500.00	0.05	SPJC
Bickett Holdings, LLC	$644,639.12	0.14	SPJC
Turner Family Partnership - Nocatee Grove	$326,000.00	0.10	SPJC
Symon Grove, LLC	$495,668.00	0.11	SPJC
North Joshua Grove, LLC	$186,000.00	0.16	SPJC
M & R Farms	$96,235.00	0.03	SPJC
Wauchula Road Duette, LLC Phase 2	$62,713.00	0.08	SWUCA
Bermont Properties, LLC - Section 22	$180,000.00	0.05	SPJC
BOYZ Properties, LLC	$631,000.00	0.17	UMRW
Symon Grove, LLC - Phase 2	$238,112.00	0.06	SPJC
Bethel Farms, LLLP - Ryals Property	$279,520.00	0.08	SPJC
Bethel Farms, LLLP - Phase 4	$243,512.57	0.06	SPJC
Farm Road Port Charlotte FL, LLC	$825,122.37	0.19	SPJC
Spanish Trails - Phase 1	$529,000.00	0.14	SPJC
Bay Grove - T&T Environmental Phase 1	$697,210.43	0.13	SPJC
Sandhill Native Growers	$303,507.00	0.08	SPJC
Varner Group	$212,000.00	0.05	SPJC
Spanish Trails - Phase 12	$528,708.50	0.14	SPJC
Bayside Sod	$378,829.00	0.09	SWUCA
Bethel Farms, LLLP - Phase 5	$296,023.00	0.07	SPJC
Bay Grove - T&T Environmental Phase 2	$350,540.00	0.08	SPJC
Spanish Trails - Phase 3	$542,000.00	0.14	SPJC
McClure Properties, LTD	$215,162.00	0.05	SWUCA
Farm Road Port Charlotte FL, LLC Phase 2	$554,200.00	0.10	SPJC
Berry Red Farms	$164,640.00	0.06	SWUCA
Cameron Dakin Dairy – Heifer Farm	$736,000.00	0.13	SWUCA
James Keen 62	$380,400.00	0.08	MIA
Total	**$10,303,366.99**	**2.65**	

Summation differences may occur due to rounding
[1]Shell, Prairie, and Joshua Creek (SPJC); Upper Myakka River Watershed (UMRW); Southern Water Use Caution Area (SWUCA); Most Impacted Area (MIA)
Notes: Projects were selected by funds budgeted in FY2020 to FY2024, meeting District RWSP definition of "projects under development." The benefit is based on projected offset.

2.2 Mini-FARMS Program

Mini-FARMS is a scaled-down version of the District's FARMS cost-share reimbursement program to implement agricultural BMPs to conserve water and protect water quality within the District. Mini-FARMS assists in the implementation of the SWUCA Recovery Strategy, DPCWUCA Recovery Strategy, the Shell and Prairie Creek WMP, and the District's Strategic Plan. Much like the FARMS Program, the Mini-FARMS Program implements BMPs on agricultural operations to reduce UFA groundwater use and/or improve water quality conditions throughout the District. The maximum cost-share amount available from Mini-FARMS projects through FY2023 was $8,000 per agricultural operation per year. Beginning in FY2024, the maximum reimbursement was increased to $10,000; however, the maximum cost-share rate remains at 75 percent of project costs.

From FY2006 through FY2024, the District has co-funded 404 water conservation BMP projects through the Mini-FARMS Program. The total cost of these projects was $3,125,718, and the District's reimbursement was $2,128,157. The Mini-FARMS Program continues to receive a strong demand from growers within the District, and it is projected that at least $500,000 will be budgeted for projects annually.

3.0 Environmental Restoration and Minimum Flows and Levels Recovery Projects

These projects include MFL recovery projects for the Hillsborough River Recovery Strategy, the upper Peace River, and SWUCA SWIMAL in support of the SWUCA Recovery Strategy.

3.1 Aquifer Recharge for SWIMAL Recovery at Flatford Swamp with Natural Systems Enhancement (H089)

Hydrologic alterations and excess runoff have adversely impacted the Flatford Swamp in the UMRW. The District has conducted evaluations to explore potential beneficial uses of water. In 2016, evaluations began on an injection recharge option that would use excess flow affecting the swamp to recharge the UFA in the vicinity of the MIA of the SWUCA to slow saltwater intrusion. The recharge system would assist with the SWUCA Recovery Strategy's goal of meeting the SWIMAL to help recover and protect groundwater resources in/near the MIA. Construction is complete on the active site, and data collection on operational testing is ongoing.

3.2 Lower Hillsborough River Recovery Strategy Morris Bridge Sink (H404-1)

This project will construct a pump station and pipeline components to divert surface water from the Morris Bridge Sinkhole to the upper pool of the TBC. A second pump station will be used to transfer water to the canal's middle pool, where it can be conveyed through the reservoir to the LHR during low-flow periods to help implement minimum flows. This project also includes required environmental monitoring.

3.3 Third Five-Year Assessment of the Lower Hillsborough River Recovery Strategy (H400-7)

The District established revised MFLs for the LHR in 2007. Since the MFLs were not being met, the District incorporated a recovery strategy for the river into Rule 40D-80.073, F.A.C. As part of the recovery strategy, the District must complete three five-year assessments.

3.4 Lower Hillsborough River Biological Data Collection (H400-13)

This project includes hydrological, biological data collection in support of the recovery strategy for the LHR. The recovery strategy specifies that salinity, biological, and water quality information for the lower river will be evaluated as part of the recovery strategy.

Chapter 8. Overview of Funding Mechanisms

This chapter provides an overview of mechanisms available to generate the necessary funds to implement the water supply and water resource projects proposed by the District and its cooperators to meet the water supply demand projected through 2045 and restore MFLs to impacted natural systems.

Table 8-1 shows the projected increase in demand for each planning region for the planning period, as described in Chapter 3 of each volume of the RWSP. The table shows that an estimated 215.35 mgd of new water supply is needed to meet user demands and to restore natural systems.

Table 8-1. *Total projected increases in demand (5-in-10) (mgd) by planning region (2020-2045)*

Planning Region	Projected Demand Increase
Heartland	59.61
Northern	48.62
Southern	40.89
Tampa Bay	66.23
Total	**215.35**

Summation differences may occur due to rounding

A portion of the total demand shown above will be met by existing permitted quantities; however, new regional infrastructure will be required to deliver permitted quantities to end users, and additional WSD is necessary to maintain adequate capacity for peak demand periods and continuing growth.

To estimate the capital cost for projects needed to meet demands, the District has compiled a list of large-scale WSD projects (Table 8-2). The District anticipates that a large portion of the remaining demand will be met through permitted but currently unused quantities that we expect users will grow into over the planning period, as well as through projects that users will select from the water supply options listed in Chapter 5. The amount of funding that will likely be generated through 2045 by the various utility, District, State, and federal funding mechanisms is compared to the capital cost of the potential large-scale projects. This comparison allows an evaluation of funding adequacy for support of projects necessary to meet water demands.

Part A. Statutory Responsibility for Funding

Section 373.705, F.S., describes the role of the WMDs regarding funding WSD and WRD projects:

(1)(a) 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.

(1)(b) 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.

(2)(b) 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.

(2)(c) 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 373.707(2)(c), F.S., further describes the role of the WMDs regarding providing funding assistance for the development of AWS:

(2)(c) Funding for the development of alternative water supplies 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.

In accordance with the applicable statutes, direct beneficiaries of WSD projects generally bear the costs of projects from which they benefit. However, affordability and benefits to natural resources are considerations recognized in Section 373.705(4)(a), F.S., for funding assistance from the WMDs:

(4)(a) Water supply development projects that are consistent with the relevant regional water supply plans and that meet one or more of the following criteria shall receive priority consideration for state or water management district funding assistance:

1. *The project supports establishment of a dependable, sustainable supply of water which is not otherwise financially feasible;*

2. *The project provides substantial environmental benefits by preventing or limiting adverse water resource impacts, but requires funding assistance to be economically competitive with other options; or*

3. *The project significantly implements reuse, storage, recharge, or conservation of water in a manner that contributes to the sustainability of regional water sources.*

Currently, the District funds both WSD and WRD projects. As discussed in Chapter 7, the District considers its WRD activities to include resource data collection and analysis as well as projects. In terms of WSD, the District has typically funded the development, storage, and transmission of non-traditional sources of water, including reclaimed water and conservation. Potential sources of funding for WSD and WRD projects are addressed below.

Part B. Funding Mechanisms

Section 1. Water Utilities

Water supply development (WSD) funding has been, and will remain, the primary responsibility of water utilities. Increased demand generally results from new customers that help to finance source development through impact fees and utility bills. Water utilities draw from a variety of revenue sources such as connection fees, tap fees, impact fees (system development charges), base and minimum charges, and volume charges. Connection and tap fees generally do not contribute to WSD 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 high base charge, or a minimum charge, which covers the cost of the number of gallons of water used, may also contribute to source development, treatment, and transmission construction cost debt service. Volume charges contribute to both source development/treatment/transmission debt service and O&M.

Community development districts and special water supply and/or sewer districts may also develop non-ad valorem assessments for system improvements to be paid at the same time as property taxes. Community development districts and special district utilities generally occur in developed areas not served by a government-run utility and generally serve a planned development. Regional water supply authorities, such as TBW, are also special water supply districts, but do not have retail customers. Facilities are funded through fixed and variable charges to the utilities they supply which are, in the end, paid by the retail customers of the utilities. All the above-mentioned types of utilities and regional water supply authorities have the ability to issue secure construction bonds backed by revenues from fees, rates, and charges. While some utility revenues will go to pay existing facility debt service, most of that service will be retired in various stages over the next 20 years and debt service for new projects will be added. Projects built late in the 20-year planning period will continue to generate revenues for debt service for many years after the planning period.

Financing through volume-related charges is the most economically efficient means to finance new WSD. Volume charge financing provides consumers and businesses the greatest degree of direct control over water-related costs and a direct incentive to conserve. Such financing increases utility revenue stream variability, but such variability may be reduced through the development of rate stabilization or reserve funds.

If volume charges are utilized to fund higher cost alternative water sources, the impact on ratepayers can be mitigated through existing and innovative rate structures and charges. High-usage rate blocks can be set to reflect the full marginal cost of the next source of supply. Usage by conserving customers can be set at the existing average embedded cost, as they are not driving the need for additional supply development (or below existing cost if a lifeline rate is necessary). If the rate change to implement this pricing is designed to exceed current revenue requirements, the additional revenue can be dedicated to new source development. Such pricing encourages conservation and reduces the need for steeper increases in future rates. Conservation incentivized by block rate structures, in combination with collecting project revenues in advance of construction, can distribute price increases more evenly over time and buffer price fluctuations inherent in common water-pricing practices. This allows customers to adjust water use practices and technology over time. Indexing of prices is another means of distributing price increases over time. If changes to water rates are revenue-neutral, additional conservation can still occur, as the difference between average and marginal price blocks for larger water users increases. There are a number of additional means available to mitigate the impact of higher cost sources to customers. Many of these are addressed in the American Water Works Association's publication, Avoiding Rate Shock: Making the Case for Water Rates (AWWA, 2004).

Section 2. Water Management District

The District's Governing Board provides significant financial assistance for conservation, planning, and AWS projects through programs including the CFI and District initiatives. Financial assistance is provided primarily to governmental entities, but private entities also participate in these programs. State funding is also allocated through state appropriations for the Water Protection and Sustainability Program, Alternative Water Supply Development, the Florida Forever (FF) Program, the FARMS Program, and Springs Initiatives.

1.0 Cooperative Funding Initiative

The District's primary funding mechanism is the CFI, which includes funding for major regional and localized WSD and WRD projects throughout the District's 16-county jurisdiction. The Governing Board jointly participates with local governments and other entities to ensure proper development, use, and protection of the regional water resources of the District. The CFI is a matching grant program where projects of mutual benefit are generally funded 50 percent by the District 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. Beginning in 2023, state and federal funds may be applied to cost increases incurred above the Governing Board approved total project cost, before equally reducing both parties' share. The CFI has been highly successful, having resulted in a combined investment (District and cooperators) of more than $4.1 billion since 1988. This investment has been for a variety of water resource projects addressing the District's four areas of responsibility: (1) water supply, (2) natural systems, (3) flood protection, and (4) water quality. From FY2021 through FY2025, the District's adopted budget included an average of $52 million in ad valorem tax dollars for the CFI, of which more than half each year was specifically for WRD and WSD assistance.

2.0 District Initiatives

Projects funded through District initiatives are of great importance or a regional priority. The District can increase its percentage match and, in some cases, provide total funding for the project. Examples of these initiatives include: (1) the QWIP to plug deteriorated, free-flowing wells that waste water and cause inter-aquifer contamination, (2) the Utilities Services Group to conserve water by assisting utilities in controlling their water loss, (3) data collection and analysis to support major District initiatives such as the MFLs program, (4) the FARMS Program and other various agricultural research projects designed to increase the WUE of agricultural operations, (5) WRD investigations and MFL recovery projects which may not have local cooperators, and (6) the WISE Program launched in 2019 to offer cost-share funding for a wide variety of water conservation projects (max of $20,000 per project) to non-agricultural entities.

From FY2021 through FY2025, the District's adopted budget included an average of $22.1 million in ad valorem tax dollars for District Initiatives, of which nearly half was specifically for WRD and WSD assistance.

The average total commitment from FY2021 through FY2025 for the CFI and District Initiatives was approximately $100.8 million in ad valorem taxes. The continued level of investment for these programs depends on economic conditions, resource demands, and the District's financial resources. However, the District believes its resources are sufficient to ensure long-term sustainability of the region's water resources moving forward.

Section 3. State Funding

1.0 FDEP Springs Initiative

The FDEP Springs Initiative is a special legislative appropriation that has provided revenue for protection and restoration of major springs systems. The District has allocated Springs Initiative funding to implement projects to restore aquatic habitats, reduce groundwater withdrawals and nutrient loading within first-magnitude springsheds, and improve the water quality and quantity of spring discharges. Projects include the re-establishment of aquatic and shoreline vegetation near spring vents, construction of infrastructure necessary to convey wastewater in priority focus areas of Outstanding Florida Springs (i.e., conversion of septic systems to sewer) which may increase reclaimed water production, and implementation of other BMPs within springshed basins.Since FY2014, over $78.4 million from the FDEP has been allocated for springs restoration in the Northern Planning Region, including funding for reclaimed water projects providing an estimated 4.5 mgd in additional reuse flows and 3 million gallons in reclaimed water storage.

2.0 Water Protection and Sustainability Program

Large areas of Florida do not have sufficient traditional water resources to meet the future needs of the state's growing population and the needs of the environment, agriculture, and industry. The state's Water Protection and Sustainability Program Trust Fund (WPSPTF) was created in the 2005 legislative session through Senate Bill 444 to accelerate the development of AWS and later recreated in Chapter 373, F.S., as part of the 2009 legislative session. Legislation focused on encouraging cooperation in the development of AWS and improving the linkage between local governments' land use plans and WMD's RWSPs. The program provides matching funds to the District for alternative WSD assistance. From FY2006 through FY2009, the District was appropriated a total of $53.75 million by the Legislature through the WPSPTF for WSD projects. An additional $700,000 in appropriations were allocated to the District between FY2020 and FY2021.Program funds are applied toward a maximum of 20 percent of eligible project construction costs. In addition, the Legislature established a goal for each WMD to annually contribute funding equal to 100 percent of the state funding for alternative WSD assistance, which the District has exceeded every year. The legislation also requires that a minimum of 80 percent of the WPSPTF funding be related to projects identified in a district water supply plan. The District's RWSP is utilized in the identification of the majority of WPSPTF-eligible projects. Projects are evaluated for funding based on 14 factors described in Subsections 373.707(8)(f) and (g), F.S. and additional District evaluation factors as appropriate.

3.0 Water Supply and Water Resource Development Grant Program

Beginning in FY2020, the state appropriated funds in addition to the WPSPTF through the establishment of a Water Supply and Water Resource Development grant program to address Florida's growing population and water demands, along with the needs of the environment. By identifying and researching all viable AWS, the grant program is intended to help communities plan for and implement conservation, reuse, and other WSD and WRD projects. Projects selected for funding are prioritized by areas of greatest need and greatest benefit, including timeliness of implementation. From FY2020 through FY2024, $36 million has been awarded to the District by FDEP for development of AWS through this grant program with an additional $10 million awarded in FY2025. If the Legislature continues to fund the state's Water Supply and Water Resource Development Grant Program, it could serve as a significant source of matching funds to assist in development of AWS and regional supply infrastructure in the region.

4.0 The Florida Forever Program

The FF Act, as originally passed by the Florida Legislature in 1999, established the 10-year FF Program. The program was extended by the Legislature during the 2008 legislative session, allowing it to continue for 10 more years. Since 1999, the District has allocated $95 million ($81.6 million for land acquisition and $13.4 million for water body restoration) of FF funding Districtwide in support of WRD.

A WRD project eligible for funding under the FF Program must meet the requirements of Section 259.105, F.S. These projects increase the amount of water available to meet the needs of natural systems and the citizens of the state by enhancing or restoring AR, facilitating the capture and storage of excess flows in surface waters, or promoting reuse. Implementation of eligible projects under the program includes land acquisition, land and waterbody restoration, ASR facilities, surface water reservoirs, and other capital improvements. An example of how the funds were used by the District was the purchase of lands around Lake Hancock within the Peace River watershed, as the first step in restoring minimum flows to the upper Peace River. In addition, the District Governing Board has expended $35.7 million in ad valorem-based funding to complete the acquisition of lands associated with the Lake Hancock project, acquired on a voluntary basis and through eminent domain proceedings.

5.0 Facilitating Agricultural Resource Management Systems Program

Operating under Governing Board Policy, the District Initiative FARMS Program is an agricultural BMPs cost-share reimbursement program that involves both water quantity and water quality projects. Developed by the District and the FDACS in 2003, this public/private partnership uses state funding when available. Since the inception of the program, the District has received $7.3 million in state appropriations and $1.3 million from the FDACS. No funding was appropriated by the state for FY2021 through FY2025.

Section 4. Federal Funding

In 1994, the District began an initiative to seek federal matching funds for water resource projects. Since that time, the Office of the Governor, the FDEP, other WMDs, and local government and regional water supply authority sponsors have joined with the District to secure federal funding. Through a cooperative effort with members of Florida's Congressional Delegation, the federal initiative has grown substantially. In 1999, the effort was expanded to seek funding for the development of alternative source projects and, in 2001, the state of Florida and the WMDs expanded a list of projects in order to seek all available resources to develop an environmentally sustainable water supply strategy that would meet the demands of growth throughout the state. The projects include the use of AWS technologies, as well as stormwater retention and filtering and wastewater treatment. Each WMD certifies that the projects submitted for funding are regional in scope and that matching funds are available either from the District's budget or from a local government sponsor.

Federal matching funds from this initiative helped fund the construction of the PRMRWSA reservoir and plant expansion. Funding for TBW's C.W. Bill Young Regional Reservoir came from individual project grant allocations through the State and Tribal Assistance Grants (STAG) program. However, Congress has not funded any individual STAG projects for several years, so future funding for individual projects through this mechanism is uncertain. District staff considers funding for water supply projects to be a top priority and continues to work with the Office of the Governor, the FDEP, the USACE, and the members of the Florida Congressional Delegation to secure federal funding.

1.0 U.S. Department of Agriculture Natural Resources Conservation Service Programs

The NRCS Environmental Quality Incentives Program (EQIP) provides technical, educational, and financial assistance to eligible farmers, ranchers, and forest landowners to address soil, water, and related natural resource concerns on their lands while complying with federal, state, and tribal environmental laws that encourage environmental enhancement. The program is achieved through the implementation of a conservation plan that includes structural, vegetative, and land management practices. The program is carried out primarily in priority areas where significant resource concerns exist. Agricultural water supply and nutrient management through detention/retention or tailwater recovery ponds can be pursued through this program.

In addition to EQIP, the FARMS Program has partnered with NRCS through the Agriculture Water Enhancement Program (AWEP) and the Florida West Coast Resource Conservation and Development Council (RC&D) to bring additional NRCS cost-share funding to the SWUCA. The AWEP was created by the 2008 Farm Bill with similar goals as the EQIP program, including conserving and/or improving the quality of ground and surface water. The RC&D is a nonprofit organization that promotes sustainable agriculture and local community food systems in Hillsborough, Manatee, Pinellas, and Sarasota counties.

The District's FARMS Program works cooperatively with the NRCS EQIP, AWEP, and RC&D programs on both financial and technical levels, and dual cost-share projects have been coordinated whenever possible. By an agreement between the District, FDACS, and the NRCS, the maximum funding for using both FARMS and EQIP is 75 percent of total project cost. As of FY2024, 41 FARMS projects Districtwide have involved some level of dual cost-share with EQIP, AWEP, and/or the RC&D, with several additional cooperative projects expected in the near future. On a technical level, agency interaction includes using the NRCS MIL to investigate using FARMS cost-share for improvements to overall irrigation system efficiency, using NRCS engineering designs for regulatory agricultural exemptions whenever possible, and coordinating cost-share on specific project related infrastructure. For example, FARMS may assist with an alternative source of irrigation water and EQIP assists with an upgrade to an irrigation delivery system. The relationship is mutually beneficial, extends cost-share dollars, and provides more technical assistance to participants in both programs.

Section 5. Public-Private Partnerships and Private Investment

As traditional water sources reach their capacity, alternative sources must be developed that involve specialized technical expertise and risky financial investments. The development of such technologies may be beyond the ability and level of tolerance of many water utilities. A range of public/private partnership options are available to provide this expertise and shift the financial risk. These options range from all-public to all-private ownership, design, construction, and facility operation. Investment and competition among private firms desiring to fund, build, or operate WSD projects could reduce project costs, potentially resulting in lower customer charges.

In addition to investor-owned public supply utilities, private risk sharing could be undertaken by three distinct forms of water supply entities: (1) public-private partnerships consisting of public utilities or regional water supply authorities contracting with private entities to design, build, or operate facilities; (2) cooperative institutions such as irrigation districts contracting with private entities; and (3) private entities, which could identify a customer base and become a water supplier to one or more water use types.

1.0 Public-Private Utility Partnerships

Two advantages of public-private partnerships are: (1) competition and economies of scale enjoyed by regional or national construction/operation firms or teams that may reduce costs and complete a project in less time and (2) some of the risk may be shifted to the private firms providing goods and services. As an example, TBW undertook a public-private partnership with Veolia Water, formerly USFilter, to design, build, and operate its surface WTP that has been in operation since 2002. Veolia assumed all risks for cost, schedule, plant design and construction, equipment supply, startup services, and facility performance through O&M. The cost savings over the life cycle of the contract are expected to be significant.

Public-private partnerships are becoming more common as water technology and regulation becomes increasingly complex. Increasing numbers of regulated pollutants and new higher-risk technologies drive privatization of some public water supply responsibilities. Partnerships work best where risks are beyond public sector tolerance, a project is new and standalone, construction and long-term operation are combined, there are clearly defined performance specifications, and there are clearly defined payment obligations (Kulakowski, 2005). Small utilities may not have the resources or project sizes sufficient to attract private interest but may participate through multi-utility agreements or through a regional water supply entity. A significant benefit of cooperation in larger projects is the economies of scale common in the water supply industry.

2.0 Cooperatives

Cooperatives are arrangements where multiple self-supplied water users pool their resources to construct water facilities that they could not technically or economically undertake on their own. They also share the risks. Such private or public/private cooperative institutions are more common where lengthy transmission systems are required, such as in the western U.S. where surface water is distributed to water districts and for irrigation. Water is usually obtained from a supplier at a cost and then distributed among members by the water district. Members cooperatively fund the construction of transmission and distribution facilities. As groundwater resources become increasingly limited and reclaimed water systems expand, the same type of economic forces that created irrigation and water districts in the west could develop in portions of Florida. Cooperatives may also shift financial risk by entering into design, build, and operate arrangements with contractors. As an example, the PRWC began as a cooperative when they first formed in 2016 to address the development and provision of AWS sources to its member local governments. They later received regional water supply authority status from the FDEP in 2023. Other forms of cooperative institutions in Florida, such as drainage districts and grower cooperatives, have effectively reduced competition and litigation over resources (OPPAGA, 1999).

3.0 Private Supply Investment (Aside from Investor-Owned Public Supply)

Private Supply Investment is where investors identify an unserved customer base and develop water facilities to meet those needs. This type of investment may facilitate the development of AWS. Such private financial investment occurs where firm regulatory limits are in place to protect water resources and related environmental features, and further development of traditional sources is not allowed. Although the purpose of the regulatory measures is resource protection, they indirectly create a customer base for alternative source developers.

Part C. Amount of Funding Anticipated to Be Generated or Made Available through District and State Programs and Cooperators

Section 1. Projection of Potentially Available Funding

Below is a summary of projected resources that could be generated by the District and state programs for WRD and WSD projects. An explanation follows as to how the funding amounts are derived.

1.0 Cooperative Funding Initiative

With the Governing Board's direction for continued investment in vital projects to protect the region's water resource needs, the District's most recent long-term funding plan estimates $1.1 billion in ad valorem tax dollars will be allocated for the CFI from 2026 through 2045. Nearly half of those funds, $490.2 million, are for Board-prioritized large-scale WSD efforts with water supply authorities in the Heartland, Southern, and Tampa Bay planning regions where the District is funding less than the normal 50 percent cost-share due to cost increases since initial Board approval of total project cost, as well as potable reuse. Combined with the Cooperators' cost-share, the prioritized projects will potentially provide $1.7 billion for WRD and WSD assistance over the next 20 years.

Assuming the remaining $618.4 million in ad valorem funds estimated for smaller-scale water resource protection and development efforts will be used for projects that will be matched by a partner on an equal cost-share basis, this would result in $1.2 billion funds leveraged. Collectively with the large-scale water supply authority efforts, the CFI anticipates generating $2.8 billion from FY2026 through FY2045 with approximately 57 percent potentially utilized for water source development. The allocation of resources is typically driven by new requests submitted through the CFI program each year, which could influence this funding projection, as the Governing Board may direct more funding for the District's other areas of responsibility (i.e., flood protection, water quality, and natural systems). It is important to note that funding does not include state or federal funds, which the District and its partners continue to seek.

2.0 District Initiatives

Also consistent with the District's long-term funding plan, an estimated $412 million in ad valorem tax dollars would be allocated for District Initiatives from 2026 through 2045. If the funding allocation of the program remains consistent with the previous five years, approximately $154 million (37 percent) could potentially be used for water source development and WSD assistance. However, the allocation of resources is typically driven by strategic priorities which could significantly influence this funding projection, as the Governing Board may direct more funding for the District's other areas of responsibility (i.e., flood protection, water quality, and natural systems). It is important to note that funding does not include state, federal, or local funds, which the District continues to seek.

3.0 FDEP Springs Initiative

In addition to new state appropriations, the amount of future state funding for the FDEP Springs Initiative is contingent upon eligible projects submitted to the District through the CFI. All current, on-going FDEP Springs Initiative projects are fully funded, but the District continues to solicit for viable projects to protect and restore major springs systems, including projects to reduce groundwater withdrawals and improve stormwater systems. The amount of future state funding for this program cannot be determined or reasonably estimated at this time.

4.0 Water Protection and Sustainability Trust Fund

The amount of future state funding for this program cannot be determined or reasonably estimated at this time. As economic conditions improve and the state resumes funding, any funding allocated for this District will be used as matching funds for the development of AWS projects.

5.0 Water Supply and Water Resource Development Grant Program

In FY2020, the state appropriated funds in addition to the Water Protection and Sustainability Program through the establishment of a Water Supply and Water Resource Development grant program in order to maximize the effort of addressing the demands on Florida's water supply to meet the future needs of the state's growing population and the needs of the environment. By identifying and researching all viable AWS resources, the grant program is intended to help communities plan for and implement conservation, reuse and other water supply and WRD projects. Projects selected for funding by the FDEP are prioritized by areas of greatest need and greatest benefit, including timeliness of implementation. The state has appropriated a minimum of $40 million annually since inception of the program, and projects submitted by the District have received an average of $10 million each year. Even though the amount of future state funding for this program cannot be determined or reasonably estimated at this time, the District continues to work with the FDEP to identify viable projects.

6.0 Florida Forever Trust Fund

The amount of future state funding for the FF Trust Fund cannot be determined or reasonably estimated at this time. The District has not received FF funding since FY2011, and all balances have been expended. Any future funding allocated for the District will be used for land acquisition, including land in support of WRD to meet the water supply demand through 2045 and to restore MFLs for impacted natural systems.

Section 2. Evaluation of Project Costs to Meet Projected Demand

Of the 215.35 mgd of Districtwide projected demand increases during the planning period to meet the demand for all users and to restore MFLs for impacted natural systems, it is estimated that 42.59 mgd, or 20 percent of the demand, has either been met or will be met by projects that are under development, including reclaimed water and water conservation. The total District share of cost for these projects currently under development, which also include regional transmission and brackish groundwater treatment systems, is just over $697 million.

To develop an estimate of the capital cost of projects necessary to meet demand, the District compiled a list of prioritized, large-scale WSD projects proposed for completion within the 2045 planning horizon in Table 8-2 below. These projects include those proposed by the PRMRWSA, PRWC, and TBW for the development of 22.5 mgd and regional transmission of AWS. Also included is funding set aside for the development of potable reuse as outlined in the District's long-term funding plan. The table shows the estimated total cost of these water supply and transmission projects is $1.72 billion.

Aside from these projects, additional water supplies are being developed in the District outside of the District's funding programs. For example, TBW will be expanding their existing Regional Surface WTP to provide an additional 10 to 12.5 mgd of water supply for the region. The PRMRWSA will also be expanding their PRF WTP to increase the surface water facility's max day capacity by 24 mgd. Due to funding constraints as the District co-funds the other regional prioritized AWS project options listed in Table 8-2, the District is currently unable to provide funding for these surface WTP expansions. However, they are critical projects for meeting growing demands.

For the Northern Planning Region, demands for water through 2045 may continue to be met with traditional groundwater sources on a regional scale, for which the District does not provide matching financial resources. However, alternative sources may be needed to supplement traditional sources to meet demands in specific high-growth areas. Regionally, the need for groundwater supplies can be reduced through the use of available reclaimed water and implementation of comprehensive water conservation measures, for which the District has historically provided funding assistance. In other planning regions, additional AWS, reclaimed water, and conservation projects chosen by users, aside from those listed in Table 8-2, will continue to be developed to meet new demands. Potential water supply project options are discussed in Chapter 5 for each planning region.

Table 8-2. *Proposed large-scale water supply and water resource development projects by 2045 (millions of $)*

Project	Planning Region	Entity to Implement	Quantities (mgd)	Capital Costs
Reservoir No. 3	Southern	PRMRWSA	N/A[1]	$375.08
Regional Integrated Loop System Phase 2B	Southern	PRMRWSA	N/A[2]	$87.44
Regional Integrated Loop System Phase 3C	Southern	PRMRWSA	N/A[2]	$70.80
Southeast Wellfield Implementation	Heartland	PRWC	12.5	$247.53
Regional Transmission Southeast Phase 1	Heartland	PRWC	N/A[3]	$174.10
West Polk Wellfield	Heartland	PRWC	10.00	$228.14
Southern Hillsborough County Transmission Expansion	Tampa Bay	TBW	N/A[4]	$438.71
Potable Reuse	TBD	TBD	TBD	$100.00
Total – Districtwide			**22.50**	**$1,721.80**

Summation differences may occur due to rounding
[1]This project will create 9 billion gallons of surface water storage capacity.
[2]This project is needed for regional transmission of AWS. Max day transmission capacity is 40 mgd.
[3]This project is needed for regional transmission of AWS. Max day transmission capacity is 30 mgd.
[4]This project is needed for regional transmission of AWS. Max day transmission capacity is 65 mgd.

Section 3. Evaluation of Potential Available Funding to Assist with the Cost of Meeting Projected Demand

Through current cooperative arrangements with the PRMRWSA, PRWC, and TBW, funding assistance from the District and the FDEP have begun to contribute to the estimated cost of meeting projected demand. Of the $1.7 billion in costs reflected in Table 8-2, a projected $1.6 billion remains to be funded in order to complete these efforts. The conservative estimate of $2.6 billion in cooperator and District financial resources that will be generated through 2045 for funding is sufficient to meet the projected total cost of the large-scale projects listed in Table 8-2. Additional state and federal funding sources may also assist with remaining costs for future AWS projects and water conservation measures where fresh groundwater resources are limited. These financial projections are subject to economic conditions that may affect the level of District ad valorem tax revenue and the availability of federal and state funding. However, such conditions may similarly affect future water demand increases.

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