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Withlacoochee Regional Water Supply Authority 2024 Regional Water Supply Plan Update

Final Report

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List of Acronyms

Abbreviation	Definition
AG	Agricultural
APPZ	Avon Park Permeable Zone
ASR	Aquifer Storage and Recovery
AR	Aquifer Recharge
AWE	Alliance for Water Efficiency
AWS	Alternative Water Supply
BEBR	Bureau of Economic and Business Research
BGS	Below Ground Surface
BLS	Bureau of Labor Statistics
CFWI	Central Florida Water Initiative
CII	Commercial, Industrial, and Institutional
COLA	Cost of Living Adjustment
CSM	Central Springs Model
DPR	Direct Potable Reuse
DSS	Domestic Self Supply
EPA	Environmental Protection Agency
FAS	Floridan Aquifer System
FDEP	Florida Department of Environmental Protection
F.S.	Florida Statutes
FSAID	Florida Statewide Agricultural Irrigation Demand
GPCD	Gallons per Capita per Day
GPM	Gallons per Minute
GSSG	Gum Slough Springs Group
HET	High Efficiency Toilet
I/C	Industrial/Commercial
IPR	Indirect Potable Reuse
IRR	Additional Irrigation Demand
L/R	Landscape/Recreation
LFA	Lower Floridan Aquifer

Abbreviation	Definition
MAPCU	Middle Avon Park Confining Unit
MAR	Managed Aquifer Recharge
MCDA	Multi-Criteria Decision Analysis
MCU	Middle Confining Unit
M/D	Mining/Dewatering
MFL	Minimum Flows and Levels
MGD	Million Gallons per Day
NF	Nanofiltration
NPR	Non-Potable Reuse
O&M	Operations & Maintenance
PG	Power Generation
POR	Period of Record
PPI	Producer Price Index
PS	Public Supply
PSA	Public Service Announcement
RIB	Rapid Infiltration Basin
RO	Reverse Osmosis
RWSP	Regional Water Supply Plan
SFR	Single-Family Residential
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SRWMD	Suwannee River Water Management District
SWFWMD	Southwest Florida Water Management District
UFA	Upper Floridan Aquifer
UIC	Underground Injection Control
USDW	Underground Source of Drinking Water
UV	Ultraviolet
WIFIA	Water Infrastructure Finance and Innovation Act
WMD	Water Management District
WRCA	Water Resource Caution Areas
WRF	Water Reclamation Facility
WRWSA	Withlacoochee Regional Water Supply Authority
WS	WaterSense
WUCA	Water Use Caution Areas
WWRF	Wastewater Reclamation Facility
WWTF	Wastewater Treatment Facility

Executive Summary

The 2025 Withlacoochee Regional Water Supply Plan Update presents a comprehensive evaluation of future water demands, environmental constraints, and feasible water supply strategies for Citrus, Hernando, Marion, and Sumter Counties. Over the next two decades, the region is expected to grow by more than 250,000 residents, bringing total population to approximately 1.22 million by 2045. This growth, combined with the region's sensitive hydrologic setting and evolving regulatory requirements, signals a need for coordinated regional planning and a diversified water supply portfolio. This Plan is intended to support regional coordination and provide technical guidance to member governments as they evaluate water supply and water resource management strategies.

Groundwater from the Upper Floridan Aquifer (UFA) will continue to serve as the region's primary supply source; however, increasing interaction between groundwater withdrawals and spring flows and the regulatory influence of Minimum Flows and Levels (MFLs) may influence the availability of groundwater withdrawals.

While most adopted MFLs remain in compliance, Silver Springs is in Prevention status, and several additional waterbodies are scheduled for MFL reevaluation by 2027. These circumstances highlight the importance of evaluating additional water supply strategies alongside traditional groundwater which alone may not fully meet future needs under certain conditions while maintaining consistency with environmental protection goals.

Key Drivers Influencing Long-Term Planning

Several overarching forces shape the region's water supply outlook:

- **Rapid population growth**, particularly in Marion and Sumter Counties, which drives increases in public supply demand.
- **Environmental and regulatory limits**, including existing and upcoming MFLs that may restrict additional groundwater withdrawals while protecting water resources.
- **Projected deficits** for multiple utilities whose permitted quantities are projected to approach permitted limits within the planning horizon.
- **Hydrogeologic variability** across the region, influencing the feasibility and cost of alternative supply options.

Collectively, these drivers create the context within which Withlacoochee Regional Water Supply Authority (WRWSA) and its member governments must plan, setting the stage for strategies that balance demand management with the careful development of new supply sources.

Projected Demands and Groundwater Constraints

As population grows, projected water demands increase steadily across all use types, with public supply accounting for the most significant share. Several utilities are expected to approach or exceed their permitted groundwater withdrawals before 2045, suggesting that additional supply development may be warranted in the mid-2030s. These projected deficits occur in a setting where groundwater withdrawals are hydraulically connected to the regional springs, rivers, and wetlands.

The region's groundwater challenges are shaped by:

- Direct hydraulic connections between the aquifer and spring systems such as Silver, Rainbow, Chassahowitzka, and Weeki Wachee.
- MFL requirements that may limit additional withdrawal.
- Karst geology that facilitates rapid water movement and increases the vulnerability of surface water features.

These conditions highlight the need for supply diversification and support the evaluation of strategies that complement continued use of the UFA. With this foundation, the Plan turns to the role of conservation and reclaimed water in meeting near-term needs.

Conservation and Reuse as Foundational Strategies

Conservation continues to provide a cost-effective and readily implementable approach of reducing future water demand. Expanded utility-sponsored programs, including high-efficiency indoor fixtures, enhanced irrigation efficiency, advanced metering infrastructure, and customer outreach, can provide measurable water savings.

Regional conservation savings are characterized by:

- 10–15 MGD of potential demand reduction by 2045 under robust implementation scenarios.
- Unit costs below $2 per thousand gallons, far lower than any alternative supply option.
- The ability to defer or downsize capital-intensive infrastructure, thereby reducing long-term financial obligations.

Reclaimed water also remains an important component of the regional supply portfolio. Opportunities may exist not only to expand non-potable irrigation uses but also to implement managed aquifer recharge (MAR), which provides both supply and environmental benefits. MAR is particularly valuable in areas where spring flows are sensitive to groundwater withdrawal reductions, supporting aquifer system benefits while enhancing future supply reliability.

These conservation and reuse strategies create a strong platform from which to pursue higher-yield alternative water supply projects as the region approaches the mid-century planning horizon.

Alternative Water Supply Options and Cost Considerations

The Plan evaluates a suite of alternative water supply (AWS) options to supplement groundwater resources. Each option offers different advantages, costs, and implementation considerations.

The major AWS findings include:

- Regional non-potable reuse expansion is well-suited to areas with sufficient irrigation demand, generally costing $4–$8 per thousand gallons.
- MAR represents a potential cost-effective AWS option under certain conditions, offering hydrologic benefits and long-term supply resilience at approximately $5 to $7 per thousand gallons.
- Lower Floridan aquifer development may be feasible, though water quality constraints and required treatment can contribute to elevated costs at $6–$10 per thousand gallons.
- Surface water withdrawals from the Withlacoochee River offer substantial potential yield but involve treatment complexity, long transmission distances, and costs in the $5–$10 per thousand gallons range.
- Desalination, while technically feasible, is the most expensive option at approximately $25–$30 per thousand gallons and is not anticipated to be needed within the planning horizon.

Taken together, these findings indicate that cost, regulatory feasibility, and environmental compatibility vary significantly across AWS options. This reinforces the importance of sequencing AWS development carefully, beginning with the most cost-effective and environmentally beneficial approaches before progressing to more complex regional projects.

Strategic Path Forward

To ensure future supply reliability while maintaining environmental stewardship, the Plan recommends a phased approach. In the near term, WRWSA and its member governments can prioritize high-yield, low-cost initiatives such as conservation and reclaimed water optimization. As demands increase and groundwater constraints intensify, the region may consider advancing MAR projects and begin planning for LFA wellfields and surface water treatment options. Beyond 2045, emerging conditions will guide whether larger-scale AWS solutions, including desalination, merit further evaluation.

This phased progression is intended to help ensure that cost-effective options are implemented first, that groundwater withdrawals remain aligned with water use permitting requirements, and that capital investment is timed efficiently relative to population growth and resource constraints. By following this integrated strategy, the WRWSA can help ensure a sustainable, reliable, and environmentally responsible water supply for its member governments through 2045 and beyond.

1. Introduction

This document presents the WRWSA update to its 2019 Water Supply Plan Update. The Southwest Florida Water Management District (SWFWMD) co-funded the preparation of this report and incorporated draft information into its 2025 Regional Water Supply Plan for the Northern Planning Region.

This report has been structured to follow the format of the Florida Department of Environmental Protection's (FDEP) Regional Water Supply Plan (RWSP) guidelines, and the outline of the SWFWMD Regional Water Supply Plans. WRWSA has also coordinated closely with the St. Johns River Water Management District (SJRWMD) planning staff for water supply planning in the eastern portion of Marion County.

1.1 Purpose of the Regional Water Supply Plan

The purpose of this 2025 Water Supply Plan Update is to advance regional water supply planning as part of the WRWSA's ongoing Regional Water Supply Planning and Implementation Program. This update provides an assessment of current population and water demands, as well as a 20-year projection of future demands and potential water sources available to meet them. It also evaluates potential water use offsets through conservation and reuse strategies for the larger utilities and identifies strategies that could reduce projected demands. Utilities anticipated to experience deficits in their permitted quantities are also identified.

The Update is intended to assist water supply utilities within the WRWSA region by developing implementable and sustainable water supply options and strategies to meet future needs. Each project option is evaluated for its technical, economic, regulatory, and environmental feasibility. The timing and practicality of developing these options may vary among utilities based on factors such as geographic location, level of need, conservation and reuse potential, economic constraints, and the availability of traditional and alternative water sources.

In addition, the analysis considers potential yields, water quality and treatment requirements, and economic factors associated with transmission, pumping, operation, and maintenance. Finally, this report discusses several key issues that the WRWSA and its member governments will need to address as the Authority moves toward the development of regional cooperative water supply solutions.

1.2 WRWSA Planning Region

The WRWSA is an independent special district of the State of Florida, created and existing pursuant to Sections 373.713 and 163.01, Florida Statutes. It is one of four water supply authorities located within the SWFWMD. The WRWSA region includes Citrus, Hernando, Marion, and Sumter counties, as well as the municipalities within these counties. A portion of Marion County within the WRWSA boundary lies in the SJRWMD. Figure 1-1 illustrates the WRWSA four-county region and its member governments.

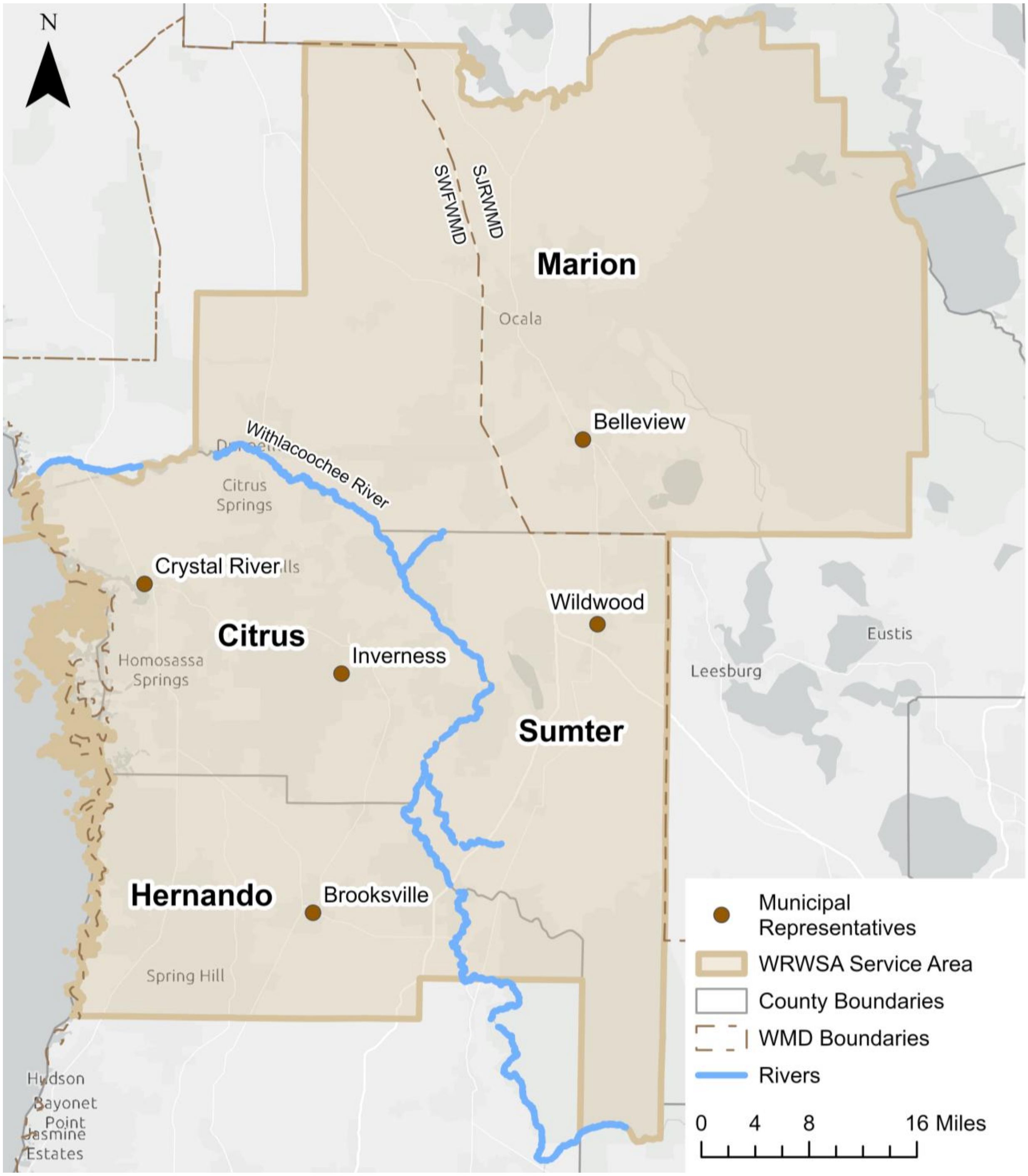

Figure 1-1: Map of WRWSA Four County Region and Municipalities

The WRWSA is responsible for planning and developing cost-efficient, high-quality drinking water supplies for its member governments, while promoting environmental stewardship through regional water conservation programs. Looking ahead, it is anticipated WRWSA will collaborate with its member governments to develop new water sources that will augment existing supplies and help meet the region's long-term water needs.

The WRWSA owns and operates the Charles A. Black wellfield in Citrus County, which has an annual average permitted capacity of approximately 7,181,900 gallons per day (gpd). The wellfield's water use permit was most recently renewed for a 20-year term on August 22, 2023. The Charles A. Black supply system includes seven production wells, two water treatment facilities, two 4-MG storage tanks, one 1-MG storage tank, and associated transmission pipelines.

The WRWSA was established in 1977 by Hernando, Citrus, Sumter, Marion, and Levy counties. An amendment to the Authority's interlocal agreement in 1984 allowed for municipal membership, enabling cities within each county to join. Levy County formally withdrew from the Authority in 1982. Today, WRWSA's membership includes Citrus, Hernando, Marion, and Sumter counties and their associated municipalities: Belleview, Brooksville, Bushnell, Center Hill, Coleman, Crystal River, Dunnellon, Inverness, McIntosh, Ocala, Reddick, Webster, and Wildwood.

In 2014, a revised and restated Inter-local Agreement which creates the current WRWSA was approved by Citrus, Hernando, Marion and Sumter counties, the four counties which are parties to the Agreement. Pursuant to the new Agreement, the WRWSA Board is comprised of two county commissioners from Citrus, Hernando and Sumter counties, three commissioners from Marion County and one municipal representative from a City municipality within each of these counties (presently Crystal River/Inverness in alternating years, Brooksville, Belleview and Wildwood).

1.2.1 Water Supply Planning History

Since the WRWSA is authorized to develop and supply water, it has historically completed water supply planning studies. A summary of previous planning efforts is provided below:

- Water Sources and Demand Study (1982).
- WRWSA Master Plan for Water Supply (1987).
- 1996 Withlacoochee Regional Water Supply Authority Master Plan for Water Supply (1996).
- Withlacoochee Regional Water Supply Authority Regional Water Supply Plan Update (2005).
- WRWSA Detailed Water Supply Feasibility Study (2010).
- WRWSA Regional Framework Initiative (2012).
- Regional Water Supply Plan Update (2014).
- Regional Water Supply Plan Update (2019).

1.2.2 Land Use and Population

The WRWSA four-county region is characterized by a diversity of land use types (Table 1-1). The area encompasses extensive tracts of federal, state, and water-management district-owned conservation lands. These protected public lands are used and maintained for timber management, ecological restoration, public recreation, and conservation of hardwood swamps, fresh and saltwater marshes, river frontage, sandhill-dwelling plants, public recreation, and prime black bear habitat. Limestone mining activities occur primarily in Hernando and Sumter counties and numerous inactive mines are scattered throughout the region. Significant agricultural activities are carried out in the region. Forestry and pasture dominate agricultural use in terms of acres and Marion County is known for its thoroughbred horse breeding industry. Ornamental production is growing particularly in Sumter County. Watermelons have been a primary crop while other crops such as sweet peppers, squash, cucumbers, cantaloupes and sweet corn are farmed at a much smaller scale.

The population of the region is projected to grow from approximately 972,000 in 2025 to 1,228,100 in 2045 (Table 1-2). This is an increase of approximately 256,100 new residents: a 26.3% increase during the planning period. Marion and Sumter counties include sections of The Villages retirement communities, the largest residential development in central Florida. A future expansion of the Suncoast Parkway can be expected to result in an increase in commercial and industrial land use and bring new residents to Citrus County. Residential and commercial development has also been concentrated along U.S. 19 in Hernando and Citrus counties and along SR 200 southwest of Ocala in Marion County.

Table 1-1: Land Use/Land Cover in the WRWSA Region (2020-2023)

Land Use/Land Cover Types	Acres	Percent
Agriculture	403,081	18.7%
Barren Land	4,584	0.2%
Industrial	6,860	0.3%
Rangeland	67,378	3.1%
Transportation, Communication, and Utilities	32,477	1.5%
Upland Forest	675,850	31.4%
Urban and Built Up	529,317	24.6%
Water	52,974	2.5%
Wetlands	379,842	17.6%
Total	**2,152,363**	**100%**

Source: FDEP Statewide Land Use Land Cover GIS Feature Layer. SWFWMD's dataset was updated in 2023 and SJRWMD's dataset was updated in 2020. The industrial land cover type is a subset of the Urban and Built Up classification, but was extracted for consistency with the 2019 WRWSA RWSP.

Table 1-2: Population Projections in the WRWSA Region (2025)

Location	2025 Population Estimate	Projected 2045 Population	Change
Citrus County	168,400	197,700	29,300
Hernando County	214,000	259,000	45,000
Marion County	427,100	531,400	104,300
Sumter County	162,500	240,000	77,500
Total	**972,000**	**1,228,100**	**256,100**

Source: University of Florida Bureau of Business and Economic Research, Volume 58, Bulletin 201, August 2025. Projections of Florida Population by County, 2025-2050, with Estimates for 2024 (Medium Estimates).

1.2.3 Watershed Physical Characteristics

The WRWSA region encompasses four major watersheds: the Upper Coastal Areas, Withlacoochee River, Florida Ridge, and Ocklawaha River watersheds.

- The Upper Coastal Areas watershed includes the Coastal Swamp, located in western Hernando and Citrus Counties along the Gulf, and the Gulf Coastal Lowlands, which extend inland between the Coastal Swamp and the Brooksville Ridge. This area is characterized by relatively flat plains transitioning to gently rolling sandhills.
- The Withlacoochee River watershed encompasses portions of southwestern Marion County, eastern Citrus and Hernando Counties, and all of Sumter County. Central Marion County lies within the Florida Ridge watershed, while eastern Marion County is part of the Ocklawaha River watershed.
- The Brooksville Ridge trends northwest to southeast across the region, extending through the central portions of Citrus and Hernando Counties. Elevations along the Ridge range from approximately 70 to 275 feet above sea level. The Ridge exhibits an irregular surface topography due to the prevalence of karst features and is underlain by clay-rich soils that influence recharge and drainage characteristics.
- Between the Brooksville Ridge and the Withlacoochee River lies the Tsala Apopka Chain of Lakes, a series of interconnected water bodies situated within the recharge area of the coastal springs. The system consists of numerous lakes separated by peninsulas and islands, with elevations ranging from approximately 35 to 75 feet above sea level.

These varied topographic and geologic features serve an important function in shaping the region’s hydrology and groundwater systems. Areas of higher elevation, such as the Brooksville Ridge, serve as primary recharge zones for the Upper Floridan aquifer, while the low-lying coastal and riverine areas function as discharge zones that sustain surface waters and spring systems. Understanding these relationships provides essential context for evaluating water resource availability, groundwater flow dynamics, and long-term supply sustainability within the WRWSA region.

1.2.4 Hydrology

Figure 1-2 depicts the major hydrologic features of the WRWSA region, including its rivers, lakes, and springs. These features define the region’s surface water systems and serve an important function in its hydrology, groundwater interaction, and ecological integrity.

1.2.4.1 Rivers

Rivers in the Upper Coastal Areas watershed include the Weeki Wachee and Mud Rivers in Hernando County, and the Chassahowitzka, Homosassa, Halls, and Crystal Rivers in Citrus County. These rivers are relatively short, generally less than 10 miles in length, and their flow is derived primarily from spring discharge.

The Withlacoochee River watershed includes portions of southwestern Marion County, eastern Citrus and Hernando Counties, and all of Sumter County. Major tributaries to the Withlacoochee River include the Rainbow River in Marion County, the Little Withlacoochee River in northeastern Hernando and Sumter Counties, and Jumper Creek and the Panasoffkee Outlet River in Sumter County. Originating in the Green Swamp, the Withlacoochee River traverses eight counties before discharging into the Gulf.

The Green Swamp is a critical hydrologic feature serving as the headwaters for several major rivers, including the Hillsborough, Peace, Withlacoochee, and Ocklawaha Rivers. The Ocklawaha River, which also originates in the Green Swamp and receives inflow from Lake Griffin and the Harris Chain of Lakes in Central Florida, flows approximately 75 miles northward before joining the St. Johns River. Significant inflows to the Ocklawaha River include the spring-fed Silver River and Orange Creek.

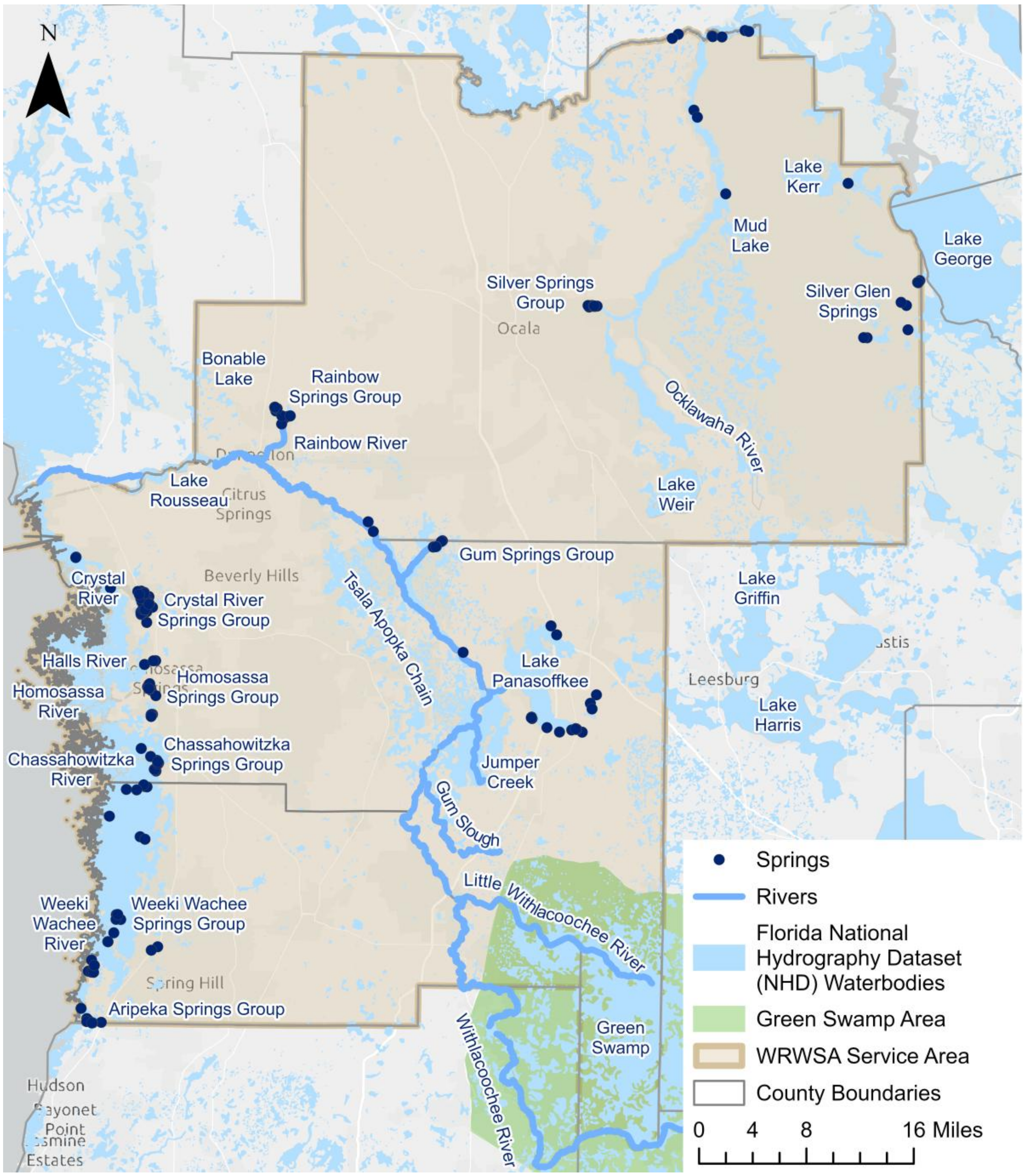

Figure 1-2: Major Hydrologic Features in the WRWSA Region

1.2.4.2 Lakes

Major lakes within the WRWSA region include Lake Panasoffkee in Sumter County (4,460 acres), Bonable Lake in Marion County (211 acres), Lake Rousseau in Levy County (3,657 acres), and the Tsala Apopka Chain of Lakes in Citrus County (23,300 acres). The Tsala Apopka system consists of a series of interconnected ponds, marshes, and open-water pools located near Floral City (9,100 acres), Inverness (8,000 acres), and Hernando (6,200 acres).

Within the portion of the WRWSA region that lies in the SJRWMD, major lakes include Lake Kerr (2,924 acres), Lake Weir (5,617 acres), and a portion of Lake George (43,402 acres). Figure 1-2 illustrates the locations of lakes greater than 20 acres in size within the WRWSA region.

1.2.4.3 Springs

Numerous first-magnitude springs (discharge exceeding 100 cubic feet per second [cfs]) are located throughout the WRWSA region. These include the Rainbow Springs Group, Silver Springs Group, and Silver Glen Springs in Marion County; the Crystal River, Chassahowitzka, and Homosassa Springs Groups in Citrus County; and the Weeki Wachee Springs Group in Hernando County.

- The Rainbow Springs Group consists of multiple vents forming the headwaters of the Rainbow River, which flows approximately 5.9 miles before joining the Withlacoochee River upstream of Lake Rousseau. The combined discharge averages 676 cfs (437 mgd) (SWFWMD, 2020), ranking it as the fourth largest among Florida’s 33 first-magnitude springs.
- The Silver Springs Group in Marion County includes at least 30 different springs and numerous smaller vents in the upper portion of the Silver River (SJRWMD, 2017), with a combined average daily discharge of 732 cfs (473 mgd) (USGS, 2025). The Silver River flows approximately five miles east to its confluence with the Ocklawaha River.
- The Silver Springs Group is one of the largest spring systems in Florida. Silver Glen Springs, located in eastern Marion County, has an average discharge of 96 cfs and flows approximately 0.75 miles east to Lake George, part of the St. Johns River.
- Along Citrus County’s Gulf Coast, the King’s Bay, Chassahowitzka, and Homosassa Springs Groups represent important coastal spring systems. The King’s Bay Springs consist of a complex network of more than 70 springs that discharge into the tidally influenced Kings Bay at an average rate of 450 cfs (291 mgd) (SWFWMD, 2020). Located near the saltwater interface of the Upper Floridan aquifer, these springs typically discharge brackish water.
- The Homosassa Springs Group discharges approximately 250 cfs (162 mgd) (SWFWMD, 2020) and, along with springs on the Halls River, provides the primary flow for the Homosassa River. Water from the main spring at the river’s head is brackish. The Chassahowitzka Springs Group has a combined discharge of about 115 cfs (74 mgd) (SWFWMD, 2020) and serves as the principal source for the Chassahowitzka River; its main spring also produces brackish water.
- The Weeki Wachee Main Spring, located at the head of the Weeki Wachee River, has an average discharge of 172 cfs (111 mgd) (SWFWMD, 2011). Because it lies farther inland, the water

remains fresh, though several smaller springs downstream discharge brackish water (Jones et al., 1997).

- Several smaller, second-magnitude and lesser springs are distributed across the region. The Aripeka Springs Group in southwestern Hernando County includes numerous small springs, including Hammock Creek, clustered within a one-square-mile area. Fenney Springs, a second-magnitude spring in Sumter County, flows to Lake Panasoffkee and the Withlacoochee River. Gum Slough, a four-mile-long spring run in northwestern Sumter County, is fed by several springs at its headwaters and discharges to the Withlacoochee River. Fern Hammock, Juniper, and Salt Springs in eastern Marion County are second-magnitude springs that discharge into spring runs, ultimately reaching the St. Johns River.

1.2.4.4 Wetlands

Wetlands within the WRWSA region can be broadly classified as saltwater or freshwater systems. Saltwater wetlands occur along coastal estuaries influenced by the mixing of freshwater and seawater, supporting characteristic vegetation such as salt grasses and mangroves. Extensive coastal wetlands are located along the western portions of Hernando and Citrus Counties, where they serve an important function in nutrient cycling, shoreline protection, and fish and wildlife habitat.

Freshwater wetlands are common throughout inland areas and are typically dominated by hardwood-cypress swamps, marshes, and wet prairies. Hardwood-cypress swamps are forested systems that remain inundated for much of the year, while marshes are shallower, herbaceous systems with seasonal hydroperiods. Wet prairies occur in transitional zones and are vegetated by a mix of mesic herbaceous species and hardwood shrubs, becoming inundated during wet periods. Extensive hardwood swamps and wet prairies occur throughout the Withlacoochee River watershed, contributing to baseflow regulation and flood attenuation.

The Green Swamp, located in southern Sumter County, contains numerous isolated wetlands vegetated primarily by herbaceous species and serve an important function in regional hydrology as a groundwater recharge area and the headwaters for the Withlacoochee, Hillsborough, Peace, and Ocklawaha Rivers. The Halpata Tastanaki Preserve in southwestern Marion County supports significant hardwood-cypress swamp systems that contribute to both local and regional groundwater recharge and surface water storage.

Together, these wetland systems provide essential ecological and hydrologic functions that sustain surface water flows, enhance aquifer recharge, and maintain the environmental health of rivers, lakes, and springs throughout the WRWSA region.

1.2.5 Geology/Hydrogeology

The geology and hydrogeology of the WRWSA region are dominated by carbonate formations that compose the Floridan Aquifer System (FAS), one of the most productive aquifer systems in the world. The FAS serves as the principal source of potable groundwater throughout the region and plays a central role in supporting spring discharge, baseflow to rivers, and wetland hydrology.

Figure 1-3 presents a generalized northeast-trending hydrogeologic cross section extending from the Gulf Coast in Citrus County to the southeastern boundary of Marion County. The cross section depicts the stratigraphic relationship between the Upper Floridan Aquifer, Lower Floridan Aquifer, and the confining units that separate them.

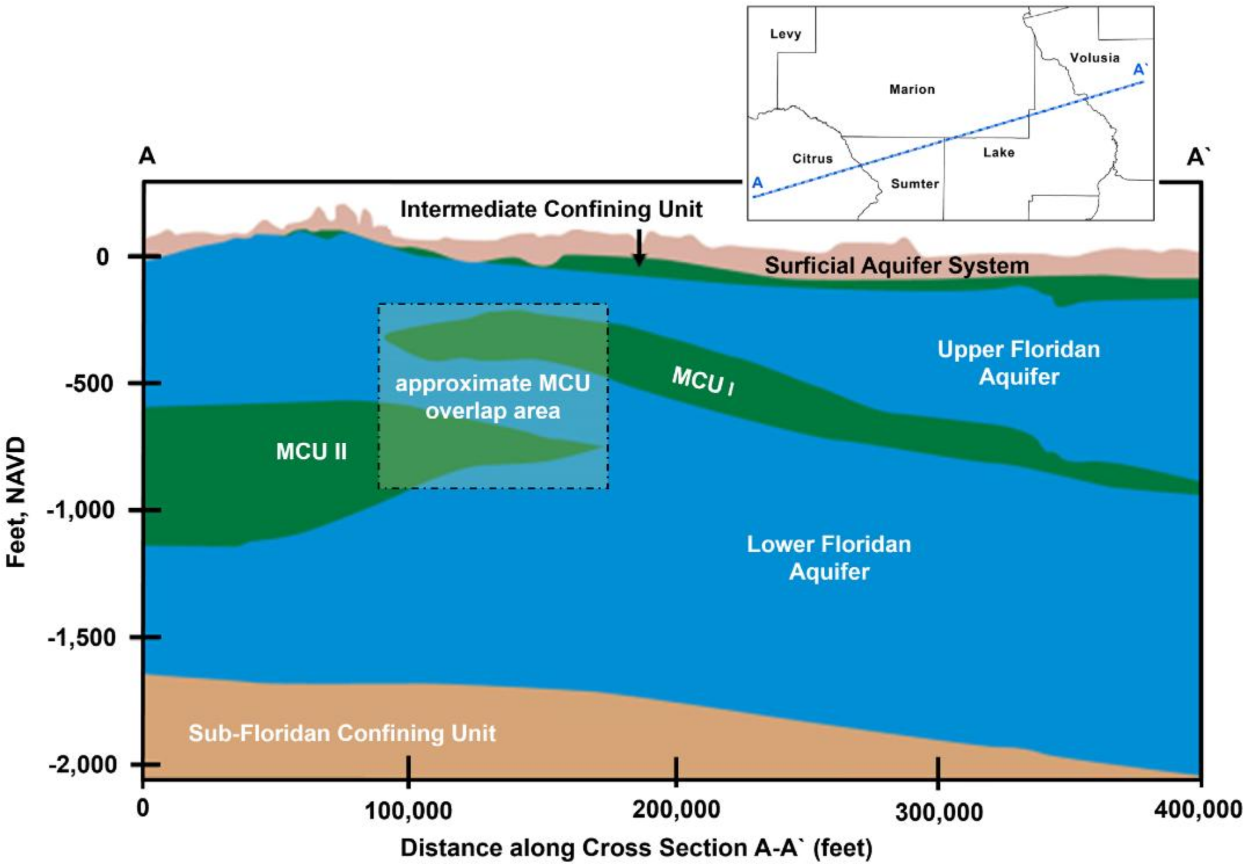

Figure 1-3: Generalized Southwest–Northeast Hydrogeologic Cross Section of the Floridan Aquifer System in the WRWSA Region (Central Springs Groundwater Flow Model Version 1.0 Report, SJRWMD and SWFWMD, 2024)

1.2.5.1 Upper Floridan Aquifer

The UFA is the principal groundwater storage and transmission unit within the WRWSA region, providing nearly all water used for public supply, domestic self-supply, and agriculture. The UFA consists of a thick sequence of marine carbonate deposits and is largely unconfined across much of the region, overlain only by a thin mantle of sands, silts, and clays. The upper several hundred feet of limestone and dolostone comprise the most productive portion of the aquifer.

Stratigraphic units composing the UFA (in order of increasing age and depth) include the Suwannee Limestone, Ocala Limestone, and part of the Avon Park Formation (2025 SWFWMD RWSP).

- The Suwannee Limestone is present at or near land surface in Hernando County and is up to 100 feet thick. It contains numerous solution channels that form part of the upper flow zone of the aquifer and are the primary source of spring discharge in the region.
- The Ocala Limestone, approximately 50 to 150 feet thick, is the uppermost unit for most of the remainder of the WRWSA service area. Both the Suwannee and Ocala Limestones exhibit extensive karst development, including sinkholes and solution cavities that promote rapid recharge.
- The Avon Park Formation, which is approximately 1,000 feet thick within the WRWSA service area, consists of interbedded limestones and dolostones with locally present gypsum beds. It underlies the entire region and outcrops in limited areas, mainly within Citrus County. The Avon Park Formation represents the deepest potable water-bearing zone of the UFA and forms its lower flow system.

1.2.5.2 Lower Floridan Aquifer

The Lower Floridan Aquifer (LFA) underlies the UFA throughout the WRWSA region and is separated from it by one or more middle confining units (MCUs) within the lower Avon Park Formation. These confining units, which vary in thickness and extent, limit hydraulic connectivity between the two aquifers, though their spatial distribution is not fully characterized.

The LFA consists primarily of carbonate rocks from the lower Avon Park and Oldsmar Formations. Dominant lithologies include chalky, fossiliferous limestones and porous, crystalline dolostones, with localized intergranular gypsum (USGS, 1986). In certain intervals, the LFA is capable of yielding substantial quantities of groundwater; several utilities in central Florida have developed municipal supplies from this aquifer.

Water quality within the LFA ranges from fresh to highly mineralized, depending on depth, confinement, and proximity to the coast. The top of the aquifer generally lies between 800 and 1,200 feet below land surface. Due to the high cost of drilling and variable water quality, the LFA has not been widely developed in the WRWSA region. However, portions of the aquifer beneath the MCU I confining unit have been identified as a potential future supply source for utilities in Marion and Sumter Counties.

Given the limited regional data available, site-specific testing is required at proposed LFA well sites to evaluate water quality and confirm the degree of confinement between the Upper and Lower Floridan Aquifers. Such testing is critical for determining suitability for potable supply, aquifer storage and recovery (ASR), or brackish water treatment.

1.2.5.3 Karst Hydrogeology

Much of the WRWSA region exhibits intensive karst development, particularly within the Coastal Lowlands, Brooksville Ridge, and Tsala Apopka Plain. The dissolution of limestone has created an extensive subsurface network of conduits, cavities, and sinkholes that strongly influence both groundwater flow and surface water drainage.

Sinkholes capture surface water runoff and channel it directly into the aquifer, enhancing recharge but also increasing the vulnerability of groundwater to contamination. Over time, continued dissolution and collapse enlarge these features, creating integrated underground drainage systems that transport groundwater rapidly through the Upper Floridan Aquifer.

Because the water table has fluctuated in response to historical changes in sea level, multiple vertical and lateral flow pathways have developed within the underlying carbonate strata (Carroll, 1970; Jones et al., 1997). These pathways contribute to the high transmissivity of the aquifer system and establish strong hydraulic connections between groundwater and surface water features such as springs, rivers, and wetlands.

1.3 Regional Context for Planning

The physical, hydrologic, and institutional setting described in this chapter provides the foundation for evaluating the region's future water needs and supply options. The WRWSA's four-county planning area is characterized by highly productive but vulnerable karst aquifers, extensive natural systems, and diverse land uses ranging from coastal wetlands to intensive agriculture and growing urban centers.

Understanding these regional characteristics is critical for identifying sustainable water management strategies that balance water supply reliability with protection of natural systems. The chapters that follow build on this foundation to examine existing water resource protection programs, forecast future water demands, and evaluate conservation and alternative water supply (AWS) options needed to meet the region's long-term needs in an environmentally responsible and economically feasible manner.

2. Water Resource Protection Strategies

The water resources of the State of Florida are regulated and protected through the coordinated efforts of the Florida Department of Environmental Protection (FDEP) and the state's five Water Management Districts (WMDs). This chapter summarizes the water management district strategies and regulatory tools that protect water resources within and adjacent to the WRWSA planning area, with emphasis on Water Resource Caution Areas (WRCAs), MFLs, and associated prevention and recovery programs.

WRCAs are regions where cumulative groundwater withdrawals have the potential to cause significant adverse impacts to water resources, natural systems, or the public interest. Figure 2-1 shows the location of WRCAs within and surrounding the WRWSA's four-county region of Citrus, Hernando, Marion, and Sumter Counties.

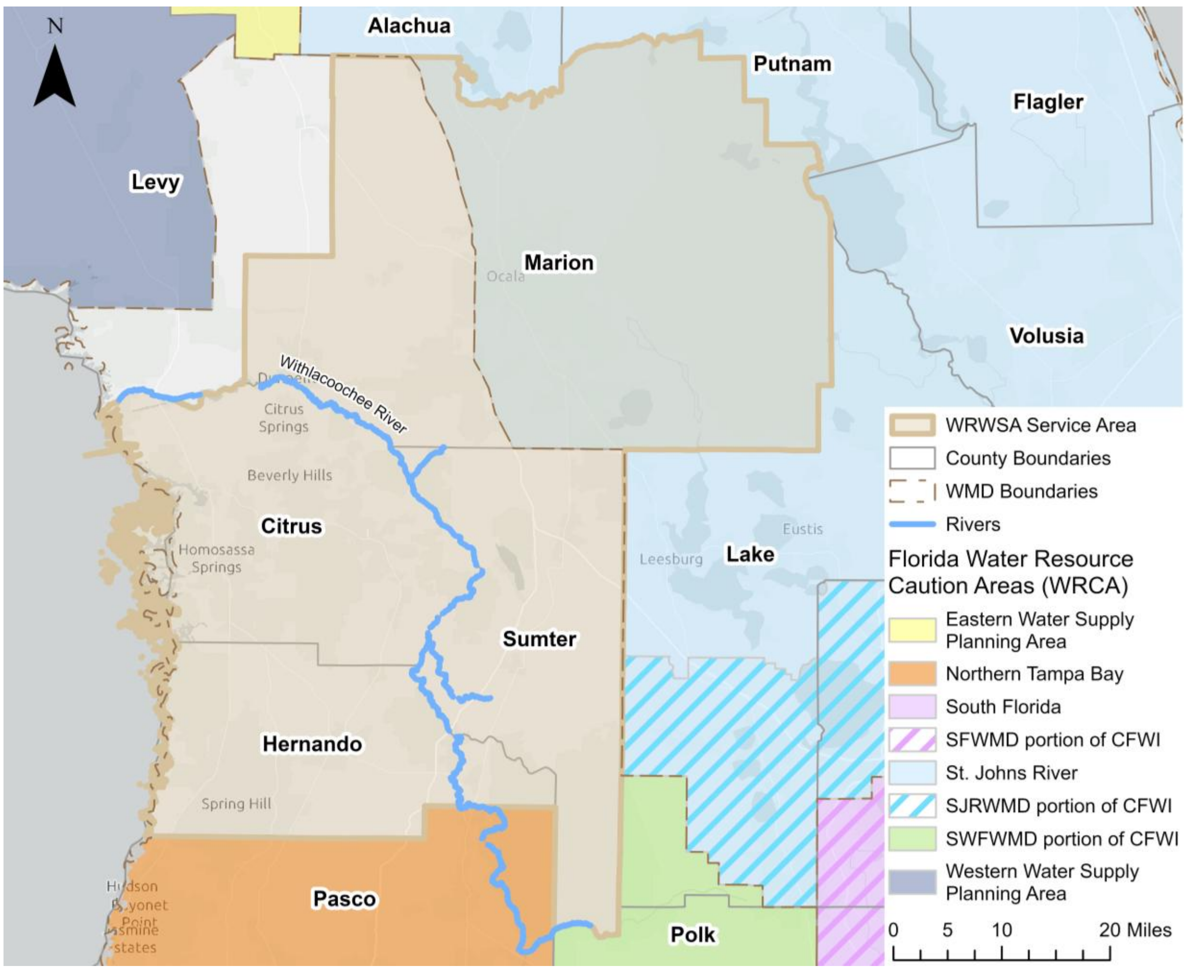

Figure 2-1: Water Resource Caution Areas within the WRWSA Planning Area

The entire SJRWMD has been designated as a WRCA, which includes eastern Marion County within the WRWSA planning region.

The Central Florida Water Initiative (CFWI) Planning Area is a WRCA and collaborative water supply planning effort consisting of all Orange, Osceola, Seminole, and Polk counties and southern Lake County where the boundaries of the St. Johns River, South Florida, and Southwest Florida water management districts meet.

To the northwest, the Suwannee River Water Management District (SRWMD) has identified two adjacent planning areas as WRCAs:

- The Western Water Supply Planning Area, which includes portions of Levy County, and
- The Eastern Water Supply Planning Area, which includes a portion of Alachua County.

To the south, SWFWMD's Northern Tampa Bay Water Use Caution Area (WUCA) encompasses Pinellas, Pasco, and northern Hillsborough Counties.

This chapter provides an overview of the regulatory and resource management strategies currently being implemented by the water management districts within the WRWSA region to ensure the long-term protection, sustainability, and efficient use of water resources.

2.1 SWFWMD Strategies

In response to development pressure and the need to protect sensitive resources, SWFWMD implements a strategy that prioritizes conservation, efficiency, and reuse to extend the viability of groundwater supplies and delay or minimize reliance on higher-cost alternative sources. This approach is intended to help avoid unacceptable resource impacts and support consistency with adopted MFLs.

SWFWMD's Strategic Plan includes a priority in the Northern Planning Region to "ensure long-term sustainable water supply." The three objectives outlined for this priority are as follows:

1. Increase water conservation
2. Increase the use of reclaimed water for potable, recharge and environmental enhancement projects
3. Continue to coordinate with the Withlacoochee Regional Water Supply Authority on regional water supply planning and development

Key requirements and programs

- **Public supply per capita performance:** Rule requirements limit gross per capita to 150 gpcd; utilities must calculate per-capita and service-area population and submit an annual public supply survey.
- **Expanded conservation rules and planning:** The District has adopted a suite of conservation-related requirements, including:
    - Enhanced conservation standards and conservation plans;
    - Justification of unused permitted quantities;
    - Irrigation limits for golf course roughs;
    - Water-conserving rate structures (inclining blocks, seasonal, or drought surcharges);
    - Reclaimed water feasibility evaluations and supplier/receiver reports to expand offsets and interconnections.
- **Stakeholder outreach:** Conservation summits, technical workshops, and coordination with local governments, utilities, media editorial boards, and partner agencies.

2.2 SJRWMD Strategies

The SJRWMD implements a suite of regulatory and resource management strategies to protect and restore water resources within its jurisdiction, including the eastern portion of Marion County within the WRWSA region. These strategies focus on sustaining groundwater levels, protecting spring flows, and maintaining ecological health through regulatory programs, cooperative projects, and planning initiatives.

In 2017, SJRWMD adopted MFLs and approved the Prevention Strategy for the Implementation of Silver Springs Minimum Flows and Levels (Prevention Strategy). Because flows at Silver Springs were projected to fall below the established minimums within the 2035 planning horizon, the Prevention Strategy was developed to implement projects, management actions, and supplemental regulatory measures to help maintain flows consistent with the adopted MFLs. Silver Springs' MFLs prevention status was confirmed in the Central Springs/East Coast Regional Water Supply Plan; 2020 – 2040 (SJRWMD, 2022). The District continues to monitor hydrologic conditions and track project implementation progress.

In addition to establishing and assessing MFLs, SJRWMD actively collaborates with local governments and utilities on projects that promote water conservation, aquifer recharge, and alternative water supply development. These projects support the long-term sustainability of water resources within the Silver Springs and Ocklawaha River basins and include:

- Reclaimed water and recharge projects to offset groundwater use;
- Regional planning coordination with the WRWSA, SWFWMD, and neighboring districts;
- Cooperative conservation programs supported through funding and technical assistance.

Through these efforts, SJRWMD seeks to balance water supply development with environmental protection, supporting the long-term maintenance of groundwater withdrawals, surface water flows, and ecological integrity.

2.3 Minimum Flows and Levels

The MFL program is a key regulatory tool established by the Florida Water Resources Act of 1972 (Chapter 373, Florida Statutes) to protect the state's water resources and natural systems from significant harm due to excessive water withdrawals. MFLs define the limit at which further withdrawals would cause significant harm to the water resources or ecology of a given system.

Under Section 373.042, F.S., each WMD is required to establish MFLs for surface watercourses, aquifers, and surface waters within its jurisdiction. Once adopted, these levels and flows serve as regulatory benchmarks in the water use permitting process and as planning tools to guide sustainable water supply development.

The Water Resource Implementation Rule (Chapter 62-40, Florida Administrative Code) further directs the Districts to establish MFLs using the best available scientific methods and to implement prevention or recovery strategies where needed:

- **Prevention Strategy:** Required when a waterbody's existing flow or level is above, but projected to fall below, its established minimum within the next 20 years.

- **Recovery Strategy:** Required when a waterbody's flow or level is already below its established minimum.

If either condition exists, the responsible WMD must adopt and implement a strategy that includes regulatory, management, and project-based measures to restore or maintain flows and levels consistent with ecological and water resource protection goals.

In accordance with Section 373.042(3), F.S., the Water Management Districts must also update and submit to FDEP an annual priority list and schedule for establishing or revising MFLs. When determining this schedule, the Districts consider factors such as:

- Regional and statewide importance of the waterbody;
- Existing or potential for significant harm to water resources or ecology;
- Inclusion of major springs, including all first-magnitude and state or federally owned second-magnitude springs;
- Availability of long-term hydrologic data sufficient for statistical and modeling analysis;
- Proximity to other established MFLs for related water resources;
- Potential for future water supply development; and
- Regulatory and permitting value of establishing an MFL.

The MFL program provides the scientific and regulatory foundation for balancing water use with resource protection. It is intended to ensure that water withdrawals and water supply development occur within limits that preserve the ecological and hydrologic integrity of Florida's aquifers, rivers, lakes, and springs.

Within the WRWSA planning region, both WMDs have established MFLs for numerous lakes, rivers, and springs (Figure 2-2 through Figure 2-5).

2.3.1 Adopted SWFWMD MFLs in WRWSA

The SWFWMD has adopted MFLs for numerous surface water and spring systems across Citrus, Hernando, Marion, and Sumter Counties within the WRWSA region. These MFLs are determined through hydrologic, ecological, and statistical analyses conducted by the District and are documented in SWFWMD's Minimum Flows and Levels Reports. Table 2-1 summarizes adopted MFLs for lakes, while Table 2-2 lists those for rivers and springs by county. The tables identify the waterbody name, MFL value, year adopted, and current status. The county and current status are also listed. Based on available data, MFLs within the WRWSA portion of SWFWMD are currently meeting their respective minimum flows or levels.

2.3.2 Adopted SJRWMD MFLs in WRWSA

MFLs are established based on analyses documented in SJRWMD's Minimum Flows and Levels Reports. MFLs represent the minimum long-term hydrologic regime necessary to sustain important ecological and human-use values at priority water bodies. Table 2-3 lists the adopted MFLs for lakes and Table 2-4 lists the adopted MFLs for springs within the portion of the WRWSA region under the jurisdiction of the SJRWMD. Each table includes the MFL value, year adopted, and current status. MFLs for Silver Springs are detailed in Table 2-5. All MFLs in this portion of the region were determined by SJRWMD to be met under current and 2040 conditions, except Silver Springs, which is in prevention (SJRWMD, 2022). Supplemental regulatory measures adopted as part of the Silver Springs Prevention Strategy impose additional permitting requirements for uses that impact Silver Springs. To note, Silver Springs and Silver Glen Springs affect two different springsheds.

2.4 MFL Reevaluations

The WMDs periodically reevaluate established MFLs to ensure they continue to reflect current hydrologic conditions, ecological relationships, and best-available science. Reevaluations may result in revised values, updated methodologies, or new supporting data for water resource planning and permitting. Table 2-6 lists the waterbodies within the WRWSA region scheduled for MFL reevaluation, along with the responsible District and anticipated completion year. These periodic reviews ensure that MFLs remain protective of regional water resources and continue to provide a sound scientific foundation for sustainable water management and supply planning.

Table 2-1: Adopted SWFWMD MFLs for Lakes in the WRWSA Service Area

Waterbody Name	MFLs (ft NGVD)	Year Adopted	MFL Status
Citrus County			
Ft. Cooper	28.7	2007	Meeting
Tsala Apopka – Floral City Pool	39.8	2007	Meeting
Tsala Apopka – Inverness Pool	38.7	2007	Meeting
Tsala Apopka –Hernando Pool	37.3	2007	Meeting
Hernando County			
Mountain	98.7	2005, 2021	Meeting
Neff	93.7	2005, 2021	Meeting
Spring	179.0	2005	Meeting
Weekiwachee Prairie	18.3	2005	Meeting
Hunters	16.4	2005	Meeting
Lindsey	65.3	2005	Meeting
Tooke	16.3	2013	Meeting
Whitehurst	17.5	2013	Meeting
Marion County			
Bonable	58.3	2013	Meeting
Little Bonable	52.2	2013	Meeting
Tiger	58.3	2013	Meeting
Sumter County			
Big Gant	74.9	2007	Meeting
Black	51.3	2007	Meeting
Deaton	63.2	2007	Meeting
Miona	51.3	2007	Meeting
Okahumpka	56.7	2007	Meeting
Panasoffkee	39.4	2007	Meeting

Table 2-2: Adopted SWFWMD MFLs for Rivers and Springs in the WRWSA Service Area

<table>
<tr><th>Waterbody Type</th><th>Waterbody Name</th><th>Percent Allowable Reduction</th><th>Year Adopted</th><th>MFL Status</th></tr>
<tr><td colspan="5">Citrus County</td></tr>
<tr><td rowspan="3">River Estuary</td><td>Chassahowitzka River</td><td>8%</td><td>2013, 2020</td><td>Meeting</td></tr>
<tr><td>Homosassa River</td><td>5%</td><td>2013, 2020</td><td>Meeting</td></tr>
<tr><td>Crystal River</td><td>11%</td><td>2018</td><td>Meeting</td></tr>
<tr><td rowspan="3">Spring</td><td>Chassahowitzka Spring Group</td><td>8%</td><td>2013, 2020</td><td>Meeting</td></tr>
<tr><td>Homosassa Spring Group</td><td>5%</td><td>2013, 2020</td><td>Meeting</td></tr>
<tr><td>Kings Bay Spring Group</td><td>11%</td><td>2018</td><td>Meeting</td></tr>
<tr><td colspan="5">Hernando County</td></tr>
<tr><td>River</td><td>Weeki Wachee River</td><td>10%</td><td>2009</td><td>Meeting</td></tr>
<tr><td rowspan="2">Spring</td><td>Weeki Wachee Spring Group</td><td>10%</td><td>2009</td><td>Meeting</td></tr>
<tr><td>Blind Spring</td><td>8%</td><td>2013, 2020</td><td>Meeting</td></tr>
<tr><td colspan="5">Marion County</td></tr>
<tr><td>River</td><td>Rainbow River</td><td>5%</td><td>2020</td><td>Meeting</td></tr>
<tr><td>Spring</td><td>Rainbow Spring Group</td><td>5%</td><td>2020</td><td>Meeting</td></tr>
<tr><td colspan="5">Sumter County</td></tr>
<tr><td>Spring</td><td>Gum Slough Spring Run</td><td>6% when flow >43 cfs</td><td>2016</td><td>Meeting</td></tr>
</table>

Table 2-3: Adopted SJRWMD MFLs for Lakes and Wetlands in the WRWSA Service Area

Waterbody Name	MFLs (ft NGVD)	Year Adopted	MFL Status[1]
Lakes			
Kerr	21.7	2016	Meeting
Weir	56.4	2000	Not assessed (under reevaluation)
Charles	39.3	2003	Meeting
Halfmoon	47.9	2003	Meeting
Bowers	54.0	2004	Meeting
Nicotoon	53.3	2004	Meeting
Smith	51.4	2004	Meeting
Wetlands			
Hopkins Prairie	23.4	2004	Meeting

[1] As reported in the SJRWMD 2022 Central Springs/East Coast Regional Water Supply Plan

Table 2-4: Adopted SJRWMD MFLs for Springs in the WRWSA Service Area

Waterbody Name	MFLs (Mean Annual Flow in cfs)	Year Adopted	MFL Status[1]
Silver Springs	NA (see Table 2-5)	2017	Prevention
Silver Glen Springs	99.6	2017	Meeting

[1] As reported in the SJRWMD 2022 Central Springs/East Coast Regional Water Supply Plan

Table 2-5: MFLs for Waterbodies Currently in Prevention[1]

Waterbody Name	Minimum Flows	Flow (cfs)	Level (NAVD)	Duration (days)	Return Interval (years)
Silver Springs	Frequent High	828	40.0	30	5
	Average	638	38.2	180	1.7
	Frequent Low	572	37.0	120	3

[1] Fla. Admin. Code R. 40C-8.031(11) (2025)

Table 2-6: MFLs to be Re-Evaluated in the WRWSA Service Area

County	Waterbody Type	Waterbody Name	Year To Be Re-Evaluated
Sumter	Spring	Gum Slough Spring Run	2026
Citrus	River, Estuary	Crystal River	2027
	Spring	Kings Bay Spring Group	2027
Marion (SJRWMD)	Lake	Weir	2028

2.5 Future MFLs

Future MFLs are planned for several segments of the Withlacoochee River, managed by SWFWMD. No additional MFLs are currently proposed within the SJRWMD portion of the WRWSA planning area. Table 2-7 identifies the future MFLs scheduled for adoption and their anticipated completion years.

In February 2024, WRWSA met with SWFWMD to discuss methods for estimating potential surface-water availability from the Withlacoochee River ahead of formal MFL adoption. Because the original analyses dated back to 2010, SWFWMD adopted an interim method for estimating supply availability until the MFLs are finalized. This approach, described in Appendix 4-2 of the District's 2025 Regional Water Supply Plan, provides a scientifically supported means of estimating river yield in the absence of finalized MFLs.

To support this effort, WRWSA contracted Applied Sciences Consulting, Inc. to estimate potential flows available for water-supply use from the Withlacoochee River. The resulting technical memorandum is included in Appendix A.

Table 2-7: Future SWFWMD MFLs in the WRWSA Service Area

County	Waterbody Type	Waterbody Name	Year To Be Adopted
Citrus, Marion, Sumter	River	Withlacoochee River (Upper Segment, Holder to Wysong Gage)	2026
Citrus, Sumter, Hernando	River	Withlacoochee River (Upper Segment, Wysong to Croom Gage)	2026
Hernando, Sumter	River	Withlacoochee River (Upper Segment, Upstream of Croom Gage)	2026
Citrus	River, Estuary	Withlacoochee River (Lower Segment)	2026

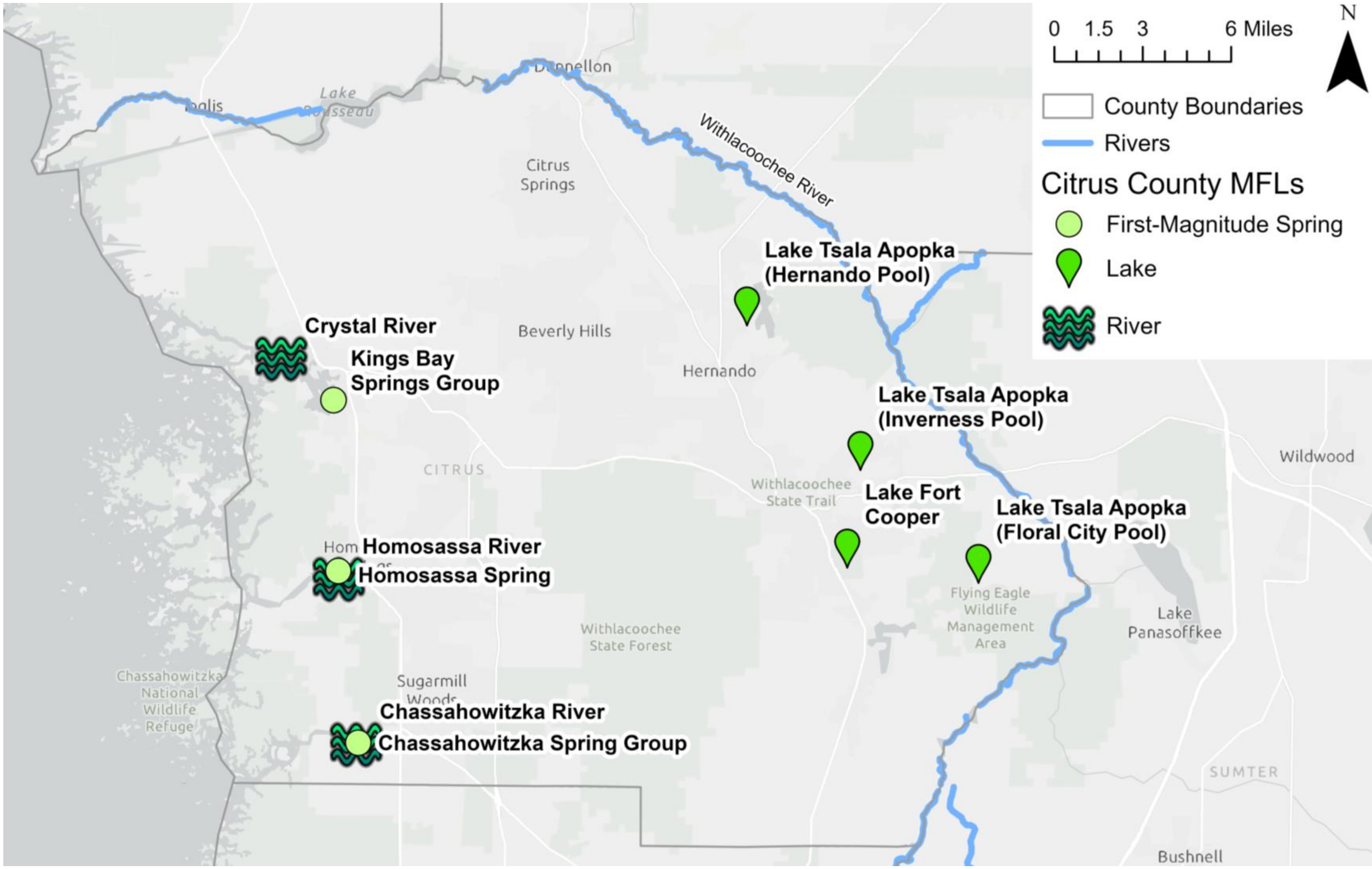

Figure 2-2: Adopted MFLs in Citrus County

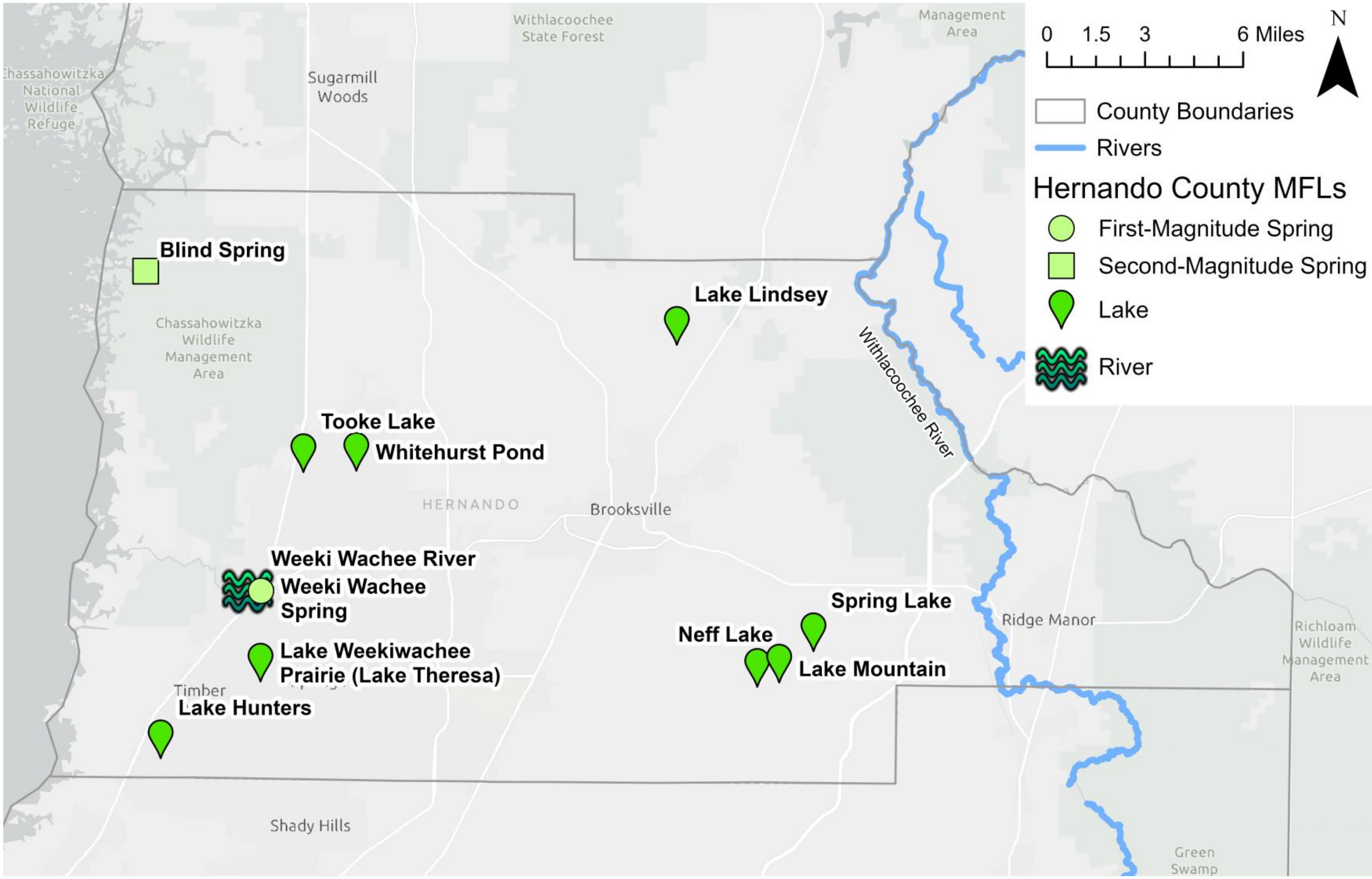

Figure 2-3: Adopted MFLs in Hernando County

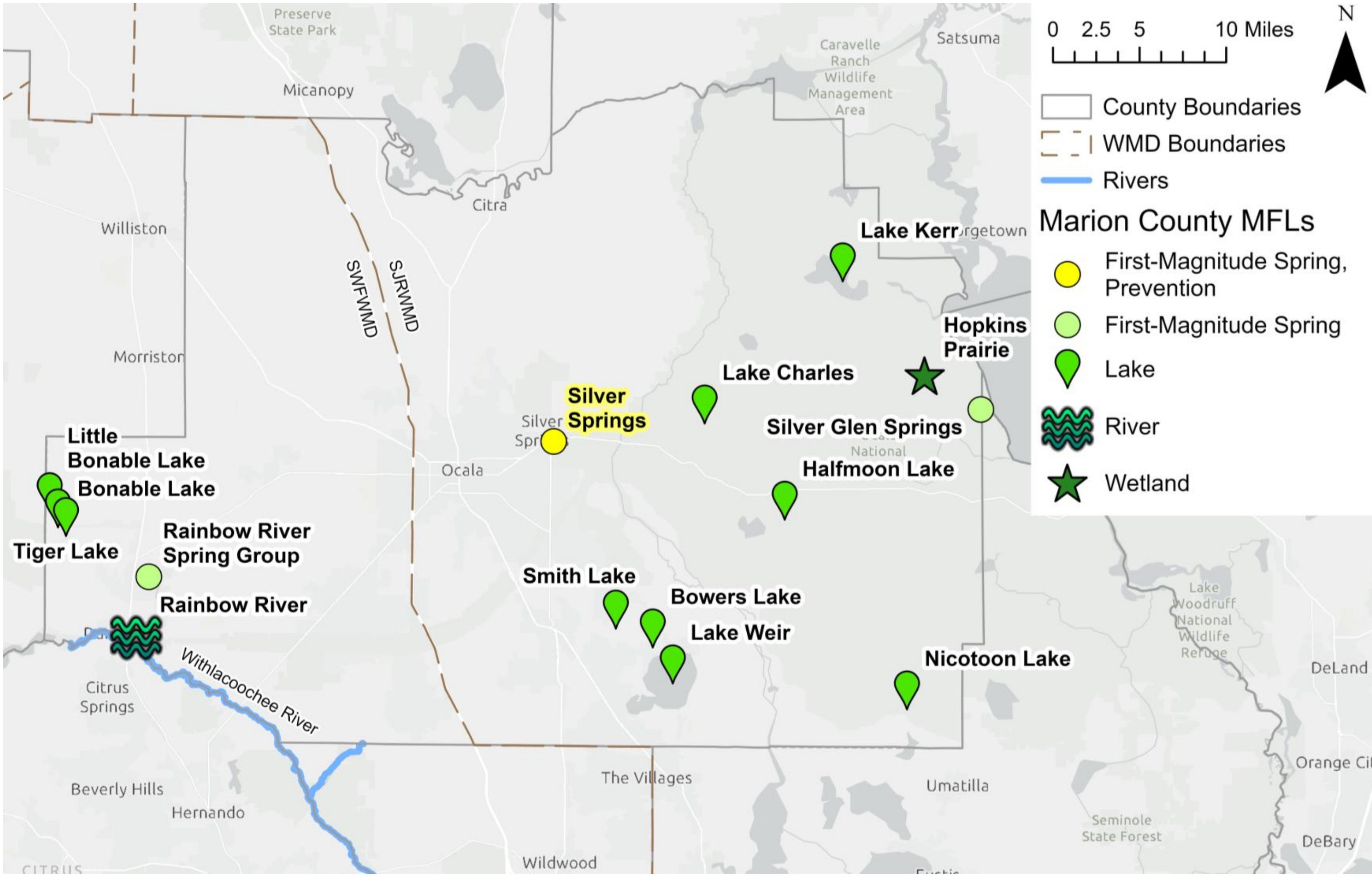

Figure 2-4: Adopted MFLs in Marion County

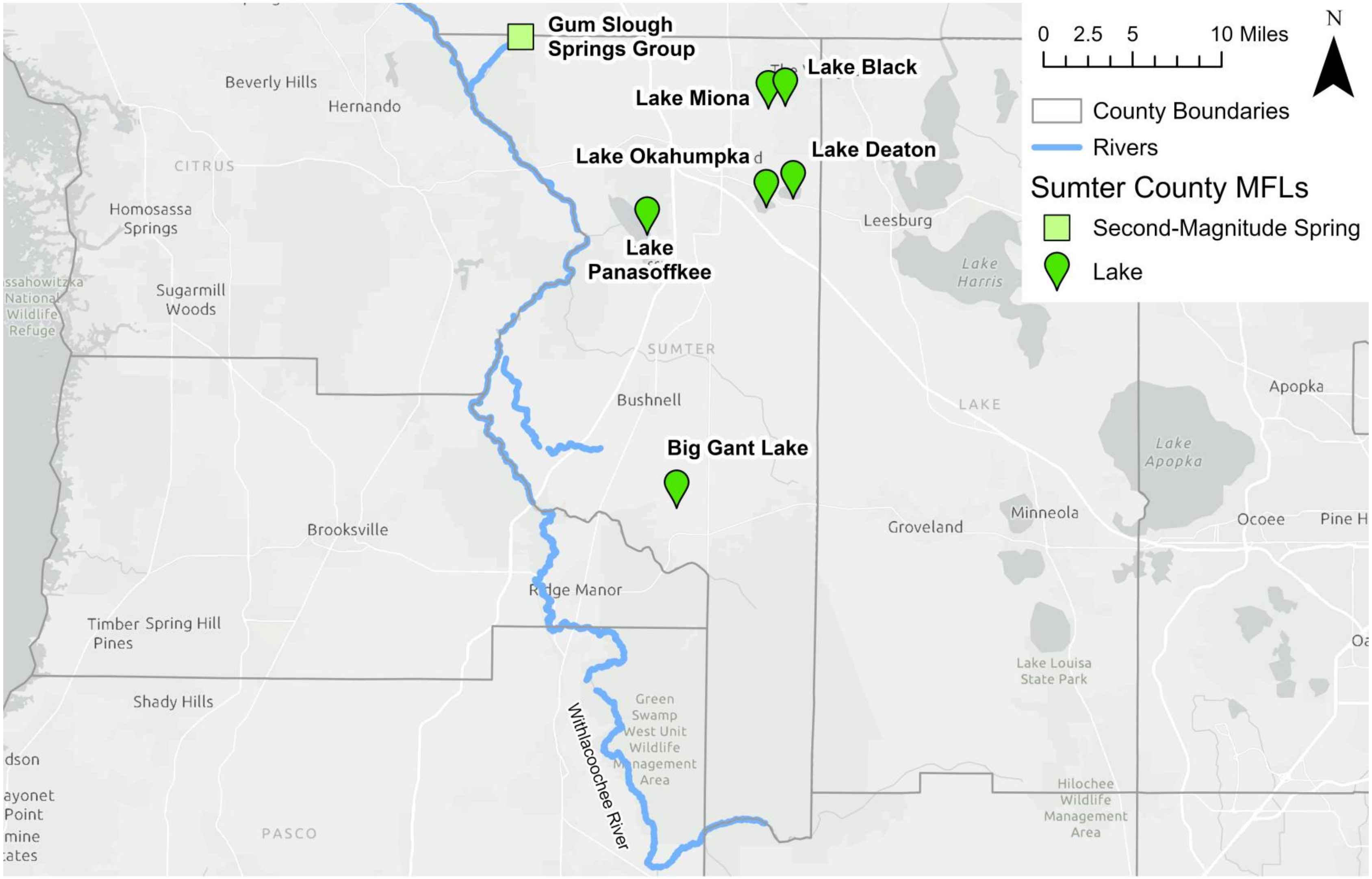

Figure 2-5: Adopted MFLs in Sumter County

3. Water Demand Projections

This section provides a comprehensive analysis of projected water demand in the WRWSA four-county region over the planning horizon. The projections represent the volume of water needed to meet reasonable and beneficial use from the 2020 base year through 2045. These estimates reflect total demand prior to applying reductions that may be achieved through demand management. This section concludes with an adjustment to projected per capita water use to account for reclaimed water use offsets. It is important to note that these demands do not incorporate water conservation efforts, which is addressed in Section 4.

3.1 Methodology and Data Sources

This chapter presents the projected water demand within the WRWSA four-county region for the planning period. Demand projections are presented for the following use types: public supply (PS), additional irrigation demand (IRR), domestic self-supply (DSS), landscape and recreation (L/R), agricultural (AG), industrial/commercial and mining/dewatering (I/C & M/D), and power generation (PG). For detailed methodologies on how these demands were calculated by the SWFWMD, see the SWFWMD 2025 RWSP Appendix 3. SJRWMD provided water demand projections in a spreadsheet dated August 10, 2023. Table 3-1 summarizes the definition of each use type. Non-public supply demand projections were based on Water Management District (WMD) datasets to maintain consistency with regional planning methodologies. Public water supply and population projections were developed in coordination with individual utilities using localized planning information. If no information was submitted by a utility, the corresponding projection from the WMD was used. Table 3-2 and Table 3-3 present the utility-based projections by county.

Table 3-1: Description of Water Use Types and Abbreviations

Water Use Type	Abbreviation	Description of Uses
Public Water Supply	PS	Mainly potable and household uses; some commercial, institutional, and industrial users are also connected to public water supply systems
Additional Irrigation Demand	IRR	Groundwater supplied via private wells for use in lawn irrigation within a utility service area; homeowners obtain potable water via a connection with a utility, but meet irrigation needs using their own well
Domestic Self Supply	DSS	Self-served potable and household uses for individual (or multi-family) residences
Landscape/Recreation	L/R	Golf course and landscape irrigation
Agricultural	AG	Irrigation of crops, livestock watering, and aquaculture
Industrial/Commercial & Mining/Dewatering	I/C & M/D	Businesses, manufacturing facilities, schools, hospitals, hotels, processing facilities, industrial fire protection, and mining
Power Generation	PG	Thermoelectric power generation

Table 3-2: Utility-Based Water Demand Projections by County (MGD)

County	Observed	Projected					2025 - 2045		
	2020	2025	2030	2035	2040	2045	Change	% Change	% of Total
Citrus	14.73	16.19	18.04	19.67	20.90	22.01	5.81	35.9%	14.9%
Hernando	21.12	22.28	25.75	28.62	31.18	33.49	11.21	50.3%	28.7%
Marion (SJRWMD)	21.18	23.38	23.98	24.59	25.16	25.73	2.35	10.1%	6.0%
Marion (SWFWMD)	12.36	15.34	16.31	17.13	18.54	19.84	4.50	29.3%	11.5%
Sumter	26.19	26.04	31.97	35.83	38.82	41.23	15.19	58.3%	38.9%
WRWSA Total	95.58	103.23	116.05	125.83	134.60	142.29	39.06	37.8%	100.0%

Table 3-3: Utility-Based Population Projections by County

County	Observed	Projected					2025 - 2045		
	2020	2025	2030	2035	2040	2045	Change	% Change	% of Total
Citrus	105,669	119,543	132,636	146,835	154,896	162,815	43,272	36.2%	12.6%
Hernando	169,545	188,090	210,189	234,210	255,818	275,490	87,400	46.5%	25.5%
Marion (SJRWMD)	145,484	157,416	162,585	167,821	172,133	176,398	18,982	12.1%	5.5%
Marion (SWFWMD)	79,519	101,787	106,610	110,823	114,527	117,689	15,902	15.6%	4.6%
Sumter	125,703	162,820	237,451	282,284	315,570	339,653	176,833	108.6%	51.6%
WRWSA Total	625,921	729,656	849,471	941,973	1,012,944	1,072,045	342,389	46.9%	100%

To develop the final WRWSA baseline projections, the utility-based projections discussed above were adjusted based on each utility's beneficial reclaimed water use. A survey was distributed to utilities with reclaimed water to collect data on their current and future projected reclaimed water use. Participants of the survey included Bay Laurel, Citrus County Utilities, Crystal River, Hernando County Utilities, the City of Ocala, the Villages, Gibson Place Utility Company, and the City of Wildwood. Reclaimed water information for other utilities was determined using the 2020 FDEP Reuse Inventory.

Using the utility-based public supply GPCD and the calculated reclaimed water GPCD, an adjusted potable demand GPCD accounting for reclaimed water offsets was developed, recognizing that the extent to which reclaimed water offsets potable demand varies by utility depending on system configuration and end use. Because the projected per capita values are based on total potable demand within the utility service area, they inherently reflect changes in nonresidential and irrigation-related potable demands, including potential offsets associated with reclaimed water availability. This adjusted potable demand was converted to MGD using the utility-based public supply population. A table displaying this methodology for reclaimed water projections is provided in Appendix B.[1]

The reclaimed water-adjusted demand projections are referred to as the WRWSA baseline projections. The WRWSA baseline projections are used as the foundation for the demand analysis presented in the following subsection. Table 3-4 shows the utilities whose projections were updated based on reclaimed water offsets through the reclaimed water use surveys and the FDEP Reuse Inventory.

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[1] Reclaimed water offsets are applied at a planning level, that offsets may not be uniform across utilities, and that the relationship between reclaimed use and public supply per capita is dependent on service area conditions and end uses.

Table 3-4: Utilities with Adjusted WRWSA Baseline Projections Based on Reclaimed Water Offsets (MGD)

County	Utility	WRWSA Baseline Water Demands						Difference in WRWSA Baseline and Utility-Based Projections					
		2020	2025	2030	2035	2040	2045	2020	2025	2030	2035	2040	2045
Citrus	Citrus Co. - Charles A. Black	4.66	5.21	6.39	7.54	8.59	9.39	-0.06	-	-0.03	-0.08	-0.13	-0.19
	Citrus Co. - Point O Woods	0.08	0.13	0.12	0.12	0.12	0.12	-	-	-	-	-0.01	-0.01
	Citrus Co. - Sugarmill Woods[1, 2]	2.17	2.44	2.41	2.35	2.17	2.04	-	-	-0.17	-0.35	-0.52	-0.71
	City of Crystal River	0.75	0.76	0.77	0.78	0.79	0.80	-	-	-	-	-	-
	City of Inverness	0.97	1.01	1.04	1.07	1.09	1.10	-	-	-	-	-	-
	Rolling Oaks	1.50	1.59	1.65	1.70	1.74	1.77	-	-	-	-	-	-
Hernando	City of Brooksville	1.33	1.40	1.48	1.56	1.64	1.70	-	-	-	-	-	-
Sumter	City of Bushnell	0.45	0.74	1.01	1.21	1.39	1.56	-	-	-	-	-	-
	City of Wildwood[2]	1.64	3.37	3.80	4.20	4.49	4.67	-	-	-0.30	-0.71	-1.23	-1.86
Marion (SWFWMD)	Bay Laurel	3.80	4.68	5.38	6.00	7.20	8.30	0.02	-	-0.03	-	-	-
	City of Dunnellon	1.07	1.16	1.24	1.30	1.36	1.41	-	-	-	-	-	-
	Marion Co. Utilities Consolidated	6.82	8.81	8.98	9.14	9.31	9.46	-0.01	-0.01	-	-	0.01	0.01
Marion (SJRWMD)	City of Belleview	0.98	1.04	1.11	1.16	1.21	1.26	-	-	-	-	-	0.01
	Marion Co. Utilities Consolidated	6.22	6.94	7.45	7.96	8.47	8.97	0.01	-	-0.01	-0.02	-0.03	-0.05

[1] Specific future end uses for allocated reclaimed water were not identified in the reclaimed water survey. A portion of the projected reclaimed water may ultimately provide irrigation to two golf courses via a reclaimed water project currently under development; therefore, actual projected potable demands may be higher if these allocated potable offsets are not fully realized within the service area over time.

[2] The projected per capita values are based on total potable demand within the utility service area, therefore they inherently reflect changes in nonresidential and irrigation-related potable demands, including potential offsets associated with reclaimed water availability. The extent to which reclaimed water offsets potable demand will vary by utility depending on system configuration and end use.

For utilities that provided updated potable water demands in the reclaimed water survey, projections were assumed to reflect reclaimed water use as incorporated by the utility and are not shown in Table 3-4. These utilities include Bay Laurel, Hernando County Utilities, Gibson Place Utility Company, and the Villages. The City of Ocala is also not included in this table, as its service expansion area is limited, and their demands are constant from 2025 to 2045. South Sumter Utility Company is also not shown in this table, as its reclaimed water received from the Leesburg/Turnpike WWTF exceeds its potable water demand, so the demand projections were assumed to have already accounted for reclaimed water.

Most utilities had an offset of 0 MGD to less than 0.005 MGD as indicated by the dashes in the table. This reflects many utilities either do not project beneficial reuse or have relatively low beneficial reuse relative to their potable water demand projections.

3.2 Baseline Water Demand and Population Projections

Table 3-5 and Table 3-6 summarize the water demand and population projections developed for this study. Together, they provide an overview of projected growth across the WRWSA region. WRWSA's baseline projections indicate that total public supply demand across the four counties is projected to increase by approximately 36.27 MGD (35.1%) between 2025 and 2045 (Table 3-5). Per WRWSA baseline projections, the four-county population is projected to grow from 729,656 people to 1,072,045 people, an increase of 342,389 people (46.9%) between 2025 and 2045 (Table 3-6). The largest population gains are projected in Sumter County, driven by ongoing development within The Villages and surrounding areas, followed by Hernando County due to continued suburban expansion.

Table 3-7 presents the aggregated four-county totals. Overall, non-public supply demand is projected to rise from 78.43 MGD in 2025 to 97.24 MGD in 2045, a 24.0% increase. The largest contributing sectors include domestic self-supply, landscape/recreation, and agriculture, while Citrus County remains the only county with projected water use for power generation.

Figure 3-1 presents total projected water demand by use type between 2020 and 2045 under WRWSA baseline public supply scenarios. The projections illustrate how regional demand growth is shaped not only by population and development pressures but also by changes in land use and water use behavior. While water use permits (WUPs) may be modified in the future based on hydrogeologic conditions, regulatory considerations, and water resource constraints, this highlights the need for continued investment in efficiency and alternative supply strategies across the planning horizon.

3.2.1 Citrus County

Table 3-8 and Table 3-9 present the WRWSA baseline projections for public supply water demand and population in Citrus County. These projections highlight projected trends in utility service growth. According to WRWSA projections, public supply demand in Citrus County is expected to increase by 4.90 MGD between 2025 and 2045, from 16.19 MGD to 21.10 MGD (Table 3-8). Over the same period, the public supply population is projected to grow by 43,272 people (36.2%), from 119,543 to 162,815 (Table 3-9). Overall, WRWSA projects a 30% increase in public supply demand over the 20-year planning horizon, consistent with steady but moderate growth relative to the inland counties in the WRWSA region.

Table 3-5: WRSWA Public Supply Baseline Water Demand Projections by County (MGD)

County	Observed	Projected Water Use (MGD)					2025 - 2045		
	2020	2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Citrus	14.67	16.19	17.84	19.24	20.24	21.10	4.90	30.3%	13.5%
Hernando	21.12	22.28	25.75	28.62	31.18	33.49	11.21	50.3%	30.9%
Marion (SJRWMD)	21.18	23.38	23.97	24.57	25.13	25.69	2.31	9.9%	6.4%
Marion (SWFWMD)	12.37	15.33	16.28	17.13	18.55	19.85	4.52	29.5%	12.5%
Sumter	26.19	26.04	31.67	35.12	37.60	39.37	13.33	51.2%	36.7%
WRWSA Total	**95.53**	**103.23**	**115.52**	**124.67**	**132.70**	**139.50**	**36.27**	**35.1%**	**100%**

Table 3-6: WRWSA Public Supply Population Projections by County

County	Observed	Projected Public Supply Population					2025 - 2045		
	2020	2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Citrus	105,669	119,543	132,636	146,835	154,896	162,815	43,272	36.2%	12.6%
Hernando	169,545	188,090	210,189	234,210	255,818	275,490	87,400	46.5%	25.5%
Marion (SJRWMD)	145,484	157,416	162,585	167,821	172,133	176,398	18,982	12.1%	5.5%
Marion (SWFWMD)	79,519	101,787	106,610	110,823	114,527	117,689	15,902	15.6%	4.6%
Sumter	125,703	162,820	237,451	282,284	315,570	339,653	176,833	108.6%	51.6%
WRWSA Total	**625,921**	**729,656**	**849,471**	**941,973**	**1,012,944**	**1,072,045**	**342,389**	**46.9%**	**100%**

Table 3-7: WRWSA Total Water Demand Projections by Use Type

Use Type	2020 Observed Water Use (MGD)	Projected Water Use (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
IRR[1]	4.95	5.32	5.63	5.88	6.10	6.28	0.96	18.0%
DSS	24.25	25.52	26.57	28.18	29.66	30.36	4.84	19.0%
L/R	16.32	17.30	20.88	24.56	26.18	27.28	9.98	57.7%
AG	20.01	20.55	20.79	21.32	22.09	22.21	1.66	8.1%
I/C & M/D	7.41	7.67	7.84	8.02	8.18	8.36	0.69	8.9%
PG	1.41	2.06	2.15	2.33	2.53	2.76	0.70	34.0%
PS (WRWSA Baseline)	95.53	103.23	115.52	124.67	132.70	139.50	36.27	35.1%
WRWSA TOTAL	**169.87**	**181.65**	**199.37**	**214.97**	**227.44**	**236.74**	**55.09**	**30.3%**

[1] Additional irrigation demands not projected by SJRWMD.

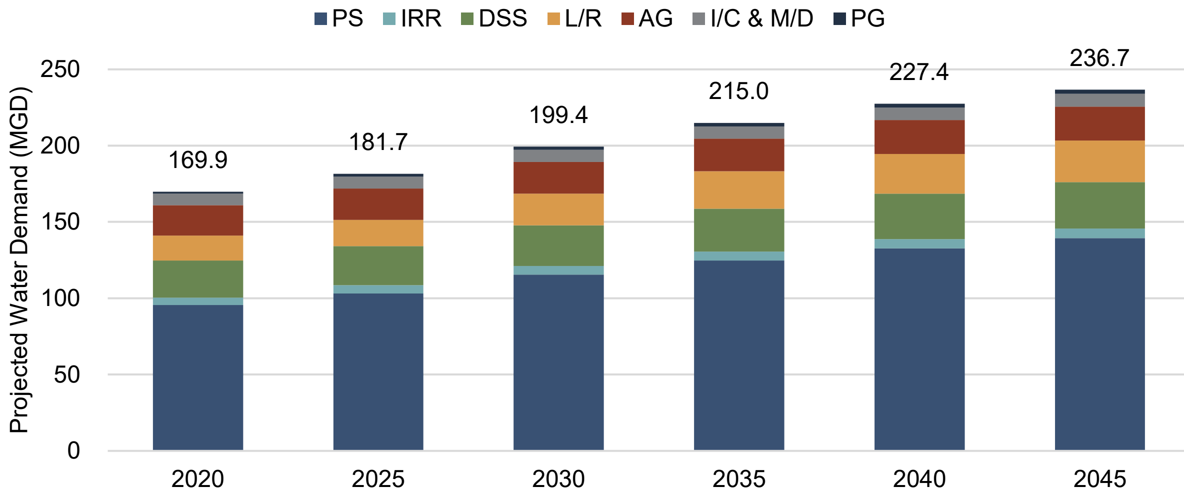


Figure 3-1: Water Demand Projections for All Use Types in the Four-County Region

3.2.1.1 Total Water Demand by Use Type

Table 3-10 summarizes water demand projections for all use types in Citrus County, including both public and non-public supply categories. Total water demand is projected to increase from 30.47 MGD in 2025 to 37.09 MGD in 2045, a gain of 6.61 MGD (21.7%).

Among the non-public supply sectors, demand rises from 14.28 MGD to 15.99 MGD (12.0%). The largest contributor to this increase is domestic self-supply, which adds approximately 0.80 MGD over the planning horizon. Power generation also exhibits notable growth, rising by 0.70 MGD (34%), consistent with ongoing facility expansion and modernization near Crystal River. Other categories, such as industrial/commercial, mining/dewatering, and additional irrigation show modest increases, while landscape/recreation and agriculture remain relatively stable, indicating limited changes in irrigated acreage and outdoor recreational demand.

Public supply accounts for roughly half of total countywide demand, underscoring the balance between utility-served and self-supplied populations. Figure 3-2 illustrates this distribution, highlighting the relative contribution of each use type to overall county demand and emphasizing the importance of continued efficiency and diversification of sources.

3.2.1.2 Water Use Permit Analysis

Average daily permitted withdrawals and peak daily permitted withdrawals are reported in Table 3-8. WUPs for each large utility are reported as of May 21, 2025. A recent technical memorandum prepared for Citrus County proposes consolidation of the Pine Ridge, Charles A. Black, and Sugarmill Woods permits into a single WUP with a combined average-daily capacity of 14.4 MGD. This would reflect ongoing efforts to align permitted capacities with observed growth and revised long-term demand projections, and support interconnections of the distribution system. It is also important to note that the Ozello Water Association (Permit No. 20230) operates as a wholesale customer of the Charles A. Black system.

Table 3-8: Citrus County Public Supply Utility Baseline Water Demand Projections

Utility Name	Permitted Capacity (MGD)[1]		GPCD (2016-2020)	2020 Water Demand (MGD)	Projected Public Supply Demands (MGD)					2025 - 2045		
	Avg.	Peak			2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[2, 3]	-	-	94	0.31	0.37	0.38	0.38	0.38	0.38	0.00	1.2%	0.1%
City of Crystal River	0.92	1.03	131	0.75	0.76	0.77	0.78	0.79	0.80	0.04	5.5%	0.7%
City of Inverness	1.54	1.98	107	0.97	1.01	1.04	1.07	1.09	1.10	0.09	9.2%	1.6%
Citrus County Pine Ridge[3]	4.78	7.17	135	2.59	3.09	3.26	3.48	3.53	3.65	0.56	18.0%	9.5%
Citrus County Charles A. Black[3]	7.18	9.12	165	4.66	5.21	6.39	7.54	8.59	9.39	4.18	80.3%	71.9%
Citrus County Sugarmill Woods[3]	2.44	3.46	180	2.17	2.44	2.41	2.35	2.17	2.04	-0.40	-16.4%	-6.9%
Cinnamon Ridge Utilities	0.29	0.49	104	0.06	0.06	0.07	0.07	0.07	0.07	0.01	10.2%	0.1%
GCP Walden Woods 1 and 2[3]	0.19	0.28	149	0.15	0.14	0.19	0.19	0.19	0.19	0.05	37.2%	0.9%
Floral City Water Assoc.	0.40	0.50	65	0.34	0.34	0.35	0.35	0.36	0.36	0.02	5.0%	0.3%
Homosassa Special Water District	0.95	1.09	135	0.78	0.79	0.80	0.81	0.81	0.82	0.03	3.5%	0.5%
Ozello Water Association, Inc.[3, 4]	0.51	0.76	81	0.38	0.38	0.53	0.53	0.53	0.53	0.14	37.2%	2.5%
Rolling Oaks Util. Inc.	1.57	2.03	134	1.50	1.59	1.65	1.70	1.74	1.77	0.18	11.4%	3.1%
Tarawood Utilities	0.15	0.30	61	0.01	0.01	0.01	0.01	0.01	0.01	0.00	3.9%	0.0%
WRWSA TOTAL	-	-	-	**14.67**	**16.19**	**17.84**	**19.24**	**20.24**	**21.10**	**4.90**	**30.3%**	**100%**

[1] SWFWMD Water Management Information System, as of May 21, 2025.
[2] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[3] Utility adjusted water demand.
[4] Wholesale permit.

Table 3-9: Citrus County Public Supply Utility Population Projections

Utility Name	2020	Projected Public Supply Population					2025 - 2045		
		2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[1,2]	3,110	3,174	3,231	3,277	3,314	3,345	171	5.4%	0.4%
City of Crystal River	5,681	5,768	5,865	5,949	6,022	6,088	320	5.5%	0.7%
City of Inverness	9,096	9,448	9,725	9,962	10,153	10,319	871	9.2%	2.0%
Citrus County Pine Ridge[2]	19,806	24,712	26,047	27,594	27,963	28,930	4,218	17.1%	9.7%
Citrus County Charles A. Black[2]	26,241	33,054	42,917	54,027	60,989	67,034	33,980	102.8%	78.5%
Citrus County Sugarmill Woods[2]	12,999	13,811	14,629	15,271	15,280	15,574	1,763	12.8%	4.1%
Cinnamon Ridge Utilities	584	609	629	646	659	671	62	10.2%	0.1%
GCP Walden Woods 1 and 2	1,021	1,021	1,021	1,021	1,022	1,022	1	0.1%	0.0%
Floral City Water Assoc.	5,175	5,280	5,364	5,436	5,494	5,546	266	5.0%	0.6%
Homosassa Special Water District	5,819	5,871	5,929	5,982	6,030	6,074	203	3.5%	0.5%
Ozello Water Association, Inc.	4,754	4,757	4,778	4,794	4,807	4,817	60	1.3%	0.1%
Rolling Oaks Util. Inc.	11,227	11,878	12,339	12,712	12,998	13,229	1,351	11.4%	3.1%
Tarawood Utilities	158	160	162	164	165	166	6	3.8%	0.0%
WRWSA TOTAL	**105,669**	**119,543**	**132,636**	**146,835**	**154,896**	**162,815**	**43,272**	**36.2%**	**100%**

[1] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[2] Utility adjusted population.

Table 3-10: Citrus County Water Demand Projections by Use Type (MGD)

Use Type	2020 Water Use (MGD)	Projected Water Use (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
IRR	1.08	1.14	1.18	1.22	1.26	1.28	0.14	12.3%
DSS	5.31	5.63	5.89	6.1	6.28	6.43	0.80	14.2%
L/R	3.24	3.26	3.27	3.28	3.29	3.29	0.03	0.9%
AG	1.66	1.80	1.80	1.80	1.81	1.81	0.01	0.6%
I/C & M/D	0.4	0.39	0.40	0.41	0.41	0.42	0.03	7.7%
PG	1.41	2.06	2.15	2.33	2.53	2.76	0.70	34.0%
PS (WRWSA Baseline)	14.67	16.19	17.84	19.24	20.24	21.10	4.90	30.3%
WRWSA TOTAL	**27.77**	**30.47**	**32.53**	**34.38**	**35.82**	**37.09**	**6.61**	**21.7%**

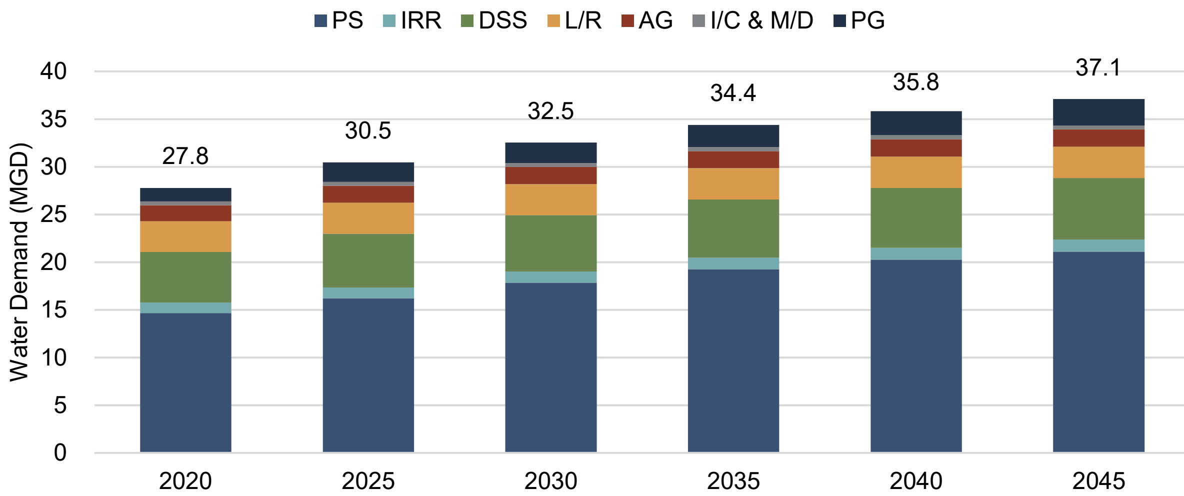


Figure 3-2: WRWSA Water Demand Projections by Use Types in Citrus County

3.2.2 Hernando County

Table 3-11 and Table 3-12 present the WRWSA baseline projections for public supply water demand and population in Hernando County., This data summarize the county's anticipated growth trajectory. According to WRWSA projections, public supply demand in Hernando County is projected to increase by 11.21 MGD between 2025 and 2045, rising from 22.28 MGD to 33.49 MGD (Table 3-11). Over the same period, the public supply population is projected to grow by 87,400 people (46.5%), from 188,090 to 275,490 (Table 3-12). Hernando County has experienced sustained population growth and development pressure, particularly in the Spring Hill and Brooksville areas along the U.S. 41 and Suncoast Parkway corridors. These areas continue to attract new residential and commercial development as growth from the Tampa Bay metropolitan area extends northward.

Hernando County Utilities accounts for nearly 97% of total projected public supply demand growth, increasing from 20.77 MGD in 2025 to 31.68 MGD in 2045—a rise of 10.91 MGD (52.5%). The City of Brooksville also shows a modest but steady increase of 0.30 MGD (21.2%) over the same period, reflecting infill and redevelopment within the city's service area.

Overall, WRWSA projects a 50% increase in public supply demand over the 20-year planning horizon, consistent with Hernando County's position as one of the fastest-growing areas within the region.

3.2.2.1 Total Water Demand by Use Type

Table 3-13 summarizes total projected water demand across all use types in Hernando County. Total demand is projected to increase from 37 MGD in 2025 to 50.56 MGD in 2045, a net gain of 13.56 MGD (36.6%). Public supply continues to dominate water use in the county, accounting for roughly two-thirds of total projected demand by 2045. Non-public supply uses make up the remaining one-third, growing more modestly over the planning horizon. Among these, domestic self-supply is the largest contributor, increasing from 2.93 MGD to 4.03 MGD (+1.10 MGD, 37.8%), followed by additional irrigation (+0.55 MGD, 17.1%) and industrial/commercial and mining/dewatering uses (+0.47 MGD, 13.7%).

Table 3-11: Hernando County Public Supply Utility Baseline Water Demand Projections

Utility Name	Permitted Capacity (MGD)[1]		GPCD (2016-2020)	2020 Water Demand (MGD)	Projected Public Supply Demands (MGD)					2025 - 2045		
	Avg.	Peak			2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[2, 3]	-	-	58	0.11	0.11	0.11	0.11	0.11	0.11	0.00	0.6%	0.0%
Hernando County Util.[3]	23.30	28.66	126	19.68	20.77	24.16	26.94	29.43	31.68	10.91	52.5%	97.3%
City of Brooksville	1.71	2.22	77	1.33	1.40	1.48	1.56	1.64	1.70	0.30	21.2%	2.7%
WRWSA TOTAL	-	-	-	**21.12**	**22.28**	**25.75**	**28.62**	**31.18**	**33.49**	**11.21**	**50.3%**	**100%**

[1] SWFWMD Water Management Information System, as of May 21, 2025.
[2] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[3] Utility adjusted water demand.

Table 3-12: Hernando County Public Supply Utility Population Projections

Utility Name	2020	Projected Public Supply Population					2025 - 2045		
		2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[1]	1,892	1,895	1,897	1,899	1,902	1,904	9	0.5%	0.0%
Hernando County Util.[2]	150,338	167,911	188,975	211,921	232,593	251,428	83,517	49.7%	95.6%
City of Brooksville	17,315	18,284	19,317	20,390	21,323	22,158	3,874	21.2%	4.4%
WRWSA TOTAL	**169,545**	**188,090**	**210,189**	**234,210**	**255,818**	**275,490**	**87,400**	**46.5%**	**100%**

[1] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[2] Utility adjusted population.

Table 3-13: Hernando County Water Demand Projections by Use Type

Use Type	2020 Water Use (MGD)	Projected Water Use (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
IRR	2.99	3.20	3.38	3.53	3.65	3.75	0.55	17.1%
DSS	2.75	2.93	3.25	3.55	3.82	4.03	1.10	37.8%
L/R	3.41	3.46	3.51	3.55	3.58	3.61	0.15	4.3%
AG	1.69	1.68	1.75	1.75	1.76	1.76	0.07	4.4%
I/C & M/D	3.33	3.44	3.56	3.68	3.79	3.92	0.47	13.7%
PS (WRWSA Baseline)	21.12	22.28	25.75	28.62	31.18	33.49	11.21	50.3%
WRWSA TOTAL	**35.28**	**37.00**	**41.20**	**44.68**	**47.78**	**50.56**	**13.56**	**36.6%**

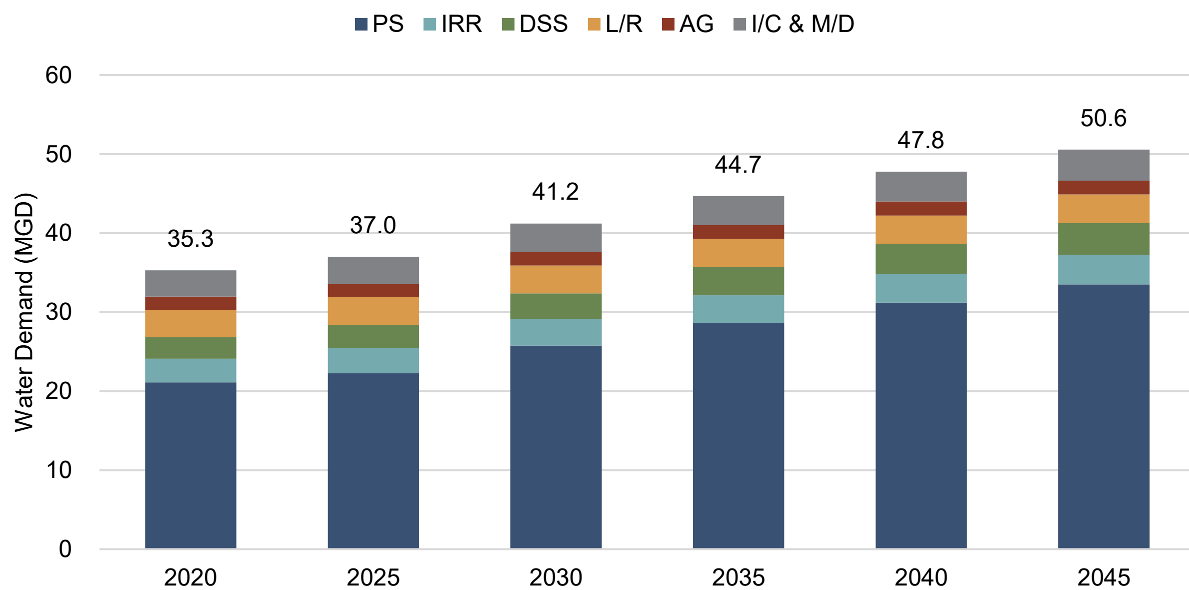


Figure 3-3: WRWSA Water Demand Projections for all Use Types in Hernando County

Landscape/recreation and agriculture demands remain stable, indicating future water demand growth is projected to stem primarily from residential and commercial development rather than expanded irrigated acreage. Figure 3-4 illustrates the distribution of projected water use by sector, highlighting Hernando County's transition toward a more urbanized demand profile dominated by utility-served households.

3.2.2.2 Water Use Permit Analysis

Average daily permitted withdrawals and peak daily permitted withdrawals are reported in Table 3-11. WUPs for each large utility are reported as of May 21, 2025. The current WUP for Hernando County Utilities (Permit No. 5789) authorizes an average daily withdrawal of 24.36 MGD and a peak daily withdrawal of 31.91 MGD. Hernando County Utilities is already in the process of updating its water use permit, reflecting ongoing efforts to align permitted capacities with observed growth and revised long-term demand projections. The updated permit is anticipated to incorporate both population growth adjustments and additional source diversification measures to ensure sustainable supply through 2045.

3.2.3 Sumter County

Table 3-14 and Table 3-15 present the WRWSA baseline projections for public supply water demand and population in Sumter County. This dataset captures the county's rapid growth trajectory, particularly in and around The Villages. According to WRWSA projections, public supply demand is projected to increase by 13.33 MGD between 2025 and 2045, rising from 26.04 MGD to 39.37 MGD (Table 3-14). Over the same period, the public supply population is projected to grow by 176,833 people (108.6%), from 162,820 to 339,653 (Table 3-15). These patterns reflect Sumter County's position as the fastest-growing county within the WRWSA region, driven by the continuing expansion of The Villages and surrounding communities. The substantial increases in both water demand and population underscore the importance of coordinated planning between WRWSA, the WMDs, and local utilities to ensure that infrastructure and permitting remain ahead of growth pressures.

3.2.3.1 Total Water Demand by Use Type

Table 3-16 summarizes total projected water demand across all use types in Sumter County. Total demand is projected to increase from 38.14 MGD in 2025 to 53.58 MGD in 2045, a net gain of 15.44 MGD (40.5%). Public supply remains the dominant water-use category, accounting for roughly 70% of total countywide demand throughout the planning horizon. Non-public supply uses make up the remaining 30% and collectively rise from 12.10 MGD to 14.21 MGD (17.4%). Within this group, landscape/recreation and domestic self-supply show the largest increases, adding 1.38 MGD and 1.36 MGD, respectively. Growth in these categories reflects expanding residential amenities and a high share of individually irrigated properties associated with master-planned developments. Other non-public sectors, such as additional irrigation, industrial/commercial, and mining/dewatering, increase moderately, while agricultural demand declines slightly (-0.88 MGD, -13.9%), consistent with the county's ongoing conversion of farmland to residential and mixed-use development. Figure 3-5 illustrates the distribution of projected water demand by use type, emphasizing the county's shift toward a predominantly urban and service-oriented water demand profile.

3.2.3.2 Water Use Permit Analysis

Average daily permitted withdrawals and peak daily permitted withdrawals are reported in Table 3-14. WUPs for each large utility are reported as of May 21, 2025.

Many of these systems in Sumter County, particularly those in and around Wildwood and the SR 44 corridor, are expected to pursue permit modifications or system consolidations in coordination with the WMDs to accommodate anticipated buildout of residential developments and accompanying population growth. In some cases, interconnections or shared source agreements may be needed to balance supply across service areas.

Table 3-14: Sumter County Public Supply Utility Baseline Water Demand Projections

Utility Name	Permitted Capacity (MGD)[1]		GPCD (2016-2020)	2020 Water Demand (MGD)	Projected Public Supply Demands (MGD)					2025 - 2045		
	Avg.	Peak			2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[2, 3]	-	-	107	0.19	0.18	0.23	0.28	0.30	0.31	0.14	78.3%	1.0%
Lake Panasoffkee Water Assoc.	0.41	0.49	65	0.28	0.32	0.36	0.39	0.42	0.44	0.11	35.0%	0.8%
City of Bushnell	1.37	2.16	129	0.45	0.74	1.01	1.21	1.39	1.56	0.81	109.4%	6.1%
City of Webster	0.39	0.49	84	0.08	0.11	0.20	0.25	0.29	0.33	0.22	193.1%	1.6%
City of Wildwood[3]	6.44	9.35	110	1.64	3.37	3.80	4.20	4.49	4.67	1.30	38.5%	9.7%
City of Center Hill	0.15	0.26	61	0.07	0.08	0.11	0.12	0.13	0.13	0.05	56.3%	0.4%
Orange Blossom Utilities	0.14	0.20	185	0.04	0.05	0.06	0.06	0.06	0.07	0.01	20.8%	0.1%
FL Grande Motor Coach Resort	0.14	0.23	133	0.14	0.14	0.14	0.14	0.14	0.14	0.00	0.0%	0.0%
The Villages[3]	19.35	44.53	246	22.02	19.35	19.35	19.35	19.35	19.35	0.00	0.0%	0.0%
South Sumter Util. Company LLC	2.60	3.80	84	1.28	1.61	1.89	2.13	2.39	2.60	1.00	62.2%	7.5%
Gibson Place Util. Company LLC[3]	3.99	5.80	71	0	0.09	3.20	4.00	4.00	4.00	3.91	4247.8%	29.3%
Blue Goose Util. Company LLC	5.78	8.42	70	0	0	1.33	2.99	4.66	5.78	5.78	-	43.4%
WRWSA TOTAL	**-**	**-**	**-**	**26.19**	**26.04**	**31.67**	**35.12**	**37.60**	**39.37**	**13.33**	**51.2%**	**100%**

[1] SWFWMD Water Management Information System, as of May 21, 2025.
[2] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[3] Utility adjusted water demand.

Table 3-15: Sumter County Public Supply Utility Population Projections

Utility Name	2020	Projected Public Supply Population					2025 - 2045		
		2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[1]	2,021	3,266	3,774	4,289	4,498	4,665	1,399	42.8%	0.8%
Lake Panasoffkee Water Assoc.	4,342	4,982	5,556	6,032	6,398	6,725	1,743	35.0%	1.0%
City of Bushnell	3,508	5,742	7,788	9,348	10,709	12,024	6,282	109.4%	3.6%
City of Webster	936	1,339	2,338	2,991	3,465	3,925	2,586	193.1%	1.5%
City of Wildwood[2]	14,928	22,450	27,352	32,726	38,100	43,474	21,024	93.6%	11.9%
City of Center Hill	1,110	1,390	1,799	1,935	2,055	2,172	782	56.3%	0.4%
Orange Blossom Utilities	205	296	308	322	339	358	62	20.9%	0.0%
FL Grande Motor Coach Resort	1,036	1,036	1,036	1,036	1,036	1,036	0	0.0%	0.0%
The Villages	89,552	90,389	90,616	90,766	90,919	91,083	694	0.8%	0.4%
South Sumter Util. Company LLC[2]	8,064	30,770	36,191	36,191	36,191	36,191	5,421	17.6%	3.1%
Gibson Place Util. Company LLC	0	1,160	41,693	53,898	55,360	55,360	54,199	4671.1%	30.7%
Blue Goose Util. Company LLC	0	0	19,000	42,750	66,500	82,641	82,641	-	46.7%
WRWSA TOTAL	**125,703**	**162,820**	**237,451**	**282,284**	**315,570**	**339,653**	**176,833**	**108.6%**	**100%**

[1] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[2] Utility adjusted population.

Table 3-16: Sumter County Water Demand Projections by Use Type

Use Type	2020 Water Use (MGD)	Projected Water Use (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
IRR	0.19	0.22	0.25	0.27	0.29	0.31	0.09	41.3%
DSS	1.71	1.39	1.35	2.05	2.75	2.75	1.36	98.2%
L/R	2.82	3.43	6.88	10.46	11.99	13.01	9.58	279.3%
AG	6.65	6.29	5.96	5.89	5.76	5.41	-0.88	-13.9%
I/C & M/D	0.84	0.87	0.91	0.94	0.98	1.02	0.15	17.5%
PS (WRWSA Baseline)	26.19	26.04	31.67	35.12	37.60	39.37	13.33	51.2%
WRWSA TOTAL	**38.39**	**38.24**	**47.02**	**54.75**	**59.37**	**61.88**	**23.64**	**61.8%**

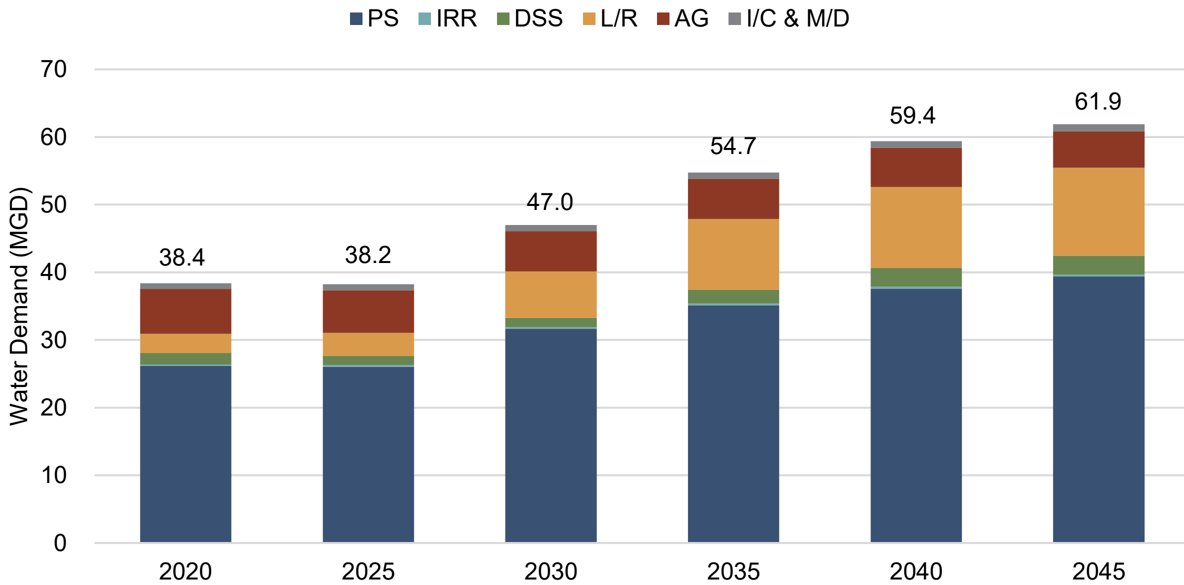


Figure 3-4: WRWSA Water Demand Projections for all Use Types in Sumter County

3.2.4 Marion County

Marion County spans both the SWFWMD and SJRWMD, creating a unique planning setting that bridges two regulatory and hydrologic regions. Water demand and population projections were developed separately for each district and combined to provide an integrated countywide perspective.

Table 3-17 summarizes the WRWSA baseline projections for Marion County, integrating results from both district areas. The table illustrates total projected public-supply water demand and public-supply population for 2025 and 2045, highlighting how growth is distributed across the county.

Table 3-17: Marion County Public-Supply Baseline Demand and Population Projections

Location	Water Demand (MGD)					Population				
	2025	2045	Change	% Change	% Change of Total	2025	2045	Change	% Change	% Change of Total
SWFWMD	15.33	19.85	4.52	29.5%	66.2%	101,787	117,689	15,902	15.6%	45.6%
SJRWMD	23.38	25.69	2.31	9.9%	33.8%	157,416	176,398	18,982	12.1%	54.4%
TOTAL	38.71	45.54	6.83	17.6%	100%	259,203	294,087	34,884	13.5%	100%

Under the WRWSA baseline projections, countywide public-supply demand rises from 38.71 MGD in 2025 to 45.54 MGD in 2045, a 17.6% increase, while population grows from 259,203 to 294,087, or 13.5%. Roughly two-thirds (66%) of new demand is in SWFWMD and one-third (34%) is in SJRWMD. Marion County shows steady, moderate growth driven by suburban expansion, infill development, and sustained agricultural and recreational water use. The Bay Laurel and Marion County Utilities systems are projected to remain the largest contributors to future water use, while established urban centers such as Ocala and Belleview continue to anchor population and demand stability in the SJRWMD area. Overall, the WRWSA projections indicate sustained moderate growth in Marion County, with the SWFWMD area driving most future increases in water demand.

3.2.4.1 SWFWMD

Table 3-18 and Table 3-19 present the WRWSA baseline projections for the SWFWMD portion of Marion County. According to WRWSA projections, public supply demand increases by 4.52 MGD between 2025 and 2045, from 15.33 MGD to 19.85 MGD (Table 3-18). Over the same period, the public supply population grows by 15,902 people (15.6%), from 101,787 to 117,689 (Table 3-19).

3.2.4.1.1 Total Water Demand by Use Type (SWFWMD)

As summarized in Table 3-20, total water demand across all use types for the SWFWMD portion of Marion County is projected to increase from 28.62 MGD in 2025 to 34.55 MGD in 2045, a net gain of 5.93 MGD (20.7%). Non-public supply uses rise from 13.29 MGD to 14.70 MGD (10.6%), with domestic self-supply contributing the largest increase (+1.50 MGD, 22.8%). Additional irrigation and landscape/recreation also increase slightly, while agricultural demand declines moderately (-0.42 MGD, -13.4%). Public supply accounts for roughly half of total projected water demand, underscoring the growing share of utility-served customers in the region. Figure 3-6 illustrates the breakdown of total water demand by use type, highlighting the increasing influence of public supply systems relative to self-supply and agricultural sources.

3.2.4.1.2 Water Use Permit Analysis (SWFWMD)

Average daily permitted withdrawals and peak daily permitted withdrawals are reported in Table 3-18. WUPs for each large utility are reported as of May 21, 2025. Proactive permit modifications and system capacity planning may be needed within the next decade to maintain sufficient authorized withdrawals in this portion of the county, especially within high growth areas such as Bay Laurel and the Marion County Utilities service area.

3.2.4.2 SJRWMD

Table 3-21 and Table 3-22 present WRWSA baseline projections for the SJRWMD portion of Marion County. According to WRWSA projections, public supply demand increases by 2.31 MGD between 2025 and 2045, from 23.38 MGD to 25.69 MGD (Table 3-21). The public supply population rises by 18,982 people (12.1%), from 157,416 to 176,398 (Table 3-22). Marion County Utilities Consolidated constitutes most of the change in water demand (87.9%) and population (79.2%) between 2025 and 2045 in the SJRWMD portion of Marion County. The majority of large utilities do not project significant growth in water demand or population during the planning horizon.

3.2.4.2.1 Total Water Demand by Use Type (SJRWMD)

As summarized in Table 3-23, total water demand across all use types in the SJRWMD portion of Marion County is projected to increase from 47.32 MGD in 2025 to 52.67 MGD in 2045, a total increase of 5.35 MGD (11.3%). Non-public supply uses increase from 23.94 MGD to 26.98 MGD (12.7%), led by agriculture, which adds 2.87 MGD (37.5%) over the planning period. Other categories, including domestic self-supply, landscape/recreation, and industrial/mining remain relatively stable. Public supply and non-public supply uses each account for approximately half of total projected water demand, highlighting the continued importance of both sectors in the SJRWMD portion of the county. Figure 3-7 provides a visual depiction of these trends.

3.2.4.2.2 Water Use Permit Analysis (SJRWMD)

Average daily permitted withdrawals are reported in Table 3-21. WUPs for each large utility are reported as of May 21, 2025. Permit modifications and system capacity planning could be necessary to accommodate high-growth service areas, including Marion County Utilities and the City of Belleview. The permit renewal application for Marion County Utilities is currently under review, reflecting ongoing efforts to align permitted capacities with observed growth and long-term demand projections. Ongoing coordination among WRWSA, SWFWMD, and SJRWMD will be important to managing permit capacities and maintaining balanced resource allocation through 2045.

Table 3-18: Marion County (SWFWMD) Public Supply Utility Baseline Water Demand Projections

Utility Name	Permitted Capacity (MGD)[1]		GPCD (2016-2020)	2020 Water Demand (MGD)	Projected Public Supply Demands (MGD)					2025 - 2045		
	Avg.	Peak			2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[2, 3]	-	-	111	0.39	0.39	0.39	0.39	0.40	0.40	0.01	1.6%	0.1%
Bay Laurel[3]	7.56	10.51	239	3.80	4.68	5.38	6.00	7.20	8.30	3.62	77.4%	80.1%
Utilities Inc. - Florida Golden Hills	0.19	0.24	148	0.15	0.15	0.15	0.15	0.15	0.15	0.00	1.0%	0.0%
Marion Landing	0.15	0.24	123	0.14	0.14	0.14	0.14	0.14	0.14	0.00	0.0%	0.0%
City of Dunnellon	1.12	1.37	157	1.07	1.16	1.24	1.30	1.36	1.41	0.25	21.1%	5.4%
Marion County Util. Consolidated[3]	6.66	10.66	133	6.82	8.81	8.98	9.14	9.31	9.46	0.64	7.3%	14.3%
WRWSA TOTAL	**-**	**-**		**12.37**	**15.33**	**16.28**	**17.13**	**18.55**	**19.85**	**4.52**	**29.5%**	**100%**

[1] SWFWMD Water Management Information System, as of May 21, 2025.
[2] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[3] Utility adjusted water demand.

Table 3-19: Marion County (SWFWMD) Public Supply Utility Population Projections

Utility Name	2020	Projected Public Supply Population					2025 - 2045		
		2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[1,2]	3,264	3,563	3,594	3,624	3,648	3,671	108	3.0%	0.7%
Bay Laurel	15,800	19,573	22,635	25,160	27,240	28,933	9,360	47.8%	58.9%
Utilities Inc. - Florida Golden Hills	1,013	1,017	1,020	1,023	1,025	1,027	10	1.0%	0.1%
Marion Landing	1,102	1,102	1,102	1,102	1,102	1,102	0	0.0%	0.0%
City of Dunnellon	6,834	7,412	7,894	8,303	8,655	8,978	1,566	21.1%	9.8%
Marion County Util. Consolidated[2]	51,506	69,120	70,365	71,611	72,857	73,978	4,858	7.0%	30.5%
WRWSA TOTAL	**79,519**	**101,787**	**106,610**	**110,823**	**114,527**	**117,689**	**15,902**	**15.6%**	**100%**

[1] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[2] Utility adjusted population.

Table 3-20: Marion County (SWFWMD) Water Demand Projections by Use Type

Use Type	2020 Water Use (MGD)	Projected Water Use (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
IRR	0.69	0.76	0.81	0.86	0.90	0.94	0.18	23.9%
DSS	6.05	6.59	7.05	7.44	7.77	8.09	1.50	22.8%
L/R	2.73	2.79	2.83	2.87	2.91	2.94	0.15	5.3%
AG	3.16	3.13	2.95	2.76	2.71	2.71	-0.42	-13.4%
I/C & M/D	0.05	0.03	0.03	0.03	0.03	0.03	0.00	7.4%
PS (WRWSA Baseline)	12.37	15.33	16.28	17.13	18.55	19.85	4.52	29.5%
WRWSA TOTAL	**25.04**	**28.62**	**29.95**	**31.08**	**32.87**	**34.55**	**5.93**	**20.7%**

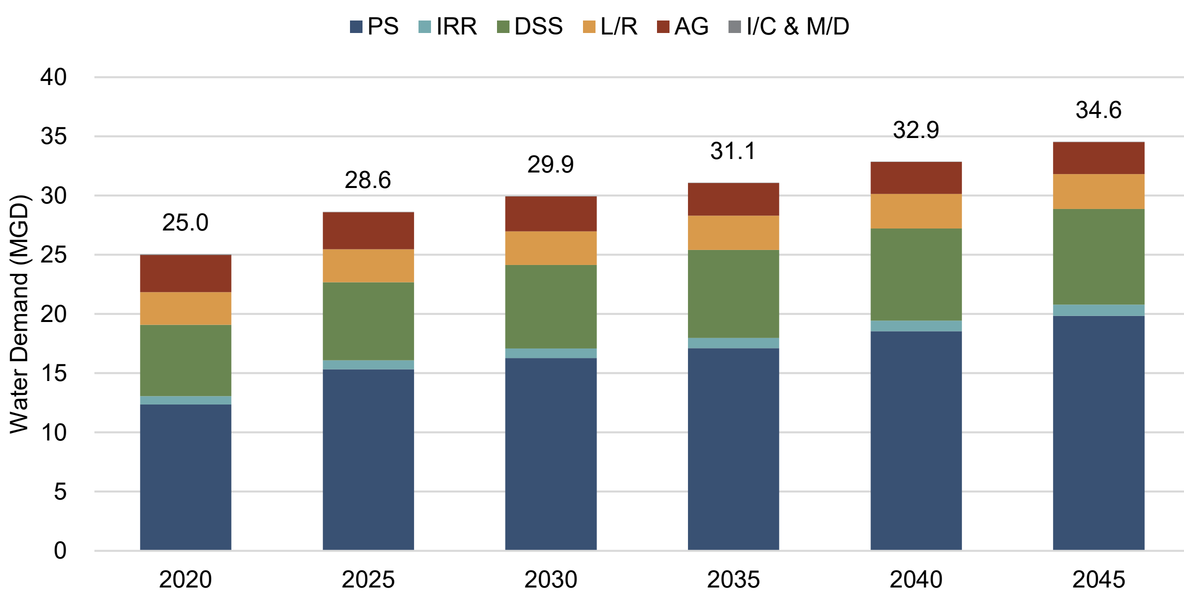


Figure 3-5: WRWSA Water Demand Projections by Use Type in Marion County (SWFWMD)

Table 3-21: Marion County (SJRWMD) Public Supply Utility Baseline Water Demand Projections

Utility Name	Average Permitted Capacity (MGD)[1]	GPCD (2016-2020)	2020 Water Demand (MGD)	Projected Public Supply Demands (MGD)					2025 - 2045		
				2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[2, 3]	-	100	1.09	0.92	0.94	0.97	0.98	0.98	0.05	5.9%	2.3%
South Marion Regional System	0.23	90	0.15	0.17	0.17	0.17	0.17	0.18	0.00	0.2%	0.0%
Ocala Heights	0.08	79	0.06	0.08	0.08	0.08	0.08	0.08	0.00	0.0%	0.0%
Winding Waters	0.10	128	0.05	0.07	0.07	0.07	0.07	0.07	0.00	4.1%	0.1%
Sunray Estates	0.20	110	0.13	0.15	0.15	0.15	0.15	0.15	0.00	0.0%	0.0%
Tradewinds Utilities Inc.	0.23	71	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.0%	0.0%
Ocala East Villas	0.11	154	0.09	0.10	0.10	0.10	0.10	0.10	0.00	0.0%	0.0%
Rolling Greens Communities	0.00	156	0.47	0.40	0.40	0.40	0.40	0.40	0.00	0.0%	0.0%
Aqua Utilities of Florida, Inc.	0.19	86	0.16	0.13	0.13	0.13	0.13	0.13	0.00	0.0%	0.0%
Marion Utilities, Inc. / Oak Bend	0.04	46	0.02	0.03	0.03	0.03	0.03	0.03	0.00	0.0%	0.0%
City of Belleview[3]	1.02	95	0.98	1.04	1.11	1.16	1.21	1.26	0.22	20.7%	9.2%
City of Ocala	17.54	181	11.66	13.24	13.24	13.24	13.24	13.24	0.00	0.0%	0.0%
Marion County Util. Consolidated[3]	7.09	137	6.21	6.94	7.46	7.98	8.50	9.02	2.08	29.9%	88.3%
WRWSA TOTAL	**-**	**-**	**21.18**	**23.38**	**23.98**	**24.59**	**25.16**	**25.73**	**2.35**	**10.1%**	**100.0%**

[1] SJRWMD Regulatory Permit Search, as of May 21, 2025.

[2] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.

[3] Utility adjusted water demand.

Table 3-22: Marion County (SJRWMD) Public Supply Utility Population Projections

Utility Name	2020	Projected Public Supply Population					2025 - 2045		
		2025	2030	2035	2040	2045	Change	% Change	% of WRWSA Total
Small Utilities[1,2]	8,968	9,481	10,117	11,085	11,129	11,129	1,648	17.4%	8.7%
South Marion Regional System	1,814	1,930	1,930	1,930	1,930	1,934	4	0.2%	0.0%
Ocala Heights	843	991	991	991	991	991	0	0.0%	0.0%
Winding Waters	473	542	561	564	564	564	22	4.1%	0.1%
Sunray Estates	1,298	1,321	1,321	1,321	1,321	1,321	0	0.0%	0.0%
Tradewinds Utilities Inc.	1,341	1,416	1,416	1,416	1,416	1,416	0	0.0%	0.0%
Ocala East Villas	621	621	621	621	621	621	0	0.0%	0.0%
Rolling Greens Communities	2,551	2,551	2,551	2,551	2,551	2,551	0	0.0%	0.0%
Aqua Utilities of Florida, Inc.	1,512	1,550	1,550	1,550	1,550	1,550	0	0.0%	0.0%
Marion Utilities, Inc. / Oak Bend	562	562	562	562	562	562	0	0.0%	0.0%
Marion Utilities, Inc. / Grand Lake	157	164	169	174	182	182	18	11.0%	0.1%
City of Belleview	10,117	10,878	11,620	12,124	12,628	13,133	2,255	20.7%	11.9%
City of Ocala	65,086	72,652	72,653	72,653	72,653	72,653	1	0.0%	0.0%
Marion County Util. Consolidated[2]	50,141	52,757	56,523	60,279	64,035	67,791	15,034	28.5%	79.2%
WRWSA TOTAL	**145,484**	**157,416**	**162,585**	**167,821**	**172,133**	**176,398**	**18,982**	**12.1%**	**100%**

[1] Small Utilities include utilities which were permitted to use 100,000 gallons or less per day in the year 2020.
[2] Utility adjusted population

Table 3-23: Marion County (SJRWMD) Water Demand Projections by Use Type

Use Type	2020 Water Use (MGD)	Projected Water Use (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
DSS	8.44	8.99	9.04	9.04	9.04	9.06	0.07	0.8%
L/R	4.12	4.36	4.38	4.40	4.41	4.43	0.07	1.6%
AG	6.85	7.65	8.33	9.12	10.05	10.52	2.87	37.5%
I/C & M/D	2.80	2.94	2.95	2.96	2.96	2.97	0.03	1.0%
PS (WRWSA Baseline)	21.18	23.38	23.97	24.57	25.13	25.69	2.31	9.9%
WRWSA TOTAL	**43.39**	**47.32**	**48.67**	**50.09**	**51.59**	**52.67**	**5.35**	**11.3%**

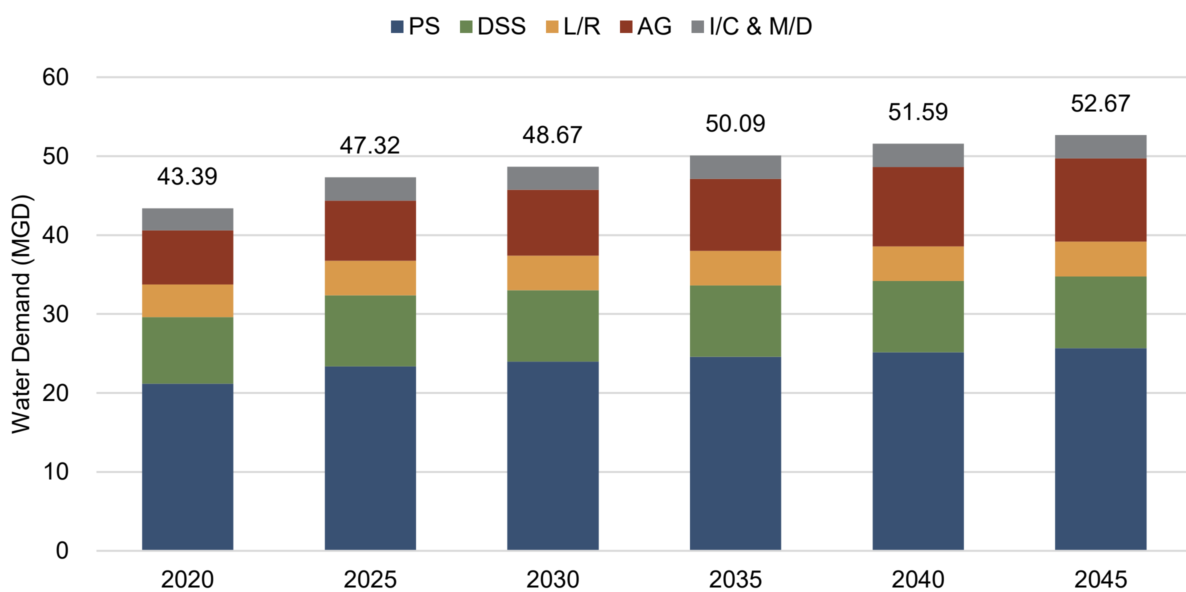


Figure 3-6: WRWSA Water Demand Projections for all Use Types in Marion County (SJRWMD)

4. Evaluation of Water Sources

This section presents the results of investigations to quantify the amount of water potentially available from various sources within the WRWSA's four-county region to meet water supply demands through 2045. Sources evaluated include water conservation, reclaimed water, groundwater, surface water, seawater desalination, and stormwater.

Groundwater from the Upper and Lower Floridan aquifers is currently the principal source of supply for all use categories in the region and is expected to continue meeting most projected demands through 2045. However, groundwater availability in certain areas may be influenced by withdrawals and regulatory considerations associated with existing and future MFLs for springs, rivers, and lakes.

Continued population and economic growth may require the development of alternative water sources and expanded demand-management programs to meet public supply needs. The following subsections summarize the evaluation of each source type and its potential contribution to meeting regional water demands through 2045.

4.1 Water Conservation

Water conservation is an important component of long-term water supply planning, offering opportunities to extend existing sources, reduce peak demand, and avoid or defer costly new supply development. Because conserved water can reduce the need for withdrawals or new supply development, conservation functions as a demand-side source, a "virtual supply" that effectively supports more efficient use of existing water-use permits and can reduce or defer the need for alternative water supply development.

This section quantifies the potential water savings achievable through various levels of conservation program implementation and describes how those scenarios were developed. The results form the basis for assessing how conservation can offset projected deficits in Section 4.7 and for identifying candidate conservation projects in Section 5.1.

4.1.1 Water Conservation Savings Potential

Plan development was supported by the Alliance for Water Efficiency (AWE) Tracking Tool, version 4, which estimates water savings, costs, and benefits for selected measures. Default savings rates were tailored with local information where available.

To support a thorough and regionally representative evaluation of conservation opportunities, the WRWSA established a Conservation Planning Committee (CPC) composed of staff from member governments and key public supply utilities, including Citrus County Utilities, Hernando County Utilities, Marion County Utilities, the City of Ocala, and The Villages.

Utility-specific conservation plans were developed in coordination with the CPC for each of these five representative "benchmark" utilities documenting existing demographic conditions, current conservation activities, and additional feasible measures. The benchmark conservation plans can be found in Appendix C. The benchmark plans formed the empirical foundation for:

- Defining conservation scenarios,
- Calibrating the Alliance for Water Efficiency (AWE) Tracking Tool, and
- Deriving reduction factors that could be applied consistently across the WRWSA region

A total of 21 potential single-family measures were identified by the CPC, including four education and outreach programs. The AWE Tracking Tool was used to quantify water conservation saving opportunities, focusing on indoor and outdoor single-family residential water use. Data from annual reports for each benchmark utility served as inputs for the AWE Tracking Tool. The model quantified conservation savings based on a three-tiered system representing a hierarchy of conservation programs:

- **Tier 1:** Passive savings from upgrades as older fixtures and appliances are replaced with new high-efficiency models.
- **Tier 2:** Tier 1 passive savings plus savings from a predetermined level of active, utility-defined conservation programs.
- **Tier 3:** Expands conservation potential by applying Tier 2 programs at higher participation and penetration rates and increasing the number of conservation programs implemented.

The three-tier framework provides a basis for comparing the potential contribution of conservation to regional supply reliability. Each tier represents an incremental step in the scale of conservation implementation from naturally occurring efficiency improvements to full regional deployment of proven measures.

Implementation of each tier was modeled in two steps:

- **Benchmark Utilities** – The AWE Tool quantified Tier 1, Tier 2, and Tier 3 savings for each benchmark utility based on its specific customer profile, existing programs, and feasible measures.
- **All Other Utilities** –The county-level average percent reductions derived from benchmark utilities were applied to non-benchmark utilities in the same county, to support consistent and defensible regional coverage.

Each scenario estimates cumulative reductions in average-day potable water demand through 2045. County-level results were then aggregated to produce the regional savings summarized in Section 4.1.2 and carried forward into the surplus/deficit assessment in Section 4.1.8.

4.1.2 Regional Application of Utility Savings Potential

The conservation plans for the five benchmark utilities informed water savings potential for all conservation tiers for all utilities within the WRWSA four-county region. To calculate a water demand reduction percentage to apply to all WRWSA utilities, the WRWSA baseline water demand, Tier 1 savings, Tier 2 savings, and Tier 3 savings for the five benchmark utilities were categorically summed. Percent reductions were calculated by dividing each tier's savings by the WRWSA baseline water demand for each five-year increment. Table 4-1 presents the demand reduction percentages for each tier and five-year period applicable to WRWSA utilities.

Utilities serving newer developments have lower passive conservation potential and, consequently, lower demand-reduction percentages, as these areas are already equipped with high-efficiency fixtures. Accordingly, four newer utilities in Sumter County including The Villages Community Development District, South Sumter Utility Company, Gibson Place Utility Company, and Blue Goose Utility Company apply the conservation reduction rates established for The Villages Conservation Program.

Table 4-2 lists the conservation programs included in the Tier 2 and Tier 3 analyses for the benchmark utilities. These measures, which inform the percent reductions in Table 4-1 represent a comprehensive and strategic approach to water demand management in the WRWSA region. The selected programs address both indoor and outdoor water use, combining device retrofits, irrigation system upgrades, landscape improvements, and educational outreach to maximize water savings and cost-effectiveness.

By focusing on high-impact areas, such as high-efficiency toilets, smart irrigation controllers, and targeted evaluations for high-use customers, utilities can achieve substantial reductions in water use at a low cost per gallon saved. Indoor fixture replacements and washer rebates provide long-term, reliable savings, while education and outreach programs foster broad participation and sustained behavioral change. The diversity of these programs supports the ability to tailor conservation efforts to the needs of each utility and customer segment.

Table 4-3 summarizes the key conservation measures evaluated, including their program category, unit cost, expected savings, lifespan, and cost-effectiveness. This information supports prioritization of investments and demonstrates why conservation remains the most affordable and effective alternative water supply option for the region.

4.1.3 Regional Conservation Savings Summary

The conservation scenarios developed through benchmark utility plans were applied to estimate potential regional water savings across the four-county area through 2045. Results from the AWE Water Conservation Tracking Tool indicate that conservation can play a significant role in reducing future water needs and offsetting projected supply deficits.

Regional savings were calculated by aggregating modeled reductions for each county and water management district subregion under three scenarios. Tier 1 represents baseline passive savings from the natural replacement of fixtures and appliances. Tier 2 includes existing active programs for the five benchmark utilities, and Tier 3 reflects the regional extension of these programs across all utilities by county and subregion. Table 4-4 summarizes the projected average-day potable water demands reductions for each conservation scenario over the planning horizon for the WRWSA region. Tier 3 yields the highest overall benefit, with potential savings of approximately 12.2 MGD in 2045, or about 9% of total regional public supply demand. These savings represent achievable reductions if all WRWSA utilities implement enhanced conservation measures consistent with the performance of the benchmark utilities.

Table 4-1: Percent Reduction Estimates for Utilities with Normal Passive Trends

Benchmark Utility / Scenario	2025	2030	2035	2040	2045
Baseline Demand (MGD)					
Citrus County Utilities Water Resources Dept.	10.9	12.4	13.9	15.1	16.1
Hernando County Utilities Dept.	20.8	24.2	26.9	29.3	31.7
Marion County Utilities Dept.	15.8	16.4	17.1	17.7	18.5
City of Ocala Water Resources Dept.	13.2	13.2	13.2	13.2	13.2
The Villages Community Development District	19.3	19.3	19.3	19.3	19.3
Total	**80.0**	**85.6**	**90.6**	**94.6**	**98.8**
Tier 1 Savings					
Citrus County Utilities Water Resources Dept.	0.4	0.5	0.7	0.8	0.8
Hernando County Utilities Dept.	0.7	1.4	2.0	2.6	3.2
Marion County Utilities Dept.	0.7	0.9	1.1	1.2	1.4
City of Ocala Water Resources Dept.	0.3	0.4	0.4	0.4	0.5
The Villages Community Development District	-	-	-	-	-
Total	**2.0**	**3.1**	**4.2**	**5.1**	**5.9**
Tier 2 Savings					
Citrus County Utilities Water Resources Dept.	0.4	0.7	0.9	1.0	1.1
Hernando County Utilities Dept.	0.7	1.5	2.2	2.9	3.4
Marion County Utilities Dept.	0.7	0.9	1.2	1.3	1.5
City of Ocala Water Resources Dept.	0.3	0.5	0.6	0.6	0.7
The Villages Community Development District	0.01	0.02	0.02	0.02	0.02
Total	**2.1**	**3.7**	**4.9**	**5.8**	**6.7**
Tier 3 Savings					
Citrus County Utilities Water Resources Dept.	0.4	0.9	1.3	1.4	1.5
Hernando County Utilities Dept.	0.8	2.3	3.5	4.1	4.7
Marion County Utilities Dept.	0.8	1.4	1.9	2.1	2.4
City of Ocala Water Resources Dept.	0.3	0.6	0.8	0.9	0.9
The Villages Community Development District	0.1	0.4	0.6	0.6	0.7
Total	**2.5**	**5.6**	**8.1**	**9.2**	**10.2**
Demand Reductions					
Tier 1: Passive Only	2.5%	3.7%	4.6%	5.4%	5.9%
Tier 2: Passive and Active	2.6%	4.3%	5.4%	6.2%	6.8%
Tier 3: Passive and Active	3.1%	6.6%	8.9%	9.7%	10.3%
Demand Reductions (New Development Service Areas)					
Tier 1: Passive Only	0.0%	0.0%	0.0%	0.0%	0.0%
Tier 2: Passive and Active	0.0%	0.1%	0.1%	0.1%	0.1%
Tier 3: Passive and Active	0.4%	1.9%	2.9%	3.1%	3.4%

Table 4-2: Selected Water Conservation Measures for Tier 2 and Tier 3 for the Five Benchmark Utilities

Program	Tier 2					Tier 3				
	Citrus County Utilities	Hernando County Utilities	Marion County Utilities	City of Ocala	The Villages	Citrus County Utilities	Hernando County Utilities	Marion County Utilities	City of Ocala	The Villages
High Efficiency Toilet (HET) Replacement	●	●	●	●		●	●	●	●	●
High User Irrigation Evaluation	●	●		●	●	●	●	●	●	●
High User Irrigation Evaluation w/Enhancement		●	●			●	●	●	●	●
High User Irrigation Evaluation w/WaterSense (WS) Controller	●			●		●	●	●	●	●
High User WS Labeled Irrigation Controller	●		●	●		●	●	●	●	●
Average User WS Labeled Irrigation Controller	●					●	●	●	●	●
Irrigation Nozzle Replacement						●	●	●	●	●
Rain Sensor Replacement	●	●		●		●	●	●	●	●
Rain Barrel (< 200 gal) Rebate		●				●	●	●	●	●
Washer Rebate (WF <=4)		●				●	●		●	●
Florida Friendly Yard Incentive Program		●				●	●	●	●	●
Workshops	●	●	●	●	●	●	●	●	●	●
Public Service Announcements (PSAs)				●	●		●	●	●	●
Exhibits	●			●	●	●	●	●	●	●
Web page				●					●	
In-School Education	●			●		●			●	
WS Showerhead	●		●			●	●	●		
WS Labeled Faucet Aerator	●	●	●	●		●	●	●	●	
WS Labeled Kitchen Faucet Aerator										
Water Use Audits			●							
HET+ Replacement						●	●	●	●	●

Table 4-3: Water Conservation Program Measures – Cost and Savings Summary

Program ID	Program Name	Program Category	Units	Utility ($/unit)	Expected Savings (gpd/unit)	Life of Savings (Years)	Cost Effectiveness ($/1000 gal)
1	HET Replacement	HET	Toilet	$100	27.8	25	$0.39
2	High User Irrigation Evaluation	Irrigation Systems & Devices	Irrigation	$400	170.0	5	$1.29
3	High User Irrigation Evaluation w/enhancement	Irrigation Systems & Devices	Irrigation	$450	197.0	5	$1.25
4	High User Irrigation Evaluation w/WS Controller	Irrigation Systems & Devices	Controller	$750	355.0	10	$0.58
5	High User WS Labeled Irrigation Controller	Irrigation Systems & Devices	Controller	$350	297.0	10	$0.32
6	Average User WS Labeled Irrigation Controller	Irrigation Systems & Devices	Controller	$100	121.0	10	$0.23
7	Irrigation Nozzle Replacement	Irrigation Systems & Devices	Sprinkler Head	$100	32.0	10	$0.86
8	Rain Sensor Replacement	Irrigation Systems & Devices	Controller	$50	35.0	3	$1.30
9	Rain Barrel (< 200 gal) Rebate	Rainwater Harvesting	Household	$50	1.7	5	$16.12
10	Washer Rebate (WF <=4)	Clothes Washers (in-unit)	Washer	$100	13.7	12	$1.67
11	Florida Friendly Yard Incentive program	Xeriscape	Landscapes	$725	133.0	25	$0.60
12	Workshops	Kits & Giveaways	10 Households	$140	70.0	1	$5.48
13	PSA	Kits & Giveaways	Times Played	$-	-	1	$-
14	Exhibits	Kits & Giveaways	# Exhibits	$-	-	1	$-
15	Web page	Kits & Giveaways	# Hits	$-	-	1	$-
16	In-School Education	Kits & Giveaways	Students	$-	-	1	$-
17	WaterSense Showerhead	Kits & Giveaways	Home	$10	2.4	10	$1.14
18	WS Labeled Faucet Aerator	Kits & Giveaways	Household	$3.50	1.7	5	$1.13
19	WS Labeled Kitchen Faucet Aerator	Kits & Giveaways	Household	$4	-	-	$-
20	Water Use Audit	Audits & Rpts	Household	$125	33.9	5	$2.02
21	HET+ Replacement	HET	Toilet	$50	8.0	25	$0.68

Table 4-4: Projected Regional Conservation Savings by Scenario (MGD)

Scenario	2025	2030	2035	2040	2045
Tier 1 – Passive Only	2.1	3.3	4.4	5.5	6.4
Tier 2 – Existing Active Programs (Benchmark Utilities)	2.2	3.9	5.3	6.3	7.3
Tier 3 – Regional Expansion of Benchmark Reductions	2.6	6.4	9.4	10.9	12.2

Source: WRWSA AWE Tracking Tool Results, 2025–2045 Planning Horizon.

4.1.3.1 County-Level Contributions

Water savings were also evaluated by county and water management district subregion to identify relative contributions to regional reductions. Table 4-5 presents the projected conservation savings by county/region, tier, and year (MGD), allowing for a clear comparison of how each area contributes to the regional total and how savings ramp up over time.

To highlight the distribution of savings, percent reductions, and the importance of active conservation, Table 4-6 provides a detailed breakdown for 2045, including each area's share of total savings at each tier. These results indicate that conservation can offset a substantial portion of projected future demand increases, particularly in the Marion (SWFWMD and SJRWMD) and Hernando subregions, where larger public supply utilities and higher per capita use provide greater efficiency potential. For example, the two Marion subregions together account for 39% of total Tier 3 savings, while Hernando contributes 28%. Sumter, while having a lower percent reduction, still provides a significant share (15%) of the total active savings due to rapid growth and new development. Implementing conservation at this scale would extend existing water-use permits, reduce groundwater withdrawals, and defer the need for new alternative water supply projects. The Tier 3 scenario forms the basis for the Deficit Analysis presented later in Section 4.7, where the potential of conservation to mitigate projected shortfalls is quantitatively assessed.

4.1.4 Water Conservation Adjusted Demand Projections

Table 4-7 presents a comprehensive summary of the WRWSA region's public supply demand, the water saved via conservation, and the total water use across all use types for the three conservation tiers. The table demonstrates how, under full implementation of Tier 3 conservation measures, the four-county region could achieve a savings of 12.2 MGD in 2045. Figure 4-1 visually illustrates the impact of each conservation tier on projected 2045 demand. While Tiers 1 and 2 (passive and existing active programs) yield similar levels of savings, Tier 3 (regional expansion of benchmark programs) results in the most substantial reduction in withdrawals.

If the WRWSA region achieves the water conservation targets for each tier, public supply could realize savings of approximately 6.4 MGD (Tier 1), 7.3 MGD (Tier 2), and 12.2 MGD (Tier 3) by 2045. Achieving the higher levels of savings associated with Tier 2 and Tier 3 will require all utilities in the WRWSA to actively implement and expand conservation measures beyond passive fixture replacement. This analysis underscores the critical importance of broad, region-wide participation in conservation programs to maximize water savings and long-term supply reliability for the WRWSA service area.

4.1.4.1 Citrus County

Table 4-8 shows the public supply demand, water saved via conservation, and the total water use across all use types for each of the three conservation tiers for Citrus County. Implementation of Tier 3 conservation is estimated to save 2.2 MGD in 2045, which is approximately 18% of the total Tier 3 2045 savings in the WRWSA four-county region.

4.1.4.2 Hernando County

Table 4-9 shows the public supply demand, water saved via conservation, and the total water use across all use types for each of the three conservation tiers for Hernando County. In 2045, Tier 1 conservation can save 2.0 MGD, Tier 2 conservation can save 2.3 MGD, and Tier 3 conservation can save 3.5 MGD. The 3.5 MGD of savings in 2045 is approximately 28% of the total Tier 3 savings in the WRWSA four-county region.

4.1.4.3 Marion County

Water conservation for the SWFWMD and SJRWMD portions of Marion County are presented separately in the following sections. The SWFWMD and SJRWMD portions of Marion County yield a combined savings of 2.7 MGD in Tier 1, 3.0 MGD in Tier 2, and 4.6 MGD in Tier 3 in 2045.

4.1.4.3.1 SWFWMD

Table 4-10 shows the public supply demand, water saved via conservation, and the total water use across all use types for each of the three conservation tiers for the SWFWMD portion of Marion County. In 2045, Tier 3 conservation results in a water savings of 2.0 MGD, or about 17% of the 2045 Tier 3 water savings in the WRWSA four-county region.

4.1.4.3.2 SJRWMD

Table 4-11 shows the public supply demand, water saved via conservation, and the total water use across all use types for each of the three conservation tiers for the SJRWMD portion of Marion County. In 2045, Tier 3 conservation yields a savings of 2.6 MGD, which is about 22% of the total 2045 Tier 3 savings in the WRWSA four-county region.

4.1.4.4 Sumter County

Table 4-12 shows the public supply demand, water saved via conservation, and the total water use across all use types for each of the three conservation tiers for Sumter County. In 2045, the Tier 3 savings is estimated to be 1.9 MGD, which is about 15% of the total 2045 Tier 3 savings in the WRWSA four-county region. Due to the lower conservation percent savings being used on newer utilities in Sumter County as discussed in Section 4.1.1 the conservation potential is proportionally lower than other utilities.

Table 4-5: Projected Conservation Savings by County/Region, Tier, and Year (MGD)

Benchmark Utility / Scenario	2025	2030	2035	2040	2045
Baseline Demand (MGD)					
Citrus	16.2	17.8	19.2	20.2	21.1
Hernando	22.3	25.8	28.6	31.2	33.5
Marion SWFWMD	15.3	16.3	17.1	18.6	19.9
Marion SJRWMD	23.4	24.0	24.6	25.1	25.7
Sumter	26.0	31.7	35.1	37.6	39.4
WRWSA	**103.2**	**115.5**	**124.7**	**132.7**	**139.5**
Tier 1 Savings					
Citrus	0.4	0.7	0.9	1.1	1.3
Hernando	0.6	0.9	1.3	1.7	2.0
Marion SWFWMD	0.4	0.6	0.8	1.0	1.2
Marion SJRWMD	0.6	0.9	1.1	1.3	1.5
Sumter	0.1	0.2	0.3	0.4	0.5
WRWSA	2.1	3.3	4.4	5.5	6.4
Tier 2 Savings					
Citrus	0.4	0.8	1.0	1.2	1.4
Hernando	0.6	1.1	1.6	1.9	2.3
Marion SWFWMD	0.4	0.7	0.9	1.1	1.3
Marion SJRWMD	0.6	1.0	1.3	1.6	1.7
Sumter	0.1	0.3	0.4	0.5	0.6
WRWSA	2.2	3.9	5.3	6.3	7.3
Tier 3 Savings					
Citrus	0.5	1.2	1.7	2.0	2.2
Hernando	0.7	1.7	2.5	3.0	3.5
Marion SWFWMD	0.5	1.1	1.5	1.8	2.1
Marion SJRWMD	0.7	1.6	2.2	2.4	2.6
Sumter	0.2	0.9	1.4	1.7	1.9
WRWSA	2.6	6.4	9.4	10.9	12.2
Tier 3 % Reductions					
Citrus	3.1%	6.6%	8.9%	9.7%	10.3%
Hernando	3.1%	6.6%	8.9%	9.7%	10.3%
Marion SWFWMD	3.1%	6.6%	8.9%	9.7%	10.3%
Marion SJRWMD	3.1%	6.6%	8.9%	9.7%	10.3%
Sumter	0.9%	2.8%	4.0%	4.4%	4.7%
WRWSA	**2.5%**	**5.5%**	**7.5%**	**8.2%**	**8.7%**

Table 4-6: Projected 2045 Conservation Savings by County/Region and Tier

County/ Region	Baseline Demand (MGD)	Tier 1			Tier 2			Tier 3			Active Savings		
		Savings (MGD)	% of Baseline Reduction[2]	% of Tier Savings	Savings (MGD)	% of Baseline Reduction[2]	% of Tier Savings	Savings (MGD)	% of Baseline Reduction[2]	% of Tier Savings	Savings (MGD)[3]	% of Baseline Reduction[2]	% of Tier Savings
Citrus	21.1	1.3	5.9%	20%	1.4	6.8%	19%	2.2	10.3%	18%	0.9	4.4%	16%
Hernando	33.5	2.0	5.9%	31%	2.3	6.8%	31%	3.5	10.3%	28%	1.5	4.4%	25%
Marion (SWFWMD)[1]	19.9	1.2	5.9%	18%	1.3	6.8%	18%	2.0	10.3%	17%	0.9	4.4%	15%
Marion (SJRWMD)[1]	25.7	1.5	5.9%	24%	1.7	6.8%	24%	2.6	10.3%	22%	1.1	4.4%	19%
Sumter	39.4	0.5	1.2%	7%	0.6	1.4%	8%	1.9	4.7%	15%	1.4	3.6%	24%
WRWSA	**139.5**	**6.4**	**4.6%**	**100%**	**7.3**	**5.2%**	**100%**	**12.2**	**8.7%**	**100%**	**5.8**	**4.1%**	**100%**

[1] Marion (SWFWMD) and Marion (SJRWMD) are split using the respective baseline demands and savings from the report's county tables.

[2] Percent reductions are calculated as (Tier Savings ÷ Baseline 2045 Public Supply Demand) × 100 for each subregion.

[3] Total Active Savings is the difference between Tier 1 and Tier 3 for each subregion.

Table 4-7: Conservation Adjusted Demand Scenarios Projections for WRWSA Region

Scenario	Use Type	Projected Water Use with Conservation (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
Baseline	Public Supply	103.2	115.5	124.7	132.7	139.5	36.3	35.1%
	Total[1]	**181.5**	**196.3**	**208.6**	**219.9**	**228.4**	**46.9**	**25.8%**
Tier 1	Conservation	2.1	3.3	4.4	5.5	6.4	4.3	210.6%
	Adjusted PS	101.2	112.2	120.2	127.2	133.1	31.9	31.6%
	Total[1]	**179.5**	**193.0**	**204.2**	**214.4**	**222.0**	**42.6**	**23.7%**
Tier 2	Conservation	2.2	3.9	5.3	6.3	7.3	5.1	237.3%
	Adjusted PS	101.1	111.6	119.4	126.3	132.2	31.1	30.8%
	Total[1]	**179.4**	**192.4**	**203.4**	**213.5**	**221.1**	**41.7**	**23.3%**
Tier 3	Conservation	2.6	6.4	9.4	10.9	12.2	9.6	369.5%
	Adjusted PS	100.6	109.1	115.3	121.8	127.3	26.7	26.5%
	Total[1]	**179.0**	**189.9**	**199.2**	**209.0**	**216.3**	**37.3**	**20.8%**

[1] Total water use combines the adjusted public supply projection with all other water-use categories in Table 3-7.

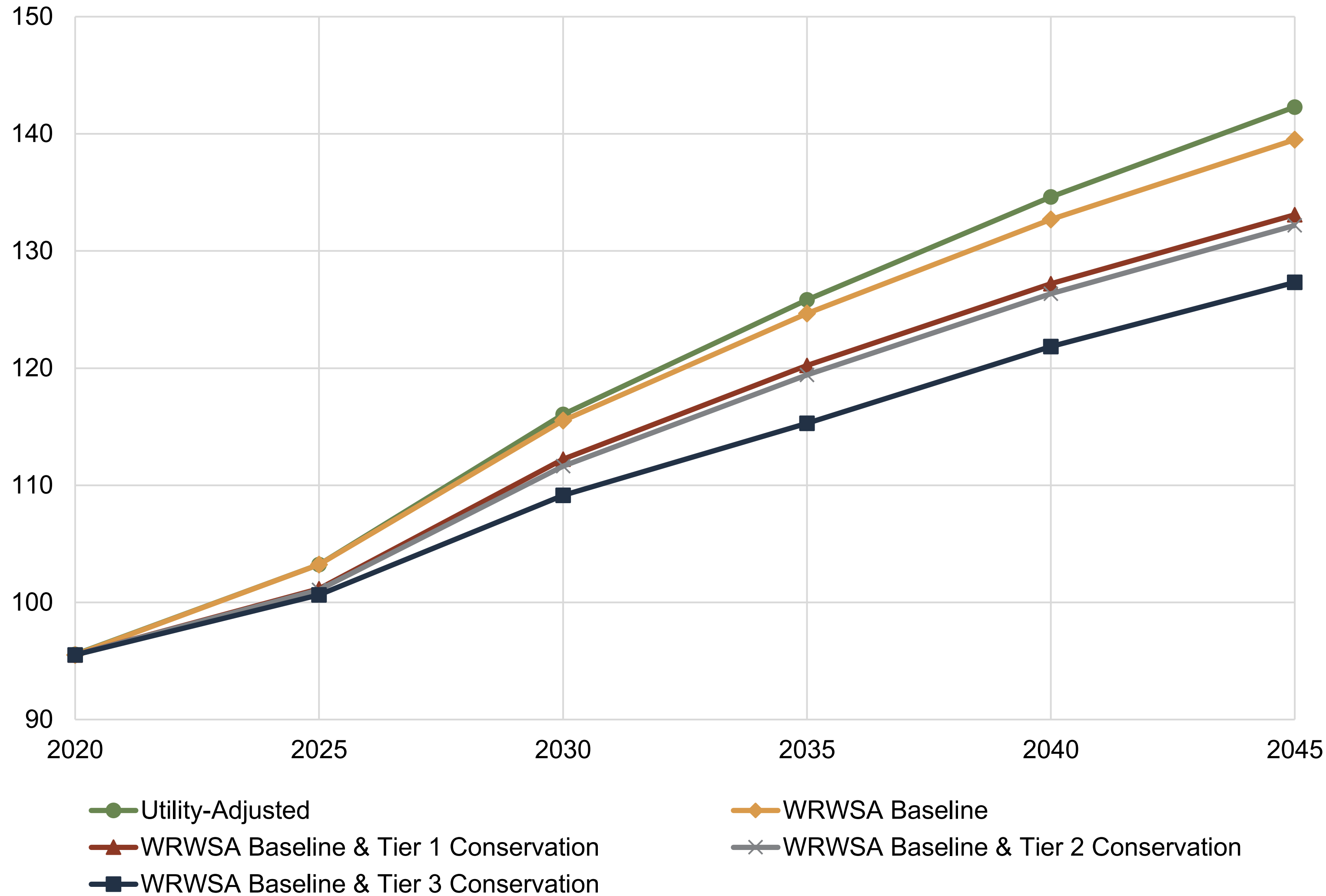


Figure 4-1: Water Conservation Potential for Public Supply Water Use (2020-2045)

Table 4-8: Conservation Adjusted Demand Scenarios Projections Citrus County

Scenario	Use Type	Projected Water Use with Conservation (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
Baseline	Public Supply	16.2	17.8	19.2	20.2	21.1	4.9	30.3%
	Total[1]	**30.5**	**32.5**	**34.4**	**35.8**	**37.1**	**6.6**	**21.7%**
Tier 1	Conservation	0.4	0.7	0.9	1.1	1.3	0.8	208.6%
	Adjusted PS	15.8	17.2	18.4	19.2	19.8	4.1	25.7%
	Total[1]	**30.1**	**31.9**	**33.5**	**34.7**	**35.8**	**5.8**	**19.2%**
Tier 2	Conservation	0.4	0.8	1.0	1.2	1.4	1.0	234.4%
	Adjusted PS	15.8	17.1	18.2	19.0	19.7	3.9	24.8%
	Total[1]	**30.0**	**31.8**	**33.3**	**34.6**	**35.7**	**5.6**	**18.7%**
Tier 3	Conservation	0.5	1.2	1.7	2.0	2.2	1.7	338.2%
	Adjusted PS	15.7	16.7	17.5	18.3	18.9	3.2	20.5%
	Total[1]	**30.0**	**31.4**	**32.7**	**33.9**	**34.9**	**4.9**	**16.5%**

[1] Total water use combines the adjusted public supply projection with all other water-use categories in Table 3-10.

Table 4-9: Conservation Adjusted Demand Scenarios Projections Hernando County

Scenario	Use Type	Projected Water Use with Conservation (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
Baseline	Public Supply	22.3	25.8	28.6	31.2	33.5	11.2	50.3%
	Total[1]	**37.0**	**41.2**	**44.7**	**47.8**	**50.6**	**13.6**	**36.6%**
Tier 1	Conservation	0.6	0.9	1.3	1.7	2.0	1.4	256.0%
	Adjusted PS	21.7	24.8	27.3	29.5	31.5	9.8	45.0%
	Total[1]	**36.4**	**40.3**	**43.4**	**46.1**	**48.6**	**12.1**	**33.3%**
Tier 2	Conservation	0.6	1.1	1.6	1.9	2.3	1.7	285.8%
	Adjusted PS	21.7	24.7	27.1	29.3	31.2	9.5	43.9%
	Total[1]	**36.4**	**40.1**	**43.1**	**45.9**	**48.3**	**11.9**	**32.6%**
Tier 3	Conservation	0.7	1.7	2.5	3.0	3.5	2.8	405.5%
	Adjusted PS	21.6	24.1	26.1	28.2	30.0	8.4	39.1%
	Total[1]	**36.3**	**39.5**	**42.1**	**44.8**	**47.1**	**10.8**	**29.7%**

[1] Total water use combines the adjusted public supply projection with all other water-use categories in Table 3-13.

Table 4-10: Conservation Adjusted Demand Scenarios Projections Marion County (SWFWMD)

Scenario	Use Type	Projected Water Use with Conservation (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
Baseline	Public Supply	15.3	16.3	17.1	18.5	19.9	4.5	29.5%
	Total[1]	**28.6**	**29.9**	**31.1**	**32.9**	**34.6**	**5.9**	**20.7%**
Tier 1	Conservation	0.4	0.6	0.8	1.0	1.2	0.8	206.7%
	Adjusted PS	14.9	15.7	16.3	17.6	18.7	3.7	24.9%
	Total[1]	**28.2**	**29.4**	**30.3**	**31.9**	**33.4**	**5.1**	**18.2%**
Tier 2	Conservation	0.4	0.7	0.9	1.1	1.3	0.9	232.4%
	Adjusted PS	14.9	15.6	16.2	17.4	18.5	3.6	24.0%
	Total[1]	**28.2**	**29.2**	**30.2**	**31.7**	**33.2**	**5.0**	**17.7%**
Tier 3	Conservation	0.5	1.1	1.5	1.8	2.0	1.6	335.4%
	Adjusted PS	14.9	15.2	15.6	16.8	17.8	2.9	19.8%
	Total[1]	28.2	28.9	29.6	31.1	32.5	4.4	15.5%

[1] Total water use combines the adjusted public supply projection with all other water-use categories in Table 3-20.

Table 4-11: Conservation Adjusted Demand Scenarios Projections for Marion County (SJRWMD)

Scenario	Use Type	Projected Water Use with Conservation (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
Baseline	Public Supply	23.4	24.0	24.6	25.1	25.7	2.3	9.9%
	Total[1]	**47.3**	**48.7**	**50.1**	**51.6**	**52.7**	**5.4**	**11.3%**
Tier 1	Conservation	0.6	0.9	1.1	1.3	1.5	0.9	160.3%
	Adjusted PS	22.8	23.1	23.4	23.8	24.2	1.4	6.0%
	Total[1]	**46.7**	**47.8**	**49.0**	**50.2**	**51.1**	**4.4**	**9.4%**
Tier 2	Conservation	0.6	1.0	1.3	1.6	1.7	1.1	182.1%
	Adjusted PS	22.8	22.9	23.2	23.6	24.0	1.2	5.2%
	Total[1]	**46.7**	**47.6**	**48.8**	**50.0**	**50.9**	**4.2**	**9.1%**
Tier 3	Conservation	0.7	1.6	2.2	2.4	2.6	1.9	269.6%
	Adjusted PS	22.7	22.4	22.4	22.7	23.0	0.4	1.7%
	Total[1]	**46.6**	**47.1**	**47.9**	**49.2**	**50.0**	**3.4**	**7.3%**

[1] Total water use combines the adjusted public supply projection with all other water-use categories in Table 3-23.

Table 4-12: Conservation Adjusted Demand Scenarios Projections Sumter County

Scenario	Use Type	Projected Water Use with Conservation (MGD)					2025 - 2045	
		2025	2030	2035	2040	2045	Change	% Change
Baseline	Public Supply	26.0	31.7	35.1	37.6	39.4	13.3	51.2%
	Total[1]	**38.1**	**43.9**	**48.4**	**51.8**	**53.6**	**15.4**	**40.5%**
Tier 1	Conservation	0.1	0.2	0.3	0.4	0.5	0.3	261.8%
	Adjusted PS	25.9	31.5	34.8	37.2	38.9	13.0	50.2%
	Total[1]	**38.0**	**43.7**	**48.1**	**51.4**	**53.1**	**15.1**	**39.7%**
Tier 2	Conservation	0.1	0.3	0.4	0.5	0.6	0.4	300.6%
	Adjusted PS	25.9	31.4	34.7	37.1	38.8	12.9	49.9%
	Total[1]	**38.0**	**43.6**	**48.0**	**51.3**	**53.0**	**15.0**	**39.5%**
Tier 3	Conservation	0.2	0.9	1.4	1.7	1.9	1.6	715.2%
	Adjusted PS	25.8	30.8	33.7	35.9	37.5	11.7	45.3%
	Total[1]	**37.9**	**43.0**	**47.0**	**50.2**	**51.7**	**13.8**	**36.4%**

[1] Total water use combines the adjusted public supply projection with all other water-use categories in Table 3-16.

4.2 Reclaimed Water

Reclaimed water, wastewater that has undergone at least secondary treatment and disinfection, serves as an important component in managing regional water supply within the WRWSA four-county area. By substituting reclaimed water for potable use in irrigation, industrial, and environmental applications, utilities can reduce potable water demand and support more efficient use of existing water supplies.

4.2.1 Overview of Existing and Projected Reuse

Baseline per-capita rates of use and potable demand projections have been adjusted to reflect existing utility plans for reclaimed system expansion. These adjustments reflect planned reclaimed water use, recognizing that the extent to which reclaimed water offsets potable demand varies by utility depending on system configuration and end use. This approach aligns with the conservation modeling assumptions in Section 4.1, which similarly integrate the effects of existing conservation and reuse initiatives to help avoid potential double-counting of savings.

Utilities throughout the WRWSA region were surveyed on their current and projected reclaimed water production, including allocations to beneficial and non-beneficial reuse. Beneficial reuse includes applications such as golf course and residential irrigation, industrial uses, and wetland augmentation. Non-beneficial reuse includes discharge to sprayfields and rapid infiltration basins (RIBs), which provide disposal and may not directly offset potable demand.

Participating utilities included Bay Laurel, Citrus County Utilities, Crystal River, Hernando County Utilities, City of Ocala, The Villages, Gibson Place Utilities, and City of Wildwood. Figure 4-2 shows the 2020 allocation of reclaimed water flows. At that time, approximately 60% of treated wastewater was beneficially reused, while 40% (11.3 MGD) was classified as non-beneficial. This 11.3 MGD represents a potential source available for future beneficial use or recharge applications subject to feasibility, infrastructure, and regulatory considerations.

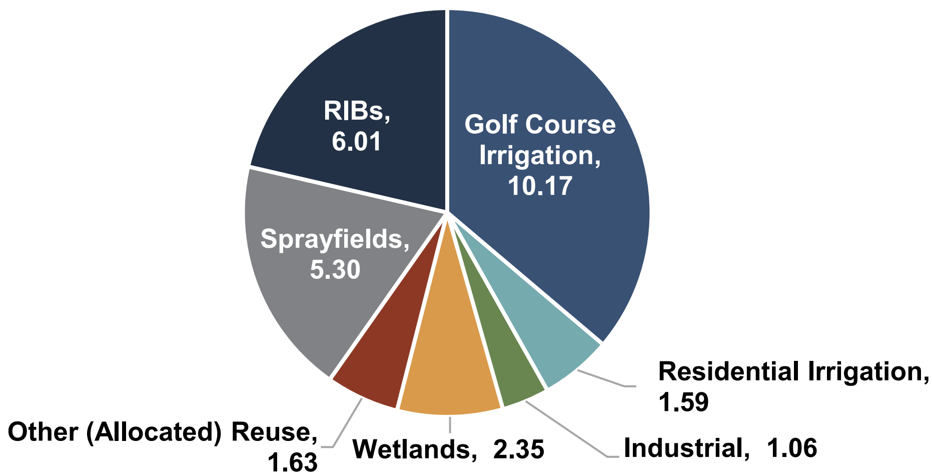


Figure 4-2: 2020 Breakdown of Reclaimed Water Use Types in the WRWSA Region (MGD)

4.2.2 Projected Growth in Reuse Availability

By 2045, total beneficial reuse flows are projected to increase by 20.1 MGD (120%), reaching nearly 37 MGD regionwide. Non-beneficial reuse flows are projected to rise slightly by 2.4 MGD (21%), leaving an estimated 13.7 MGD of unallocated reclaimed water that may be considered for beneficial reuse or MAR applications, subject to site-specific feasibility and regulatory considerations. Table 4-13 summarizes the 2020 and 2045 reuse allocations by county. These results illustrate the relative scale of reuse activity by county and the overall regional increase in beneficial reuse capacity through 2045. Detailed facility-level data are presented in Table 4-14.

Table 4-13: Beneficial and Non-Beneficial Reclaimed Water Flows in the WRWSA Region (MGD)

County	Beneficial Reuse			Non-beneficial Reuse		Primary Reuse Opportunity
	2020	2045	Change	2020	2045	
Citrus	0.88	2.27	+1.38	2.61	1.71	Reuse interconnect between Crystal River and CAB systems; inland recharge near Lecanto corridor
Hernando	2.33	5.78	+3.45	3.22	3.58	Irrigation expansion and potential aquifer recharge
Marion	5.62	8.10	+2.48	4.82	6.20	Reuse optimization, such as NPR expansion
Sumter	7.96	20.77	+12.81	0.66	2.20	Reuse expansion in The Villages and Bushnell corridor
WRWSA Total	**16.79**	**36.92**	**+20.13**	**11.31**	**13.69**	**Maximize beneficial reuse, support aquifer recharge, and enhance regional water supply sustainability**

Table 4-14: Beneficial and Non-Beneficial Reclaimed Water Flows by WRF (MGD)

Location	Wastewater Facility	Facility Code	Beneficial Flow (MGD)			Non-Beneficial Flow (MGD)		
			2020	2045	Change (2020-2045)	2020	2045	Change (2020-2045)
Citrus	Rolling Oaks Beverly Hills	FLA011869				0.46	0.54	0.08
	Citrus County - Point O Woods	FLA011893	0.01	0.02	0.01	0.01	0.01	0.00
	Citrus County - Brentwood Regional	FLA011844		0.51	0.51	0.45		-0.45
	Citrus County - Meadowcrest	FLA011845	0.37	0.48	0.11	0.30	0.39	0.09
	Citrus County - Sugarmill Woods	FLA011903		0.71	0.71	0.69		-0.69
	Inverness	FLA011847	0.20	0.23	0.03	0.33	0.38	0.04
	Crystal River	FLA011848	0.30	0.32	0.02	0.36	0.39	0.03
	Citrus County Total		**0.88**	**2.27**	**1.38**	**2.61**	**1.71**	**-0.90**
Hernando	Hernando County - Airport	FLA017223				1.64	2.90	1.26
	Hernando County - Glen	FLA012069		4.49	4.49	1.05	0.25	-0.80
	Hernando County - Ridge Manor	FLA012031				0.25	0.43	0.18
	Hernando County - Brookridge[1]	FLA012028				0.19		-0.19
	Hernando County - Spring Hill[2]	FLA012043	1.33		-1.33	0.09		-0.09
	Brooksville (William S. Smith WWRF)	FLA012036	1.01	1.29	0.28			
	Hernando County Total		**2.33**	**5.78**	**3.45**	**3.22**	**3.58**	**0.36**
Marion (SJRWMD)	Belleview	FLA010678	0.44	0.56	0.12	0.01	0.02	0.00
	Marion Correctional Institute	FLA010789	0.10	0.14	0.04	0.39	0.57	0.18
	Marion County Silver Springs Shores	FLA296651	0.30	0.43	0.14	0.93	1.35	0.42
	Marion County Stonecrest	FLA010741	0.17	0.24	0.08	0.02	0.03	0.01
	Ocala Plant #2	FLA010680	1.28	1.28	0.00	2.67	2.67	0.00
	Marion County (SJRWMD) Total		**2.28**	**2.66**	**0.38**	**4.02**	**4.63**	**0.61**
Marion (SWFWMD)	On Top of the World - Bay Laurel	FLA012683	0.49	1.07	0.58	0.09	0.61	0.53
	Ocala Plant #3	FLA190268	2.29	3.59	1.31			
	Marion County - Northwest Regional	FLA272060	0.08	0.11	0.03			
	Marion County - Oak Run	FLA012697	0.49	0.67	0.19	0.38	0.52	0.14
	Dunnellon	FLA126594				0.17	0.23	0.05
	Rainbow Springs WRF[3]	FLA012693				0.17	0.22	0.05
	Marion County (SWFWMD) Total		**3.34**	**5.44**	**2.10**	**0.80**	**1.57**	**0.77**
Sumter	Wildwood (includes Coleman Correctional)	FLA013497		2.32	2.32	0.04	0.42	0.38
	Continental Country Club	FLA043699				0.10	0.41	0.31
	Villages - North Sumter Util. Co. WWTF[4]	FLA281581	3.12	4.80	1.68	0.07		-0.07
	Villages - Central Sumter Util. Co. WWTF	FLA499951	1.24	1.60	0.36	0.04		-0.04
	Villages - Little Sumter Util. Co. WWTF	FLA017133	1.54	3.00	1.46			
	South Sumter Util. Co. Master Reuse[5]	FLAB03270	1.90	4.48	2.58			
	Gibson Place Utility Company	FLAB07202		4.00	4.00			
	Sumter Correctional	FLA013558	0.17	0.57	0.40	0.12	0.41	0.29
	Bushnell	FLA188697				0.28	0.96	0.68
	Sumter County Total[6]		**7.96**	**20.77**	**12.80**	**0.66**	**2.20**	**1.54**
	WRWSA TOTAL		**16.79**	**36.92**	**20.12**	**11.31**	**13.69**	**2.39**

[1] Facility was decommissioned. Flows received at the Brookridge WRF are now being received at the Glen WRF.
[2] Facility was decommissioned. Flows received at the Spring Hill WRF are now being received at the Airport WRF.
[3] Rainbow Springs WRF flows shown pending decommissioning and transfer to Dunnellon WRF.
[4] Existing reclaimed water transfers to North Sumter identified in the Wildwood Utility System Master Plan were reflected within the NSU projections, with only the remaining reclaimed allocation applied within the Wildwood service area.
[5] South Sumter receives reclaimed water from the Leesburg/Turnpike WWTF (FLA105147) in Lake County. In 2020, the South Sumter Master Reuse System received all reclaimed water from the Leesburg/Turnpike WWTF per the 2025 SWFWMD RWSP.
[6] Projected growth in total wastewater flow (14.34 mgd from 2020 to 2045, per WRWSA projections) exceeds projected growth in public supply demands. This relationship is primarily associated with beneficial reuse assumptions incorporated into the WRWSA projections, including: (1) a projected 100% beneficial reuse assumption of 4.48 mgd in 2045 applied to the South Sumter Utility Company (2025 SWFWMD RWSP); and (2) projected beneficial reuse in 2045 equal to current plant capacities for the North Sumter, Central Sumter, Little Sumter, and Gibson Place utilities, consistent with utility survey responses.

4.2.3 Reclaimed Water Supply Potential Summary

By 2045, the WRWSA region is projected to produce nearly 50 MGD of total reclaimed water. Approximately 37 MGD (75 percent) will be beneficially reused for irrigation, industrial, and environmental purposes. The remaining 13.7 MGD represents unallocated reclaimed water that could be redirected to new beneficial uses or considered for MAR projects where hydrogeologic conditions and regulatory requirements allow.

Regional patterns show that:

- Citrus County retains roughly 1.7 MGD of non-beneficial flows near the Crystal River and Charles A. Black (CAB) systems, suggesting that interconnection between these facilities could provide an early regional reuse project.
- Hernando County presents potential for targeted irrigation expansion and evaluation of recharge opportunities, such as MAR as discussed in Section 5.2.2.
- Marion County shows significant opportunities for reuse optimization, through projects such as NPR expansion.
- Sumter County has the largest total reuse volume, driven by the Villages' extensive irrigation network and continued system expansion.

Taken together, these flows represent the most immediately available alternative water source in the region, one that can help reduce potable water demand and support more efficient use of existing water supplies. These opportunities inform the project concepts presented in Section 5, including potential inter-utility interconnects and regional recharge initiatives.

4.3 Groundwater

Fresh groundwater from the UFA is the principal source of supply for all use categories across the WRWSA four-county region, owing to its high quality, productivity, and widespread availability. It is anticipated to remain a primary source through 2045. The UFA, several hundred feet thick, underlies the entire region and generally dips and thickens southward, from about 400 feet to over 800 feet. The top of the aquifer ranges from approximately 0 to 100 feet below mean sea level.

The UFA in the WRWSA region is predominantly freshwater throughout its depth, with the exception being the freshwater/saltwater interface, generally identified 5 to 8 miles from the coast as shown in Figure 4-3. Where unconfined, recharge may occur via rainfall infiltration.

Localized constraints, including groundwater withdrawal impacts and the establishment of MFLs for first-magnitude springs, may influence groundwater availability in certain areas subject to hydrogeologic conditions and regulatory considerations. The Middle Confining Unit I (MCU I) and Middle Confining Unit II (MCU II) separate the UFA from the LFA and vary significantly across the region. Figure 4-4 displays the location of MCU I, MCU II, and their overlap. MCU I occurs primarily in the eastern WRWSA area, is 100–300 feet thick and may allow limited vertical flow. MCU II dominates the western portion, ranging from 100–800 feet thick, and is generally considered a more competent confining unit.

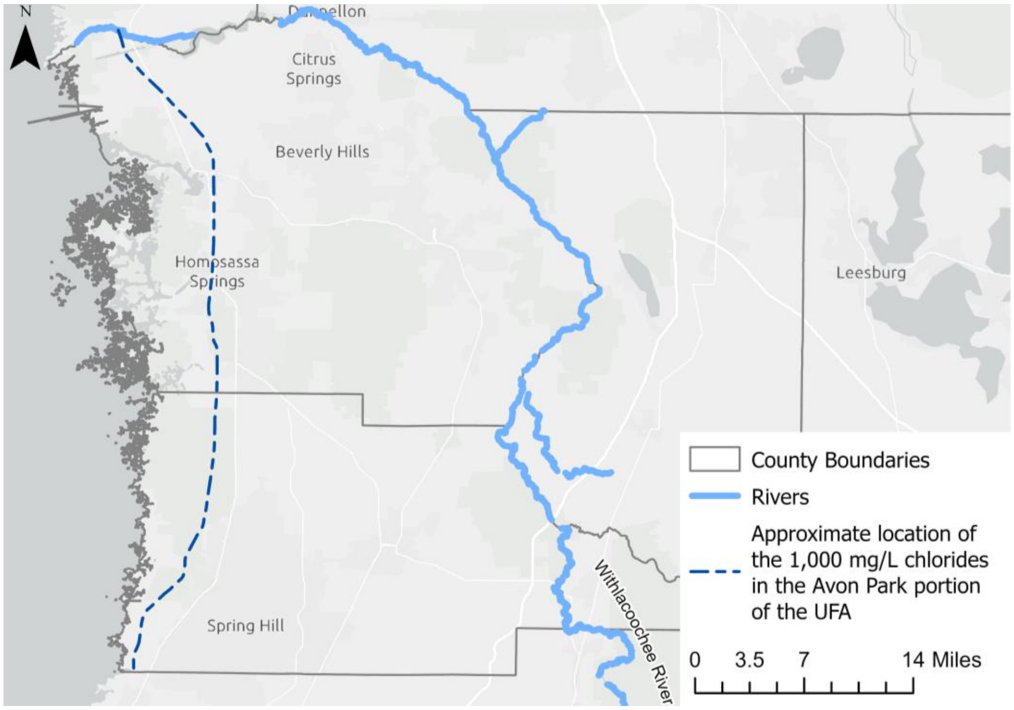


Figure 4-3: Generalized Location of the Freshwater-Saltwater Interface (SWFWMD 2025 RWSP)

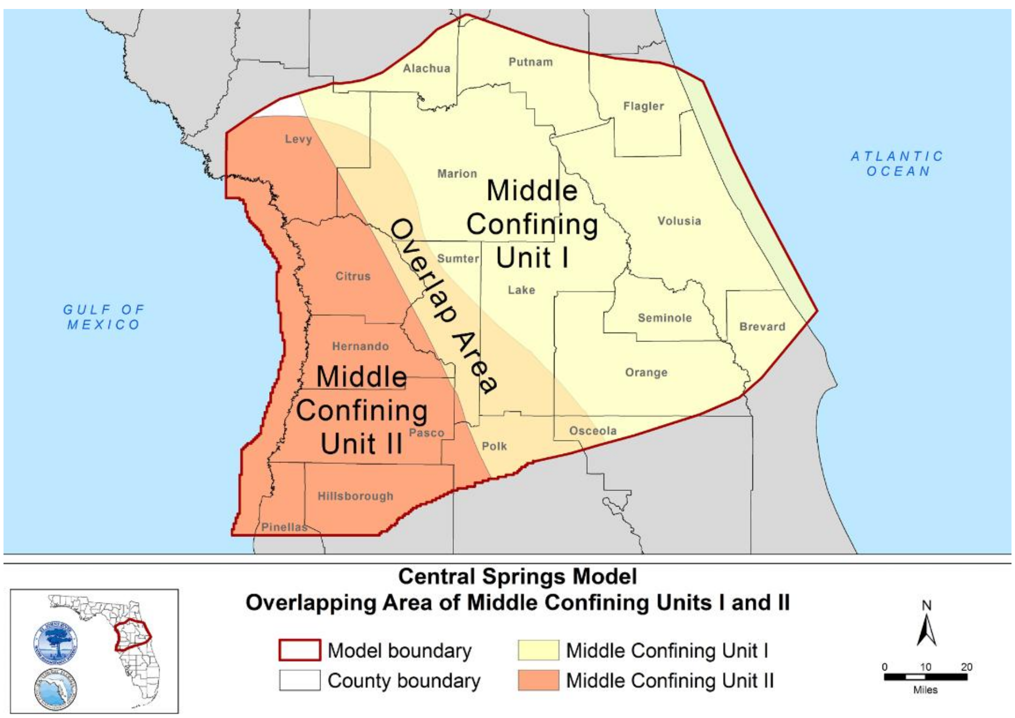


Figure 4-4: Area of Middle Confining Units I and II and Their Overlap (Central Springs Groundwater Flow Model Version 1.0 Report, SJRWMD and SWFWMD, 2024)

Beneath the MCU II, additional investigation may be warranted to further evaluate hydrogeologic conditions for the WRWSA region. Available data indicate that near the coast, water quality is generally more saline, with freshwater being present further inland. Despite this, these observations are based on limited monitoring data, indicating that additional investigation may be warranted. Refer to Figure 1-3 which displays the cross section through the WRWSA Region where the UFA, LFA, and respective MCUs can be visualized.

4.3.1 Spring Flow

Changes in spring flow from no-pumping conditions to 2045 were estimated using the Central Springs Model (CSM v1.1), developed jointly by the SWFWMD and SJRWMD. The model simulates regional hydrogeologic conditions and projected groundwater withdrawals to evaluate potential changes in discharge at major first-magnitude spring systems. CSM groundwater modeling is based on both Districts' public supply water demand projections. SWFWMD's modeling results are reported in the 2025 SWFWMD RWSP, and SJRWMD's modeling results were provided by the District.

The following narrative summarizes the results shown in Table 4-15 for each of the major spring systems in the WRWSA region:

- **Rainbow Springs System** – The minimum flow adopted for the Rainbow Springs and River system is 5.0 percent reduction in flow. The table shows the modeled change for the system of 1.5 percent, based on projected 2045 groundwater withdrawals, which is below the allowable 5.0 reduction.
- **Chassahowitzka Springs System** – The minimum flow adopted for the Chassahowitzka Springs System is 8.0 percent reduction in flow. The table shows the predicted decline for the system of 2.3 percent, resulting from projected 2045 groundwater withdrawals, which does not exceed the allowable 8.0 reduction.
- **Homosassa Spring Group** – The minimum flow adopted for the Homosassa Spring Group is 5.0 percent reduction in flow. The table shows the predicted decline for the system of 1.5 percent, resulting from projected 2045 groundwater withdrawals, which does not exceed the allowable 5.0 reduction.
- **King's Bay Springs System** – The minimum flow adopted for the Kings Bay Spring's System is 11.0 percent reduction in flow. The table shows the predicted decline for the system of 1.5 percent, resulting from projected 2045 groundwater withdrawals, which does not exceed the allowable 11.0 reduction.
- **Weeki Wachee Springs System** – The minimum flow adopted for the Weeki Wachee Springs System is 10.0 percent reduction in flow. The table shows the predicted decline for the system of 5.7 percent, resulting from projected 2045 groundwater withdrawals, which does not exceed the allowable 10.0 reduction.
- **Gum Slough and Springs System** – The minimum flow adopted for the Gum Slough Springs System is 6.0 percent reduction in flow. The table shows the predicted decline for the system of 9.4 percent according to the additional model run, resulting from projected 2045 groundwater

withdrawals, which is above the allowable 6.0 percent reduction based on the additional model run. Scenario results from the CSM version 1.1 indicate that the MFL allowable spring flow reduction (6 percent) for Gum Slough Springs may be exceeded under the projected 2045 demand. The MFL of Gum Slough Spring Group is currently under reevaluation, with completion anticipated in 2026. Additional modeling efforts using the CSM will be incorporated into the MFL reevaluation, taking into account factors including historical water use, reclaimed water use, and recharge variations. The current MFL was established in 2011 using simulation results from the Northern District Model, which relied on limited hydrologic data available at the time, for calibration in the surrounding area. The improved CSM model is expected to provide a more accurate evaluation of allowable flow reduction from the spring system.

- **Silver Springs System** – Six minimum hydrologic events (3 flows and 3 levels) were adopted for Silver Springs, each with a magnitude, duration and return interval. These events define the conditions used to evaluate whether the overall Silver Springs MFLs are met. SJRWMD will reassess the status of the Silver Springs MFLs as part of the SJRWMD 2027 Central Springs/East Coast (CSEC) regional water supply planning effort, which kicked off in January 2025. This updated status will be reflected in the next update of the WRWSA water supply plan.

Overall, modeled results indicate that widespread MFL exceedances are not projected under modeled conditions; however, localized management actions may be considered near Gum Slough and Silver Springs to support long-term resource management.

Table 4-15: Predicted Flow Declines for Various MFL Springs from 2025 to 2045

Spring Name	No Pumping Flows (cfs)	District Model Run	2045 No Pumping District Model Run (% Change)	MFL Allowable Flow Reduction (%)
Rainbow Springs and River	683.4	672.8	1.5	5.0
Chassahowitzka Spring Group	189.3	184.9	2.3	8.0
Homosassa Spring Group	312.7	307.9	1.5	5.0
Kings Bay Springs	482.8	475.3	1.5	11.0
Weeki Wachee Spring Group	226.7	213.7	5.7	10.0
Gum Slough[1]	98.8	89.4	9.4	6.0
Silver Springs[2]	567.7	531.2	6.4	NA

[1] The withdrawal impacts for Gum Slough flow is based on an estimated springflow contribution of 72 percent.
[2] Silver Springs has a modeled 2016-2020 average flow of 547.1 cfs.

4.3.2 River Flow

The WRWSA region includes two major river systems, the Withlacoochee River and the Ocklawaha River, both of which are influenced by groundwater levels in the UFA. Projected changes in baseflow contributions to these rivers were evaluated using the Central Springs Model (CSM v1.1), developed by the SWFWMD and SJRWMD.

Currently, there are no MFL evaluations scheduled for the Ocklawaha River. However, the SWFWMD 2025 Regional Water Supply Plan includes MFLs for several Withlacoochee River segments anticipated for adoption in 2026. These include:

- The upstream segment above the Croom gauge,
- The reach between the Wysong and Croom gauges,
- The reach from Holder to Wysong, and
- The lower segment partially located in Citrus County (downstream of Lake Rousseau).

Model results indicate minor reductions in baseflow contribution through 2045, remaining within the range of modeled conditions. These results are summarized in Table 4-16.

Table 4-16: Predicted Changes in River Baseflow Contribution (2025–2045)

River Segment	No Pumping Flow (cfs)	Predicted Flow (cfs)	Percent Change
Withlacoochee River at Croom	54.4	53.5	1.7
Withlacoochee River near Holder	340.8	314.6	7.7

The CSM indicates baseflow changes of less than 8 percent under 2045 pumping conditions. Although modest, the modeled changes suggest that groundwater withdrawals may influence localized river-aquifer interactions, particularly near the Holder gauge where the river interacts strongly with the UFA.

Continued coordination with SWFWMD may be important as MFLs are finalized to support consistency between regional groundwater management and long-term ecological flow objectives.

4.3.3 Lakes and Wetlands

Potential impacts on lakes and wetlands were qualitatively assessed using groundwater-level change outputs from the CSM v1.1 and current MFL compliance data. The analysis did not include explicit modeling of individual lake responses to projected withdrawals; rather, it relied on existing water-management-district evaluations.

Within the SWFWMD portion of the WRWSA region, all MFL lakes are currently meeting their adopted levels. In the SJRWMD portion of Marion County, eight lakes have adopted MFLs: seven presently meet established MFLs under current and 2045 conditions, while Lake Weir is scheduled for re-evaluation in 2028. Lake Charles, which lacks significant hydraulic connection to the UFA and has no permitted surface-water withdrawals, is not identified as being at risk from consumptive uses under current or 2045 conditions based on available information.

Applicants for new or expanded groundwater withdrawals must demonstrate that proposed pumping will not cause or contribute to a violation of adopted MFLs.

4.3.4 Groundwater Supply Potential Summary

Estimating groundwater supply potential is inherently uncertain due to ongoing MFL development and incomplete hydrogeologic data in portions of the region. Model results indicate that 2045 demands in the SWFWMD portion may be met primarily through UFA withdrawals under modeled conditions, with localized considerations identified near Gum Slough.

In the SJRWMD portion, Silver Springs is in prevention. Implementation of the Silver Springs Prevention Strategy is intended to maintain MFL compliance through at least 2040 (SJRWMD, 2022), however, new UFA allocations in central and eastern Marion County may be constrained by regulatory and resource considerations. As mentioned previously, SJRWMD will update the status of the Silver Springs MFLs in the 2027 CSEC RWSP.

Some additional supply may be obtainable from the LFA where sufficient confinement between aquifers can be demonstrated and impacts are not projected to cause harm to water resources. The SWFWMD 2025 RWSP indicates the LFA exhibits good quality and productivity in some areas, though variable confinement requires site-specific evaluation.

The SWFWMD 2025 RWSP also identifies currently permitted but unused groundwater quantities that public supply utilities may grow into over the planning horizon. These quantities, shown in Table 4-17, were based on SWFWMD's Estimated Water Use Report (Ferguson, 2024).

Table 4-17: Potential Additional Water Availability in Fresh Groundwater

County	Unused Permitted Fresh Groundwater (MGD)
Citrus	0.84
Hernando	2.76
Marion (SWFWMD)	3.00
Sumter	12.27
TOTAL	18.87

4.4 Surface Water

The Withlacoochee and Ocklawaha rivers are the only major river systems in the WRWSA four-county region. In the SWFWMD, the Weeki Wachee, Chassahowitzka, Homosassa, Crystal, and Rainbow rivers are all spring runs with varying degrees of brackishness. The Weeki Wachee River remains fresh for some distance downstream from its head spring; however, direct surface water withdrawals from these spring runs are unlikely. Instead, groundwater withdrawals are expected to continue as the primary source to meet demand, with limitations triggered when spring discharge impacts approach their MFL thresholds.

The Rainbow River, which is fresh for its entire length to the Withlacoochee River, represents the most feasible location for future withdrawals if necessary, though any such withdrawals would likely occur downstream at Lake Rousseau. In the SJRWMD, the Silver River functions as the outflow for Silver Springs and a tributary to the Ocklawaha River.

This section evaluates the availability of surface water from the Withlacoochee River for potential water supply use. The Ocklawaha River is not included in the analysis because MFLs have not yet been established and no adoption schedule exists. However, previous studies have estimated potential availability downstream of the Silver River confluence.

4.4.1 Withlacoochee River

The Withlacoochee River watershed spans approximately 2,100 square miles. Originating in the Green Swamp in Polk County, the river flows north for 157 miles before discharging into the Gulf near Yankeetown. In the upper watershed, the Withlacoochee and Hillsborough River headwaters are separated by a low natural divide; during extreme high flows, limited overflow between the basins can occur.

Land use within the upper watershed is largely agricultural and wetland-dominated. The corridor becomes more developed near Dade City (Pasco County), but much of the mid- and lower-basin remains rural or natural. Downstream of Lake Tsala Apopka to Dunnellon, the landscape is characterized by mixed forest, springs, and low-intensity development. Major tributaries include Pony Creek, Grass Creek, Gator Hole Slough, Little Withlacoochee River, Jumper Creek, Panasoffkee Outlet River, Gum Slough, and Rainbow River.

Several springs discharge directly to the river, including Dobes Hole Spring, Riverdale Spring, Nichols Spring, Gum Slough Springs, Wilson Head Spring, Blue Spring, and Rainbow Springs. Key control structures include the Inglis Dam at Lake Rousseau, structures regulating outflows from Lake Tsala Apopka, and the Wysong-Coogler Dam, located two miles downstream from the Panasoffkee Outlet River.

West of Lake Rousseau, the river discharges into the Gulf through the Withlacoochee Bay estuary, where channel modifications related to the Cross Florida Barge Canal have altered hydrologic conditions by reducing high-flow variability and long-term average discharge.

According to the SWFWMD 2025 Regional Water Supply Plan, the Withlacoochee River is a gaining stream, with baseflow contributions increasing downstream. Between October 2003 and March 2007, approximately 40% of total flow at the Holder gauge originated from groundwater seepage, 30% from tributary inflows, and 30% from spring discharge.

4.4.1.1 Yield Assessment

The WRWSA contracted Applied Sciences Consulting, Inc. to estimate potential surface water yields from the Withlacoochee River (Appendix A). The analysis incorporates the proposed SWFWMD MFLs for three segments: (1) upstream of the Croom gauge, (2) between Wysong and Croom gauges, and (3) between Holder and Wysong gauges. Although these MFLs were initially proposed in 2010, final adoption is scheduled for 2026.

Until MFLs are formally adopted, the SWFWMD applies an interim planning-level flow criterion, assuming a minimum flow equaled or exceeded 85% of the time (P85). Withdrawals are limited to 10% of daily flow when flows exceed P85, and no withdrawals are allowed below this threshold. Maximum daily withdrawals are further constrained to twice the median (P50) or the practical pump station capacity, whichever is lower.

For this yield assessment, the WRWSA decided to utilize a period of record (POR) of 30 years prior to the analysis (1994 to 2023). Two yield estimation methods were evaluated:

- The POR capped by a practical pump station maximum.
- The POR capped at twice the P50 flow (2×P50).

Applied Sciences Consulting, Inc. developed estimated yields for the Croom, Wysong, and Holder gauges, as summarized in Table 4-18 and as follows:

- **Croom Gauge:** Drainage area ~810 sq mi. Average flow 338 cfs. Practical maximum yield 14.3 MGD; 21.4 MGD under 2×P50 scenario.
- **Wysong Gauge:** Drainage area ~1,520 sq mi. Average flow 512 cfs. Practical maximum yield 23.4 MGD; 32.6 MGD under 2×P50 scenario.
- **Holder Gauge:** Drainage area ~1,820 sq mi. Average flow 729 cfs. Practical maximum yield 36.1 MGD; 45.8 MGD under 2×P50 scenario.

Figure 4-5 illustrates gauge locations and proposed MFL segments along the Withlacoochee River.

Table 4-18: Yield Assessment for USGS Gauges Along the Withlacoochee River based on flow record from 1994 to 2023

USGS Gauge	River Flow Range (cfs)	Average Flow (cfs)	P85 Flow (cfs / MGD)	P50 Flow (cfs / MGD)	Maximum Withdrawal		
					Occurrence (cfs)	Practical (MGD)	2X P50 (MGD)
Croom	0–4,280	338.3	20 / 12.9	140 / 90.5	580.0	14.3	21.4
Wysong	0–4,880	511.5	76 / 49.1	298 / 192.6	773.5	23.4	32.6
Holder	33–5,430	729.0	180 / 116	497 / 321.3	1,160	36.1	45.8

4.4.1.2 Croom Gauge Water Supply Yield

The Croom gauge is located approximately 18.6 miles upstream of the Panasoffkee Outlet River and downstream of Silver Lake at the I-75 overpass, with a drainage area of 810 square miles. For the 30-year period, daily flows averaged 338 cfs (0–4,280 cfs range). The P85 exceedance flow is 20 cfs (12.9 MGD), and P50 is 140 cfs (90.5 MGD). Maximum withdrawals at the practical pump capacity of 37.5 MGD occur when river flows exceed 580 cfs. The average annual yield is 14.3 MGD (practical) and 21.4 MGD (2×P50). The more conservative 37.5 MGD maximum is recommended for planning.

4.4.1.3 *Wysong Gauge Water Supply Yield*

The Wysong gauge, located at the Wysong-Coogler Water Conservation Structure, has a drainage area of 1,520 square miles. Average flow is 511.5 cfs, with a range of 0–4,880 cfs. The P85 is 76 cfs (49.1 MGD), and P50 is 298 cfs (192.6 MGD). Withdrawals are capped at 50 MGD (77.4 cfs) when flows exceed 773 cfs, producing an average annual yield of 23.4 MGD (practical) or 32.6 MGD (2×P50).

4.4.1.4 *Holder Gauge Water Supply Yield*

The Holder gauge, located approximately 20 miles downstream of Lake Panasoffkee near SR 200, drains 1,820 square miles. Average flow is 729 cfs, ranging from 33–5,430 cfs. The P85 is 180 cfs (116 MGD), and P50 is 497 cfs (321 MGD). Withdrawals capped at 75 MGD (116 cfs) occur when flows exceed 1,160 cfs, resulting in an estimated average annual yield of 36.1 MGD (practical) or 45.8 MGD (2×P50).

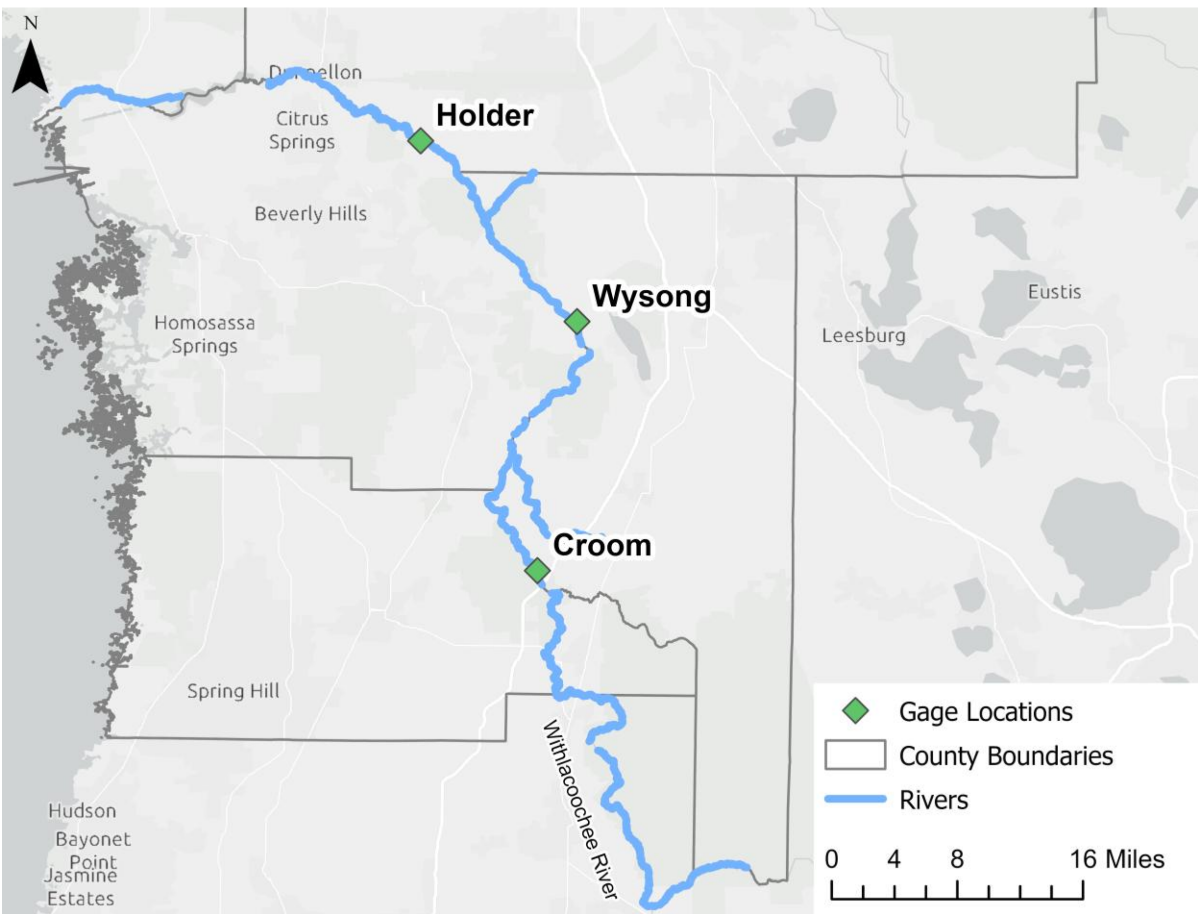


Figure 4-5: Locations of Gages on the Withlacoochee River

4.4.2 Surface Water Supply Potential Summary

Once MFLs are adopted for the Withlacoochee River, yield estimates will be refined to reflect final flow protection criteria. The combined yield from all three gauges does not represent a cumulative total;

instead, a single regional facility, potentially near the Holder gauge, would be developed due to its higher yields and downstream location.

The SWFWMD 2025 RWSP identifies approximately 49.7 MGD as a planning-level estimate near Holder, which is 27% higher than the practical withdrawal yield (36.1 MGD) and 8% higher than the 2×P50 scenario (45.8 MGD). Differences between this estimate and the yields presented herein reflect varying assumptions and methodologies.

Several factors may influence future yield development, including:

1. Final MFL adoption and ecological flow requirements,
2. Variations in spring and tributary inflows,
3. Changes in regional groundwater withdrawals, and
4. Storage and conveyance capacity for consistent delivery.

These considerations will inform detailed feasibility evaluations for potential regional surface water projects under the WRWSA's long-term supply planning framework.

4.5 Seawater Desalination

Seawater desalination provides a stable, drought-resistant source of potable water, particularly in coastal areas where traditional groundwater or surface-water supplies are limited. The Florida Department of Environmental Protection (FDEP) defines seawater as water from a sea, gulf, bay, or ocean with total dissolved solids (TDS) concentrations of 35,000 mg/L or greater.

In desalination using reverse osmosis (RO), pressurized seawater passes through semi-permeable membranes that separate freshwater from salts and other dissolved minerals. The process yields a stream of product water and a high-salinity concentrate (brine). While effective, seawater desalination remains among the most energy-intensive and costly supply options because of high-pressure pumping requirements and complex concentrate management.

The principal environmental consideration in seawater desalination is disposal of the RO concentrate. Facilities typically discharge to marine or estuarine waters under National Pollutant Discharge Elimination System (NPDES) permits, which often require dilution with cooling water or treated effluent to reduce salinity impacts. Another method is deep-well injection into saline aquifers. Each method carries distinct regulatory and cost implications and strongly influences siting feasibility.

4.5.1 Seawater Desalination Supply Potential Summary

Because of high capital and energy costs and limited coastal access, seawater desalination is not expected to be a near-term supply option for most of the WRWSA service area. It remains a long-term contingency source that could become viable if other supply options are fully utilized or regulatory limits restrict additional groundwater development. Future feasibility would depend on proximity to the Gulf Coast, availability of deep-water intake and discharge locations, and partnerships with major coastal industrial users for shared infrastructure.

4.6 Stormwater

The Florida Department of Environmental Protection (FDEP) defines stormwater as the flow of water that results from, and occurs immediately following, a rainfall event—typically captured in ponds, swales, or other detention features for water quality treatment or flood control. Alterations to the natural landscape, such as urbanization and impervious surface development, substantially modify the hydrologic characteristics of stormwater flows, often increasing both volume and rate of runoff.

Stormwater runoff can represent a significant local water source when captured, treated, and reused for beneficial purposes. Under Fla. Admin. Code Rule 62-40, stormwater recycling is defined as the capture and reuse of stormwater for irrigation or other beneficial uses. However, the reliability of stormwater supply varies considerably depending on climatic conditions, watershed size, and available storage capacity. For this reason, stormwater reuse is often most feasible when integrated with other sources—such as reclaimed water—to reduce operational risks associated with seasonal variability.

Stormwater represents a practical alternative water source for non-potable uses such as irrigation and reclaimed water system supplementation. The Villages provides a notable regional example, where stormwater is combined with reclaimed water to sustain landscape irrigation systems. As development continues across the WRWSA region, particularly in Sumter and Marion Counties, stormwater harvesting is expected to remain a significant local source for meeting irrigation demands.

Future opportunities for stormwater development lie in expanding interagency collaboration. Local governments and utilities can partner with the Florida Department of Transportation (FDOT) on stormwater capture and harvesting projects. Through FDOT's Efficient Transportation Decision Making (ETDM) process, the Water Management Districts (WMDs) and other agencies can identify cooperative stormwater opportunities during the Planning Screen and Project Development and Environment (PD&E) phases. FDOT's Environmental Look-Arounds—conducted during project planning, help identify regional stormwater sources suitable for reuse augmentation, aquifer recharge, or MFL recovery initiatives.

Together, these opportunities suggest that stormwater, while limited in scale, could play an important part of the WRWSA's long-term supply strategy by:

- Providing supplemental irrigation supply in growing urban areas.
- Reducing nutrient loads to receiving waters when coupled with reuse systems.
- Enhancing recharge potential when integrated into regional water management designs.

These coordinated planning efforts illustrate how stormwater capture can be advanced through multi-agency partnerships rather than stand-alone utility projects. Although stormwater availability is highly variable and site-specific, integrating it with reclaimed water systems or aquifer recharge projects can improve system reliability and maximize beneficial use of rainfall-derived flows. As such, stormwater may be considered a complementary source in the WRWSA's long-term supply portfolio, supporting both water supply resilience and regional water resource sustainability.

4.6.1 Stormwater Supply Potential Summary

Stormwater reuse represents a locally scalable and complementary source within the WRWSA's diversified supply portfolio. While its reliability is inherently variable due to seasonal rainfall patterns, stormwater harvesting can meaningfully supplement reclaimed water systems and offset irrigation demand when integrated with storage and conjunctive-use strategies.

The greatest near-term potential lies in localized reuse partnerships, such as those already demonstrated in The Villages, where stormwater is blended with reclaimed water for irrigation. Expanded collaboration between local governments, utilities, and the Florida Department of Transportation (FDOT) could identify additional stormwater capture opportunities through shared infrastructure and "Environmental Look Around" assessments in transportation corridors.

Incorporating stormwater into future supply planning enhances both resilience and water quality outcomes, offering a cost-effective complement to large-scale reclaimed water and recharge initiatives discussed in Section 5.

4.7 Summary of Water Supply Potential

Table 4-19 summarizes the potential demand reductions and the potential quantities of water from all sources across the WRWSA four-county region through 2045. These estimates represent planning-level potentials that may be realized through conservation, reclaimed-water expansion, and development of alternative supplies.

Table 4-19: Demand Reduction Potential and Water Availability from all Sources in the WRWSA Four-County Region through 2045 (MGD)

County	Water Conservation[1]	Reclaimed Water[2]	Groundwater[3]	Surface Water (Withlacoochee)[4]	Desalination[5]	Total
Citrus	2.18	1.71	0.84	18.05	10.0	32.78
Hernando	3.45	3.58	2.76		-	9.79
Marion	4.70	6.20	5.75	18.05	-	34.70
Sumter	1.85	2.20	12.27		-	16.32
TOTAL	12.18	13.69	21.62	36.10	10.0	93.59

[1] Derived from Tier 3 conservation savings in 2045.

[2] Represents unallocated reclaimed water identified in the 2024 utility survey.

[3] Represents potential additional groundwater from unused permit capacity. LFA quantities may supplement UFA withdrawals. SWFWMD values derived from the District's 2025 RWSP.

[4] Represents the most likely surface-water supply option (up to 36.1 MGD) at the Holder gage based on the Applied Sciences (2024) yield assessment, split between Citrus and Marion counties. Other alternative, not additive, gage locations are at Wysong (23.4 MGD assigned to Sumter County) and Croom (14.2 MGD assigned to Hernando County).

[5] Conceptual 10 MGD desalination facility; expansion beyond this scale is not proposed due to concentrate disposal constraints.

As shown, the most significant future contributions to regional supply reliability are associated with reclaimed water (~14 MGD) and conservation (~12 MGD), both of which represent near-term strategies. Groundwater remains a primary source, though it may be subject to increasing constraints, while surface water represents a potential new supply option, with estimated yields ranging between 35 and 45 MGD under planning assumptions, depending on the selected Withlacoochee River intake location (Croom, Wysong, or Holder). Because only one surface-water facility would likely be constructed, this range represents alternative yield scenarios, not additive totals.

Desalination may serve as a long-term contingency source, with a conceptual capacity of 10 MGD at the Crystal River power station. Together, these diversified sources may provide flexibility to help offset projected deficits and support regional resilience, though actual implementation will depend on project feasibility, environmental permitting, and cost effectiveness.

4.7.1 Determination of Water Supply Surpluses and Deficits

Table 4-20 summarizes projected surpluses and deficits under current permitted conditions through 2045 based on baseline demands and existing permitted withdrawal capacities. The analysis compares county-level demands to current permit quantities to identify when and where capacity shortfalls may occur.

Table 4-20: Surplus and Deficit Analysis for WRWSA Based on 2045 Demands

County	Permitted Capacity (MGD)	Baseline Demand Projections (MGD)						Percent of 2045 Permit Capacity	Surplus/Deficit (MGD)					
		2020	2025	2030	2035	2040	2045		2020	2025	2030	2035	2040	2045
Citrus	21.15	14.67	16.19	17.84	19.24	20.24	21.10	99.8%	6.49	4.96	3.46	2.06	1.05	0.20
Hernando	26.19	21.12	22.28	25.75	28.62	31.18	33.49	127.9%	5.07	3.91	0.44	**-2.43**	**-4.99**	**-7.30**
Marion (SWFWMD)	18.96	12.37	15.33	16.28	17.13	18.55	19.85	104.7%	6.60	3.63	2.68	1.84	0.41	**-0.89**
Marion (SJRWMD)	28.44	21.18	23.38	23.97	24.57	25.13	25.69	90.3%	7.26	5.06	4.47	3.87	3.31	2.75
Sumter	39.22	26.19	26.04	31.67	35.12	37.60	39.37	100.4%	13.03	13.17	7.55	4.10	1.62	**-0.15**
WRWSA (Total)	133.96	95.53	103.23	115.52	124.67	132.70	139.50	104.1%	38.43	30.73	18.44	9.29	1.26	**-5.39**

Regional demand is projected to rise from 95.5 MGD (2020) to 139.5 MGD (2045), a 46 percent increase. The WRWSA region as a whole will utilize about 103 percent of existing permitted capacity by 2045, resulting in a 5.4 MGD deficit.

- Citrus County remains roughly balanced through 2045.
- Hernando County exhibits the largest shortfall (≈7.3 MGD), beginning near 2035.
- Marion County (SWFWMD) shows a small deficit, SJRWMD retains a 2.8 MGD surplus.
- Sumter County approaches full capacity by 2045 with a marginal 0.15 MGD deficit.

These findings demonstrate a potential need for action such as utility permit modifications or development of alternative water supply options in the future.

4.7.2 Utility-Level Supply Deficit Assessment

A utility-level analysis was conducted to identify public supply utilities within the WRWSA four-county region projected to experience supply deficits by 2045. This assessment compared each utility's projected water demand to its current permitted groundwater withdrawal quantities. Utilities with projected demands exceeding their permitted allocations were identified as having potential deficits, and the approximate year of exceedance was determined.

These identified deficits represent planning-level indicators under existing permit conditions and are not intended to imply that permitted quantities are fixed. Utilities may pursue permit modifications or alternative supply development, subject to regulatory review and consistency with MFL requirements and other applicable criteria. As such, the results are intended to highlight where additional evaluation of supply options or permitting strategies may be warranted.

Table 4-21 summarizes the utilities projected to experience supply deficits under both the WRWSA Baseline and Tier 3 Conservation scenarios, which represent the upper and lower bounds of conservation savings considered in this analysis. All utilities with any projected deficit are listed; however, those with deficits greater than 0.1 MGD are highlighted.

Under the WRWSA Baseline scenario, eight utilities are projected to have deficits exceeding 0.1 MGD by 2045, while under Tier 3 Conservation, the number decreases to four, illustrating the measurable benefit of expanded conservation efforts. The reduction in both the number and magnitude of deficits under the Tier 3 scenario demonstrates that aggressive conservation can meaningfully delay or offset the need for additional supply development.

Additionally, each county's unallocated reclaimed water, which represents a potential supplemental source to help reduce projected groundwater deficits, subject to feasibility, infrastructure, and regulatory considerations. For remaining shortfalls that cannot be offset through reclaimed water use or conservation, utilities may pursue permit modifications, interconnections, or AWS projects, such as expanded reuse, brackish groundwater development, or regional intertie projects.

Figure 4-6 through Figure 4-10 complement Table 4-21 by illustrating the magnitude and location of these estimated deficits within each county. The graphics emphasize that while some localized deficits may be minor and resolvable through operational adjustments or permit modification, others, particularly in Hernando County and the SWFWMD portion of Marion County, may require regional coordination and infrastructure investment to support long-term supply reliability.

Under Tier 3 water conservation assumptions:

Citrus County

- Pine Ridge, Charles A. Black, and Sugarmill Woods (Consolidated Scenario): A consolidated permit for these three systems is not projected to exceed capacity through 2045.
- Sugarmill Woods (Permit No. 9791): Not projected to exceed its permitted withdrawal capacity through 2045.
- Charles A. Black: Now projected to exceed its permitted capacity in 2040, instead of 2035.

- Rolling Oaks Utilities: Now projected to exceed its permitted capacity in 2045, rather than 2025.

Hernando County

- Hernando County Utilities: Still projected to exceed its permitted capacity in 2035, but by a smaller margin than in the baseline.
    - Hernando County Utilities (Baseline): Projected to exceed its permit by 2.6 MGD in 2035, 5.1 MGD in 2040, and 7.3 MGD in 2045.
    - Hernando County Utilities (Tier 3 Conservation): Exceedances reduced to 0.2 MGD in 2035, 2.2 MGD in 2040, and 4.1 MGD in 2045.

Sumter County

- Sumter County Systems: Reclaimed water offsets and conservation measures substantially reduce projected exceedances across the county.
- City of Bushnell: Now projected to exceed its permitted capacity in 2045, rather than 2040.
- Lake Panasoffkee: No longer projected to exceed its permitted capacity through 2045.
- City of Wildwood: No longer projected to exceed its permitted capacity through 2045; lower projected demands are driven by reclaimed water offsets. In 2045, projected demands are 6.5 MGD (1.9 MGD over) under utility-adjusted projections, 4.7 MGD (0.1 MGD over) under baseline projections, and 4.2 MGD (0.4 MGD under) with Tier 3 conservation.
- Gibson Place Utility Company: No longer projected to exceed its permitted withdrawal capacity through 2045.

Marion County

- Bay Laurel: No longer projected to exceed its permitted capacity within the planning horizon with Tier 3 conservation.
- Marion County Utilities (SWFWMD): No longer projected to exceed its permitted capacity within the planning horizon with Tier 3 conservation.
- Marion County Utilities (SJRWMD): Now projected to exceed its permitted capacity in 2035, rather than 2030.

Collectively, these analyses confirm that while conservation and reclaimed water expansion can mitigate near-term deficits, regional AWS projects may be needed to sustain long-term reliability. The following section (Section 5) identifies and evaluates these potential projects.

In summary, the WRWSA's existing and potential water sources, including groundwater, reclaimed water, surface water, stormwater, and desalination, represent a diversified but finite portfolio. The next section translates this resource assessment into specific, feasible project concepts to help address projected deficits and support regional supply resilience through 2045 and beyond.

Table 4-21: Public Supply Utilities with Projected Deficits through 2045 in the WRWSA Region (MGD)

Utility	2025 Permit Quantity	2045 Tier 3 Conservation	2045 Unallocated Reclaimed[1]	Baseline			Tier 3 Conservation		
				2045 Demand	2045 Deficit	Estimated Year of Exceedance	2045 Demand	2045 Deficit	Estimated Year of Exceedance
Inverness Village Condo Association	0.01	0.01		0.03	-0.02	2020	0.02	-0.01	2020
Inverness Park	0.01	0.01		0.02	-0.01	2020	0.01		
Citrus County Utilities Point O Woods	0.09	0.01	0.01	0.12	-0.03	2025	0.11	-0.02	2025
Rolling Oaks Utilities	1.57	0.18	0.54	1.77	-0.20	2025	1.59	-0.01	2045
Citrus County Utilities Water Oaks	0.02	0.00		0.03	-0.01	2025	0.03	-0.01	2025
Citrus County Charles A Black	7.18	0.97	0.39	9.39	-2.21	2035	8.42	-1.24	2040
Citrus County Total			**1.71**		**-2.48**			**-1.29**	
Hernando County Water System	24.36	3.27	3.58	31.68	-7.32	2035	28.41	-4.05	2035
Hernando County Total			**3.58**		**-7.32**			**-4.05**	
Sun Communities - Saddle Oak Club MHC[2]	0.08	0.01		0.10	-0.02	2020	0.09	-0.01	2020
City Of Dunnellon	1.12	0.15	0.44	1.41	-0.29	2025	1.26	-0.15	2025
Bay Laurel Center Public Water Supply System	7.56	0.86	0.61	8.30	-0.74	2045	7.44		
Marion County Utilities Consolidated WUP	9.37	0.98	0.52	9.46	-0.09	2045	8.48		
Marion County (SWFWMD)			**1.57**		**-1.14**			**-0.16**	
East Marion Utilities LLC	0.03	0.01		0.04	-0.01	2020	0.03	-0.01	2020
City Of Belleview	1.02	0.13	0.02	1.26	-0.24	2025	1.13	-0.11	2030
Wilderness RV Park Estates LLC	0.04	0.01		0.05	-0.01	2035	0.04		
Marion County Utilities Consolidated CUP	7.09	0.92	1.95	8.97	-1.88	2030	8.05	-0.96	2035
Marion County (SJRWMD) Total			**4.64**		**-0.42**			**-1.08**	
Jumper Creek HOA	0.04	0.01		0.10	-0.06	2025	0.09	-0.05	2025
Gibson Place Utility Company LLC	3.99	0.13		4.00	-0.01	2035	3.87		
Lake Panasoffkee	0.41	0.05		0.44	-0.03	2040	0.39		
City Of Bushnell	1.37	0.17	1.37	1.56	-0.19	2040	1.39	-0.03	2045
Southern Villas RV Park	0.07	0.01		0.10	-0.03	2040	0.09	-0.02	2040
City Of Wildwood	4.58	0.49	0.83	4.67	-0.09	2045	4.18		
Sumter County Total			**2.20**		**-0.41**			**-0.10**	

[1] In the county total lines, the unallocated reclaimed is presented for the entire county.

[2] Sun Communities (Permit No. 6792): Permit canceled in October 2024 and not reissued as of August 2025 per SWFWMD WMIS.

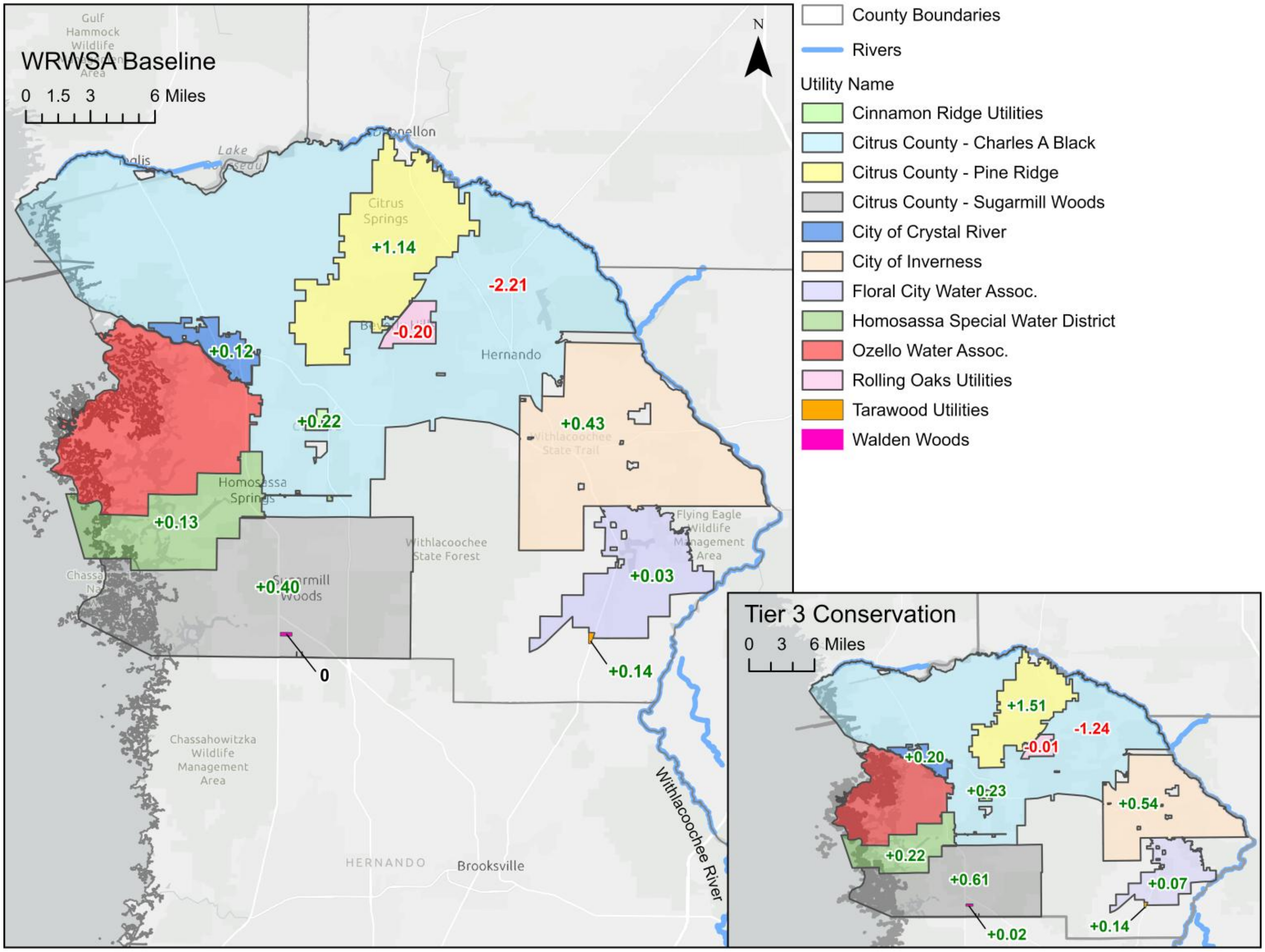


Figure 4-6: Citrus County Supply Surpluses and Deficits Based on 2045 Demands

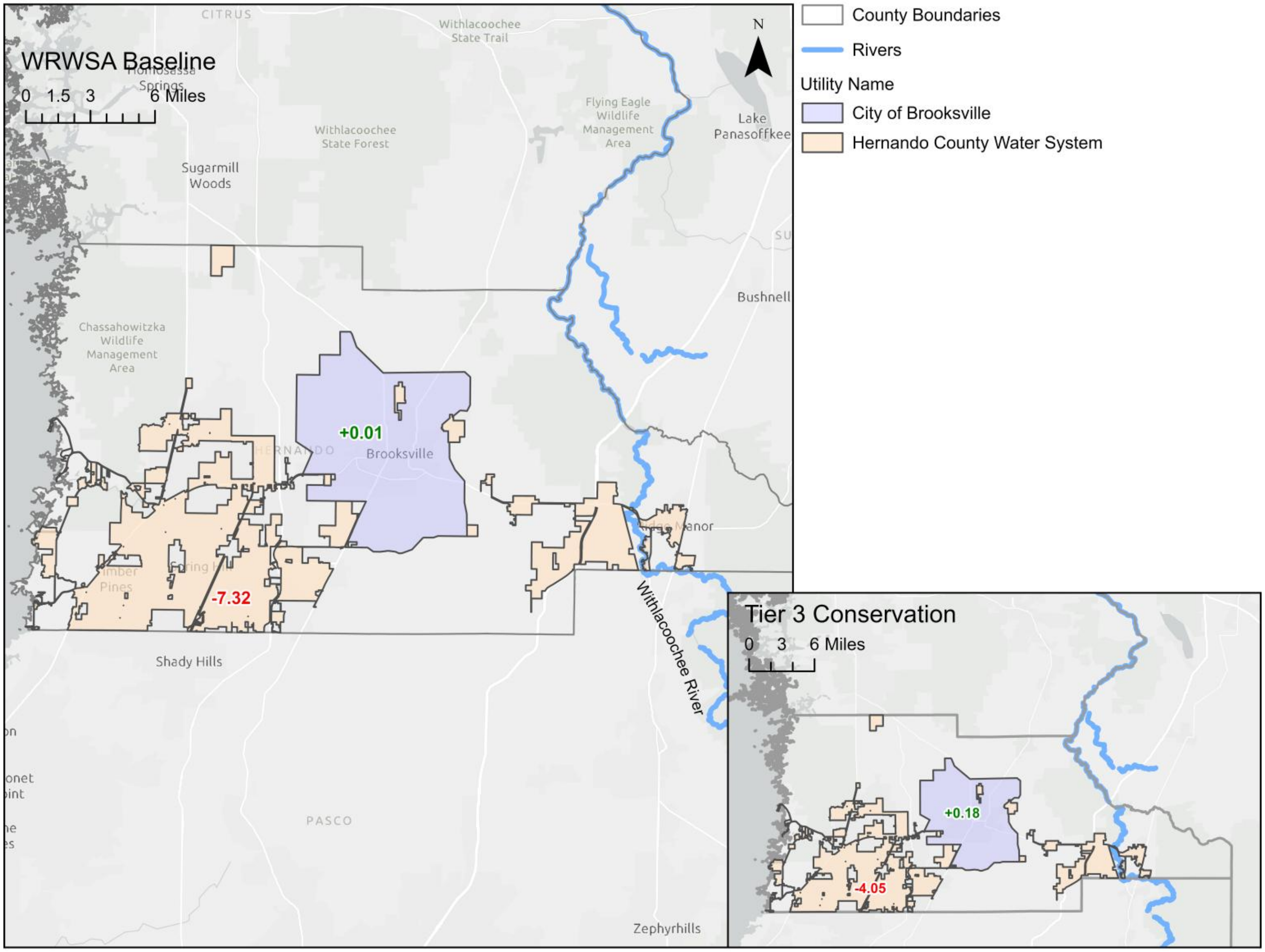


Figure 4-7: Hernando County Supply Surpluses and Deficits Based on 2045 Demands

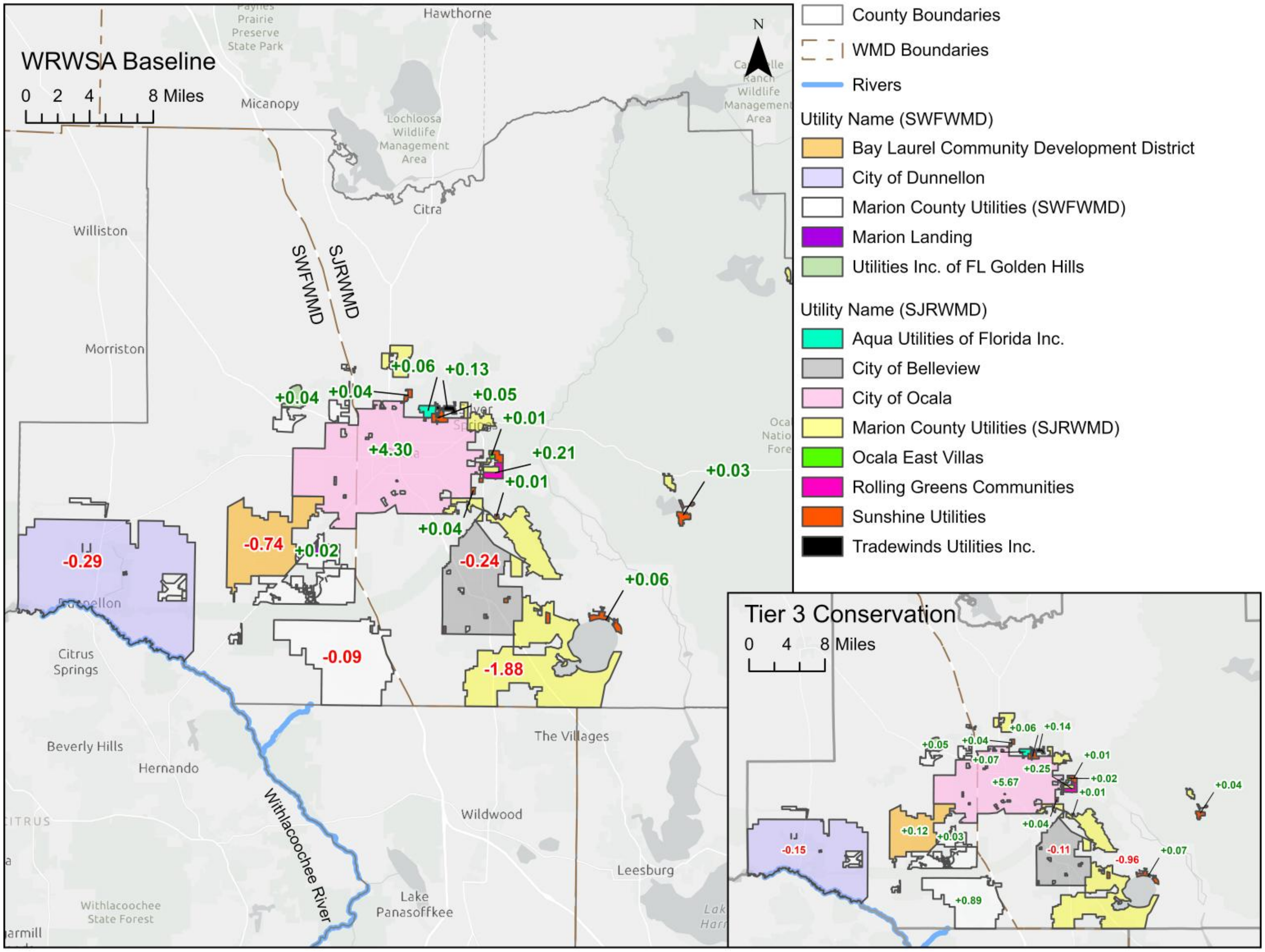


Figure 4-8: Marion County Supply Surpluses and Deficits Based on 2045 Demands

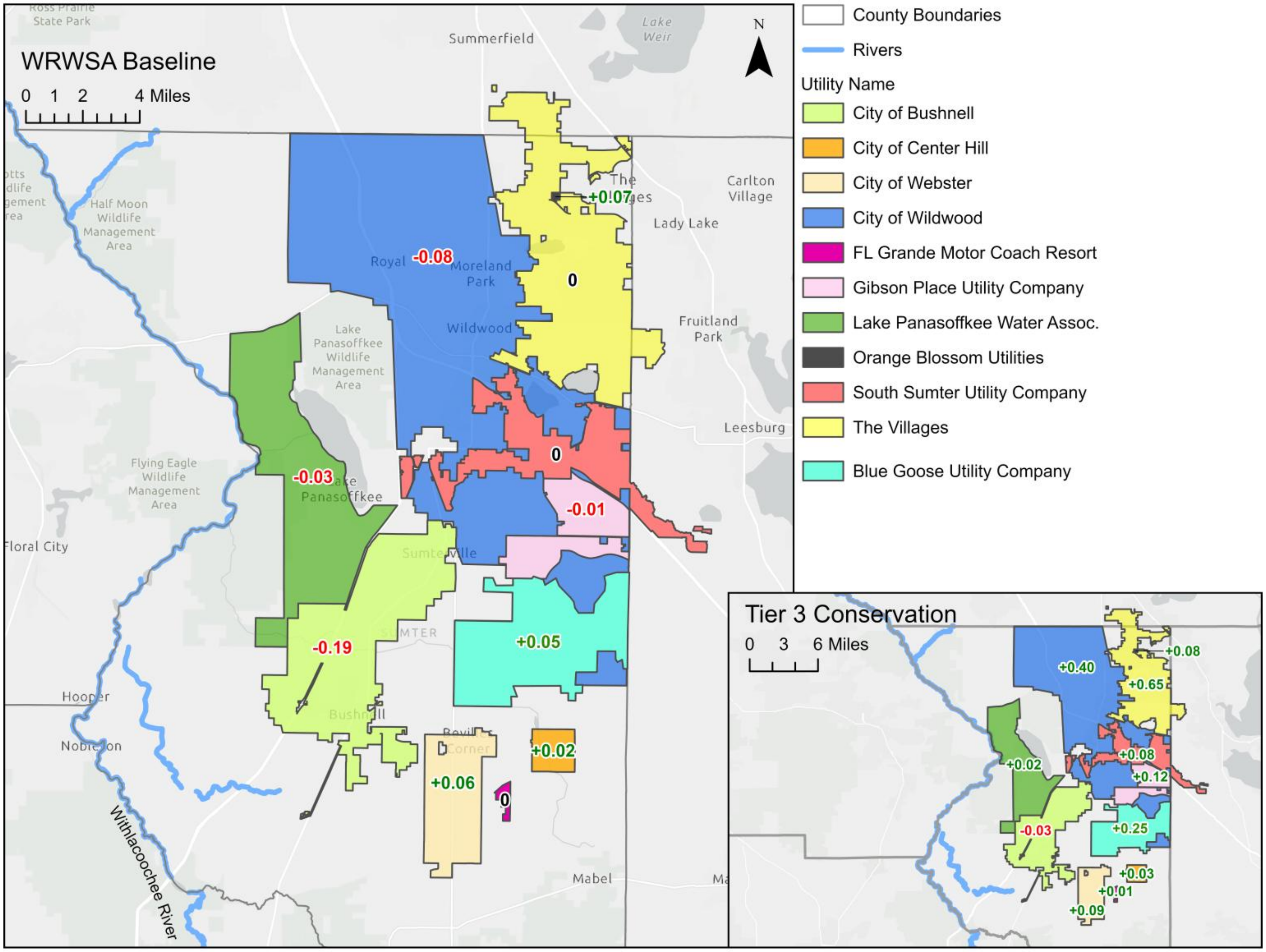


Figure 4-9: Sumter County Supply Surpluses and Deficits Based on 2045 Demands

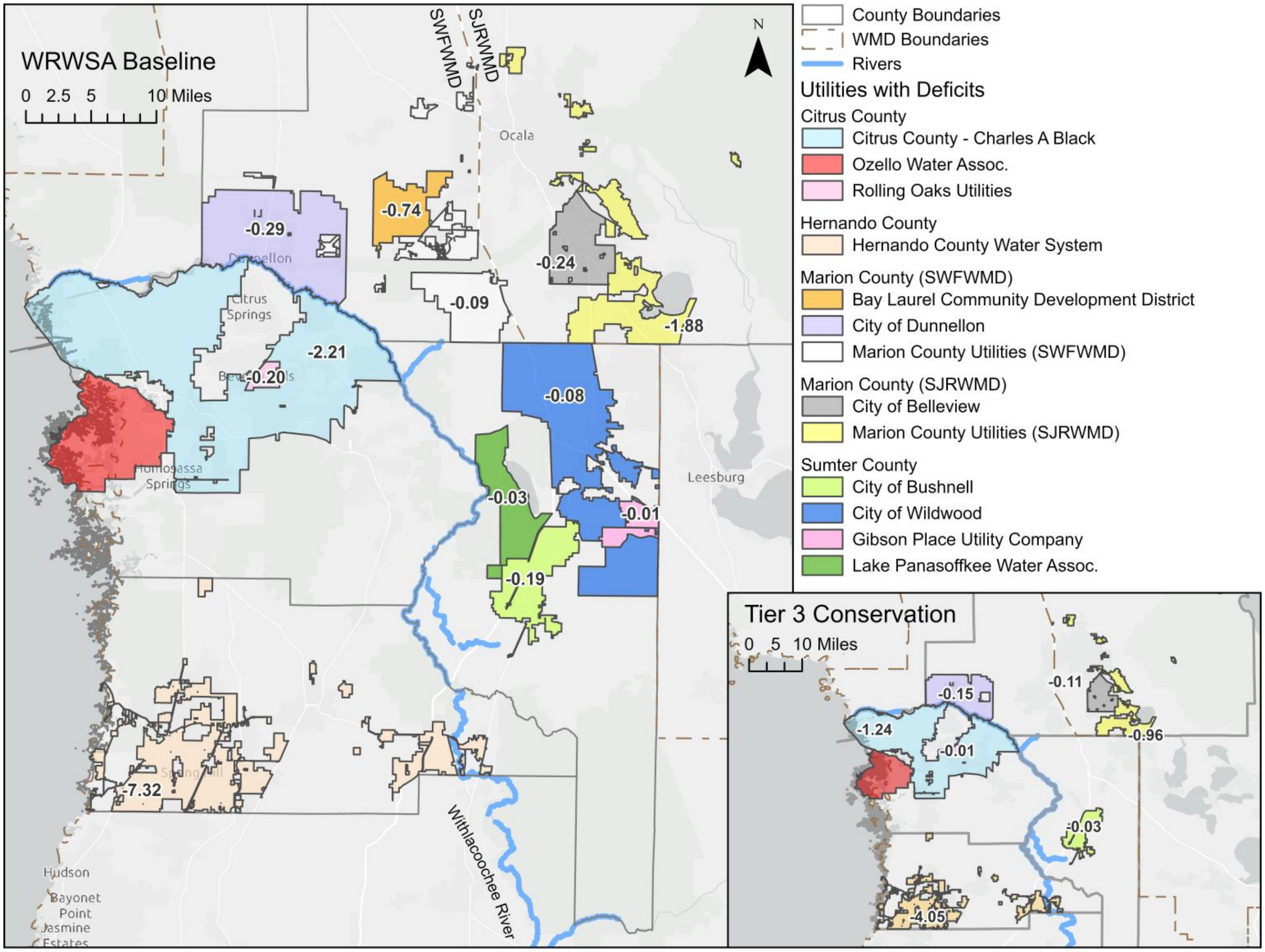


Figure 4-10: WRWSA Regional Supply Deficits Based on 2045 Demands

5. Water Supply Development Options

This section identifies potential water supply development options that can help public supply utilities meet their projected future demands. As described in Section 4, the WRWSA region has several viable sources of supply, including water conservation, reclaimed water, groundwater, surface water, and seawater desalination. This chapter builds upon those findings by evaluating specific project concepts that could be implemented to develop or expand these sources.

Planning-level investigations were conducted to assess the technical feasibility, environmental considerations, and order-of-magnitude capital and operating costs of each project option. To ensure consistency across all alternatives, all cost estimates in this chapter were developed using the SJRWMD AWS Cost Model (Special Publications SJ2008-SP10 and SJ2008-SP13), updated to reflect 2024 dollars, current Bureau of Labor Statistics inflation indices, regional energy pricing, and WRWSA-specific assumptions regarding peaking, capacity, and component service life.[2]

These planning-level costs provide a consistent and comparable basis for screening project options but are not intended to replace detailed design, engineering, or permitting analyses. Complete cost methodology details and calculations are provided in Appendix D.

Many of the larger water supply concepts, particularly surface water treatment, LFA wellfield development, and regional reclaimed water interconnections, would require coordination among utilities, the WRWSA, and the water management districts. Other projects, such as conservation programs and local reclaimed water extensions, may be implemented by individual utilities.

This chapter is organized as follows:

- Section 5.1 – Water Conservation, describing strategies supporting Tier 3 demand reductions.
- Section 5.2 – Reclaimed Water, including non-potable reuse (NPR), MAR, and IPR readiness.
- Section 5.3 – Groundwater, including UFA optimization and LFA development.
- Section 5.4 – Surface Water, identifying potential withdrawal locations and treatment options.
- Section 5.5 – Desalination, describing long-term or contingency concepts.

A summary of all potential project options and their planning-level costs is presented in Table 5-1.

[2] It should be noted that the Ponds & Reservoirs component, and long-term O&M, show significant differences between this RWSP and the 2019 plan. These differences reflect the use of the AWS cost model (SP10 and SP13) for this update, which applies updated cost equations, treatment and maintenance assumptions, and adjustments to 2024 dollars using current Bureau of Labor Statistics inflation indices. Projects in the 2019 RWSP were re-estimated using the AWS model to ensure consistent, current-year planning-level cost values across all AWS options. Differences relative to the 2019 RWSP therefore reflect updated cost inputs rather than changes in project scope.

Table 5-1: Project Option Descriptions

Project ID	Project	Primary Candidate Deficit Utilities / Areas	Planning Role	Capacity (MGD)	Development Horizon	Notes / Key Drivers
1A	Water Conservation (Tier 3)	Regional	Decreasing water demand through water conservation measures	12 MGD	All Terms	Can implement water conservation measures on a utility basis
2A	Hernando County Managed Aquifer Recharge (MAR)	Hernando County Water System	Coastal or inland recharge to maintain UFA heads	3 MGD recharge	Near Term (2025 – 2030)	Tie into county reclaimed distribution; combine with stormwater reuse where feasible
2B	Citrus County Managed Aquifer Recharge (MAR)	Citrus County Utilities (Charles A. Black); Crystal River; Rolling Oaks Utilities	Coastal or inland recharge to maintain UFA heads	2 MGD recharge	Near Term (2025 – 2035)	Tie into county reclaimed distribution; combine with stormwater reuse where feasible
2C	Non-Potable Reuse Regional Expansion (Purple Pipe)	Regional	Expansion of reuse water systems	8 MGD	All Terms	Tie into existing reclaimed distribution; create new reclaimed distribution systems
3A	Lower Floridan Aquifer Wellfield	Bay Laurel CDD; City of Belleview; City of Wildwood; Marion County Utilities	Deep-aquifer source; potential to relieve UFA withdrawals near Lake Weir and Gum Springs	5 – 10 MGD	Mid-Term (2035 – 2045)	Start exploratory drilling & test wells 2026–2028; design and permitting mid-2030s
4A	Withlacoochee River Surface Water Treatment Facility (North Sumter)	City of Bushnell; City of Wildwood; Lake Panasoffkee Water Association; The Villages	Downstream intake; emergency or peak-period supply	10 MGD	Long-Term (post-2045)	Flow variability and water-quality constraints
4B	Withlacoochee River Surface Water Treatment Facility (Holder)	Bay Laurel CDD; Citrus County Utilities; Dunnellon; Marion County Utilities	Inland surface-water source; may also feed MAR systems	10 MGD	Long-Term (post-2045)	Design for conjunctive use
4C	Withlacoochee River Surface Water Treatment Facility (Lake Rousseau)	Bay Laurel CDD; Citrus County Utilities; Dunnellon; Marion County Utilities	Upper-river diversion & treatment; blend source for central systems	10 MGD	Long-Term (post-2045)	Coordinate with SWFWMD on environmental-flow criteria; moderate permitting complexity
4D	Withlacoochee River Aquifer Recharge	Hernando County Water System; Southeastern Citrus County; Southwestern Sumter County	Seasonal recharge from river source; regional resilience	5 MGD	Mid-Term (2035 – 2045)	Begin with pilot to confirm infiltration & water-quality performance; full build contingent on MFL review
5A	Desalination with Ocean Outfall	Coastal Citrus & Hernando Utilities; Crystal River	Long-term drought-proof source from brackish/ saline waters	5 MGD	Long-Term (post-2045)	Utilize industrial corridor sites; integrate concentrate management with reuse systems
5B	Desalination with Deep Well Injection	Coastal Citrus & Hernando Utilities; Crystal River	Long-term drought-proof source from brackish/ saline waters	5 MGD	Long-Term (post-2045)	Utilize industrial corridor sites; integrate concentrate management with reuse systems

5.1 Water Conservation

Water conservation is the most readilyimplementable and lowest-cost water management strategy for the WRWSA region. As demonstrated in Chapter 4, conservation has the potential to reduce public supply demand by an estimated 12.2 MGD by 2045 under the Tier 3 scenario, significantly reducing or deferring the need for new supply development. Conservation also supports long-term sustainability goals by decreasing pressure on the UFA, and moderating long-term infrastructure needs.

Conservation functions as a demand-side water supply source and is therefore evaluated as an AWS alternative within this chapter. More detailed program-level assumptions and measure-specific savings and cost estimates are provided in Chapter 4 Table 4-3.

5.1.1 Implementation Approach

As described previously in Section 4.1, the regional conservation assessment was conducted using the AWE Conservation Tracking Tool, which provides transparent and quantifiable estimates of water savings, cost-effectiveness, and long-term performance for a wide range of program measures. Five benchmark utilities Citrus County, Hernando County, Marion County, the City of Ocala, and The Villages served as the analytical foundation for developing regional savings factors, program participation assumptions, and long-term scaling to Tier 3 conditions. Collectively, these utilities account for 70.8% of total regional public-supply consumption and are broadly representative of WRWSA's demographic, housing stock, and irrigation-use characteristics.

Conservation potential varies across the WRWSA region due to differences in housing characteristics, landscape patterns, and customer water-use behavior. Several key factors influence the scale and distribution of achievable savings:

- **Age of Housing Stock:** Older neighborhoods in Citrus and Hernando Counties offer substantial passive savings as legacy fixtures and appliances are naturally replaced or upgraded.
- **Prevalence of Irrigation Systems:** Newer developments in Sumter County and portions of Marion County exhibit extensive automatic irrigation systems and larger irrigated areas, creating significant opportunities for targeted outdoor-use reductions.
- **Distribution of High-Use Customers:** The top 20% of single-family residential (SFR) accounts represent a disproportionate share of peak-season demand and were therefore a central focus of Tier 2 and Tier 3 program design.
- **Outdoor Water Use:** Irrigation frequently accounts for more than 50% of SFR demand during high-use months in many WRWSA utilities, making irrigation-focused programs particularly effective in reducing peak and annual demand.

Achieving Tier 3 conservation savings will require sustained, regionally coordinated implementation of proven efficiency measures, including:

- High-efficiency fixture retrofits (e.g., replacing 1.6/1.28 gpf toilets with 0.8 gpf models)

- Irrigation efficiency and Florida-Friendly Landscaping initiatives
- Smart irrigation controllers and micro-irrigation system rebates
- AMI, customer leak notifications, and active utility leak detection
- Conservation-based rate structures and coordinated ordinances
- Regional public education and outreach

Implementation priorities will vary among utilities based on customer composition, irrigation prevalence, and the maturity of existing conservation programs. However, when deployed at scale, these measures collectively form the core of the Water Conservation (Tier 3) Project 1A and represent the most cost-effective and readilyavailable water supply strategy in the WRWSA region.

5.1.2 Project Cost

Benchmark utilities collectively generate 8.79 MGD of Tier 3 savings at an annual program cost of $939,461 (in constant 2024 dollars). To estimate regionwide conservation program costs under Tier 3 conditions, a scaling factor was derived based on the ratio of projected full regional savings (12.2 MGD) to benchmark utility savings (8.79 MGD):

$$\text{Scaling Factor} = \frac{12.2}{8.79} = 1.39$$

Applying this factor to benchmark program costs of $939,461 yields an estimated annual regional program cost of $1,303,916 in 2024 dollars. This value represents the annualized cost of implementing Tier 3 conservation regionwide in 2045, consistent with RWSP cost conventions using constant 2024 dollars. County savings and costs were distributed proportionally according to each area's estimated Tier 3 contributions. These values are planning-level estimates suitable for regional evaluation. The estimated full regional implementation costs is presented by county in Table 5-2. Benchmark utility savings and cost estimates supporting the regional estimates are provided in Appendix E.

Table 5-2: Estimated Regional Program Savings and Costs (2024$)

County / Service Area	Tier 3 Savings (MGD)	Percent of Total	2045 Annual Cost (2024 Dollars)
Citrus County	2.20	18%	$235,132
Hernando County	3.50	29%	$374,074
Marion SWFWMD	2.00	16%	$213,757
Marion SJRWMD	2.60	21%	$277,884
Sumter County	1.90	16%	$203,069
Regional Total	**12.20**	**100%**	**$1,303,916**

5.1.3 Cost-Effectiveness and Present Value

Using estimated Tier 3 costs and savings, conservation achieves an estimated raw unit cost of approximately $2–$3 per 1,000 gallons. This cost represents constant-dollar annual program investments divided by long-term conserved volumes and is consistent with the measure-level cost-effectiveness results presented in Table 4-3. Because these results are based on benchmark utility performance scaled to all counties and service areas, they reflect realistic regional conditions and achievable participation levels within WRWSA member utilities.

When expressed on a cumulative basis through 2045, the Tier 3 conservation scenario provides 12.2 MGD of savings at build-out, offering the lowest-cost demand reduction of all supply or conservation measures evaluated in this RWSP. As demonstrated in Chapter 4, conservation measures consistently outperform other strategies in terms of both cost-effectiveness and implementation timing, reinforcing conservation as the foundation of the WRWSA's near-term and long-term supply portfolio.

Using benchmark utility performance and scaling to all WRWSA counties and service areas, the Tier 3 conservation scenario provides 12.2 MGD of savings by 2045, representing the achievable build-out of the regional conservation portfolio. A present-value (PV) assessment of the conservation program over the 2025–2045 horizon further demonstrates its cost-effectiveness:

- PV Savings: 16,932 MG (51,955 AF)
- PV Cost: $14.86 million
- Unit Cost: $0.88 per 1,000 gallons
- Benefit–Cost Ratio: 3.4, assuming an avoided-cost value of $3 per 1,000 gallons

These results confirm conservation as an economical and low-risk option available to the WRWSA, underscoring its role as the foundation of the Authority's long-term water supply strategy.

5.1.4 Conservation Summary

Water conservation provides an estimated 12.2 MGD of achievable demand reduction by 2045 at an annualized cost of $1.30 million per year (2024 dollars). Conservation remains the foundation of the WRWSA's long-term water supply strategy and is the least expensive, fastest-to-implement, and most broadly beneficial option in the regional portfolio.

When deployed at Tier 3 levels, conservation yields substantial near-term (2025–2035) supply benefits and defers the need for more capital-intensive AWS projects. Conservation should also be implemented concurrently with other near-term and mid-term supply projects to maximize regional resilience and ensure that future AWS investments operate as efficiently and effectively as possible.

Implemented at scale, these measures maximize regional resilience by helping utilities manage seasonal variability, drought conditions, growth-related demand increases, and long-term aquifer sustainability challenges. For these reasons, conservation should be considered a first-priority water supply project, supported through continued WRWSA leadership, cooperative funding, and coordinated implementation across member utilities.

Near-term (2025–2035) benefits of Tier 3 conservation include:

- Delays Citrus County deficits by ~5 years
- Reduces Hernando County's 2045 deficit from –7.3 MGD to –4.1 MGD
- Eliminates deficits in Marion County (SWFWMD portion)
- Eliminates projected deficits entirely for utilities such as Wildwood and Bay Laurel

Because conservation reduces actual withdrawals from the UFA, it directly improves:

- Groundwater level conditions
- Performance at springs and rivers
- Peak-season stress on the most impacted subregions (Hernando, Citrus, SWFWMD portion of Marion)

Additional benefits include:

- Operational flexibility during seasonal peaks
- Reduced required capacity for future MAR, SWTP, and LFA projects
- Long-term sustainability improvements in Silver Springs, Rainbow Springs, Gum Slough, and Weeki Wachee

Tier 3 conservation represents the most cost-effective and readily actionable strategy available to the WRWSA region. It strengthens UFA protection, mitigates near-term deficits, and lowers the long-term capital burden associated with developing new water supplies. As such, conservation should be implemented regionwide as a first-priority water supply project, with continued WRWSA leadership, cooperative funding, and coordinated program delivery among member utilities.

5.2 Reclaimed Water

Reclaimed water development remains a cornerstone of the WRWSA's long-term water supply strategy. As outlined in Section 4.2, approximately 13.7 MGD of unallocated reclaimed water is projected to be generated across the WRWSA region by 2045. Figure 5-1 illustrates the existing reclaimed water infrastructure network throughout the WRWSA service area. This volume represents a cost-effective, locally controlled alternative for offsetting potable demand, enhancing aquifer sustainability, and mitigating regional groundwater deficits.

Current reclaimed water use is dominated by non-potable reuse practices including landscape irrigation and industrial cooling, delivered through a separate purple-pipe system and regulated under FDEP's Reuse Program. Several utilities continue to discharge excess reclaimed water to rapid infiltration basins (RIBs) or sprayfields, particularly during the wet season. These discharges often occur near areas of projected aquifer drawdown, creating clear opportunities for expanded beneficial reuse and aquifer recharge.

To support consistent terminology throughout this section, the following definitions apply:

- **Non-Potable Reuse (NPR):** NPR refers to the beneficial use of reclaimed water for non-drinking purposes such as landscape irrigation, golf courses, industrial uses, environmental enhancement, and soil-aquifer treatment systems. NPR is supplied through a separate purple-pipe system and does not require advanced treatment to drinking water standards.

- **Indirect Potable Reuse (IPR):** IPR refers to the deliberate recharge of highly treated reclaimed water to a potable source, typically an aquifer, through an environmental buffer such as groundwater or a reservoir. The buffer provides additional treatment, residence time, and water quality attenuation before the water is withdrawn for potable use.
- **Managed Aquifer Recharge (MAR):** MAR can be implemented as a form of IPR when reclaimed water or advanced treated water is intentionally recharged under controlled conditions such as infiltration basins or injection wells. In this application, the receiving aquifer can function as an environmental buffer and storage medium, depending on project type and state permitting. This can potentially support groundwater level recovery and supplement potable withdrawals. MAR projects intended to support IPR are regulated under Chapter 62-565, F.A.C., with applicable requirements of the Underground Injection Control (UIC) program applying where injection wells are used.
- **Direct Potable Reuse (DPR):** Direct Potable Reuse involves introducing advanced-treated reclaimed water directly into a potable water treatment plant or distribution system without an environmental buffer. DPR requires advanced treatment such as membrane filtration, reverse osmosis, advanced oxidation, and real-time process monitoring.

DPR is not considered a viable option for the WRWSA region during this planning horizon due to:

- High treatment cost: DPR requires energy- and capital-intensive treatment trains exceeding those used for IPR/MAR.
- Lack of regional drivers: The WRWSA region does not face the surface-water scarcity or wastewater discharge constraints motivating DPR in other parts of the state.
- Institutional readiness: DPR requires consolidated operations, advanced compliance monitoring, and a level of regional coordination not currently in place.

As a result, DPR is not included as a feasible alternative in this RWSP. The region's reclaimed water strategy focuses instead on NPR, MAR, and long-term IPR readiness, which align with regional hydrogeologic conditions, existing utility capabilities, and near-term infrastructure needs.

Three potential reclaimed water project concepts have been identified:

1. Hernando County MAR (Project 2A)
2. Citrus County MAR (Project 2B)
3. Non-Potable Reuse Regional Expansion (Project 2C)

The feasibility of the MAR projects should be evaluated through site-specific studies. Together, these projects may support an integrated system that enhances beneficial reuse and provides new recharge capacity in areas with projected groundwater deficits.

5.2.1 Hydrogeology

When observing surrounding hydrogeology of the area, the Brooksville Ridge provides a potentially favorable setting in Florida for MAR and IPR. The Ridge extends from southern Levy County through Citrus, Hernando, and Sumter Counties into northern Pasco County and is characterized by high elevations, sandy surficial soils, and highly permeable UFA limestone. These characteristics indicate it functions as a regionally significant natural recharge zone and aligns closely with areas where reclaimed water is available for beneficial reuse.

Key hydrogeologic attributes of the Brooksville Ridge include:

- Highly permeable surficial soils that promote rapid percolation and downward flow.
- Thick, transmissive limestone units within the UFA that facilitate lateral movement and long-term storage.
- Favorable vertical gradients that enhance downward hydraulic movement.
- Direct connection to priority spring systems, including Weeki Wachee, Chassahowitzka, Homosassa, and Gum Slough.
- Regional-scale recharge influence, meaning recharged water benefits multiple utilities and ecosystems.

Because confinement is thin or absent in portions of the Ridge, recharge can occur efficiently. These conditions may improve the potential for MAR projects to enhance aquifer levels, offset groundwater deficits, and potentially qualify for groundwater recharge or augmentation credits under the SWFWMD Consumptive Use Permit (CUP) framework.

However, the Brooksville Ridge also experiences a high rate of natural recharge in wet seasons: often exceeding 10 inches per year, with maximums reaching above 20 inches per year. This can create risks associated with rapid injection and areas of limited confinement in this area, rooting from the rapid recharge and significant pressure changes in the rainy season (i.e. soil and subsurface instability).

Because of the advantages, disadvantages, and unknowns of this area, pilot testing and phased development are necessary to confirm site-specific feasibility, geochemical compatibility, and environmental performance. Because of this, MAR project options explored are not fixed to site specific locations.

Figure 5-2 identifies major water reclamation facilities (WRFs) in Citrus and Hernando counties.

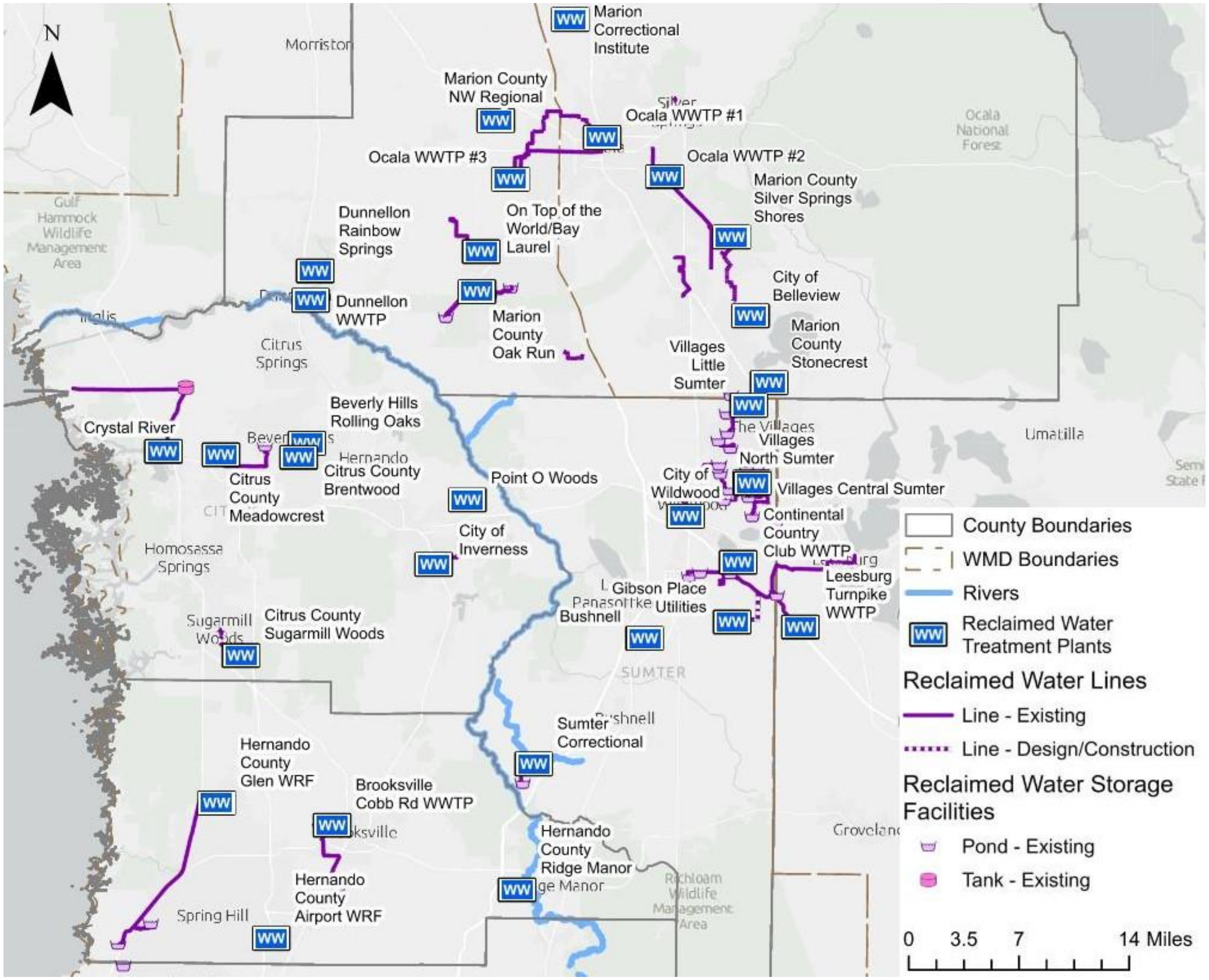


Figure 5-1: Reclaimed Water Infrastructure Across the WRWSA Region

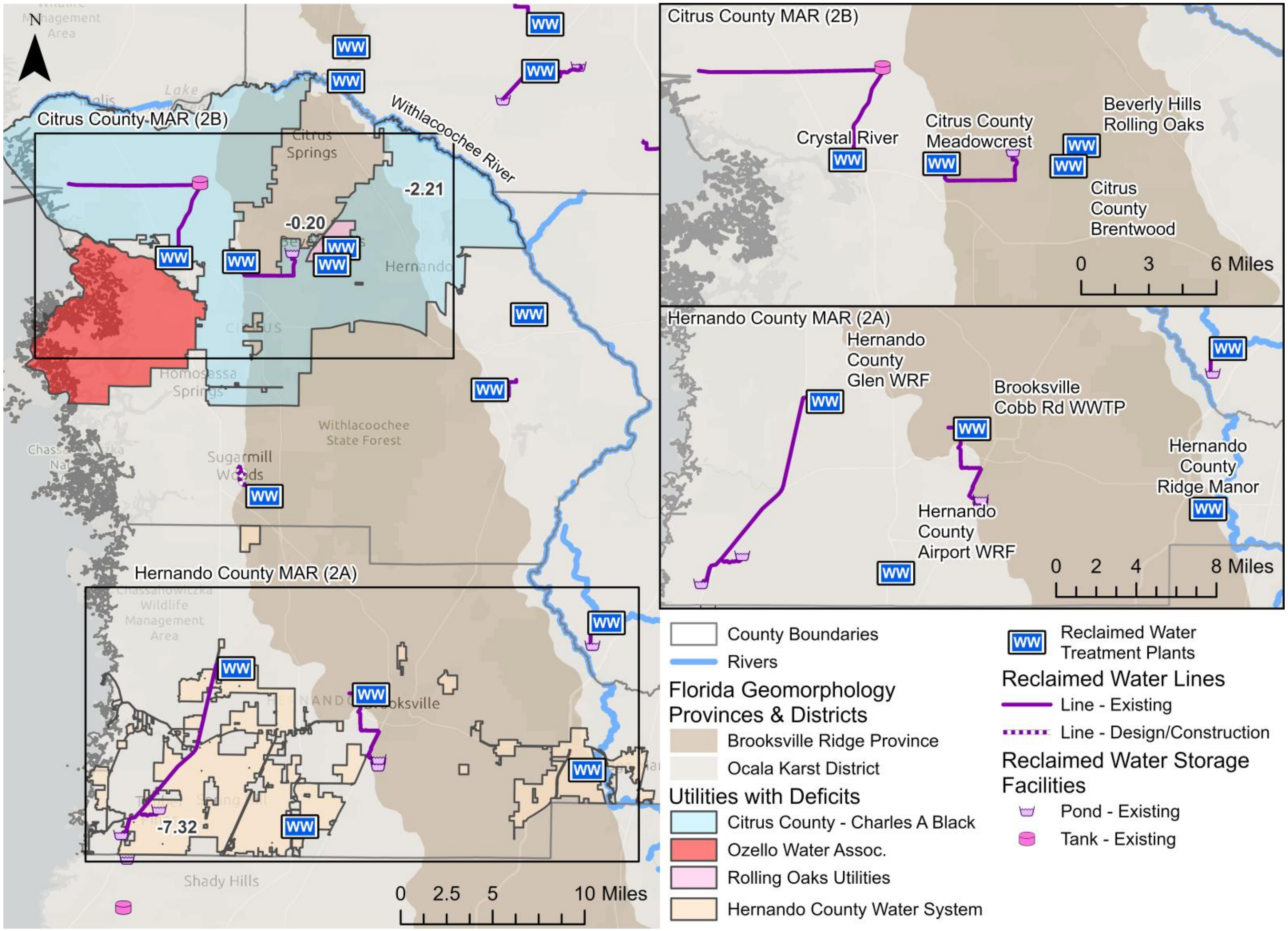


Figure 5-2: Reclaimed Water Infrastructure and WRWSA Baseline Utility Deficits (2045) for Potential MAR Interconnection

5.2.2 Managed Aquifer Recharge Option

The following Hernando County MAR and Citrus County MAR project concepts are intended to utilize the area's favorable hydrogeologic characteristics to facilitate efficient aquifer recharge using advanced-treated reclaimed water.

Both MAR projects may support either infiltration-based recharge or injection wells, depending on localized conditions determined by feasibility studies.

- Infiltration basins (RIBs or percolation basins) may be feasible in areas with well-drained sandy soils and adequate vadose-zone thickness. These areas can provide effective recharge at lower cost if infiltration rates are sustainable.
- Injection wells may be required where soils are finer, karst features limit infiltration stability, additional confinement is needed, or if credit-eligible recharge requires precise aquifer placement.

Phase I testing would determine which recharge method is feasible and preferred.

Both MAR project options would require a combination of FDEP and SWFWMD approvals. The permitting pathway will depend on the selected recharge method:

- Infiltration: Evaluated under FDEP groundwater standards, including soils characterization, nutrient reduction performance, infiltration and mounding analysis, and confirmation that percolation meets groundwater protection criteria.
- Injection: Requires a Class V, Group 2 UIC permit involving hydrogeologic drilling, water-quality and geochemical compatibility evaluation, monitoring well installation, and assessment of potential movement of undesirable water.

Regardless of the recharge method, both MAR project options would require a SWFWMD WUP modification to authorize recharge, verify no impacts to existing legal users, and evaluate eligibility for recharge credits.

For inland locations, an advanced treatment process, described in Fla. Admin. Code R. 62-565.560, is assumed to produce water meeting applicable drinking water standards. This may be required if the area of the aquifer where recharge is occurring would impact an Underground Source of Drinking Water (USDW). A USDW is defined as a part of the aquifer that is capable of supplying drinking water for human consumption now or in the future and contains fewer than 10,000 mg/L total dissolved solids. The advanced treatment process is assumed to be necessary for the infiltration project options, as the recharge of this option has a greater likelihood to occur in a USDW. The advanced treatment process may not be necessary for injection well project options because it is assumed that the water will not be discharged into a USDW, however advanced treatment may still be required based on factors such as site conditions and aquifer confinement. Regardless of recharge method chosen for inland locations, further analysis and feasibility studies will need to be conducted to ensure the quality of recharged water meets the appropriate regulation.

According to Fla. Admin. Code R. 62-565.560, advanced treatment of water to meet the established Technology-Based Treatment Requirements and pathogen requirements can be achieved using microfiltration/ultrafiltration, reverse osmosis, and an oxidation treatment process. This advanced treatment train is utilized to predict possible costs for the inland MAR projects. The final treatment configuration will be determined through detailed feasibility analyses and applicable Florida regulations governing potable reuse systems, as per the entirety of Fla. Admin. Code R. 62-565.

For coastal locations, only injection wells are considered as a recharge method. Infiltration-based recharge alternatives were considered; however, such systems introduce uncertainty related to the potential for interaction with overlying or adjacent potable aquifers. Consistent with groundwater protection requirements under Fla. Admin. Code R. 62-522, the selected approach avoids these uncertainties by providing a more controlled method of recharge and a clearly defined point of compliance. If analyzed further, feasibility of this recharge method will have to be evaluated, in addition to proximity of coastal springs to ensure adequate hydraulic separation.

The coastal MAR would function as a non-potable recharge system. Reclaimed water utilized for the project will be sourced from existing permitted treatment facilities and represents unallocated reclaimed water that has already undergone treatment in accordance with Fla. Admin. Code R. 62-610. No additional treatment processes are proposed beyond those currently in place, however FDEP may require this based on site conditions, aquifer confinement, or other factors. While not intended to augment a drinking water supply, the purpose of the coastal option could potentially help address saltwater intrusion, which will greatly rely on feasibility studies and siting decisions.

Subsequent feasibility and pilot studies should include evaluation of recharge water conditions, including management or quenching of dissolved oxygen concentrations. These evaluations are intended to support geochemical compatibility with the receiving aquifer and minimize the potential mobilization of harmful constituents, such as arsenic. Any design and operation would be conducted in accordance with Fla. Admin Code R. 62-565 and Fla. Admin Code R. 62-528, as appropriate. Further evaluations beyond this will be necessary to determine feasibility.

5.2.2.1 Hernando County Managed Aquifer Recharge Option

The Hernando County MAR project proposes recharging approximately 3 MGD of unallocated reclaimed water from the Airport Subregional and Ridge Manor WRFs. Injection wells or infiltration may be feasible methods of recharge. Preliminary research must be done to confirm feasibility of these methods (e.g. subsurface conditions and land availability). The permitting process is expected to involve multiple phases including feasibility evaluation, pilot testing, and operational verification. The Hernando MAR project may align with SWFWMD funding priorities subject to project-specific feasibility, demonstrated water resource benefits, and available funding.

This project would aim to offset Hernando County’s projected 7.3 MGD groundwater deficit by 2045, enhance aquifer levels, and support regulatory compliance. This MAR project could provide a scalable, cost-effective approach to address future groundwater deficits and strengthen long-term water supply reliability, dependent on feasibility study outcomes and chosen recharge method.

5.2.2.2 Citrus County MAR Managed Aquifer Recharge Option

Citrus County's western corridor, including the Crystal River, Meadowcrest, and Rolling Oaks/Beverly Hills WRFs, will produce approximately 1.7 MGD of unallocated reclaimed water in 2045.

These facilities are situated near the CAB water system, which serves central Citrus County and is projected to experience increasing potable supply pressure through the planning horizon. If an inland MAR site near CAB is chosen, Citrus County could improve operational flexibility and route surplus reclaimed water for aquifer recharge by interconnecting reclaimed water infrastructure among these WRFs.

Similar to Hernando County, Citrus County may support either infiltration-based recharge or injection wells, depending on the outcome of feasibility studies. Also similar to Hernando County, the permitting process for Citrus County is expected to entail a multi-phase approval process including feasibility evaluation, pilot testing, and operational verification.

The recharge volume is estimated at 2 MGD. Site-specific feasibility studies and monitoring will be required during design. Implementing this project may offset potable withdrawals and reduce non-beneficial rapid infiltration basin (RIB) discharge, thereby enhancing both water supply sustainability and environmental protection for the region.

5.2.2.3 Infrastructure Components

Both the Citrus County and Hernando County MAR projects are presented to have similar infrastructure systems to convey, treat, and recharge reclaimed water. These components are summarized below and apply to both projects.

High Service Pumping System: The aquifer recharge system will include a pump station designed to convey reclaimed from the source facility to the recharge site. The pump station will provide the hydraulic lift necessary to overcome system head losses and maintain consistent flow to the recharge locations. Capacity will be based on projected recharge volumes and system demand scenarios developed during detailed design.

Transmission Pipeline: A water transmission main will transport water from the water reclamation facilities to the designated recharge area. Transmission infrastructure materials will be selected to accommodate anticipated pressures and the chemical characteristics of the source water. Flow control and monitoring structures will be integrated along the pipeline to support operational flexibility and system performance tracking.

Injection Well System: The cost analyses assume an injection well system as one of the methods of recharge. The system includes one injection well, monitoring well(s), double well casings, and the necessary pumps and motors. A storage tank capable of holding 24-hour's worth of demand is also costed for emergency scenarios. Prior to operation, there must be a geophysical study, well development, and pump testing, which are also included in the construction cost. The system would operate under an UIC permit.

Infiltration Basin: The cost analyses assume infiltration basins as the other method of recharge. Advanced treated water will be discharged to engineered basins where recharge will occur through controlled infiltration into the underlying soils. The infiltration basins will be designed to provide adequate residence time for soil aquifer treatment and to protect groundwater quality. Feasibility studies will be conducted to confirm appropriate basin sizing, infiltration rates, and hydraulic loading consistent with site-specific conditions.

Advanced Treatment Train: For infiltration-based recharge options, it is assumed that the proposed MAR system will require an advanced treatment train to achieve regulatory compliance. The selected treatment process shall include microfiltration or ultrafiltration, reverse osmosis, and an advanced oxidation process utilizing ultraviolet (UV) treatment. These treatment components are required to ensure that all water used for recharge meets applicable Florida Administrative Code rules.

5.2.2.4 Project Cost

Table 5-3 presents pipeline lengths and sizes for the conceptual transmission systems. The capital cost, annual O&M cost, and equivalent annual cost for the project options are presented in Table 5-4.

Table 5-3: MAR Projects' Pipeline Lengths and Sizes

Option	Pipeline Size	Pipeline Length		Water Type
	(inches)	(feet)	(miles)	
2A Hernando	18	79200	15.00	Finished
2B Citrus	12	79200	15.00	Finished

Table 5-4: MAR Capital, Operation, Maintenance and Unit Production Cost Estimate (2024$)

Description	2A Hernando (3 MGD)		2B Citrus (2 MGD)	
	Injection Well	Infiltration	Injection Well	Infiltration
High Service Pumping System	$2,601,164	$2,601,164	$1,872,883	$1,872,883
Transmission Pipelines[1]	$19,464,165	$19,464,165	$12,976,110	$12,976,110
Advanced Treatment Train[2]	NA	$65,184,409	NA	$52,544,413
Infiltration Basin	NA	$29,797,018	NA	$19,893,892
Injection Well	$22,689,589	NA	$20,106,921	NA
Subtotal Construction Capital Cost	$44,754,918	$117,046,757	$34,955,914	$87,287,298
Non-Construction Capital Cost (25 percent)	$11,188,729	$29,261,689	$8,738,978	$21,821,824
Land Acquisition	$6,024,426	$6,024,426	$6,024,426	$6,024,426
Total Capital Cost	**$61,968,073**	**$152,332,872**	**$49,719,318**	**$115,133,548**
Annual O&M Cost	**$2,347,472**	**$4,844,682**	**$1,843,840**	**$3,711,768**
Equivalent Annual Cost	**$3,590,291**	**$11,502,554**	**$2,876,456**	**$6,688,677**
Unit Production Cost ($/kgal)	**$5.42**	**$14.93**	**$6.47**	**$14.25**

[1] An estimated transmission pipeline length of 15 miles was used for the cost estimation based on the proximity of the WRFs and to capture the areas that could be the location of discharge. The pipeline diameter is dependent on the project capacity. To adjust the cost based on the pipeline length: the cost of the 18-inch pipe is $108 per linear foot, and the cost of the 12-inch pipe is $72 per liner foot.

[2] For the injection well option, it was assumed that water would be pumped below any USDW and would not require advanced treatment. Feasibility studies, the engineering design process, and FDEP requirements will ultimately determine the treatment needed.

The life-cycle costs presented for the Hernando MAR option should be viewed as conservative because they are based on an injection well recharge configuration rather than surface infiltration. Injection wells typically require specialized drilling, advanced treatment, UIC permitting, and a dedicated monitoring-well network. These components contribute to higher capital and operational costs but may provide greater control over recharge and may support regulatory considerations, including potential credit eligibility under the SWFWMD WUP framework. While shallow infiltration may be feasible in some areas, soils and land availability near the Hernando WRF suggest that injection represents a conservative planning assumption. Future hydrogeologic testing may identify opportunities to incorporate infiltration and reduce costs; however, the current use of an injection-based cost model provides an upper-bound estimate consistent with the conservative approach applied to other AWS project options in this RWSP.

5.2.3 Non-Potable Reuse Regional Expansion Option

NPR is the distribution and use of reclaimed water that has received secondary treatment, filtration, and high-level disinfection, but is not treated to potable standards. NPR requires a dedicated distribution system ("purple pipe") that is hydraulically separated from the potable system.

Typical NPR end uses include:

- Residential and commercial irrigation
- Golf course irrigation
- Agricultural irrigation
- Industrial cooling and process water
- Rapid infiltration basins (RIBs)
- Soil aquifer treatment systems
- Environmental enhancement projects

NPR is considered a demand-side water resource, reducing potable system withdrawals and supporting regional water supply reliability. Because NPR does not require advanced treatment, it provides a cost-effective pathway for optimizing reclaimed water utilization before pursuing higher-cost IPR or DPR applications.

The WRWSA region contains multiple reclaimed water systems that currently operate independently. This limits the ability to redirect reclaimed water from areas with seasonal surpluses to areas with sustained irrigation demand or potable system deficits. Figure 5-1 illustrates the existing reclaimed water infrastructure across the WRWSA Region. The Non-Potable Reuse Regional Expansion option would interconnect major reclaimed systems across county boundaries, establishing a flexible reclaimed water network that supports beneficial reuse, MAR, and future IPR.

The Regional Reuse Expansion option is intended to create a flexible reclaimed water backbone that links multiple utilities, enabling:

- Delivery of reclaimed water from WRFs with seasonal surpluses to areas with consistent high irrigation demand
- Reduction of non-beneficial discharges at the regional scale

- Improved performance of Hernando and Citrus MAR projects through more reliable wet-season reclaimed water availability
- Long-term preparation for IPR where future regulations and infrastructure allow
- Greater operational resilience under drought and periods of elevated irrigation use

This project is conceptual by design. Specific pipeline corridors, pump station locations, and storage configurations will be defined through a Phase I Optimization Study, which is an essential next step.

5.2.3.1 Planning Yield

Hydraulic evaluations and utility-provided reclaimed production forecasts indicate that up to 13 MGD of reclaimed water could be transferred region-wide through a regional backbone system. Based on Table 4-14 and regional reclaimed-water projections:

- Up to 13 MGD of reclaimed water could potentially be redistributed region-wide with new interconnections.
- Approximately 5 MGD of this volume is allocated as recharge yield to the Hernando and Citrus MAR projects (Sections 5.3.2).
- The remaining ~8-9 MGD represents incremental potable offset associated with expanded irrigation reuse and reduced non-beneficial discharges.

Accordingly, a planning-level incremental effective yield of 8 MGD is assigned to the Non-Potable Reuse Regional Expansion for cost-comparison purposes. This avoids double-counting reclaimed supply already attributed to MAR projects.

Because reclaimed water systems across the region were developed independently and vary widely in pressure zones, storage capacities, and demand characteristics, a Phase I Reclaimed Water Optimization Study is the essential next step to refine the project.

The Optimization Study will define implementation sequencing, permitting considerations, funding eligibility (including SWFWMD Cooperative Funding Initiative [up to 50% cost share]) and the infrastructure required to support phased regional build-out. The following are benefits of NPR regional expansion:

- Maximizes beneficial reuse across the WRWSA region
- Increases operational flexibility during variable climate and demand conditions
- Establishes a shared backbone infrastructure supporting future IPR and MAR initiatives
- Enhances reliability and performance of the Hernando and Citrus MAR projects by ensuring dependable reclaimed feedwater
- Positions WRWSA and its members for enhanced regional partnerships and long-term water supply resilience

The Optimization Study should include:

- Detailed mapping of existing and planned reclaimed infrastructure

- Pressure zone and hydraulic modeling
- Evaluation of storage needs and locations
- Quantification of interconnection benefits
- Prioritization of corridors for near-, mid-, and long-term build-out
- Evaluation of cost-sharing frameworks and funding eligibility
- Coordination with MAR and potential future IPR projects

The results of the Phase I Optimization Study will provide the refined corridors, component lists, sequencing, and planning-level cost estimates needed for subsequent RWSP updates, capital planning, and future funding applications. This work will form the foundation for a phased, adaptable regional NPR system that maximizes reclaimed water value and strengthens long-term water supply sustainability across the WRWSA region.

Phase II would establish backbone priority interconnections (2027–2035) similar to the Villages and Wildwood to connect demand centers and AWS projects. These interconnections would allow beneficial reuse to be maximized within the region and reduce non-beneficial discharges during the wet season.

5.2.3.2 Infrastructure Components

Given the varying maturity of reclaimed systems in the region, several uncertainties must be resolved before infrastructure components, corridors, and capital costs can be defined with confidence, such as:

- Lack of consistent pressure zone mapping across utility boundaries
- Limited understanding of diurnal and seasonal reclaimed demand patterns across the region
- Uncertainty regarding future irrigation build-out in key corridors
- Variability in reclaimed water storage and pumping capability by utility
- Regulatory considerations for future IPR readiness
- Operational agreements required between utilities for flow balancing and cost-sharing

At a conceptual level, the infrastructure needed to support regional reuse integration may include:

- Transmission corridors (12–24 in.) along major roadways or utility easements
- Interconnection pump stations, likely 2–3 sites initially
- Additional wet-weather storage or equalization, depending on local hydraulic behavior
- Control valves, metering stations, PRVs, and SCADA integration
- Selective pipeline upsizing, where local systems originally designed for small irrigation zones must support multi-utility transfers

These elements are not intended to represent final facilities; but instead illustrate the types of improvements typically needed to interconnect currently stand-alone reclaimed systems.

5.2.3.3 Project Cost

Because this project is in a conceptual phase and does not have defined routes or facility locations, the AWS cost model is not appropriate for estimating purple-pipe expansion costs. Instead, planning-level cost ranges are derived from:

- SWFWMD Reclaimed Water Feasibility Studies (2010–2017)
- WRF 4635 & 4710 Reuse Cost Benchmarks
- Recent Florida reclaimed water transmission projects
- Utility-provided reclaimed pipeline construction costs

Using these sources:

- Pipeline construction in Florida commonly ranges from $1.6–$3.2M per mile depending on diameter, traffic conditions, and utility conflicts.
- Pump stations vary widely by capacity and elevation, typically $3–$7M.
- EQ/storage (if required) typically ranges from $3–$5M for 2–3 MG.

Applying these general assumptions to 25–30 miles of potential interconnect corridors yields a planning-level total capital cost of $90–$185 million (2024 dollars) with a mid-range value of $135 million used for comparison with other AWS options.

Annual O&M is assumed at $1.5–$3.0M, acknowledging uncertainty regarding:

- Final pipeline length and pump head
- Seasonal operating patterns
- Storage configuration
- Pressure zone integration
- Inter-utility operational arrangements

Unit production cost for comparison in this RWSP is therefore estimated at $4–$8 per 1,000 gallons, based on the incremental 5-MGD yield.

5.2.4 Reclaimed Water Summary

Combined, the Hernando and Citrus MAR projects could beneficially recharge more than 5 MGD of reclaimed water by 2045, reducing the need for additional groundwater withdrawals to meet potable demand. These projects also establish a foundation for future IPR strategies, consistent with regional hydrogeologic conditions and WRWSA's sustainability goals. Further feasibility and pilot testing will confirm recharge performance, treatment requirements, and long-term monitoring protocols under FDEP's UIC program.

5.3 Groundwater

Groundwater from the UFA currently serves as the primary potable supply for all utilities within the WRWSA region, although the City of Ocala is currently implementing an LFA conversion project to address a portion of their impacts to Silver Springs. Although historically abundant, the UFA is increasingly constrained by:

- MFLs for major spring systems,
- Declining regional potentiometric trends in localized areas,
- Projected 2045 demands that approach or exceed current permitted capacities, and
- An MFL prevention strategy in the SJRWMD.

Section 4 identifies several utilities, particularly in southwestern Marion County, the Lake Weir region, and western Sumter County, that will face measurable groundwater deficits by 2045. Even under the Tier 3 conservation scenario, multiple systems approach full utilization of their permitted UFA quantities.

To ensure long-term reliability and regional resource sustainability, the WRWSA evaluated deep aquifer development in the LFA. The LFA Wellfield (Option 3A) is based on favorable geologic conditions identified in some areas in southwestern Marion County with a conceptual capacity of 5 to 10 MGD of treated potable water while reducing long-term pressure on the UFA and the sensitive spring systems it supports. As the interest in LFA wellfield development increases in central Florida, it is important to monitor potential cumulative impacts to verify continued reduction of UFA impacts.

This project is considered a mid-term (2030–2035) supply option and complements parallel strategies involving conservation, reclaimed water, MAR, and surface water development.

5.3.1 Hydrogeology

The WRWSA region lies within the Northern Planning Region of the SWFWMD, where groundwater occurrence and movement are strongly controlled by intensive karst development. Sinkholes, limited surface drainage, and undulating topography dominate much of the area and facilitate rapid recharge to the UFA. Dissolution of limestone along fractures has produced extensive subsurface conduits, many of which occur below the water table and significantly enhance groundwater flow. These features reflect both active and relict karst processes associated with historic sea-level changes.

The UFA is the principal source of groundwater and potable supply in the region and is largely unconfined due to the absence, or discontinuity, of overlying clay confining units. A laterally extensive surficial aquifer system is generally absent, although localized perched water tables may occur. The UFA consists of the Suwannee Limestone, Ocala Limestone, and the upper portion of the Avon Park Formation, with the upper several hundred feet comprising the most productive interval.

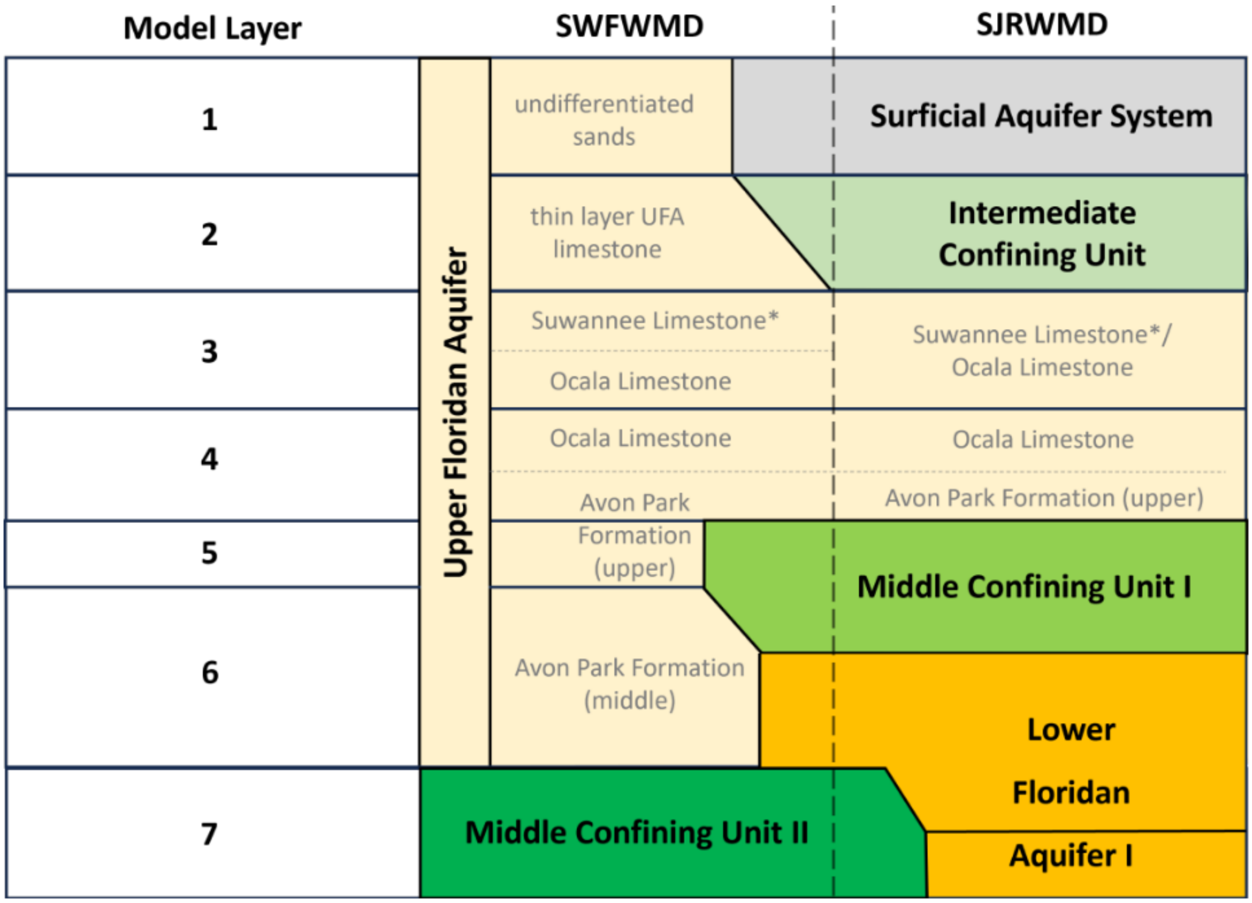
The Avon Park Formation is approximately 1,000 feet thick. It is composed of interbedded limestone and dolostone, with evaporite minerals such as gypsum occurring in the middle to lower portions. Within this formation, middle confining units (MCUs) define the base of the UFA and provide vertical separation from deeper aquifers. MCU II, where present, forms the lower limit of freshwater production. Water quality near and below MCU II is typically brackish due to mineral contact.

In northeastern Sumter County and eastern Marion County, MCU II is absent and a shallower MCU I occurs within the upper Avon Park Formation. MCU I consists of dense, fine-grained carbonate rock and is leakier than MCU II, providing only semi-confinement in this area and allowing hydrologic connection between the UFA and the underlying LFA I, with limited isolation.

Both MCU I and the LFA below MCU I (LFA I) extend eastward from Sumter and Marion counties across the SJRWMD. The LFA I contains fresh groundwater and is currently being used for water supply in eastern parts of the planning region, where present. The LFA below MCU II (LFA II) may be productive, but it has not been used or extensively tested in the region due to the availability of fresh water.

Together, the presence of strong confinement, artesian heads, and high transmissivity supports evaluation of the feasibility of a deep-aquifer supply. Figure 5-3 provides a regional hydrogeologic visual illustrating the UFA, LFA, and confining-unit distribution.

This regional hydrogeologic setting provides the physical and regulatory basis for evaluating the feasibility of the LFA wellfield project. Figure 5-4 and Figure 5-5 show the key hydrological parameters for LFA wellfield siting in the WRWSA region.



*Where present

Figure 5-3: Visual Depiction of the Relationship between the UFA and LFA and their Associated Confining Units in the SJRWMD and SWFWMD (Central Springs Groundwater Flow Model Version 1.1 Report, SJRWMD and SWFWMD, 2025)

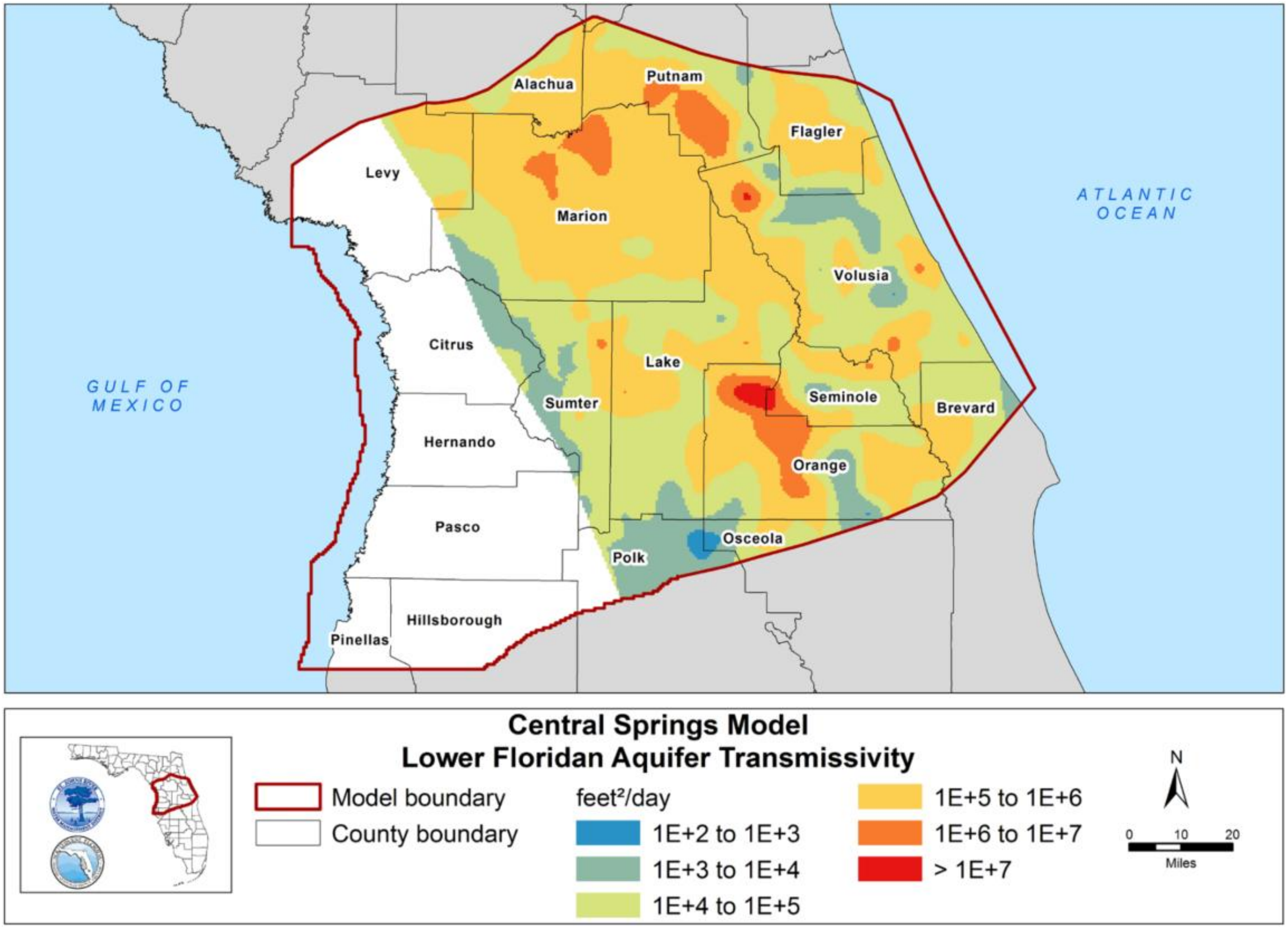


Figure 5-4: LFA Composite Transmissivity
(Central Springs Groundwater Flow Model Version 1.0 Report, SJRWMD and SWFWMD, 2024)

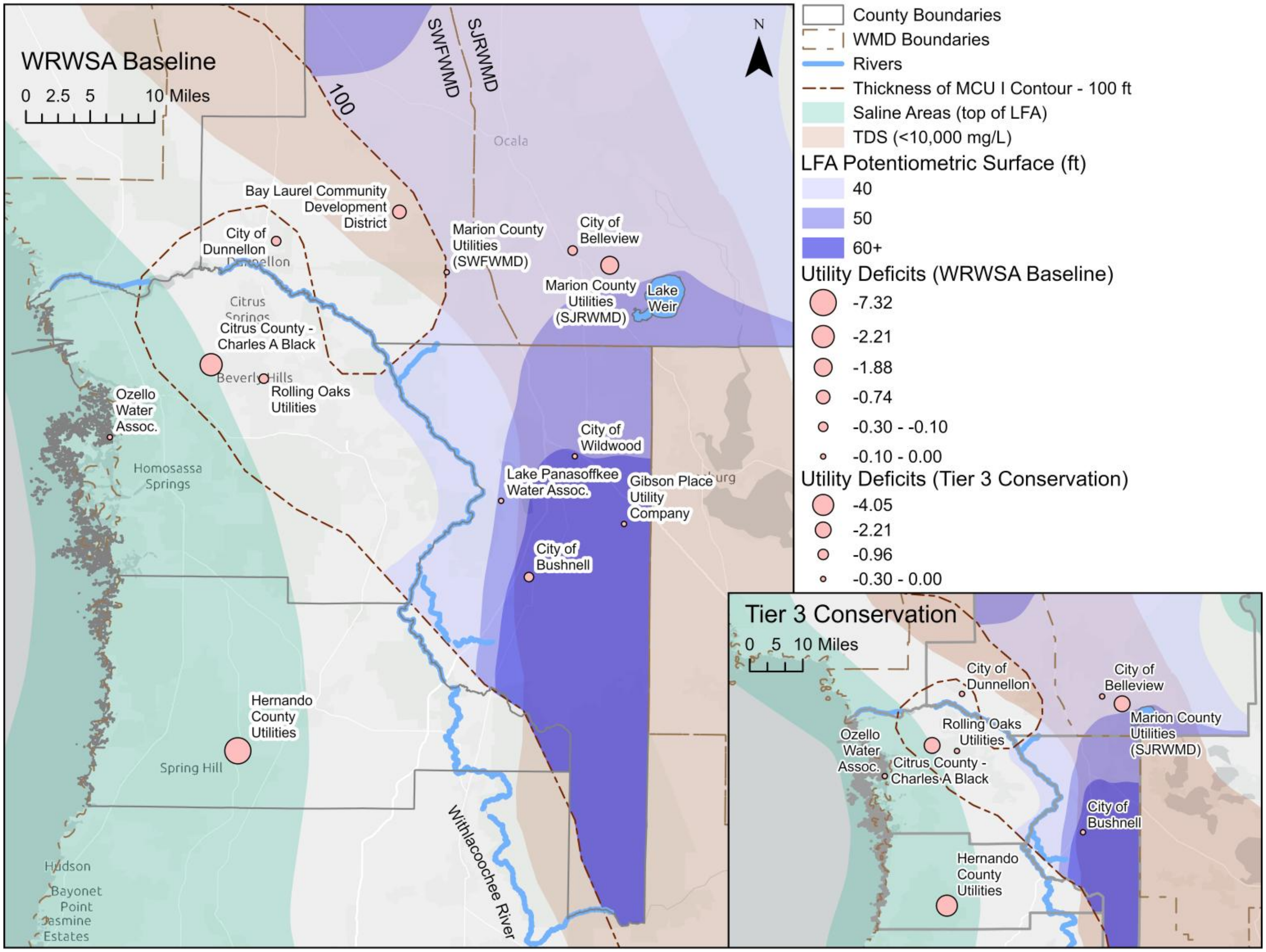


Figure 5-5: Hydrogeology in the WRWSA Region to Assess LFA Siting

5.3.2 Lower Floridan Aquifer Wellfield Option

The LFA Wellfield (Option 3A) is conceptualized as a deep groundwater supply intended to support long-term potable demands and may help reduce reliance on the UFA under suitable conditions. The LFA below MCU I is reported to have suitable groundwater quality and productivity in some areas. However, the degree of confinement in the MCU I is variable throughout the region, requiring exploratory drilling and aquifer testing to evaluate site suitability. Potential interactions with the overlying UFA should also be evaluated. The project concept includes development of a regional wellfield near Lake Weir and Gum Springs to provide a potential source of potable water to southeastern Marion County and adjacent portions of Sumter County. The Villages Combined Water Use Permit (Permit 13005) allows for both UFA and LFA withdrawals, which is located within the broader project area.

The project targets where MCU I demonstrates adequate thickness and confining properties between the UFA and LFA. If hydrologic separation is sufficient, the LFA wellfield may reduce the risk of inducing additional UFA drawdown and improves compatibility with long-term water resource protection goals. The project objectives include increasing water supply reliability by developing another sustainable deep-aquifer source, and reducing UFA pumping stress near Lake Weir, Gum Springs, and southern Marion County.

LFA raw-water quality within the study area ranges from fresh to slightly brackish, with observed TDS and hardness levels varying across test wells. Two treatment configurations were therefore evaluated:

- **LFA Without Nanofiltration (NF):** Applicable where raw-water TDS and hardness are within potable standards. This configuration minimizes capital and O&M costs but may not be suitable for all withdrawals in the feasibility zone.
- **LFA With Nanofiltration:** Applicable where raw-water quality requires additional softening or TDS reduction. This configuration increases cost but broadens the feasible siting area.

The conceptual feasibility zone and nearby utilities with potential interconnections are shown on Figure 5-6. Additionally, two capacity configurations, 5 MGD and 10 MGD, were evaluated. Projected 2045 demands indicate that multiple Marion County utilities will fully utilize their existing UFA allocations by the end of the planning horizon. Although individual deficits are relatively modest (generally under 1 MGD), cumulative UFA constraints and regional water resource considerations suggest limited ability to expand withdrawals from the upper aquifer. The LFA option would add 5–10 MGD of new potable supply, diversifying withdrawal sources. This would allow for suitable regional distribution, including to Sumter County utilities located proximate to the Marion–Sumter boundary.

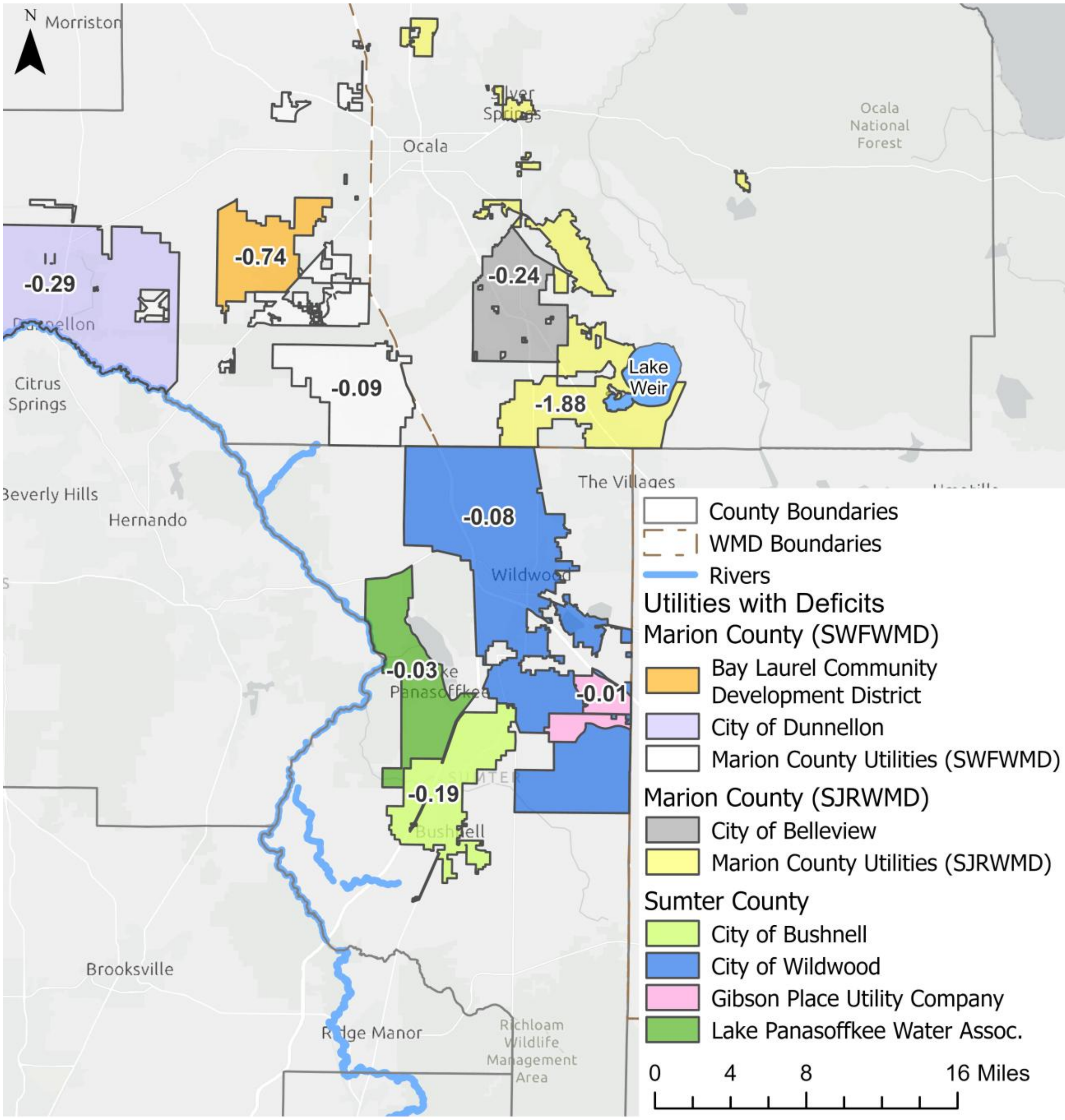


Figure 5-6: LFA Wellfield Conceptual Feasibility Zone

5.3.2.1 Site Criteria

The proposed wellfield area in southwestern Marion County lies within one of the most favorable LFA development zones in the WRWSA service area. Feasibility was evaluated using five key parameters, potentiometric surface, confinement, transmissivity, water quality, and salinity profile, each of which supports the viability of the project.

Potentiometric Surface (LFA Head Elevation): Observed LFA heads range from approximately +40 to +50 feet NGVD, indicating artesian conditions with sufficient upward hydraulic gradients. These heads limit downward leakage from the UFA and provide stable pressure conditions for long-term production. For planning purposes, LFA heads of +40 ft NGVD or higher represent favorable conditions for sustained withdrawals.

Confinement: The MCU I provides over 100 feet material between the UFA and LFA in the project corridor. However, the degree of confinement in the MCU I is regionally variable. If confinement is found to be sufficient, LFA withdrawals are unlikely to measurably affect nearby UFA water levels or contribute to spring-flow reductions at Silver Springs or Rainbow Springs. If LFA withdrawals were to result in UFA drawdown, analysis of potential cumulative impacts to water bodies outside of the WRWSA will be necessary.

Transmissivity: The targeted area exhibits LFA transmissivity in the range of 1,000 to 100,000 ft^2/day. An aquifer performance test should be conducted to verify transmissivity in order to support the development of 5–10 MGD of firm capacity with a moderate number of production wells.

Water Quality: Although available data are limited, existing logs and regional aquifer studies indicate brackish groundwater (1,200–1,800 mg/L TDS) suitable for RO or NF treatment. The selected treatment design in Option 3A assumes RO treatment to achieve a blended finished-water TDS target of approximately 500 mg/L. If deeper wells encounter higher salinity, NF pre-treatment can be incorporated.

Salinity Profile: The 10,000 mg/L TDS boundary, representing the transition to non-USDW conditions, occurs well below the target production zone (>1,200 ft below land surface). This indicates that the target production zone is within the brackish-to-moderately-saline range.

These site-specific hydrogeologic conditions indicate that the LFA wellfield may be developed to reduce impacts to the UFA and nearby spring systems, while providing a potential deep-aquifer source for long-term regional supply. Based on analogous regional wellfields and aquifer parameters, the following site conditions are expected to exist:

- Specific capacity: ~25–35 gpm/ft
- Yield per well: 1.0–1.5 MGD
- Firm capacity: 5 MGD (4–5 wells); 10 MGD (8–10 wells)

Drawdown is estimated to be <10 ft per well under planning assumptions, indicating limited potential for inter-aquifer leakage or UFA interference. By shifting a portion of supply from the UFA to the LFA, the project could reduce downward gradients beneath Lake Weir and Gum Springs, supporting more stable surface-water levels.

5.3.2.2 Infrastructure Components

LFA supply configurations rely on a consistent suite of infrastructure components that enable the withdrawal, treatment, conveyance, and distribution of brackish groundwater. Although project specific variations occur in the number of production wells, treatment capacity, or pipeline alignment, the fundamental system architecture remains the same. This subsection provides a cohesive narrative description of what would be considered the shared elements.

LFA Wellfield: LFA production wells form the foundation of the project and provide the raw water supply to the treatment facility. These wells are constructed to depths typically between 1,000 and 1,500 feet where transmissivity is sufficient to support municipal-scale withdrawals. Each well requires multiple casing intervals to seal off the UFA and the MCU I, ensuring strict hydraulic separation between aquifer zones. Stainless steel casing, gravel-packed screens are installed in the production interval to maximize yield and maintain water quality.

Option 3A includes a wellfield of approximately 4 to 10 production wells, depending on the 5 or 10 MGD capacity selection.

High Service Pumping System: A raw water pump station would be constructed adjacent to the treatment plant. The facility would include two or more vertical turbine pumps to pump raw water to the head of the treatment plant. The capacity of the pump station would be the same as the design capacity of the project. Standby pump capacity would be provided in accordance with the Ten State Standards and Fla. Admin Code R. Chapter 62-550.

Raw-Water Transmission: Once withdrawn, brackish groundwater would be conveyed from the wellfield to the treatment plant through a dedicated raw-water transmission pipeline. This pipeline must accommodate both the chemical characteristics of brackish water and the hydraulic requirements associated with deep-well pumping. For planning and cost estimating purposes, a raw-water pipeline, designed to minimize environmental impacts while providing operational accessibility, will extend from the wellfield to the treatment facility.

Raw water conveyance is assumed to occur via a 3-mile 12-inch transmission main to a membrane-treatment facility equipped to produce either 5 MGD or 10 MGD of finished water.

Brackish Groundwater Treatment Plant: The treatment facility is designed to remove dissolved solids and other constituents characteristic of the LFA source. The facility would house all treatment processes and operations necessary to produce finished water that meets local, state, and federal drinking water standards in an efficient and cost-effective manner. The plant is designed to treat raw water to 1,500 mg/L total dissolved solids (TDS) or lower. The major elements of the treatment facility would likely include:

- Reverse osmosis treatment system
- Chemical feed systems for disinfection, pH stability, corrosion inhibition, and scale control in the transmission system
- Finished water storage (Clearwell) and pumping system
- Residual handling

The treatment process would follow a conventional treatment train for a brackish groundwater supply, based on comparable facilities in west-central Florida. The specific process configuration would depend on site-specific source water quality. Water quality data would be gathered to characterize the full range of flow conditions in the groundwater.

Nanofiltration System (Optional): After confirming site-specific groundwater quality and the effectiveness of the brackish groundwater treatment plant, the addition of nanofiltration may be deemed necessary. As a conservative estimate, the baseline assumption is that nanofiltration will be necessary.

The major elements of the nanofiltration system would likely include:

- Membrane process equipment and associated pumps and motors
- Chemical clean-in-place equipment
- Membrane cleaning system

Facilities include a RO or RO+NF treatment train, a 2.5 MG or 5 MG concrete storage tank, high-service pumping infrastructure sized to meet firm capacity at both the 5-MGD and 10-MGD scale, allowing the wellfield to operate reliably during peak-demand periods or during maintenance events.

Concrete Storage Tanks: Storage for processed water would be provided in case of transmission interruption or other conflicts with the delivery and use system. Storage would be provided by circular pre-stressed concrete storage tanks, constructed in accordance with AWWA D-110. In accordance with FDEP minimum storage requirements, total on-site storage must equal at least 25 percent of the system's maximum daily demand. For conceptual design purposes, a storage volume equivalent to 50 percent of the projected average daily demand is assumed to be adequate to meet this requirement.

Final storage volumes would be established during detailed design and permitting, in coordination with the participating utilities. The site layout would also allow space for future expansion, including the installation of an additional storage tank as system demands increase should long-term demands justify additional capacity.

Finished Water High Service Pumping for Delivery: A dedicated finished water pumping system would convey treated water from the facility to the communities served. The system would include three or more horizontal split-case pumps, potentially equipped with variable frequency drives and would be controlled using pressure levels in the downstream transmission/distribution system, water levels in downstream storage tanks, or both. Results from the hydraulic modeling of the finished water transmission system would be used to establish sizing and selection requirements for the finished water pumping system.

Finished Water Transmission: A finished water transmission system would be evaluated, designed, and constructed to convey treated water from the treatment facility to the service areas. The proposed transmission routes typically assume that water will be provided to utilities at an approximate location within the respective service area, through easements acquired along public rights-of-way.

Actual pipeline routes and points of connection will be identified during design and permitting through coordination with the participating utility. Proposed pipeline routes are generally located along county or state roads, therefore potential future roadway improvements may warrant consideration. To help minimize the need for future pipe relocation, acquisition of easements along the pipeline corridors should be considered, with typical widths of 30 feet for pipes 16 inches or larger and 20 feet for smaller pipes.

A dedicated 6-mile,12-inch finished-water transmission main water pumping system would convey treated water from the facility to the communities served. It is anticipated finished water treatment lines would be interconnected with nearby utility service areas such as Marion County Utilities, the City of Belleview, and the City of Wildwood. Participating utilities would be responsible for the interconnection and distribution of water to their respective customers.

Monitoring Network: Paired UFA and LFA observation wells near Lake Weir and Gum Springs to track head differentials.

5.3.2.3 Project Cost

Table 5-5 details the size and length of the raw and finished water transmission lines. Cost estimates for both the 5-MGD and 10-MGD alternatives reflect 2024 dollars and were sourced from the SJRWMD AWS Cost model. These include construction costs, non-construction costs, land acquisition, total capital cost, annual operations and maintenance (O&M), equivalent annual cost, and unit production cost ($/kgal) as presented in Table 5-6. Together, these components establish the baseline system requirements applicable to all LFA configurations considered under this project option.

Table 5-5: LFA Projects' Pipeline Lengths and Sizes

Pipeline Size	Pipeline Length		Water Type
(inches)	(feet)	(miles)	
12	15840	3.00	Raw
12	31680	6.00	Finished

Table 5-6: LFA Wellfield Capital Cost, O&M and Unit Cost Estimates (2024$)

Description	LFA Wellfield With NF		LFA Wellfield Without NF	
	5 mgd	10 mgd	5 mgd	10 mgd
Membrane Softening (Nanofiltration)	$46,814,835	$79,985,402	NA	NA
High Service Pumping System	$4,057,726	$7,699,130	$4,057,726	$7,699,130
High Service Pump to Deliver	$4,057,726	$7,699,130	$4,057,726	$7,699,130
Transmission Pipelines	$7,785,666	$7,785,666	$7,785,666	$7,785,666
Concrete Storage Tank	$2,779,301	$4,776,263	$2,779,301	$4,776,263
LFA Wellfield	$9,947,718	$18,658,964	$9,947,718	$18,658,964
Brackish Groundwater Treatment Plant	$77,771,779	$126,612,395	$77,771,779	$126,612,395
Subtotal Construction Capital Cost	$153,214,750	$253,216,950	$106,399,915	$173,231,548
Non-Construction Capital Cost (25 percent)	$38,303,688	$63,304,237	$26,599,979	$43,307,887
Land Acquisition	$2,000,000	$2,000,000	$2,000,000	$2,000,000
Total Capital Cost	**$193,518,438**	**$318,521,187**	**$134,999,894**	**$218,539,435**
Annual O&M Cost	**$5,325,729**	**$8,993,029**	**$4,801,956**	**$8,014,175**
Equivalent Annual Cost	**$12,023,286**	**$19,802,458**	**$8,612,933**	**$13,975,705**
Unit Production Cost ($/kgal)	**$9.51**	**$7.89**	**$7.35**	**$6.02**

5.3.3 Groundwater Summary

The LFA Wellfield (Option 3A) may provide a feasible deep groundwater supply capable of producing 5–10 MGD of potable water while potentially reducing UFA stress affecting Lake Weir and Gum Springs. However, lack of regional data confirming strong confinement, favorable transmissivity, and suitable water quality raise the need for additional feasibility studies. Implementation of the LFA wellfield would require coordination with the WMDs to confirm that LFA withdrawals will not induce measurable UFA impacts. Additional considerations include concentrate management permitting, phased capacity development to align with observed demand growth, and potential integration with regional interconnection infrastructure. A phased approach, in which a 5 MGD facility is constructed first with a future expansion to 10 MGD, may offer the most cost-effective strategy for aligning supply availability with long-term needs.

Although there are no distance-based restrictions, the WMDs require demonstration that proposed LFA withdrawals will not cause significant changes in UFA potentiometric head or cause significant harm to water resources in the area. To meet this requirement, future feasibility and permitting phases may include:

- Groundwater modeling to estimate UFA head response and/or spring flow changes at Gum Springs, Lake Weir, and other water bodies;
- Verification of MCU I thickness and hydraulic conductivity through test drilling; and
- Installation of paired UFA/LFA observation wells to confirm hydraulic isolation during operation.

These activities are intended to demonstrate consistency with WMD water-use criteria. Next steps would include:

- Exploratory Drilling & Aquifer Testing: confirm confinement, transmissivity, and quality.
- Paired Monitoring Wells: install UFA and LFA sentinels near Lake Weir, Gum Springs, and other potential strategic locations.
- Groundwater Model Update: evaluate head response and spring/lake effects.
- Utility Integration Study: define interconnect routes to Marion County Utilities, Belleview, and Wildwood.

If feasibility is confirmed, the project could advance as a regional LFA wellfield serving multiple utilities while supporting environmental restoration goals. The project offers competitive unit production costs relative to surface water and desalination alternatives, reduces long-term dependence on the UFA, and aligns well with expected regional deficits emerging after 2030. In the context of the overall WRWSA portfolio, the LFA project is best suited as a mid-term option (2030–2035).

5.4 Surface Water

Surface water from the Withlacoochee River could supplement the potable supply for many utilities within the WRWSA region. Use of surface water entails sophisticated means of treatment, management of the variability in quantity and quality of source waters, and management of associated environmental impacts to downstream ecology and water resources. These characteristics would typically be evaluated and addressed during permitting prior to implementation of specific surface water projects. It should be noted that the development of surface water project options is not anticipated to be necessary during the 2025-2045 planning period. This is because in addition to water conservation potential, both UFA and LFA groundwater sources are anticipated to be adequate to meet demands after conservation and reclaimed water are taken into consideration. Another factor in favor of developing groundwater sources is that they are significantly less costly than surface water sources.

5.4.1 Withlacoochee River Surface Water Treatment Plant Option

The analysis that determined the availability of surface water in the rivers for public supply water use was presented in Chapter 4, Section 4. The surface water options identified below are based on the Withlacoochee River System's flow characteristics, future demand for water supply in the region, and associated environmental resource data.

Three surface water treatment plant options are proposed at three locations along the Withlacoochee River for comparative purposes:

- North Sumter (4A)
- Holder (4B)
- Lake Rousseau (4C)

Figure 5-7 illustrates the proposed facility locations. Because construction of more than one facility on the river is unlikely, the proposed capacities of the three options should not be interpreted as cumulative potential withdrawals.

A water supply facility at one of these locations could successfully operate conjunctively as part of an interconnected regional system. When surface water is available, groundwater production could be reduced. Although groundwater wellfields are necessary to maintain supply, those wells could be rested for significant intervals, thereby reducing impacts from groundwater withdrawals on water resources in the area.

Three criteria were utilized to identify potential facility locations:

- public ownership to limit land acquisition costs;
- sufficient site area to accommodate facilities necessary for supply from the river reach (treatment plant, reservoir, etc.); and
- proximity to the raw water intake and adequate road access.

Based on these criteria, potential sites were identified. The following sections summarize planning-level project information for each site, including location, facility layout, river intake, and raw water pumping components.

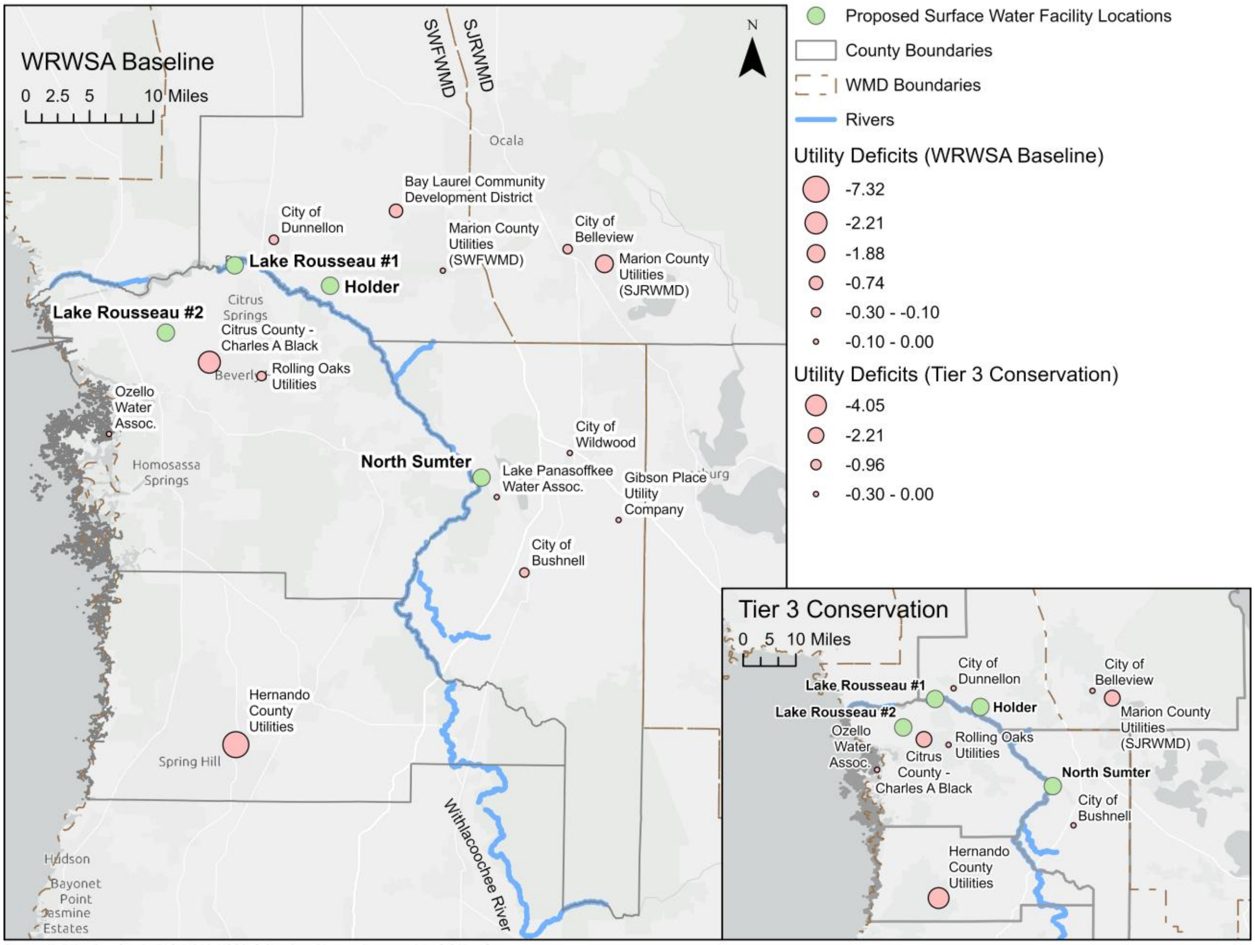


Figure 5-7: Potential Surface Water Treatment Plant Locations

5.4.1.1 North Sumter Surface Water Treatment Facility (Project 4A)

The North Sumter Option is in North Sumter County on the Panasoffkee Outlet Property owned by the SWFWMD. The property is bound by the Withlacoochee and Outlet Rivers to the west and south, respectively, State Road 315, and North County Road 470. The site is sufficient to accommodate the water supply facilities for a 10 MGD conjunctive use project, including a raw water reservoir. The proposed intake structure will be on the Withlacoochee River, approximately 1.8 miles upstream of the Wysong-Coogler Dam.

5.4.1.2 Holder Surface Water Treatment Facility (Project 4B)

The Holder site is in southwest Marion County on the Halpata Tastanaki Preserve, northeast of the Town of Holder, and is owned by the SWFWMD. The preserve is adjacent to the Withlacoochee River to the south and has access to State Road 200. The site can accommodate water supply facilities for a 10 MGD project, including a raw water storage reservoir. The proposed intake structure would be located on the Withlacoochee River. Because the North Sumter and Holder Options include lands designated by Sumter

County as Conservation and Marion County as Preservation, respectively, amendments to future land use designations and/or zoning may also be required for the development of such facilities.

5.4.1.3 Lake Rousseau Surface Water Treatment Facility (Project 4C)

Two Lake Rousseau site alternatives in Citrus County were identified for comparative purposes.

The first option is an undeveloped parcel (18E16S33 21000) owned by TIITF/ Greenways, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida – Office of Greenways and Trails. Located less than 1 mile from Lake Rousseau, the property is adjacent to North River Garden Drive and approximately 0.1 mile from Highway 488. It has access to Duke Energy electric utilities and is close to the nearest water transmission main. Despite being near the Lake, this property is not in a flood zone (FEMA Panel 12017C0-086D). Future land use maps for Citrus County indicate that this property is under conservation, zoned CLMH (low-intensity coastal lakes/mobile homes allowed).

The second option is a mostly undeveloped parcel (17E17S27 80000) owned by the City of Crystal River. The N358-The City of Crystal River to Progress Energy Reclaim Water Project was recently completed on the southeast corner of this parcel, occupying approximately 15 acres of the available land. The property is adjacent to County Road 495, approximately 3.7 miles south of Lake Rousseau, with access to Withlacoochee Regional Electric utilities and proximity to the nearest water transmission main. The property is not in a flood zone (FEMA Panel 12017C0- 177D). Future land use maps for Citrus County indicate that this property is slated for agriculture and transportation/communications/utilities, zoned AGR MG (agricultural – mobile homes allowed) and TCU (transportation/communications/utilities).

Both sites are large enough to accommodate water supply facilities for the 10 MGD conjunctive use project, although the second option provides more flexibility and growth potential. The first option requires significantly less raw water transmission main length than the second option. Property acquisition of the first option may be a simpler process, but converting the property from conservation land to transportation/communications/utilities may be more challenging. The first option has additional challenges regarding the parcel's proximity to residential homes and recreational spaces, whereas the second option is in a more rural setting with utilities already on site.

5.4.1.4 Infrastructure Components

Surface Water Intake: A concrete intake structure is proposed along the riverbank at locations reasonably proximate to the potential treatment plant sites. The intake would consist of a submerged reinforced concrete weir structure.

Floating barriers and intake screens would be installed to prevent the entry of debris and vegetation into the structure. Design of the structure would address FDEP criteria for impingement and entrainment of aquatic organisms. Generally, an intake velocity of less than 2.0 feet per second would be developed and the screen design would prevent access by listed species.

A detailed environmental and hydraulic evaluation would be required during the design and permitting phase to assess potential impacts of the intake on local habitat conditions and the river's flow regime, and to identify the most environmentally acceptable intake locations and design configurations.

Raw Water High Service Pumping System: A raw water pump station would be constructed adjacent to the intake structure. Raw water would flow from the intake structure through a culvert or large-diameter pipe to the wet well of the raw water pump station. The facility would include two or more vertical turbine pumps to pump raw water from the wet well to the head of the treatment plant.

For the North Sumter (4A) and Holder (4B) options, the capacity of the pump station would be twice the capacity of the project to fill the raw water reservoir during high-flow periods. The Lake Rousseau Options (4C) do not include reservoirs, so the capacity of the pump station would be the same as the design capacity of the project.

Standby pump capacity would be provided in accordance with the Ten State Standards and Fla. Admin. Code R. . The wet well would meet the hydraulic needs of the pumps but would not serve as a storage facility. Raw water would be conveyed from the pump station to the treatment plant and/or reservoir through a large-diameter concrete pipe.

Reservoirs: The reach near the North Sumter (4A) and Holder (4B) project options may be a suitable setting for reservoir storage due to water resource limitations that would restrict the periods when the facility could withdraw from the river. The following is an overview of the conceptual design for a lined reservoir to support a 10 MGD year-round supply.

The primary purpose of the reservoir would be to store raw water during the wet months for treatment and supply during the dry season when withdrawals from the river would be reduced or prohibited. To properly size the reservoir, a thorough water balance analysis would need to be prepared that would include river withdrawals based on adopted MFLs, rainfall, seepage losses, and evaporation rates. Further evaluation of the statistical frequency and duration of deficit periods, and of their relationship with the low-flow regime, would be required to optimize the size of the reservoir and refine the estimate of reliability. The reservoir for this conceptual phase of the project will be sized for a 120-day storage period, resulting in 1.2 billion gallons for a 10 MGD year-round supply.

A storage depth of 20 feet is assumed. The area of the reservoir with this storage depth would be approximately 200 acres. At minimum, 5 feet of freeboard would be provided in accordance with Fla. Admin. Code R. 62-572. To accommodate rainfall from major storm events, freeboard was set at 8 feet, resulting in a berm crest elevation of 28 feet.

Geotechnical investigations would be required to verify that the site is not susceptible to sinkhole formation, a significant consideration in this area. If sinkhole potential were identified, alternative locations or construction contingency measures would be developed. Soil testing would determine percolation rates and seepage characteristics. Due to the underlying highly permeable limestone, the reservoir would be lined to prevent excessive water loss.

The reservoir would be designed to include inside slope protection to guard against erosion from wave runup, seepage control on the outside slope, and a spillway for emergency overflows. Inside slopes would be protected from erosion by soil-cement planting, stair step protection systems, vegetated berms, and optimization of interior slopes. A blanket system and perimeter toe-drain would collect seepage and return it to the reservoir.

To convey raw water from the reservoir to the water treatment plant, a transfer pump station would be required. The station would have three or more horizontal split-case centrifugal pumps.

Conventional Surface Water Treatment Plant: The treatment facility would require an area of approximately 20 acres for a 10 MGD facility. The facility would house all treatment processes and operations necessary to produce finished water that meets local, state, and federal drinking water standards in an efficient and cost-effective manner.

The treatment process would follow a conventional treatment train for a fresh surface water supply, based on comparable facilities in west-central Florida. The specific process configuration would depend on site-specific source water quality. Because the Withlacoochee River is not currently utilized as a potable water source, a pilot study or jar testing program would be required to evaluate treatment performance and to identify any necessary process modifications. Water quality data would be gathered to characterize the full range of flow conditions in the river.

The major elements of the treatment facility would likely include:

- Activated Carbon for removal of taste and odor
- High-rate flocculation, coagulation and clarification for removal of organic and inorganic particulate constituents and dissolved organic matter
- Deep bed filters equipped with dual media filtration for polishing filtration and removal of finer particulates and organic matter
- Chlorine disinfection
- Disinfection by addition of chloramines
- Addition of chemicals for pH stability, corrosion inhibition, and scale control in the transmission system
- Finished water storage (Clearwell) and pumping system
- Residual handling

Concrete Storage Tanks: Storage for processed water would be provided in case of transmission interruption or other conflicts with the delivery and use system. Two or more storage tanks would be provided on site for plant downtime and transmission system interruptions. Storage would be provided by circular pre-stressed concrete storage tanks, constructed in accordance with AWWA D-110.

In accordance with FDEP minimum storage requirements, total on-site storage must equal at least 25 percent of the system's maximum daily demand. For conceptual design purposes, a storage volume equivalent to 50 percent of the projected average daily demand for each tank is assumed to be adequate to meet this requirement with redundancy. Final storage volumes would be established during detailed design and permitting, in coordination with the participating utilities.

The site layout would also allow space for future expansion, including the installation of an additional storage tank as system demands increase.

Finished Water High Service Pumping for Delivery: A dedicated finished water pumping system would convey treated water from the facility to the communities served. The system would include three or more horizontal split-case pumps, potentially equipped with variable frequency drives and would be controlled using pressure levels in the downstream transmission/distribution system, water levels in downstream storage tanks, or both. Results from the hydraulic modeling of the finished water transmission system would be used to establish sizing and selection requirements for the finished water pumping system.

Residual Disinfection for Treatment Systems: The residual disinfection for transmission systems will monitor the chloramine residual in the treated water. It includes a booster station with sodium hypochlorite storage, ammonia storage, and chemical feed equipment to treat the water if the quality is not at a suitable level.

Transmission Pipelines: A finished water transmission system would be evaluated, designed, and constructed to convey treated water from the treatment facility to the service areas. A conceptual transmission system for each option was prepared for this element of the project. The proposed transmission routes typically assume that water will be provided to utilities at an approximate location within the respective service area, through easements acquired along public rights-of-way.

Proposed pipeline routes are generally located along county or state roads therefore, potential future roadway improvements may warrant consideration. Coordination with participating utilities will be important in planning locations where the finished water supplies would be routed and connected to existing water distribution systems. Actual pipeline routes and points of connection would be identified during design and permitting. To help minimize the need for future pipe relocation, acquisition of easements along pipeline corridors may be considered, with typical widths of approximately 30 feet for pipes 16 inches or larger and 20 feet for smaller pipes.

The conceptual design of the transmission piping is based on the planning demands and the overall capacity of the project. Hydraulic modeling and coordination with participating utilities would be performed during design and permitting to determine the actual transmission requirements. Final pipe sizes would be determined based on maximum daily flows provided by the utilities and operational criteria established during design.

For large-diameter transmission pipelines, typical flow velocities under average daily conditions are approximately 5 feet per second. During maximum daily flows, velocities may increase to the 6 to 8 feet per second range, assuming a typical peaking factor of 1.5. The transmission system is designed with the assumption that existing local supply facilities will meet most peak demands, with the new facility providing limited support for peak flows.

Ductile iron pipe (DIP) is assumed to be the primary pipeline material, but other pipeline materials including cement-lined prestressed concrete and polyvinyl chloride (PVC) could be evaluated during preliminary design.

Connection points to the municipal distribution systems are approximate at this stage. Final alignments and connection locations would be determined during detailed design and permitting, which may result in changes to pipeline lengths and impact the conceptual cost estimates presented in subsequent sections. Participating utilities would be responsible for the interconnection and distribution of water to their respective customers.

Blending: For utilities that receive potable water supply from both groundwater and surface water, differences in water chemistry should be considered. This will require review of the treated surface water supply characteristics, existing groundwater supply of the utilities, the construction materials of the utilities' distribution systems, and the disinfection and corrosion issues associated with blending potable water from different sources.

Key considerations in blending include disinfectant residuals, disinfection byproduct (DBP) formation, and pipeline corrosion. Surface water typically contains higher levels of total organic carbon (TOC) and pathogens, such as *Giardia*, and requires higher levels of disinfection than groundwater. Elevated TOC in surface water can increase the level of DBPs compared to groundwater. Compliance with potable water standards, as specified in Fla. Admin. Code R. 62-550.310, must be maintained in the transmission system, and meeting disinfection and corrosion control requirements will influence the design of the utility blending facilities.

After blending, changes in distribution system water chemistry can affect the stability of pipe coatings and disrupt protective biofilms, potentially increasing corrosion risk. DBP levels may also increase due to interactions among disinfectants from different sources. Combined water chemistry must be considered when blending groundwater and surface water. Ultimately, potable water standards must be met in blended water.

Because each utility's source water and distribution system are unique, the responsibility for blending water, distributing it to customers, and determining associated costs and infrastructure requirements rests with the individual utility. Each utility must also select the appropriate blending method and treatment processes to ensure compliance with primary and secondary drinking water standards.

5.4.1.5 Project Cost

Table 5-7 presents pipeline lengths and sizes for the conceptual transmission systems. A summary of construction costs, non-construction costs, land acquisition, total capital cost, annual operations and maintenance (O&M), equivalent annual cost, and unit production cost ($/kgal) are presented in Table 5-8. While total capital costs and unit production costs of surface water treatment plants exceed those of traditional UFA groundwater sources, surface water projects provide critical diversification of supply and reduce stress on the aquifer by lowering UFA withdrawal demands.

Table 5-7: Surface Water Projects' Pipeline Lengths and Sizes

Option	Pipeline Size	Pipeline Length		Water Type
	(inches)	(feet)	(miles)	
North Sumter (4A)	48	2000	0.38	Raw
	48	68145	12.91	Finished
	36	46245	8.76	Finished
Holder (4B)	48	4000	0.76	Raw
	48	8440	1.60	Finished
	42	69460	13.16	Finished
	36	109230	20.69	Finished
	24	69660	13.19	Finished
	12	13090	2.48	Finished
Lake Rousseau (4C)	48 (Option 1)	1320	0.25	Raw
	48 (Option 2)	22704	4.3	Raw
	48	36615	6.93	Finished
	42	69990	13.26	Finished
	36	109230	20.69	Finished
	24	104415	19.78	Finished
	12	13090	2.48	Finished

Table 5-8: Surface Water Treatment Facility Capital Cost, O&M and Unit Cost Estimates (2024$)

Description	North Sumter Option (4A)	Holder Option (4B)	Lake Rousseau Option 1 (4C)	Lake Rousseau Option 2 (4C)
High Service Pumping System 1	$7,699,130	$7,699,130	$7,699,130	$7,699,130
High Service Pumping System 2	$7,699,130	$7,699,130	NA	NA
High Service Pump to Deliver	$7,699,130	$7,699,130	$7,699,130	$7,699,130
Transmission Pipelines	$104,107,832	$171,075,755	$213,490,080	$235,988,946
Concrete Storage Tank 1	$4,776,263	$4,776,263	$4,776,263	$4,776,263
Concrete Storage Tank 2	$4,776,263	$4,776,263	$4,776,263	$4,776,263
Ponds & Reservoirs[1]	$105,647,023	$105,647,023	NA	NA
Surface Water Intake	$22,009,673	$22,009,673	$22,009,673	$22,009,673
Residual Disinfection for Transmission Systems	$2,064,062	$2,064,062	$2,064,062	$2,064,062
Conventional Surface Water Treatment Plant	$105,133,045	$105,133,045	$105,133,045	$105,133,045
Subtotal Construction Capital Cost	**$371,611,550**	**$438,579,473**	**$367,647,646**	**$390,146,511**
Non-Construction Capital Cost (25 percent)	$92,902,888	$109,644,868	$91,911,911	$97,536,628
Land Acquisition	$6,024,426	$6,024,426	$6,024,426	$6,024,426
Total Capital Cost	**$470,538,864**	**$554,248,768**	**$465,583,983**	**$493,707,565**
Annual O&M Cost[2]	**$4,848,464**	**$4,848,464**	**$4,422,070**	**$4,422,070**
Equivalent Annual Cost	**$28,341,997**	**$33,220,456**	**$28,417,853**	**$30,056,782**
Unit Production Cost ($/kgal)	**$9.09**	**$10.43**	**$9.00**	**$9.45**

[1, 2] AWS model costs differ from 2019 values due to updated cost equations, assumptions, and 2024 inflation adjustments.

5.4.2 Withlacoochee River Aquifer Recharge Option

The Aquifer Recharge Project Option (4D) would utilize water from the Withlacoochee River to recharge the Upper Floridan aquifer. River water would be diverted to a shallow recharge basin or reservoir to provide aquifer recharge and then withdrawn from the UFA down gradient of the recharge reservoir for water supply.

Because this project option does not require advanced treatment or extensive transmission infrastructure, it is expected to be more cost-effective compared to other alternatives. The conceptual project configuration is presented below, and Figure 5-8 shows the proposed site location.

Since the project option would recharge the Upper Floridan aquifer, it could serve any user that relies on groundwater in the groundwater basin where the project is located. The North- Central Western Florida Groundwater Basin includes all of Citrus, Hernando, and Sumter counties.

However, recharge effects would decline with distance from the project, so it is unlikely that the entire basin would be considered for benefit. Coordination with the SWFWMD will be required to identify a service area for the project. Local groundwater modeling would be required to identify the specific area where groundwater users could be served.

Criteria used to evaluate potential sites for the location of the recharge facility included:

- public ownership to minimize or eliminate land costs,
- sufficient size to accommodate a storage/recharge reservoir, and
- close proximity to the raw water intake with road access.

Due to the general northwesterly flow of the Upper Floridan aquifer, sites located towards the southern end of the WRWSA region were preferred. Based on these requirements, a potential site for the recharge facility was identified and is shown in Figure 5-8.

5.4.2.1 Hydrogeology and Siting Criteria

It is expected that recharge of river water through the proposed basin would not adversely affect water quality in the Upper Floridan Aquifer, due to the relatively thick sequence of sands and clay confining layers overlying the aquifer. Site-specific drilling and geotechnical investigations would be required to characterize subsurface conditions, confirm the absence of sinkholes, and ensure the site is not susceptible to sinkhole formation.

The maximum recharge potential of the facility would be 6.5 MGD. The preliminary design is costed at a capacity of 5 mgd and can be expanded in the future. Based on the Applied Sciences' estimation, approximately 37.5 MGD could be available from the river at the Croom gage on an annual basis to supply this option. Based on the 323-acre reservoir footprint, an annual evaporative loss from the reservoir is estimated at 1.2 MGD. By subtracting the annual evaporative loss from the river withdrawal, a potential recharge of 36.3 MGD is estimated.

The flow available from the river over the lifetime of this option can be affected by several factors including anthropogenic flow declines (due to changes in land use, groundwater withdrawals, etc.) and climate change. These factors and their potential effect on the design of river withdrawal will be considered during preliminary design. Additionally, this project analysis does not consider the effects of this withdrawal on other potential alternative projects.

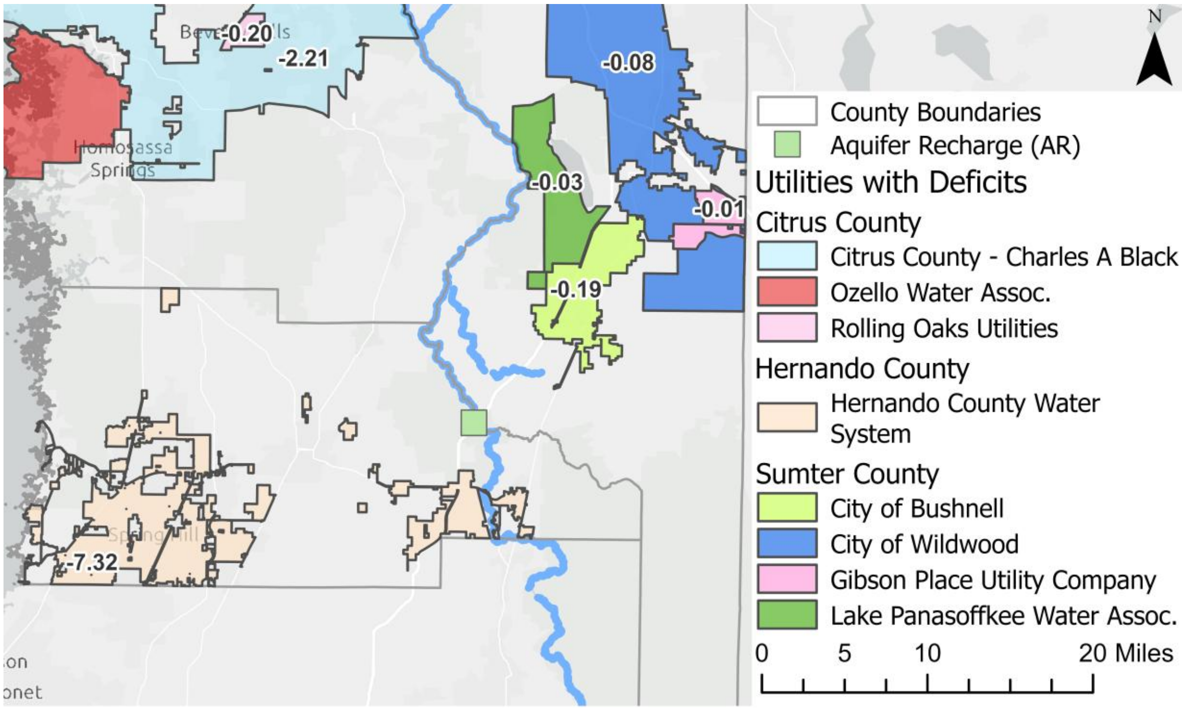


Figure 5-8: Potential Aquifer Recharge (AR) Location

5.4.2.2 Infrastructure Components

Surface Water Intake: A detailed environmental and hydrologic study would be required to evaluate the potential effects of the proposed intake structure on the riverine environment and the river's flow regime. The study would guide the selection of an environmentally compatible intake location.

The concrete intake structure would be constructed on the west bank of the Withlacoochee River, approximately 2.4 miles west of Interstate 75. A shoreline intake configuration is proposed, consisting of a submerged reinforced concrete weir structure. A floating barrier and bar screens would be installed at the intake to prevent entry into the structure.

Aquifer Recharge Reservoir: The land surface elevation of the site is approximately 50 to 80 feet NGVD. The reservoir footprint would be developed to maximize surface area within the constraints of the parcel and design water levels.

The layout would be designed to minimize environmental impacts, avoiding wetlands where possible and maintaining a 100-foot buffer to adjacent parcels. Additionally, a 500-foot setback from the Withlacoochee River would be provided to reduce the potential for short-circuiting, ensuring that water recharges to the UFA rather than returning directly to the river.

To remain below FDEP dam safety thresholds, the reservoir would be limited to a maximum water depth of five feet, with one foot of freeboard. The earthen berms would have a 12-foot crest width and 2:1 side slopes, constructed using on-site fill material excavated during basin formation. The constructed bottom elevation of the reservoir would be approximately 65 feet NGVD.

High Service Pumping System: The aquifer recharge system will include a pump station designed to convey reclaimed or excess surface water from the source facility to the recharge site. The pump station will provide the hydraulic lift necessary to overcome system head losses and maintain consistent flow to the recharge locations. Capacity will be based on projected recharge volumes and system demand scenarios developed during detailed design.

Transmission: A raw-water transmission main will convey water from the pump station to the recharge area. Pipeline materials will be selected to accommodate operating pressures and source-water chemistry. Flow-control valves, isolation valves, and monitoring stations will be incorporated to support operational flexibility and performance tracking.

5.4.2.3 Project Cost

Table 5-9 presents pipeline lengths and sizes for the conceptual transmission systems. A summary of construction costs, non-construction costs, land acquisition, total capital cost, annual operations and maintenance (O&M), equivalent annual cost, and unit production cost ($/kgal) for the aquifer recharge facility is presented in Table 5-10.

The driver of total capital cost is the recharge basin. Operational costs are low compared to other alternatives due to minimal treatment requirements, lower infrastructure complexity, lower energy demand, and less labor and maintenance needs. Therefore, aquifer recharge can provide a long-term cost-effective solution to supplementing UFA levels.

Table 5-9: Aquifer Recharge Project Pipeline Lengths and Sizes

Pipeline Size	Pipeline Length		Water Type
(inches)	(feet)	(miles)	
42	1000	0.19	Raw

Table 5-10: Aquifer Recharge Capital Cost, O&M and Unit Cost Estimates (2024$)

Description	Total Cost
High Service Pumping System	$4,057,726
Transmission Pipelines	$573,439
Aquifer Recharge Reservoir[1]	$49,603,272
Surface Water Intake	$17,166,997
Subtotal Construction Capital Cost	$71,401,434
Non-Construction Capital Cost (25 percent)	$17,850,358
Land Acquisition	$6,024,426
Total Capital Cost	**$95,276,218**
Annual O&M Cost[2]	**$504,142**
Equivalent Annual Cost	**$5,531,429**
Unit Production Cost ($/kgal)	**$3.31**

[1, 2] AWS model costs differ from 2019 values due to updated cost equations, assumptions, and 2024 inflation adjustments.

5.4.3 Surface Water Summary

Surface water from the Withlacoochee River remains a viable long-term alternative supply option for the WRWSA region. Three conceptual treatment plant sites, North Sumter (4A), Holder (4B), and Lake Rousseau (4C), have been evaluated, each with a proposed capacity of 10 MGD.

The estimated surface water that could potentially be obtained from the Withlacoochee River varies based on a planning level criterion the District introduced in the absence of established MFLs. However, the availability could further be constrained by the establishment of minimum flows and groundwater pumping effects. Capital costs for a single facility are projected between $465 million and $555 million, with unit costs of $9–$10.4 per 1,000 gallons—significantly higher than groundwater or reclaimed water alternatives. While surface water projects provide supply diversification and drought resilience, their high cost and permitting complexity position them as long-term strategies beyond the 2045 planning horizon. Continued feasibility studies and coordination with regulatory agencies are recommended to preserve these options for future implementation.

The aquifer recharge project (Option 4D) proposes diverting river water to a basin for aquifer replenishment, offering lower cost and operational complexity. This approach enhances groundwater levels and provides a sustainable means of mitigating regional drawdown impacts without the need for full-scale surface water treatment.

5.5 Seawater Desalination

The desalination project options remain a potential alternative water supply strategy for meeting future regional demands through the treatment of seawater or brackish groundwater. This option would involve developing a centralized treatment facility designed to produce potable water that meets all applicable regulatory standards, supported by the necessary intake, conveyance, and concentrate management systems. These options provide a resilient supply source that could help diversify the region’s portfolio and reduce dependence on traditional groundwater withdrawals.

Seawater, as a source of water, does not require a water use permit from the SWFWMD and is not limited by any regulatory limitations other than the concentrate disposal regulations imposed by the FDEP. The proposed withdrawal location for this option is the Cross Florida Barge Canal, seaward of the Inglis Dam. Because this location receives substantial freshwater discharges from Lake Rousseau, water quality data from the canal was reviewed to identify potential issues.

Salinity, total dissolved solids measured in parts per thousand (ppt), is the key water quality driver for desalination. The salinity in the Barge Canal typically fluctuates between 15 to 20 ppt and can vary from completely fresh (0 ppt) to seawater (35 ppt). This variability results from the regulation schedule of the Inglis Dam, which directs freshwater discharges from Lake Rousseau to the Barge Canal. When discharges occur, they reduce salinity in the Barge Canal and create a wedge effect where saltier water remains at depth while fresher water flows at the surface.

The canal’s typical salinity range of 15 to 20 ppt is highly desirable in comparison to direct seawater, as fresher, less saline waters reduce operating costs for the desalination process. However, the facility would need to be designed to accommodate the fluctuations within the canal's water. These additional or enhanced components would increase both capital and operating costs.

5.5.1 Desalination Project Option

5.5.1.1 Desalination with Ocean Outfall (Option 5A)

Desalination project options 5A and 5B are identical except for their disposal method. Desalination of seawater creates a waste concentrate stream that must be managed and disposed of in accordance with FDEP regulations. In option 5A, the concentrate would be piped offshore and discharged into the Gulf.

5.5.1.2 Desalination with Deep Well Injection (Option 5B)

Option 5B includes deep well injection as the method of waste concentrate disposal. Deep well injection would pump the concentrate into confined layers below the underground drinking water source. Deep well injection is only viable long-term when it can operate without degrading potable aquifers. Feasibility studies and exploratory wells are used to determine suitability and siting of deep injection wells.

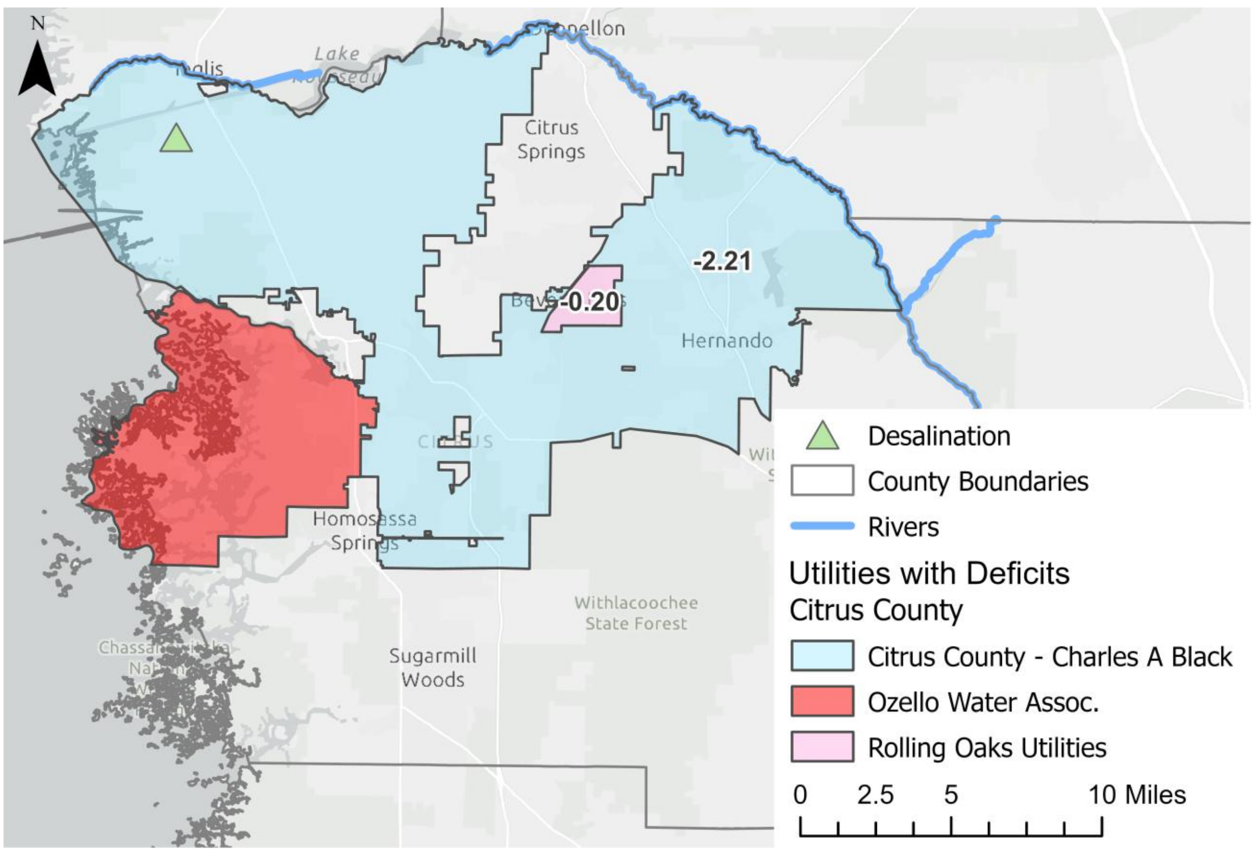


Figure 5-9: Potential Seawater Desalination Treatment Plant Location

5.5.1.3 Infrastructure Components

Complete Seawater Desalination Treatment Plant: A concrete intake structure is proposed along the south bank of the Barge Canal, consisting of a submerged reinforced concrete weir. A floating barrier and screens would prevent debris and aquatic life, such as manatees and sea turtles, from entry into the structure. The design of the structure would address the FDEP criteria for impingement and entrainment of aquatic organisms. A detailed study of the effect of the Barge Canal intake on the environment in the area would need to be performed during design and permitting to determine the final location and design of the intake structure.

A raw water pump station would be constructed adjacent to the intake structure. Water would flow from the intake structure through a culvert or large diameter pipe to the wet well of the pump station. The pump station would include two or more vertical turbine pumps to convey raw water from the wet well to the head of the treatment facility. Standby pump capacity would be provided in accordance with the Ten State Standards and Fla. Admin. Code Rule 62-550.The wet well would be designed to meet the hydraulic needs of the pumps but would not include storage since adequate year-round flow is available in the Barge Canal.

The treatment system will consist of plates settlers (flocculation and clarification), either microfiltration or ultrafiltration, reverse osmosis (in multiple passes), chemical feed systems, and residual disinfection chemicals.

FDEP's secondary standard for TDS requires potable water systems to maintain less than 500 mg/L in their finished water. Typical water treatment plants target between 100 and 400 mg/L TDS to prevent corrosive conditions, maintain palatability, and comply with FDEP standards. To achieve this range, it is assumed that the desalinated product can be blended with treated waters from other sources prior to distribution. Blending desalinated water with treated waters from other sources prior to distribution to the end users is a common practice which helps to stabilize the finished water before reaching the customers. Nearby utilities should adequately be within the capability to blend the desalinated water with groundwater to achieve a desired TDS level.

Concrete Storage Tanks: Two storage tanks will be provided on site for plant downtime and transmission system interruptions. The FDEP criteria for minimum storage require that the total storage capacity of the facility meets at least 25 percent of the maximum daily demand of the system. For conceptual design, it is assumed that 50 percent of the projected average daily demand is sufficient storage to satisfy the storage requirements. The finalized maximum daily demand and storage requirements will be determined during design and permitting through coordination with utility end users. Storage will be provided using pre-stressed concrete storage tanks. The site will be developed with adequate space to install a future storage tank to meet expansion needs.

High Service Pump to Deliver: To transfer finished water from the treatment facility to end users, a high service pumping system would be installed. This system would consist of three or more horizontal split-case pumping units with variable speed drives and would be controlled using pressure levels in the downstream transmission/distribution system, water levels in downstream storage tanks, or a combination of both. Results from hydraulic modeling of the finished water transmission system would be used to determine appropriate sizing and selection requirements for the finished water pumping system.

Ocean Outfall: Ocean outfall, as a means of disposal, would be implemented in option 6A. The system would consist of a long pipeline, extending to a specified depth and distance into the Gulf, with a diffuser structure at the end. The outfall pipeline and diffuser would be designed by modeling the plume to ensure the adequate dilution/dispersion levels and mixing zones as required by the permit are met, such that the salinity levels and marine life in the receiving body would not be adversely affected. The outfall pipeline would discharge approximately 6 miles offshore at a depth of approximately 20 feet. The onshore component of the outfall pipeline would be 3.7 miles in length, assumed to be the same length as the estimated raw water transmission. Therefore, the total length of the outfall pipeline would be approximately 9.7 miles. If the ocean outfall option is ultimately chosen, there will be a need for environmental monitoring to meet the NPDES permit limits.

Deep Well Injection: Deep well injection, as a means of disposal, would be implemented in option 6B. Deep well injection disposes of concentrate by pumping into confined subsurface rock formations that are below the underground source of drinking water. It is considered a viable method for concentrate disposal provided that long-term operation can be maintained without degrading potable aquifers.

Injection well depths are typically thousands of feet deep, dependent on the geological conditions at the site. A typical injection well system generally consists of an injection pump, conveyance system to the injection well, and a wellbore, which is protected by multiple casing strings set at various depths and cemented in place.

Careful evaluation of the subsurface conditions is essential in selecting an appropriate injection site. Injection zones must have a total dissolved solids level greater than 10,000 mg/L, and at least one overlaying confining layer separating the targeted injection zone from potable aquifers.

Such a disposal system will face substantial technical and environmental hurdles. Deep well injection costs depend on the concentrate volume, distance from the plant to the injection point, well depth and diameter, pumping pressure, specific capacity of the well, emergency storage, and regulatory permitting and monitoring requirements.

A critical component of any deep well injection program is to conduct a feasibility study, which is designed to address permitting requirements. The study typically includes the drilling of multiple exploratory wells, which would provide information needed to confirm deep well feasibility and criteria for the design and construction of a test injection well.

Deep well injection will be regulated by the FDEP under the UIC program, which holds primacy in Florida for implementing EPA rules and regulations governing deep well injection.

Transmission: To deliver finished water produced by the desalination facility to users, a finished water transmission system would need to be evaluated, designed, and constructed. The transmission route assumes that water will be provided to utilities at an approximate location within the respective service area, via easements acquired along public rights-of-way. Proposed pipeline routes are generally located along county or state roads; therefore, potential future roadway improvements may warrant consideration. Coordination with participating utilities will be important in planning locations where finished water supplies would be routed and connected to existing distribution systems. Actual pipeline routes and points of connection would be identified during design and permitting. To help minimize the need for future pipe relocation, acquisition of easements along the pipeline corridors should be considered, with typical widths of approximately 30 feet for pipes 16 inches or larger and 20 feet for smaller diameters.

A raw water transmission system would also be required to convey raw water from the intake location to the treatment plant. Finalized pipeline routes and points of connection would be identified during design and permitting through coordination with the participating utility.

The conceptual design of the transmission piping is based on the average daily demands of the users and the overall capacity of the project. As raw water storage would not be provided at the intake structure, the raw and finished water transmission systems would be designed on the same basis. Hydraulic modeling and coordination with participating utilities would be performed during design and permitting to determine the necessary transmission requirements. Finalized transmission sizes would be based on maximum daily flows determined by participating utilities. It is assumed that the existing local supply facilities will continue to meet peak demand needs, with only limited peak flow support provided by the new desalination facility.

The raw water pipeline material would be coated ductile iron. Alternative materials such as concrete, fiberglass, and high-density polyethylene could be considered during design. Ductile iron pipe is also assumed to be the finished water pipeline material. Other pipeline materials, including cement-lined reinforced concrete and PVC, may be evaluated during preliminary design.

Blending Water with Utility Distribution Systems: If finished water will not provide dedicated service, the differences in the water chemistry between treated groundwater and treated seawater present potential issues that must be considered by utilities in the planning process. This will require a detailed review of the treated seawater supply characteristics, existing groundwater supply of the end user, construction materials of the distribution system, potential locations for blending water, and disinfection and corrosion issues associated with blending potable water from different sources.

The primary concerns associated with blending are water quality impacts related to the disinfectant residual, disinfectant byproducts formation, and pipeline corrosion. Post-membrane water is highly aggressive and must be chemically stabilized prior to introduction into a transmission system. Additionally, the choice of disinfectants will affect byproduct formation. Potable water standards must be met throughout the transmission system. Meeting the disinfection and corrosion control needs in the desalination plant’s transmission system would also need to be addressed.

After treated water from one source mixes with that of another source, changes in distribution system water chemistry can affect the stability of pipe coatings and biofilms that protect pipes from corrosion. An increase in disinfection byproducts can also occur, either cumulatively or due to source interactions among multiple disinfectant types. The blending of groundwater and seawater must consider the combined water chemistry in the utility distribution system.

5.5.1.4 Project Cost

The pipe lengths and sizes are presented in Table 5-11 for the transmission system of project 6A and 6B. A summary of construction costs, non-construction costs, land acquisition, total capital cost, annual operations and maintenance (O&M), equivalent annual cost, and unit production cost ($/kgal) are presented in Table 5-12.

Seawater desalination facilities generally exhibit higher total capital costs and unit production costs due to their need for specific corrosion-resistant materials and energy-intensive treatment systems like RO. While these costs exceed those of groundwater and surface water sources, desalination projects provide diversification of supply and reduce dependence on stressed aquifers, which promotes long-term sustainability.

Table 5-11: Desalination Projects' Pipeline Lengths and Sizes

Pipeline Size	Pipeline Length		Water Type
(inches)	(feet)	(miles)	
42	19708	3.73	Raw
42	67665	12.82	Finished
30	115320	21.84	Finished
12	2125	0.40	Finished

Table 5-12: Desalination Capital Cost, O&M and Unit Cost Estimates (2024 Dollars)

Description	Ocean Outfall Disposal	Deep Injection Disposal
High Service Pump to Deliver	$4,057,726	$4,057,726
Transmission Pipelines	$97,686,272	$97,860,351
Concrete Storage Tank 1	$4,776,263	$4,776,263
Concrete Storage Tank 2	$4,776,263	$4,776,263
Residual Disinfection for Transmission Systems	$1,758,658	$1,758,658
Complete Seawater Desalination TP <25 mgd[1]	$393,460,657	$377,463,701
Injection Well System	NA	$27,138,108
Subtotal Construction Capital Cost	$506,515,838	$517,831,069
Non-Construction Capital Cost (25 percent)	$126,628,959	$129,457,767
Land Acquisition	$6,024,426	$6,024,426
Total Capital Cost	**$639,169,223**	**$653,313,263**
Annual O&M Cost[2]	**$12,072,638**	**$12,503,677**
Equivalent Annual Cost	**$40,608,031**	**$41,296,879**
Unit Production Cost ($/kgal)	**$28.87**	**$29.48**

[1, 2] AWS model costs differ from 2019 values due to updated cost equations, assumptions, and 2024 inflation adjustments.

5.5.2 Seawater Desalination Summary

Duke Energy has significantly revised their plans for power generation at the Crystal River Energy Complex since the seawater desalination treatment plant's conceptual design in the 2014 WRWSA RWSP. Unit 3, the sole nuclear unit, was decommissioned in 2013. Unit 1 and Unit 2, water-cooled coal units, were shut down in 2018 upon start-up of the two combined-cycle natural gas units at the Citrus Combined Cycle Station. The shutdown of Unit 1 and Unit 2 eliminated 919 MGD of cooling water flows. Therefore, there is no longer a reliable cooling water outflow able to dilute the waste concentrate from the seawater desalination treatment plant. There are other solutions for the disposal of the concentrate, but they are more expensive and technically complex.

A seawater desalination treatment plant would provide an alternate supply source to fulfill future potable water demand in Citrus County. However, its feasibility has decreased with the decommissioning of units at the Crystal River Energy Complex.

5.6 Project 30-year Life-Cycle Cost Analysis

A 30-year life-cycle cost assessment was completed to compare the long-term economic performance of the WRWSA's potential water supply development options. Because the alternatives differ substantially in treatment requirements, energy intensity, regulatory complexity, and implementation timelines, a standardized financial basis is required for meaningful comparison. This section summarizes the results of the updated AWS cost model (SP10 and SP13; adjusted to 2024 dollars) and the unit production costs developed for each project in Section 5.

The analysis applies the Equivalent Annual Cost (EAC) framework, which annualizes capital and O&M costs over each component's useful life and expresses the results as dollars per thousand gallons ($/kgal). This approach provides a consistent and defensible basis for comparing conservation, reclaimed water, groundwater, surface water, and desalination options at the planning level. These values are intended for regional screening and prioritization and do not replace detailed engineering or financial feasibility evaluations.

5.6.1 Cost Evaluation Framework

Life-cycle costs were developed using the following standardized conventions:

- **Capital Costs**: Derived from the updated SJRWMD AWS model with 60% construction markup, 25% non-construction cost allowance, BLS-based inflation adjustments, and 2024 land value assumptions.

- **Annual O&M Costs:** Includes labor, power, chemicals, and replacement components. Costs reflect updated nonresidential maintenance PPIs and energy pricing of $0.09/kWh (EIA industrial sector average for Florida).

- **Discount Rate:** A 5.0% discount rate was used to calculate annualized capital cost (consistent with 2024 municipal water sector bond rates).

- **Equivalent Annual Cost (EAC):** Annualized capital cost + annual O&M over the applicable service life of each component (30–40 years).

- **Unit Production Cost:** EAC divided by average annual yield (expressed as $/1,000 gallons).

For each project, annualized capital cost was calculated using a standard capital recovery factor:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

where i = 0.05 and n = 30 years.

The resulting EAC represents the long-term annual cost of constructing and operating each project. Dividing EAC by annual yield or by annual water savings for conservation provides a life-cycle unit cost representing the cost to supply or offset one thousand gallons of potable water over a multi-decade horizon. This framework is intended to support the evaluation of all water supply options, regardless of scale, treatment level, or energy requirements, are evaluated on a comparable and consistent long-term economic basis.

5.6.2 Life-Cycle Cost Summary

Life-cycle unit costs were calculated for each of the WRWSA's water supply development options based on the Equivalent Annual Cost (EAC) framework described above. Table 5-13 and Figure 5-10 summarize the resulting planning-level unit costs for conservation, reclaimed water, groundwater, surface water, and desalination projects.

Because each alternative provides varying levels of yield, treatment complexity, and implementation readiness, these unit costs should be interpreted in the context of broader regional needs, including water resource constraints, projected deficits, reliability, and long-term diversification.

The discussion below synthesizes comparative cost findings across the five major supply categories.

5.6.2.1 Conservation (Project 1A)

Conservation provides the lowest life-cycle unit cost of all alternatives evaluated. Modeled Tier 3 program savings produce a long-term unit cost in the \$2–\$3/kgal range, consistent with measure-level cost-effectiveness in Table 4-3 and prior WRWSA and WRF studies.

Because conservation offsets potable withdrawals rather than replacing them with new supply, its benefits extend beyond cost:

- No energy-intensive treatment or conveyance
- No new regulatory or environmental burden
- Immediate implementation potential
- High reliability during drought
- Material reductions in UFA pumping

As a portfolio component, conservation is the first and most cost-effective investment and can be implemented concurrently with other near-term and mid-term supply projects.

5.6.2.2 Managed Aquifer Recharge (Projects 2A and 2B)

Hernando County MAR development estimated between \$5.4-14.9/kgal and Citrus County MAR development estimated between \$6.5-14.3/kgal yields 3 MGD and 2 MGD, respectively. MAR alternatives can deliver high-value regional benefits by potentially increasing aquifer levels and reducing reliance on stressed UFA subregions.

- Hernando County MAR: *$5.4-14.9/kgal*
  - Variable confinement conditions
  - Protect regional water resources
  - Highest expected likelihood of recharge/augmentation credits
- Citrus County MAR: *$6.5-14.3/kgal*
  - More variable confinement conditions
  - Elevated permitting and monitoring requirements due to coastal spring proximity
  - Still lower-cost than all groundwater, surface water, and desalination options

Given the limited ability to expand UFA withdrawals, MAR projects represent one of the most cost-effective supply-side options in the RWSP.

5.6.2.3 Regional Non-Potable Reuse (Project 2C)

NPR expansion provides up to 8 MGD of regional yield at planning-level costs of $4–$8/kgal. While mid-range relative to conservation and MAR, NPR serves as a long-term backbone infrastructure investment enabling

- Large-scale beneficial reuse
- Balancing surplus and deficit reclaimed water utilities
- Strategic preparation for future MAR or IPR

Costs vary significantly depending on pipeline length, pressure class, pumping needs, and intertie sequencing. However, when amortized over meaningful regional yields, NPR can be comparable to MAR in unit cost and significantly lower than new groundwater or surface water supply sources.

5.6.2.4 Lower Floridan Aquifer (Project 3A)

LFA wellfield development provides 5–10 MGD at a mid-range cost of $6–$9.5/kgal. This option provides a deeper, drought-resilient aquifer supply but involves moderately high life-cycle costs due to:

- Deep well construction
- Nanofiltration at some locations
- Energy use for high-pressure pumping
- Regulatory and hydrogeologic evaluation
- Transmission system needs for regional distribution

While costlier than MAR or conservation, LFA provides valuable diversification, especially if future MFL determinations limit UFA pumping in southeastern Marion and northern Sumter Counties.

5.6.2.5 Surface Water Treatment (Projects 4A–4C)

Surface water treatment provides 10 MGD per facility at relatively high costs of $9–$10.4/kgal. Higher costs reflect:

- Complex surface water treatment processes
- Intake structure requirements
- Reservoir and pumping systems
- Long, large-diameter transmission pipelines

These projects remain strategic reserves for the region but are not cost-competitive relative to conservation, MAR, or reclamation-based solutions.

5.6.2.6 Desalination (Projects 5A and 5B)

Desalination provides 5 MGD at the highest unit cost of any alternative evaluated at approximately $29/kgal. This option exhibits the highest life-cycle unit cost of all evaluated options, driven by:

- Energy-intensive treatment
- Pre-treatment requirements
- Concentrate management (outfall or deep well injection)
- Significant capital cost for intake, plant, and transmission

Desalination is generally considered only as a long-term, last-resort diversification strategy particularily in response to more significant UFA or surface water constraints that may emerge from future MFLs or climate variability.

5.6.3 Cost-Effectiveness in the Context of MFLs, Groundwater Constraints, and Deficit Timing

While life-cycle costs provide a clear financial comparison among alternatives, long-term water supply planning in the WRWSA region must also account for evolving regulatory, environmental, and hydrologic constraints. Several regional factors—including impending MFLs, UFA withdrawal limitations, and the timing of projected utility deficits—substantially influence the practical cost-effectiveness of each supply option.

The WRWSA four-county region is experiencing increased pressure on the UFA, with several key MFLs either recently adopted, under review, or scheduled for development in the near term:

- Gum Springs (Marion/Sumter) – under evaluation
- Lake Weir (Marion) – under reevaluation
- Withlacoochee River – expected MFL adoption in 2026–2027

These determinations may restrict UFA withdrawals for multiple utilities. At the same time, several utilities in the region are projected to experience resource-based or permit-based deficits before 2035, highlighting the need for supply options that are both cost-effective and rapidly deployable. Within this context, the relative cost-effectiveness of each supply source shifts meaningfully, as summarized below.

Table 5-13: Summary of Evaluated Alternatives

Project ID	Category	Estimated Yield (MGD)	Total Capital Cost (Million $, 2024)	Annual O&M	Unit Cost ($/1,000 gal)	Development Horizon
1A	Water Conservation (Tier 3)	12	N/A (programmatic)	$1.30M	0.8–2.5	All Terms
2A	Hernando County Managed Aquifer Recharge (MAR)	3	$60-150M	$2.3–4.8M	5.4–14.9	Near Term (2025-2030)
2B	Citrus County Managed Aquifer Recharge (MAR)	2	$50-115M	$1.8–3.7M	6.5–14.3	Near Term (2025-2035)
2C	Non-Potable Reuse Regional Expansion (Purple Pipe)[1,2]	8	TBD	TBD	4–8	All Terms
3A	Lower Floridan Aquifer Wellfield	5–10	$135–320M	$4.8–9.0M	6–9.5	Mid-Term (2035-2045)
4A	Withlacoochee River Surface Water Treatment Facility (North Sumter)	10	$470M	$4.85M	9.1	Long-Term (post-2045)
4B	Withlacoochee River Surface Water Treatment Facility (Holder)	10	$555M	$4.85M	10.4	Long-Term (post-2045)
4C	Withlacoochee River Surface Water Treatment Facility (Lake Rousseau)	10	$465–495M	$4.42M	9.0–9.5	Long-Term (post-2045)
4D	Withlacoochee River Aquifer Recharge	5	$95M	$0.5M	3.3	Mid-Term (2035-2045)
5A	Desalination with Ocean Outfall	5	$639M	$12.1M	28.9	Long-Term (post-2045)
5B	Desalination with Deep Well Injection	5	$653M	$12.5M	29.5	Long-Term (post-2045)

[1] Dependent on transmission distance and customer density.

[2] Unit cost is based on ranges reported in SWFWMD Reclaimed Water Feasibility Studies (2010–2017), WateReuse Florida statewide reuse cost benchmarks, and Water Research Foundation studies (WRF 4635 and WRF 4710).

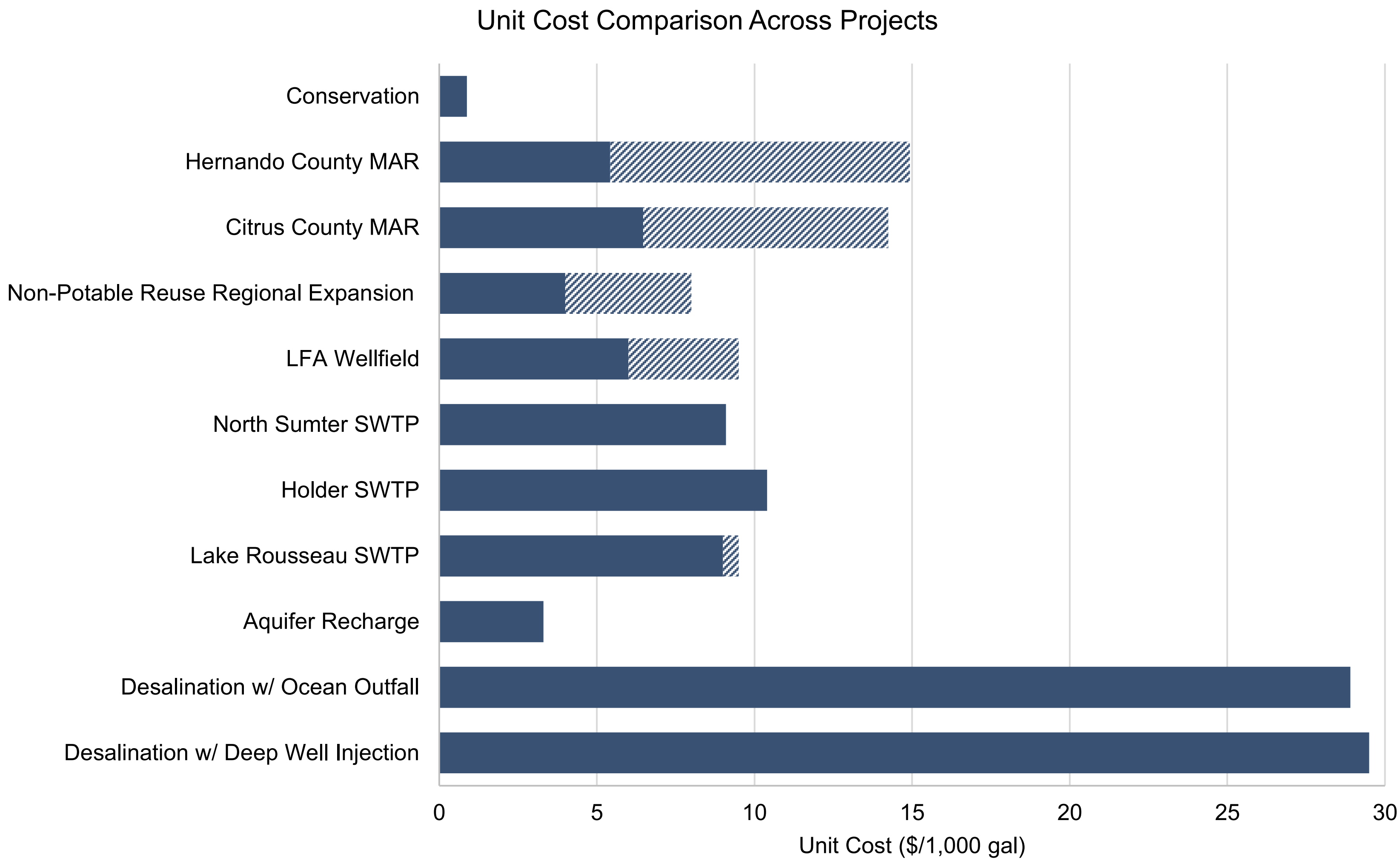


Figure 5-10: Unit Cost Comparison Across Alternative Water Supply Projects

Conservation and MAR Move Further Ahead Under Water Resource Constraints

Both conservation and MAR directly reduce UFA withdrawals and help stabilize aquifer levels. When evaluated alongside potential water resource constraints, these alternatives become even more cost-advantaged because they:

- Offset groundwater pumping in the most stressed areas
- Improve or stabilize aquifer levels in aquifer recharge zones
- Support spring flow protection and MFL compliance
- Deliver measurable benefits within near-term planning windows (2025–2035)
- Reduce pressure on utilities facing deficits as early as 2030

Even without regulatory drivers, conservation remains the lowest-cost option. .

Similarly, Hernando and Citrus MAR provide quantifiable recharge benefits and may generate groundwater credits that can offset existing or future deficits. These outcomes strengthen MAR's cost-effectiveness relative to alternatives that do not address aquifer conditions.

NPR and LFA Gain Strategic Value for Mid-Term (2035–2045) Resilience

NPR and LFA projects have higher unit costs than conservation and MAR but offer important systemwide benefits under tightening UFA constraints:

- NPR creates backbone reclaimed water infrastructure for future MAR or IPR
- LFA diversifies supply portfolios and reduces pressure on the UFA
- Both provide mid-term reliability as growth accelerates in Sumter and Marion Counties
- LFA may be less vulnerable to water resource restrictions due to deeper aquifer source

If MFL determinations significantly restrict UFA withdrawals, both NPR and LFA could become necessary mid-term options even if their life-cycle costs exceed those of conservation and MAR.

Surface Water and Desalination Become Long-Term Strategic Reserves

Surface water treatment plants and desalination facilities have the highest life-cycle unit costs, but they provide:

- High reliability during droughts
- Independence from groundwater constraints
- Large, centralized yields
- Climate resilience

Under current conditions, these options are not cost-competitive and are not required to meet 2045 projected deficits. However, they remain essential in the long-term planning portfolio if:

- UFA withdrawals become sharply restricted by water resource protection requirements
- Sustained droughts reduce surface water availability
- Growth-driven demand exceeds the capacity of lower-cost options

Thus, while their near-term financial value is limited, their strategic value increases under scenarios involving high regulatory pressure or significant hydrologic change.

Overall Conclusion: Cost Alone Cannot Drive Supply Decisions

Life-cycle cost provides a critical screening metric, but it does not operate independently from:

- Water resource protection requirements
- Aquifer conditions
- Timing of utility deficits
- Reliability needs
- Regional interconnectivity opportunities

When these factors are considered together:

- Conservation and MAR emerge as the highest-value near-term investments
- NPR and LFA offer important mid-term diversification benefits
- Surface water and desalination provide long-term resilience rather than cost-efficient supply

This integrated perspective forms the basis for the Multi-Criteria Decision Analysis (MCDA) presented in Section 5.8 and the project prioritization strategies in Section 5.9.

5.6.4 Summary of Life-Cycle Cost Findings

Taken together, life-cycle cost analysis indicates that a phased, portfolio-based strategy provides the most cost-effective and resilient path for meeting future regional supply needs. Low-cost, high-benefit options, conservation, MAR, and NPR, deliver the strongest returns when implemented early, while higher-cost supply sources such as LFA and surface water treatment provide valuable mid-term diversification as regional deficits expand and regulatory pressures intensify.

The life-cycle cost analysis highlights several clear trends that inform regional supply planning:

- **Conservation** provides the greatest yield at the lowest cost and remains the most readily immediately implementable option. Its avoided-cost benefits substantially exceed program expenditures, offering near-term deficit mitigation and long-term reductions in UFA stress.

- **MAR projects**, particularly in Hernando County, demonstrate the strongest combination of favorable unit cost, high environmental value, and significant aquifer recharge potential. These projects not only produce cost-effective supply but also improve water resource conditions, making them a priority in both economic and resource-protection terms.

- **NPR regional expansion** offers substantial systemwide value by improving reuse reliability, reducing non-beneficial discharges, and creating the backbone for future IPR or distributed recharge. Although costs vary by corridor length and pumping requirements, NPR remains a competitively priced mid-term investment with significant operational and regional benefits.

- **LFA and surface water options** provide important diversification of the regional supply portfolio. Their unit costs are higher than conservation, MAR, and NPR, but they offer long-term resiliency benefits and reduce dependence on the UFA, especially important if pending MFLs result in more restrictive groundwater allocations to protect regional water resources.

- **Desalination** has the highest life-cycle cost but offers unmatched drought resilience and independence from local hydrologic constraints. As such, it serves as a long-term contingency rather than a near-term cost-effective supply.

Accordingly, life-cycle costs support prioritizing near-term investment in conservation, reuse integration, and MAR, while reserving larger and more capital-intensive alternatives, such as LFA, surface water treatment, and ultimately desalination, for mid- to long-term planning horizons. This sequencing aligns cost-effectiveness with regulatory uncertainty and the evolving needs of WRWSA member utilities, forming the quantitative foundation for the multi-criteria evaluation and prioritization presented in Sections 5.8 and 5.9.

5.7 Non-Cost Project Benefits

While life-cycle costs provide a quantifiable means to compare alternatives, water supply decision-making for the WRWSA region must account for a broader set of performance criteria. Many benefits of conservation, reuse, and aquifer-recharge projects are qualitative but highly consequential for long-term sustainability, regulatory compliance, and system resilience.

5.7.1 Aquifer Protection and MFL Support

The UFA remains the primary potable supply for the region, and its long-term sustainability is closely linked to spring flows and river hydrology. Conservation, MAR, and NPR projects reduce UFA withdrawals or contribute additional recharge, providing measurable benefits to Silver Springs, Rainbow Springs, Gum Slough, Weeki Wachee, and other water resources in the area. These ecological improvements are not captured in $/kgal but carry significant regulatory and public value.

5.7.2 Resilience and Operational Flexibility

Conservation, NPR interconnections, and LFA development each enhance system resilience by diversifying supply sources, reducing seasonal peak stress, and providing redundancy during drought. Surface water and desalination also diversify the supply portfolio, though with higher capital and operational cost.

5.7.3 Implementation Readiness

Conservation and NPR expansion are readily immediately implementable, supported by existing programs and partnerships, with proven technologies and clear regulatory pathways. MAR projects require hydrogeologic validation but align strongly with regional aquifer recovery goals. LFA and surface water options involve multi-year permitting and engineering but provide essential medium-term supply diversification. Desalination remains the most complex and long-term option.

5.7.4 Cost-Share Potential

Water supply and resource development projects may be eligible for funding opportunities through the WMDs or FDEP. Large regional projects may also be competitive for federal funding sources such as SRF or WRDA. High-cost projects (surface water, desalination) may require phased implementation or multi-utility cost sharing.

5.7.5 Land Use and Siting Constraints

Demand-side and reuse strategies require limited footprint, while surface water and desalination facilities impose substantial land, siting, and environmental permitting challenges. Together, these non-cost factors form an essential complement to life-cycle cost analysis and directly inform the prioritization framework presented below.

5.8 Multi-Criteria Decision Analysis (MCDA)

Selecting the most appropriate water supply projects for the WRWSA region requires a structured approach that reflects not only cost but also environmental performance, groundwater sustainability, feasibility, timing, and regional benefits. Many of the AWS projects considered in this RWSP differ substantially in complexity, implementation lead time, permitting requirements, and hydrogeologic uncertainty. The Multi-Criteria Decision Analysis (MCDA) provides a structured planning-level framework to compare AWS options based on of how well they align with WRWSA and member utility priorities.

The MCDA framework expands on the technical and cost evaluations presented earlier in Chapter 5. The criteria selected reflect both the regulatory environment within the SWFWMD and the strategic considerations shared across Citrus, Hernando, Marion, and Sumter counties.

The scoring was developed at a planning level based on available data, regional conditions, and professional judgment, and is intended to support consistent comparison among alternatives rather than represent a formal stakeholder ranking or project selection process. By incorporating multiple perspectives, the MCDA helps ensure that the selected projects are not only economically justified but also environmentally responsible, feasible, and compatible with long-term regional growth.

5.8.1 Evaluation Criteria and Weighting

Seven criteria were used, consistent with the WRWSA’s 2019 prioritization structure and updated to reflect current planning conditions. Relative weights reflect their importance to near- and long-term water supply security:

- **Cost-Effectiveness (20%)**
  Cost remains a key driver, especially for projects intended to mitigate short-term deficits. However, cost alone cannot determine selection because low-cost options may not provide sufficient reliability, yield or regulatory constraints.

- **Supply Yield and Timing (20%)**
  With several utilities projected to reach permit limits before 2035, and with MFLs pending for Gum Springs, Lake Weir, and the Withlacoochee River, timing is a critical consideration. Projects that can provide reliable yield within the planning horizon score higher than those requiring longer development timelines or additional feasibility evaluation..

- **Aquifer and Environmental Benefits (15%)**
  Projects that reduce UFA withdrawals, enhance natural recharge, or improve spring system performance were prioritized due to ongoing water resource constraints and groundwater sustainability goals. While some alternatives, such as desalination, reduce dependence on groundwater withdrawals, they do not directly enhance aquifer recharge or contribute to spring system recovery. Additionally, desalination projects may involve environmental considerations related to intake, concentrate disposal, and energy use. As a result, desalination receives a lower score under this criterion.

- **Implementation Risk and Complexity (15%)**
  Hydrogeologic uncertainty, siting challenges, interagency coordination requirements, and permitting steps can delay project timelines. MAR projects may provide environmental benefits under suitable conditions but receive lower feasibility scores due to site specific hydrogeologic uncertainty and regulatory complexity.

- **Regional Benefit and Scalability (10%)**
  WRWSA's mission emphasizes regional value. Projects that benefit multiple utilities, create backbone infrastructure, or support future IPR development receive higher scores.

- **Funding Potential (10%)**
  This criterion reflects the relative likelihood that a project could receive funding support based on perceived alignment with current FDEP and WMD funding priorities. Projects consistent with established funding priorities, such as conservation, reclaimed water, and regional supply development, were assigned higher scores, while projects with greater uncertainty or higher costs were assigned moderate to lower scores. Scores are qualitative and intended to support relative comparison among alternatives. Funding availability is subject to program priorities, budget constraints, and evolving State and District funding programs.

- **Resilience Contribution (10%)**
  Drought vulnerability, climate variability, and peak-season groundwater drawdown influence how well each project supports long-term resilience. Desalination scores strongly due to its independence from UFA recharge and rainfall, and its drought resilience. LFA may contribute to system resilience where feasible, though performance is dependent on site-specific conditions and system integration. .

Together, these criteria provide a balanced and defensible means of evaluating projects that differ widely in purpose and scale.

5.8.2 Project Scoring

The MCDA scoring process evaluates the performance of each project option across the seven criteria using a 1–5 scale (1 = poor performance, 5 = excellent performance). However, because not all criteria contribute equally to regional priorities, each criterion is weighted to reflect its relative importance.

The scores reflect a combination of quantitative factors (costs, yields) and qualitative assessments (feasibility risk, regulatory complexity, MFL benefit).

Because several alternatives are conceptual and dependent on site-specific conditions, the MCDA results are intended to support relative comparison at a planning level and should not be interpreted as definitive feasibility or implementation readiness.

The raw scoring results (Table 5-14) show that several projects perform well in specific criteria but not uniformly across all categories. Conservation, for example, receives the highest possible ratings for cost-effectiveness, supply timing, environmental benefit, and implementation ease, but its regional scalability score is slightly lower because some opportunities (such as smart irrigation controllers or AMI-enabled leak detection) vary in applicability across utilities. MAR projects may provide environmental benefits under suitable conditions but receive lower feasibility scores due to site-specific hydrogeologic uncertainty and regulatory complexity under both FDEP groundwater standards and UIC requirements.

At the regional planning level, both MAR concepts were evaluated using a consistent set of assumptions and scoring criteria. Given the conceptual nature of these projects and the importance of site-specific hydrogeologic conditions, both projects received similar scores across most criteria. Differences in performance are expected to be refined through future feasibility and pilot-scale evaluations. These results are intended to guide further evaluation rather than differentiate site-specific performance at this stage.

Each project's score was multiplied by the criterion weighting to determine a composite score. When the weighting is applied, the resulting composite scores (Table 5-15) reveal a more holistic picture of project performance and help distinguish between options that may have similar raw scores but differ in strategic relevance.

Conservation achieves the highest weighted score (4.70), affirming its potential as the cornerstone of the WRWSA's near-term and long-term strategy.

The LFA Wellfield represents a relatively high-scoring potable supply alternative within the MCDA, reflecting its potential for reliability and resilience; however, feasibility is site-specific and dependent on hydrogeologic conditions, water quality, and regulatory considerations.

NPR Regional Expansion ranks among the higher-performing alternatives, supported by high regional value, funding alignment, and resilience benefits, though limited by cost uncertainty and implementation complexity.

MAR concepts follow closely in overall performance, reflecting their potential to provide aquifer and environmental benefits under suitable conditions, but with lower feasibility scores due to hydrogeologic uncertainty and regulatory complexity.

Surface water and desalination projects score lowest overall. While these options offer substantial reliability and resilience benefits, particularly desalination, which is largely independent of hydrologic variability, their high capital and operating costs, extended development timelines, and environmental and regulatory complexity reduce their relative priority. In addition, desalination is considered a long-term option and is not expected to contribute to meeting near- or mid-term supply needs within the planning horizon, which results in lower scores under the supply yield and timing criterion. Nevertheless, these projects remain essential long-term strategic reserves and could rise in priority should water resource restrictions tighten or groundwater availability decrease.

Together, the weighted MCDA results provide a robust, defensible ranking that balances economic, environmental, operational, and regulatory considerations. The scoring confirms the importance of advancing conservation immediately, pursuing MAR and LFA feasibility work in parallel, and developing NPR as a long-term regional backbone for reuse and potential future IPR implementation. These results directly inform the prioritization and timing recommendations presented in Section 5.9.

5.8.3 Summary Discussion

The MCDA results indicate that Conservation remains the highest-value investment for the region, offering near-universal benefits at the lowest risk and lowest cost. The LFA Wellfield represents a potential potable supply option, subject to site specific feasibility, water quality and regulatory considerations.

MAR concepts were evaluated as potential strategies that may provide environmental and aquifer benefits under suitable conditions, while its feasibility risks, dependent on infiltration performance, karst variability, and permitting requirements, tempered its overall score. At the regional planning level, both Hernando and Citrus MAR concepts received similar scores, reflecting consistent assumptions and the conceptual nature of these alternatives.

While MAR may offer opportunities to beneficially use reclaimed water and support groundwater sustainability, feasibility remains dependent on site-specific hydrogeologic conditions, infiltration performance, and regulatory considerations. As a result, MAR scores lower under implementation risk and supply timing relative to more established alternatives.

NPR Expansion ranks just behind MAR options due to its strategic importance for future MAR and potential IPR use, as well as its unique ability to balance reclaimed water availability across multiple utilities.

The remaining options, including surface water and desalination, have value primarily as long-term diversification strategies but do not warrant near- or mid-term advancement based on the current regulatory and hydrologic context.

Together, the MCDA results underscore the need for parallel feasibility pathways, especially for MAR and LFA, as well as early implementation of high-value, low-risk options.

Table 5-14: MCDA Raw Scoring Matrix (1–5)

Criterion	Conservation	Hernando MAR	Citrus MAR	NPR Expansion	LFA Wellfield	Surface Water	Desalination
Cost-Effectiveness	5	4	4	3	3	2	1
Supply Yield & Timing	5	3	3	4	4	3	2
Aquifer & Environmental Benefits	5	3	3	4	2	3	2
Implementation Risk & Complexity	5	2	2	3	2	2	1
Regional Benefit & Scalability	4	4	4	5	4	4	3
Funding Potential	5	3	3	4	3	3	2
Resilience Contribution	4	3	3	4	4	4	5

Table 5-15: Weighted MCDA Scores

Criterion	Weight	Water Conservation	Hernando MAR	Citrus MAR	NPR Expansion	LFA Wellfield	Surface Water	Desalination
Cost-Effectiveness	0.20	1.00	0.80	0.80	0.60	0.60	0.40	0.2
Yield & Timing	0.20	1.00	0.60	0.60	0.80	0.80	0.60	0.4
Environmental Benefits	0.15	0.75	0.45	0.45	0.60	0.30	0.45	0.3
Implementation Risk	0.15	0.75	0.30	0.30	0.45	0.30	0.30	0.15
Regional Benefit	0.10	0.40	0.40	0.40	0.50	0.40	0.40	0.3
Funding Potential	0.10	0.50	0.30	0.30	0.40	0.30	0.30	0.2
Resilience Contribution	0.10	0.40	0.30	0.30	0.40	0.40	0.40	0.5
Total Weighted Score	1.00	4.80	3.15	3.15	3.75	3.10	2.85	2.05

5.9 Recommended Project Prioritization and Implementation Strategy

The prioritization of potential water supply projects for the WRWSA region must address both the immediate pressures facing utilities and the longer-term uncertainties associated with groundwater availability, regulatory constraints, growth trends, and climate variability. The WRWSA service area contains multiple utilities approaching WUP/CUP limits, and several MFLs for major systems, Gum Springs, Lake Weir, and the Withlacoochee River, are expected to be finalized between 2026 and 2028. These regulatory milestones have the potential to further restrict UFA withdrawals. At the same time, reclaimed water production is increasing across the region, yet the infrastructure needed to maximize its beneficial use remains limited. These conditions collectively shape when each project should advance and how the WRWSA considers balancing low-cost near-term options with high-reliability longer-term supplies. Because several alternatives remain conceptual and dependent on site-specific conditions, implementation pathways may be refined as feasibility results and regulatory conditions evolve.

The MCDA results presented in Section 5.8 provide a foundation for prioritization by comparing projects across cost, environmental benefit, feasibility, regional value, and resilience. However, prioritization requires more than ranking. It must consider the sequence in which projects can reasonably be implemented given the timing of deficits, the lead time required for feasibility work and permitting, and the inherent uncertainty around complex alternatives such as MAR. The approach adopted here recognizes that the region requires both immediate actions that reduce UFA dependence and flexible pathways that preserve long-term supply security.

5.9.1 Near-Term Priorities (2025–2035)

In the near term, the highest priority for the WRWSA is the full implementation of the Tier 3 conservation program. Conservation provides the fastest, most cost-effective reduction in groundwater demand and produces measurable benefits well before supply deficits begin to materialize. With an estimated 12.2 MGD of savings by 2045, and significant savings achieved in the first decade, conservation is the only option capable of reducing UFA withdrawals relatively quickly, improving water resources in sensitive areas such as Citrus and Hernando counties, and deferring the timing and scale of other capital-intensive supply options. Its minimal permitting requirements, strong cost-share eligibility, and regional applicability further reinforce conservation as the essential first step in the WRWSA's supply strategy. Implementing conservation across the region would require significant planning and coordination to roll out new programs and gain participation and traction.

During this same period, the Authority should consider initiating the feasibility work needed to support both MAR and the LFA wellfield. While MAR may provide significant environmental benefits under suitable conditions, its feasibility depends on infiltration performance, soil and limestone permeability, karstic variability, and the degree of hydraulic separation from nearby spring systems. These conditions vary substantially across the Brooksville Ridge. Pilot testing, geochemical compatibility evaluations, and monitoring well installation will be required to determine whether MAR can achieve the expected yields.

At the same time, the LFA wellfield represents the most dependable mid-term potable supply option, with relatively lower hydrogeologic uncertainty in some areas and a defined regulatory pathway in multiple Florida regions. However, LFA development also requires exploratory drilling, raw-water quality characterization, treatment assessment, and long-range design considerations. Because both MAR and LFA have multi-year feasibility and permitting timelines, and because feasibility is not guaranteed, the WRWSA may consider advancing both options in parallel. This dual-track approach is intended to maintain flexibility and reduce potential delays in the event that MAR yields are more limited than expected or infiltration-based recharge is not feasible at certain locations.

In parallel, the near-term period may include the Phase I NPR Regional Optimization Study, which is intended to help address current reclaimed water imbalances and inform planning for future MAR and potential IPR applications. This study will determine the most effective routing of reclaimed flows across utilities, evaluate storage needs, identify optimal interconnection corridors, and assess the long-term potential to move reclaimed water inland into areas with more favorable hydrogeology. The NPR system ultimately serves as the backbone for a long-term regional reuse strategy and must be defined early to support future supply development.

5.9.2 Mid-Term Priorities (2035–2045)

By the mid-2030s, conservation savings will continue to accrue, but population growth and potential withdrawal limitations will begin to place pressure on several utilities. At this stage, new potable supply will be required to maintain regional reliability. Based on the MCDA results, life-cycle cost analysis, and feasibility considerations, the LFA wellfield may represent a viable mid-term supply option, subject to site-specific feasibility and regulatory considerations. Its relatively predictable performance, resilience during drought, potential to reduce reliance on UFA under suitable conditions, and scalability between 5 and 10 MGD make it a logical next step. If feasibility studies have confirmed favorable transmissivity, confining conditions, and treatment requirements, construction can proceed in a phased manner aligned with projected deficits.

The second major mid-term priority is advancing full-scale MAR in locations where pilot testing has demonstrated viable recharge performance and limited spring connectivity. MAR may provide environmental benefits by restoring aquifer levels. In Hernando County, MAR is well aligned with regional water resource needs, and pilot results will determine whether infiltration-based methods or injection wells are most effective. If infiltration is feasible, MAR becomes one of the most cost-effective alternatives available. If injection is required, costs increase but the strategy remains valuable due to its aquifer benefits and regulatory alignment. Managing spatial variability and potential recharge constraints underscores the importance of the parallel feasibility approach initiated in the near term.

During this period, NPR infrastructure may begin to transition from planning to construction. As reclaimed water availability increases and MAR sites become operational, NPR interconnections, pump stations, and storage facilities will be necessary to route flows efficiently across the region. These interconnections will also allow utilities to reduce reliance on the UFA during peak-season irrigation demand and will expand the region's capacity to offset potable water use with reclaimed alternatives.

5.9.3 Long-Term Priorities (Post-2045)

Looking beyond 2045, the region will benefit from a diversified supply portfolio capable of adapting to changing hydrologic conditions, water resource requirements, and population growth. While surface water and desalination do not appear necessary within the current 20-year planning horizon based on projected deficits and conservation savings, they remain critical long-term contingency options.

Surface water development offers substantial yield potential and supports regional supply diversification; however, these projects involve high capital costs, significant land and storage needs, and complex environmental considerations. Feasibility is driven by seasonal flow variability, intake and wetland permitting, and the need for large storage facilities to buffer variable flows. Accordingly, surface water sources such as Holder, North Sumter, and Lake Rousseau may remain active planning options but are best reserved for post-2045 scenarios when freshwater supply constraints intensify.

Desalination, while the highest-cost option, provides an almost unlimited drought-proof source of supply that is independent of freshwater hydrology. However, both ocean outfall and deep injection well concentrate disposal present complex regulatory and financial challenges. Desalination is therefore best retained as a long-term strategic reserve to be activated only if climate change substantially reduces freshwater availability or if regional groundwater withdrawals become significantly restricted by water resource protection rules or cumulative impacts.

5.9.4 Summary of Recommended Strategy

Taken together, the prioritization framework supports a phased implementation strategy that maximizes near-term cost-effectiveness, maintains flexibility during uncertainty, and remains long-term alternatives reserved for future conditions that may require additional drought or regulatory resilience. Conservation forms the foundation of the regional supply portfolio due to its relatively quick benefits and low cost. Parallel feasibility for MAR and LFA preserves the region's options in the face of uncertain hydrologic and regulatory outcomes. The LFA may be a viable, mid-term potable supply option, subject to feasibility and regulatory considerations, with MAR advancing where demonstrated to be feasible and NPR providing the backbone for integrated reuse. Surface water and desalination remain long-term alternatives reserved for future conditions that may require more robust drought or regulatory resilience.

This tiered approach supports prudent, cost-effective actions today while maintaining flexibility to adapt to uncertainties that will shape the region's water future.

6. Regionalization of Water Supply

The section explains how the WRWSA can lead the development of a regional water supply system in the long-term. Where feasible, regional collaboration, also known as regionalization, is the preferred alternative for new treatment plants, new beneficial disposal methods, and reclaimed water line expansions. The key components of regionalization include water supply infrastructure, timing of infrastructure development, evolution of the governance structure between the WRWSA and its member governments, and communication with WMDs to meet the needs of the WRWSA and its member governments.

One of the takeaways from this RWSP is the anticipated difficulty of obtaining additional permitted capacity to withdraw from the UFA to sustain the projected public supply demands. This constraint may be the catalyst for the regionalization of water supply facilities in the WRWSA, as it was for Tampa Bay Water, the Peace River Manasota Regional Water Supply Authority, and the CFWI area.

6.1 Benefits of Regionalization

The joining of multiple local governments provides the opportunity to address water supply issues and apply solutions that would not otherwise be possible for a single government due to geographic, resource, and funding constraints.

6.1.1 Regional Cooperation vs. Competition for Resources

Education, information sharing, focused research, and data gathering are pillars of maintaining a collective. Meeting and discussing concerns and positions of each utility is beneficial to all parties, and makes it easier to determine a mutually agreed solution to regional issues and build trust between the members.

Cooperation allows for the focused development of one project nearby a demand center comprised of multiple utilities, rather than one project within each utility with an identified water supply need. Creating one, larger regional project lowers cost by distributing it among multiple entities, avoids duplication of expensive infrastructure, and mitigates undue stress to shared water sources.

Cooperation also helps identify and achieve the optimal use of groundwater, surface water, and reuse sources in conjunction with conservation measures. When determining the allocation of each water source on a regional scale, it is possible to mimic natural hydrologic cycles and minimize environmental impact.

Competition can lead to over-withdrawal of shared water sources such as aquifers, springs, lakes, and rivers, as each member individually withdraws water to secure their supply. Competition typically results in each local government developing their own near-term solution that does not account for the regional consequences.

Overall, cooperation leads to cost savings, coordinated projects, and sustainability of water resource management.

6.1.2 Economies of Scale

One of the main advantages of regionalization is the economy of scale. It is unlikely that a single local government could develop the proposed reclaimed water line expansion, LFA wellfield, or surface water treatment plant. However, the WRWSA could develop the water supply and transmission system, and the water could be wholesaled to the nearby members with public water supply needs. Therefore, regionalization reduces the capital costs, per-gallon treatment costs, and delivery costs that a single local government would incur otherwise.

6.1.3 Prioritized Funding

Funding for water supply and water resource development projects is anticipated to be requested from Water Management District programs and State funding opportunities.In addition to District funding, State programs administered by the Florida Department of Environmental Protection (FDEP) represent an important source of potential funding for projects that support water supply development, water resource protection, and regional resilience. As such, project funding potential may be considered in the context of evolving funding priorities, program eligibility, and available resources at both the District and State levels. Coordination with funding agencies will be necessary to identify opportunities and align projects with applicable funding programs.

Water Management District funding programs often emphasize projects that provide regional benefits and involve collaboration among multiple local governments. Florida Statute §373.709(8) describes the WMD's role in encouraging coordination among local governments and the District when alternative water supply projects are needed. While regional projects may be more competitive for available funding due to their broader benefits, funding is not guaranteed and remains subject to program priorities and available resources.

As such, regional approaches present an opportunity to share costs among member governments, the WRWSA, and funding partners, potentially reducing the financial burden on individual utilities. Initial implementation may include smaller-scale or phased projects to build experience and coordination among participating entities.

The WRWSA has demonstrated its ability to support member governments in implementing funded water conservation and water resource development initiatives through coordination with Water Management District programs. For example, the WRWSA's water conservation grant program has leveraged District funding to assist members in improving water efficiency and conducting residential irrigation audits, which provide site-specific data to optimize landscape water use.

Overall, benefits of regionalization of water supply facilities include:

- Taking advantage of conjunctive use by
    - Utilizing groundwater and other sources to mimic natural hydrologic cycles and lower environmental impact, and
    - Diversifying water sources to build climate resilience, especially regarding drought events

- Ensuring adequate water supplies are available to member governments and participating utilities
- Improving reliability through inter-utility emergency interconnects
- Distributing the cost of developing, constructing, and operating alternative water supply projects to achieve economies of scale
- Eliminating duplicative facilities to lower costs and prevent over-withdrawal of shared water supply sources
- Executing watershed-level planning and management
- Attracting and retaining experienced and specialized utility personnel

6.2 Administrative Framework

This section presents a potential sequence of events to achieve regionalization of water supply systems in the near-term, mid-term, and long-term.

6.2.1 Near Term – 0-10 Years

For all future planning efforts, water conservation and expanding beneficial reuse water systems serve as the baseline recommendation for reducing potable water demands. Alternative groundwater, surface water, and desalination projects are designed to be developed in conjunction with conservation and beneficial reuse. Investigating the feasibility of a MAR is the recommended near-term option to utilize reclaimed water. Groundwater credits may be received by utilities if the MAR can be proven to maintain or supplement UFA levels and meet monitoring and regulatory requirements.

Currently, all established MFLs in the SWFWMD are being met and all spring MFLs are projected to be met through 2045, with the exception of Gum Slough Spring Group (GSSG). Scenario results from the CSM version 1.1 indicate that the MFL allowable spring flow reduction (6 percent) for Gum Slough Springs might be exceeded under the projected 2045 demand. The MFL of GSSG is currently under reevaluation, with completion anticipated in 2026. Additional modeling efforts using the CSM will be incorporated into the MFL reevaluation, taking into account factors including historical water use, reclaimed water use, and recharge variations. The current MFL was established in 2011 using simulation results from the NDM, which relied on limited hydrologic data available, at the time, for calibration in the surrounding area. The improved CSM model is expected to provide a more accurate evaluation of allowable flow reduction for the spring system.

In the SJRWMD, all MFLs are currently being met, and will be met, through 2045 except for Silver Springs, which SJRWMD has determined is in prevention. Further monitoring and analysis will be pertinent for the future status of Silver Springs.

To support diversification of water supply sources and complement continued use of the UFA, the suitability of the LFA as a groundwater source may be evaluated in relation to the projected needs in southwestern Marion County and northeastern Sumter County. Regionalization and potential future governance needs could be discussed during this time to prepare for mid-term implementation.

In the near-term, the WRWSA's current governance structure is sufficient to support water conservation, small-scale supply projects, and interconnects.

6.2.2 Mid Term – 10-20 Years

After determining LFA suitability and siting in the near-term, the LFA wellfield can be constructed by the WRWSA and/or member governments in the mid-term. Interconnects may support local Marion and Sumter County utilities that have projected water supply deficits.

As larger-scale regional projects enter the planning and implementation phase in the mid-term, the WRWSA governance structure will need to be evaluated to determine its suitability for overseeing and operating the regional system.

6.2.3 Long Term – 20 Years and Beyond

In the long-term, a schedule may be developed for phased construction of a Withlacoochee River surface water treatment plant and its integration with current groundwater supply facilities and transmission systems. The surface water treatment plant is intended to address projected supply needs in Citrus County and Marion County. Potential near-term development of a Citrus County MAR and potential mid-term development of an LFA wellfield interconnected to several Marion County utilities may also need to be considered in supply projections and development timing for the surface water treatment plant.

If development of potable water supply from the Withlacoochee River proceeds, the WRWSA governance framework could be structured to support regional sharing of multiple water supply sources at interconnected facilities.

6.3 Project Triggers and Authorization

Authorization of alternative water supply projects will follow established WRWSA governance protocols and will require coordination among member governments, the WRWSA, and the applicable Water Management District(s). Project advancement is expected to be trigger-based, responding to documented system needs, regulatory constraints, or performance thresholds rather than fixed schedules.

Triggers identified in this section reflect conditions under which planning, feasibility, or implementation of specific projects becomes justified. Meeting a trigger does not automatically authorize construction but initiates further evaluation, coordination with regulatory agencies, and consideration of funding and governance requirements.

Table 6-1 shows the triggers for alternative water supply project development.

Table 6-1: Alternative Water Supply Project Triggers

Project	Trigger
Water Conservation	• Projected demand approaching or exceeding permitted groundwater withdrawals • Increasing seasonal peak demand or drought sensitivity • Need to delay or downsize capital-intensive AWS projects
Hernando County MAR	• Availability of unallocated reclaimed water suitable for recharge • UFA level declines • Demonstrated aquifer benefit through pilot testing or modeling
Citrus County MAR	• Reclaimed water surpluses currently discharged to non-beneficial uses • Inland aquifer declines affecting CAB system reliability • Confirmation of recharge feasibility and minimal spring-basin connectivity
Non-Potable Reuse Regional Expansion	• Increasing non-beneficial reclaimed water discharges • Mismatch between reclaimed supply and demand across utility systems • Need to support MAR, future IPR readiness, or regional balancing
LFA Wellfield	• UFA withdrawal limitations • Long-term demand growth exceeding UFA reliability • Verification of sustainable LFA yield and treatability
Withlacoochee River Aquifer Recharge	• UFA declines affecting river–aquifer interaction • Availability of suitable source water and recharge locations
Surface Water Treatment Facility	• Long-term regional demand exceeding groundwater-based supply options • More restrictive UFA/LFA withdrawal limits • Need for high-yield, drought-resilient regional supply diversification
Seawater Desalination Treatment Plant	• Significant constraints on all freshwater sources (UFA, LFA, surface water) • Long-term climate or drought risks requiring a climate-independent source • Strategic need for ultimate supply diversification

6.4 Governance

An important factor in determining whether to create, modify, or join a regional water supply authority is the evaluation of potential benefits and drawbacks for its members. These outcomes are closely tied to the governance structure of the authority, which can vary significantly under Florida law. In addition to the WRWSA, three other regional water supply authorities operate within the SWFWMD: Tampa Bay Water, the Peace River Manasota Regional Water Supply Authority, and the Polk County Regional Water Cooperative. The governance models of these entities provide useful examples for WRWSA as it considers future modifications to its own structure.

Governance considerations become increasingly important during the mid-term period as regional water supply projects begin to advance. At that stage, WRWSA's governance framework may be evaluated its ability to manage and operate a regional system effectively. Key issues include membership and voting structure, ownership and funding of facilities, water rate-setting mechanisms, and dispute resolution processes.

6.4.1 Authorizing Mechanism

Water supply authorities in Florida are authorized under Sections §163.01 (Florida Interlocal Cooperation Act) and §373.713, Florida Statutes (F.S.), granting broad powers to local governments that collaborate to develop, store, and supply water for municipal purposes.

WRWSA operates under its Revised and Restated Interlocal Agreement (January 14, 2014) executed pursuant to §163.01, F.S., which provides full statutory authority under Section §373.713, F.S. Unlike Tampa Bay Water, WRWSA has no additional statutory limitations.

Tampa Bay Water was restructured in 1998 to resolve litigation over water withdrawals among its six member governments (Hillsborough, Pasco and Pinellas counties, and the cities of New Port Richey, St. Petersburg, and Tampa). They are authorized under Section §373.715(2)(b), F.S., to develop, store, and transport water and are required to construct and maintain facilities to ensure adequate supply to all citizens throughout their service area.

The Peace River Manasota Regional Water Supply Authority was established through an interlocal agreement executed pursuant to Section §163.01, F.S. and authorized under Section §373.713, F.S. Their interlocal agreement was last updated in 2005 and includes Desoto County, Manatee County, Sarasota County, and the SWFWMD portion of Charlotte County.

Similarly, the Polk Regional Water Cooperative is a regional water supply authority authorized pursuant to Section §373.713, F.S. It was formed in 2016 by Polk County and 15 municipalities.

6.4.2 Membership and Voting Structure

WRWSA's Revised and Restated Interlocal Agreement specifies 13 board members: two representatives each from Citrus, Hernando, and Sumter counties, three from Marion County, and one municipal representative from each county. Representatives and alternates are designated by the respective member government and must be a local government commission member, a local government council member, or a staff member of the respective local government.

A quorum requires representation from a majority of counties, with all counties represented by at least one county commissioner for annual budget approval. Each member has one vote, and a simple majority governs most actions. Although unstated in the Interlocal Agreement, the addition of new members or change to voting structure requires the unanimous agreement of all members because an agreement cannot be amended without the consent of the parties unless that power is reserved within the agreement.

Tampa Bay Water's governing board is composed of nine elected officials: two representatives each from Hillsborough, Pasco, and Pinellas counties, and one representative from the cities of New Port Richey, St. Petersburg, and Tampa. Each board member holds one vote, with a minimum of five affirmative votes required for most actions. Certain decisions, such as approving contracts for water purchase or sale, assuming ownership or operational control of facilities with potential rate impacts, and disposing of Tampa Bay Water assets, require at least six affirmative votes.

The Peace River Manasota Regional Water Supply Authority's governing board is composed of one director each from Charlotte, DeSoto, Manatee, and Sarasota counties. Directors must be a member of the Board of County Commissioners, but alternate directors do not. Each member has one vote, and a simple majority is required for most actions. An exception is that the addition of a new board member must be by unanimous vote.

Differences in board sizes and different quorum requirements are considered types of weighted voting, but there are other variations that may be considered. An authority can require supermajority votes for significant actions such as purchasing water supply facilities or incurring debt. It is important to note that state law mandates voter approval of the electors in each participating county and municipality for any levy of ad valorem taxes, up to but not exceeding 0.5 mills, regardless of the authority's voting structure (see §373.713(2)(a), F.S.).

Weighted voting variations that may also be considered include:

- **Weighting Vote on Population of Local Governments Represented:** WRWSA currently applies a population-based approach by allocating a different number of representatives to each member county according to population size. If contributions to support the authority are based in part on the population, assigning greater voting weight to more populous areas may be reasonable. However, this method can discourage participation from smaller counties which can reduce environmental benefits that come from distributing water supply facilities across the region.
- **Weighted Voting Based on Customers Served by Member Governments:** Some local governments serve a potable water customer base that differs significantly from their resident population. Since wholesale water costs are ultimately passed on to consumers, it may be appropriate to give more say to members serving larger customer bases.

6.4.3 Water Rate Structure

WRWSA's current Purchase Agreement with Citrus County, approved in 2016, established an initial wholesale rate of $0.1335 per thousand gallons of water delivered. This rate was designed to approximate the annual revenue under the original Purchase Agreement between the WRWSA and Citrus County of $224,000. The rate is subject to a cost-of-living adjustment (COLA) consistent with the COLA applied by Citrus County for retail water sales, not to exceed 3 percent. Revenue generated through this agreement supports WRWSA's water resource development projects.

Tampa Bay Water employs a uniform rate structure for its member governments, expressed as a cost per 1,000 gallons. This rate includes both fixed and variable components, with the exception of water supplied to the City of Tampa from the Tampa Bypass Canal. Each member's pro rata share of fixed costs is adjusted based on the actual quantity of water deliveries. Additional credits are applied annually for debt service to amortize Tampa Bay Water's purchase of members' water supply facilities, as well as credits for direct treatment costs.

The Peace River Manasota Regional Water Supply Authority primarily funds its operations through water sales to member governments. To defray administrative expenses, the Authority also imposes a population-based contribution on its members.

6.4.4 Dispute Resolution Practices

The WRWSA Revised and Restated Interlocal Agreement does not include specific provisions for dispute resolution, nor does the agreement for the Peace River Manasota Regional Water Supply Authority. Florida Statutes §373.313, which addresses water supply authorities, is also silent on this matter. However, the authority to establish dispute resolution procedures is explicitly granted under §163.01, F.S. Florida Statutes §163.01(5)(p) specifically allows interlocal agreements to include provisions for adjudicating disagreements, addressing nonpayment of shared costs, and defining the rights of participating parties in such cases.

Additionally, water supply authorities fall under the scope of the Florida Governmental Conflict Resolution Act (§164.101 et seq.), which specifies a duty to negotiate (§164.1041) prior to litigation when conflicts arise. However, if the dispute is purely administrative, then the Act does not apply and pre-suit mediation and negotiation may not be necessary. The Florida Governmental Conflict Resolution Act specifically identifies disputes involving resource allocation including water, land, and other natural resources as subject to its provisions (§164.1051(4)).

Tampa Bay Water's Amended and Restated Interlocal Agreement provides a model for incorporating dispute resolution measures specific to permits. It includes binding arbitration for permit-related conflicts and requires mediation for all other disputes before administrative or judicial proceedings may be initiated.

6.5 Funding Opportunities

Regional water supply development requires a combination of local, state, and federal funding sources. Historically, WMDs have prioritized cost-share funding for multijurisdictional projects, and similar strategies.

6.5.1 Local

Local funding mechanisms include per capita assessments, wholesale water sales, and interlocal cost-sharing agreements. WRWSA currently funds its operations through a 19-cent per capita assessment from member counties, revenue from its purchase agreement with Citrus County, reserve funds, and matching contributions from project partners.

Member governments may share costs for new or expanded facilities through contractual agreements, as practiced by the Peace River Manasota Regional Water Supply Authority's cost-sharing arrangement with its counties and the City of North Port. Local governments may also issue bonds backed by their credit to finance infrastructure projects, as practiced by Tampa Bay Water.

6.5.2 WMD and State

External funding opportunities exist at the WMD and State level. The SWFWMD has historically invested hundreds of millions of dollars in regional water supply projects, including alternative water supply development and transmission systems for Tampa Bay Water, the Polk Regional Water Cooperative, and the Peace River Manasota Regional Water Supply Authority. Many of these projects have also received funding from the FDEP through the Water Supply and Water Resource Development Grant Program.

Additionally, the WRWSA developed and owns the Charles A. Black Water Supply Facility, which received a $4.7 million grant from the SWFWMD's Coastal and Withlacoochee River Basin Boards for its construction. The facility is operated and maintained by Citrus County, which is under an agreement with the WRWSA that controls County purchases of bulk water from the authority.

The WRWSA may continue to pursue similar cost-share opportunities for Lower Floridan aquifer development and surface water projects.

6.5.3 Federal

Federal funding opportunities, while less frequently utilized, can provide significant support for large-scale infrastructure projects. These may include grants or appropriations for water resource development, resiliency initiatives, and environmental restoration. Federal programs often prioritize projects that address regional water supply challenges, promote sustainability, and reduce environmental impacts.

In 2023, the Polk Regional Water Cooperative received a $223 million U.S. Environmental Protection Agency (EPA) Water Infrastructure Finance and Innovation Act (WIFIA) loan in conjunction with a nearly $200 million SWFWMD grant to support its Lake Wales brackish desalination plant, which includes the construction of LFA production wells, RO facilities, and transmission lines.

As of November 2025, EPA has announced the availability of $6.5 billion in WIFIA funding. The WRWSA may consider seeking federal funding in coordination with state and local partners to supplement district cost-share programs and local contributions, especially regarding largescale water treatment plant projects.

7. Summary and Recommendations

The 2025 Regional Water Supply Plan identifies a diverse set of strategies capable of meeting projected water demands across the WRWSA region through 2045 and beyond. The findings of this plan show that no single option is sufficient on its own; rather, a phased, portfolio-based approach is required, one that advances the most cost-effective and immediately beneficial actions while preparing mid- and long-term alternatives in response to future hydrologic, regulatory, and growth conditions.

The recommendations presented in this chapter build directly on the comparative technical, economic, and environmental evaluations in Chapter 5, as well as the Tier 3 conservation assessment in Chapter 4. They also reflect the water resource challenges anticipated over the next 20 years, including projected utility deficits, increasing reliance on the UFA, and the potential implications of forthcoming MFLs for Gum Springs, Lake Weir, and the Withlacoochee River.

The goal of these recommendations is to support a resilient and adaptive regional supply strategy that protects water resources, supports responsible growth, leverages regional partnerships, and maximizes the benefits of existing infrastructure particularly reclaimed water systems. The recommended actions are organized into near-term, mid-term, and long-term horizons to align with utility deficit timing, project development requirements, and evolving regulatory conditions.

At the core of the recommended strategy is the advancement of low-cost, high-benefit projects particularly regional water conservation, expanded reclaimed water utilization, and evaluation of targeted MAR. These measures may help strengthen aquifer conditions, support water resource protection, and reduce pressure on traditional groundwater sources. As regional needs evolve, additional diversification through Lower Floridan Aquifer (LFA) development, surface water treatment, and long-term drought-resilient supplies such as desalination will provide increasing value.

Finally, these recommendations emphasize WRWSA's vital regional coordination role supporting member governments through cooperative funding, shared planning, technical assistance, and the development of interlocal partnerships that enable cost-effective, multi-utility solutions. By implementing these strategies in a phased, adaptive manner, the Authority and its member governments can ensure a sustainable, resilient water supply for the region's residents, businesses, and ecosystems well into the future.

Conservation is the Most Cost-Effective and Widely Applicable Strategy

The Tier 3 conservation scenario provides 12.2 MGD of achievable demand reduction by 2045 at an estimated \$2–\$3 per 1,000 gallons (constant 2024 dollars). Present-value analysis yields a unit cost of \$0.88/kgal and a benefit–cost ratio of 3.4, confirming conservation as the lowest-cost regional water supply option. Conservation reduces reliance on the UFA, delays or eliminates deficits across multiple utilities, enhances water resource protection, and improves systemwide resilience. No other option provides comparable economic, environmental, and operational benefits. Conservation should remain the first-priority WRWSA strategy and be implemented consistently regionwide.

Reclaimed Water Represents a Major Long-Term Regional Asset

Approximately **13.7 MGD** of future unallocated reclaimed water is projected to be available across the region by 2045. Expansion and regional integration of reclaimed water systems offer several benefits:

- Reduced potable demand
- Improved utilization of surplus flows
- Reduced non-beneficial discharges
- Enhanced readiness for future IPR or MAR projects
- Strengthened drought resilience and storage flexibility

The NPR Regional Expansion concept provides the backbone for coordinated regional water reuse, while the Hernando and Citrus MAR projects offer near-term opportunities to recharge highly treated reclaimed water into the aquifer where it yields the greatest hydrologic benefit.

MAR and NPR Provide High-Value, Mid-Cost Solutions with Strong Water Resource Benefits

The 3 MGD Hernando MAR option represents a potentially favorable alternative, subject to site-specific feasibility, combining moderate cost (~$5.8/kgal), potential recharge benefits, including possible support for springs under suitable conditions and water resource protection. Citrus MAR is expected to provide similar benefits under suitable conditions at a smaller scale.

NPR regional interconnections complement MAR by enabling movement of reclaimed water from surplus areas to deficit zones and future recharge sites. Together, NPR and MAR enhance aquifer conditions, offset potable demand, and increase long-term system flexibility.

LFA and Surface Water Options Provide Mid- to Long-Term Diversification

While more capital-intensive than conservation or MAR, the LFA wellfield and the Holder surface water options provide valuable source diversification as the region approaches the limits of UFA withdrawals. These projects become increasingly important if:

- Water resource protection requirements restrict groundwater availability
- Long-term growth exceeds current projections
- Climate variability reduces reliability of traditional sources

The 5–10 MGD LFA wellfield and 10 MGD Holder WTP alternatives offer moderate unit costs ($6–$10/kgal) and may provide potable supply resilience under appropriate conditions when combined with conservation, NPR, and MAR.

Desalination Serves Long-Term Regional Resilience Needs

Desalination remains the most expensive option (~$29/kgal) but offers unmatched drought-proof supply. It is not required in the near or mid-term but should remain under long-term consideration as a strategic contingency, particularly if groundwater and surface water constraints intensify.

Pending MFL Determinations Create Uncertainty in Future UFA Availability

New or revised MFLs for Gum Springs, Lake Weir, and the Withlacoochee River could further limit UFA withdrawals or require reductions from existing permits. These regulatory pressures reinforce the need for:

- Conservation
- Regional reuse and MAR
- Mid-term diversification (LFA, surface water)
- Adaptive management and monitoring

The WRWSA supply strategy must remain flexible to adjust to new regulatory limits.

Regional Coordination and Cooperative Funding Are Essential

Many of the highest-performing options MAR, NPR, interconnections, LFA, surface water—require multi-utility cooperation and substantial capital investment. WRWSA participation is essential to:

- Coordinate regional planning
- Develop shared infrastructure
- Pursue SWFWMD, SJRWMD, and FDEP Cooperative Funding (up to 50%)
- Support local utilities with technical and financial assistance
- Facilitate interlocal agreements

These efforts build on the Authority's long history of regional conservation and reclaimed water support.

7.1.1 Near-Term (0–10 Years)

- **Implement Tier 3 Conservation Regionwide**
  Conservation is the lowest-cost option and provides relatively quick deficit relief. WRWSA should continue supporting member utilities through technical assistance, joint procurement, and a regional conservation funding program.

- **Advance Hernando and Citrus MAR Projects to Feasibility and Pilot Testing**
  MAR may provide significant recharge and water resource benefits, but feasibility and yield are dependent on site-specific conditions. Early testing and design will allow project initiation ahead of potential withdrawal limits.

- **Initiate a Phase I NPR Regional Optimization Study**
  This study should map existing reclaimed water systems, evaluate storage needs, identify high-priority interconnection corridors, define phasing, and assess cost-share opportunities. NPR expansion is foundational to long-term regional resilience.

- **Maintain Regional Monitoring to Track UFA Conditions and MFL Developments**
  Given pending MFL determinations, heightened monitoring and scenario planning are recommended.

7.1.2 Mid-Term (10–20 Years)

- **Advance LFA Wellfield Development**
  As groundwater availability tightens under future MFLs, the LFA may provide a reliable mid-term potable supply, subject to feasibility and regulatory considerations for southeastern Marion and northern Sumter Counties.

- **Advance Planning for the Holder Surface Water Treatment Plant**
  These planning-level activities refine long-term feasibility and preserve the surface-water option, including updated hydrologic evaluation, early environmental review, conceptual engineering, and identification of transmission corridors.

- **Construct Priority NPR Interconnections Identified in Phase I**
  Mid-term investments should focus on bridging surplus and deficit reclaimed water systems and supporting future MAR/IPR readiness.

7.1.3 Long-Term (20+ Years)

- **Reevaluate Surface Water and LFA Expansion Based on Monitoring Trends**
  Regional hydrologic conditions, regulatory changes, and long-term growth will determine whether these options need to be expanded or accelerated.

- **Implement the Holder Surface Water Treatment Plant**
  This high-yield surface-water source may provide long-term regional diversification and drought resilience but should advance to full implementation only if future conditions warrant it, such as more restrictive UFA withdrawals, slower-than-expected MAR or LFA yield development, or higher regional demand growth. Implementation would occur following detailed design, permitting, and capital planning once long-term need is confirmed.

- **Maintain Desalination as a Contingency Option**
  Desalination should remain under strategic consideration as a drought-resilient, climate-independent source.

- **Update the RWSP Every Five Years with Scenario-Based Testing**
  Future updates should include scenario analysis incorporating water resource constraints, climate variability, and reclaimed water availability.

7.1.4 Regional Coordination and Funding Strategy

The successful implementation of MAR, NPR, LFA, and surface-water projects requires extensive cooperation across multiple utilities and regulatory partners. The WRWSA should continue to lead:

- Coordination of regional planning
- Pursuit of SWFWMD, SJRWMD, and FDEP Cooperative Funding (typically up to 50%, subject to program availability and priorities)
- Support for local utilities in feasibility studies, environmental evaluation, and design

- Development of interlocal agreements needed for shared infrastructure
- Maintenance and expansion of the WRWSA regional conservation grant program

This coordinated approach reduces costs, increases eligibility for external funding, and is intended to support project alignment with regional needs rather than isolated local priorities.

7.1.5 Continued Monitoring and Adaptive Management

Because regulatory conditions and hydrologic trends will evolve substantially over the next two decades, the WRWSA should maintain a dynamic adaptive management framework that includes:

- Intensive monitoring of UFA levels and spring flows
- Tracking reclaimed-water availability and demand
- Regular reassessment of MAR feasibility and LFA performance
- Protection of regional water resources
- Standardized methods for tracking monthly water demand and seasonal use patterns
- Incorporation of climate, growth, and land-use projections into future RWSPs

The Authority should update the RWSP every five years to reflect the latest scientific, hydrologic, and regulatory information.

7.1.6 Final Statement

The WRWSA region can meet future demands through a phased, diversified water supply strategy that emphasizes conservation, reclaimed water, aquifer recharge, and selective new supply development. By prioritizing low-cost, high-benefit options in the near term, while preparing mid- and long-term alternatives based on evolving regulatory and growth conditions, the Authority and its member governments can safeguard water resources, enhance regional resilience, and ensure sustainable supply for decades to come.

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