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Demand Management: Water Conservation

TOPICS

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An important element of water supply planning is accounting for the reduction in water demands that can be achieved through water conservation efforts. Water conservation entails reducing the quantity of water required to meet demands through water use efficiency improvements, the prevention or reduction of unnecessary uses, or the cessation of water losses contributing to the sustainability of water supply resources. Section 373.709(2), Florida Statutes (F.S.), requires that water conservation be considered when determining if the total capacity of the water supply development project options included in a water supply plan (**Chapter 7**) exceeds the increase in projected demands for the planning horizon (**Chapter 2**).

All water sources are finite; therefore, conservation and efficiency measures should be maximized, regardless of the source, before more costly development options are implemented. Water conservation can reduce, defer, or eliminate the need to develop new water supply sources to meet current or future demands, which has the same effect as expanding the existing water supply. Moreover, conservation and demand management have been shown to reduce costs to utilities and customers over the long term (Feinglas et al. 2013, Chesnutt et al. 2018). Improving water use efficiency can reduce operational costs (e.g., lower water utility bills, lower costs to heat or move water) for most other users as well.

This chapter describes water conservation measures and programs available to water users in the Lower Kissimmee Basin (LKB) Planning Area of the South Florida Water Management District (SFWMD or District). Where applicable, an estimate of potential water savings achievable in the LKB Planning Area by 2045 is provided. Additional conservation information can be found in the *2021–2024 Support Document for the Water Supply Plan Updates* (2021–2024 Support Document; SFWMD 2021) in *Water Conservation: A Comprehensive Program for South Florida* (SFWMD 2008), and on the SFWMD webpage (https://www.sfwmd.gov/conserve).

CONSERVATION MEASURES

Per capita water use demand reduction has occurred gradually across the country since the 1980s in part due to implemented conservation measures like irrigation restrictions, but also largely due to passive water savings. Passive savings result from replacing older appliances and fixtures with more water-efficient models and designing new homes with less irrigated green space. Federal, state, and local codes and standards promote the development and use of more efficient devices, increasing passive savings.

However, depending solely on passive savings will delay or exclude substantial conservation savings potential. Therefore, additional proactive conservation measures and programs are necessary to encourage the use of high-efficiency equipment or improved water use behaviors that yield water savings, including increased outreach, education, and messaging to water users. Local governments, utilities, and large water users are encouraged to research which types of programs would be most appropriate and cost-effective for their residents and specific user groups and to develop goal-based water conservation plans that include development and deployment of public education and outreach materials. Cost-share funding and other collaborative opportunities may be available to help implement conservation measures and programs. The following subsections include a brief description of outdoor and indoor water conservation measures that can be implemented.

Outdoor Water Use (Irrigation)

A significant share of water used outdoors in the LKB Planning Area is for irrigation. Irrigation of food and other commodity crops is practiced by agricultural water users, while lawns and landscapes are irrigated by residential and commercial property owners. Many irrigation efficiency principles are common across these user groups; however, patterns and scales of use, system design, hardware and components, and operator knowledge can vary widely.

Agriculture

Many alternatives for improving irrigation efficiency and conserving water in agricultural operations are available and should be considered for implementation when economically feasible. Typically, agricultural water conservation measures fall under three categories: 1) converting from one irrigation method (or system type) to a more efficient one; 2) improving the precision irrigation management capabilities of the system; and 3) implementing best management practices (BMPs). Real-time information on soil moisture and weather conditions, along with remote operation to allow quick irrigation changes in response to changing weather, can help adjust when water is delivered to precisely meet crop needs.

Hardware and technology that can improve system management, reduce water quantities required to meet crop needs, and minimize water losses include the following:

- Flowmeters
- Weather stations
- Soil moisture sensors
- Variable-frequency pump drives
- Automated control systems
- Best management practices (e.g., laser leveling, irrigation system maintenance)

Urban

In South Florida, where irrigation occurs year-round, the largest portion of water used by urban water users often is for irrigation. Moreover, the United States Environmental Protection Agency (USEPA) estimates approximately 50% of water used outdoors is wasted due to inefficient watering methods and systems. Therefore, while the volumes may be small, improvements to irrigation efficiency are still considered a target for conserving water used by urban water users.

Irrigation efficiency improvements can be achieved at single-family and multifamily residences, commercial and institutional properties, recreational areas (e.g., parks, athletic fields), and other landscaped areas (e.g., roadway medians) by replacing outdated irrigation systems and timers. Automatic controllers should be tested and shown to meet the USEPA's WaterSense program specifications for water efficiency and performance. More information on the WaterSense program and labeled irrigation controllers is available at https://www.epa.gov/watersense. In Florida, all automatic lawn and landscape irrigation systems must be properly equipped with technology that inhibits or interrupts the system's operation during periods of sufficient rainfall (Section 373.62, F.S.) and should be programmed to irrigate only as necessary to supplement rainfall following any mandatory irrigation restrictions.

Golf courses typically are irrigated with a high degree of efficiency. However, opportunities to improve efficiency may exist using the same types of hardware and technology as described above. Additional practices for efficient golf course water use can be found in *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses* published by the Golf Course Superintendents Association of America (2021) for golf course managers https://www.gcsaa.org/environment/bmp-planning-guide.

Indoor Water Use

Another area of potential conservation savings is indoor water use in single-family and multifamily residences and commercial/institutional buildings (e.g., office buildings, restaurants, movie theaters, long-term care facilities, and hospitals). Feasible measures include detecting and repairing water leaks and replacing older, inefficient plumbing fixtures (e.g., toilets, urinals, faucets, showerheads) with models that have been tested and shown to meet the USEPA's WaterSense program specifications for water efficiency and performance. For more information on the WaterSense program and to find labeled products, visit https://www.epa.gov/watersense. Older, inefficient appliances can be replaced with water-efficient models that have received the ENERGY STAR label. For more information on the ENERGY STAR program and to find labeled products, visit https://www.energystar.gov.

Common water efficiency improvement measures for commercial and industrial users are outlined in the SFWMD's (2013) *Water Efficiency Audit Guide*, which is discussed in greater detail in the 2021–2024 Support Document (SFWMD 2021). Measures for improving water efficiency in nonresidential settings may be applicable to specific operations or facilities, such as autoclaves in hospitals; pre-rinse spray valves, food steamers, and waste grinders in restaurants; heating, ventilation, and air conditioning (HVAC) system efficiency upgrades; converting water-based cooling devices to air-based; and water reuse/recycling in industrial operations. Other applicable measures may exist for specific industrial processes.

CONSERVATION PROGRAMS

Conservation programs help reduce water demands through incentives (educational, financial, and regulatory) and implementation of effective water conservation measures by specific user groups. Conservation measures can be actions or hardware that improve water efficiency. Utilities and local governments are the primary entities that typically develop conservation programs. Because Public Supply (PS) makes up a small percentage of demand in the LKB Planning Area, other agencies may assume a leadership role in promoting water conservation at the local, regional, and state level.

The following subsections contain brief descriptions of established conservation programs that may be applicable to different water use categories. A single program or a combination of these can be part of a robust conservation plan. The design and selection of conservation programs depends on the target group and is directed by a conservation strategy created to effectively reach that group.

Education, Outreach, and Marketing

Education, outreach, and marketing are essential to reducing water use and instilling a lasting conservation ethic in businesses and communities. Although water savings attributed to these campaigns are difficult to quantify, they are considered vital to a successful conservation program and behavioral adoption among users. Campaigns usually are designed to reach a specific user group or subgroup (e.g., residents, schools, commercial properties).

The SFWMD maintains its commitment to water conservation education through distributing educational materials, conducting speaking engagements, and utilizing social media platforms to raise awareness about the necessity of saving water.

Cost-Share Funding Programs

Funding programs, such as the ones described below, may be available to specific user groups and should be investigated by agencies, local governments, and end users for applicability to their target water use type.

SFWMD Cooperative Funding Program

The Water Conservation component of the SFWMD Cooperative Funding Program (CFP) seeks to financially support projects that improve water use efficiency and conservation. The CFP provides financial incentives to local governments and utilities, homeowners' associations, commercial entities, and agricultural operations to implement technology and hardware-based water conservation projects. Historically, funding for the CFP has come from both ad valorem taxes and the Florida Legislature through the Florida Department of Environmental Protection (FDEP). CFP funding is considered annually during the SFWMD's budget development process. Since the *2019 Lower Kissimmee Basin Water Supply Plan Update* (SFWMD 2019), the SFWMD has provided approximately $2.5 million in water conservation funding for 43 projects Districtwide. However, no applications were submitted for projects in the LKB for funding consideration. The CFP is expected to continue although future funding levels are uncertain. Additional information regarding the CFP can be found on the SFWMD's webpage (https://www.sfwmd.gov/doing-business-with-us/coop-funding).

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP), implemented through the United States Department of Agriculture – Natural Resources Conservation Service, promotes agricultural production and environmental quality. Financial and technical assistance is offered to participants to address natural resource concerns and deliver environmental benefits, such as improved water and air quality, conserved groundwater and surface water, reduced soil erosion and sedimentation, and improved or created wildlife habitat. From Fiscal Year (FY) 2018 through FY2023, EQUIP has provided funding for 54 irrigation efficiency projects in the LKB Planning Area. Seven projects were in Glades County, 34 in Highlands County, and 13 in Okeechobee County. These projects have affected 8,396 acres, 20,448 acres, and 2,160 acres in those counties, respectively. EQIP is expected to continue although future funding levels are uncertain.

Agricultural Best Management Practices Program

The Florida Department of Agriculture and Consumer Services (FDACS) develops and adopts agricultural BMPs by rule for different types of agricultural operations. These BMPs have been designed primarily to reduce negative impacts on water quality while maintaining or enhancing agricultural production. However, some BMPs (e.g., citrus, dairy, nurseries, sod, specialty fruit and nut crops, vegetable, and other crops) also improve water use efficiency and could reduce the amount of water needed to meet crop demands in average to wet years.

The Lake Okeechobee Basin Management Action Plan, which covers much of the LKB Planning Area, requires agriculture producers to implement FDACS-adopted BMPs or conduct water quality monitoring. FDACS also provides funding to assist producers with implementing BMPs. Agricultural producers may qualify to receive 75% of project costs related to water conservation and/or quality. All agricultural water users are encouraged to enroll in the FDACS BMP program. Additional information is available on the FDACS webpage (https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Best-Management-Practices).

Other Programs

Agricultural Mobile Irrigation Labs

The FDACS Mobile Irrigation Lab (MIL) program performs free evaluations of irrigation system efficiency on agricultural lands and makes recommendations for physical and operational improvements. Such recommendations may include modification of irrigation systems and equipment, alteration of irrigation scheduling, and other aspects of system management. FDACS has MIL service available for all counties within the LKB Planning Area. Presently, the Highlands Soil and Water Conservation District serves Highlands County, the Palm Beach Soil and Water Conservation District serves Okeechobee County, and the Collier Soil and Water Conservation District serves Glades County. More information regarding the MIL program can be found on the FDACS webpage (https://www.fdacs.gov/Water/Mobile-Irrigation-Labs).

Florida Automated Weather Network

The Florida Automated Weather Network (FAWN), operated by the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), provides weather information throughout the state at 15-minute intervals. FAWN management tools provide decision support functions to growers using historical and real-time weather data as well as crop modeling technology to help with short- and long-term planning, thereby maximizing the efficiency of irrigation practices (UF/IFAS 2024). Three FAWN stations (Okeechobee, Palmdale, and Sebring) currently serve the LKB Planning Area. Additional information for these stations is available at https://fawn.ifas.ufl.edu/.

Certification and Recognition Programs

There are several national and statewide certification and recognition programs that direct builders, property owners, and building managers toward meeting environmentally friendly standards. Such programs include the Florida Green Building Coalition's green certification programs, the FDEP's Green Lodging Program, the United States Green Building Council's Leadership in Energy and Environmental Design (LEED), and the Green Building Initiative's Green Globes Certification. These holistic programs typically include criteria affecting water use, energy efficiency, climate-adaptive landscaping, sustainable building material, site selection, indoor environmental quality, and greenhouse gas emissions.

INFO

Florida-Friendly Landscaping means using low-maintenance plants and environmentally sustainable landscaping practices to conserve water, reduce pollution and erosion, and create wildlife habitat.

With respect to growing development and finite water resources, there are single-focus programs that target water use efficiency. These programs often are less expensive for builders and property managers than holistic ones. Two single-focus programs endorsed by all Florida water management districts are Florida Water Star and Florida-Friendly Landscaping Recognition. More information on these programs can be found on their individual program webpages and on the SFWMD's water conservation webpage (https://www.sfwmd.gov/conserve).

REGULATORY INITIATIVES

From consumptive use permitting and local landscape ordinances to year-round irrigation conservation measures, rules and regulations have a role in advancing water use efficiency, promoting water conservation as the least-cost source of new water, sustaining limited water supplies, and protecting the natural environment. The SFWMD requires that water conservation measures and programs be considered for users with water use permits. For a proposed use of water to be deemed reasonable-beneficial, water users requiring a permit must include a water conservation plan in the permit application. Section 2.3.2 of the *Applicant's Handbook for Water Use Permit Applications within the South Florida Water Management District* (SFWMD 2022) includes specific water conservation requirements for various water use categories.

The SFWMD's Mandatory Year-Round Landscape Irrigation Conservation Measures Rule (Chapter 40E-24, Florida Administrative Code [F.A.C]) was adopted to help protect South Florida's water resources by addressing landscape irrigation. The rule limits landscape irrigation to 2 days per week in Okeechobee and Highlands counties and 3 days per week in Glades County. This rule applies to all users, with the exception of permitted agricultural operations, and to all sources of water (e.g., utility, lake, canal, well) except reclaimed water. Provisions in the rule for new landscaping and other situations exist, with some limitations. Local governments may adopt more stringent landscape irrigation ordinances based on local water demands, system limitations, or resource availability. More information on watering restrictions is available on the SFWMD's webpage (https://www.sfwmd.gov/community-residents/landscape-irrigation) and in the 2021–2024 Support Document (SFWMD 2021).

POTENTIAL FOR WATER CONSERVATION SAVINGS

Agriculture

Agriculture (AG) is the largest water use category in the LKB Planning Area, accounting for 202.76 million gallons per day (mgd), or 95% of the total 2045 projected demand for the region. Therefore, local and regional efforts to increase water conservation implementation in this planning area should focus on this user group, which includes row and field crops, aquaculture, orchards, nurseries, and livestock operations.

The amount of potential AG conservation savings in the LKB Planning Area was determined using the Florida Statewide Agricultural Irrigation Demand (FSAID) geodatabase, which is an online user interface available on the FDACS webpage (https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Water-Supply-Planning). Estimated efficiency improvement (i.e., conservation estimate) is one of the parameters calculated by the FSAID model, and the spatially based data are available for water management district planning basins. According to the 2021–2045 FSAID report (FSAID X), "on a per acre basis, Florida farmers are projected to increase their irrigation efficiency by about 0.25% per year" (FDACS 2023).

The FSAID statewide methodology for calculating the amount of potential AG conservation savings is more fully described in Appendix E of the FSAID X report (FDACS 2023), but generally is based on the United States Department of Agriculture's (USDA) Irrigation and Water Management (IWM) Survey and the MIL actual water savings data. AG water use is based on several site-specific parameters, including crop type, acreage, soil type, evapotranspiration, and rainfall. Conservation savings can be achieved through more efficient irrigation and planting methods as well as other irrigation management strategies. The selection of new irrigation systems and management strategies depends on crop type, water source, food safety requirements, and water availability. Financial incentives may be necessary to help agricultural operations transition to more efficient irrigation systems. The volume of water that could be conserved for an individual project varies depending on the number and magnitude of parameters targeted for change. Using the FSAID statewide methodology, the accuracy of the projected conservation savings for a specific water supply planning area depends on the region's similarities to the USDA IWM survey data (e.g., crop mix, existing irrigation systems, soil types, economic feasibility, financial incentives).

From 1978 to 2018, agricultural operations in Florida that participated in the survey reduced the amount of water used by an average of 6,600 gallons per acre per year, primarily based on irrigation system changes. From 2003 to 2018, the survey data show efficiency improvements of approximately 5,200 gallons per acre per year, due primarily to changes in scheduling and sensor-based automation. "This is reduced to 3,500 gallons/acre/year for the projection period of 2021-2045. Two exponential trends from the IWM dataset were used to estimate future irrigation efficiency improvement. The trend from 1978-2018 is used for currently irrigated fields that are not drip or micro-sprinkler irrigated, and the more conservative trend from 2003-2018 is used for newly irrigated fields or those irrigated with drip or micro-sprinkler" (FDACS 2023).

The total savings calculated by the FSAID model for any given year depends on the crops produced, the acreage of each crop, and the irrigation systems employed, as projected to exist in that year. Because these variables change over the planning horizon (2022 to 2045), the projected savings also change and may be nonlinear. Based on data available in 2021–2045 (FSAID X), the estimated conservation potential for the LKB Planning Area in 2045 is 6.99 mgd (1.39 mgd in Glades County, 4.15 mgd in Highlands County, and 1.45 mgd in Okeechobee County). Future versions of the FSAID report may include different estimates of conservation potential based on new variables and projections.

Water Conservation Potential for Other Water Use Categories

Florida-Friendly Landscaping

All nonagricultural water use categories combined, including PS, Domestic Self-Supply (DSS), Landscape/Recreational (L/R), and Commercial/Industrial/Institutional (CII), are projected to account for 11.67 mgd of demand in 2045, just 5% of all water use in the LKB Planning Area. Of this, PS accounts for the highest portion (5.03 mgd; 2%) of use. DSS demands are 1.84 mgd or 0.9% of total use. The 2045 projected PS and DSS demands are atypically low compared to the other SFWMD planning areas. Additionally, the per capita use rate for residential users is much lower compared to other similar users in the District, presumably due to less residential use of potable water for lawn and landscape irrigation. L/R users account for 1.92 mgd (0.9%) of the total 2045 projected demand, while the CII use category accounts for 2.88 mgd (1.34%). Since there are no power generation sites located in the LKB Planning Area, there are no demands for this water use category. Given the relatively low nonagricultural water demands and data availability, a potential water savings of 0.10 mgd was assumed for these water use categories. This assumes a conservative volumetric savings of 10% (of demand) at a 10% participation rate.

SUMMARY OF WATER CONSERVATION

AG is the largest water use category in the LKB Planning Area. FDACS, through the FSAID X model, projected 6.99 mgd of water could be conserved in 2045 through irrigation efficiency and scheduling improvements. Greater conservation savings may be possible if additional measures are implemented or if increased participation rates are realized, which can be facilitated through education programs and other assistance opportunities. Agricultural operations are encouraged to take advantage of the FDACS BMP program as well as funding opportunities (through EQIP or CFP), site audits via MILs, and FAWN to make weather-based irrigation decisions. Water use by all nonagricultural water use categories in the LKB Planning Area is atypically low compared to other SFWMD planning areas. Savings for these users have been estimated, conservatively, to be 0.10 mgd.

Local, regional, and state government agencies as well as PS utilities in the LKB Planning Area can develop conservation strategies to encourage and assist water users to improve water use efficiency. Because PS utilities typically promote conservation only within their service

areas, government agencies should consider conducting educational outreach to promote and incentivize conservation among DSS users. Cost-share funding may be available to local governments and, in some cases, directly to large users. Individual users are encouraged to seek out funding and other resources to improve water use efficiency and reduce operational expenses.

SFWMD staff are available to assist conservation program developers in the LKB Planning Area with technical support, collaborative program implementation, ordinance review, long-term demand management planning, and funding assistance via the District's CFP. In addition to the programs and strategies discussed in this chapter, conservation program resources are discussed further in the 2021–2024 Support Document (SFWMD 2021).

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