South Florida Water Management District
2016 Estimated Water Use Report

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EXECUTIVE SUMMARY

This report compiles estimated water use information by use category within the South Florida Water Management District for calendar year 2016, based primarily on water pumpage records reported pursuant to water use permitting requirements. Water use is defined as any consumptive use of water that reduces the supply from which it was withdrawn or diverted. This report is not intended to comprehensively account for all water used or conveyed within the District (e.g., for flood control, natural systems, water quality treatment). In 2016, approximately 2,531 million gallons per day (mgd) of surface water and groundwater were used in the following categories:

- Public Water Supply (1,093 mgd)
- Domestic and Small Public Supply (41 mgd)
- Industrial/Commercial/Institutional (93 mgd)
- Agricultural Irrigation (1,040 mgd)
- Recreational/Landscape Irrigation (255 mgd)
- Power Generation (9 mgd)

Of the 2,531 mgd, approximately 1,494 mgd were derived from groundwater and 1,037 mgd were derived from surface water sources, with 2,354 mgd being freshwater and 177 mgd considered saline water. Additionally, approximately 228 mgd of reclaimed water were used primarily for landscape irrigation and, to a lesser extent, industrial and power generation uses.

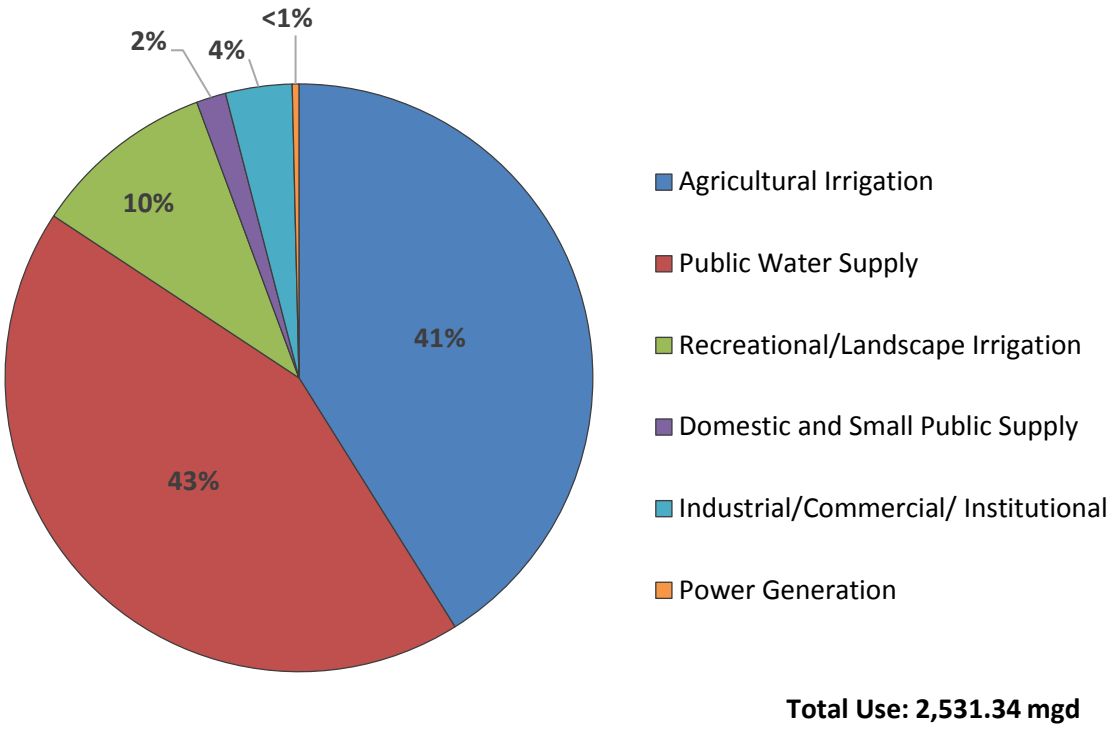

Figure ES-1. Percentage Water Use by Category

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ACRONYMS AND ABBREVIATIONS

AGR	Agricultural Irrigation
D&I	Diversion and Impoundment
District	South Florida Water Management District
DSS	Domestic and Small Public Supply
EAA	Everglades Agricultural Area
FDEP	Florida Department of Environmental Protection
ICI	Industrial/Commercial/Institutional
mgd	million gallons per day
mg/L	milligrams per liter
PWR	Power Generation
PWS	Public Water Supply
REC	Recreational/Landscape Irrigation
SFWMD	South Florida Water Management District
USGS	United States Geological Survey

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INTRODUCTION

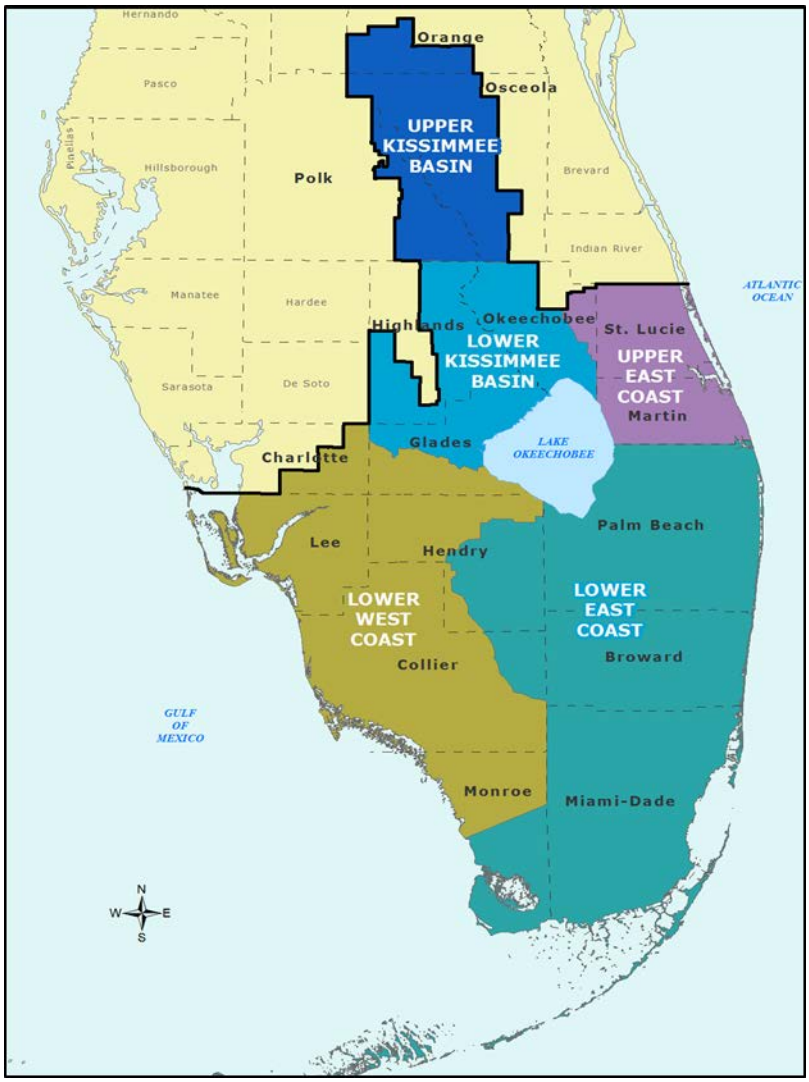
The South Florida Water Management District (SFWMD or District) is a regional government agency created in 1949 responsible for managing and protecting the water resources of South Florida by balancing and improving water quality, flood control, natural systems, and water supply. The District encompasses all or part of 16 counties from Orlando to the Florida Keys and serves a population of approximately 8.3 million residents. It is the oldest and largest of the state's five water management districts. Among other duties, water management districts are responsible for water use permitting as well as water supply planning within their jurisdictional area.

This report compiles estimated water use within the SFWMD for calendar year 2016. Water use is defined as any consumptive use of water that reduces the supply from which it was withdrawn or diverted. This report is a complement to the District's regional water supply plans, which capture current and projected water use, and to the United States Geological Survey (USGS)-Florida Department of Environmental Protection (FDEP) report *Water Withdrawals, Use, and Trends in Florida* (Marella 2014), historically produced every 5 years. This report is based primarily on water pumpage records reported pursuant to water use permitting requirements. However, because nearly one-third of the overall volume was estimated, rather than reported, this report is called the *Estimated Water Use Report*. This report is an important source of data and information to support the District's water resource programs and initiatives, including water supply planning, water use permitting, and water conservation.

This report documents the District's assessment of total water use. Estimated amounts are based on best available data at the time of publication. The document is not intended to comprehensively account for all water used or conveyed within the District (e.g., for flood control, natural systems, water quality treatment).

GEOGRAPHIC DESCRIPTION

The District encompasses more than 18,000 square miles in all or part of 16 counties of central and southern Florida. To manage water supply and plan for current and future water uses, the District is geographically divided into five planning regions (**Figure 1**). These regions are home to many permanent and seasonal residents in addition to a large tourist industry, a significant agricultural industry, and a growing industrial and commercial sector. Several major natural systems are located within the District, including the Upper Chain of Lakes, Kissimmee River and floodplain, Lake Okeechobee, Caloosahatchee River and Estuary, St. Lucie River and Estuary, Big Cypress National Preserve, Everglades Water Conservation Areas, Everglades National Park/Florida Bay, and Biscayne National Park.



Upper Kissimmee Basin: Osceola County and portions of Orange and Polk counties

Lower Kissimmee Basin: Portions of Okeechobee, Highlands, and Glades counties

Upper East Coast: Martin and St. Lucie counties and a portion of eastern Okeechobee County

Lower East Coast: Palm Beach, Broward, and Miami-Dade counties and portions of Monroe, Collier, and Hendry counties

Lower West Coast: Lee County, most of Collier County, and portions of Glades, Hendry, Monroe, and Charlotte counties

Figure 1. Water Supply Planning Regions

WATER USE PERMITTING AND REPORTING

Ensuring an adequate supply of water to protect, enhance, and restore natural systems and to meet all other existing and projected needs is a fundamental element of the SFWMD's mission. The District has adopted rules for regulating the use of water as contained in Chapter 40E-2, Florida Administrative Code, including the *Applicant's Handbook for Water Use Permit Applications* (Applicant's Handbook; SFWMD 2015). Uses exempt from permitting are indoor domestic use at a single-family or duplex dwelling, water used for firefighting purposes, the use of seawater, and the use of reclaimed water. The SFWMD issues two types of permits based primarily on the quantity of water required: Individual and General (both by rule and noticed). Individual permits normally are those allocating at least 0.1 million gallons per day (mgd) of water (averaged annually). Regional exceptions exist, such as the South Dade Agricultural Area, where Individual permits are issued for allocations of at least 0.3 mgd, and the Lower West Coast, where Individual permits are issued for groundwater allocations of at least 0.01 mgd. General permits by rule include landscape irrigation at a single-family dwelling or duplex, on-site short-term dewatering, and

closed-loop systems. Noticed General permits typically are for water users consuming less than 0.1 mgd that meet certain other requirements. Users with General permits (whether by rule or noticed) are not required to account for or report their water use.

Users with Individual permits typically are required to account for their water use and report a monthly volume used to the SFWMD. Individual permits are required to have a reliable, repeatable water use accounting system to record water use from all withdrawal facilities. For pumped systems, acceptable water use accounting systems include calibrated flowmeters or clocks that totalize pump operation. For gravity flow systems, acceptable methods include the use of rated water control structures in conjunction with certified structure rating curves. Water use accounting and calibration methods must be submitted as part of the permit application. Prior to the use of any authorized facility, the approved water use accounting method must be operating and the initial calibration submitted to the SFWMD. Recalibration results for the water use accounting method are required every 5 years (from the date of last calibration).

The water use of 19,455 permits was evaluated for calendar year 2016. In addition, there are 1,473 active permits for dewatering and 390 active permits for heating/cooling pools and for air conditioning units. These 390 permittees recirculate water in such a way that there is no net consumption (closed-loop system); therefore, these permits were not included in the total use estimates. Another 110 permits using surface water exist within the boundaries of the Everglades Agricultural Area (EAA), which were evaluated holistically and are discussed later. Finally, 34 permits were classified as "other" that cumulatively contribute a negligible volume (less than 0.8 mgd) and were disregarded.

WATER USE ESTIMATION METHODOLOGY

The most accurate way to determine the amount of water used each year would be to total the annual water use of every user. However, as described previously, not all water users are required to account for and report their annual use, and some users had not reported their water use at the time of this report. Recognizing these data deficiencies, this report utilized water use information from water users that had reported their use in 2016 and estimated the amount of water used by those who had not reported.

The specific water demands of each permittee are evaluated at the time of permit application, and each permittee has a calculated maximum volume of water allowed for use (i.e., a permit allocation). The annual permit allocation is determined by calculating the quantity of water to be withdrawn over a 12-month period under 1-in-10 year drought conditions for the associated use category. For agricultural irrigation users, it is the amount of water a crop needs to supplement the rainfall received during 1-in-10 year drought conditions. For other use categories, it is the quantity of water required by each component of demand for the particular use, which may include factors such as treatment losses; other sources of water; conservation practices; and water purchased, sold, or transferred. It is important to understand that the allocated permit volume for most categories is the water volume required by those users during 1-in-10 year drought conditions. Therefore, during 1-in-10 year drought conditions for the entire area of the District, the total water use for the District should approximate the summation of all the permit allocations. During a year when it is drier than 1-in-10 year drought conditions, additional water, even above the permit allocation, may be used. Water use in 2016 was less than the amount allocated in permits.

The amount of water reported as used in 2016 when compared to the permit allocation (as a percentage) should reflect the demands based on actual 2016 weather conditions. This percentage of reported use to the permit allocation was used as an analogue to obtain an estimate of use for permittees who did not report or were not required to report. For purposes of calculating the percentages, the time series of individual reported water use were scrutinized to ensure that gaps in monthly reporting were properly accounted for. Using a combination of reported and estimated water use for each permittee, the total amount of water used for each use category was estimated. Further information on specific methods by use category are described later in this document.

WATER SOURCES

This report estimates the volume of water withdrawn or diverted from groundwater and surface water sources. Reported pumpage data were ascribed to specific water sources (i.e., groundwater or surface water). All estimated data were assigned a source based on their related facility types. Permittees exclusively utilizing pumps to extract water are assigned as surface water users, and those exclusively using wells are designated as groundwater users. In cases where a permittee has both pumps and wells, the estimated volumes were split equally between the sources. More specific ratios were utilized for some of the larger agricultural users (greater than 1 mgd), where it was determined to be more appropriate. Some permits employ "recharge" facilities (almost exclusively groundwater sources), which provide recharge water to surface water bodies to be repumped, almost exclusively for irrigation use. In those cases, the volumes from each source were carefully evaluated to avoid double counting, with primacy given to groundwater sources.

As stated earlier, the use of reclaimed water is not regulated by water management districts. However, reclaimed water use is a key component of water resource management. The beneficial use of reclaimed water for irrigation and other uses has reduced the use of surface water and groundwater sources. Reclaimed water data are compiled separately in this report based on inventories produced by the FDEP from data submitted by utility providers. Reclaimed water users that did not report water withdrawals were assumed to have met all their water demands from a reclaimed water supplier and were not estimated individually. In the case where reclaimed water was partially used (reported) by a permittee, care was taken to ensure that only the volume from the groundwater or surface water source was counted to avoid double counting the reclaimed water volumes. Additional information on sources is provided under individual use categories later in this report.

WATER QUALITY

Water use estimates contained in this report are divided into fresh water and saline water. For the purposes of this report, the following terms and definitions from the Applicant's Handbook (SFWMD 2015) are used to define different water qualities:

- ***Freshwater*** is water with a chloride concentration ≤250 milligrams per liter (mg/L)
- ***Saline water*** is water with a chloride concentration between 250 and 19,000 mg/L
- ***Seawater*** or ***Saltwater*** is water with a chloride concentration ≥19,000 mg/L

In general, freshwater sources in the District include the Upper Floridan aquifer in the Kissimmee Basin; the surficial aquifer system in the Upper East Coast Planning Area; the Biscayne aquifer in the Lower East Coast Planning Area; the Lower Tamiami, Water Table, and Sandstone aquifers in the Lower West Coast Planning Area; and surface water upstream of coastal salinity water control structures. Saline water sources in the SFWMD include the Floridan aquifer system in the Upper East Coast, Lower East Coast, and Lower West Coast planning areas, while seawater sources include the Atlantic Ocean and Gulf of Mexico as well as connected tidal water bodies. Saline water and saltwater sources require blending with freshwater sources or desalination treatment prior to use as potable water or for irrigation. Only a fraction of the permits requires water quality testing to determine salinity. Therefore, the volumes reported as saline are only for permits known to require treatment or blending from known saline sources, primarily in the Public Water Supply (PWS) category and to a lesser extent the Recreational/Landscape Irrigation (REC) category. If the salinity of the source water and treatment/blending requirements are unknown, the water quantities are classified as fresh.

WATER SUPPLY CATEGORIES

Water use estimates in this report were developed for each of the following six water supply categories established by the FDEP for use in water supply planning:

- Public Water Supply (PWS)
- Domestic and Small Public Supply (DSS)
- Industrial/Commercial/Institutional (ICI)
- Agricultural Irrigation (AGR)
- Recreational/Landscape Irrigation (REC)
- Power Generation (PWR)

PWS includes treated potable water provided to some of the other use categories within a utility's service area boundaries. The other categories include users that are separately permitted and do not receive water from a utility but rather have their own water supply withdrawal facilities (e.g., wells, pumps, structures). These water supply categories are not identical to the use classes utilized in permitting. As a result, permitting use classes were combined in some cases to develop the water use estimate for the water supply categories used in this report.

Dewatering activities are not included in this report. Dewatering involves pumping water from an area to produce a dry working condition and includes withdrawals of water for construction activities, some mining operations, and minor uses such as exploratory testing, short-term remedial action plans, and aquifer performance tests. Water from dewatering activities normally is required to be retained on site such that losses are limited to evaporation, which are considered minimal compared to the volumes pumped. Furthermore, permits for dewatering are not given allocations (although General permits must comply with daily and annual withdrawal limits), and permittees generally are not required to report water use to the SFWMD.

There are 387 permits classified as industrial that utilize wells for their geothermal properties and are not included in this report. These "closed-loop" applications include air conditioning and swimming pool temperature regulation, which extract groundwater, pass it through a heat exchange unit, and then reinject the warm or cool water back into the ground. The result of the

closed-loop system operation effectively is a zero-balance withdrawal. Recent changes to water use rules have made these type systems a “no notice” permit such that they are no longer issued a permit number or tracked.

Diversion and Impoundment (D&I) permits usually are for large parcels of land that contain smaller users within their boundaries. These permittees divert surface water through pumps or control structures, or divert a combination of surface water and groundwater into a conveyance canal network system, to provide for the demands of secondary users and of consumptive and non-consumptive uses. There are 25 D&I permits outside of the EAA that exclusively serve agriculture, and 2 permits that partially serve agriculture. The estimated volumes are included in the AGR category. In addition, there are 9 D&I permits within the EAA whose water use is accounted for in the EAA estimate later in this report. Finally, 11 D&I permits primarily for recharging aquifer and canal networks, hydrating wetlands, maintaining salinity barriers along the coast, or providing fire protection were not included in the water use estimates of this report.

2016 WEATHER

Average historical (1915 to 2016) annual rainfall within the District is 52.09 inches. **Figure 2** presents the annual deviation from average rainfall over the past century. From 2006 to 2016, average annual rainfall within the District varied by 16 inches; the driest year was 2006 with 40.74 inches (22 percent below average), and the wettest year was 2016 with 56.73 inches (9 percent above average). However, a Districtwide average number does not tell the whole story as rainfall varies not only by year but also by month and location. The District typically receives two-thirds of its annual rainfall between May and October (**Figure 3**). **Figure 4** presents the rainfall amounts received by each basin within the District for 2016.

DATA SOURCES

The primary sources of data for this report are permittee-reported monthly pumpage volumes recorded in the SFWMD’s regulatory database (RegDB). Quarterly and semiannual reporting of monthly data generally is required for all permittees with permit quantities of 0.1 mgd or greater. Monthly pumpage data are collected using calibrated flowmeters or other approved water use accounting methods. Estimates of water use were made for permittees who had not reported based on the assumptions described in the methodology section earlier and in the specific use category sections that follow. Rainfall data were provided by the SFWMD’s Operations Section.

For this report, water use estimates are based on RegDB queries performed on August 10, 2017. Data for all use categories were obtained for active permits through December 31, 2016. Analysis of reported water use was performed by specialists within the SFWMD’s Water Supply Development Section to compile the best available data. However, the SFWMD cannot guarantee the validity of the reported data or that permittees have used consistent measurement techniques or quality control standards in their data collection and reporting. Additionally, sources of data used for this report may be updated after publication.

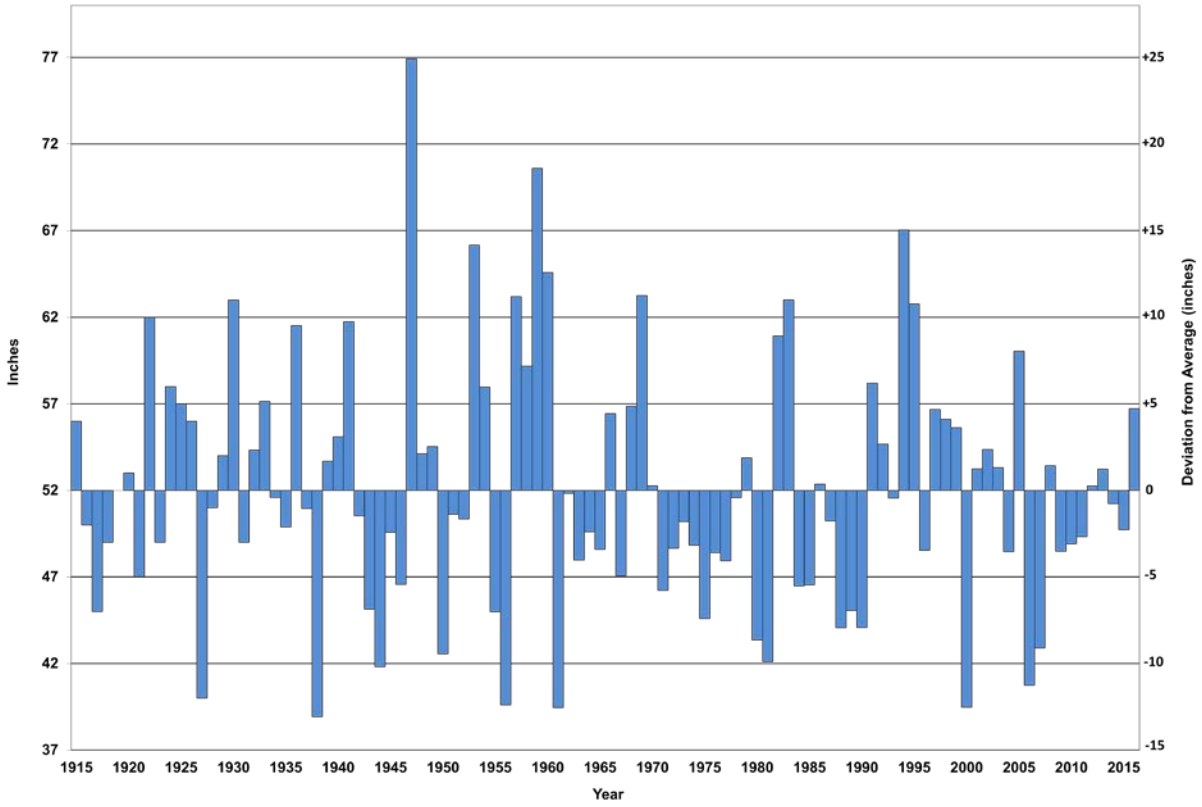


Figure 2. SFWMD Annual Difference from Average Rainfall (1915-2016)

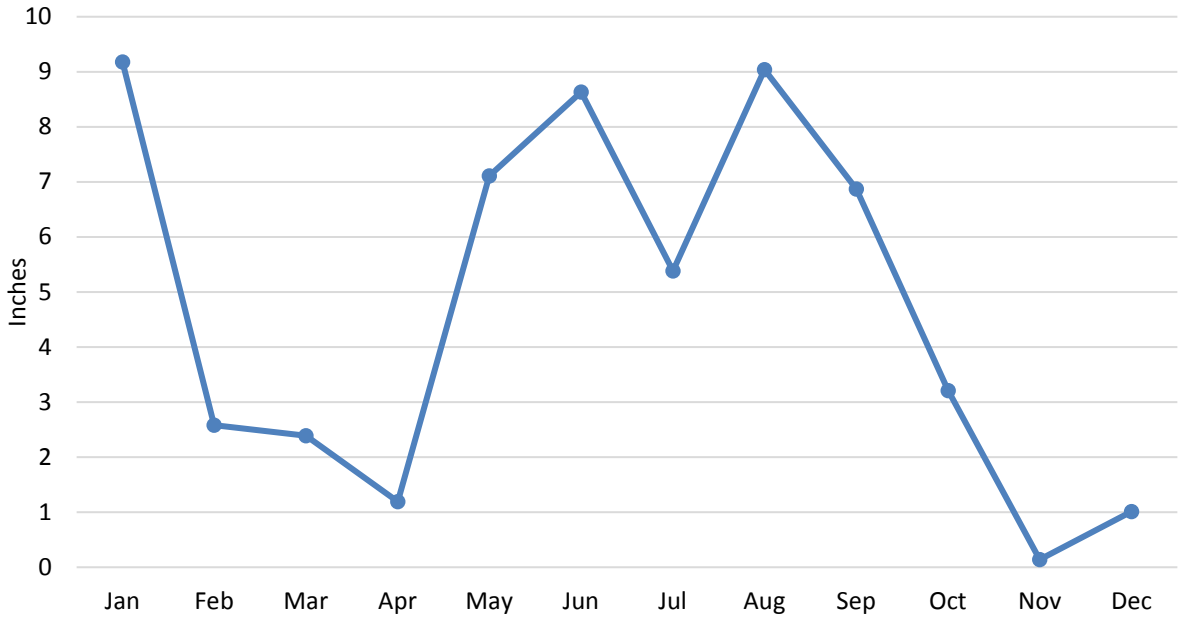


Figure 3. 2016 Average District Monthly Rainfall Distribution

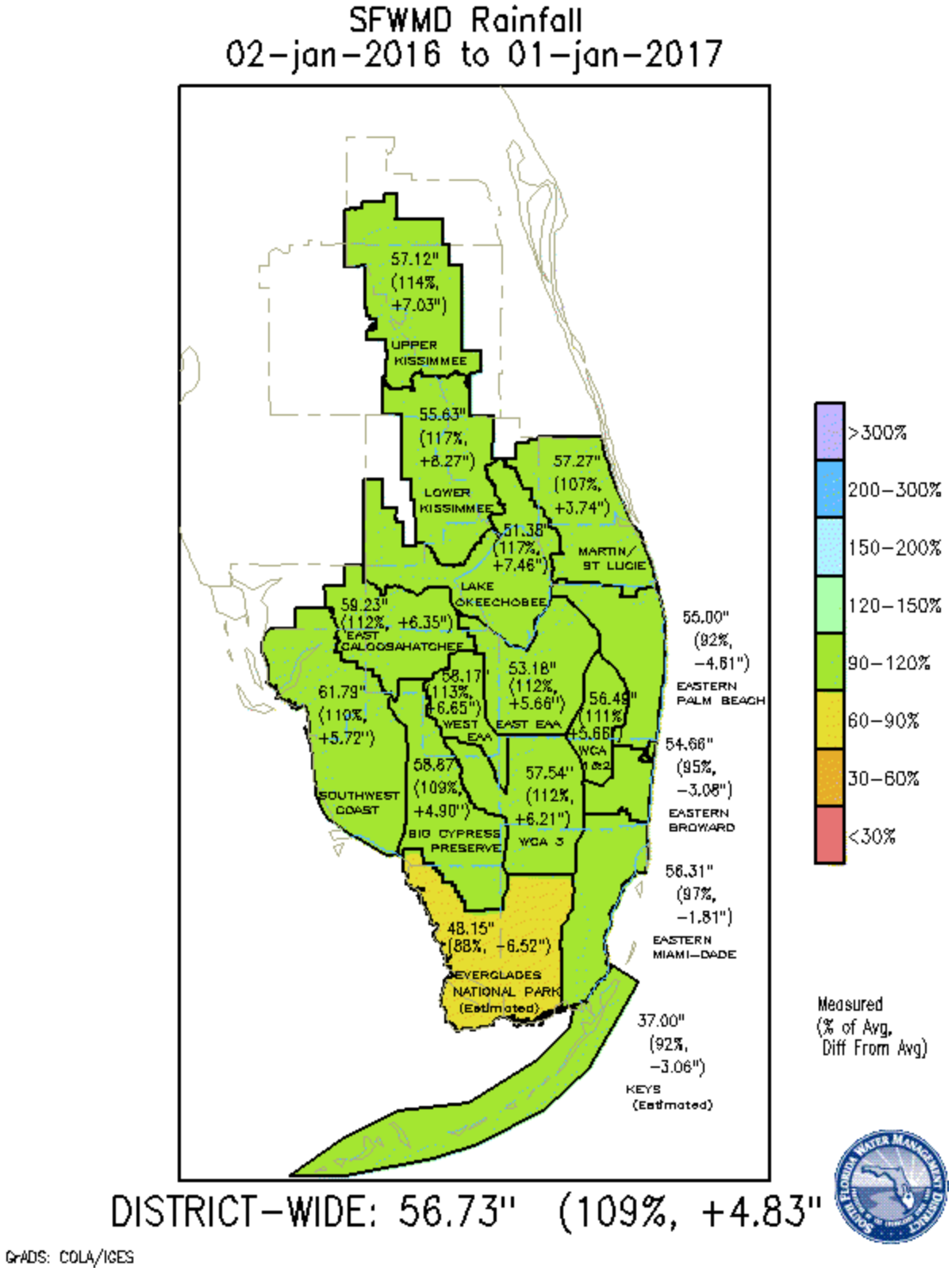


Figure 4. SFWMD 2016 Rainfall Distribution Map

2016 ESTIMATED WATER USE BY CATEGORY

Water use was estimated by category from fresh, saline, and reclaimed water sources and reported as an average (in mgd, unless noted otherwise).

Public Water Supply

Water withdrawn, treated, and delivered to service areas within the SFWMD by privately and publicly owned water supply utilities (or systems) is defined as Public Water Supply (PWS). This encompasses water supplied by water treatment facilities for potable use (i.e., drinking quality) with projected average pumpage rates of 0.1 mgd or greater. The volumes reported represent gross (raw) water withdrawn before treatment and distribution losses. In 2016, there were 126 active PWS permits (0.1 mgd or greater) serving an estimated 7.72 million people (93 percent of the total District population). PWS utilities and users classified as PWS using less than 0.1 mgd are included in the DSS category. PWS demand often fluctuates during the year in response to seasonal rainfall and variations in temperature as well as seasonal and tourist populations. For 2016, the total water use for PWS was 1,093.41 mgd, with 85 percent coming from freshwater sources and 15 percent coming from saline water sources. Groundwater contributed 89 percent of the water, and surface water accounted for the remaining 11 percent. **Table 1** presents total water use Districtwide and by county for fresh and saline water from groundwater and surface water sources in the PWS category.

Table 1. Public Water Supply (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	213.62	12.61	0.00	226.22	**226.22**	25
Charlotte	0.08	0.00	0.00	0.08	**0.08**	3
Collier	20.41	35.71	7.34	48.78	**56.12**	11
Glades	0.44	0.00	0.00	0.44	**0.44**	2
Hendry	0.55	2.80	0.00	3.35	**3.35**	4
Highlands	0.00	0.25	0.00	0.25	**0.25**	2
Lee	26.29	41.20	2.34	65.15	**67.50**	14
Martin	8.42	11.54	0.00	19.96	**19.96**	8
Miami-Dade	329.69	13.32	0.00	343.01	**343.01**	7
Monroe[2]	0.00	0.00	0.00	0.00	**0.00**	0
Okeechobee	2.70	0.09	2.11	0.68	**2.79**	2
Orange	39.15	0.00	0.00	39.15	**39.15**	7
Osceola	41.03	0.00	0.02	41.02	**41.03**	8
Palm Beach	233.55	26.86	108.74	151.67	**260.41**	19
Polk	2.63	0.00	0.00	2.63	**2.63**	5
St. Lucie	8.18	22.30	0.00	30.48	**30.48**	9
Total	**926.74**	**166.67**	**120.55**	**972.87**	**1,093.41**	**126**

[1] Values are only for the portions of the county located within the SFWMD.
[2] The Florida Keys Aqueduct Authority (FKAA) serves the Florida Keys in Monroe County. Because the FKAA's wellfields are located in Miami-Dade County, the volume delivered to Monroe County (17.70 mgd of groundwater [17.17 mgd fresh and 0.53 mgd saline]) is included in the Miami-Dade County totals.

Domestic and Small Public Supply

Domestic and Small Public Supply (DSS) is primarily for individual residences located in rural areas without access to a PWS system, and often is provided by small shallow private wells. Domestic consumption at single-family and duplex residences is exempt from water use permitting and reporting. Landscape irrigation at a single-family dwelling or duplex is granted a General permit by rule. For reporting purposes, the DSS category includes PWS utilities and users classified as public water supply withdrawing less than 0.1 mgd. These typically serve a limited number of households (e.g., a small subdivison or mobile home park). Other small self-supply permits classified as PWS are for domestic indoor use (and possibly landscape irrigation) at a single structure such as a sales trailer, small office, or convenience store. There were 1,030 permits for PWS with an allocation less than 0.1 mgd in 2016. All water volumes reported under the DSS category are considered fresh groundwater.

Because DSS residential users are not required to report their use, estimations for the DSS category are based on county population data and the PWS per capita use within each county. The DSS demand estimate was calculated by multiplying the 2016 DSS county populations by the 2016PWS Districtwide uniform residential per capita use rate (PCUR). The 2016 PWS Districtwide uniform residential PCUR was derived from water use reported by utilities to the SFWMD as part of their annual reporting required pursuant to Section 373.709(6), Florida Statutes. **Appendix A** contains further information regarding population, PCURs, and self-supplied use calculations.

The 2016 total water use for DSS was estimated to be 41.11 mgd, with 100 percent coming from fresh groundwater sources. **Table 2** presents total water use by county for fresh and saline water from groundwater and surface water sources in the DSS category.

Table 2. Domestic and Small Public Supply (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits[2]
Broward	0.88	0.00	0.00	0.88	**0.88**	22
Charlotte	0.00	0.00	0.00	0.00	**0.00**	5
Collier	4.21	0.00	0.00	4.21	**4.21**	68
Glades	0.51	0.00	0.00	0.51	**0.51**	27
Hendry	1.09	0.00	0.00	1.09	**1.09**	66
Highlands	0.52	0.00	0.00	0.52	**0.52**	26
Lee	12.19	0.00	0.00	12.19	**12.19**	130
Martin	0.95	0.00	0.00	0.95	**0.95**	104
Miami-Dade	1.92	0.00	0.00	1.92	**1.92**	88
Monroe	0.00	0.00	0.00	0.00	**0.00**	0
Okeechobee	1.34	0.00	0.00	1.34	**1.34**	82
Orange	0.59	0.00	0.00	0.59	**0.59**	17
Osceola	6.54	0.00	0.00	6.54	**6.54**	91
Palm Beach	5.86	0.00	0.00	5.86	**5.86**	152
Polk	1.52	0.00	0.00	1.52	**1.52**	24
St. Lucie	2.99	0.00	0.00	2.99	**2.99**	128
Total	**41.11**	**0.00**	**0.00**	**41.11**	**41.11**	**1,030**

[1] Values are only for the portions of the county located within the SFWMD.
[2] PWS permits less than 0.1 mgd included.

Industrial/Commercial/Institutional

Industrial/Commercial/Institutional (ICI) consists of self-supplied water consumed by business operations. Industrial facility uses include processing and manufacturing, dust control, maintenance, cleaning, and washing. Groundwater remediation projects also are classified as an industrial use. Commercial facilities under the ICI category include office complexes, hotels, restaurants, gas stations, car washes, laundromats, and theme parks and zoos, among others. Some larger institutions such as schools, hospitals, and prisons also are included in the ICI category primarily for heating, ventilation, and cooling (HVAC) system operations. Water use for ICI facilities receiving water from PWS utilities (i.e., not self-supplied) are included in the PWS category. ICI does not include water used for power generation.

Mining is included in the ICI use category. The mining uses reported herein include dust suppression, non-recycled water use as part of on-site mining processes, water entrained within commercial products, and minor volumes for potable/sanitary use by on-site employees. The volumes reported do not include recycled surface water or dewatering volumes, which are separately permitted under the dewatering use class and not included in this report.

The estimated water volumes were based on the ratio of reported pumpage to allocation for permittees who did report (29 percent for ICI), multiplied by the allocation of the permits that did not report. Permittees reporting no water use were included in the dataset when determining the percentage pumpage rate to apply to the estimated permits.

The ICI category includes 27 mining and 52 industrial permits that have an allocation of 0.1 mgd or greater, and 551 permits with an allocation less than 0.1 mgd. The total 2016 water use for ICI was 92.6 mgd, with fresh groundwater contributing 40 percent and fresh surface water contributing 60 percent. Industrial use accounted for 13.6 mgd (15 percent) and mining use accounted for 78.9 mgd (85 percent) of the total ICI use. **Table 3** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the ICI category. Further detail is provided in **Appendix B**.

Table 3. Industrial/Commercial/Institutional (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	2.36	0.00	0.14	2.22	**2.36**	89
Charlotte	0.08	0.00	0.00	0.08	**0.08**	7
Collier	1.88	0.00	1.00	0.88	**1.88**	76
Glades	14.43	0.00	14.23	0.20	**14.43**	10
Hendry	2.43	0.00	0.01	2.42	**2.43**	38
Highlands	0.13	0.00	0.01	0.12	**0.13**	15
Lee	17.79	0.00	17.42	0.37	**17.79**	91
Martin	1.38	0.00	0.87	0.51	**1.38**	35
Miami-Dade	42.97	0.00	16.50	26.47	**42.97**	74
Monroe	0.00	0.00	0.00	0.00	**0.00**	1
Okeechobee	0.16	0.00	0.02	0.14	**0.16**	21
Orange	2.01	0.00	0.00	2.01	**2.01**	15
Osceola	0.09	0.00	0.00	0.09	**0.09**	18
Palm Beach	6.59	0.00	4.89	1.70	**6.59**	111
Polk	0.03	0.00	0.00	0.03	**0.03**	2
St. Lucie	0.23	0.00	0.10	0.13	**0.23**	27
Total	**92.56**	**0.00**	**55.20**	**37.35**	**92.56**	**630**

[1] Values are only for the portions of the county located within the SFWMD.

Agricultural Irrigation

Agricultural Irrigation (AGR) includes water used for commercial crop irrigation, nurseries, livestock watering, pasture, and aquaculture. AGR estimates were based on the methodology described in the *Water Use Estimation Methodology* section of this report, with the following exceptions:

- For the agriculture and nursery permitting use classes, reported water use to permitted allocation ratios were determined by water supply planning regions to take regional weather effects into account.
- For the aquaculture permitting use class, the ratio of use multiplier (64 percent) was based on the three out of four permittees who reported their use. All others were estimated using that ratio of use multiplier.
- For the livestock permitting use class, users in three of the four regions reported. All permittees that did not report were estimated using a ratio of use multiplier based on the three regions that reported (58 percent).

The AGR category included 3,897 permits, including 2,299 agriculture, 870 nursery, 498 livestock, and 84 aquaculture permits. The AGR category also includes water used by 27 D&I permits that serve agricultural operations. Additionally, the AGR category includes 119 permits within the EAA.

Everglades Agricultural Area (EAA)

The EAA is located south of Lake Okeechobee and was created from drainage of the northern Everglades. The EAA encompasses approximately 700,000 acres (1,158 square miles) of highly productive agricultural land and land used by the District for water storage and treatment (e.g., Stormwater Treatment Areas). The agricultural land is mostly sugar cane interspersed with winter vegetables, sod, and rice. The EAA extends south from Lake Okeechobee to the northern levee/boundary of Water Conservation Area 3A, from its eastern boundary at the L-8 canal to the western boundary along the L-1, L-2, and L-3 levees (**Figure 5**). Four major canals (West Palm Beach, Hillsboro, North New River, and Miami) pass through the EAA and supply agricultural irrigation, mainly through gravity release from Lake Okeechobee. The primary irrigation method in the EAA is seepage irrigation. Farmers utilize a set of secondary and tertiary canals to distribute surface water from gated culverts and pumps to their respective fields. Flows from Lake Okeechobee into the canals are from structures S-351, S-352, and S-354. Runoff (outflow from the EAA) from the four canals to the Stormwater Treatment Areas are discharged through pump structures S-5A, S-6, G-370, G-372, G-434, and G-435.

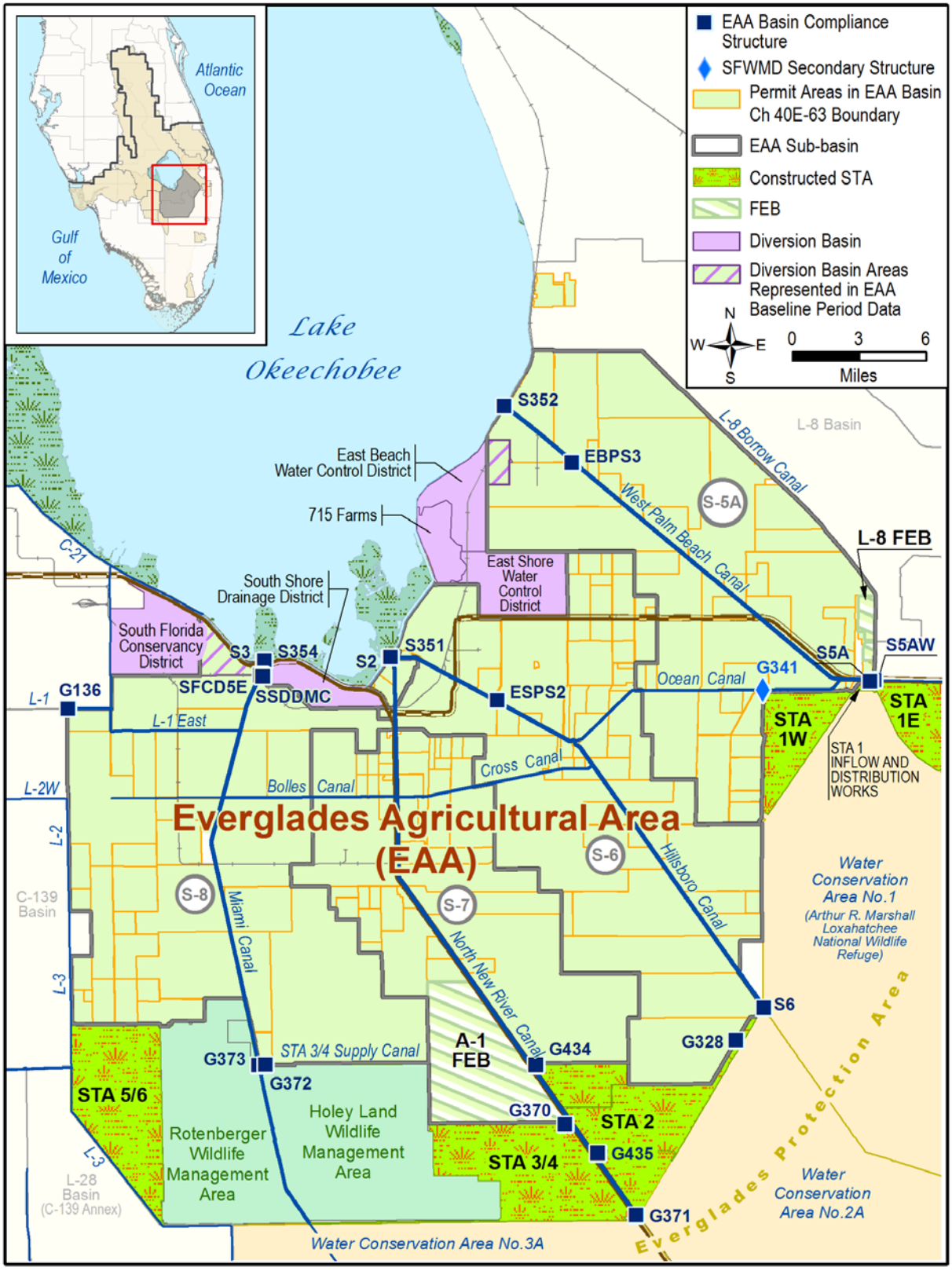


Figure 5. Map of the Everglades Agricultural Area

Daily records of the water volumes into and out of these structures are kept such that a surface water demand volume of the EAA can be estimated using a water balance method. The Engineering Support Unit of the SFWMD's Everglades Technical Support Bureau calculated total water demands within the EAA as 348.52 mgd for 2016. Within the EAA, there are 4 agricultural permits in Hendry County and 83 permits in Palm Beach County utilizing surface water sources, serving 359,485 acres (562 square miles) of agriculture. There is 1 D&I permit in the EAA in Hendry County and 8 D&I permits in Palm Beach County, serving 99,290 acres (155 square miles) of primarily agricultural land. Also included in this surface water delivery volume are 23 permits for industrial, golf, and landscape areas that utilize surface water. Agricultural permits within the EAA that only utilize groundwater sources are not included in this estimated volume but are included in the overall AGR water use estimates. For simplification, all permits located within the EAA are reported as being in Palm Beach County.

The total 2016 water use for AGR, including the EAA, was 1,040.12 mgd. Of this total volume, agriculture (crop irrigation) outside the EAA accounted for 488.56 mgd (47 percent); agriculture in the EAA was 348.52 mgd (34 percent); agriculture within D&I areas was 171.21 mgd (16 percent); and aquaculture, livestock, and nursery combined were 31.82 mgd (3 percent). The water was derived from fresh surface water sources (72 percent) and fresh groundwater sources (28 percent). **Table 4** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the AGR category. Further detail is provided in **Appendix B**.

Table 4. Agricultural Irrigation (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	2.23	0.00	1.60	0.63	**2.23**	115
Charlotte	4.73	0.00	3.09	1.63	**4.73**	20
Collier	79.43	0.00	2.85	76.59	**79.43**	171
Glades	78.02	0.00	72.01	6.01	**78.02**	141
Hendry	270.43	0.00	174.78	95.65	**270.43**	284
Highlands	38.57	0.00	10.88	27.69	**38.57**	196
Lee	20.13	0.07	3.91	16.30	**20.21**	315
Martin	90.79	0.00	82.95	7.84	**90.79**	209
Miami-Dade	23.03	0.00	0.19	22.84	**23.03**	1,116
Monroe	0.02	0.00	0.00	0.02	**0.02**	1
Okeechobee	12.53	0.00	1.77	10.77	**12.53**	208
Orange	0.18	0.00	0.05	0.13	**0.18**	25
Osceola	7.96	0.00	0.42	7.55	**7.96**	140
Palm Beach	369.27	0.00	365.22	4.05	**369.27**	576
Polk	2.13	0.00	0.84	1.29	**2.13**	32
St. Lucie	40.60	0.00	26.20	14.40	**40.60**	348
Total	**1,040.04**	**0.07**	**746.75**	**293.37**	**1,040.12**	**3,897**

[1] Values are only for the portions of the county located within the SFWMD.

Recreational/Landscape Irrigation

Recreational/Landscape Irrigation (REC) is water used for irrigation of golf courses, parks, cemeteries, large common areas (such as homeowners' associations and commercial developments), and other self-supplied irrigation uses with demands of 0.1 mgd or greater. The volumes reflect those reported plus an estimated volume based on the ratio (percentage) of reported pumpage to allocation for permittees who did report multiplied by the allocation of the permits that did not report. A percentage was calculated for each planning area to take regional weather effects into account.

There were 13,184 permits for landscape irrigation and 312 permits for golf courses in 2016. An additional 10 permits, classified as PWS, were used for augmentation of reclaimed water (or other water sources) for landscape irrigation use and are included in the REC category. Total water use for REC was 254.84 mgd for 2016. Of this, landscape irrigation accounted for 175.09 mgd (69 percent), golf course irrigation was 75.28 mgd (29 percent), and reclaimed water supplementation for irrigation use was 4.47 mgd (2 percent). Surface water was used for 45 percent of the total water use and groundwater was 55 percent. There were 10 golf and 4 landscape permits, utilizing a total of 4.56 mgd of saline water. **Table 5** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the REC category. Further detail is provided in **Appendix B**.

Table 5. Recreational/Landscape Irrigation (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	43.79	0.16	24.50	19.46	**43.95**	2,891
Charlotte	0.04	0.00	0.01	0.03	**0.04**	7
Collier	38.19	0.00	16.50	21.69	**38.19**	904
Glades	3.16	0.00	0.83	2.33	**3.16**	29
Hendry	0.43	0.00	0.12	0.31	**0.43**	101
Highlands	0.14	0.27	0.10	0.31	**0.41**	16
Lee	22.78	0.00	8.05	14.74	**22.78**	2,394
Martin	28.44	1.03	9.60	19.87	**29.46**	802
Miami-Dade	15.61	0.00	5.28	10.33	**15.61**	1,095
Monroe	0.72	0.36	0.20	0.88	**1.08**	3
Okeechobee	0.96	0.00	0.32	0.64	**0.96**	132
Orange	6.63	0.00	0.89	5.74	**6.63**	203
Osceola	6.40	0.00	0.74	5.67	**6.40**	192
Palm Beach	73.18	2.71	42.35	33.55	**75.90**	3,825
Polk	1.15	0.00	0.00	1.15	**1.15**	16
St. Lucie	8.67	0.03	4.38	4.31	**8.70**	896
Total	**250.28**	**4.56**	**113.86**	**140.98**	**254.84**	**13,506**

[1] Values are only for the portions of the county located within the SFWMD.

Power Generation

Power Generation (PWR) is water consumed by power plants for use in the production of electricity. The volume reported is for a variety of on-site uses and does not include once-through cooling water. It can include both fresh and saline water but excludes the use of seawater and reclaimed water sources. The total 2016 water use for PWR was 9.30 mgd, with 34 percent coming from freshwater sources and 66 percent coming from saline water sources. Groundwater contributed 89 percent of the water, and surface water contributed the remaining 11 percent. **Table 6** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the PWR category.

Table 6. Power Generation (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits[2]
Lee	0.56	0.00	0.00	0.56	**0.56**	2
Martin	1.17	0.00	1.04	0.13	**1.17**	2
Miami-Dade	0.00	6.13	0.00	6.13	**6.13**	1
Palm Beach	0.10	0.00	0.00	0.10	**0.10**	1
St. Lucie	1.34	0.00	0.00	1.34	**1.34**	1
Total	**3.17**	**6.13**	**1.04**	**8.26**	**9.30**	**7**

[1] Values are only for the portions of the county located within the SFWMD.
[2] Power generation facilities are permitted by the FDEP under the Power Plant Siting Act ss.403.501-.518, F.S.

A substantial volume of saline/ocean water is used for once-through cooling at power plants, primarily in coastal areas of the District. The once-through cooling volumes are considered non-consumptive and are being provided for informational purposes only. The total 2016 water use reported to the SFWMD for once-through cooling for PWR was 3,283 mgd. Of this volume, 3,262 mgd were saline water and the remaining 21 mgd were fresh water. Only 7.1 mgd of the total water were derived from groundwater.

Reclaimed Water

Reclaimed water is water flowing out of a domestic wastewater treatment facility that has received at least secondary treatment as well as basic disinfection and is reused for some beneficial purpose. The SFWMD requires all applicants for water use permits proposing to irrigate with 0.1 mgd or greater of water and applicants within a municipal mandatory reuse zone to use reclaimed water, if feasible. However, reclaimed water is not a regulated source for consumptive use. Annual wastewater and reclaimed water volumes are compiled by the FDEP and reported here for informational purposes. In 2016, 276.17 mgd of reclaimed water were used in the District. Of this, 228.43 mgd were reused for four of the six water supply categories, and 47.74 mgd were reused for groundwater recharge and other non-consumptive water use purposes. **Tables 7** to **9** as well as **Figures 6** and **7** present reclaimed water use by county and use category.

Table 7. Reclaimed Water Use (in mgd) by County and Use Types (From: FDEP 2017)

County	Reclaimed Water Flow[1]	Industrial/ Commercial/ Institutional[2]	Agricultural Irrigation[3]	Recreational/ Landscape Irrigation[4]	Power Generation[5]
Broward	16.18	7.63	0.00	8.15	0.40
Charlotte[6]	0.11	0.11	0.00	0.00	0.00
Collier	20.09	0.00	0.17	19.92	0.00
Glades	0.00	0.00	0.08	0.00	0.00
Hendry	1.40	0.00	1.40	0.00	0.00
Highlands[6]	0.04	0.00	0.04	0.00	0.00
Lee	46.54	0.33	0.06	45.19	0.96
Martin	3.70	0.31	0.00	3.26	0.13
Miami-Dade	17.01	16.28	0.00	0.73	0.00
Monroe	0.29	0.01	0.00	0.28	0.00
Okeechobee	0.52	0.04	0.48	0.00	0.00
Orange[6]	42.49	3.81	2.16	36.48	0.04
Osceola	16.56	0.01	0.07	14.08	2.40
Palm Beach	59.47	3.72	0.00	41.94	13.81
Polk[6]	0.08	0.00	0.08	0.00	0.00
St. Lucie	3.95	0.25	0.00	3.70	0.00
Total	**228.43**	**32.50**	**4.46**	**173.73**	**17.74**

Note: Reclaimed water was not used for PWS or DSS.

[1] Reclaimed water flows as reported in the FDEP 2016 Reuse Inventory (FDEP 2017), not including 47.74 mgd for groundwater recharge and other non-water-use purposes.

[2] Industrial reuse (excluding power generation).

[3] Edible and other crops.

[4] All public access areas and landscape irrigation.

[5] Reclaimed water flow to power generation facilities based on "at other facility" use type in the FDEP 2016 Reuse Inventory (FDEP 2017).

[6] Values are only for the portions of the county located within the SFWMD.

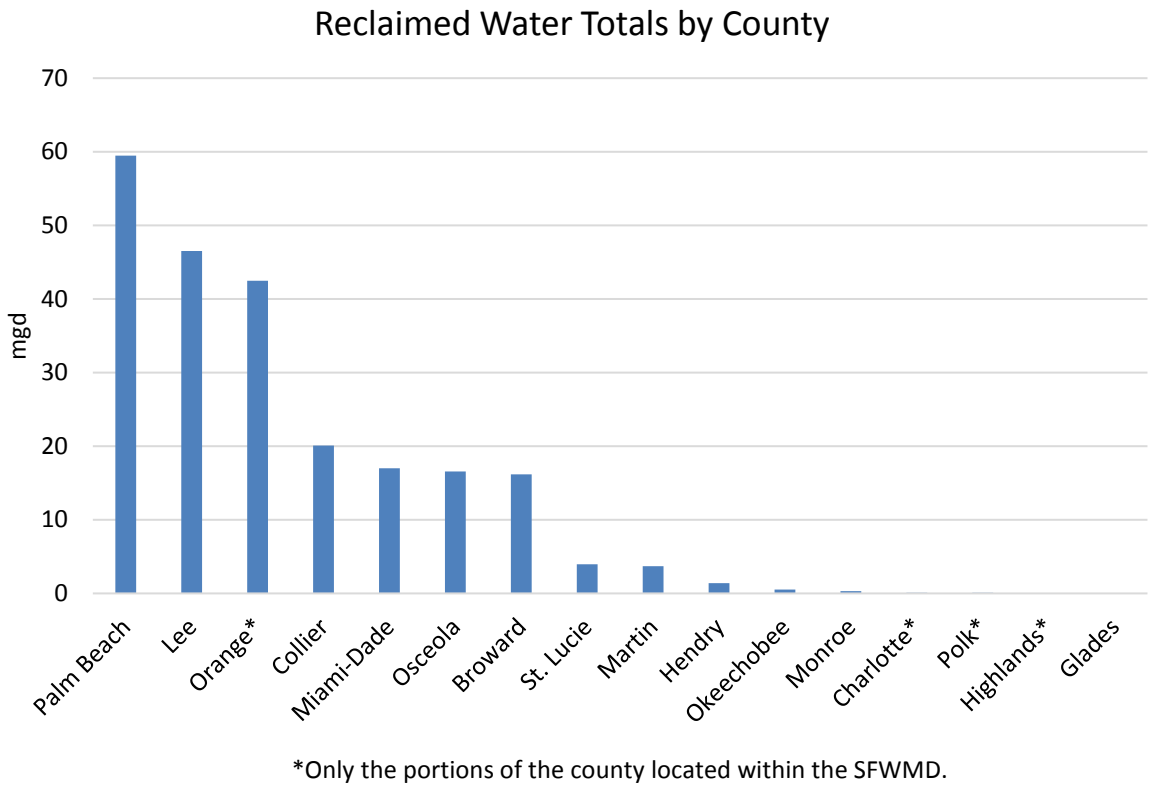


Figure 6. Reclaimed Water Reused by County

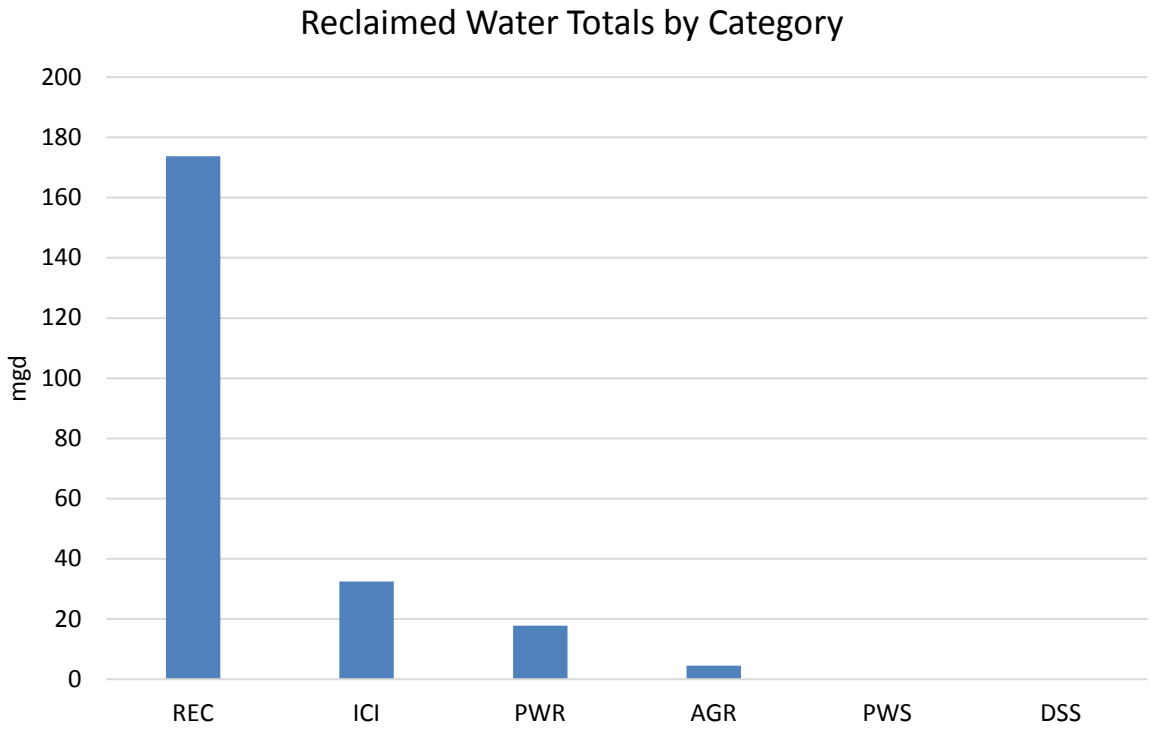


Figure 7. Reclaimed Water Reused by Category

SUMMARY OF 2016 ESTIMATED WATER USE

The total amount of water withdrawn from groundwater and surface water resources in 2016 within the District was approximately 2,531 mgd (**Table 8**). The two largest water use categories were AGR and PWS, using 1,040 mgd and 1,093 mgd, respectively. These two categories constitute 84 percent of the total water use. Of the total use, 1,037 mgd (41 percent) came from surface water and 1,494 mgd (59 percent) came from groundwater sources (**Figure 8**). Approximately 2,354 mgd (93 percent) were withdrawn from fresh water sources and 177 mgd (7 percent) were derived from saline water sources. In addition, reclaimed water use totaled 228 mgd in 2016. Of the total 2,531 mgd, 19 percent (473.42 mgd) was estimated and 81 percent (1,957.93 mgd) was derived from reported pumpage (**Appendix C**). PWS is largest in Miami-Dade County, while Palm Beach County has the largest estimated AGR volume. Palm Beach County also has the greatest use of reclaimed water by volume.

Figure 9 depicts the percentage of total water use by category. **Table 9** presents the breakdown of water use by county of fresh, saline, surface, and groundwater. **Figure 10** depicts fresh water versus saline water use by county. **Figure 11** depicts surface water versus groundwater by county. **Table 10** presents the breakdown of water used by county and by use category (excluding reclaimed water).

Table 8. Total Water Use by Category and Source – Including Reclaimed Water – (in mgd)[1]

Water Use Category	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Reclaimed Water	**Total Use with Reclaimed Water**
Agricultural Irrigation	1,040.04	0.07	746.75	293.37	**1,040.12**	4.46	**1,044.58**
Public Water Supply	926.74	166.67	120.55	972.87	**1,093.41**	0.00	**1,093.41**
Recreational/Landscape Irrigation	250.28	4.56	113.86	140.98	**254.84**	173.73	**428.57**
Industrial/Commercial/Institutional	92.56	0.00	55.20	37.35	**92.56**	32.50	**125.06**
Power Generation	3.17	6.13	1.04	8.26	**9.30**	17.74	**27.04**
Domestic and Small Public Supply	41.11	0.00	0.00	41.11	**41.11**	0.00	**41.11**
Total	**2,353.90**	**177.44**	**1,037.40**	**1,493.94**	**2,531.34**	**228.43**	**2,759.77**

[1] Values are only for the portions of the county located within the SFWMD.
Note: Minor discrepancies in table totals are due to rounding.

Figure 8. Water Use by Source and Category

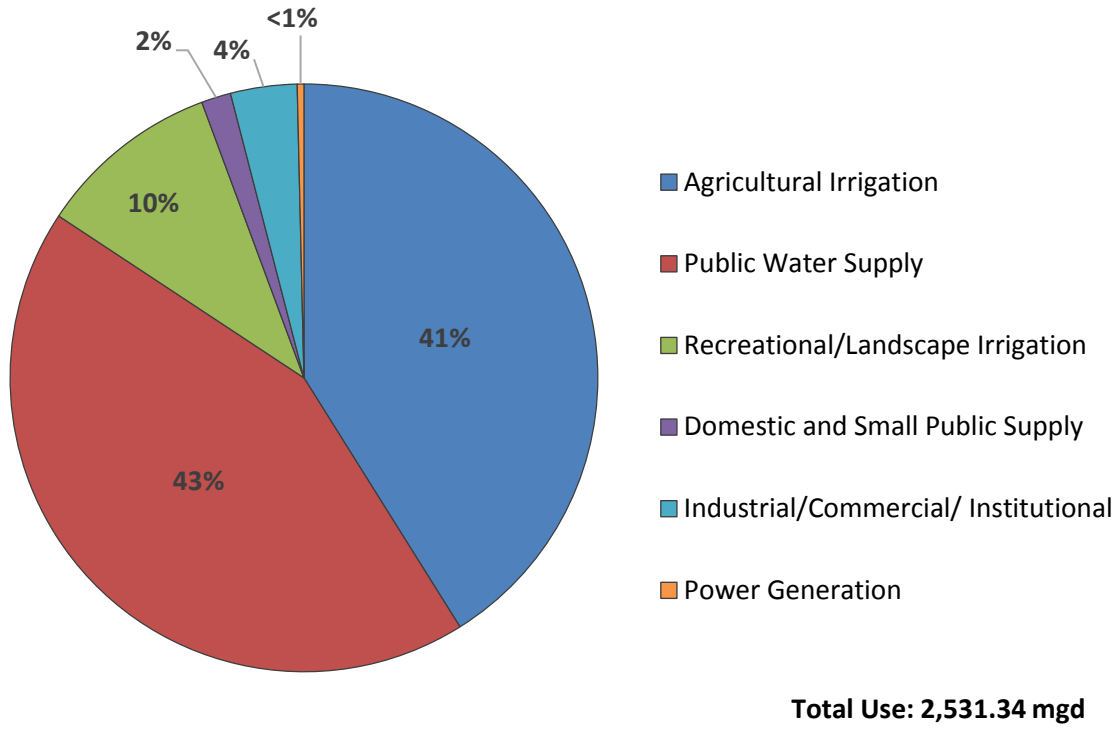


Figure 9. Percentage Water Use by Category

Table 9. Total Water Use by County and Source (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Reclaimed Water	**Total Use with Reclaimed Water**
Broward	262.88	12.77	26.23	249.41	**275.65**	16.18	**291.83**
Charlotte	4.93	0.00	3.11	1.82	**4.93**	0.11	**5.04**
Collier	144.12	35.71	27.69	152.14	**179.83**	20.09	**199.92**
Glades	96.56	0.00	87.08	9.49	**96.56**	0.00	**96.56**
Hendry	274.93	2.80	174.91	102.81	**277.72**	1.40	**279.12**
Highlands	39.35	0.52	10.99	28.89	**39.88**	0.04	**39.92**
Lee	99.75	41.28	31.72	109.31	**141.03**	46.54	**187.57**
Martin	131.14	12.57	94.46	49.25	**143.71**	3.70	**147.41**
Miami-Dade	413.22	19.45	21.98	410.70	**432.68**	17.01	**449.69**
Monroe	0.74	0.36	0.20	0.90	**1.10**	0.29	**1.39**
Okeechobee	17.69	0.09	4.22	13.56	**17.77**	0.52	**18.29**
Orange	48.55	0.00	0.94	47.61	**48.55**	42.49	**91.04**
Osceola	62.03	0.00	1.17	60.86	**62.03**	16.56	**78.59**
Palm Beach	688.55	29.57	521.19	196.93	**718.12**	59.47	**777.59**
Polk	7.45	0.00	0.84	6.61	**7.45**	0.08	**7.53**
St. Lucie	62.01	22.33	30.69	53.66	**84.34**	3.95	**88.29**
Total	**2,353.90**	**177.44**	**1,037.40**	**1,493.94**	**2,531.34**	**228.43**	**2,759.77**

[1] Values are only for the portions of the county located within the SFWMD.
Note: Minor discrepancies in table totals are due to rounding.

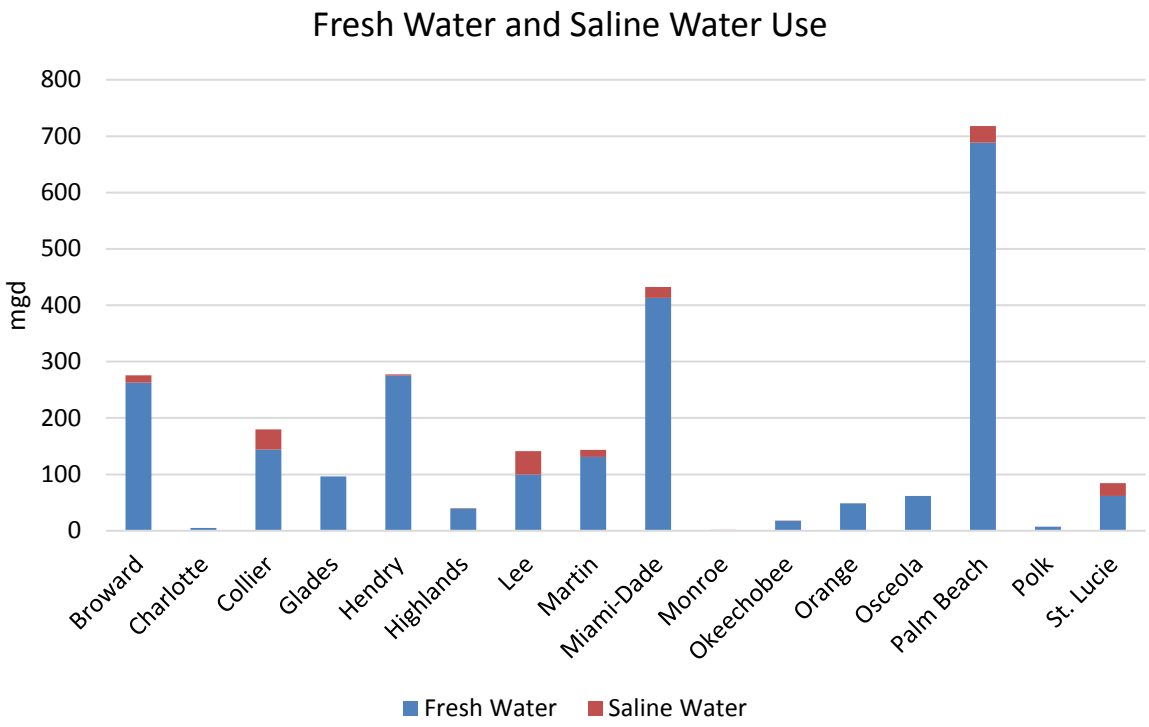


Figure 10. Fresh Water and Saline Water Use by County for All Use Categories

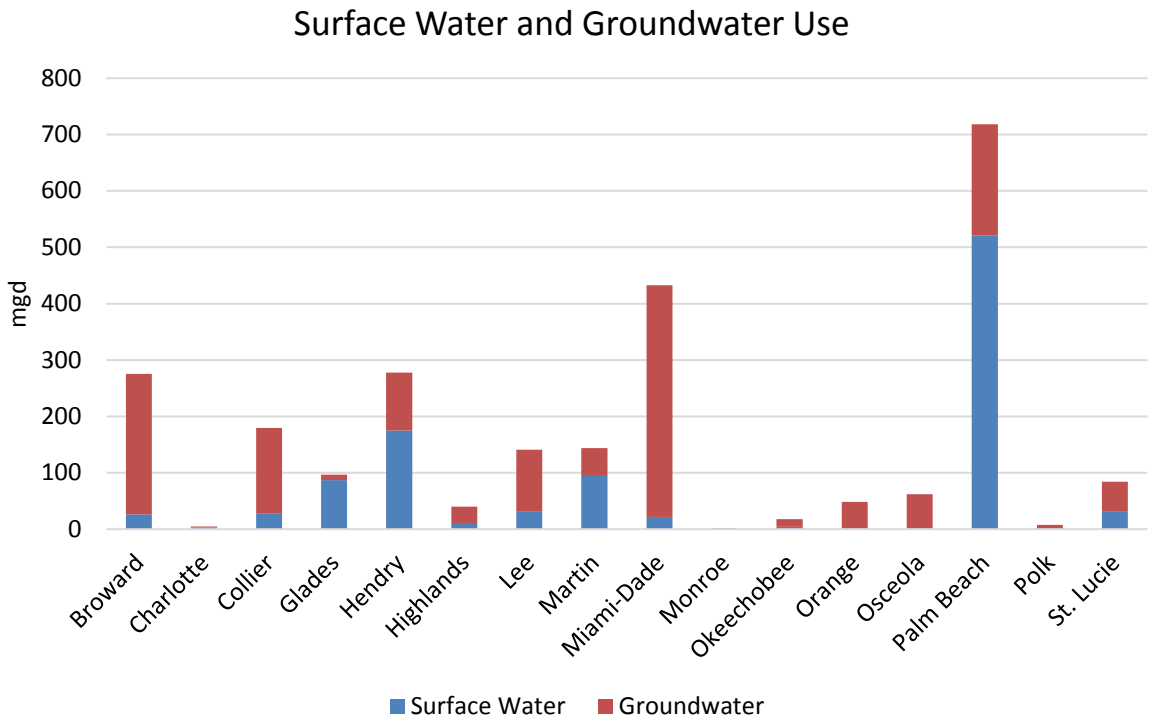


Figure 11. Surface Water and Groundwater Use by County for All Use Categories

Table 10. Total Water Use by County and Category – Excluding Reclaimed Water – (in mgd)[1]

County	Agricultural Irrigation	Industrial/ Commercial/ Institutional	Domestic and Small Public Supply	Recreational/ Landscape Irrigation	Power Generation	Public Water Supply	**Total**
Broward	2.23	2.36	0.88	43.95	0.00	226.22	**275.65**
Charlotte	4.73	0.08	0.00	0.04	0.00	0.08	**4.93**
Collier	79.43	1.88	4.21	38.19	0.00	56.12	**179.83**
Glades	78.02	14.43	0.51	3.16	0.00	0.44	**96.56**
Hendry	270.43	2.43	1.09	0.43	0.00	3.35	**277.72**
Highlands	38.57	0.13	0.52	0.41	0.00	0.25	**39.88**
Lee	20.21	17.79	12.19	22.78	0.56	67.50	**141.03**
Martin	90.79	1.38	0.95	29.46	1.17	19.96	**143.71**
Miami-Dade	23.03	42.97	1.92	15.61	6.13	343.01	**432.68**
Monroe	0.02	0.00	0.00	1.08	0.00	0.00	**1.10**
Okeechobee	12.53	0.16	1.34	0.96	0.00	2.79	**17.77**
Orange	0.18	2.01	0.59	6.63	0.00	39.15	**48.55**
Osceola	7.96	0.09	6.54	6.40	0.00	41.03	**62.03**
Palm Beach	369.27	6.59	5.86	75.90	0.10	260.41	**718.12**
Polk	2.13	0.03	1.52	1.15	0.00	2.63	**7.45**
St. Lucie	40.60	0.23	2.99	8.70	1.34	30.48	**84.34**
Total	**1,040.12**	**92.56**	**41.11**	**254.84**	**9.30**	**1,093.41**	**2,531.34**

[1] Values are only for the portions of the county located within the SFWMD.
Note: Minor discrepancies in table totals are due to rounding.

DISCUSSION OF RESULTS

This is the third year that the SFWMD has compiled an estimated water use report. Caution should be exercised when comparing water use estimates between this report and its predecessors as adjustments have been made to the water use estimation method. Notable changes to the methodology since the first report include the following:

- Industrial permits for geothermal heating/cooling were included in the first year (2014) estimate but have been removed from the water use calculations for 2015 and 2016.
- Several permits located within the EAA that rely solely on groundwater were estimated independently of permits that rely solely on surface water. Previous EAA estimates included all permits within the geographic area as surface water users.
- Neither reported pumpage over the allocation nor permits with no pumpage were removed (as was done the first year).
- The source split for estimated permits with both surface water and groundwater sources was calculated based on the percentage split on those with known sources reporting rather than an equal split as was done for the 2015 and 2016 data. This gives a better characterization of permits that utilize sources of water for recharge purposes.

Refinements in the methodology likely will continue for future reports in an effort to improve the accuracy of water use estimates.

When considering water use estimates and changes between years, it is important to recognize that the quantity and quality of reported water use data can vary over time and between water use categories. The PWS use category is unique in that nearly 100 percent of permittees submit monthly water use reports; however, estimates for other categories are calculated based on a much smaller proportion of permittees. Relying on a small and potentially non-representative portion of users inhibits the ability to make some conclusions with a high degree of confidence. This is particularly notable for the aquaculture, livestock, and nursery portions of the AGR use category. The impacts of non-universal reporting are further complicated by non-uniform compliance from year to year. Errors in data, inaccurate measurements, and the complexity of some permitted water systems introduce inaccuracies and biases that often are undetected (or extremely difficult to measure), hindering better analysis.

Water use within the District decreased by 14 percent (from 2,943 to 2,531 mgd) between 2015 and 2016. A general comparison of changes in water use between 2015 and 2016 is provided in **Figure 12**. More detailed analyses of inter-year changes for use categories, water sources, and/or geographical areas are not provided due to the caveats mentioned above. Generally, more supplemental water is expected to be required to meet water demands when rainfall levels are lower. The decrease in water use is likely attributable to the difference in the amount of rainfall (7 inches more Districtwide in 2016 than 2015), which should require less supplemental irrigation.

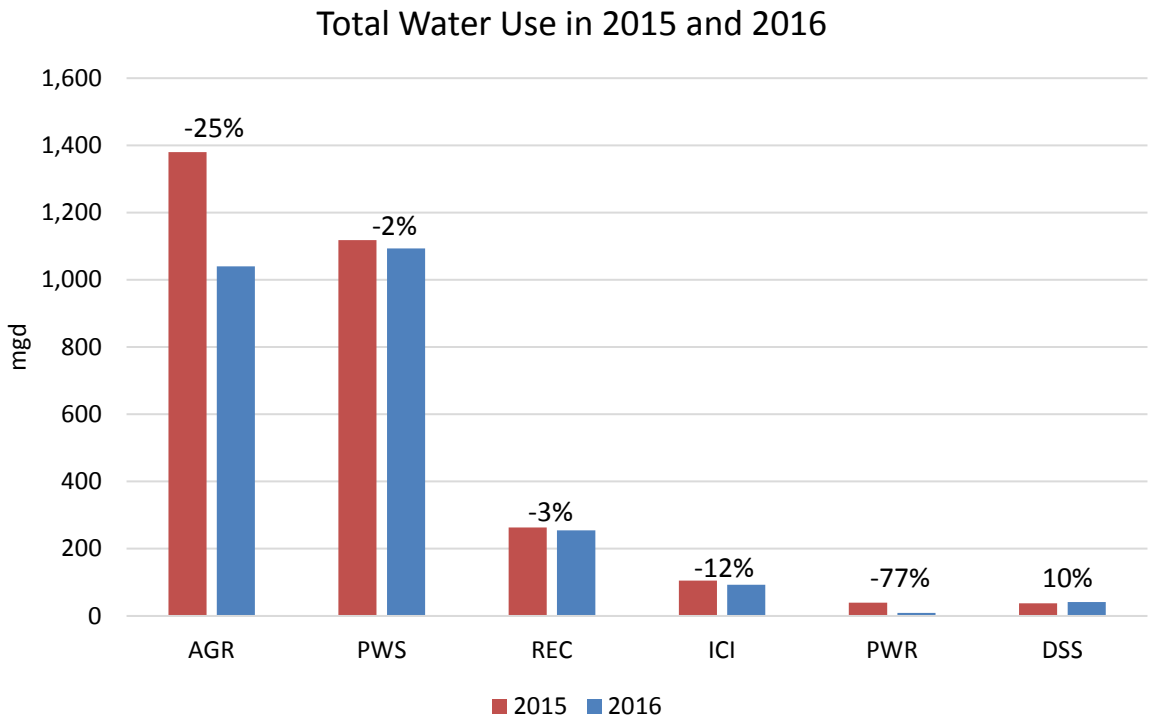


Figure 12. Comparison of 2015 to 2016 Total Estimated Water Use by Use Category

CONCLUSIONS

For 2016, 2,531 mgd of water were estimated to have been used throughout the District, distributed among the six water use categories. Approximately 1,494 mgd were derived from groundwater and 1,037 mgd were derived from surface water sources, with 2,354 mgd being freshwater and 177 mgd considered saline water. This is 412 mgd less than was used in 2015. The SFWMD will continue to prepare an estimation of water use on an annual basis.

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APPENDIX A: DSS POPULATION AND DEMAND METHODOLOGY

Population

Population estimates are intended for planning purposes only. The 2016 county population estimates of permanent residents are from the Bureau of Economic and Business Research (BEBR 2017). For counties located within more than one water management district, the proportion of a county's residents within the South Florida Water Management District (SFWMD or District) were calculated using the results of the 2010 U.S. Census. The Domestic and Small Public Supply (DSS) population was estimated by multiplying the county population by the percentage of the population self-supplied (from the latest regional water supply plan updates).

Demand Estimates

The DSS water use estimates were calculated by multiplying the 2016 DSS population by the 2016 Public Water Supply (PWS) Districtwide uniform residential per capita use rate (PCUR). The 2016 PWS Districtwide uniform residential PCUR was derived from uniform residential PCURs (treated water) voluntarily reported by utilities to the SFWMD as part of their annual reporting, required pursuant to Section 373.709(6), Florida Statutes. Based on the reported submissions, the SFWMD calculated a 2016 Districtwide, population-weighted residential PCUR of 85.36 gallons (treated water). Minimal treatment and distribution losses are anticipated in DSS and smaller scale utility systems such that the uniform residential per capita use rate and domestic self-supplied per capita use rates are comparable. **Table A-1** provides the PWS and DSS populations and demand estimates.

Table A-1. Domestic and Small Public Supply Population and Demand by County[1]

County	PWS Total Population	DSS Total Population	Total Population	% DSS/ Total	2016 County Total Population BEBR[2]	PWS Population for Report	DSS Population for Report (% × County BEBR)	DSS (mgd)
Broward	1,844,173	10,340	1,854,513	0.6%	1,854,513	1,844,173	10,340	0.88
Charlotte[3]	1,968	72	2,040	3.5%	1,448	1,397	51	0.00
Collier	286,738	47,045	333,783	14.1%	350,202	300,843	49,359	4.21
Glades[4]	7,103	5,905	13,008	45.4%	13,047	7,124	5,923	0.51
Hendry[5]	23,521	11,677	35,198	33.2%	38,370	25,641	12,729	1.09
Highlands	3,230	7,258	10,488	69.2%	8,795	2,709	6,086	0.52
Lee	529,759	140,660	670,419	21.0%	680,539	537,756	142,783	12.19
Martin	135,557	10,761	146,318	7.4%	150,870	139,774	11,096	0.95
Miami-Dade	2,678,259	22,535	2,700,794	0.8%	2,700,794	2,678,259	22,535	1.92
Monroe	72,143	-	72,143	0.0%	76,047	76,047	-	-
Okeechobee[6]	23,327	15,161	38,488	39.4%	39,750	24,092	15,658	1.34
Orange	331,634	6,529	338,163	1.9%	359,538	352,596	6,942	0.59
Osceola	201,922	63,238	265,160	23.8%	321,221	244,613	76,608	6.54
Palm Beach	1,323,105	68,636	1,391,741	4.9%	1,391,741	1,323,105	68,636	5.86
Polk	13,830	13,333	27,163	49.1%	36,236	18,450	17,787	1.52
St. Lucie	244,511	33,278	277,789	12.0%	292,826	257,747	35,079	2.99
Total	**7,720,780**	**456,428**	**8,177,208**	**5.6%**	**8,315,937**	**7,834,324**	**481,612**	**41.11**

BEBR = Bureau of Economic and Business Research; DSS = Domestic and Small Public Supply; mgd = million gallons per day; PWS = Public Water Supply.
[1] The 2016 Districtwide, population-weighted uniform residential per capita use rate = 85.36 gallons.
[2] Medium BEBR county totals published in 2017.
[3] Used calculation of SFWMD portion from 2017 Lower West Coast Water Supply Plan Update ([2012/159,978] × 164,469) for 2016 BEBR county total.
[4] 2010 base; Lower West Coast: 4,345 PWS and 4,672 DSS; Lower Kissimmee Basin: 2,758 PWS and 1,233 DSS.
[5] Lower West Coast: 23,521 PWS and 10,357 DSS; Lower East Coast: 1,320 DSS.
[6] 2010 base; Upper East Coast 2010 DSS added Lower Kissimmee DSS.

References

Rayer, S. and Y. Wang. 2017. Projections of Florida Population by County, 2020–2045, with Estimates for 2016. Florida Population Studies 50(177). April 2017. University of Florida, Bureau of Economic and Business Research, Gainesville, FL.

APPENDIX B: WATER USE CATEGORY BREAKDOWN BY PERMIT USE CLASS

Table B-1. Agricultural Irrigation by Use Class Quantity (in mgd)

County	Agriculture		Aquaculture		Livestock		Nursery		Agriculture D&I		Agriculture-EAA		**Total**
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	
Broward	1.15	0.23	0.00	0.11	0.02	0.03	0.43	0.27	0.00	0.00	0.00	0.00	**2.23**
Charlotte	3.09	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**4.73**
Collier	2.71	76.15	0.00	0.06	0.00	0.01	0.14	0.36	0.00	0.00	0.00	0.00	**79.43**
Glades	46.23	5.53	0.00	0.00	0.00	0.47	0.00	0.01	25.78	0.00	0.00	0.00	**78.02**
Hendry	68.12	94.78	0.00	0.44	0.03	0.23	0.04	0.19	106.60	0.00	0.00	0.00	**270.43**
Highlands	10.76	25.33	0.04	0.09	0.01	0.64	0.07	1.63	0.00	0.00	0.00	0.00	**38.57**
Lee	0.40	15.79	0.00	0.13	0.00	0.08	0.82	0.30	2.68	0.00	0.00	0.00	**20.21**
Martin	63.75	7.29	0.00	0.03	0.00	0.16	0.45	0.34	18.75	0.01	0.00	0.00	**90.79**
Miami-Dade	0.13	7.73	0.00	1.06	0.00	0.01	0.07	14.05	0.00	0.00	0.00	0.00	**23.03**
Monroe	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
Okeechobee	1.68	7.43	0.02	0.14	0.01	2.98	0.06	0.21	0.00	0.00	0.00	0.00	**12.53**
Orange	0.05	0.12	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	**0.18**
Osceola	0.42	6.81	0.00	0.34	0.00	0.14	0.00	0.26	0.00	0.00	0.00	0.00	**7.96**
Palm Beach	1.86	1.38	0.00	0.07	0.01	0.01	1.49	2.59	13.33	0.00	348.52	0.00	**369.27**
Polk	0.84	1.21	0.00	0.01	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.00	**2.13**
St. Lucie	22.08	13.91	0.00	0.01	0.00	0.33	0.06	0.15	4.06	0.00	0.00	0.00	**40.60**
Total	**223.26**	**265.30**	**0.06**	**2.50**	**0.08**	**5.16**	**3.63**	**20.40**	**171.20**	**0.01**	**348.52**	**0.00**	**1,040.12**
% of Total	**21.5%**	**25.5%**	**0.0%**	**0.2%**	**0.0%**	**0.5%**	**0.3%**	**2.0%**	**16.5%**	**0.0%**	**33.5%**	**0.0%**	**100.0%**

D&I = Diversion and Impoundment; EAA = Everglades Agricultural Area; GW = groundwater; SW = surface water.

Table B-2. Agricultural Irrigation by Use Class Quality (in mgd)

County	Agriculture		Aquaculture		Livestock		Nursery		Agriculture D&I		Agriculture-EAA		**Total**
	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	
Broward	1.38	0.00	0.11	0.00	0.05	0.00	0.70	0.00	0.00	0.00	0.00	0.00	**2.23**
Charlotte	4.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**4.73**
Collier	78.86	0.00	0.06	0.00	0.01	0.00	0.50	0.00	0.00	0.00	0.00	0.00	**79.43**
Glades	51.76	0.00	0.00	0.00	0.46	0.00	0.01	0.00	25.78	0.00	0.00	0.00	**78.02**
Hendry	162.90	0.00	0.44	0.00	0.26	0.00	0.23	0.00	106.60	0.00	0.00	0.00	**270.43**
Highlands	36.09	0.00	0.14	0.00	0.65	0.00	1.70	0.00	0.00	0.00	0.00	0.00	**38.57**
Lee	16.19	0.00	0.05	0.07	0.08	0.00	1.13	0.00	2.68	0.00	0.00	0.00	**20.21**
Martin	71.03	0.00	0.03	0.00	0.16	0.00	0.80	0.00	18.76	0.00	0.00	0.00	**90.79**
Miami-Dade	7.85	0.00	1.06	0.00	0.01	0.00	14.11	0.00	0.00	0.00	0.00	0.00	**23.03**
Monroe	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
Okeechobee	9.12	0.00	0.15	0.00	2.99	0.00	0.27	0.00	0.00	0.00	0.00	0.00	**12.53**
Orange	0.16	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	**0.18**
Osceola	7.23	0.00	0.34	0.00	0.14	0.00	0.26	0.00	0.00	0.00	0.00	0.00	**7.96**
Palm Beach	3.24	0.00	0.07	0.00	0.02	0.00	4.08	0.00	13.33	0.00	348.52	0.00	**369.27**
Polk	2.04	0.00	0.01	0.00	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	**2.13**
St. Lucie	35.99	0.00	0.01	0.00	0.33	0.00	0.21	0.00	4.06	0.00	0.00	0.00	**40.60**
Total	**488.56**	**0.00**	**2.49**	**0.07**	**5.23**	**0.00**	**24.03**	**0.00**	**171.21**	**0.00**	**348.52**	**0.00**	**1,040.12**
% of Total	**47%**	**0%**	**0%**	**0%**	**1%**	**0%**	**2%**	**0%**	**16%**	**0%**	**34%**	**0%**	**100%**

D&I = Diversion and Impoundment; EAA = Everglades Agricultural Area.

Table B-3. Industrial/Commercial/Institutional by Use Class Quantity (in mgd)

County	Industrial		Mining		**Total**
	Surface Water	Groundwater	Surface Water	Groundwater	
Broward	0.04	2.22	0.10	0.00	**2.36**
Charlotte	0.00	0.08	0.00	0.00	**0.08**
Collier	0.02	0.88	0.98	0.00	**1.88**
Glades	0.02	0.02	14.21	0.18	**14.43**
Hendry	0.01	2.42	0.00	0.00	**2.43**
Highlands	0.01	0.12	0.00	0.00	**0.13**
Lee	0.08	0.37	17.34	0.00	**17.79**
Martin	0.25	0.51	0.62	0.00	**1.38**
Miami-Dade	0.08	2.18	16.42	24.29	**42.97**
Monroe	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	0.02	0.14	0.00	0.00	**0.16**
Orange	0.00	2.01	0.00	0.00	**2.01**
Osceola	0.00	0.09	0.00	0.00	**0.09**
Palm Beach	0.13	1.70	4.76	0.00	**6.59**
Polk	0.00	0.03	0.00	0.00	**0.03**
St. Lucie	0.10	0.13	0.00	0.00	**0.23**
Total	**0.75**	**12.89**	**54.45**	**24.46**	**92.56**
% of Total	**1%**	**14%**	**59%**	**26%**	**100%**

Table B-4. Industrial/Commercial/Institutional by Use Class Quality (in mgd)

County	Industrial		Mining		**Total**
	Fresh	Saline	Fresh	Saline	
Broward	2.25	0.00	0.11	0.00	**2.36**
Charlotte	0.08	0.00	0.00	0.00	**0.08**
Collier	0.90	0.00	0.98	0.00	**1.88**
Glades	0.04	0.00	14.39	0.00	**14.43**
Hendry	2.43	0.00	0.00	0.00	**2.43**
Highlands	0.13	0.00	0.00	0.00	**0.13**
Lee	0.45	0.00	17.34	0.00	**17.79**
Martin	0.75	0.00	0.62	0.00	**1.38**
Miami-Dade	2.26	0.00	40.71	0.00	**42.97**
Monroe	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	0.16	0.00	0.00	0.00	**0.16**
Orange	2.01	0.00	0.00	0.00	**2.01**
Osceola	0.09	0.00	0.00	0.00	**0.09**
Palm Beach	1.83	0.00	4.76	0.00	**6.59**
Polk	0.03	0.00	0.00	0.00	**0.03**
St. Lucie	0.23	0.00	0.00	0.00	**0.23**
Total	**13.64**	**0.00**	**78.91**	**0.00**	**92.56**
% of Total	**15%**	**0%**	**85%**	**0%**	**100%**

Table B-5. Recreational/Landscape Irrigation by Use Class Quantity (in mgd)

County	Golf Course		Landscape		PWS-Irrigation Supplement		**Total**
	Surface Water	Groundwater	Surface Water	Groundwater	Surface Water	Groundwater	
Broward	4.25	4.18	20.25	15.27	0.00	0.00	**43.95**
Charlotte	0.00	0.00	0.01	0.03	0.00	0.00	**0.04**
Collier	6.77	9.63	7.67	10.16	2.06	1.89	**38.19**
Glades	0.01	0.03	0.82	2.29	0.00	0.00	**3.16**
Hendry	0.00	0.00	0.12	0.31	0.00	0.00	**0.43**
Highlands	0.06	0.27	0.04	0.04	0.00	0.00	**0.41**
Lee	4.94	7.40	3.10	7.22	0.00	0.11	**22.78**
Martin	0.80	3.25	8.80	16.62	0.00	0.00	**29.46**
Miami-Dade	2.00	2.26	3.28	8.06	0.00	0.00	**15.61**
Monroe	0.20	0.87	0.00	0.01	0.00	0.00	**1.08**
Okeechobee	0.16	0.01	0.16	0.63	0.00	0.00	**0.96**
Orange	0.20	2.72	0.70	2.86	0.00	0.17	**6.63**
Osceola	0.01	2.84	0.71	2.70	0.02	0.12	**6.40**
Palm Beach	9.65	10.27	32.70	23.17	0.00	0.11	**75.90**
Polk	0.00	0.99	0.00	0.16	0.00	0.00	**1.15**
St. Lucie	0.82	0.69	3.56	3.63	0.00	0.00	**8.70**
Total	**29.86**	**45.42**	**81.93**	**93.16**	**2.07**	**2.40**	**254.84**
% of Total	**11.7%**	**17.8%**	**32.1%**	**36.6%**	**0.8%**	**0.9%**	**100%**

PWS = Public Water Supply.

Table B-6. Recreational/Landscape Irrigation by Use Class Quality (in mgd)

County	Golf Course		Landscape		PWS-Irrigation Supplement		**Total**
	Fresh	Saline	Fresh	Saline	Fresh	Saline	
Broward	8.43	0.00	35.36	0.16	0.00	0.00	**43.95**
Charlotte	0.00	0.00	0.04	0.00	0.00	0.00	**0.04**
Collier	16.40	0.00	17.84	0.00	3.95	0.00	**38.19**
Glades	0.05	0.00	3.11	0.00	0.00	0.00	**3.16**
Hendry	0.00	0.00	0.43	0.00	0.00	0.00	**0.43**
Highlands	0.06	0.27	0.08	0.00	0.00	0.00	**0.41**
Lee	12.35	0.00	10.33	0.00	0.11	0.00	**22.78**
Martin	3.02	1.03	25.41	0.00	0.00	0.00	**29.46**
Miami-Dade	4.26	0.00	11.35	0.00	0.00	0.00	**15.61**
Monroe	0.71	0.36	0.01	0.00	0.00	0.00	**1.08**
Okeechobee	0.17	0.00	0.79	0.00	0.00	0.00	**0.96**
Orange	2.92	0.00	3.55	0.00	0.17	0.00	**6.63**
Osceola	2.85	0.00	3.41	0.00	0.14	0.00	**6.40**
Palm Beach	18.90	1.02	54.17	1.70	0.11	0.00	**75.90**
Polk	0.99	0.00	0.16	0.00	0.00	0.00	**1.15**
St. Lucie	1.48	0.03	7.19	0.00	0.00	0.00	**8.70**
Total	**72.58**	**2.70**	**173.23**	**1.86**	**4.47**	**0.00**	**254.84**
% of Total	**28%**	**1%**	**68%**	**1%**	**2%**	**0%**	**100%**

Note: Minor discrepancies in or between table totals are due to rounding.
PWS = Public Water Supply.

APPENDIX C: METADATA TABLES

Table C-1. Reported Versus Estimated Use (in mgd) by County

County	Reported	Estimated	% Estimated	**Total**
Broward	244.21	31.44	11%	**275.65**
Charlotte	4.72	0.21	4%	**4.93**
Collier	166.36	13.47	7%	**179.83**
Glades	93.82	2.74	3%	**96.56**
Hendry	253.29	24.43	9%	**277.72**
Highlands	38.38	1.49	4%	**39.88**
Lee	112.81	28.22	20%	**141.03**
Martin	137.63	6.08	4%	**143.71**
Miami-Dade	401.05	31.63	7%	**432.68**
Monroe	0.36	0.74	68%	**1.10**
Okeechobee	13.88	3.90	22%	**17.77**
Orange	44.75	3.81	8%	**48.55**
Osceola	51.92	10.11	16%	**62.03**
Palm Beach	317.15	300.97	42%	**718.12**
Polk	5.41	2.04	27%	**7.45**
St. Lucie	72.20	12.15	14%	**84.34**
Total	**1,957.93**	**473.42**	**19%**	**2,531.34**

Table C-2. Reported Versus Estimated Use (in mgd) by Water Use Category

Water Use Category	Reported	Estimated	% Estimated	**Total**
Agricultural Irrigation	630.46	309.66	30%	**1,040.12**
Industrial/Commercial/Institutional	87.51	5.04	5%	**92.56**
Domestic and Small Public Supply	0.00	41.11	100%	**41.11**
Power Generation	9.30	0.00	0%	**9.30**
Public Water Supply	1093.41	0.00	0%	**1,093.41**
Recreational/Landscape Irrigation	137.24	117.60	46%	**254.84**
Total	**1,957.93**	**473.42**	**19%**	**2,531.34**

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