

Technical Fact Sheet SJ2017-3

2016 Survey of Annual Water Use
for St. Johns River Water Management District



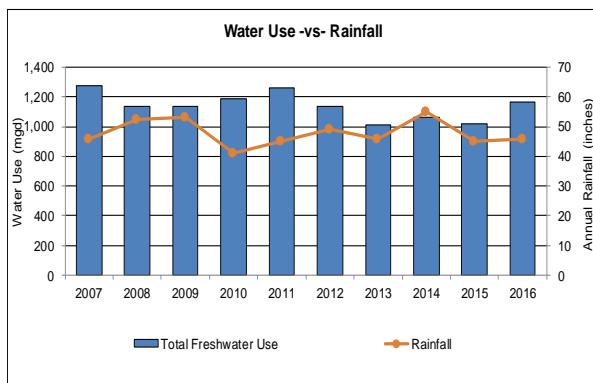
2016 Survey of Annual Water Use for St. Johns River Water Management District

St. Johns River Water Management District 2016 Annual Water Use Executive Summary

This executive summary provides a brief overview and glance of the water use statistics for the last 10 years. Definitions for the categories of water use and explanations regarding changes in water use are included in the report, following the executive summary.

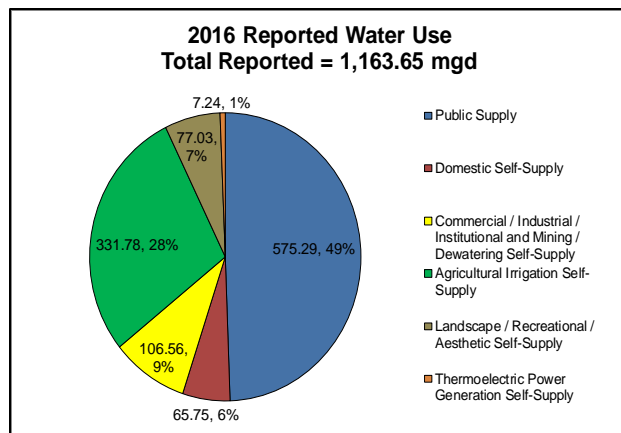
2016 Rainfall

- At 46 inches, it was the fourth driest year in the last decade
- 17% lower than the 10-year high in 2014 and 4% below the 10-year average



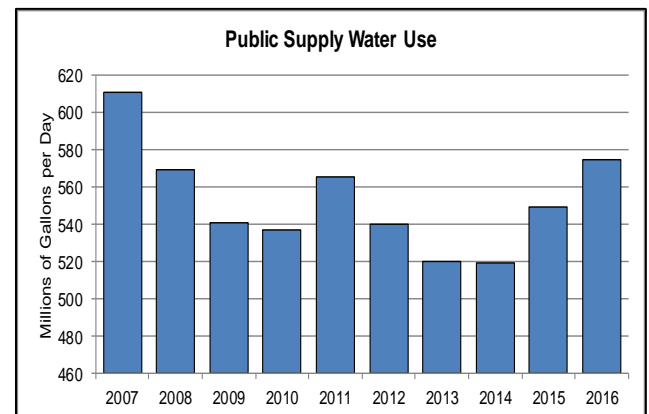
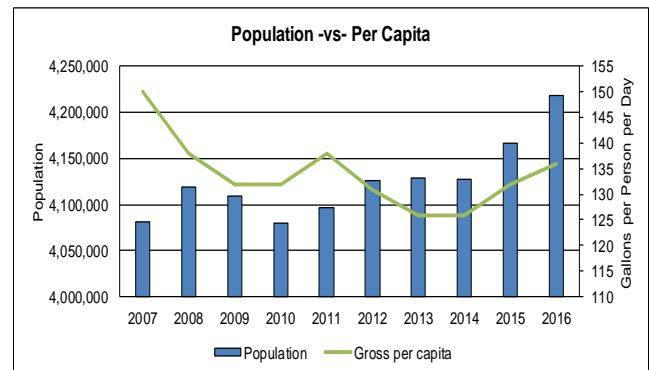
2016 Total Water Use

- 2% higher than the 10-year average and 14% higher than 2015 use
- Deviates from the decreasing trend in water use reported for 2015



2016 Public Supply Water Use

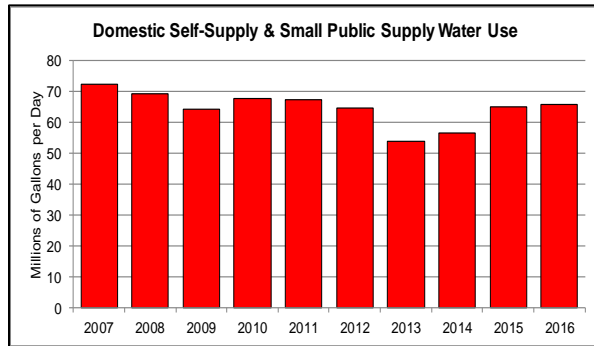
- Since 2007, population increased by 3% while public supply water use decreased by 6%
- Between 2007 and 2016, public supply water use decreased from 611.47 million gallons per day (mgd) to 575.29 mgd, while population increased approximately from 4,081,029 to 4,218,862 persons)
- Public supply water use increased 5% from 2015



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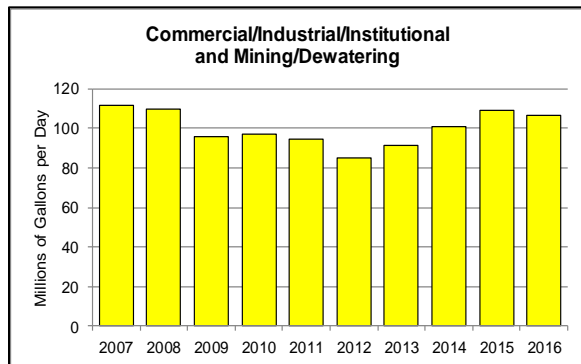
2016 Domestic Self-Supply

- At 65.75 mgd, it was 2% higher than the average use over the last 10 years
- Self-supplied households consumed an average 91 gallons per person per day



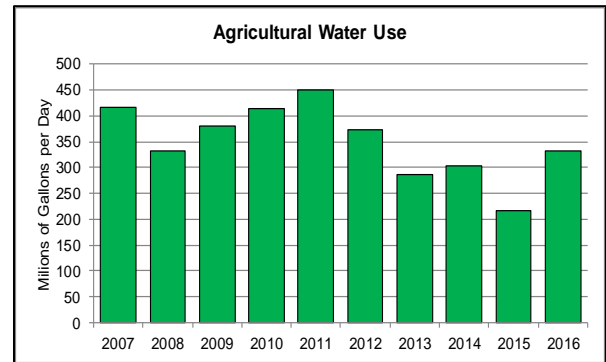
2016 Commercial/Industrial/Institutional and Mining/Dewatering (CII/MD)

- Mining and pulp and paper make up 72% of CII/MD water use
- At 106.56 mgd, CII/MD use is 6% above the annual average of the last 10 years



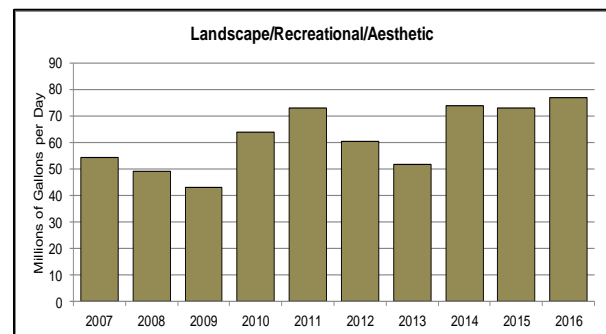
2016 Agricultural Water Use

- At 331.78 mgd, reported water use was 5% lower than the annual average over the last 10 years
- Farmers were growing crops with a rain deficit close to 10 inches



2016 Landscape/Recreational/Aesthetic (L/R/A)

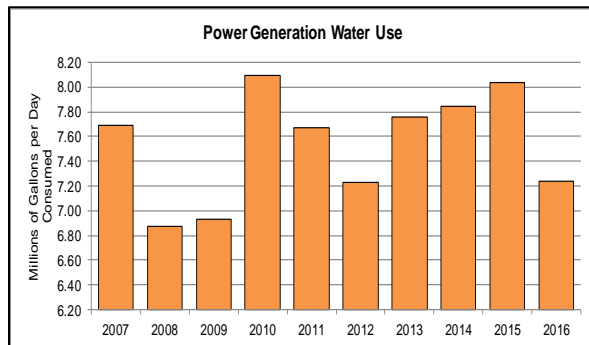
- At 63.03 mgd, the 186 active golf courses represent 81% of the water use under this category, 77.03 mgd
- Total L/R/A water use was 25% higher than the annual average over the last 10 years



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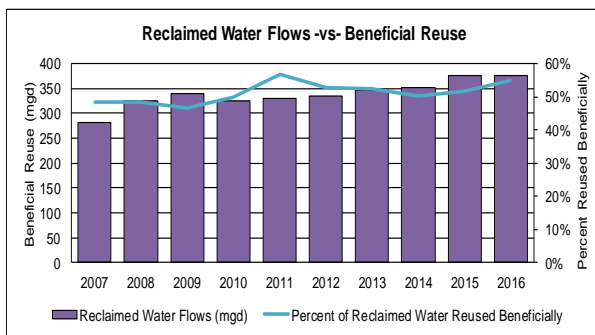
2016 Power Generation Water Use

- At 7.24 mgd, consumptive water use is 4% lower than the 10-year average
- Only 2% of reported surface water withdrawals are considered consumptive
- This category represents approximately 1% of the total water withdrawals



2016 Beneficial Reuse

- At 207 mgd, beneficial reuse set another record for highest reclaimed water used beneficially; this includes 7 mgd of recharge in Alachua County
- Districtwide, more than 50% of wastewater flows have been reused beneficially since 2011
- Countywide reuse utilization rates range from 6% (Baker) to 95% (Alachua)



2016 Survey of Annual Water Use for St. Johns River Water Management District

20-Year Historical Perspective

Category	1997		2016		% Change
	Water Use	Percent of Total	Water Use	Percent of Total	
Public supply (PS)	486	44	575.29	49	18
Agriculture irrigation self-supply (AG)	358.34	32	331.78	28	-7
Thermoelectric power generation self-supply (PG)	27.95	3	7.24	1	-74
Commercial / Industrial / Institutional and Mining Dewatering self-supply (CII/MD)	120.8	11	106.56	9	-12
Landscape / Recreational / Aesthetic self-supply (LRA)	38.66	3	77.03	7	99
Domestic self-supply and small public supply systems (DSS)	82.27	7	65.75	6	-20
Total	2,125.32	100	1,163.65	100	-45

Category	1997		2016		% Change
	Population	Percent of Total	Population	Percent of Total	
Public supply	3,134,956	86	4,218,862	85	35
Domestic self-supply and small public supply systems	520,256	14	725,634	15	39
Total	3,655,212	100	4,944,496	100	35

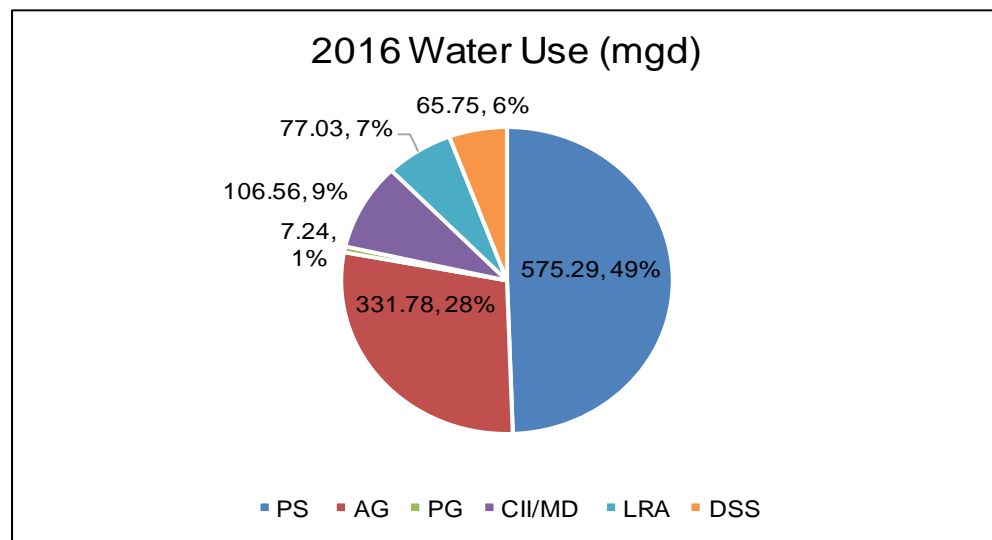
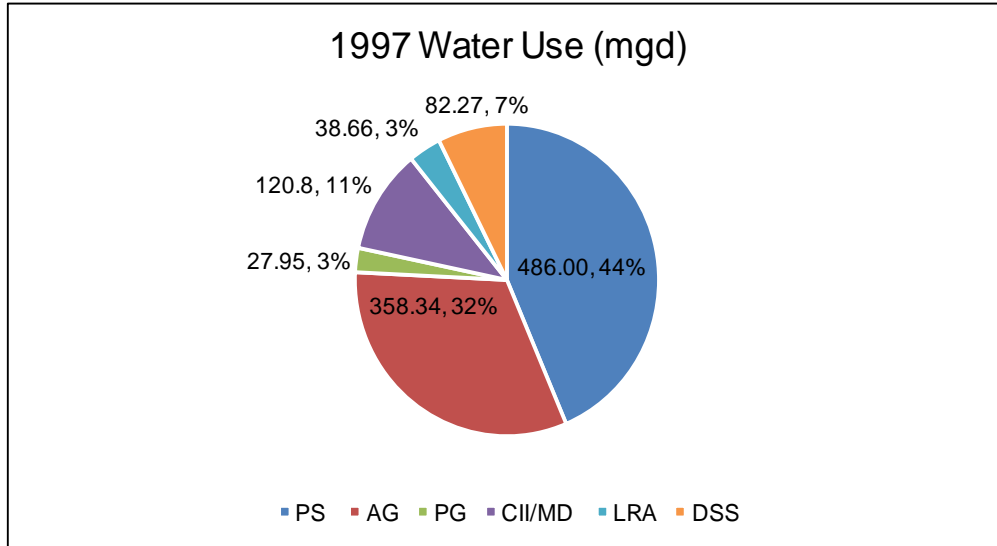
Per Capita Rates	1997	2016	% Change
Gross Per Capita	155	136	-12
Residential Per Capita	155	91	-41

Reclaimed Water	1997	2016	% Change
Total Flow	283.51	375.52	32
Beneficially Used	90.21	207.07	130
Percent Beneficially Used	32	55	72

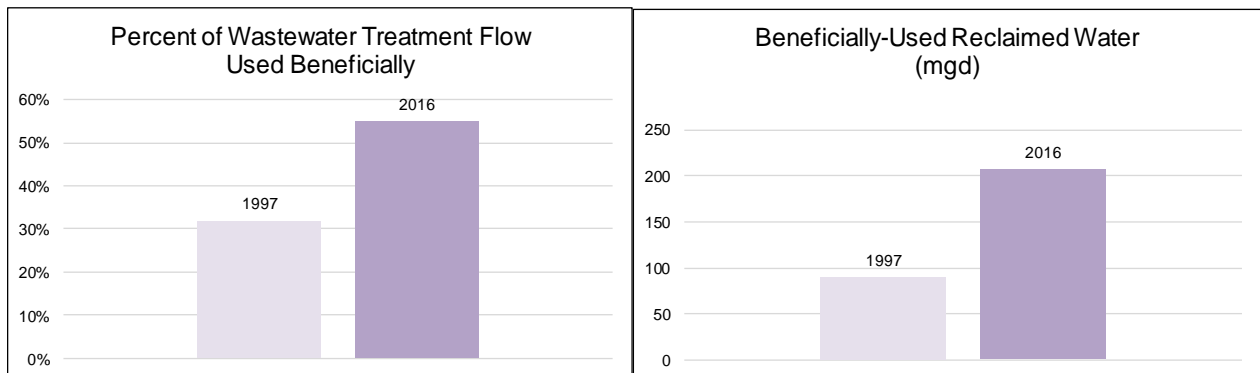
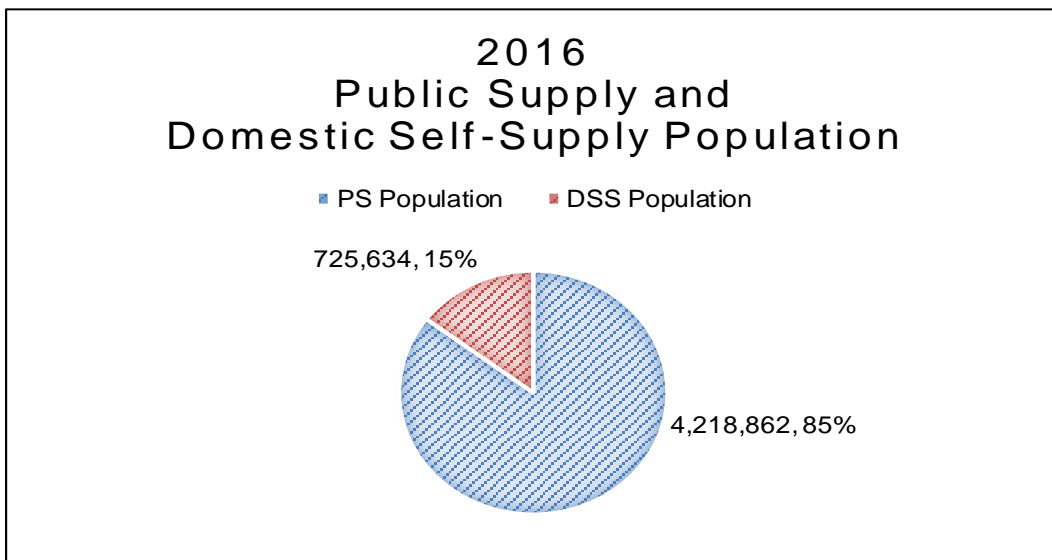
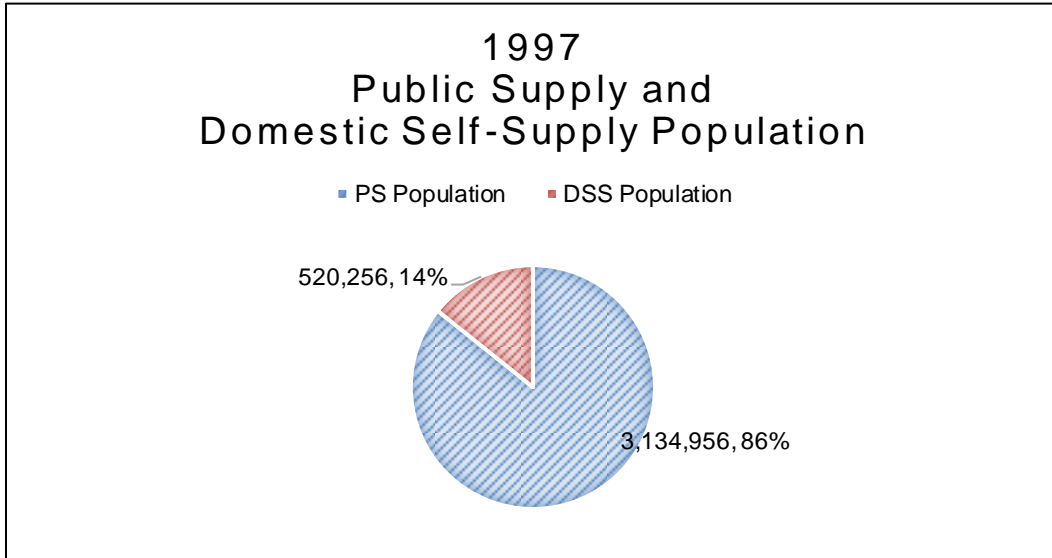
Note: Water use and reclaimed water flows are shown in million gallons per day (mgd).

2016 Survey of Annual Water Use for St. Johns River Water Management District

20-Year Historical Perspective (Cont.)



20-Year Historical Perspective (Cont.)



**Technical Fact Sheet SJ2017-FS3
2016 Survey of Annual Water Use
for St. Johns River Water Management District**

Introduction. St. Johns River Water Management District (SJRWMD) has published annual water use data since 1978. These “annual water use surveys” assess total water use, with data arranged by source, category of use, and county. Amounts are based on best available data at the time of publication. Published reports can be found on the SJRWMD website, www.sjrwmd.com. In publishing the annual data, SJRWMD cooperates with the U.S. Geological Survey (USGS) that compiles national water use data on 5-year intervals.

Since 1997, total public supply water use, which represents 49% of total water use in 2016, has increased by 18% (from 486.00 mgd to 575.29 mgd). At the same time, total population served by public supply has increased 35% (from 3,134,956 to 4,218,862 persons). In the 10-year period ending in 2016, public supply water use decreased 6% (from 611.47 mgd to 575.29 mgd), while population served by public supply increased 3% from 4,081,029 to 4,218,862 persons. Although public supply water use and gross per capita rates are higher in 2015 than 2016 (due to factors such as rainfall / drought conditions and economic factors), they have both seen a significant decrease since 1997.

Factors such as increased water conservation, less landscape irrigation with potable water and increases in multifamily housing occupancy can decrease gross per capita rates. Conversely, expanded tourism and other commercial development, larger irrigated lots, and increases in single family housing can increase gross per capita rates. Since 1997, gross per capita water use has decreased from 155 gallons per person per day to 136 gallons per person per day.

Geographic Survey Area. SJRWMD includes all or part of 18 counties, encompassing 12,300 square miles in northeast and east-central Florida and representing more than 4.9 million people, or approximately 25% of the state’s population. The following water basins are located within SJRWMD: the entire St. Johns River and Nassau River basins, the Indian River Lagoon and Northern Coastal Basins, and portions of the St. Marys River Basin and Florida Ridge.

Area Rainfall Statistics. Average annual rainfall within SJRWMD for 2016 was 45.73 inches. From the most recent 10-year period, 2007–2016, average annual rainfall within SJRWMD varied by 14 inches (from 41.10 to 55.13 inches). Average annual rainfall within SJRWMD for the 10-year period January 2007–December 2016 was 47.84 inches.

Through evapotranspiration, nearly 70% of rainfall within SJRWMD is returned to the atmosphere, while the remaining 30% becomes runoff to surface waters or recharge to aquifers (Fernald and Purdum 1998).

Data Sources, Methodology and Terminology. Data for the 2016 Annual Water Use Survey came from a variety of sources: raw water withdrawal data submitted to SJRWMD (via EN-50 forms; which represents 88 percent of the 2016 water use in this report) and treated water data from Florida Department of Environmental Protection (DEP) monthly operating reports (MORs). Reuse water data were derived from the *2016 Reuse Inventory Report* (DEP 2017). Rainfall by county was obtained from SJRWMD’s monthly hydrologic conditions reports (SJRWMD 2017). Water use for those small users (12 percent of the 2016 total water use) that are not required to

report information to SJRWMD or DEP is estimated using professional analyses of historical data and trends.



Freshwater. Water with concentration of total dissolved solids (TDS) less than 1,000 milligrams per liter (mg/L) is considered freshwater and may be withdrawn from either groundwater or surface water sources. This definition is based on the one provided by USGS, in Water Supply Paper 2254 (Hem 1985), and has been used for reporting consistency with USGS. This definition differs from that used by SJRWMD in determining if a source is “brackish” when identifying an alternative water supply source. Source waters that do not always meet federal and state drinking water standards for chloride, sulfate, or total dissolved solids are generally identified by SJRWMD as “brackish” waters. The state’s five water management districts have efforts underway to standardize the classification of freshwater for water supply planning and consumptive use permitting practices.

Saline water. Water with more than 1,000 mg/L TDS is considered saline. All water reported as saline is withdrawn from surface water or surficial aquifer sources in SJRWMD.

Reuse. Reclaimed water is treated wastewater that has received at least secondary treatment and basic disinfection. It may be distributed for nonpotable uses that achieve a water resource benefit (SJRWMD 2006).

Data Source/Methodology: SJRWMD’s methodology is based on quantities of reuse water reported by DEP in the *2016 Reuse Inventory Report* (DEP 2017). Water management districts refine the quantities of beneficial reuse reports in DEP’s Reuse

2016 Survey of Annual Water Use for St. Johns River Water Management District

Inventory Report to reflect those uses of reclaimed water that achieve a water resource benefit. In particular, reuse must take the place of an existing or potential use of higher-quality water or be used to grow useful crops; restore or maintain adopted minimum flows and/or levels of a river, lake, or wetland; or effectively recharge a useable aquifer. If the water applied does not meet one of these requirements, it is considered as disposal. Types of reclaimed water considered as reuse by DEP are as follows: underground injection for disposal; absorption fields and rapid infiltration basins located in discharge areas; surface water augmentation where not required; spray fields; artificial wetlands.

Florida population. This is the number of permanent residents living within Florida.

Data Source/Methodology: The source for population is *Projections of Florida Population by County, 2020–2045, with Estimates for 2016* (BEBR 2017a).

SJRWMD population. This is the number of permanent residents living within SJRWMD’s 18-county region.

Data Source/Methodology: Population estimates are intended for planning purposes only; 2016 county population estimates are from *Projections of Florida Population by County, 2020–2045, with Estimates for 2016* (BEBR 2017a).

Water use category. Classification of water use is based on one of the following six categories: (1) public supply, (2) domestic self-supply and small public supply systems, (3) agricultural self-supply, (4) commercial/industrial/institutional and mining/dewatering self-supply, (5) landscape/recreational/aesthetic self-supply, and (6) thermoelectric power generation self-supply. Beneficial use of reclaimed water is also included in this report. Listed below are the definitions for each water use category and the source or methodology for the data presented in this report.

Public supply. Water withdrawn, treated, and delivered to service areas within SJRWMD by privately and publicly owned water supply utilities (or systems) is defined as public supply. This encompasses both residential and nonresidential uses by utilities that are permitted to withdraw equal to or more than 0.10 million gallons per day (mgd) from groundwater or surface water sources.

Data Source/Methodology: Water use data in this category were obtained from two sources: SJRWMD EN-50 forms and DEP’s MOR datasets. All Individual CUPs require the permittee to measure their water use. Individual CUPs that are permitted to withdraw more than 0.10 mgd are required to submit this pumpage data to SJRWMD via the EN-50. Water use data for permits with allocations of 0.10 mgd or less are also required to measure their water use and maintain the data, but are not required to report water use to SJRWMD unless specifically requested. The water use data for these CUPs was obtained from MORs. These are submitted to DEP by approximately 98% of the public supply utilities for which SJRWMD had individual consumptive use permits (CUPs) in effect during 2016. (Note: Water for use by the City of Cocoa, in Brevard County, is withdrawn from wells in Orange County.)

Domestic self-supply and small public supply systems. Domestic self-supply water use refers primarily to water use by individuals not served by a public supply water utility (e.g., a residence with a private well). The population associated with small public supply utility systems (permitted average daily flow under 0.10 mgd) is also included in this category. In most cases, small public supply utility systems need not report water use data to SJRWMD. However, many of these small public supply utility systems do report water use data to DEP via MORs.

Data Source/Methodology: Domestic self-supply water use is calculated from residential population and residential public supply (including small public supply systems) per capita water use rates at the county level. Residential water use for each public supply utility and small public supply system is calculated by multiplying the total public supply and small public supply system water use by the percent of the total water use allocated to residential use, as authorized in the SJRWMD-issued CUP. The resulting water use values for each public supply utility and small public supply system are then summed to the county level and divided by the total county permanent/residential public supply and small public supply population to obtain the county-level residential per capita value. The county residential per capita value is multiplied by the domestic self-supply population, resulting in the amount of water use for domestic self-supply. The domestic self-supply population for each county wholly within SJRWMD is obtained by subtracting the total number of people served by public supply utilities and small public supply systems in a county from the total number of permanent residents living in the county. The domestic self-supply population for each county partially within SJRWMD is obtained by multiplying the number of residential parcels within SJRWMD known to have domestic-self supply wells by the 2016 number of persons per household obtained from BEBR (BEBR 2016). For counties with a population of less than 5% within the jurisdiction of SJRWMD or that have no public supply or small public supply system water use, SJRWMD's average residential public supply (including small public supply systems) per capita figure of 90 gallons per day (gpd) was used. For the purpose of reporting, all domestic self-supply water is assumed to be groundwater. Water use data for small public supply systems was obtained from SJRWMD EN-50 and/or DEP MORs.

Commercial/industrial/institutional and mining/dewatering self-supply. This is water withdrawn from groundwater and surface water sources for commercial, industrial, institutional, mining or dewatering purposes not provided by public supply systems. It includes businesses, government facilities, military installations, schools, prisons, hospitals, industrial uses such as processing and manufacturing and mining and long-term dewatering operations. (Note: For this report, surface water use by mining and long-term dewatering operations represents 5% of surface water use, to account for the loss of water entrained in mining products and evaporative losses. The remaining surface water is assumed to be recirculated in the mining process and, therefore, is considered nonconsumptive. Where nonconsumptive is defined by SJRWMD as any use of water that does not reduce the water supply from which it is withdrawn or diverted.)

2016 Survey of Annual Water Use for St. Johns River Water Management District

Data Source/Methodology: Data in this category reflects water use information reported to SJRWMD by consumptive use permittees via SJRWMD EN-50 forms.

Thermoelectric power generation self-supply. This is water withdrawn from groundwater and surface water sources and used by power plants not supplied by public supply systems. (Note: This does not include water used for once-through cooling, which is considered nonconsumptive.)

Data Source/Methodology: Data in this category reflect water use information reported to SJRWMD by power plant operators via SJRWMD EN-50 forms or through a yearly SJRWMD survey. Monthly operating report data from DEP was used to cross-check EN-50 data and fill in any data gaps.

Agricultural self-supply. This is reported and calculated water from groundwater and surface water sources for use in supplemental crop irrigation. It also includes non-irrigation use such as draining an agricultural field after a large rain storm.

Data Source/Methodology: Data in this category reflect water use information reported to SJRWMD by agricultural water users via SJRWMD EN-50 forms and water use amounts provided by the Florida Department of Agricultural and Consumer Services (FDACS) Florida Statewide Agricultural Irrigation Demand 4 (FSAID IV). Individual CUPs report water use data via the EN-50 forms. For smaller CUPs and non-permitted agricultural fields, water use was obtained from the draft FSAID IV (January 2017). With reduced rain and record setting high temperatures for the second year in a row, crops and livestock required significantly more irrigation.

Landscape/recreational/aesthetic self-supply. This is water withdrawn from groundwater and surface water sources for use in golf course irrigation, irrigation of urban landscapes or athletic fields, water-based recreational areas, and ornamental or decorative purposes not supplied by public supply systems.

Data Source/Methodology: Data in this category reflect water use information reported to SJRWMD by consumptive use permittees via SJRWMD EN-50 forms.

2016 Water Use by Category. Water use is reported for water withdrawals from fresh, saline, and reuse water sources, expressed in average mgd unless otherwise noted. In this 2016 survey, the water use amounts are based on best available data as of March 6, 2017. As shown in Figure 1, 88% of the 2016 water use was reported to SJRWMD via EN-50 forms. Water withdrawal information is reported for six categories of use: (1) public supply, (2) domestic self-supply and small public supply systems, (3) commercial/industrial/institutional and mining/dewatering self-supply, (4) agricultural self-supply, (5) landscape/recreational/aesthetic irrigation self-supply, and (6) thermoelectric power generation self-supply. This report also includes information on beneficially reused wastewater flows. A reporting threshold of 0.10 mgd of permitted average daily flow by individual water users was used for all water use categories, excluding the agricultural self-supply and domestic self-supply and small public supply systems categories, in

the reporting of consumptive use for 2016. Consumptive use is defined by SJRWMD as any use of water that reduces the supply from which it is withdrawn or diverted.

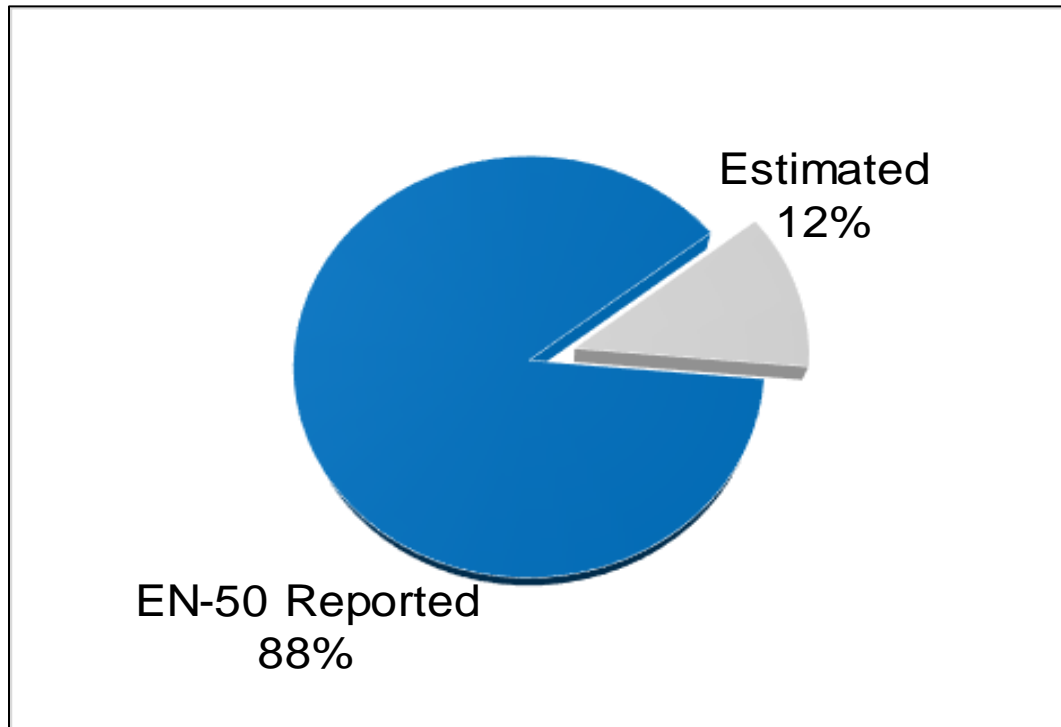


Figure 1. Water use (mgd) in SJRWMD, 2016

Rainfall and water use totals within SJRWMD are shown in Table 1, with figures tabulated by county. Table 2 shows total water use by category and Table 3 shows water use by county and category. The total consumptive use in SJRWMD for 2016, including fresh, saline and reuse (reclaimed) water, was 1,366.71 mgd. Of the total consumptive amount, 1,163.65 mgd was freshwater and 3.22 mgd was saline water (Tables 1–3). In 2016, the largest consumptive use of freshwater within SJRWMD was public supply, which totaled 575.29 mgd, or 49%, of total consumptive freshwater use (Tables 2 and 3, Figure 2). Next was agricultural water use, which used 331.78 mgd, or 28%, of total consumptive freshwater within SJRWMD (Tables 2 and 3, Figure 1). Beneficial use of reclaimed water accounted for 199.84 mgd and was reported under the agricultural, commercial/industrial/institutional and landscape/recreational/aesthetic categories of water use (Tables 2 and 3). An additional 7.23 mgd in Alachua County was used for recharge.

Public Supply. In 2016, 330 public supply utilities (or systems) served approximately 4,218,862 people, or 85%, of the SJRWMD total population (see Table 4 note). Total water use, from both groundwater and surface water sources, was 8% above the average annual use for the preceding 5-year period (Tables 2 and 3, Figures 2 and 3). Average gross per capita use, based on the population served by a public supply system, was 136 gallons per capita per day (gpcd). As seen in Table 5, gross per capita ranges from 96 gpd (Putnam) to 195 gpd (Lake). Average residential per capita for SJRWMD is 91 gpd. It ranges from 44 gpd (Putnam) to 142 (Nassau). Bradford County is excluded for comparison as only a small population is served by Clay County utilities. Public supply water use typically fluctuates during the year in response to seasonal rainfall and

2016 Survey of Annual Water Use for St. Johns River Water Management District

temperature variations. Water use tends to increase during the warm season (April–October), when outdoor use is highest. In 2016, water use ranged from a low of 485.69 mgd (115 gpcd) in February to a high of 660.75 mgd (157 gpcd) in July (Figure 3). Of the total water withdrawn for public supply use, 98% was groundwater.



Water treatment facility in Palm Coast, left. Water storage tower in Ormond Beach, right.

Counties with the largest public supply water use during 2016 were Orange County¹ (126.60 mgd, serving 857,194 people; 148 gpcd) and Duval County (115.99 mgd, serving 771,495 people; 150 gpcd) (Table 3, Figures 4 and 5). These counties combined represented 42% of total public supply water use and 39% of the public supply population. (Note: There is no public supply water use in the portions of Okeechobee and Osceola counties within SJRWMD.)

Domestic Self-Supply and Small Public Supply Systems. In 2016, approximately 725,634 people used 65.75 mgd of domestic self-supply water (including small public supply systems), or 6%, of total freshwater used in SJRWMD (Tables 1–3, Figure 2). Duval County had the largest self-supplied population, with 152,152 people (15.12 mgd). Marion County had the second-largest population, 103,830 (7.59 mgd), followed by Clay County, 72,250 (6.72 mgd) (Table 4).

Domestic self-supply water use (including small public supply systems) has fluctuated over the 10-year period, reaching a low of 53.84 mgd in 2013 to a high of 72.46 mgd in 2007. The average for the 10-year period was 64.73 mgd; water use in 2016 was 2% above average. Fluctuations in water use are mainly attributed to changes in methodologies since the initial publication of the AWUS in 1978. In 2016, average domestic self-supply and small public supply system water use per capita within SJRWMD was 91 gpcd (See Table 5).

Commercial/Industrial/Institutional and Mining/Dewatering Self-Supply. In 2016, a total of 129 commercial/industrial/institutional and mining/dewatering individual permit holders reported water use. Total freshwater use in the commercial/industrial/institutional and mining/dewatering category was 106.56 mgd, or 9%, of total freshwater use

¹ Orange County totals only include the water consumed and population served in SJRWMD.

(Tables 2 and 3, Figure 2). Of this freshwater total, 75.89 mgd was groundwater and 30.67 mgd was surface water. Reclaimed water use totaled 21.78 mgd (Tables 2 and 3).

Most of the freshwater withdrawn for commercial/industrial/institutional and mining/dewatering purposes supplied the pulp and paper industries in Duval, Nassau and Putnam counties. Water use for pulp and paper production in 2016 totaled 63.13 mgd. It included 40.86 mgd of fresh groundwater, 21.11 mgd of fresh surface water and 1.16 mgd of saline surface water. The second-largest water user in this category was the mining industry, which accounted for 12.85 mgd of fresh groundwater and 1.76 mgd of fresh surface water. Pulp/paper production and mining accounted for a combined total of 76.58 mgd of freshwater, or 72%, of the commercial/industrial/institutional and mining/dewatering freshwater use.

Commercial/industrial/institutional and mining/dewatering self-supply water use was highest in 2007 (111.72 mgd) and lowest in 2012 (84.91 mgd). The average for the 10-year period was 100.15 mgd; water use in 2016 was 6% above this average. Commercial/industrial/institutional and mining/dewatering freshwater use in 2016 varied from a low of 91.69 mgd in November to a high of 116.26 mgd in May (Figure 6).

Agricultural Self-Supply. Total consumptive use of freshwater for agricultural water use was 331.78 mgd, which is 28% of total freshwater use in SJRWMD during 2016 (Tables 2 and 3, Figure 2). Reuse water accounted for 2.77 mgd of agricultural water use. Agricultural permittees used 287.57 mgd of groundwater (85.96%) and 44.21 mgd of surface water (13.21%). There are currently 321,636 irrigated acres in SJRWMD. Eighty-four percent of these acres (270,313) are covered by a consumptive use permit. Agricultural water use in 2016 had the largest seasonal fluctuation than any other water use category, reaching a low of 183.73 mgd in September to a high of 560.32 mgd in April (Figure 7). These fluctuations are typical of irrigation water use and are related to rainfall patterns and planting / harvesting times.

By county, the largest water use for agriculture occurred in St. Johns County, with 62.77 mgd of freshwater, accounting for 19% of total SJRWMD agricultural water use (Table 3). All the water used in this county was withdrawn from groundwater sources.

During 2016 in SJRWMD, the largest water use for a single crop was citrus, which accounted for 55.89 mgd or 16.8%, of total agricultural water use. Pasture, potatoes and cut foliage were the three other largest categories; accounting for 12.7–16.4% of total agricultural water use (Figure 8).

Landscape/Recreational/Aesthetic Irrigation Self-Supply. The landscape/recreational/aesthetic (L/R/A) irrigation self-supply category includes water used to irrigate turf grass for golf courses, urban landscapes, athletic fields, water-based recreational areas, or for ornamental or decorative purposes. Use of freshwater in the L/R/A irrigation category totaled 77.03 mgd, about 7% of total freshwater use in 2016. Nearly 67.7% (52.17 mgd) of the quantities were withdrawn from surface water sources. The remainder 24.86 mgd (32.3%) came from groundwater sources. Reuse water under this category totaled 175.29 mgd. By county (Table 3), the largest freshwater use for L/R/A irrigation occurred in Lake County (17.99 mgd), followed by Indian River County (13.60 mgd) and Duval

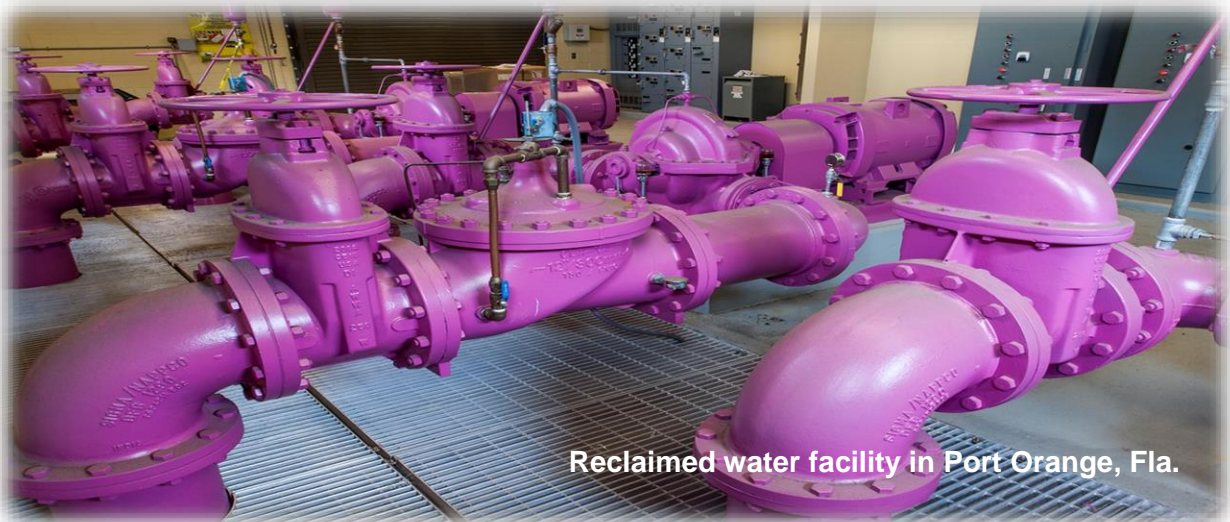
County (8.28 mgd). In terms of reuse, the four counties with the largest reclaimed water used for L/R/A are Orange (56.78 mgd), Volusia (22.5 mgd), Seminole (20.46 mgd), and Brevard (19.62 mgd).

During the past 10 years (2007–2016), L/R/A irrigation freshwater use was highest this year (77.03 mgd) and lowest in 2009 (43.14 mgd). Average water use over the 10-year period was 61.89 mgd. Landscape/recreational/aesthetic irrigation water use in 2016 was 25% above the 10-year average. Landscape/recreational/aesthetic irrigation freshwater use in 2016 varied from a low of 24.75 mgd in January to a high of 115.32 mgd in July (Figure 9).

Thermoelectric Power Generation Self-Supply. The thermoelectric power generation self-supply category consists of water withdrawn from groundwater and surface water sources by power plants, excluding reuse water or water used for once-through cooling, which is considered nonconsumptive use. Water use amounts for 2016 reflect consumptive use data for 12 self-supplied thermoelectric power plants, totaling 7.24 mgd (Tables 2 and 3, Figure 2). The largest amount of consumptive freshwater use within this category (Table 3) occurred in Duval County (5.04 mgd).

Thermoelectric power generation freshwater use in 2016 fluctuated from a low of 4.37 mgd in May to a high of 8.97 mgd in August (Figure 10). Fluctuations in water use are related to power plant shutdowns for maintenance or increased power demands during periods of high or low temperatures.

Beneficial Reuse (Reclaimed Water). As explained on Page 4, beneficially reused wastewater has received at least secondary treatment and basic disinfection. It is currently used by permittees to help meet agricultural, commercial/industrial/institutional and recreation/aesthetic demands. In 2016, 207.07 mgd of reclaimed water was used for beneficial purposes. In terms of utilization rates, the top four counties were Alachua (95%), Putnam (90.57%), Lake (82.96%), and Orange (80.03%), Figure 14. Eighty-eight percent of the reclaimed water is applied to landscape, fields and golf courses, Figure 15. Of note, 7.23 mgd in Alachua County was used for recharge.



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2016 Survey of Annual Water Use for St. Johns River Water Management District

Table 1. Total water use (mgd) and rainfall by county in SJRWMD, 2016

County	Freshwater (mgd)	Saline Water (mgd)	Reuse (mgd)	Total Water Use (mgd)	Rainfall (inches)
Alachua	35.84	0.00	10.76	46.60	44.39
Baker	4.11	0.00	0.05	4.16	41.87
Bradford	0.18	0.00	0.00	0.18	43.20
Brevard	125.99	0.00	21.21	147.20	48.89
Clay	23.49	0.00	5.36	28.85	43.15
Duval	165.29	0.00	14.41	179.70	44.40
Flagler	31.72	1.82	5.58	39.12	41.71
Indian River	91.53	0.00	6.56	98.09	53.86
Lake	119.22	0.00	11.49	130.71	45.52
Marion	46.68	0.00	4.71	51.39	43.45
Nassau	48.90	1.40	1.21	51.51	40.64
Okeechobee	7.19	0.00	0.00	7.19	55.13
Orange	145.68	0.00	65.45	211.13	50.92
Osceola	1.14	0.00	0.00	1.14	56.86
Putnam	60.48	0.00	1.44	61.92	44.07
St. Johns	90.58	0.00	3.51	94.09	48.83
Seminole	68.16	0.00	23.91	92.07	47.72
Volusia	97.47	0.00	24.19	121.66	45.39
Total	1,163.65	3.22	199.84	1,366.71	45.73

Note: Total water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

Source of domestic self-supply is assumed to be groundwater.

* Districtwide rainfall average.

Table 2. Total water use (mgd) by category in SJRWMD, 2016

Category	Freshwater (mgd)	Saline Water (mgd)	Reuse (mgd)	Total Water Use (mgd)
Public supply	575.29	0.00	0.00	575.29
Domestic self-supply and small public supply systems	65.75	0.00	0.00	65.75
Commercial / Industrial / Institutional and Mining / Dewatering self-supply	106.56	3.22	21.78	131.56
Agricultural irrigation self-supply	331.78	0.00	2.77	334.55
Landscape / Recreational / Aesthetic self-supply	77.03	0.00	175.29	252.32
Thermoelectric power generation self-supply	7.24	0.00	0.00	7.24
Total	1,163.65	3.22	199.84	1,366.71

Note: Water use is in million gallons per day (mgd).

Source of domestic self-supply is assumed to be groundwater.

Amounts are based on best available data as of March 6, 201

2016 Survey of Annual Water Use for St. Johns River Water Management District

Table 3. Total water use (mgd) by county and category in SJRWMD, 2016

County	Freshwater							Saline Water	Reuse	All Water Use
	Public Supply	Domestic Self-Supply	Commercial/Industrial/Institutional	Agricultural Self-Supply	Landscape/Recreational/Aesthetic Self-Supply	Thermoelectric Power Generation Self-Supply	Total Freshwater	Commercial/Industrial/Institutional		
Alachua	22.46	1.02	5.21	5.70	0.69	0.76	35.84	0.00	10.76	46.60
Baker	0.98	2.17	0.35	0.61	0.00	0.00	4.11	0.00	0.05	4.16
Bradford	0.03	0.14	0.01	0.00	0.00	0.00	0.18	0.00	0.00	0.18
Brevard	52.24	2.82	7.80	58.01	5.10	0.02	125.99	0.00	21.21	147.20
Clay	13.98	6.93	0.26	1.36	0.96	0.00	23.49	0.00	5.36	28.85
Duval	115.99	15.12	18.17	2.69	8.28	5.04	165.29	0.00	14.41	179.70
Flagler	9.64	0.35	0.00	18.65	3.08	0.00	31.72	1.82	5.58	39.12
Indian River	18.61	0.20	0.19	58.93	13.60	0.00	91.53	0.00	6.56	98.09
Lake	50.84	7.92	6.91	35.33	17.99	0.23	119.22	0.00	11.49	130.71
Marion	19.50	7.59	2.60	12.22	4.77	0.00	46.68	0.00	4.71	51.39
Nassau	7.66	4.24	33.46	0.35	3.19	0.00	48.90	1.40	1.21	51.51
Okeechobee	0.00	0.14	0.00	7.05	0.00	0.00	7.19	0.00	0.00	7.19
Orange	126.60	2.96	3.24	8.94	3.58	0.36	145.68	0.00	65.45	211.13
Osceola	0.00	0.03	0.00	1.11	0.00	0.00	1.14	0.00	0.00	1.14
Putnam	2.01	2.29	25.03	29.31	1.30	0.54	60.48	0.00	1.44	61.92
St. Johns	18.03	3.18	0.76	62.77	5.84	0.00	90.58	0.00	3.51	94.09
Seminole	60.80	2.06	0.00	3.25	2.05	0.00	68.16	0.00	23.91	92.07
Volusia	55.92	6.59	2.57	25.50	6.60	0.29	97.47	0.00	24.19	121.65
Total	575.29	65.75	106.56	331.78	77.03	7.24	1,163.65	3.22	199.84	1,366.71

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

Source of domestic self-supply is assumed to be groundwater.

Small public supply systems are included in the domestic self-supply category.

Mining and dewatering is included in the commercial/industrial/institutional category.

2016 Survey of Annual Water Use for St. Johns River Water Management District

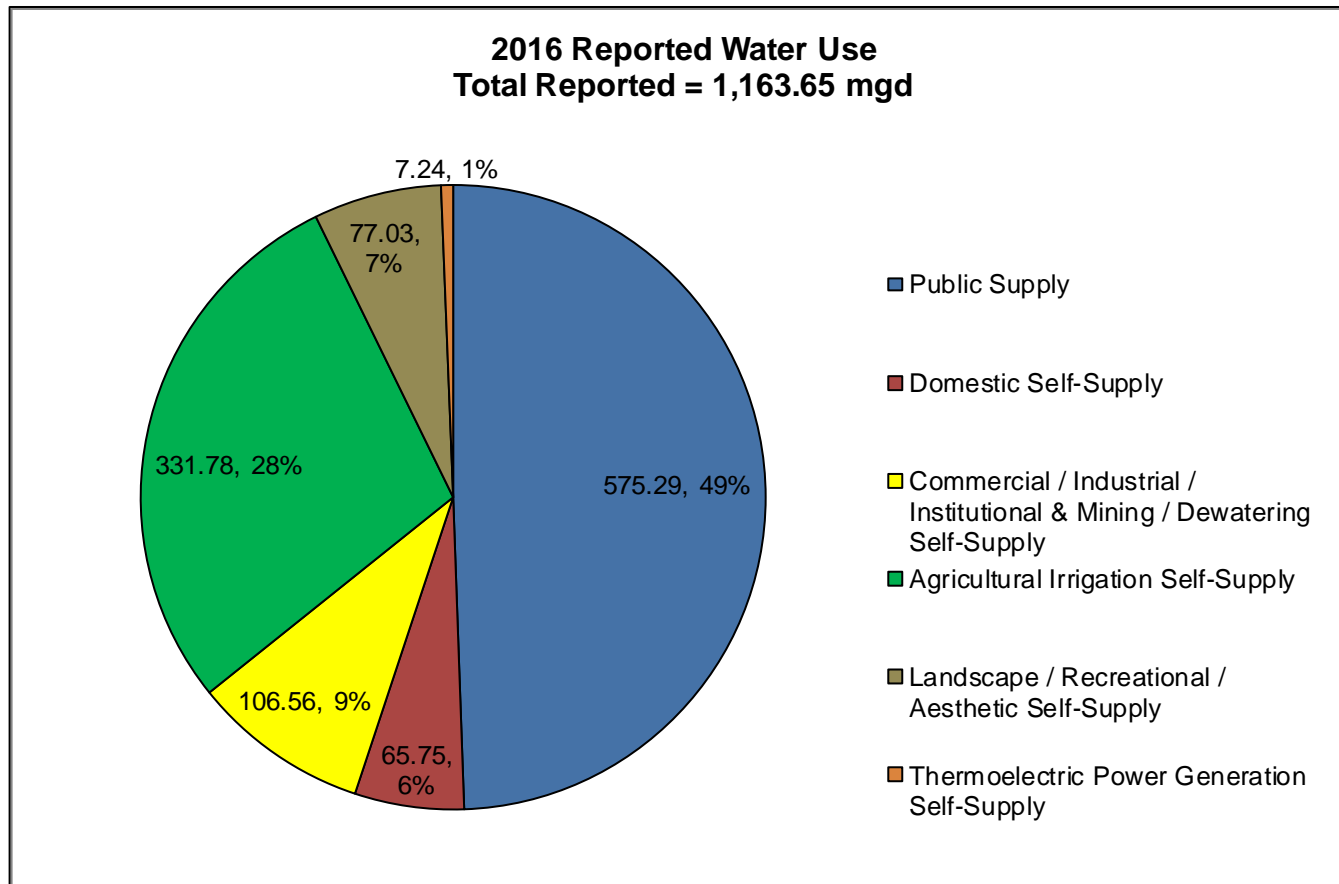


Figure 2. Total freshwater use (mgd), 2016

Note: Water use is in million gallons per day (mgd).
Amounts are based on best available data as of March 6, 2017.
Source of domestic self-supply is assumed to be groundwater.

2016 Survey of Annual Water Use for St. Johns River Water Management District

Table 4. Population by county, 2016

County	County Population	Percentage of County Population in SJRWMD	SJRWMD Population	Public Supply Population	Domestic Self-Supply and Small Public Supply Systems Population
Alachua	257,062	77.3%	198,585	185,270	13,315
Baker	26,965	97.8%	26,372	6,430	19,942
Bradford	27,440	20.3%	5,570	905	4,665
Brevard	568,919	100.0%	568,919	524,516	44,403
Clay	205,321	100.0%	205,321	133,071	72,250
Duval	923,647	100.0%	923,647	771,495	152,152
Flagler	103,095	100.0%	103,095	96,902	6,193
Indian River	146,410	100.0%	146,410	141,905	4,505
Lake	323,985	99.8%	323,337	261,213	62,124
Marion	345,749	63.5%	219,552	115,722	103,830
Nassau	77,841	100.0%	77,841	47,898	29,943
Okeechobee	40,806	3.5%	1,442	0	1,442
Orange	1,280,387	69.1%	884,382	857,194	27,188
Osceola	322,862	0.1%	259	0	259
Putnam	72,972	100.0%	72,972	20,931	52,041
St. Johns	220,257	100.0%	220,257	175,863	44,394
Seminole	449,124	100.0%	449,124	427,135	21,989
Volusia	517,411	100.0%	517,411	452,412	64,999
Total	5,910,253		4,944,496	4,218,862	725,634

Note: 2016 population county population is from BEBR, Florida Estimates of Population (BEBR 2016)

Total population for the state of Florida in 2016 = 20,148,654

Percent of total state of Florida population that lives within SJRWMD = 25%

Percent of SJRWMD population served by public supply = 85%

The SJRWMD population is derived from the county population multiplied by the percentage of county population in SJRWMD. The percentage of county population, as represented, is rounded to the nearest tenth. Thus, in some cases, the presented SJRWMD population is slightly different than the product of the county population multiplied by the percentage of county population in SJRWMD.

2016 Survey of Annual Water Use for St. Johns River Water Management District

Table 5. Gross and residential public supply per capita water use in gallons per day

County	PS Gross Per Capita (gpd)	PS Residential Per Capita (gpd)
Alachua	121	77
Baker	152	109
Bradford*	N/A	30
Brevard	100	64
Clay	105	93
Duval	150	99
Flagler	99	57
Indian River	131	44
Lake	195	125
Marion	169	73
Nassau	160	142
Okeechobee*	N/A	97
Orange	148	109
Osceola*	N/A	116
Putnam	96	44
St. Johns	103	72
Seminole	142	94
Volusia	124	101
Total	136	90

Note: As of December 2016, there were no permitted public supply uses in SJRWMD's portion of Bradford, Okeechobee and Osceola counties. The population residing therein rely on domestic wells for their potable needs.

2016 Survey of Annual Water Use for St. Johns River Water Management District

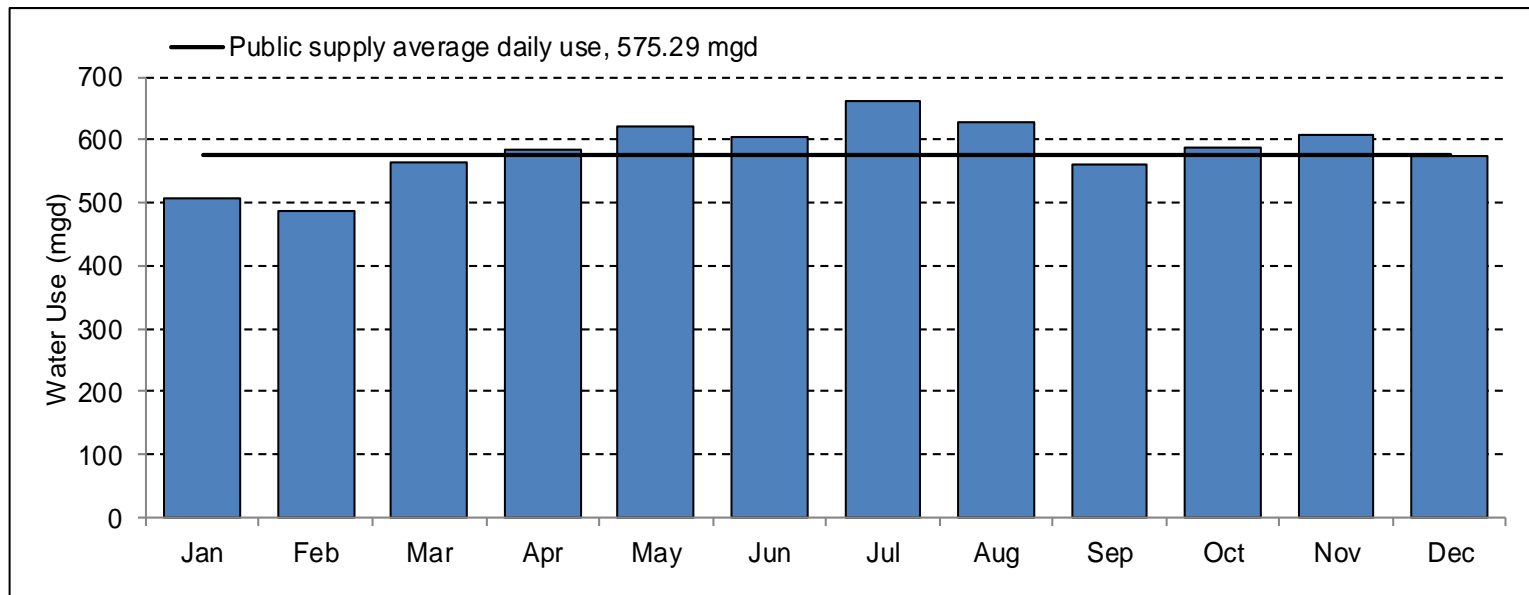


Figure 3. Average daily public supply water use (mgd) by month, 2016

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

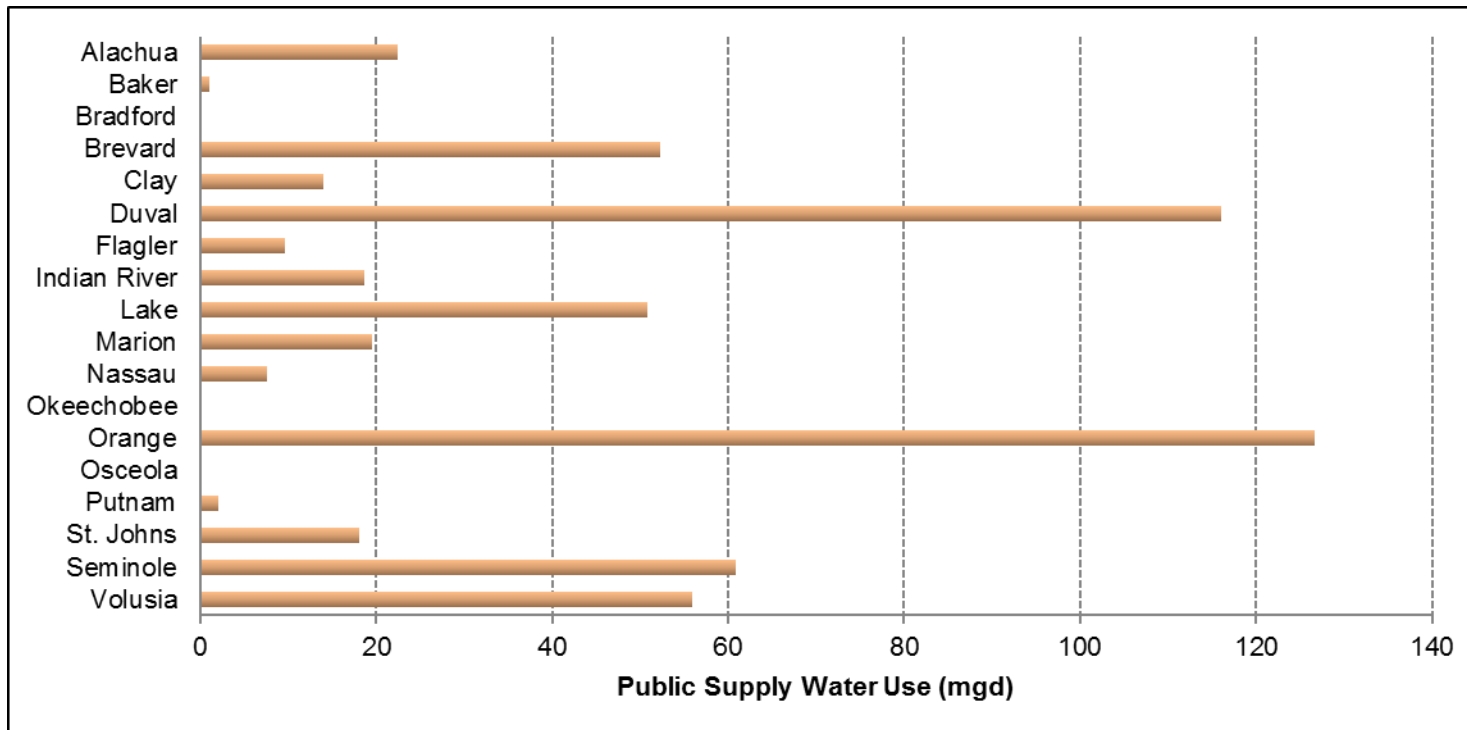


Figure 4. Freshwater use (mgd) for public supply in SJRWMD, 2016

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

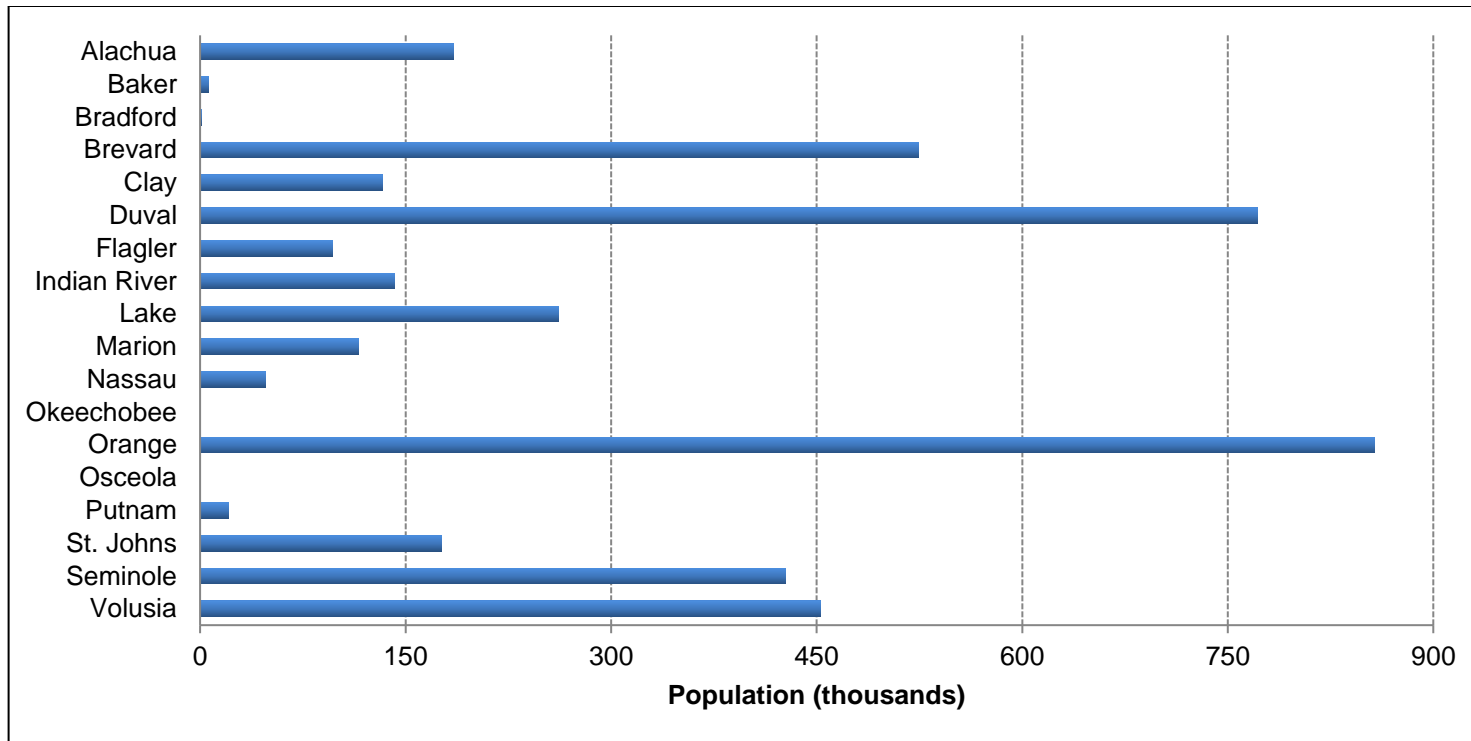


Figure 5. Population served by public supply in SJRWMD, 2016

Note: Amounts are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

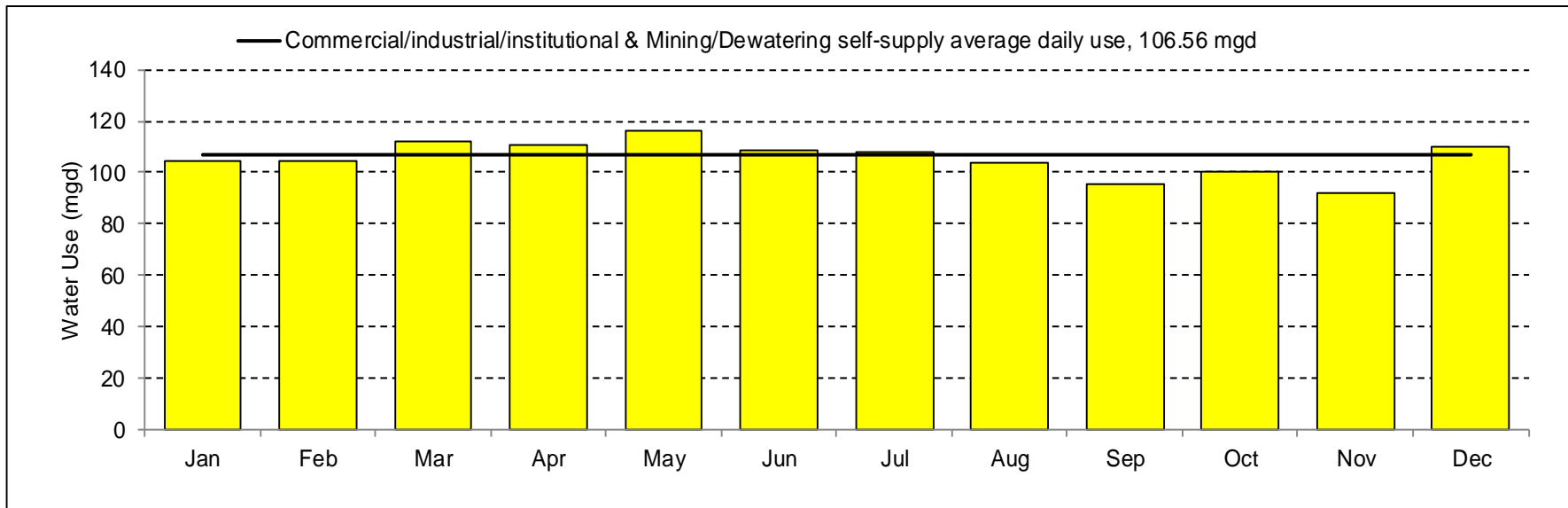


Figure 6. Average daily commercial/industrial/institutional and mining/dewatering self-supply freshwater use (mgd) by month, 2016

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

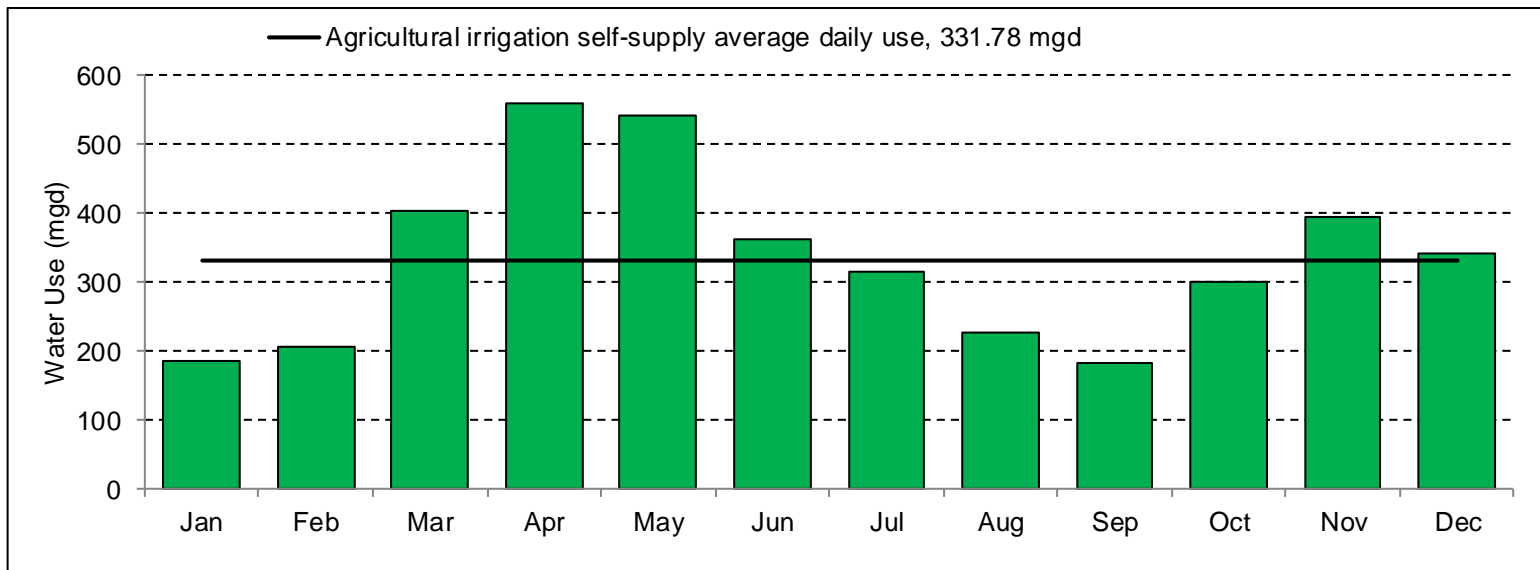


Figure 7. Average daily agricultural self-supply freshwater use (mgd) by month, 2016

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

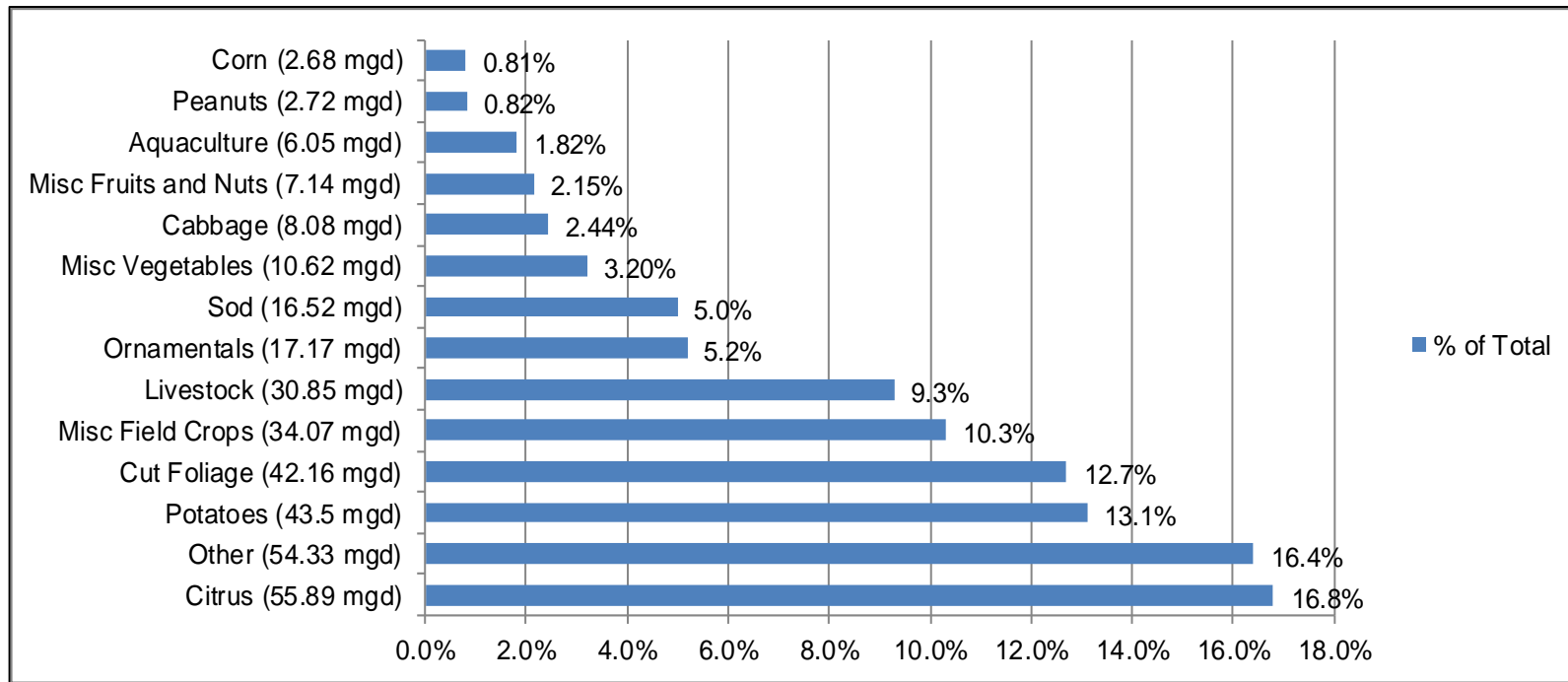


Figure 8. Agricultural water use by crop, 2016

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

Calculation anomalies due to rounding account for nominal discrepancies.

2016 Survey of Annual Water Use for St. Johns River Water Management District

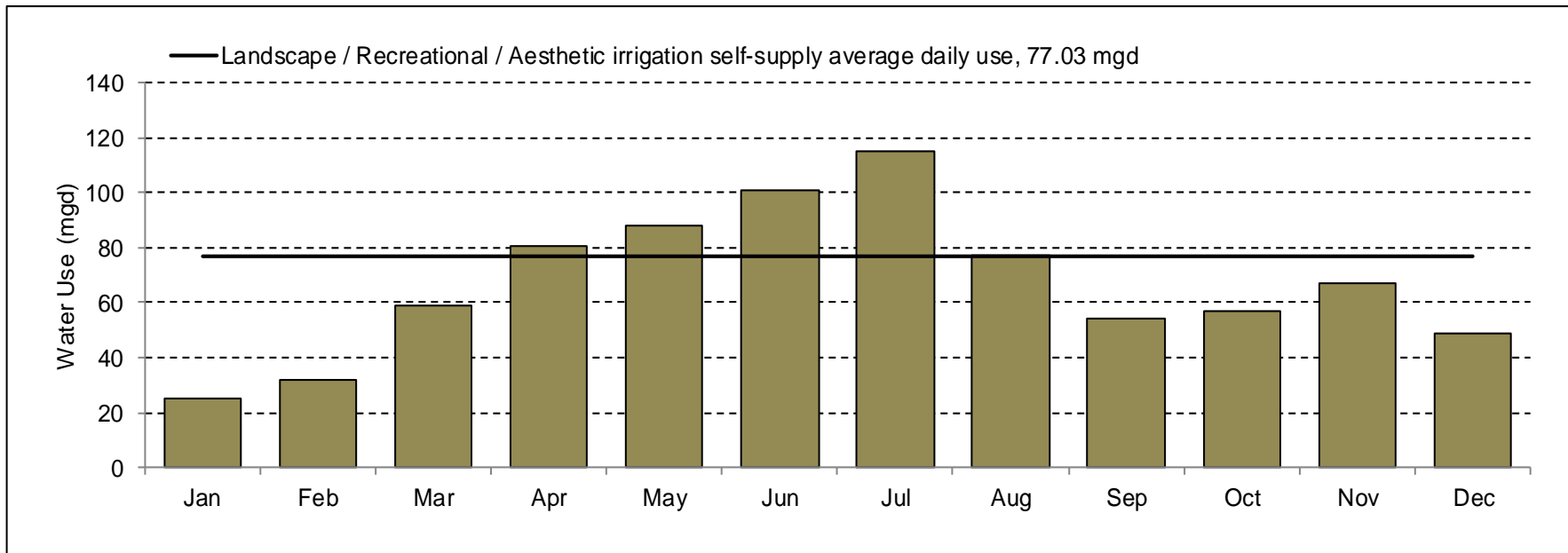


Figure 9. Average daily landscape/recreational/aesthetic irrigation self-supply freshwater use by month, 2016

Note: Water use is in million gallons per day (mgd).

Amounts are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

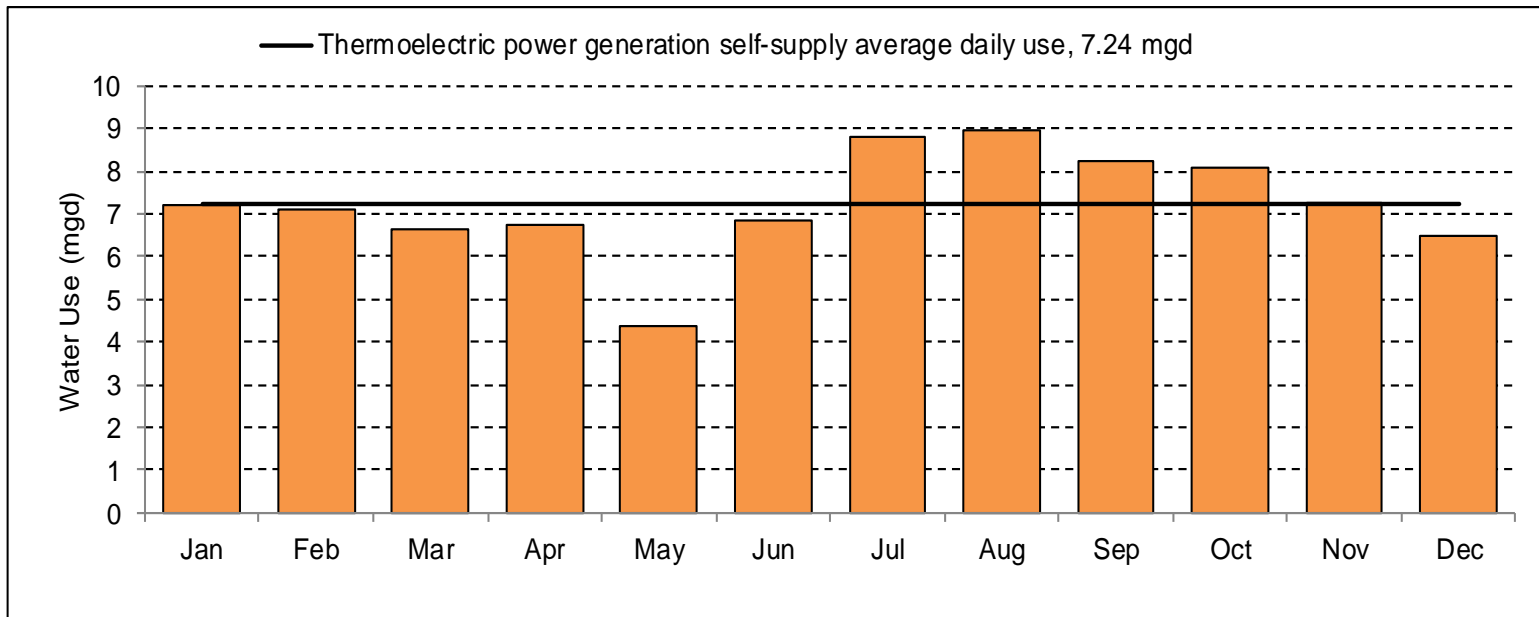


Figure 10. Average daily thermoelectric power generation self-supply freshwater use by month, 2016

Note: Water use is in million gallons per day (mgd).

Amounts of consumptive freshwater use are based on best available data as of March 6, 2017.

2016 Survey of Annual Water Use for St. Johns River Water Management District

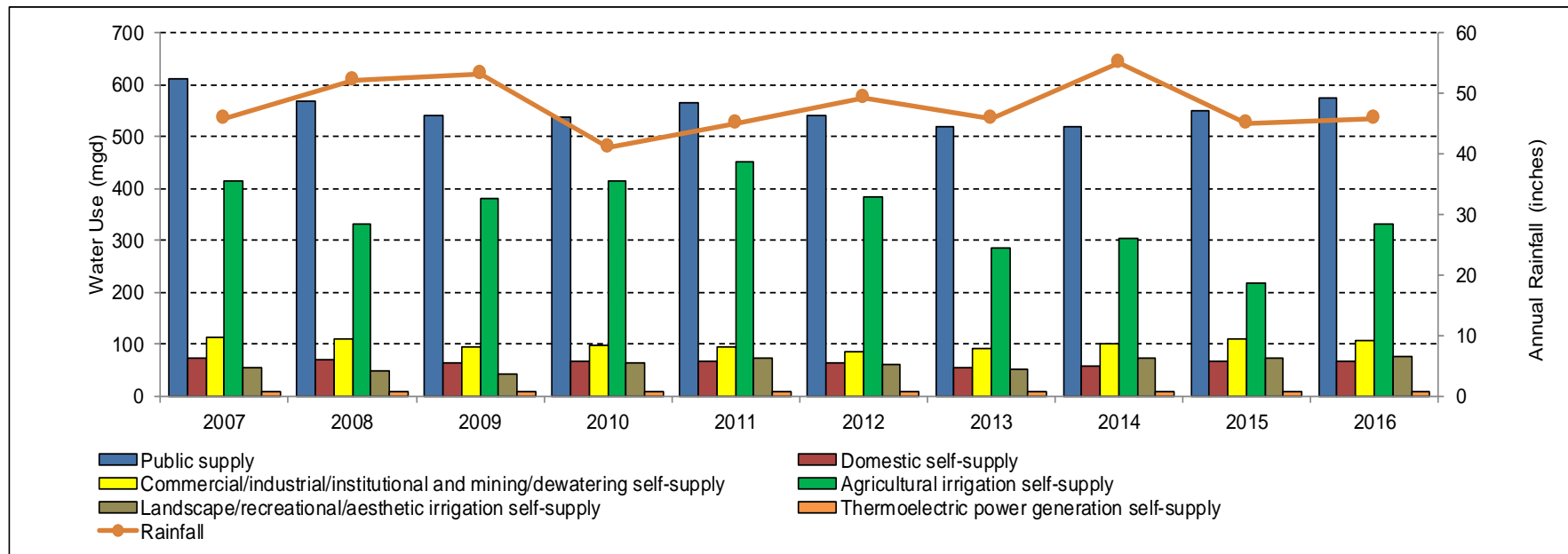


Figure 11. Annual rainfall and freshwater use by category, 2012–2016

Note: Water use is in million gallons per day (mgd); rainfall is measured in inches.
 Amounts are based on best available data as of March 6, 2017.
 Source of domestic self-supply is assumed to be groundwater.

2016 Survey of Annual Water Use for St. Johns River Water Management District

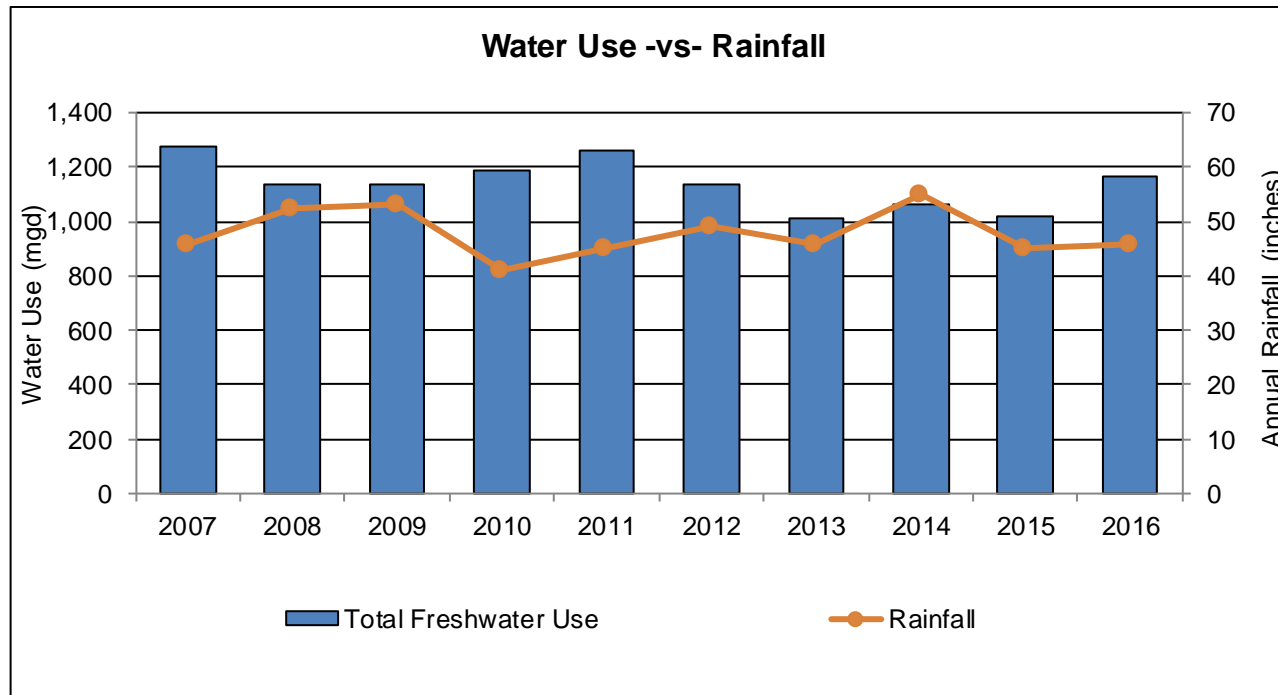


Figure 12. Annual rainfall and total freshwater use, 2012–2016

Note: Water use is in million gallons per day (mgd); rainfall is measured in inches.
Amounts are based on best available data as of March 6, 2017.
Source of domestic self-supply is assumed to be groundwater.

2016 Survey of Annual Water Use for St. Johns River Water Management District

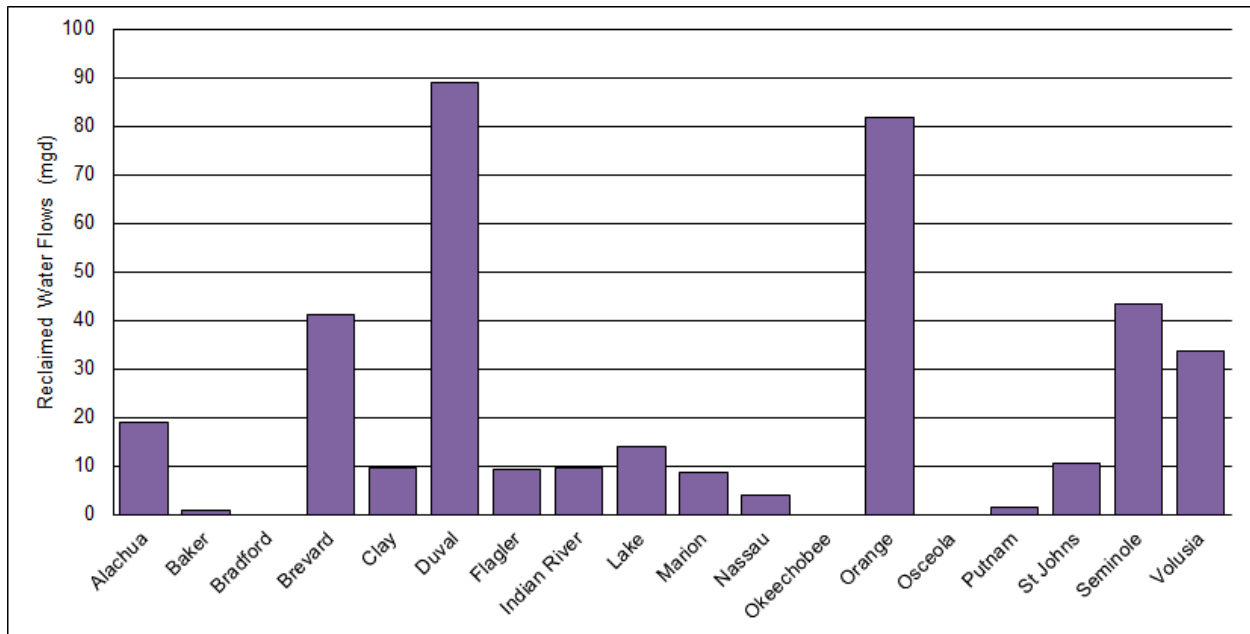


Figure 13. Wastewater flows reused beneficially, 2016

Note: Reclaimed water flows in million gallons per day (mgd).
Data obtained from the 2016 DEP Reuse Inventory.

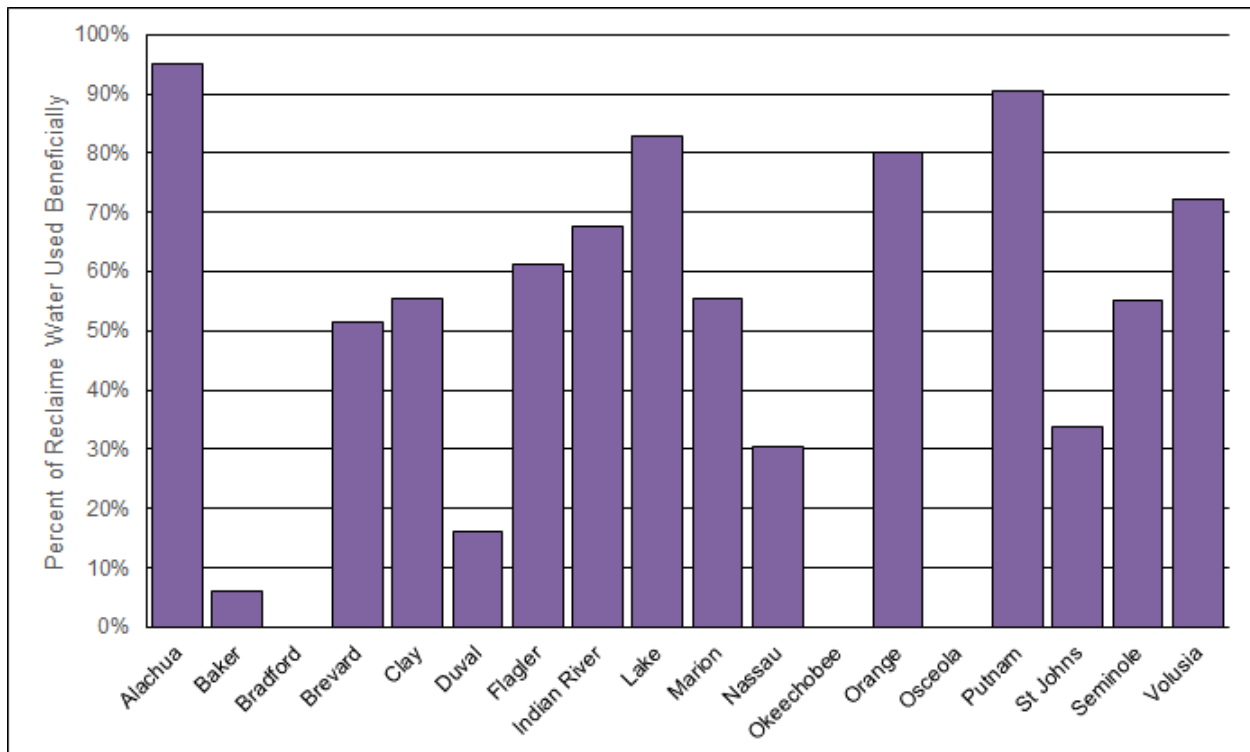


Figure 14. Percent of wastewater flows reused beneficially, 2016

Note: Data obtained from the 2016 DEP Reuse Inventory.

2016 Survey of Annual Water Use for St. Johns River Water Management District

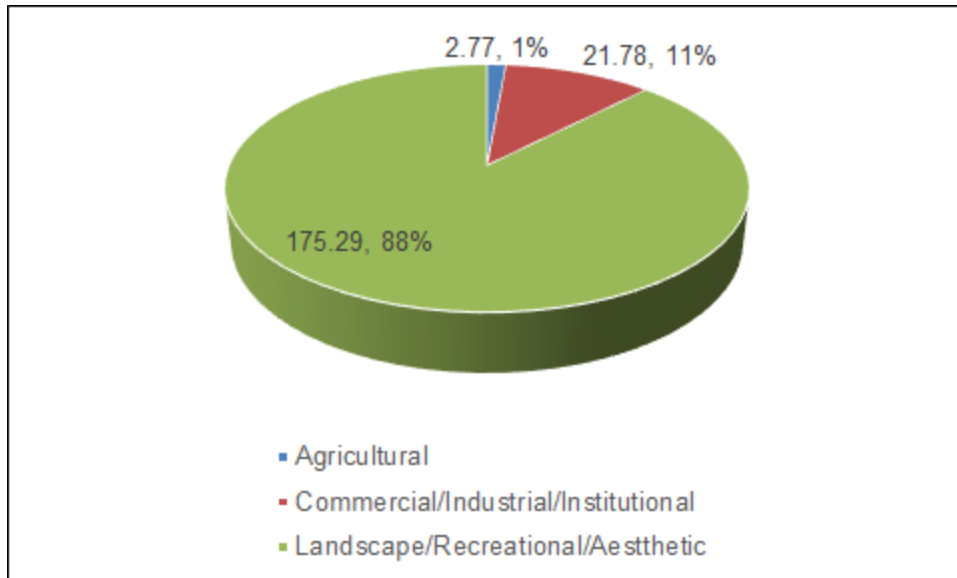


Figure 15. Beneficially used reclaimed water by use type, 2016

Note: Water use is in million gallons per day (mgd).

Data obtained from the 2016 DEP Reuse Inventory.