



# Southwest Florida Water Management District (SWFWMD) Governing Board Approved 2019 Minimum Flows and Levels (MFLs) Priority List and Schedule and Reservations List and Schedule (October 22, 2019)

#### Priority Water Bodies with Adopted and Effective Minimum Flow and Minimum Water Level Rules, Including Those That Have Been Reevaluated

- Alafia River (upper segment)
- Alafia River (lower segment)/Lithia-Buckhorn Spring Group
- Anclote River (lower segment)
- Anclote River (upper segment)
- Braden River (upper segment)
- Chassahowitzka River System and Spring Group<sup>b</sup> and Blind Spring
- Citrus County Lakes Ft. Cooper, Tsala Apopka Floral City, Inverness and Hernando Pools
- Crystal River/Kings Bay Spring Group (OFS)<sup>b</sup>
- Crystal Springs
- Dona Bay/Shakett Creek System
- Dover/Plant City Water Use Caution Area Minimum Aquifer Level
- Gum Slough Spring Run<sup>a</sup>
- Hernando County Lakes Hunters, Lindsey, Mountain, Neff, Spring, Tooke, Weekiwachee Prairie, Whitehurst
- Highland County Lakes Angelo<sup>a</sup>, Anoka<sup>a</sup>, Damon<sup>a</sup>, Denton<sup>a</sup>, Jackson<sup>a</sup> (reevaluated), Little Lake Jackson<sup>a</sup> (reevaluated), June-in-Winter<sup>a</sup>, Letta<sup>a</sup> (reevaluated), Lotela<sup>a</sup> (reevaluated), Placid<sup>a</sup>, Tulane<sup>a</sup>, Verona<sup>a</sup>
- Hillsborough County Lakes Alice (reevaluated), Allen (reevaluated), Barbara, Bird (reevaluated), Brant (reevaluated), Calm, Carroll, Charles, Church, Crenshaw, Crescent, Crystal (reevaluated), Cypress, Dan (reevaluated), Deer (reevaluated), Dosson (reevaluated), Echo, Ellen, Fairy [Maurine], Garden, Halfmoon, Hanna, Harvey (reevaluated), Helen, Hobbs (reevaluated), Hooker, Horse (reevaluated), Jackson, Juanita (reevaluated), Keene, Kell, Little Moon (reevaluated), Merrywater (reevaluated), Mound, Platt, Pretty, Rainbow (reevaluated), Raleigh, Reinheimer, Rogers, Round (reevaluated), Saddleback (reevaluated), Sapphire, Starvation, Stemper (reevaluated), Strawberry, Sunset (reevaluated), Sunshine (reevaluated), Taylor, Virginia (reevaluated), Wimauma
- Hillsborough County Wetland Sites CBRWF #32, Cosme WF Wetland, CR1, CR2, CR3, CR4, CR5, CR6, EWWF NW-44, MBWF Clay Gully Cypress, MBWF Entry Dome, MBWF Unnamed, MBWF X-4, S21 WF NW-53 East
- Hillsborough River (lower segment) (reevaluated)
- Hillsborough River (upper segment)
- Homosassa River<sup>d</sup>/Homosassa Spring Group (OFS)<sup>b</sup>
- Levy County Lake Marion
- Marion County Lakes Bonable, Little Bonable and Tiger
- Myakka River (lower segment)
- Myakka River (upper segment)





- Northern Tampa Bay 7 Wells Upper Floridan aquifer/Saltwater Intrusion
- Pasco County Lakes Bell, Big Fish (reevaluated), Bird, Buddy (reevaluated), Camp (reevaluated), Clear, Green, Hancock, Iola, Jessamine, King, King [East], Linda, Middle, Moon (reevaluated), Padgett (reevaluated), Parker aka Ann, Pasadena (reevaluated), Pasco, Pierce (reevaluated), Unnamed #22 aka Loyce
- Pasco County Wetland Sites CBARWF Q-1, CBARWF Stop #7, CBARWF T-3, CBARWF TQ-1 West, CBRWF A, CBRWF #4, CBRWF #16, CBRWF #20, CBRWF #25, CC Site G, CC W-11, CC W-12, CC W-17, CC W-41, NPWF #3, NPWF #21, SPWF NW-49, SPWF NW-50, SPWF South Cypress, STWF Central Recorder, STWF Eastern Recorder, STWF D, STWF M, STWF N, STWF S-75, STWF Z
- Peace River (lower segment) (reevaluated)
- Peace River (middle segment)
- Peace River (three upper segments "low" minimum flows)
- Pinellas County Wetland Site EWWF Salls Property Wetland 10S/10D
- Pithlachascotee River (lower segment)
- Pithlachascotee River (upper segment)
- Polk County Lakes Annie<sup>a</sup>, Aurora<sup>a</sup>, Bonnie<sup>a</sup>, Clinch<sup>a</sup> (reevaluated), Crooked<sup>a</sup> (reevaluated), Crystal<sup>a</sup>, Dinner<sup>a</sup>, Eagle<sup>a</sup> (reevaluated), Easy<sup>a</sup>, Eva<sup>a</sup>, Hancock<sup>a</sup>, Lee<sup>a</sup>, Lowery<sup>a</sup>, Mabel<sup>a</sup>, McLeod<sup>a</sup> (reevaluated), North Lake Wales<sup>a</sup>, Parker, Starr<sup>a</sup> (reevaluated), Venus<sup>a</sup>, Wailes<sup>a</sup> (reevaluated)
- Rainbow River/Rainbow Spring Group (OFS)<sup>a, b</sup>
- Sulphur Springs
- Sumter County Lakes Big Gant<sup>a</sup>, Black<sup>a</sup>, Deaton<sup>a</sup>, Miona<sup>a</sup>, Okahumpka<sup>a</sup>, Panasoffkee<sup>a</sup>
- Southern Water Use Caution Area Upper Floridan aquifer<sup>a</sup>
- Tampa Bypass Canal
- Weeki Wachee River System and Springs (includes Weeki Wachee, Jenkins Creek, Salt, Little Weeki Wachee and Mud River Springs)

# Water Bodies with Adopted and Effective Reservation Rules

• Morris Bridge Sink (water reserved to contribute to achieving or maintaining minimum flows adopted for the lower Hillsborough River for the protection of fish and wildlife)

# Minimum Flows and Levels to be Adopted in 2019

- Hillsborough County Lakes (reevaluations) Calm, Charles, Church, Echo, Sapphire
- Pasco County Lake Linda (reevaluation)
- Chassahowitzka River/Chassahowitzka Spring Group and Blind Spring (OFS)<sup>b</sup> (reevaluation)
- Homosassa River/Homosassa Spring Group (OFS)<sup>b</sup> (reevaluation)
- Rainbow River/Rainbow Spring Group (OFS)<sup>c</sup>
- Pasco County Wetland Sites (reevaluations) CBRWF #20, CBRWF #25, NPWF #3, NPWF #21, SPWF NW-49, SPWF NW-50, SPWF South Cypress, STWF Central Recorder, STWF Eastern Recorder, STWF Z
- Hillsborough County Wetland Sites (reevaluations) CBRWF #32, CR1, CR2, CR3, EWWF NW-44, MBWF Clay Gully Cypress, MBWF Entry Dome, MBWF Unnamed, MBWF X-4 Pinellas County Wetland Site – EWWF Salls Property Wetland 10S/10D (reevaluation)

2



## Minimum Flows and Levels to be Adopted in 2020

2020

- Hillsborough County Lakes (reevaluations) Cypress, Garden, Halfmoon, Jackson, Strawberry (North Crystal) Hillsborough County Wetland Sites (reevaluations) – Cosme WF Wetland, CR4, CR5, CR6, S21 WF NW-53 East
- Peace River (lower segment) (reevaluation)Shell Creek (lower segment) Pasco County Wetland Sites (reevaluations) – CBARWF Q-1, CBARWF Stop #7, CBARWF T-3, CBARWF TQ-1 West, CBRWF A, CBRWF #4, CBRWF #16, CC Site G, CC W-11, CC W-12, CC W-17, CC W-41, STWF D, STWF M, STWF N, STWF S-75

#### Minimum Flows and Levels to be Adopted in 2021

- Braden River (lower segment)
- Manatee River (lower segment)
- Hillsborough County Lakes (reevaluations) Barbara, Crenshaw, Ellen, Helen, Mound

## Minimum Flows and Levels to be Adopted in 2022

- Little Manatee River (lower segment)
- Little Manatee River (upper segment)

# Minimum Flows and Levels to be Adopted in 2023

- Charlie Creek
- Horse Creek
- Southern Water Use Caution Area Saltwater Intrusion Minimum Aquifer Level (SWIMAL) (reevaluation)

# Minimum Flows and Levels to be Adopted in 2024

- Withlacoochee River (lower segment) Withlacoochee River (upper segment, U.S. Geological Survey Holder gage to U.S. Geological Survey Wysong gage)
- Withlacoochee River (upper segment, U.S. Geological Survey Wysong gage to U.S. Geological Survey Croom gage)
- Withlacoochee River (upper segment, upstream of U.S. Geological Survey Croom gage)

# Minimum Flows and Levels to be Adopted in 2025

- Peace River (upper segment, U.S. Geological Survey Zolfo Springs gage to U.S. Geological Survey Ft. Meade gage) (reevaluation)
- Peace River (upper segment, U.S. Geological Survey Ft. Meade gage to U.S. Geological Survey Bartow gage) (reevaluation)
- Peace River (upper segment, upstream of U.S. Geological Survey Bartow gage) (reevaluation)Prairie Creek
- Shell Creek (upper segment)

#### Minimum Flows and Levels to be Adopted in 2026

- Cypress Creek
- Gum Slough Spring Group (reevaluation)



#### Minimum Flows and Levels to be Adopted in 2027

- Pasco County Lake Pasco Lake (reevaluation)
- Crystal River/Kings Bay Spring Group (OFS)<sup>b</sup> (reevaluation)

2020

- North Prong Alafia River
- South Prong Alafia River
- Rainbow River/Rainbow Spring Group (OFS)<sup>b</sup> (reevaluation)

#### Minimum Flows and Levels to be Adopted in 2029

- Chassahowitzka River/Chassahowitzka Spring Group (OFS)<sup>b</sup> (second reevaluation)
- Homosassa River/Homosassa Spring Group (OFS)<sup>b</sup> (second reevaluation)

#### Water Bodies Scheduled for Reservations Adoption in 2020

Polk County Lake – Hancock (reservation proposed to contribute to achieving or maintaining minimum flows adopted for the upper Peace River and for the protection of fish and wildlife).

#### **Notes**

a Water body may be affected by groundwater withdrawals in an adjacent water management district.

b OFS = Outstanding Florida Spring.

c Emergency rule in 40DER17, F.A.C. for the Rainbow River/Rainbow Spring Group in effect until related rule proposed in rule 40D-8-041, F.A.C., becomes effective.



# Minimum Flows and Water Levels (MFLs) Methodology

202

The District's minimum flows and water levels methodology is briefly described in this appendix. Detailed descriptions of the methodology used for establishing MFLs can be found in documents cited in Hancock and Leeper (2019) and at the District's MFLs (Environmental Flows) Documents and Reports web page at <a href="https://www.swfwmd.state.fl.us/projects/mfl/documents-and-reports">https://www.swfwmd.state.fl.us/projects/mfl/documents-and-reports</a>.

#### Technical Approach to the Establishment of MFLs

The District's technical approach for establishing MFLs addresses all relevant requirements expressed in the Florida Water Resources Act of 1972 (Section 373, Florida Statutes (F.S.)) and the Water Resource Implementation Rule (Chapter 62-40, Florida Administrative Code (F.A.C.)). The approach assumes that alternative hydrologic regimes may exist that differ from Historic conditions but are sufficient to protect water resource features from significant harm. Chapter 62-40-8.021, F.A.C. defines "Historic" as a Long-term period when there are no measurable impacts due to withdrawals and Structural Alterations are similar to current conditions. "Longterm" is defined as a period that spans the range of hydrologic conditions, which can be expected to occur based upon historical records, ranging from high water levels to low water levels. "Structural Alterations," as defined in the Rule, are man's physical alteration of the control point of a lake or wetland that affects water levels. For example, consider a Historic condition for an unaltered river or lake system with no local ground or surface water withdrawal impacts. A new hydrologic regime for the system would be associated with each increase in water use, from small withdrawals that have no measurable effect on the Historic regime, to large withdrawals that could substantially alter the regime. A threshold hydrologic regime may exist that is lower or less than the Historic regime, but which protects the water resources and ecology of the system from significant harm. This threshold regime could conceptually allow for water withdrawals, while protecting the water resources and ecology of the area. MFLs may therefore represent minimum acceptable rather than Historic or potentially optimal hydrologic conditions.

#### **Ongoing Work, Reassessment and Future Development**

The District continues to conduct the necessary activities to support the adoption of MFLs into its Water Levels and Rates of Flow rules (Chapter 40D-8, F.A.C.) according to the District's Priority List and Schedule for MFLs establishment. Refinement and development of new methodologies are also ongoing. In accordance with the Florida Water Resources Act, MFLs are established based upon the best available information. The District plans to conduct periodic reevaluations of adopted MFLs based on consideration of the significance of specific MFLs in water supply planning, the relevance of new data that may become available, and rule-specified reevaluation schedules.

#### Scientific Peer Review

The Florida Water Resources Act permits affected parties to request independent scientific peer review of the scientific and technical data and methodologies used to determine MFLs. In addition to supporting any requested peer review processes, the District voluntarily seeks independent scientific peer review of MFL methodologies that are developed for all priority water bodies, as well as the review of proposed MFLs for specific priority water bodies in accordance with criteria identified in the Water Resource Implementation Rule.





#### Methodology

#### Wetlands

The District has developed a method for establishing minimum levels for palustrine cypress wetlands (i.e., isolated, freshwater, cypress-dominated wetlands). Data collection and analysis is ongoing for the development of minimum level methods for other wetland types. The method for establishing minimum levels for palustrine cypress wetlands is based on a statistical assessment of the relationship between hydrology and certain ecologic parameters in a number of wetlands. The goal for the method and Minimum Wetland Levels (MWLs) developed using the method is to identify a hydrologic threshold, expressed as a water level, beyond which it would be reasonable to expect that significant harm may occur in a wetland. A MWL for palustrine cypress wetlands is determined by surveying a normal pool elevation based on "Hydrologic Indicators" occurring within the wetland and calculating an elevation 1.8 feet below the normal pool. Chapter 40D-8.021, F.A.C., defines "Hydrologic Indicators" as those biological and physical features which are representative of previous water levels, as listed in the Rule. A complete description of the methods used for establishing MWLs can be found in SWFWMD (1999c) and the District Water Levels and Rates of Flow rules.

Wetland water levels are determined to be above the MWL if the Long-term (as defined in the Rule) median stage is at or above the adopted minimum level. If insufficient hydrologic data exists to determine if water levels in a wetland are above or below an adopted MWL, a wetland can be evaluated based on a comparison with wetlands that are hydrologically or hydrogeologically similar, located in close proximity, or by use of aerial photographs or evaluation of available hydrologic data or Hydrologic Indicators in the subject wetland.

#### Lakes

Minimum levels for lakes, including a Minimum Lake Level (MLL) and High Minimum Lake Level (HMLL) are determined through analysis of measured and modeled lake stage and other hydrologic data, consideration of Structural Alterations, evaluation or surveying of basin-specific features or conditions, and through identification of appropriate lake-class-specific significant change standards.

For establishment of minimum lake levels, priority lakes are classified as Category 1, 2 or 3. Systems with fringing cypress wetlands greater than 0.5 acres in size, where water levels regularly rise to an elevation expected to fully maintain the viability of the wetlands (i.e., the median lake stage is not more than 1.8 feet below the normal pool elevation) are classified as Category 1 lakes. Lakes with fringing cypress wetlands greater than 0.5 acres in size that have been Structurally Altered such that the median lake stage is more than 1.8 feet below the normal pool elevation are classified as Category 2 lakes. Lakes without fringing cypress wetlands or with less than 0.5 acres of fringing cypress wetlands are classified as Category 3 lakes.

MLLs are established using lake-specific significant change standards and other available information. For Category 1 or 2 lakes, a significant change standard is established 1.8 feet below the normal pool elevation. This standard identifies a desired median lake stage that, if achieved, may be expected to preserve the ecological integrity of the lake-fringing wetlands. For Category 3 lakes, six significant change standards associated with dock-use, aesthetics, basin connectivity, recreational/ski use, water column mixing, and maintenance of species richness, are developed and used for preventing significant harm to environmental values associated with the standards.



Potential changes in the coverage of herbaceous wetland vegetation and aquatic plants are also taken into consideration.

2020

The MLL is the elevation that a lake's water levels are required to equal or exceed 50 percent of the time on a Long-term basis. For Category 1 lakes, the MLL is established at the standard elevation 1.8 feet below the normal pool. The MLL for Category 2 lakes is established at the median lake stage that would be expected in the absence of withdrawal impacts, with existing Structural Alterations in place. For Category 3 lakes, the MLL is established at the most conservative (i.e., the highest) appropriate standard elevation, except where the standard elevation is above the median lake stage that would occur in the absence of withdrawals, with existing Structural Alterations in place. In these cases, the MLL is established at the median lake stage.

The High Minimum Lake Level (HMLL) is the elevation that a lake's water levels are required to equal or exceed ten percent of the time on a Long-term basis. For Category 1 lakes, the HMLL is established 0.4 feet below the normal pool. The HMLL for Category 2 lakes is established at the elevation water levels would be expected to equal or exceed ten percent of the time, given existing Structural Alterations and the absence of withdrawal impacts. For Category 3 lakes, the HMLL is developed by summing the MLL elevation and the expected difference between the median lake stage and the water level equaled or exceeded ten percent of the time. A complete description of the methodology used for establishing MLLs can be found in SWFWMD (1999b), Leeper et. al. (2001) and the District Water Levels and Rates of Flow rules.

Lake MFLs are met when the Long-term median lake stage is at or above the MLL and the Long-term water level equaled or exceeded ten percent of the time is at or above the HMLL. If insufficient data exists to determine if lake levels are above or below the MFLs, the lake can be evaluated based on a comparison with lakes that are hydrologically or hydrogeologically similar, located in close proximity, or by use of aerial photographs or evaluation of available hydrologic data or Hydrologic Indicators at the lake.

#### Aquifers

Saltwater Intrusion Minimum Aquifer Levels (SWIMALs) have been developed for the Upper Floridan aquifer (UFA) in the Northern Tampa Bay Water Use Caution Area (NTBWUCA) to prevent regional saltwater intrusion and in the Southern Water Use Caution Area (SWUCA) to slow the rate of saltwater intrusion. A Minimum Aquifer Level (MAL) has been developed for the Dover/Plant City Water Use Caution Area (Dover/Plant City WUCA) to maintain UFA levels above a level that was associated with formation of a large number of sinkholes and well failures during an extreme frost/freeze event in 2010. Due to differing hydrogeologic conditions and water use patterns, the approaches used to determine SWIMALs or MALs differed slightly in these three areas.

The development and implementation of a SWIMAL is a three-step process. The first step is to assess the current status and anticipated future advancement of saltwater intrusion. For the NTBWUCA, current and future status of regional saltwater intrusion was assessed through use of a sharp interface model. For the SWUCA, the number of wells and water supply potentially at risk to saltwater intrusion over the next 50 years was determined through review of existing hydrogeologic and water-use data and use of a solute transport model. The second step for SWIMAL development involves identification of a proposed goal for the SWIMAL. In the





NTBWUCA, the goal was preventing further advancement of regional seawater intrusion. In the SWUCA, the goal for the SWIMAL was to slow the rate of saltwater intrusion to the rate that occurred for the period from 1990 to 1999, based on the number of wells and water supply potentially at risk to saltwater intrusion in the Most Impacted Area of the SWUCA. Finally, for development and implementation of a SWIMAL, a network of monitor wells and corresponding water levels is selected to evaluate SWIMAL status based on a Long-term average (NTBWUCA) or ten-year moving annual average (SWUCA) UFA water levels. A complete description of methodology used for developing SWIMALS can be found in SWFWMD (1999a, 1999d and 2002).

The MAL for the Dover/Plant City WUCA was developed through review of complaints concerning regional well conditions and information on reported sinkholes that occurred in association with groundwater withdrawals used for frost/freeze protection during an extremely cold period in January 2010 (Weber and Peterson 2010). Maximum regional aquifer-level drawdown information was also used, along with other available geologic and hydrogeologic data and groundwater flow modeling to identify an appropriate MAL. The goal for the MAL was to identify a regional potentiometric level for the UFA that would reduce the likelihood of well failures and other potential impacts during future prolonged freeze events.

The status of the Dover/Plant City WUCA MAL is evaluated using a groundwater flow model simulation of the permitted groundwater frost/freeze withdrawals in the Dover/ Plant City WUCA. Based on an annual simulation, the MAL is met if the resulting potentiometric level of the UFA is at or above the MAL elevation.

#### **Rivers, Estuaries, and Springs**

Development of minimum flows for flowing surface waters, including freshwater or estuarine river segments and springs, typically involves characterization of existing and historical withdrawal impacts and Structural Alterations; identification of seasonal high, medium and low flow periods or blocks; identification of benchmark flow records; and development of significant harm standards. Measured and modeled/estimated flow records, water-use information and other hydrologic data are used along with groundwater flow and other hydrologic modeling for characterization of withdrawal impacts. These data may be used along with other information (e.g., water control structure operation schedules, land-use changes, etc.) to assess effects of Structural Alterations on flows.

Seasonal flow blocks are typically identified to address system characteristics associated with components of the flow regime (*e.g.*, maintenance of water depths sufficient for fish passage across shoals during low flow periods and inundation of floodplains during high flow periods). Benchmark water level records reflecting the hydrologic regime expected in the absence of water withdrawals for specific time-periods, based on identified Structural Alterations and/or climatic cycles, are used along with significant harm/change standards for environmentally relevant criteria (e.g., allowable change in fish habitat availability; areal and volumetric changes in specific salinity zones; changes in abundances of fish, macroinvertebrates and phytoplankton; and thermal refugia for the endangered manatee) to identify block-specific percent-flow reductions that are used to establish minimum flows. The MFLs are typically expressed as allowable flow-reduction percentages associated with no more than a 15 percent change in standard-specific criteria, based on daily flow measurements, and may also include specific flow thresholds that serve to limit withdrawals.





River, estuary and spring MFLs are met if measured or modeled flows indicate that allowable percent-of-flow reductions or specific low flow thresholds are not exceeded. These assessments may be based on analysis of measured and/or modeled flow records, including consideration of Long-term flow statistics expected based on natural climatic variation, and consideration of other hydrologic and hydrogeologic information.

#### References

- Hancock, M.C., and Leeper, D.A. 2019. *Minimum flows and levels development, status assessment, and implementation in the Southwest Florida Water Management District.* Southwest Florida Water Management District. Brooksville, Florida.
- Leeper, D., Kelly, M., Munson, A. and Gant, R. 2001. A multiple-parameter approach for establishing minimum levels for Category 3 Lakes of the Southwest Florida Water Management District, June14, 2001 draft. Southwest Florida Water Management District. Brooksville, Florida.
- SWFWMD. 1999a. Environmental minimum aquifer levels as used in Rule 40D-8, F.A.C., in Northern Tampa Bay minimum flows and levels white papers: white papers supporting the establishment of minimum flows and levels for isolated cypress wetlands, Category 1 and 2 lakes, seawater intrusion, environmental aquifer levels, and Tampa Bypass Canal; peerreview final draft, March 19, 1999. Brooksville, Florida.
- SWFWMD. 1999b. Establishment of minimum levels for Category 1 and Category 2 lakes, in Northern Tampa Bay minimum flows and levels white papers: white papers supporting the establishment of minimum flows and levels for isolated cypress wetlands, Category 1 and 2 lakes, seawater intrusion, environmental aquifer levels and Tampa Bypass canal, peerreview final draft, March 19, 1999. Brooksville, Florida.
- SWFWMD. 1999c. Establishment of minimum levels in palustrine cypress wetlands, in Northern Tampa Bay minimum flows and levels white papers: white papers supporting the establishment of minimum flows and levels for isolated cypress wetlands, Category 1 and 2 lakes, seawater intrusion, environmental aquifer levels, and Tampa Bypass Canal; peerreview final draft, March 19, 1999. Brooksville, Florida.
- SWFWMD. 1999d. Seawater intrusion minimum levels for northern Tampa Bay, in Northern Tampa Bay minimum flows and levels white papers: white papers supporting the establishment of minimum flows and levels for isolated cypress wetlands, Category 1 and 2 lakes, seawater intrusion, environmental aquifer levels, and Tampa Bypass Canal; peerreview final draft, March 19, 1999. Brooksville, Florida.
- SWFWMD. 2002. Saltwater intrusion and the minimum aquifer level in the Southern Water Use *Caution Area*, August 21, 2002 draft. Southwest Florida Water Management District. Brooksville, Florida.

5





Weber, K. and Peterson. R. 2010. *Determining the need for a cap on groundwater use for freeze protection in the Dover/Plant City area*. Southwest Florida Water Management District. Brooksville, Florida.





2379 Broad Street, Brooksville, Florida 34604-6899 (352) 796-7211 or 1-800-423-1476 (FL only) WaterMatters.org

Tampa Service Office

Tampa, Florida 33637-6759 (813) 985-7481 or

1-800-836-0797 (FL only)

7601 U.S. 301 North (Fort King Highway)

Bartow Service Office 170 Century Boulevard Bartow, Florida 33830-7700 (863) 534-1448 or 1-800-492-7862 (FL only)

#### September 9, 2019

Interested	Parties
	Interested

THROUGH: Jay Hoecker, Manager, Water Supply Section, Water Resources Bureau

Sarasota Service Office

1-800-320-3503 (FL only)

Sarasota, Florida 34240-9711

6750 Fruitville Road

(941) 377-3722 or

FROM: R. Thomas Kiger, P.E., Senior Professional Engineer Kevin Wills, Senior Economist, Water Resources Bureau Ryan Pearson, Economist, Water Resources Bureau Cortney Cameron, Staff Hydrogeologist, Water Resources Bureau

#### SUBJECT: 2020 Regional Water Supply Plan: Agricultural Water Use Demand Projections

#### Introduction

Every five years, the District develops a Regional Water Supply Plan (RWSP) in accordance with statutory requirements. A key component of this Plan is a quantification of the water supply needs for all existing and future reasonable-beneficial uses within the 20-year planning horizon. Agricultural water use is the second largest water use sector in the District and developing agricultural water use projections is an important step in assessing regional water use projections for the 2020 Regional Water Supply Plan, and the results of the current 2020 agricultural water use projections.

The Southwest Florida Water Management District (District) also participated in the development of the RWSP for the Central Florida Water Initiative (CFWI) in conjunction with representatives from the Florida Department of Environmental Protection (FDEP), major public supply stakeholders and the South Florida and St. John's River water management districts. The CFWI region includes portions of Lake and Polk Counties which are under District jurisdiction. Consequently, the projected agricultural water use projections for Lake and Polk County were developed on a different basis than the rest of the planning area and are detailed in the Draft Central Florida Water Initiative Demand Projections as of October 2018.

#### Purpose

This memo explains the assumptions, methodologies, and sources used to develop the agricultural water use projections for the 2020 SWFWMD RWSP. This information includes:

- Projected irrigated agricultural acreages by crop type.
- Projected water demands for irrigated agriculture
- Projected water demands for livestock and aquaculture.
- The spatial distribution of agricultural water use projections within the District

SUBJECT: 2020 Agricultural Water Demand Projections Page 2 of 17 September 9, 2019

#### Statutory Guidance

Section 373.709, Florida Statutes (F.S.) sets forth the requirement for regional water supply planning. Under these provisions, the Governing Board of each water management district shall develop a Regional Water Supply Plan (RWSP) for regions within the district where existing sources of water are not adequate to supply water for all existing and future reasonable-beneficial uses and to sustain the water resources and related natural systems for the 20-year planning period. This must include a water supply development component which includes a quantification of the water supply needs for all existing and future reasonable-beneficial uses within the planning horizon.

Section 373.709(2)(a)1.b F.S. further states that:

Agricultural demand projections used for determining the needs of agricultural self-suppliers must be based upon the best available data. In determining the best available data for agricultural self-supplied water needs, the district shall consider the data indicative of future water supply demands provided by the Department of Agriculture and Consumer Services pursuant to s. 570.93 and agricultural demand projection data and analysis submitted by a local government pursuant to the public workshop described in subsection (1), if the data and analysis support the local government's comprehensive plan. Any adjustment of or deviation from the data provided by the Department of Agriculture and Consumer Services must be fully described, and the original data must be presented along with the adjusted data.

#### Data and Information Sources

The two primary sources of data used to develop the agricultural water use projections were the District's Estimated Water Use Reports (2015-2017) the Florida Department of Agriculture and Consumer Services' Florida Statewide Irrigation Demand Report version 5 (FSAID V), published June 29, 2018. This included the use of the FSAID V agricultural water use geodatabases associated with the FDACS report. The District also utilized permit level data from both the Water Well Construction permitting program and the Water Use Permitting program.

#### Methodology

The process of developing the 2020 agricultural water use projections was generally divided into two parts: 1) a review of the FSAID V in comparison to existing historical water use data, and 2) the development of an adjusted FSAID V which more closely reflects historical water use patterns in the District. This adjustment was made for each of the three general categories of water use in the FSAID V: Irrigated crops, livestock demands, and aquaculture. The review of the FSAID V and the subsequent adjustments to each category are discussed in this section.

#### FSAID V Review:

The process of developing the FSAID water use projections is fully described in FDACS' technical report. A high-level summary of FSAID development can be generally be described in 5 key steps:

1. **Water Use Data Collection:** FDACS collects annual water use data at the permit level from each water management district. This is water use data collected for metered agricultural water use permits by each district's water use permitting program.

- 2. **Baseline Irrigated Acreage Map:** FDACS creates a baseline map (2016 in this case) of actively irrigated areas within each district.
- 3. Develop an econometric water use model, and model 2016 water demands: After mapping 2016 baseline irrigated areas, FDACS joins the District's water use data to this coverage for individual permitted operations. Using FDACS irrigated acreages and District water use data, FDACS develops a database of irrigation application rates, and uses this data to calibrate an econometric model to predict per acre water use for various crop categories. This model is then run to create a modeled 2016 estimated water demand coverage for the FSAID V.
- 4. Project future irrigated acreages: To assess the projected change in irrigated acreage, FDACS uses a statistical regression based on the historical trends in irrigated acreage in each county. Using this trend, FDACS projects future total irrigated acreage for each county. FDACS then uses a GIS model to produce a map of projected irrigated acreage and crop types in each county for 2040.
- **5. Project future irrigation demands:** After the 2040 projected irrigated acreage coverage is complete, FDACS uses the econometric model to simulate future irrigation demands for 2040 at the parcel level based on project crop type. The econometric model assigns a per acre water use to each irrigated parcel based on crop type and projected crop price. Crop price is one of the key changing variables in the econometric model between the 2016 baseline and 2040 projected water use simulations.

Once the projected 2040 acreages, crop mix, and application rates are modeled at the parcel level, FDACS compiles this data into a geodatabase for publication and summarizes the results in the final FSAID report.

District staff reviewed the published report, and particularly examined the 2016 baseline water use estimates, the 2016 irrigated acreage coverage, the 2040 acreage projections and crop mix, and the 2040 projected water use. In general, although the District found the acreage data to be satisfactory for planning, the District identified several items relating to the water use baseline and projections that required modification of the projections for inclusion in the RWSP. These items are as follows:

1) The baseline year (2016) FSAID V ILG water demand estimates for the District and for whole counties were significantly higher than District historic water use estimates, even where there is an extremely high percentage of metered data. Overall, the 2016 modeled water use in the FSAID V ILG for SWFWMD was 430 mgd, and published 2016 estimated water use (for FSAID crops) was 315 mgd. This inflated baseline compared to recent historical water use data created the potential for significant over-projection of future demands. The high baseline demand would also be challenging for use in groundwater modeling for regional water supply planning, as use of these values would create sudden large increase in pumpage in the regions of the District's groundwater models, as compared to historical water use estimates based on metered data. The over-estimation trend for baseline 2016 water demands was particularly apparent in counties in the SWUCA (Charlotte, Desoto, Hardee, and Manatee), posing a challenge for future MFL assessment.

SUBJECT: 2020 Agricultural Water Demand Projections Page 4 of 17 September 9, 2019

- 2) The use of the FSAID econometric model to synthesize typical 2016 water demands for permits where historical, user-reported metered data is available was also problematic from a planning perspective. Using the FSAID econometric model to predict baseline 2016 water demands, rather than metered data, not only created potential for under- and over-estimation of demands at the permit level, but also altered the spatial distribution of water use within counties, even where the FSAID predicted county totals may align with District estimates. Altering the spatial distribution of baseline water use can be particularly problematic in MFL assessments. Using modeled water demands where metered data is available can also have the effect of obscuring the benefits of individual grower's water conservation practices, or the conservation benefits of growers who have participated in District FARMS cost share programs. Similarly, the District also found cases where FSAID5 estimated water use under-reported historical baseline demands for individual permittees, effectively flattening out high volume water users. For these reasons, the District required baseline water demand data to be more reflective of historical metered water use at the permit level.
- 3) It appeared that some of the large discrepancies in FSAID modeled water use compared to historical, metered data were a result of over-estimation of irrigated acreages within permits. This was observed particularly for crops where agricultural land use or irrigated parcels can rapidly change, such as rotational vegetable operations in Manatee county, strawberry operations in Hillsborough county which can rotate with other agricultural land uses each year, and citrus, where citrus greening disease has caused rapid changes in acreages due to grove abandonments and replantings.
- 4) District staff also found that when comparing final FSAID values to multi-year averages of water use at the permit scale, that the FSAID model appeared to systematically over-estimate water use for the permit population of SWFWMD. Staff compared metered data to FSAID estimates and conducted a preliminary assessment of residuals and found evidence of over-estimation trends. Part of this trend seems to stem from the use of asymmetrical screening thresholds in the calibration of the econometric model. When applying District-supplied metered data to the estimated 2016 acreage of FSAID parcels, FDACS screened out the lower 25% of per acre water use rates, but only screened out the upper 10% of per acre water use rates. This dataset was then used for calibration of the econometric water use model. Screening out 15% more low water use values than high water use values prior to calibrating the econometric model creates a condition where statistical bias is introduced to the model. Models calibrated to an asymmetrical subset of an original population will be unable to predict the characteristics of the overall observed population. Although it is necessary to screen and QCQA data for model calibration, it seems unlikely that water use data for the lowest 25% of water users in the District should be thrown out as outliers while only the top 10% of data should be removed. Additionally, since the data screening process is based on application rates (metered data divided by FSAID-estimated acreage), over-estimation of irrigated acreage (observed in other analysis) would increase the likelihood of "outliers." In summary, this method of asymmetrical screening of water use data appeared to have

SUBJECT: 2020 Agricultural Water Demand Projections Page 5 of 17 September 9, 2019

introduced bias into the econometric model, resulting in overestimation of agricultural water use in the District.

In summary, the 2016 baseline water demands and the 2040 projected agricultural water demands presented in the FSAID V report deviated significantly from historical metered water use in the District at the regional, county, and permit levels, and required adjustment to incorporate into the RWSP. It was particularly important to ensure that groundwater modeling exercises for the RWSP were reflective of existing metered water use.

#### FSAID V Agricultural Water Demand Adjustments:

To ensure that the FSAID V ILG irrigation demands were consistent with permittee-reported historical water use data, District staff used metered water use data where available to adjust the FSAID V application rates. This allowed the District to incorporate the best available data into the projections.

#### Acreage:

As the District does not directly track total irrigated acreage on an annual basis, and NRCS had not published acreages for the baseline interval at time the projections were developed, the FSAD V ILG irrigated acreage coverage was considered the best available acreage data for this RWSP. The use of the FSAID V acreage projections also included the added benefits of consistent statewide crop categories, and the recent incorporation of irrigated areas field verification efforts by FDACS in some District counties. A summary of FSAID V irrigated acreage projections for the SWFWMD by crop type are provided below.

Сгор Туре	2016 Acreage	2040 Acreage
Citrus	278,503	259,524
Field Crops	11,440	14,998
Fruit (Non-citrus)	18,397	17,557
Greenhouse/Nursery	9,581	8,841
Hay	8,215	10,242
Potatoes	1,849	2,510
Sod	8,151	7,534
Vegetables (Fresh Market)	65,681	73,988
Grand Total	401,817	395,195

#### FSAID V Irrigated Acreage Projections for SWFWMD

Typical Year Water Use Projections:

District staff used the FSAID V ILG, Aquaculture, and Livestock coverage to develop an adjusted average year FSAID V water use projection. The methods differed for each category based on data availability. All adjustments were done at the permit level for known District permits, and at the FSAID polygon level for non-permitted water uses. The adjustments described below were conducted for all counties in the District for consistency. After the adjustments to the FSAID V projections were complete, the agricultural projections for SWFWMD's portion of Polk county was replaced by the unadjusted FDACS FSAID IV

SUBJECT: 2020 Agricultural Water Demand Projections Page 6 of 17 September 9, 2019

projections, as Polk County is in the CFWI Planning Area, and FSAID IV was used for the agricultural projections in the CFWI region.

1) Metered Irrigation Permits:

Staff compiled Estimated Water Use Report Data for all metered agricultural permits for 2014-2016. Staff then merged acreage and crop data in a spreadsheet for all FSAID ILG polygons by permit number. Once the FSAID was summarized at the permit level, staff joined the 2014-2016 estimated water use data to each permit by permit number in the same spreadsheet. An average 2014-16 water use for each metered permit was developed (years with no data were excluded). The 2014-16 average water use for each permit. This permit-level per acre water use rate was multiplied by the 2016-2040 FDACS projected acreages for each permit. This created a new projected water use projection (in MGD) for each permit based on future acreage and current application rates. In no case did FDACS forecast a change in crop type for an individual permit, so existing application rates remained reasonable for the project future crop type.

2) Unmetered ILG Irrigated Areas:

Staff developed county by county per acre water use rates for each crop type to estimate demands from unmetered permits or FSAID polygons. Staff developed a summary table of metered FSAID acreage and (2014-2016 average) metered water use by county based on the previous analysis of metered permits. This data was used to develop average per acre water use by crop type for each county. Per acre water use by crop was then joined to each unmetered permit or parcel in the FSAID ILG. This per acre water use value was then multiplied by the projected 2016-2040 acreages to develop 2016-2040 projected water use in mgd for each unmetered permit. In no case did FDACS forecast a change in crop type for an individual permit, so per acre application rates remained constant for each permit over the 2016-2040 planning horizon.

3) Aquaculture:

FDACS held aquaculture water use constant over the 2016-2040 planning horizon. District staff examined the FSAID V aquaculture coverage to identify where metered data was available. Staff identified 11 permits where metered data was available. The 2016 water use baseline for each of these permits was set at the average water use of each permit from 2014-2016. The other aquaculture parcels identified in the FSAID V were left unchanged. The corporation of metered data where available resulted in an increase of 3.15 mgd compared to the FSAID V aquaculture projections. District staff followed FDACS forecasted trends and held aquaculture use constant from 2016 to 2040.

4) Livestock:

FDACS held aquaculture water use constant over the 2016-2040 planning horizon. District staff examined the FSAID V aquaculture coverage to identify where metered data was available. The overall FSAID livestock GIS coverage identified 9.13 mgd of livestock demands District wide. These had been developed using statewide livestock inventory and typical water

SUBJECT: 2020 Agricultural Water Demand Projections Page 7 of 17 September 9, 2019

use per animal demands. As many District agricultural permits include multiple water use types (such as livestock and an irrigated crop), staff identified permits that were also included in the ILG. These water demands were removed from the livestock projections as the SWFWMD metered data for the adjusted ILG demands were based on total metered water use for the whole permit and would have included smaller secondary water uses for livestock in the adjusted ILG demands. This left 4.80 mgd of total demands not included in larger irrigated permits/parcels.

The remaining livestock demands were then reclassified to be more closely aligned with historical District water use data, which is focused on water use as withdrawals from a water resource. In many cases, although cattle or other livestock may require water for drinking, water may be readily available in local surface water features and no withdrawal will be present. For this reason, projected livestock demands were limited to likely demands for withdrawals of groundwater. Staff investigated the spatial livestock demands, and found that based on landcover data, 57% of livestock parcels in the FSAID had a surface water feature present. Additionally, 62% of the livestock parcels did not have a water well permit onsite, indicating a likely lack of withdrawals. Thus, final livestock demands were further limited to those livestock polygons which had a permitted water well onsite AND were not included in a larger irrigated permit as described above. Total adjusted FSAID V livestock water demand for the 2016 baseline and 2040 projection was thus 1.82 mgd Districtwide (including Polk county).

1-in-10 Dry Year Projections:

Upon completion of all FSAID adjustments for typical year ILG demands, staff scaled the adjusted ILG average year demands to 1-in-10 demands. This was done using the scaling factors developed by FDACS in the FSAID. 2015 to 2040 projected ILG demands were scaled up at the permit level using the crop-specific scaling factors used in FSAID V. Aquaculture and livestock demands were identified to be the same for a typical year in and a 1-in-10 event in the FSAID V report. Thus, adjusted aquaculture and livestock demands were also not scaled, are reported as the same value.

Spatial Distribution for Modeling:

Upon completion of all FSAID adjustments for typical year ILG demands, staff developed an updated well file for use in groundwater modeling exercises. In the majority of the District, the distribution was handled in a two-step process described here. In Polk county, the distribution was developed in the CFWI planning effort and documented in the CFWI technical memorandums.

In the first step, all projections associated with an exiting permit in the Districts annual water use GIS coverage were joined to their existing permitted withdrawals. Projected water use was distributed within each permit such that each withdrawal made up the same percentage of total water use within that permit as had occurred in 2015. For example, if a well in a permit accounted for 50% of total water use in historical pumpage data for that permit, it would be scaled up such that it would account for 50% of total permit.

In the second step, projections for FSAID parcels that were not associated with existing withdrawals were distributed. In this case, a new projected well was added to the water use

SUBJECT: 2020 Agricultural Water Demand Projections Page 8 of 17 September 9, 2019

geodatabase, located at the centroid of the polygon. The well was assigned to the typical groundwater source for that region, in most cases the Upper Floridan Aquifer. This process included the implicit assumption that most future growth in demand would be met by groundwater sources, as is currently the case.

This when distributing water to known permits in step one, the distribution exercise for each permit included both ground and surface water withdraw points. As such, the creation of this geodatabase also generated a projected groundwater vs surface water split. Although not a formal part of the agricultural water use projections, this data is needed for groundwater modeling exercises and other technical work. The projected groundwater and surface water split is included in summary tables below.

#### Benefits of Adjustments to FSAID V Demands:

There are several benefits to the use of the FSAID V projections with the SWFWMD modifications. Firstly, using FSAID V acreages allows the District to use an updated statewide dataset for agricultural acreage with common statewide crop categories. These active acreages ae updated annually, in in many cases include field verification. The use of grower-provided, metered water use data for water use application greatly increased the utility of the FSAID V acreage projections. Using permit-level water use data allows the District to maintain grower-level water use patterns while scaling up water use based on projected acreage growth. The grower provided water use data represents the best available data for local agricultural water use patterns and is reflective of regional efforts to improve water use efficiency through the SWUCA Recovery Strategy and the investments of the FARMS program. Using metered data as a projection baseline also ensures that water use is not redistributed for future modeling efforts and maintains local high and low water use centers in each county, providing for more accurate assessment of water resources and MFLs.

#### Stakeholder Input on Projection Methods:

In addition to the outreach efforts that are ongoing as part of the overall development of the Regional Water Supply Plan, the District conducted additional outreach with key stakeholders early in the development of the agricultural water use projections.

District staff held numerous meetings in summer and fall of 2018 with the FDACS Office of Agricultural Water Policy, the publisher of the FSAID. District staff provided updates on the technical challenges of incorporating of the unadjusted FSAID V into the RWSP. FDACS staff provided significant feedback, which led to a very helpful QAQC exercise of District metered datasets, resulting in an increase in data quality. District staff also provided FDACS with summary data and potential methods for how the FSAID V could best be incorporated into the RWSP and be reflective of historical District metered data. FDACS staff accented to the proposed modifications, the District proceeded with the methods described in this paper. The District believes that the use of FSAID V acreage projections and District metered water use data utilizes the best available data for this regional effort.

Additionally, in September 2018 the District provided a presentation on the FSAID V and potential agricultural water use projections to the members of the District's Agricultural and Green Industry Advisory Committee. The District provided a technical summary of the FSAID V methods and results, and also provided potential options for an alternate adjusted projection

SUBJECT: 2020 Agricultural Water Demand Projections Page 9 of 17 September 9, 2019

method. District staff requested that the Committee take a vote on the preferred method based on their industry expertise. The Committee wished to take time to consider the proposed methods and adjourned to solicit feedback from industry groups and other stakeholders. In October 2018, the Committee reconvened, and District staff provided an additional presentation on the potential agricultural projections methods and draft results. Stakeholders present included representatives from the Florida Turfgrass Association, Florida Citrus Mutual, the Florida Strawberry Growers Association, the Florida Nursery Growers and Landscape Association, and the University of Florida IFAS, among others. After discussion, the Agricultural and Green Industry Advisory Committee voted to support the District's updated Agricultural Water Demands Projections Methodology based on the FSAID V projected acreages and adjustments to incorporated District metered water use data. The vote was passed unanimously.

In summary, District staff conducted significant outreach efforts to determine the best way to incorporate the FSAID V into the 2020 RWSP. The proposed method was developed by District water supply staff, and incorporated stakeholder comments. The final method was approved by the stakeholders of the Agricultural and Green Industry Advisory Committee and was accented to by the FDACS Office of Agricultural Water Policy.

SUBJECT: 2020 Agricultural Water Demand Projections Page 10 of 17 September 9, 2019

#### SWFWMD 2020 Agricultural Water Use Projections:

County	ADJUSTED 2015 MGD	ADJUSTED 2020 MGD	ADJUSTED 2025 MGD	ADJUSTED 2030 MGD	ADJUSTED 2035 MGD	ADJUSTED 2040 MGD
Charlotte	8.12	8.31	8.75	9.20	9.89	10.30
Citrus	1.62	1.74	1.77	1.80	1.83	1.88
DeSoto	44.09	44.29	44.45	44.63	44.70	45.09
Hardee	32.27	31.58	30.98	30.34	29.74	29.17
Hernando	1.87	2.07	2.25	2.53	2.78	3.04
Highlands	41.64	39.95	38.01	35.92	35.46	33.01
Hillsborough	43.20	41.32	39.44	37.64	35.79	33.55
Lake	0.66	0.59	0.51	0.31	0.31	0.28
Levy	7.27	7.82	8.27	8.92	9.87	10.62
Manatee	48.87	49.28	49.68	50.45	50.93	51.34
Marion	1.70	2.99	4.13	5.31	6.27	7.40
Pasco	4.89	4.78	4.72	4.69	4.64	4.59
Pinellas	0.02	0.02	0.02	0.02	0.02	0.02
Polk*	81.83	80.83	80.36	80.67	81.36	81.61
Sarasota	3.97	3.70	3.60	3.24	3.03	2.92
Sumter	5.32	4.96	4.72	4.31	3.89	3.49
Grand Total	327.34	324.22	321.68	319.96	320.53	318.30

Total Agricultural Water Use Projections (5-in-10 Water Demands, MGD)

\*Polk totals are unadjusted FSAID IV values from the 2020 CFWI Projections.

SUBJECT: 2020 Agricultural Water Demand Projections Page 11 of 17 September 9, 2019

County	2015 Baseline	Projected 2020	Projected 2025	Projected 2030	Projected 2035	Projected 2040
Charlotte	8.03	8.21	8.65	9.10	9.80	10.20
Citrus	1.57	1.69	1.72	1.74	1.78	1.83
DeSoto	43.16	43.36	43.53	43.70	43.77	44.16
Hardee	31.88	31.18	30.59	29.95	29.35	28.77
Hernando	1.84	2.04	2.23	2.50	2.75	3.01
Highlands	41.58	39.89	37.95	35.86	35.40	32.95
Hillsborough	41.07	39.18	37.31	35.50	33.65	31.41
Lake	0.65	0.58	0.50	0.29	0.29	0.27
Levy	7.26	7.81	8.26	8.92	9.87	10.61
Manatee	48.64	49.06	49.46	50.23	50.71	51.11
Marion	1.65	2.94	4.08	5.25	6.22	7.34
Pasco	4.72	4.61	4.55	4.52	4.47	4.42
Pinellas	0.02	0.02	0.02	0.02	0.02	0.02
Polk*	80.82	79.82	79.36	79.66	80.36	80.61
Sarasota	3.49	3.21	3.12	2.76	2.55	2.44
Sumter	3.53	3.17	2.93	2.52	2.10	1.70
Grand Total	319.90	316.78	314.25	312.52	313.10	310.87

Irrigated Crop Water Use Projections (5-in-10 Water Demands, MGD)

\*Polk totals are unadjusted FSAID IV values from the 2020 CFWI Projections.

Public

SUBJECT: 2020 Agricultural Water Demand Projections Page 12 of 17 September 9, 2019

Irrigated	Crop	Acreage	Pro	iections	bv	Crop <sup>-</sup>	Гуре
	-			,		-	

Year	2016**	2020	2025	2030	2035	2040
Citrus	277,631	273,816	269,610	265,683	262,557	258,659
Field Crops	11,381	12,091	13,233	13,834	14,154	14,923
Fruit (Non-citrus)	18,213	17,756	17,446	17,015	17,086	17,400
Greenhouse/Nursery	11,045	10,887	10,775	10,620	10,496	10,384
Hay	8,200	8,326	8,502	9,247	9,836	10,101
Potatoes	1,849	1,849	1,858	2,108	2,108	2,471
Sod	8,070	8,512	8,037	7,872	7,781	7,432
Vegetables (Fresh Market)	65,428	67,112	69,494	70,680	72,727	73,826
Grand Total	401,817	400,349	398,954	397,058	396,745	395,195

\*\*Acreage values provided are 2016 FSAID V values. The 2016 acreages were used with 2014-2016 water use data to develop an estimated 2015 water demand baseline. Acreages provided in the 2020 CFWI Projections for Polk county are from the FSAID IV and will differ slightly from the values in this table.

SUBJECT: 2020 Agricultural Water Demand Projections Page 13 of 17 September 9, 2019

_ivestock Wat	er Use Projectio	ns (5-in-10 Water	Demands, MGD)	CX.			
County	2015 Baseline	Projected 2020	Projected 2025	Projected 2030	Projected 2035	Projected 2040	
Charlotte	0.02	0.02	0.02	0.02	0.02	0.02	
Citrus	0.03	0.03	0.03	0.03	0.03	0.03	
DeSoto	0.27	0.27	0.27	0.27	0.27	0.27	
Hardee	0.35	0.35	0.35	0.35	0.35	0.35	
Hernando	0.03	0.03	0.03	0.03	0.03	0.03	
Highlands	0.06	0.06	0.06	0.06	0.06	0.06	
Hillsborough	0.19	0.19	0.19	0.19	0.19	0.19	
Lake	0.00	0.00	0.00	0.00	0.00	0.00	
Levy	0.01	0.01	0.01	0.01	0.01	0.01	
Manatee	0.15	0.15	0.15	0.15	0.15	0.15	
Marion	0.02	0.02	0.02	0.02	0.02	0.02	
Pasco	0.17	0.17	0.17	0.17	0.17	0.17	
Pinellas	-	-	- 0	-	-	-	
Polk*	0.79	0.79	0.79	0.79	0.79	0.79	
Sarasota	0.27	0.27	0.27	0.27	0.27	0.27	
Sumter	0.17	0.17	0.17	0.17	0.17	0.17	
Grand Total	2.52	2.52	2.52	2.52	2.52	2.52	

Livestock Water Use Projections (5-in-10 Water Demands, MGD)

\*Polk totals are unadjusted FSAID IV values from the 2020 CFWI Projections.

200

SUBJECT: 2020 Agricultural Water Demand Projections Page 14 of 17 September 9, 2019

Aquaculture W	ater Use Project	tions (5-in-10 Water	Demands, MGD)		CK	
County	2015 Baseline	Projected 2020	Projected 2025	Projected 2030	Projected 2035	Projected 2040
Charlotte	0.08	0.08	0.08	0.08	0.08	0.08
Citrus	0.02	0.02	0.02	0.02	0.02	0.02
DeSoto	0.66	0.66	0.66	0.66	0.66	0.66
Hardee	0.04	0.04	0.04	0.04	0.04	0.04
Hernando	-	-	-	-,	-	-
Highlands	-	-	-	<i>(</i> -)	-	-
Hillsborough	1.95	1.95	1.95	1.95	1.95	1.95
Lake	0.01	0.01	0.01	0.01	0.01	0.01
Levy	-	-	- •	0.	-	-
Manatee	0.07	0.07	0.07	0.07	0.07	0.07
Marion	0.04	0.04	0.04	0.04	0.04	0.04
Pasco	-	-		-	-	-
Pinellas	-	-		-	-	-
Polk*	0.19	0.19	0.19	0.19	0.19	0.19
Sarasota	0.22	0.22	0.22	0.22	0.22	0.22
Sumter	1.62	1.62	1.62	1.62	1.62	1.62
Grand Total	4.89	4.89	4.89	4.89	4.89	4.89

Aquaculture Water Use Projections (5-in-10 Water Demands, MGD)

\*Polk totals are unadjusted FSAID IV values from the 2020 CFWI Projections. 

2 JL

SUBJECT: 2020 Agricultural Water Demand Projections Page 15 of 17 September 9, 2019

County	2015 Baseline	Projected 2020	Projected 2025	Projected 2030	Projected 2035	Projected 2040
Charlotte	11.39	11.65	12.26	12.86	13.76	14.29
Citrus	2.12	2.28	2.31	2.35	2.39	2.46
DeSoto	64.75	65.03	65.24	65.50	65.61	66.15
Hardee	47.04	46.03	45.18	44.26	43.37	42.51
Hernando	2.36	2.62	2.87	3.21	3.52	3.85
Highlands	61.96	59.44	56.57	53.45	52.76	49.10
Hillsborough	55.49	52.99	50.54	48.18	45.80	42.94
Lake	0.96	0.86	0.74	0.43	0.43	0.39
Levy	9.07	9.78	10.36	11.20	12.43	13.39
Manatee	64.43	64.97	65.48	66.49	67.12	67.68
Marion	2.11	3.74	5.22	6.77	8.04	9.51
Pasco	6.76	6.61	6.53	6.47	6.41	6.34
Pinellas	0.02	0.02	0.02	0.02	0.02	0.02
Polk*	119.94	118.48	117.79	118.24	119.25	119.62
Sarasota	4.99	4.64	4.51	4.05	3.75	3.62
Sumter	6.06	5.64	5.35	4.85	4.35	3.87
Grand Total	459.45	454.78	450.99	448.34	449.02	445.74

CX.

Total Agriculture Water Use Projections (1-in-10 Dry Year Water Demands, MGD)

\*Polk totals are unadjusted FSAID IV values from the 2020 CFWI Projections.





Total Agricultural Water Use Projections (5-in-10 Water Demands, MGD) and Historical Water Use

SUBJECT: 2020 Agricultural Water Demand Projections Page 17 of 17 September 9, 2019

Districtwide Irrigated Acreage Projections by Crop Category







Bartow Service Office 170 Century Boulevard Bartow, Florida 33830-7700 (863) 534-1448 or 1-800-492-7862 (FL only) 2379 Broad Street, Brooksville, Florida 34604-6899 (352) 796-7211 or 1-800-423-1476 (FL only)

WaterMatters.org

Sarasota Service Office 6750 Fruitville Road Sarasota, Florida 34240-9711 (941) 377-3722 or 1-800-320-3503 (FL only) 
 Tampa Service Office

 7601 U.S. 301 North (Fort King Highway)

 Tampa, Florida 33637-6759

 (813) 985-7481 or

 1-800-836-0797 (FL only)

#### September 5, 2019

TO:	Interested Parties
THROUGH:	Jay Hoecker, Water Supply Manager, Water Resources Bureau
FROM:	Kevin Wills, Senior Economist, Water Resources Bureau Ryan Pearson, Economist, Water Resources Bureau
SUBJECT:	2020 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections

#### Introduction

Chapter 373, Florida Statutes (F.S.) sets forth the requirement for regional water supply planning. Under the provisions of this chapter, a Regional Water Supply Plan (RWSP) must be developed for those areas where available water supplies are not expected to meet projected demands over a 20-year planning horizon. The statute requires that the determination of the need for a RWSP be made every five years. Guidance for developing projections is contained in the publication, Format and Guidelines for Regional Water Supply Plans (Florida Department of Environmental Protection (DEP) et al., June 2009). This guidance document was produced by representatives from the DEP and each of the five water management districts. Following a Districtwide water supply assessment that identified water demands and existing sources, the Governing Board of the Southwest Florida Water Management District (SWFWMD or District) determined the need for a RWSP in the southern ten counties of the District, and the District produced its first RWSP in 2001. Starting with the 2010 edition of the RWSP, as directed by the Governing Board, District staff included demand projections for all sixteen counties within the District.

In support of this effort, the Southwest Florida Water Management District (District) participated in the development of the RWSP for the Central Florida Water Initiative (CFWI) in conjunction with representatives from the Florida Department of Environmental Protection (FDEP), major stakeholders and the South Florida and St. John's River water management districts. The CFWI region includes portions of Lake and Polk Counties which are under District jurisdiction. Consequently, the population and water demands for Lake and Polk County are from Draft Central Florida Water Initiative Demand Projections as of October 2018.

#### Purpose

This memo details the methodology used to develop water demand projections for industrial/commercial (I/C), power generation (PG), and mining/dewatering (M/D) interests within the District. I/C uses include chemical manufacturing, food processing, and miscellaneous I/C uses. While diversified, much of the water used in food processing can be attributed to citrus and other agricultural crops. For the most part, chemical manufacturing is closely associated with phosphate mining and consists mainly of phosphate processing. Several different products are mined within the District's boundaries, including phosphate, limestone, shell, and sand. For the

SUBJECT: 2020 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections

Page 2 of 11 September 5, 2019

purposes of the water supply planning process, thermoelectric power generation is separated out as an individual use category. While the Format and Guidelines (DEP et al., June 2009) identified 0.1 million gallons per day (mgd) as the mandatory reporting threshold for the I/C and M/D categories, the District examined and included all permitted or reported uses, regardless of the quantity in projecting demand. The decision to include all water use permits (WUPs), regardless of size, resulted from a belief that projection accuracy would be improved by capturing all available water use data.

#### Background

The District is divided into four planning regions: Heartland, Northern, Southern, and Tampa Bay. The Heartland Planning Region includes Hardee, Highlands, and Polk counties; the Northern Planning Region includes Citrus, Hernando, Lake, Levy, Marion, and Sumter counties; the Southern Planning Region includes Charlotte, DeSoto, Manatee, and Sarasota counties; and the Tampa Bay Planning Region includes Hillsborough, Pasco, and Pinellas counties. For the 2020 RWSP, 2015 is the starting point, or baseline year, for the purpose of developing and reporting water demand projections. This is consistent with the methodology in the Format and Guidelines (DEP et al., June 2009). The data for the baseline year consists of reported and estimated water usage for 2015, whereas data for the years 2020 through 2040 are projected demands (estimated needs).

#### **Data Source**

Baseline pumpage data comes from the Water Use Well Package Database (WUWPD) (SWFWMD, 2017). This database includes metered use for individual/general permits and estimated use for small general permits. These quantities are for consumptive use of groundwater and fresh surface water. Recirculated water is not considered consumptive use, nor is the use of circulated seawater, and they are not included in the baseline and projected demand. The WUWPD does not include the use of reclaimed water; therefore, reclaimed water is not included in the baseline or demand projections.

#### Methodology

As with the 2015 RWSP, it was decided that a general economic driver, such as a growth rate factor derived from the Gross Regional Product (GRP) (Woods and Poole Economics, 2017 would likely provide the best overall driver for industrial, commercial and mining activities. The GRP is the market value of all final goods and services produced within a region (e.g. state, county, Metropolitan Statistical Area (MSA), etc.). However, the calculated Woods and Poole Economics five-year growth rates produced projections that were significantly higher than, and out of line with, previous projections and actual data. It was noticed that the one-year calculated Woods and Poole Economics growth rates were generally in the 2.5 percent to 3.5 percent range, or very close to the 3.0 percent over five-year growth rate used in previous RWSPs but had the added advantage of growth rates varying at the county level and across time. In the absence of other better data, it was decided to use the Woods and Poole Economics one-year growth rate as a proxy for the previously used 3.0 percent over five-year growth rate across the board. The growth factors used for all sectors by county and year are found in Table 1 in the attached Appendix.

Water use projections were developed for all sectors by multiplying water use data from the WUWPD by the growth factor based on the Woods and Poole Economics GRP forecasts by county. For example, Cemex Construction Material, LLC (WUP# 7871) in Charlotte County reported using 0.006 mgd in 2015. This is a permit for a cement or concrete batch plant. Using the Charlotte County GRP-based growth factors in Table 1, this permit's demand is projected to

SUBJECT: 2020 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections

Page 3 of 11 September 5, 2019

grow 2.88 percent from 2015 to 2020, and 3.00 percent from 2020 to 2025. Projected use for 2020 and 2025 were calculated as follows:

2020 projected use = 6,000 times 1.0288 = 6,420 gallons per day (0.00642 mgd)

2025 projected use = 6,420 times 1.03 = 6,613 gallons per day (0.00661 mgd)

This methodology was used for all institutional, I/C, and M/D permits with one exception. As with the 2015 RWSP, The District consulted with the Mosaic Company to develop projections of I/C and M/D water demands associated with each of its processing facilities and mining operations. The objective was to better reflect the movement of pumpage across counties as their mines and demands shifted locations during the RWSP 20-year period of analysis.

For power generation demands, the District used a combination of historic water use and the 2018 10-year site plans for each power generation facility. These plans include historic number of customers and megawatt production. Using data for 2011-2015, a 5-year average water use per megawatt was calculated. This value is then applied to a projection of future megawatts by power generation facility. The 2018 10-year site plans for each power generation facility include projections of future customers and megawatts produced through 2027. The 20-year (2008-2027) average customer growth rate was used to extend the projections of customers through 2040. A calculation of megawatt use per customer is then applied to the projection of customers to arrive at a projection of megawatts by power generation facility. Future groundwater demand for 2020-2040 is calculated by applying the (2011-2015) average water use per megawatt to the projected megawatts specific to each power generation facility

The water use sectors addressed in the technical memorandum are not significantly affected by drought. The projections provided are the same for average and drought conditions (DEP et al., June 2009).

#### **Projections Summary**

For power generation, Table 2 in the Appendix indicates that Districtwide demand will increase by 3.0 mgd from 14.4 in 2015 to 17.4 mgd in 2040, an increase of 21 percent. County projection breakdowns and totals for each of the planning regions can be found in Tables 3 through 6 in the Appendix.

For the I/C and M/D sectors, Table 7 in the Appendix indicates that Districtwide demand will increase by 14.2 mgd from 78.4 mgd in 2015 to 92.5 mgd in 2040, an increase of 18 percent. County I/C and M/D projection breakdowns and totals for each of the planning regions can be found in Tables 8 through 11 in the Appendix.

#### Review

Upon receiving any additional stakeholder comments, the District will review suggested changes and, if appropriate, include updates. As this is a long-term planning effort, it is important to note that methodology changes based on short-term trends are not considered. Comments and suggested changes will only be taken into consideration if they are justifiable, defensible, based on historical regression data and long-term trends, and/or supported by complete documentation. The projection methods were presented to District staff and the Industrial Advisory Committee (August 14, 2018). The projections contained herein were provided to the District's Industrial Advisory Committee on November 6, 2018.  SUBJECT: 2020 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections
 Page 4 of 11
 September 5, 2019

#### Appendix

The appendix includes all the tables referenced above. In addition to the tables referenced, Table 12 breaks down the projected demands for the two sectors for selected years Districtwide.

#### References

DEP et al., June 2009. Format and Guidelines for Regional Water Supply Plans.

- SJRWMD, SFWMD, SWFWMD and DEP, *Draft 2020 CFWI Regional Water Supply Plan Demand Projections. October 31, 2018.*
- SWFWMD, June 19, 2017. *Water Use Well Package Database.* \\bkvshare\GWModels\WP\92\_2015

Woods and Poole Economics. Florida State Profile, 2017. *State and County Projections to 2040.* www.woodsandpoole.com/main.php?cat=country  SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections
 Page 5 of 11
 March 28, 2019

# APPENDIX A Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projection Tables

# SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections Page 6 of 11 March 28, 2019

County	2020	2025	2030	2035	2040
Charlotte	2.88%	3.00%	2.73%	2.49%	2.32%
Citrus	2.14%	2.69%	2.54%	2.36%	2.19%
Desoto	1.41%	2.23%	2.20%	2.14%	2.10%
Hardee	1.84%	1.93%	1.87%	1.77%	1.69%
Hernando	2.37%	2.66%	2.40%	2.19%	2.10%
Highlands	2.43%	2.29%	2.14%	1.97%	1.81%
Hillsborough	2.93%	2.75%	2.56%	2.38%	2.26%
Lake	N/A	N/A	N/A	N/A	N/A
Levy	2.44%	2.26%	2.15%	2.06%	1.99%
Manatee	3.13%	3.34%	3.10%	2.89%	2.74%
Marion	2.42%	2.08%	1.90%	1.70%	1.54%
Pasco	3.09%	2.67%	2.45%	2.30%	2.23%
Pinellas	1.44%	1.29%	1.16%	1.04%	0.94%
Polk	N/A	N/A	N/A	N/A	N/A
Sarasota	2.23%	2.54%	2.43%	2.29%	2.14%
Sumter	5.22%	3.61%	3.53%	3.39%	3.25%

#### Table 1. General Five-Year Growth Percentages Applied to I/C, M/D and PG Demands

Note: Lake and Polk projections are from Draft CFWI RWSP

## SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections

Page 7 of 11 March 28, 2019

Table 2. De	Change	% Change						
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040
Charlotte	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Citrus	2.944	1.797	1.852	1.960	2.079	2.206	-0.738	-25%
DeSoto	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Hardee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Hernando	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Highlands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Hillsborough	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Manatee	3.595	3.688	3.919	4.171	4.397	4.636	1.041	29%
Marion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Pasco	0.258	0.342	0.347	0.356	0.366	0.377	0.118	46%
Pinellas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Polk <sup>1</sup>	7.621	9.944	9.998	10.065	10.134	10.208	2.587	34%
Sarasota	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Sumter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
District Total	14.418	15.771	16.116	16.551	16.976	17.427	3.009	20.87%

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP

Note: Quantities do not include reclaimed or seawater sources.

<b>Table 3.</b> Hea 10) (mgd)	Change	% Change						
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040
Hardee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Highlands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Polk <sup>1</sup>	7.621	9.944	9.998	10.065	10.134	10.208	2.587	34%
Total	7.621	9.944	9.998	10.065	10.134	10.208	2.587	34%

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP

Note: Quantities do not include reclaimed or seawater sources.

# SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections

Page 8 of 11 March 28, 2019

Table 4. No in-10) (mgd)	Change	% Change						
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040
Citrus	2.944	1.797	1.852	1.960	2.079	2.206	-0.738	-25%
Hernando	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Marion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Sumter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Total	2.944	1.797	1.852	1.960	2.079	2.206	-0.738	-25%

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP

Note: Quantities do not include reclaimed or seawater sources.										
<b>Table 5.</b> So in-10) (mgd)	Change	% Change								
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040		
Charlotte	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%		
DeSoto	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%		
Manatee	3.595	3.688	3.919	4.171	4.397	4.636	1.041	29%		
Sarasota	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%		
Total	3.595	3.688	3.919	4.171	4.397	4.636	1.041	29%		

Note: Quantities do not include reclaimed or seawater sources.

<b>Table 6.</b> Ta (5-in-10) (mg	Change	% Change						
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040
Hillsborough	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Pasco	0.258	0.342	0.347	0.356	0.366	0.377	0.118	46%
Pinellas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Total	0.258	0.342	0.347	0.356	0.366	0.377	0.118	46%

Note: Quantities do not include reclaimed or seawater sources.

#### SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections

Page 9 of 11 March 28, 2019

Table 7. Districtwide Demand Projections by County for I/C and M/D (5-in-10) (mgd)							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040
Charlotte	0.137	0.083	0.086	0.088	0.090	0.092	-0.044	-32%
Citrus	0.220	0.225	0.231	0.236	0.242	0.247	0.027	13%
DeSoto	0.593	0.602	0.615	0.629	0.642	0.656	0.062	10%
Hardee	3.983	2.423	2.429	11.498	11.072	8.063	4.080	102%
Hernando	5.419	5.547	5.694	5.831	5.959	6.084	0.665	12%
Highlands	0.109	0.101	0.104	0.106	0.108	0.110	0.001	1%
Hillsborough	17.486	24.972	25.141	12.569	12.723	12.873	-4.614	-26%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.005	0.006	0.006	0.006	0.006	0.006	0.001	11%
Manatee	4.993	6.153	6.165	9.552	9.563	9.574	4.581	92%
Marion	0.010	0.010	0.010	0.010	0.010	0.011	0.001	10%
Pasco	0.978	0.951	0.976	1.000	1.023	1.046	0.068	7%
Pinellas	0.189	0.192	0.194	0.196	0.198	0.200	0.011	6%
Polk <sup>1</sup>	43.202	50.104	50.457	54.452	52.204	52.410	9.208	21%
Sarasota	0.369	0.304	0.312	0.319	0.326	0.333	-0.036	-10%
Sumter	0.699	0.736	0.762	0.789	0.816	0.843	0.143	20%
District Total	78.393	92.408	93.182	97.282	94.984	92.548	14.155	18%

Projections for the SWFWMD portion from Draft CFWI RWSP Note: Quantities do not include reclaimed or seawater sources.

Table 8. He (mgd)	Change	% Change						
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040
Hardee	3.983	2.423	2.429	11.498	11.072	8.063	4.080	102%
Highlands	0.109	0.101	0.104	0.106	0.108	0.110	0.001	1%
Polk <sup>1</sup>	43.202	50.104	50.457	54.452	52.204	52.410	9.208	21%
Total	47.295	52.628	52.990	66.056	63.384	60.583	13.288	28%

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP

Note: Quantities do not include reclaimed or seawater sources.
## SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections Page 10 of 11

March 28, 2019

Table 9. No (mgd)	orthern Plar	nning Regio	on Projecte	d I/C and I	M/D Deman	nd (5-in-10)	Change	% Change				
County	2015	2020	2025	2030	2035	2040	2015-2040	2015-2040				
Citrus	0.220	0.225	0.231	0.236	0.242	0.247	0.027	13%				
Hernando	5.419	5.547	5.694	5.831	5.959	6.084	0.665	12%				
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%				
Levy	0.005	0.006	0.006	0.006	0.006	0.006	0.001	11%				
Marion	0.010	0.010	0.010	0.010	0.010	0.011	0.001	10%				
Sumter	0.699	0.736	0.762	0.789	0.816	0.843	0.143	20%				
Total	6.353	6.523	6.703	6.873	7.033	7.190	0.837	13%				
<sup>1</sup> Projections for Note: Quantities	<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP Note: Quantities do not include reclaimed or seawater sources											

Table 10. So (mgd)	outhern Pla	Change	% Change					
County	2015	2020	2025	2015-2040	2015-2040			
Charlotte	0.137	0.083	0.086	0.088	0.090	0.092	-0.044	-32%
DeSoto	0.593	0.602	0.615	0.629	0.642	0.656	0.062	10%
Manatee	4.993	6.153	6.165	9.552	9.563	9.574	4.581	92%
Sarasota	0.369	0.304	0.333	-0.036	-10%			
Total	6.092	7.142	10.655	4.563	75%			

Note: Quantities do not include reclaimed or seawater sources.

<b>Table 11.</b> <i>T</i> 10) (mgd)	Change	% Change						
County	2015	2015-2040	2015-2040					
Hillsborough	17.486	24.972	-4.614	-26%				
Pasco	0.978	0.951	0.976	1.000	1.023	1.046	0.068	7%
Pinellas	0.189	0.192	0.200	0.011	6%			
Total	18.653	14.119	-4.534	-24%				

Note: Quantities do not include reclaimed or seawater sources.

## SUBJECT: 2015 Regional Water Supply Plan: Industrial/Commercial, Power Generation and Mining/Dewatering Demand Projections Page 11 of 11 March 28, 2019

Table 12.	Baseline Usage	and Water	Demand Pro	ojections in	16-County Area	(mgd)
-----------	----------------	-----------	------------	--------------	----------------	-------

Water Use by Use Category	2015 Baseline Usage	2020 Water Demand Projection	2040 Water Demand Projection	Difference 2015-2040
Industrial/Commercial & Mining/Dewatering	78.393	92.408	92.548	14.155
Power Generation	14.418	15.771	17.427	3.009

Notes: 2015 Baseline usage (mgd) is aggregate data from the Water Use Well Package database, (2017).





Bartow Service Office 170 Century Boulevard Bartow, Florida 33830-7700 (863) 534-1448 or 1-800-492-7862 (FL only) 2379 Broad Street, Brooksville, Florida 34604-6899 (352) 796-7211 or 1-800-423-1476 (FL only)

WaterMatters.org

**Sarasota Service Office** 6750 Fruitville Road Sarasota, Florida 34240-9711 (941) 377-3722 or 1-800-320-3503 (FL only) Tampa Service Office 7601 U.S. 301 North (Fort King Highway) Tampa, Florida 33637-6759 (813) 985-7481 or 1-800-836-0797 (FL only)

July 3, 2019

TO:	Interested Parties
THROUGH:	Jay Hoecker, Manager, Water Supply Section, Water Resources Bureau
FROM:	Kevin Wills, Senior Economist, Water Resources Bureau Ryan Pearson, Economist, Water Resources Bureau
SUBJECT:	2020 Regional Water Supply Plan: Public Water Supply Demand Projections

## Introduction

Chapter 373, Florida Statutes (F.S.) sets forth the requirement for regional water supply planning. Under the provisions of this chapter, the Governing Board of each water management district shall develop a Regional Water Supply Plan (RWSP) for regions within the district where existing sources of water are not adequate to supply water for all existing and future reasonable-beneficial uses and to sustain the water resources and related natural systems for the 20-year planning period. This plan shall be reevaluated every five years. In support of this effort, the Southwest Florida Water Management District (District) participated in the development of the RWSP for the Central Florida Water Initiative (CFWI) in conjunction with representatives from the Florida Department of Environmental Protection (FDEP), major public supply stakeholders and the South Florida and St. John's River water management districts. The CFWI region includes portions of Lake and Polk Counties which are under District jurisdiction. Consequently, the population and water demands for Lake and Polk County are from Draft Central Florida Water Initiative Demand Projections as of October 2018.

## Purpose

This memo explains the assumptions, methodologies, and sources used to develop the projections for the Public Supply component. The Public Supply sector includes:

- Domestic self-supply (residential dwellings systems that are provided water from a dedicated, on-site well and are not connected to a central utility)
- Water supply permittees with permitted water uses for:
  - Residential Single Family
  - Residential Multi-family
  - Residential Mobile Home
- Residential irrigation wells (on-site wells that serve the outdoor needs of individual residential dwellings that are connected to a central water utility system for their indoor needs).

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 2 of 41 July 3, 2019

## **Data and Information Sources**

The methodology to develop public supply water demand projections utilizes many data sources. The District's Estimated Water Use Reports (2011-2015) were used to gather base information for public supply water utility populations, water use, and per capita water use rates (SWFWMD, 2011-2015). The University of Florida's Bureau of Economic and Business Research (BEBR) publications (2017) were used to gather base year population and future county population projections. The District's geographic information system (GIS) model also incorporates a large amount of data gathered from stakeholders, enabling the District to project population at the utility service area level (GIS Associates, Inc., 2017).

#### Methodology

## 2015 Base Year Population Methods and Assumptions

The base year for these public supply water demand projections is 2015. The 2015 population was generated by extrapolating back from the GIS Associates, Inc. (GISA) 2016 population estimate using the compound annual growth rate between 2016 and 2020. This was performed to keep the base year consistent with the subsequent projected years. For example:

- a) Utility X's 2016 population estimate is 5,704
- b) Utility X's 2020 population projection is 5,984
- c) Annual growth percentage over the four year period was calculated using Microsoft® Excel's Rate formula: RATE(4,,-5704,5984)= 1.21%
- d) Utility X's 2015 population estimate = 5,704 \* (100%–1.21%) = 5,635

Utilities with permitted quantities less than 100,000 gallons per day are not required to report population or submit service area information. Consequently, the base year population for these permits was obtained from the application information related to the last issued permit revision.

Domestic self-supply is defined as that portion of the county population not served by a utility. County domestic self-supply population estimates and projections were calculated as the difference between the total county population estimate or projection and the total population served by the utilities. For those counties not fully contained within the District boundaries, only that portion of the population within the District was included (Table 1 and Table 2).

#### 2015 Base Year Water Use

The 2015 Public Supply base year water use for each large utility is derived by multiplying the average 2011-2015 unadjusted gross per capita rate, if applicable, by the 2015 estimated population for each individual utility. In the case of small utilities, per capita information was obtained from the application information related to the last issued permit revision. If no per capita information was found in the last permit, the per capita is assumed to equal the average county unadjusted gross per capita.

Base year water use for small utilities is derived by multiplying the per capita from the last issued permit times the 2015 estimated population from the last issued permit.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 3 of 41 July 3, 2019

Base year water use for domestic self-supply is calculated by multiplying the 2015 domestic selfsupply population for each county by the average 2011-2015 residential countywide per capita water use as defined below.

## 2011-2015 Average per Capita Water Use Rate

Precipitation in the years 2011-2015 (avg 52.35") was in line with the historic District average (52.76"). Rainfall between 2011-2013 was below the long-term District average, whereas higher than average precipitation in 2014 and 2015 brought the 2011-2015 average close to the historic average. Typically, there is an inverse relationship between public supply water use and annual precipitation (i.e., less rain results in increased water use, largely due to outdoor water use). This inverse relationship is demonstrated by a lower Districtwide average gross per capita per day (gpcd) water use rate in 2015 of 97 gpcd than the Districtwide average per capita water use rate of 101 gpcd in 2011. The per capita water use rate is the factor applied to projected population to project water demand (described below). Therefore, it is necessary for the base year per capita rate to represent water use in an average year. To address this situation, the District has calculated average five-year per capita use rates using data provided by utilities in their Public Supply Annual Reports and published in the Estimated Water Use Reports for the years 2011 through 2015. The unadjusted gross per capita rate used is calculated as Withdrawals + Imports - Exports - Treatment Losses divided by the Served Functional Population. For large utilities, this information is published in Table A-1 of the "Estimated Water Use Report" for years 2011-2015. For small utilities, the per capita is assumed to equal the per capita from the last issued permit or the five-year average unadjusted gross per capita for the county. Domestic self-supply per capita was taken from the countywide residential per capita provided in Table A-2 of the "Estimated Water Use Report" for the years 2011-2015.

#### **Population Projections**

The population projections made by the University of Florida's Bureau of Economic and Business Research (BEBR) are generally accepted as the standard throughout the State of Florida (University of Florida Bureau of Bureau of Economic and Business Research, 2017). However, these projections are made at the county level only. Accurately projecting future water demand requires more spatially precise data than the county-level BEBR projections. Consequently, the District's projections are BEBR projections disaggregated to land parcel level, which is the smallest area of geography possible for population studies. In turn, these parcel-level projections are normalized to the BEBR medium projection for the counties. Using this methodology, the District contracted with GISA to provide small-area population projections for the 16 counties entirely or partly within the District.

In the case of Manatee and Pinellas counties, the sum of the projections for all utilities exceeds the projected county population. Thus, the county population was increased enough to cover the deficit plus allow for self-supplied population. Thus, county total population was recalculated as follows:

Original county total + deficit + GISA self-supplied population estimate.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 4 of 41 July 3, 2019

## **GIS Model Overview**

This geographic information system (GIS) based model projects future Census Population Cohort population growth at the parcel level and normalizes those projections to BEBR county projections. First, a Countywide Build-Out Model is developed from the base parcel dataset. Current permanent population is estimated and then the maximum population growth is determined at the parcel level. Areas which cannot physically or lawfully sustain residential development (built-out areas, water bodies, public lands, commercial areas, etc.) are excluded from the Countywide Build-Out Model. Conversely, the model identifies areas where growth is more likely to occur based on proximity to existing infrastructure and available services such as schools, shopping centers and entertainment opportunities.

Next, population growth is modeled between the current estimated population and the build-out population. Projections are based on a combination of historic growth trends and spatial constraints and influences, which restrict or direct growth.

BEBR develops three projections for each county: "low", "medium", and "high". BEBR's medium projection is widely considered to be the most likely scenario. For this reason, the District's small area projections by year are controlled by BEBR's medium projection for each county.

The base year for the projection model is 2016. Projections were made through the year 2040 in the following five-year increments: 2020 through 2025, 2025 through 2030, 2030 through 2035, and 2035 through 2040.

Finally, the parcel level projections are easily aggregated by any set of boundaries desired (Public Supply utility service areas, municipalities, watersheds, etc.). For the District's planning efforts, parcel projections are summarized by Public Supply utility service areas. Complete methodology, references, tables, and data sources can be found by referring to the published technical memorandums supporting the GIS Model: "The Small-Area Population Projection Methodology of The Southwest Florida Water Management District," and "Updates to The Southwest Florida Water Management District," and "Updates to The Southwest Florida Water Management District," Bouth Water Management District, and "Updates to The Southwest Florida Water Management District," and "Updates to The Southwest Florida Water Management District," and "Updates to The Southwest Florida Water Management District," Bouth Water Management District," Bouth Water Management District, Bouth Water Management District, Bouthwest Florida Water Management District, Bouthwest Florida Water Management District, Bouthwest Florida Water Management District," Bouth Water Management District, Bouth Water Management Dis

#### **Countywide Build-Out Models**

The Countywide Build-Out Models are composed of multiple GIS data elements. Each model is based on the county's property appraiser GIS parcel database, including the associated tax roll information. Other elements incorporated into each build-out model include the 2010 U.S. Census data, District wetland data, local government future land use maps (FLU), and Development of Regional Impact (DRI) plans for the county of interest.

A. Parcels

GIS parcel layers and county tax roll databases were obtained from each county's property appraiser office. Parcel geometry was checked for irregular topology, particularly overlaps and fragments. Parcel tables were checked for errors, particularly non-unique parcel identifiers and missing values. Required tax roll table fields include actual year built, Florida Department of Revenue (DOR) land use code, and the total number of existing residential units for each unique parcel. In cases where values or fields were missing, other information was extrapolated and used as a surrogate. For example, data reported by the State of Florida was

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 5 of 41 July 3, 2019

used to identify the number of residential units (and population) in large group quarters facilities.

#### 2010 U.S. Census Data

Some of the essential attribute information contained in the Countywide Build-Out Models was derived from data from the 2010 Decennial Census. Average population per housing unit by census tract was calculated and then transferred to each county's parcel data. No additional adjustment for vacant units was required, as the calculation was made using total housing units (not limited to <u>occupied</u> units). However, slight adjustments were made using trends in average household size and unit occupancy from the U.S. Census Bureau's American Community Survey (ACS) data. This average population per housing unit enabled parcel-level estimation of population from parcel-based housing unit estimates.

In cases where property appraiser data were missing or incomplete, other data were used. For example, because mobile home parks without individually platted parcels may not contain the number of units within the property appraiser data, the number of residential units for some of the parks larger than five acres had to be estimated using a hand count from recent imagery.

B. Water Management District Boundaries

Each parcel in the Countywide Build-Out Models was also attributed with the District boundaries, which enable the countywide models for any counties split between two or more districts to be summarized by the District.

C. Wetlands

Wetlands play a large role in modeling a county's build-out. The District, along with the FDEP, has been given regulatory powers over private and public lands and is required by Chapter 373, F.S., to protect water resources of the state. However, the District and FDEP, under the auspices of the U.S. Army Corps of Engineers, have a permit process by which wetlands can be altered for development. The Countywide Build-Out Models consider the impact wetlands have on residential development.

The District maintains detailed GIS databases of wetland areas and wetland mitigation areas within its boundaries. These databases contain the location and spatial extent of the wetlands and wetland mitigation areas, as well as the specific types of wetlands, as defined by the District's land use and land cover classification system. Certain wetland types were identified that would be difficult and expensive to convert to residential development. These areas were identified in the District's wetland database and applied to the build-out model. The wetland types include streams and waterways, lakes, marshy lakes, reservoirs, bays and estuaries, slough waters, wetland hardwood forests, mangrove swamp, mixed wetland hardwoods, cabbage palm wetland, cabbage palm hammock, wetland coniferous forest, cypress, pond pine, hydric pine flatwoods, wetland forested mixed, freshwater marshes, saltwater marshes, wet prairies, emergent aquatic vegetation, mixed scrub-shrub wetland, and non-vegetated wetland.

Using GIS techniques, the area of wetlands within parcels were calculated and recorded as the water area for that parcel. If the area covered by water within a parcel exceeded 0.5 acres, it was subtracted from the total area of the parcel feature to determine the relative developable area in that parcel.

There were exceptions to this rule. In some cases, parcels with little or no developable area after wetlands were removed were already developed, thus the estimated unit total was not reduced by the wetland acreage. In other cases, inaccurate wetland delineations were overridden, such as when a newly platted residential parcel was shown to be covered by a wetland. In such a case, the parcel was considered developable by the submodel.

#### D. Future Land Use

Future Land Use (FLU) maps are essential elements of each county's build-out model, as they help guide where and at what density residential development will occur within a county. FLU maps are a part of the Local Government Comprehensive Plans required by Chapter 163, Part II, F.S. They are typically developed by the local government's planning department, or, in some cases, a regional planning council with guidance from the local government. The latest available FLU map is obtained annually and applied to the build-out model.

FLU classifications for residential land uses are assigned maximum dwelling unit densities (per acre) or density ranges. These ranges are intended to guide the type and density of development. However, development does not always occur at FLU guided densities. For this reason, the County Build-out Submodels reflect the median density of recent development for each future land use category in the specific incorporated place. For example, if a city's medium density residential future land use designation allows up to 8 housing units per acre, but the median density of units built over the last 20 years is 5.7 housing units per acre, the submodel assumed future densities at 5.7 housing units per acre for that future land use designation in that city. The median density calculation was typically limited to the last 20 years of development within each unique combination of land use and jurisdiction, as more recent development was deemed a better proxy for future densities than older development.

In some cases, limiting the historical data to the last 20 years resulted in too small a sample, so either county average values were used (extended beyond the jurisdiction) or all historical development was used (not limited to the last 20 years). In those cases, the determination of which sample to use depended upon the heterogeneity of the category across county jurisdictions and the heterogeneity of historical densities prior to the last 20 years. Also, vacant or open parcels less than one acre in size were typically considered single family residential, with one housing unit as the maximum allowable density

E. Build-out Density Calculation

Using GIS overlay techniques, attributes of the census, political boundary, wetlands, and future land use data were attributed to each county's parcel data to develop the County Buildout Submodels. These submodels forecast the maximum residential population by parcel at buildout. Census tracts where the 2010 population was zero, and therefore the average persons per housing unit was zero, were assigned the county's average persons per housing unit. Also, if there were tracts with 2010 census values for persons per housing unit greater than zero that were based on a small number of homes with greater than five persons per housing unit, the county's average persons per housing unit was typically used.

F. Large Planned Developments

The final step in the development of the County Build-out Submodels was adjusting build-out densities within large planned developments (such as Developments of Regional Impact, Sector Plans, and Rural Land Stewardship Areas) to correspond with approved development plans wherever their boundaries are available in a GIS format. Although large planned developments often do not develop as originally planned by the developer, the total number of units planned (regardless of timing) is likely to be a better forecast of the units at build-out than one based on the median historic densities. Therefore, in each of the County Build-out Submodels, parcels with centroids within a large planned development were attributed with the name of the development. The build-out densities for those parcels were adjusted so that the total build-out for the development was consistent with the development plan, and the build-out population for that area was recalculated.

## **Growth Drivers Model**

The Growth Drivers Model is a raster (cell-based) dataset representing development potential as determined by incorporating a GIS suitability model. This model is a continuous surface of 10-meter cells containing relative values of 1-10, with 10 having the highest development potential and 1 having the lowest development potential. It influences the Population Projection Model by factoring in the attraction of certain spatial features, or growth drivers, have on development. These drivers are defined from transportation features and land use/cover types including:

- 1. Proximity to roads and interchanges prioritized by level of use (with each road type modeled separately)
- 2. Proximity to existing residential development
- 3. Proximity to existing commercial development (based on parcels with commercial land use codes deemed attractors to residential growth)
- 4. Proximity to coastal and inland waters
- 5. Proximity to large planned developments

Each of the drivers listed above were used as independent variables in a logistic regression equation. Dependent variables included existing residential units built during or after 1995 as the measure of "presence", and large undeveloped vacant parcels outside of large planned developments were used to measure "absence". The resulting equation could then be applied back to each of the regional grids resulting in a single regional grid with values 0 through 100, for which a value of 0 represented the lowest relative likelihood of development, and a value of 100 represented the highest relative likelihood of development.

This seamless, "regional" model covers the counties whose boundaries are all or partially within the District, plus a one-county buffer to eliminate "edge effects". In this case, the edge effects refer to the presence or absence of growth drivers outside the District that could influence growth within the District. This model was then used by the Population Projection Model to rank parcels in undeveloped Census blocks based on their development potential.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 8 of 41 July 3, 2019

#### **Population Projection Model**

The Population Projection Model integrates the Countywide Build-Out Models and the Regional Growth Drivers Model with historic growth trends and county-level population controls from BEBR.

A. Historic Growth Trends

Historic growth trends were derived from historic census population estimates for 1990, 2000, and 2010. For 1990 and 2000, census block population estimates from the Florida House of Representatives Redistricting Data were summarized at the 2010 tract level and combined with the 2010 tract population estimates. These estimates are used to produce twelve projection calculations using six different methods. The highest four and lowest four calculations are discarded, and the remaining four are averaged.

The six methods utilized by the model include: Linear, Exponential, Constant Population, Constant Share, Share of Growth, and Shift Share. The Linear, Exponential, and Constant Population techniques employ a "bottom-up" approach, extrapolating the historic growth trends of each census tract with no consideration for the county's overall growth. The Constant Share, Share of Growth, and Shift Share techniques employ a "top-down" approach, allocating a portion of the total projected county growth to each census tract based on that census tract's percentage of county growth over the historical period. Each of the six methods is a good predictor of growth in different situations and growth patterns, so using a combination of all six was the best way to avoid the largest possible errors resulting from the least appropriate techniques for each census tract within the 16-county area.

This methodology is patterned after that used by BEBR, and is well suited for small area population projections. The details of the methods are as follows:

#### Linear Projection Method

The Linear Projection Method assumes that future population change for each Census block will be the same as over the base period. Three linear growth rate calculations were made, one from 1990 through 2020, one from 1990 through 2000, and one from 2000 through 2010.

#### Exponential Projection Method

The Exponential Projection Method assumes that population will continue to change at the same annual growth rate as over the base period.

#### Constant Population Method

The Constant Population Method assumes that future population will remain constant at its present value.

#### Constant Share Projection Method

The Constant Share Projection Method assumes that each census tract's percentage of the county's total population will be the same as over the base period.

#### Share of Growth Projection Method

The Share of Growth Projection Method assumes that each Census tract's percentage of the county's total growth will be the same as over the base period. Three share of growth rate calculations were made, one from 1990 through 2010, one from 1990 through 2000, and one from 2000 through 2010.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 9 of 41 July 3, 2019

## Shift Share Projection Method

The Shift Share Projection Method assumes that each Census tract's percentage of the county's total annual growth will change by the same annual amount as over the base period. Three shift share calculations were made, one from 1990 through 2010, one from 1990 through 2000, and one from 2000 through 2010.

#### Average of the Projection Extrapolations

The four minimum and four maximum of the twelve calculations for each census tract are removed to eliminate the most extreme results of the thousands of heterogeneous census tracts within the 16-county area. The four remaining calculations are then averaged to account for the considerable variation in growth rates and patterns over all of the census tracts within the 16-county area. All four remaining methods are weighted equally.

B. Growth Calculation Methodology

The methodology for calculating growth within the Population Model includes the following steps:

- 1. Apply Census tract-level average historical growth rate to parcels within a particular tract.
- 2. Check growth projections against build-out population, and reduce any projections exceeding build-out to the build-out numbers.
- 3. After projecting growth for all Census tracts within the particular county, summarize the resulting growth and compare against the Countywide BEBR target growth.
  - a. If the Model's projections exceed the BEBR target (which is unlikely), reduce the projected growth for all Census tracts by the percentage that the projections exceeded the BEBR target, and go on to the next time increment.
  - b. If the Model's projections are less than the BEBR target (which is typical due to high growth areas building out), continue growing the county using the Growth Drivers.
- 4. Select parcels in undeveloped Census tracts with the highest Growth Driver value and develop them. (Note: Most parcels are projected to completely build out in this step, which represents a five-year interval; however, some large parcels may require two or more five-year intervals to build out.) Summarize growth and check against build-out. Continue this process until the county build-out growth target is reached.

## **Non-Permanent Population Projections**

In addition to the permanent population projections generated by the Population Projection Model, projections of non-permanent population were also made. Those projections include peak seasonal population, permanent plus seasonal population (or functionalized seasonal population), tourist population and net commuter population. The methods derived by the District and implemented by GISA for projecting those population types are described in this section. For a more detailed explanation of these methods, see the District's SWUCA II Population Guidelines.

A. Peak Population

Seasonal population is estimated using a combination of 2010 U.S. Census data (at the Zip Code Tabulation Area or ZCTA level) and hospital admissions data. Average 2009-2011

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 10 of 41 July 3, 2019

emergency room admissions data was utilized for a population cohort typical of seasonal residents (between the ages of 45 and 74).

A "Seasonal Resident Ratio" was calculated by ZCTA to estimate the proportion of peak (including seasonal) to permanent population. This 2010 U.S. Census-era ratio is held constant over time when applied to future projections of population, but it will be updated with each **decennial Census**. The ratio was derived using the following generalized steps:

- 1. Subtract total 2009–2011 total third quarter (Q3, or July, August and September) hospital admissions from first quarter (Q1, or January, February and March) admissions.
- 2. Calculate the average annual difference between Q1 and Q3 by dividing above result by three.
- Calculate a seasonal population estimate for ZCTA by dividing above difference by the general population's probability of being admitted to the emergency room (approximately 2.23%).
- 4. Calculate the Seasonal Resident Ratio by adding the seasonal population to the permanent population and dividing that total by the permanent population.

This ratio can then be applied to future projections of permanent population to derive peak population projections.

B. Permanent plus Seasonal Population or Functionalized Seasonal Population

The functionalized seasonal population is the peak seasonal resident population adjusted downward to account for the percentage of the year seasonal residents typically reside elsewhere, and the lack of indoor water use during that time. It was calculated using the following generalized steps:

- 1. Determine the appropriate proportion of the year seasonal residents spend in Florida. This varies from beach destination counties (44.2%) to non-beach destination counties (56.7%).
- 2. Develop a seasonal resident adjustment based on average per capita water use.
  - a. The six-year (1996–2006) districtwide average per capita use is 132 gallons per person per day, and 69.3 is estimated indoor per capita use; (Alliance for Water Efficiency, 1999).
  - b. The adjustment factor is calculated using the following equation for "beach destination" counties (Charlotte, Manatee, Pinellas and Sarasota):

 $((0.442 \times 132 \text{ gpd}) + ((1 - 0.442) \times (132 \text{ gpd} - 69.3 \text{ gpd})/132 \text{ gpd} = 0.707$ 

c. The adjustment factor is calculated using the following equation for "non-beach destination counties":

 $((0.567 \times 132 \text{ gpd}) + ((1 - 0.567) \times (132 \text{ gpd} - 69.3 \text{ gpd})/132 \text{ gpd} = 0.773$ 

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 11 of 41 July 3, 2019

- 3. Calculate "functionalized" seasonal population by multiplying the seasonal population by the appropriate seasonal resident adjustment factor for the particular county (0.707 or 0.773).
- 4. Calculate total functional population by adding the functionalized seasonal population to the permanent population.
- 5. Calculate ratio of Census-era functional population to permanent population.
- 6. Apply above ratio to future projections of permanent population to derive functional population projections.
- C. Tourist Population

The tourist population projections were based on 20 years (1997-2016) of county level lodging room data from the Florida Department of Business and Professional Regulation (DBPR). The SWFWMD methodology for projecting future tourist rooms by county utilizes two different methods and averages the two results for each county.

The first method projects the increase in rooms by county by extrapolating the linear trend using the least squares method derived from the last 20 years of county total room estimates. This was the method used by the District for the past several years.

A second method projects future rooms based on projections of employment in the Accommodation and Food Services industries (from data from Woods and Poole). This is also an extrapolation of a linear trend using the least squares method, but rooms by county are projected as a function of a county's employment projections rather than time.

SWFWMD staff previously tested both methods by projecting values for the years 2007-2013 using room estimates from 1996-2006. Based on the differences between actual room estimates and projected values for 2007-2013, neither method was clearly superior to the other. For that reason, SWFWMD staff opted to use both methods. The results of both methods were averaged, but only after adjusting for the average 2007-2013 error for each projection in each county.

These projections of future rooms were then converted to "functionalized" tourist population by applying various county level average unit occupancy and party size ratios. These ratios were provided by SWFWMD, who also updated the values associated with locations identified as short-term rentals for this projection set based on SWFWMD research.

These projections of tourist population were joined to the existing lodging facility locations. No attempt was made to project future locations of lodging facilities, as:

1. The precise locations would be highly speculative.

2. It was assumed that lodging facilities often are built in the general vicinity of existing lodging facilities, or at least in close enough proximity to be within the same utility service area.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 12 of 41 July 3, 2019

#### D. Net Commuter Population

The net commuter population projections were based on special tabulations from the American Community Surveys conducted in the years 2006-2010. For each 2010 U.S. Census tract, the ratio of net commuters to permanent population was calculated. This ratio was then applied to future projections of permanent population to derive projections for net commuter population. That population was then "functionalized" with the following ratios:

- 1. 8/24 (typical working hours per day)
- 2. 5/7 (typical working days per week)

By applying both of these ratios to the net commuter population, the resulting functional net commuter population is 23.8 percent of the actual net commuter population. This functional number better reflects the water use that is expected for net commuters.

Note that the net commuter population projection summaries by utility service area were often negative, as many utilities serve "bedroom communities" and other areas where more residents work outside the utility service area than the population (residents and non-residents) employed within it. Only positive net commuter populations were included in a utility's total functional population.

#### Summarize By Utility Service Areas

The parcel-level results are then summarized by public supply service area boundaries for all utilities districtwide that average at least 0.1 million gallons per day (mgd) of total water use. These boundaries, maintained by the District, are overlaid with the districtwide parcel-level population projection GIS layer, and each parcel within a service area is assigned a unique identifier for that service area. The projected population can then be summarized by that identifier and joined to the District's potable service area database to produce tabular or GIS output. Note that these service areas change over time, so for any future use of these deliverables, it is important to match this projection set only with the service areas included in the GIS deliverables.

#### Spatial Incongruity of Boundaries

Due to mapping errors, the service area boundaries do often bisect parcel boundaries. In the present modeling activity, parcels are deemed to be within a given service area if their center points (or "centroids") fell inside the service area boundaries. The error associated with this spatial incongruity at the parcel level was much smaller than would be the case with census tract level data. This is one of the primary benefits of disaggregating census tract level data to the parcel level. The percentage of parcels erroneously attributed or excluded from a service area by this process is insignificant.

#### **Final Results**

The final results are provided in tabular format (Microsoft Excel spreadsheet) and GIS format (ESRI's file geodatabase). The utility-level spreadsheets were distributed by District staff to utilities for comparison with their own and/or other projections for their service areas. If there are discrepancies, the spatial results (each county's parcel-level population layer) may be used in part to depict projected patterns of future growth. The spatial data is available for download from the District's Demographics website.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 13 of 41 July 3, 2019

The population projections detailed in Tables 3 through 19, except for Lake and Polk County (Tables 10 and 16) are the sum of the functionalized permanent, seasonal, net commuter, and tourist populations. It should be noted that only positive net commuters were aggregated. Service areas with negative net commuters were not penalized. For Lake and Polk County (Tables 10 and 14), the population projections represent permanent populations and are from Draft Central Florida Water Initiative Demand Projections as of October 2018.

There are some uncertainties with the model projections. In some instances, the projections detailed in Tables 3 through 19 may not match the raw model output in the tabular format (Microsoft Excel spreadsheet) and the GIS format (ESRI's file based geodatabase). As the parcel level projections are summarized by public supply service area boundaries and the service area is incorrect or includes domestic self-supply population that is not delineated as self-served, the aggregated population could be less than or greater than what the utility is actually projected to serve. Upon review and identification of such cases (including stakeholder input), the functional population for such instances was revised to reflect the correct service area boundaries and/or reduction of domestic self-supply.

Adjusting Population Projections using 2016 Estimated Water Use

Many public supply service areas include a significant number of self-supplied and vacant parcels within their boundaries. In most cases, the service area layer does not include information on self-supplied or not-yet-served areas. The population projections generated by GISA's parcel projection model include self-supplied persons or population in parcels not yet served. GISA generates projections for 297 service areas. One hundred six of these service areas had a 2016 population estimate that was at least ±5 percent different from the 2016 population served estimate from the Estimated Water Use Report. Here is an example on how population estimate and projection was adjusted using the 2016 population served estimate:

Total	Total	Total	Total	Total	Total
Functional	Functional	Functional	Functional	Functional	Functional
Population	Population	Population	Population	Population	Population
2016	2020	2025	2030	2035	2040
1,452	1,494	1,578	1,791	2,125	2,432

a) Results from GISA's parcel level model for utility Z:

- b) In 2016, the utility reported a population served estimate of 1,316 people
- c) This population estimate is 9 percent lower than the GISA projection
- d) Thus, new projections are generated by applying the GISA growth rates to the 2016 population served estimate:

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 14 of 41 July 3, 2019

Adjusted	Adjusted	Adjusted	Adjusted	Adjusted	Adjusted
Total	Total	Total	Total	Total	Total
Functional	Functional	Functional	Functional	Functional	Functional
Population	Population	Population	Population	Population	Population
2016	2020	2025	2030	2035	2040
1,316	1,353	1,430	1,623	1,926	2,204

## Water Demand Projections

Water demand projections are calculated for the years 2020, 2025, 2030, 2035, and 2040. To develop these projections, the District used the 2011-2015 average unadjusted gross per capita water use rate and applied it to the projected populations, described above. In the case of small utilities (utilities permitted for less than 100,000 gallons per day), the 2011-2015 per capita is the per capita stated in the last issued permit or the average unadjusted gross per capita of the county.

## One-in-Ten Drought Event

The one-in-ten "is an event that results in an increase in water demand of a magnitude that would have a 10 percent probability of occurring during any given year" (SWFWMD, 2001). The One-in-Ten Year Drought Subcommittee of the Water Planning Coordination Group, as stated in their final report, determined that a 6.0 percent increase in demand will occur in such an event for public supply water use. Therefore, the one-in-ten year water demand projections are the average year demands times 1.06.

## Residential Irrigation Wells

These are defined as private wells smaller than 6" which do not require a Water Use Permit (WUP); however, for this analysis, wells less than 5" in diameter were selected because of the unlikely scenario that any residential unit has irrigation wells greater than 4" in diameter. These wells are used primarily for outdoor irrigation purposes at residences that are connected to a central utility system and receive potable water service for indoor use. Using the methodology described below, District staff has estimated the number of domestic irrigation wells by county and their associated water demand. This information was updated and incorporated into the attached Public Supply demand projections (See Table 23 in Appendix A). Currently, the District estimates that approximately 332 gallons per day are used for each irrigation well<sup>1</sup>.

Using the District's well construction permit GIS feature class, the following selection criteria are necessary to capture residential irrigation wells:

- Use Type equal to 'Irrigation'
- Diameter less than 5"
- Only include wells that lie inside public supply service areas
- Site status description of active, inactive, proposed, or blank
- Exclude wells that lie within WUP Control Areas Permitted

<sup>&</sup>lt;sup>1</sup> Determination of Landscape Irrigation Water Use in Southwest Florida, May 31, 2018, Michael Dukes & Mackenzie Boyer

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 15 of 41 July 3, 2019

 Include only those wells permitted by the District (do not include those within the St. John's River Water Management District boundary)

For select utilities, the existence of domestic wells utilized for irrigation purposes necessitated additional analysis. To ensure that the domestic wells were also served by utilities, billing data were provided and spatially joined in GIS to create a feature class. From there, a 50-foot buffer was formed around each address in order to identify domestic wells within served property boundaries. Similar to residential irrigation wells, the selection criteria for the domestic wells was:

- Located within public supply service areas
- Use Type equal to 'Domestic'
- Diameter less than 5"
- Site status description of active, inactive, proposed, or blank
- Exclude wells that lie within WUP Control Areas Permitted
- Permit issuance on or before 2015

Wells identified from this analysis were subsequently incorporated into additional irrigation demand.

#### Review

The District will be providing this technical memorandum and demand projection tables to WUP staff and public supply use sector stakeholders for review and comment, as each permitting staff and stakeholder may have a much more intimate understanding of the permits for which they are responsible. Upon receiving stakeholder comments, the District will review suggested changes and, if appropriate, included updates. It is important to note that this is a long-term planning effort, methodology changes based on short term trends will unlikely be taken into account. Comments and suggested changes will be taken into consideration if they were justifiable, defensible, based on historical regression data and long-term trends, and supported by complete documentation. The projections contained herein were presented to District staff and the Public Supply Advisory Committee (August 14, 2018).

The District understands and shares stakeholder's concerns of how critically important accurate demand projections are; however, the District must comply with Chapter 373.0361, F.S., which sets forth requirements for regional water supply planning. ("Population projections used for determining public water supply needs must be based upon the best available data. In determining the best available data, the district shall consider the University of Florida's Bureau of Economic and Business Research (BEBR) medium population projections and any population projection data and analysis submitted by a local government pursuant to the public workshop described in subsection if the data and analysis support the local government's comprehensive plan.")

## **Tables and Figures**

Tables 1 through 2 provide permanent and functional future populations for each county. Tables 3 through 19 provide county population and public supply water demand estimates and projections on a countywide basis. Both average year demand and the one-in-ten year drought demands are reflected in these tables. Table 20 presents county-level demands. Tables 21 and

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 16 of 41 July 3, 2019

22 show population and water demands by region and caution areas. Lastly, Table 23 summarizes the existing irrigation wells and the exponential growth rate used to project future irrigation wells.

## Summary

Overall, for the public supply sector, the District is expecting an increase in average demand of 188 mgd from 577 mgd in 2015 to 765 mgd in 2040 for the 16-county area. The 188 mgd increase by 2040 is distributed as follows: 33 mgd increase in the Heartland Planning Region, 37 mgd increase in the Northern Planning Region, 31 mgd in the Southern Planning Region, and 87 mgd increase in the Tampa Bay Planning Region. Appendix A; Tables 1 through 23 start on page 16 and provide data by county, utility, and planning region.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 17 of 41 July 3, 2019

#### References

- Chapter 373.709, F.S., 2001; Final Report: 1-in-10-year Drought Requirement in Florida's Water Supply Planning Process
- GIS & Associates, Inc., 2018. *Small-Area Population Methodology of the SWFWMD* (January, 2018). Prepared for the Southwest Florida Water Management District.
- SWFWMD, 2011-2015. Estimated Water Use Reports for the years 2011-2015.
- SWFWMD, 2018. *Summary Rainfall Data by Region*. 2018 www.swfwmd.state.fl.us/data/hydrologic/rainfall\_data\_summaries.
- University of Florida Bureau of Economic and Business Research, 2017. *Projections of Florida Population by County*
- U.S. Census Place Data, 2010; www.census.gov/geo/www/2010census/gtc/gtc place.html.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 18 of 41 July 3, 2019

## Appendix A

# Public Supply Data Tables Population and Demand Projections Irrigation Well Projections

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 19 of 41 July 3, 2019

		Table 1. County	wide Permaner	t Population Est	timates and Pro	ojections						
		BE	BR Medium Perr	nanent Populati	on <sup>1</sup>				Permanent Po	pulation in SWFV	VMD <sup>2</sup>	
		Populatio	on inside and out	side District bo	undaries.			Pe	opulation Inside	District boundari	es only.	
County	2015	2020	2025	2030	2035	2040	2015	2020	2025	2030	2035	2040
Charlotte	168,087	180,100	191,000	200,400	208,400	215,600	165,572	177,447	188,236	197,535	205,440	212,545
Citrus	141,736	148,400	154,500	159,600	163,800	167,100	141,736	148,400	154,500	159,600	163,800	167,100
DeSoto	34,953	35,900	36,700	37,500	38,200	38,700	34,953	35,900	36,700	37,500	38,200	38,700
Hardee	27,596	27,800	27,900	28,100	28,200	28,300	27,596	27,800	27,900	28,100	28,200	28,300
Hernando	176,671	191,100	204,600	216,300	227,000	236,200	176,671	191,100	204,600	216,300	227,000	236,200
Highlands	100,577 105,400		109,600	113,000	115,600	117,600	92,539	96,472	99,898	102,673	104,800	106,434
Hillsborough	1,325,132	1,466,900	1,602,900	1,722,900	1,824,900	1,919,900	1,325,132	1,466,900	1,602,900	1,722,900	1,824,900	1,919,900
Lake	316,425	355,300	391,600	422,800	451,300	478,400	1,059	1,296	1,579	1,853	2,122	2,383
Levy	40,269	41,700	43,000	44,100	44,900	45,600	22,368	23,189	23,934	24,566	25,029	25,434
Manatee	350,055	388,700	425,700	458,700	487,700	511,800	350,055	388,700	425,700	458,700	487,700	511,800
Marion	340,435	367,500	392,800	414,800	434,700	452,000	106,534	117,373	127,280	135,840	143,993	151,675
Pasco	486,409	534,800	579,800	618,300	653,900	686,000	486,409	534,800	579,800	618,300	653,900	686,000
Pinellas	951,377	967,400	982,400	995,700	1,007,900	1,012,800	951,377	967,400	982,400	995,700	1,007,900	1,012,800
Polk	634,597	698,000	757,200	806,800	853,700	896,400	597,981	658,283	714,001	760,328	804,277	844,431
Sarasota	394,325	420,800	444,600	464,000	480,000	492,200	394,325	420,800	444,600	464,000	480,000	492,200
Sumter	113,352	140,900	168,100	192,600	216,000	236,400	113,352	140,900	168,100	192,600	216,000	236,400
Total	5,601,998	6,070,700	6,512,400	6,895,600	7,236,200	7,535,000	4,988,790	5,396,760	5,782,127	6,116,495	6,413,261	6,672,302

Reference Sources for Countywide Permanent and Permanent Population Projections

<sup>1</sup> 2016-2040 projections are based on The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2040, Florida Population Studies, Volume 50, Bulletin 177, April 2017. 2 Permanent population estimates and projections were generated by GIS Associates. Source File: GISA SWFWMD PSSA Population Summaries, 2018-01-12.xlsx.Tab Name: County & WMD Summary. SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 20 of 41 July 3, 2019

		Table 2. Coun	tywide Perman	nent and Total	Functional po	pulation
		Total Fu	Inctional Popula	ation in SWFWI	MD <sup>1,2,3,4,6</sup>	
	Total Funct	tional Populatio	on = Permanen	t + Seasonal+ 1	Fourist + Net C	Commuters
County	2015	2020	2025	2030	2035	2040
Charlotte	191,446	205,401	217,978	228,875	238,188	246,609
Citrus	154,717	161,834	168,447	173,991	178,568	182,185
DeSoto	36,508	37,551	38,401	39,260	40,015	40,554
Hardee	28,360	28,617	28,736	28,959	29,077	29,196
Hernando	182,854	197,648	211,555	223,654	234,719	244,274
Highlands	102,783	107,458	111,216	114,265	116,606	118,409
Hillsborough	1,438,767	1,589,177	1,731,457	1,856,960	1,961,869	2,059,559
Lake <sup>4</sup>	1,059	1,296	1,579	1,853	2,122	2,383
Levy	23,732	24,585	25,356	26,010	26,489	26,908
Manatee⁵	423,741	466,041	507,393	544,241	576,900	604,543
Marion	112,040	123,467	133,759	142,657	151,129	159,115
Pasco	515,412	565,764	612,750	652,965	690,156	723,710
Pinellas⁵	1,207,943	1,222,356	1,240,929	1,257,345	1,272,410	1,278,592
Polk <sup>4</sup>	597,981	658,283	714,001	760,328	804,277	844,431
Sarasota	472,188	501,783	528,324	549,621	567,149	580,570
Sumter	125,529	156,397	185,527	211,678	236,768	258,670
Total	5,615,061	6,047,660	6,457,409	6,812,661	7,126,441	7,399,709

Reference Sources for Countywide Permanent in SWFWMD and Functional Population Projections

<sup>1</sup>Total functional population comprises permanent population, functional seasonal population, functional tourist, and functional net commuters population.

<sup>2</sup>2016 Estimate was generated from the population, inclusion, and the storm a board and the commodel data (October 2017) and the PS\_SERVICEAREAS GIS layer (dated: 02FEB2018). Population estimates and projections were adjusted using the latest GIS Associates, Inc's population projection model data (October 2017) and the PS\_SERVICEAREAS GIS layer (dated: 02FEB2018). Population estimates and projections were adjusted using the 2016 Public Supply Annual Report population served estimate. The 2015 estimate had to be extrapolated using the 2016-2020 growth rate for each utility. The GISA projections are based on The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2040, Florida Population Studies, Volume 50, Bulletin 177, April 2017.

<sup>3</sup> The 2020-2040 projections were generated from the latest GIS Associates, Inc.'s population projection model data (October 2017) and the PS\_SERVICEAREAS GIS layer (dated: 02FEB2018). Population estimates and projections were adjusted using the 2016 Public Supply Annual Report population served estimate. The GISA projections are based on The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2040, Florida Population Studies, Volume 50, Bulletin 177, April 2017.

<sup>4</sup> This total includes estimates and projections from District portion of county from draft 2020 Regional Water Supply Plan for the Central Florida Water Initiative (April 2018)

<sup>5</sup> For Manatee and Pinellas County, the sum of adjusted functional population exceeds original county total. Thus, county total was recalculated as original county total plus deficit plus EWU self-supplied population estimate (ex. 2020 Pinellas County Total = 1,078,741 + 138,003 + 5,611 = 1,222,356).

#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 21 of 41 July 3, 2019

#### TABLE 3. CHARLOTTE COUNTY POPULATION ESTIMATES AND PROJECTIONS

			(1)	(2) 2015 POPULATION TIMES 2011-2015 CROD		PROJEC	(3) TED POPUL	ATION		(4) 2011-2015		(5) PROJECTED WATER DEMANDS MGD				
	WUP		POPULATION	MGD	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040	
(6)	DSS	Domestic Self-Supply	7,640	0.482	8,295	9,137	9,872	10,518	11,087	63	0.524	0.577	0.623	0.664	0.700	
	718	Gasparilla Island Water Assoc.	6,012	1.104	6,438	6,497	6,553	6,605	6,658	184	1.183	1.193	1.204	1.213	1.223	
	871	City of Punta Gorda	35,742	4.254	37,512	39,216	40,588	41,660	42,461	119	4.465	4.668	4.831	4.959	5.054	
	1512	Charlotte Harbor Water Assoc.	3,501	0.292	3,987	4,455	4,874	5,237	5,570	83	0.332	0.371	0.406	0.436	0.464	
	3522	Charlotte County Utilities / Burnt Stor	6,646	0.404	7,406	8,128	8,773	9,327	9,820	61	0.450	0.494	0.533	0.567	0.597	
	7104	Charlotte County Utilities	127,046	9.948	136,795	145,437	152,969	159,479	165,556	78	10.712	11.388	11.978	12.488	12.964	
(9)	8626	Homeowners of Alligator Park	915	0.079	915	915	915	915	915	86	0.079	0.079	0.079	0.079	0.079	
(10)	99913	El Jobean Water Association	1,454	0.151	1,473	1,501	1,529	1,553	1,572	104	0.153	0.156	0.159	0.161	0.163	
(10)	99916	Riverwood Development	2,492	0.259	2,579	2,692	2,801	2,894	2,969	104	0.268	0.280	0.291	0.301	0.309	
(8)		Additional Irrigation Demand		2.233							2.395	2.542	2.669	2.778	2.876	
	Total Coun	nty	191,446	19.206	205,401	217,978	228,875	238,188	246,609		20.561	21.748	22.774	23.646	24.429	
(7)	1-10 Droug	nht Year Demand									21 794	23 053	24 140	25 065	25 894	

<u>Notes:</u> MGD = million gallons per day

(1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017.

(2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015.

(3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.

(4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use.

(b) Computed as projected population multipled by 2011-2015 average per capta water use.
 (c) County residential per capita rate from the District's annual Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used.
 (7) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.
 (8) Additional irrigation Demand is defined as water demand from residential irrigation values used.
 (9) This utility has a small general permit and is identified in the PS\_SERVICEAREAS layer. The per capita is listed in the permit document.
 (10) This service area is a wholesale importer. There is no water use permit associated with this service area. Per capita is assumed to equal to the average county per capita.

#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 22 of 41

#### July 3, 2019

TABLE 4. CITRUS COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2)												
				2015			(2)						(5)			
				TIMES			(5)						(D) D WATED D	EMANDS		
			(1)	2011 2015		PRO IEC				(4) (11) (12)		(MCD)				
			2015	GPCD		FROJEC	TED FOFULA	ATION .		2011_2015			(1100)			
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040	
				(												
(6)	DSS	Domestic Self-Supply	54,633	5.204	57,755	60,604	62,982	64,939	66,465	95	5.501	5.773	5.999	6.186	6.331	
	207	City of Crystal River	5,639	0.740	5,659	5,718	5,773	5,824	5,872	131	0.742	0.750	0.757	0.764	0.770	
	419	City of Inverness	9,449	1.082	9,806	10,138	10,420	10,655	10,843	115	1.123	1.161	1.194	1.220	1.242	
(9)	729	Citrus Co. Utilities - Point O' Woods	838	0.072	842	845	848	850	852	86	0.072	0.073	0.073	0.073	0.073	
(9)	872	Inverness Village	264	0.029	264	264	264	264	264	110	0.029	0.029	0.029	0.029	0.029	
	1118	Floral City Water Association Inc	5,047	0.295	5,197	5,334	5,449	5,544	5,620	59	0.304	0.312	0.319	0.324	0.329	
(10)	1345	Royal Oaks of Citrus HOA	443	0.044	443	443	443	443	443	100	0.044	0.044	0.044	0.044	0.044	
	2842	Citrus Co. Utilities - Citrus Springs/Pin	17,211	2.329	18,769	20,195	21,387	22,367	23,138	135	2.540	2.733	2.894	3.027	3.131	
(10)	4008	Inverness Park	218	0.030	218	218	218	218	218	138	0.030	0.030	0.030	0.030	0.030	
	4153	Rolling Oaks Utilities Inc	11,301	1.507	11,301	11,302	11,304	11,306	11,308	133	1.507	1.507	1.507	1.507	1.508	
	4406	Homosassa Special Water District	5,668	0.741	5,783	5,911	6,022	6,115	6,193	131	0.756	0.773	0.788	0.800	0.810	
(9)	4753	Constate Utilities	621	0.070	632	642	650	656	662	112	0.071	0.072	0.073	0.074	0.074	
(9)	6291	Citrus Co. Utilities - Rosemont/Rolling	331	0.050	331	332	332	333	333	150	0.050	0.050	0.050	0.050	0.050	
	6691	Gulf Highway Land Corporation	578	0.073	579	579	579	579	579	126	0.073	0.073	0.073	0.073	0.073	
	7121	Citrus Co. Utilities - Charles A. Black	24,281	3.562	25,258	26,159	26,905	27,515	27,988	147	3.705	3.837	3.947	4.036	4.106	
(9)	7295	Citrus Co. Utilities - Golden Terrace	260	0.026	261	261	261	261	261	100	0.026	0.026	0.026	0.026	0.026	
(9)	7784	Citrus Co. Utilities - Water Oaks	310	0.040	310	310	310	310	310	130	0.040	0.040	0.040	0.040	0.040	
(10)	8147	Oak Pond LLC	98	0.010	98	98	98	98	98	97	0.010	0.010	0.010	0.010	0.010	
(10)	8623	River Lodge Resort	0	0.000	21	44	63	78	90	116	0.002	0.005	0.007	0.009	0.010	
(10)	9097	Tarawood Utilities LLC	140	0.020	144	147	149	152	153	140	0.020	0.021	0.021	0.021	0.021	
(10)	9532	Greenbriar One of Citrus Hills	416	0.062	416	416	416	416	416	150	0.062	0.062	0.062	0.062	0.062	
	9791	Citrus Co. Utilities - Sugarmill Woods	11,068	2.146	11,827	12,528	13,120	13,615	14,020	194	2.293	2.429	2.544	2.640	2.718	
	11839	GCP Walden Woods One, LLC and G	1,021	0.145	1,021	1,021	1,021	1,021	1,021	142	0.145	0.145	0.145	0.145	0.145	
	20230	Ozello Water Association Inc	4,882	0.446	4,902	4,941	4,977	5,009	5,039	91	0.448	0.451	0.455	0.458	0.460	
(8)		Additional Irrigation Demand		1.223							1.280	1.332	1.376	1.412	1.441	
(7)	Total Cou	nty	154,717	19.945	161,834	168,447	173,991	178,568	182,185		20.874	21.737	22.462	23.060	23.534	
$(\prime)$	1-10 Droug	Int Year Demand									22.126	23.042	23.809	29.444	24.946	

<u>Notes:</u> MGD = million gallons per day

(1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017.

Population Studies, Volume SU, Bulletin 17, April 2017. (2) Estimated using average 2011-2015 EPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area. (4) For utilities with at least O. Img daverage annual withdrwal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand.

(5) Computed as projected population multiplied by 2011-2015 average per capita water use.

(6) County residential per capita rate from the District's annual "Estimated Water Use Report" for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used. (7) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.

(9) Additional trigation Demand is defined as water demand from residential inigation wells utilized by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gallons per well per day. (9) Small general water use permits are not required to submit annual information on their per capita. Consequently, per capita information for the following small general WUPs was obtained as follows:

(b) changing there is wave user permission to require to submit and information for the percapture of COL = Point of Woods (WUIP# 729). Per capita information obtained from permit issued in 2017. b) Constate Utilities (WUIP# 4753): Per capita information obtained from permit issued in 2017. c) CCU = Rosemont (WUIP# 4753): Per capita information was obtained from permit issued in 1937. d) CCU = Golden Terrace (WUIP# 725): Per capita information was obtained from permit issued in 1937.

e) Inverness Village (WUP# 872). Per capita information was obtained from permit issued in 2012. f) Citrus Co. Utilities - Water Daks (WUP# 7784): Per capita and population information was obtained from permit issued in 2011.

g) River Lodge Resort (WUP# 8623): Per capita information was obtained from permit issued in 2009. (10) These are small general public supply permits listed in the PS\_SERVICEAREAS layer. If available, the permit per capita was used. Otherwise, it was assumed that the per capita was equal to the 2015 unadjusted gross per capita for the county.

#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 23 of 41

July 3, 2019

TABLE 5. DESOTO COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2)											
			F	POPULATION			(3)				PR	OJECTED	(5) ) WATER [	DEMANDS	
			(1)	2011-2015		PROJECT	TED POPUL	ATION		(4)			(MGD)		
			2015	GPCD						2011-2015					
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	19,960	1.305	20,815	21,520	22,191	22,771	23,201	65	1.361	1.407	1.451	1.489	1.517
(10)	3318	Cross Creek Country Club	1,112	0.056	1,112	1,112	1,112	1,112	1,112	50	0.056	0.056	0.056	0.056	0.056
	4725	Arcadia WTP	10,005	0.798	10,088	10,158	10,244	10,323	10,373	80	0.805	0.810	0.817	0.823	0.827
(10)	6483	DeSoto Village Mobile Home Park	266	0.029	266	266	266	266	266	110	0.029	0.029	0.029	0.029	0.029
(9) (8)	20457	DeSoto County Utilities Additional Irrigation Demand	5,165	0.505 0.073	5,270	5,345	5,447	5,543	5,602	98	0.515 0.075	0.522 0.077	0.532 0.079	0.541 0.080	0.547 0.082
(7)	Total Coun 1-10 Droug	i <b>ty</b> ght Year Demand	36,508	2.765	37,551	38,401	39,260	40,015	40,554		2.840 3.011	<b>2.901</b> 3.075	2.963 3.141	3.019 3.200	3.057 3.241

Notes:

MGD = million gallons per day

10) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida

Population Studies, Volume 50, Bulletin 177, April 2017. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015.

 (2) Estimated using average 2011-2015 Group, as provided in Table A-101 the District's reports under Similated Valer Use; 2011-2015.
 (3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.
 (4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand.

(5) Computed as projected population multiplied by 2011-2015 average per capita water use.

(6) County residential per capita rate from the District's annual 'Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used.

(7) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.

(9) Additional krigation Demand is defined as water demand from residential irrigation wells utilized by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gallons per well per day. (9) This is wholesale permit that imports supply from the PRMRWSA. The County also holds an Industrial/Commercial WUP (#6841) for the DeSoto Annex Correctional Facility which houses an average 1,540 persons.

(10) Since of the control of the second seco

b) DeSoto Village Mobile Home Park (WUP# 6483): Per capita information was obtained from permit issued in 2007.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 24 of 41 July 3, 2019

#### TABLE 6. HARDEE COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2) 2015											
			P	OPULATION			(3)						(5)		
			-	TIMES			(-)				P	ROJECTED	WATER D	EMANDS	
			(1)	2011-2015		PROJECT	TED POPULA	TION		(4)			(MGD)		
			2015	GPCD						2011-2015					
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	9,563	0.451	9,730	9,807	9,919	9,994	10,009	47	0.459	0.463	0.468	0.472	0.472
	30	City Of Bowling Green Municipal Wate	4,616	0.292	4,628	4,640	4,696	4,709	4,773	63	0.293	0.294	0.297	0.298	0.302
(9)	2402	Orange Blossom RV Park	305	0.021	305	305	305	305	305	70	0.021	0.021	0.021	0.021	0.021
	4461	City Of Wauchula	6,396	0.646	6,415	6,423	6,446	6,454	6,474	101	0.648	0.649	0.651	0.652	0.654
(9)	7022	MHC Peace River	11	0.002	11	11	11	11	11	150	0.002	0.002	0.002	0.002	0.002
	7658	Town Of Zolfo Springs	2,493	0.137	2,494	2,494	2,494	2,495	2,495	55	0.137	0.137	0.137	0.137	0.137
(10)	9550	Hardee Correctional Institution	1,963	0.251	1,963	1,963	1,963	1,963	1,963	128	0.251	0.251	0.251	0.251	0.251
(9)	11087	Florida SKP	293	0.014	293	293	293	293	293	47	0.014	0.014	0.014	0.014	0.014
(9)	11180	Torrey Oaks HOA	88	0.010	88	88	88	88	88	115	0.010	0.010	0.010	0.010	0.010
	13026	Hardee County BOCC	2,632	0.131	2,690	2,713	2,744	2,765	2,786	50	0.134	0.135	0.137	0.138	0.139
(8)		Additional Irrigation Demand		0.043							0.043	0.043	0.044	0.044	0.044
	Total Cou	ntv	28,360	1.999	28,617	28,736	28,959	29,077	29,196		2.013	2.019	2.032	2.039	2.046
(7)	1-10 Droug	ht Year Demand			,				,		2.133	2.140	2.154	2.161	2.169

Notes:

 Notes:

 MGD
 million gallons per day

 (1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bullein 117, April 2017.

 (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015.

 (3) Source: Population Projections calculated using CIS Associates, Inc.'s population projection model data and the PS\_SERVICEAPEAS CIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters; if applicable to the service area.

 (4) For utilities with at least 01 migd average annual withdraway, user 2011-2015 saverage estimated per capita water use rates, as provided in Table A-1 of the District's annual "Estimated Vater Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand.

 (5) County residential per capita rate from the District's annual "Estimated Vater Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was used.

 (3) Source: Population Projected population multiplied by 2011-2015 average residential per capita rate was used.

 (7) 1-Di DroughtY Year Demandis calculated as 106 x Projected Future Water Use.

 (8) Additional Irrigation Demand is defined as water demand from residential per capita. Consequently, per capita information non there is per capita.

 <

#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 25 of 41 July 3, 2019

#### TABLE 7. HERNANDO COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2) 2015											
			P	OPULATION			(3)						(5)		
				TIMES			(-)				P	ROJECTED	WATER I	DEMANDS	
			(1)	2011-2015		PROJEC	TED POPULA	TION		(4), (10)			(MGD)		
			2015	GPCD						2011-2015					
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	25,752	2.416	31,836	38,036	44,276	50,351	55,906	94	2.986	3.568	4.153	4.723	5.244
(9)	1891	Campers Holiday Association	546	0.027	547	549	551	554	558	50	0.027	0.027	0.028	0.028	0.028
(9)	2119	Imperial Estates	242	0.011	242	242	242	242	242	45	0.011	0.011	0.011	0.011	0.011
(9)	3273	Holiday Springs RV Park	462	0.046	462	462	462	462	462	100	0.046	0.046	0.046	0.046	0.046
(9)	3720	McGist, Inc. (Frontier Campground)	149	0.007	149	149	149	149	149	46	0.007	0.007	0.007	0.007	0.007
	5789	Hernando Co Utilities	139,654	17.810	147,808	154,944	160,115	164,246	167,380	128	18.850	19.760	20.419	20.946	21.346
(9)	6302	Avalon Development LLC	1,000	0.085	1,000	1,000	1,000	1,000	1,000	85	0.085	0.085	0.085	0.085	0.085
	7627	City Of Brooksville	14,617	1.076	15,169	15,735	16,417	17,268	18,126	74	1.117	1.159	1.209	1.272	1.335
(9)	8443	Camp-A-Wyle Condominium	431	0.039	434	438	442	446	451	90	0.039	0.039	0.040	0.040	0.041
(8)		Additional Irrigation Demand		2.801							3.027	3.240	3.426	3.595	3.742
	Total Cou	inty	182,854	24.318	197,648	211,555	223,654	234,719	244,274		26.196	27.943	29.424	30.753	31.884
(7)	1-10 Droug	ght Year Demand									27.768	29.619	31.189	32.598	33.797

<u>Notes:</u> MGD = million gallons per day

(2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015.

(3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.

residents, tourists and net commuters, if applicable to the service area. (4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See Footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use. (6) County residential per capita rate from the District's annual 'Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate on the District's 2011-2015 average residential per capita rate from the District's 2011-2015 average residential per capita rate from the District's 2011-2015 average residential per capita rate on the association (N1 DPM 2011-2015 average residential per capita rate was used. (7) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use. (8) Additional lingation Demand is defined as vater demand from residential lingation vells utilized by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gallons per well per dayu. (9) Campler alwater use permits are not required to submit annual information on their per capita. Consequently, per capita information was obtained from permit issued in 2010. (a) Campers Holdway Association (VUP# 1831): Per capita information was obtained from permit issued in 2010. (b) Imperial Estates (VUP# 2173): Per capita information was obtained from permit issued in 2010. (c) Holdway Springs FW Park (VUP# 3273): Per capita information was obtained from permit issued in 2010. (c) Holdway Paring VUP# 372): Per capita information was obtained from permit issued in 2010.

OF notice (Sungaryor and WOF # 2019). For Capita information was obtained from permit issued in 2015.
 e) Avaion Development LLC (WUP# 6302): Per capita information was obtained from permit issued in 2015.
 f) Camp-A-Wyle (WUP# 6443): Per capita information was obtained from permit issued in 2016.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 26 of 41 July 3, 2019

#### TABLE 8. HIGHLANDS COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2) 2015											
			P	OPULATION			(3)						(5)		
				TIMES							PR	OJECTE	D VATER	DEMANI	DS
			(1)	2011-2015		PROJEC	TED POPU	LATION		(4)			(MGD)		
			2015	GPCD						2011-2015					
	VUP	F	POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supplu	18.865	1.166	20,598	22.072	23,253	24,148	24,829	62	1.274	1.365	1.438	1.493	1.535
	4167	HC Waterworks	1.545	0.170	1,585	1.617	1.643	1.662	1.677	110	0.174	0.177	0.180	0.182	0.184
	4492	City of Sebring	35,768	3.466	37,239	38,362	39,275	39,975	40,514	97	3.608	3.717	3.806	3.873	3.926
(9)	4670	Maranatha Baptist Church	515	0.051	515	514	514	514	514	99	0.051	0.051	0.051	0.051	0.051
.,	4980	Lake Placid Holding Co	4,308	0.276	4,470	4,610	4,721	4,805	4,868	64	0.286	0.295	0.302	0.307	0.312
	5270	Town Of Lake Placid	7,136	0.710	7,317	7,441	7,540	7,615	7,673	100	0.728	0.741	0.751	0.758	0.764
	6029	City Of Avon Park	21,906	1.957	22,354	22,688	22,961	23,172	23,336	89	1.998	2.027	2.052	2.071	2.085
(11)	6456	HC Waterworks	624	0.062	625	627	628	629	629	100	0.063	0.063	0.063	0.063	0.063
(11)	6804	Lake Bonnet Village MHP	500	0.050	500	500	500	500	500	100	0.050	0.050	0.050	0.050	0.050
	7139	Buttonwood Bay Ütilities	1,646	0.161	1,646	1,646	1,646	1,646	1,646	98	0.161	0.161	0.161	0.161	0.161
	9490	LP Utilities Corporation	731	0.057	739	741	743	744	746	77	0.057	0.057	0.058	0.058	0.058
(11)	10926	Lake Lynn Shores	30	0.005	30	30	30	30	30	150	0.005	0.005	0.005	0.005	0.005
(11)	10930	Lake Placid Campground	239	0.009	239	239	239	239	239	37	0.009	0.009	0.009	0.009	0.009
(11)	11601	Pine Ridge Park Inc	631	0.032	631	631	631	631	631	51	0.032	0.032	0.032	0.032	0.032
(11)	12846	Tropical Harbor Mobile Home Esta	835	0.094	835	835	835	835	835	113	0.094	0.094	0.094	0.094	0.094
	13099	Sun N Lake Of Sebring Impr Dist	7,278	0.602	7,894	8,408	8,841	9,187	9,464	83	0.653	0.696	0.731	0.760	0.783
(11)	13272	Lake Park Village Condo Assoc	54	0.004	54	54	54	54	54	80	0.004	0.004	0.004	0.004	0.004
(10)	13367	Silver Lake Utilities, Inc.	19	0.001	33	46	57	64	71	68	0.002	0.003	0.004	0.004	0.005
(11)	20470	Orange Blossom Park	154	0.023	154	154	154	154	154	150	0.023	0.023	0.023	0.023	0.023
(8)		Additional Irrigation Demand		3.556							3.717	3.847	3.953	4.034	4.096
	Total Co	ounty	102,783 7	12.452	107,458	111,216	114,265	116,606	118,409		12.989	13.418	13.766	14.033	14.239
(7)	1-10 Droug	iht Year Demand									13.769	14.223	14.591	14.875	15.093

Notes: MGD = million gallons per day (1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 117, April 2017. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.

(4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual "Estimated Water Use Report" for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita water use. Self-Supply and Additional Irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use.

(6) County residential per capita rate from the District's annual Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used. (7) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.

(1) Probaging the probability of the p

average county per capita. average county per capita. (11) Small general water use permits are not required to submit annual information on their per capita. Consequently, per capita information for the following small general WUPs was obtained as follows: a) HC Wateworks (WUP# 6456): Per capita information was obtained from permit issued in 1998. b) Lake Bonnet Willage MHP (WUP# 6604): Per capita and population information were obtained from permit issued in 2011. c) Lake Lynn Shores (WUP#10326): Per capita and population information were obtained from permit issued in 2013. d) Lake Placid Campground (WUP#10330): Per capita information was obtained from permit issued in 2013. a) Pline Ridge Park Inc (WUP# 11601): Per capita information was obtained from permit issued in 2017. f) Tropical Harbor Mobile Home Estates (WUP# 12646): Per capita information was obtained from permit issued in 2017. g) Lake Park Willage Condo Assoc (WUP# 12627): Per capita information was obtained from permit issued in 2018. b) Cake Park Willage Condo Assoc (WUP# 13272): Per capita information was obtained from permit issued in 2018. b) Cake Bark Willage Condo Assoc (WUP# 20470): Per capita information was obtained from permit issued in 2018. b) Orange Blossom Park (WUP# 20470): Per capita information was obtained from permit issued in 2018.

#### TABLE 9. HILLSBOROUGH COUNTY POPULATION ESTIMATES AND PROJECTIONS

			(1) 2015	(2) 2015 POPULATION TIMES 2011-2015 GPCD		PROJE	(3) CTED POPU	LATION		(4) 2011-2015	F	ROJECTE	(5) D WATER (MGD)	DEMANDS	3
	VUP	F	POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6) (9) (9) (9) (9) (9) (9) (9) (9) (9) (9	wor           DSS           1           245           435           450           1776           1787           1988           2062           2285           23955           3752           3926           4757           6542           6579           7633           7783           7783           77843           8579           85798	Domestic Self-Supply Park Village Hoa DI Ruskin Chula Vista Mobile Home Park The Wildwod Company, Inc. City Di Temple Terrace Briarwood Mobile Home Park City Di Plant City Utilities Hillsborough County BOCC: San Rem Willaford Groves, LLC City Of Tampa Vater Dept Charles Springer Sunrise MHC, LLC Spanish Main RV Resort Citrus Knoll MHP Oakbrook Associates (Plant City Wilder Corporation Camp Lemora Rv Park C W Utility Systems, LLC Parkwood Estates Mobile Home Park Bay Hills Willing Gostemers, LLC Parkwood Estates Mobile Home Park Bay Hills Wills @ Condomium Assoco, Riverside Golf Course Comm Llc Southern Arie Mobile Home Park Bonita Bay Farnworker Housing Neptune Valley Mobile Home Park Sonste Manor Hoa	160.185 99 327 700 32,618 226 37,520 244 323 360,435 425 425 425 425 425 425 425 42	(NAL) 11.148 0.015 0.030 0.102 3.403 0.019 4.903 0.026 0.022 67.513 0.113 0.021 0.030 0.053 0.024 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.076 0.005	2020 185,869 101 327 700 36,331 226 43,858 216 323 325 43,858 216 323 355 425 425 425 425 425 425 425 4	2020 214,185 102 327 700 33,297 2256 52,041 323 55,041 323 55,041 323 323 354 323 354 425 425 425 2,021 1,038 495 2,021 1,035 1,035 2,184 495 2,021 1,035 2,021 1,035 2,021 1,035 2,021 1,035 2,021 1,035 2,021 1,035 2,041 2,041,041 2,0,	2030 241,469 10(3) 327 7000 41,753 226 60,272 220 323 350 350 350 350 350 350 354 425 425 425 425 425 2,021 1,038 495 2,184 495 2,185 1,132 2,455 1,135 2,146 1,135 2,146 1,135 2,146 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 1,153 2,164 2,155 2,154 2,155 2,154 2,155 2,154 2,155 2,154 2,155 2,154 2,155 2,15	2003 278.417 113 327 7000 43.524 226 66.676 221 323 374.543 323 374.543 467 354 425 425 425 2021 1,038 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 495 218 218 218 218 218 218 218 218 218 218	2040 315,928 123 327 700 44,745 226 72,927 72,927 222 323 550 550 550 550 550 550 550 550 550 55	70 144 142 148 70 148 93 145 104 151 104 151 104 151 104 151 105 100 150 100 150 150 150 70 150	12.335 0.015 0.030 0.030 0.030 0.030 0.021 0.026 0.022 0.022 0.021 0.030 0.031 0.031 0.031 0.031 0.031 0.031 0.031 0.035 0.024 0.032 0.025	14,306 0.015 0.030 0.012 4.100 0.019 6.801 0.026 0.021 0.030 0.021 0.030 0.031 0.030 0.031 0.030 0.031 0.030 0.031 0.033 0.033 0.033 0.033 0.033 0.034 0.024 0.033	2030 16.804 0.015 0.030 0.030 0.030 0.030 0.027 0.027 0.027 0.027 0.027 0.027 0.022 81.578 0.030 0.030 0.030 0.030 0.030 0.030 0.033 0.535 0.033 0.535 0.024 0.035 0.024 0.035 0.024 0.035 0.025 0.035 0.035 0.035 0.035 0.045 0.045 0.045 0.045 0.045 0.057 0.057 0.027 0.027 0.027 0.027 0.027 0.027 0.027 0.027 0.027 0.027 0.027 0.021 0.030 0.030 0.030 0.030 0.030 0.030 0.030 0.045 0.035 0.035 0.025 0.035 0.025 0.035 0.025 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.035 0.045 0.035 0.045 0.045 0.057 0.025 0.057 0.025 0.035 0.030 0.030 0.030 0.030 0.030 0.035 0.024 0.035 0.024 0.035 0.024 0.035 0.024 0.035 0.024 0.035 0.024 0.035 0.024 0.035 0.024 0.035 0.024 0.005 0.035 0.024 0.005 0.005 0.005 0.024 0.005 0	19.376 0.017 0.030 0.012 4.541 0.022 83.439 0.022 0.022 0.022 0.022 0.022 0.030 0.030 0.030 0.031 0.030 0.031 0.033 0.033 0.033 0.033 0.033 0.034 0.021 0.035 0.024 0.025 0.024 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.026 0.027 0.030 0.022 0.026 0.0270000000000	21,940 0,018 0,030 0,030 0,04 4,669 0,059 9,531 0,022 85,034 0,047 0,022 0,022 0,022 0,022 0,033 0,030 0,030 0,030 0,033 0,033 0,033 0,033 0,033 0,034 0,024 0,024 0,025 0,024 0,026 0,026 0,027 0,026 0,027 0,026 0,027 0,026 0,027 0,026 0,027 0,026 0,026 0,027 0,026 0,026 0,027 0,026 0,027 0,020000000000
(9) (9) (9) (9) (9) (9) (11) (8)	8386 10066 10443 10543 12513 12621 13004 13063 20141	Allied Utilities, Inc. Florida Aceeapaders, Inc. Windemete Utility Company Cici Trailer Town Mobile Home Hometown Little Manatee Springs, LLC Hideaway Partners, LLLP Eastriled Stopes Condo Cart Lakeshore Villas Mhp Hillsborough County Utilities Additional Irrigation Demand	85 152 2,775 90 475 678 229 522 588,687	0.013 0.022 0.259 0.013 0.038 0.022 0.031 0.059 55.491 2.235	85 152 2,780 90 475 678 231 522 658,787	85 152 2,784 90 475 678 236 522 719,038	85 152 2,788 90 475 678 243 522 767,897	85 152 2,813 90 475 678 245 522 810,996	85 152 2,837 90 475 678 248 522 849,395	150 147 93 144 80 32 134 113 94	0.013 0.022 0.259 0.013 0.038 0.022 0.031 0.059 62.099 2.469	0.013 0.022 0.260 0.013 0.038 0.022 0.032 0.059 67.778 2.690	0.013 0.022 0.260 0.013 0.038 0.022 0.033 0.059 72.384 2.885	0.013 0.022 0.262 0.013 0.038 0.022 0.033 0.059 76.446 3.048	0.013 0.022 0.265 0.013 0.038 0.022 0.033 0.059 80.066 3.199
	Total Co DPCVUC NTB SVUCA	ounty CA	1,438,767 42,304 1,274,544 592,725	146.675 5.377 132.585 56.198	1,589,177 48,643 1,399,268 662,827	1,731,457 56,826 1,513,231 723,079	1,856,960 65,057 1,611,449 771,939	1,961,869 71,461 1,679,399 815,048	2,059,559 77,712 1,739,569 853,456		161.514 6.206 145.403 62.806	175.533 7.275 157.230 68.486	187.897 8.351 167.500 73.092	197.585 9.188 174.452 77.156	206.514 10.005 180.618 80.777
(7)	1-10 Droug DPCVUC NTB 1-10 D SVUCA 1-1	ht Year Demand A 1-10 Drought Year Demand Drought Year Demand 10 Drought Year Demand									171.205 6.578 154.127 66.575	186.065 7.712 166.664 72.595	199.171 8.852 177.550 77.477	209.440 9.739 184.919 81.785	218.905 10.605 191.455 85.623

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 28 of 41 July 3, 2019

#### TABLE 10. LAKE COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2) 2015												
			F	OPULATION												
				TIMES								PR	OJECTED	WATER D	EMANDS	
			(1)	2011-2015		I	PROJECTED	D POPULATI	ON					(MGD)		
			2015	GPCD												
	WUP		POPULATION	(MGD)		2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
	DSS	Domestic Self-Supply & Small Utilities	1,059	0.140	1	,296	1,579	1,853	2,122	2,383	NA	0.170	0.200	0.240	0.270	0.310
(3)	Total Coun 1-10 Droug	ty in SWFWMD (all utilities and DSS) ant Year Demand	1,059	0.140	1	,296	1,579	1,853	2,122	2,383		<b>0.170</b> 0.180	<b>0.200</b> 0.212	<b>0.240</b> 0.254	<b>0.270</b> 0.286	0.310 0.329
	CFWI Large	e Utilities (Public Supply)	NA NA	IA	NA	NA	NA	NA	NA			0.000	0.000	0.000	0.000	0.000
	CFWI Large	e Utilities 1-10 Drought Year Demand	NA NA	JA.	NA	NA	NA	NA	NA			0.000	0.000	0.000	0.000	0.000

Ndcs: MGD = million gallons per day (1) Estimate & projections of domestic self-supplied & small utility population for District portion of county from draft 2020 Regional Water Supply Plan for the Central Florida Water Initiative (April 2018). (2) Estimate & projections of domestic self-supplied & small utility population for District portion of county from draft 2020 Regional Water Supply Plan for the Central Florida Water Initiative (April 2018). (3) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.

## SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 29 of 41

July 3, 2019

#### TABLE 11. LEVY COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2)											
			F	POPULATION			(3)				PR		(5) WATER F		
			(1) 2015	(1) 2011-2015 2015 GPCD POPULATION (MGD) 20			TED POPUL/	ATION		(4) 2011-2015			(MGD)		
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	17,984	0.963	18,741	19,424	20,000	20,418	20,784	54	1.004	1.040	1.071	1.093	1.113
	5640	City of Williston	3,207	0.443	3,286	3,361	3,428	3,481	3,527	138	0.454	0.465	0.474	0.481	0.488
	7755	Town Of Yankeetown	855	0.059	862	868	874	878	881	69	0.059	0.060	0.060	0.060	0.061
(9)	7825	Oak Avenue Water System	57	0.008	57	57	58	58	58	150	0.009	0.009	0.009	0.009	0.009
	8953	Town Of Inglis	1,630	0.132	1,640	1,646	1,651	1,655	1,658	81	0.133	0.133	0.134	0.134	0.134
(8)		Additional Irrigation Demand		0.018							0.019	0.019	0.020	0.020	0.020
	Total Cour	nty	23,732	1.623	24,585	25,356	26,010	26,489	26,908		1.677	1.725	1.767	1.797	1.824
(7)	1-10 Droug	ght Year Demand									1.777	1.829	1.873	1.905	1.934

Notes: MGD = million gallons per day (1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.

tourists and net commuters, it applicable to the service area. (4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use. (6) County residential per capita rate from the District's annual 'Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used. (7) 1-10 Drought Year Demand is calculated as 1.06 x Projected future Water Use. (8) Additional Irrigation Demands is defined as water demand from residential intrgation water demands from the last issued pornit. It is nor required to submit an annual per capita rate prof. Per capita information is from the last issued permit. If no per capita information was found in WMIS, the per capita assumed to equal the average capita information year capita. average county per capita.

#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 30 of 41 July 3, 2019

TABLE 12. MANATEE COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2) 2015											
			I	POPULATION			(3),(11)						(5)		
				TIMES							P	ROJECTE	) WATER I	DEMANDS	
			(1)	2011-2015		PROJEC	TED POPULA	ATION		(4)			(MGD)		
			2015	GPCD						2011-2015					
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6),(10)	DSS	Domestic Self-Supply	10,245	0.623	11,129	11,798	12,561	13,296	14,009	61	0.677	0.717	0.764	0.808	0.852
	6392	City Of Bradenton	65,840	5.552	67,484	68,604	69,137	69,646	70,130	84	5.691	5.785	5.830	5.873	5.914
	10963	Town of Longboat Key	18,054	1.625	18,324	18,629	18,902	19,180	19,472	90	1.649	1.677	1.701	1.727	1.753
	12443	City Of Palmetto	17,463	1.335	19,637	21,517	22,757	23,562	23,634	76	1.501	1.645	1.740	1.801	1.807
(12)	13154	Walker Communities	37	0.003	37	37	37	37	37	68	0.003	0.003	0.003	0.003	0.003
(9),(10)	13343	Manatee County Utility Operations	312,076	28.553	349,406	386,783	420,822	451,153	477,237	91	31.968	35.388	38.502	41.277	43.664
(12)	20235	ERS/Palmetto Park.	24	0.004	24	24	24	24	24	150	0.004	0.004	0.004	0.004	0.004
(8)		Additional Irrigation Demand		1.786							1.964	2.138	2.294	2.431	2.548
(11)	Total Cou	nty	423,741	39.480	466,041	507,393	544,241	576,900	604,543		43.456	47.357	50.837	53.924	56.543
(7)	1-10 Droug	ht Year Demand									46.064	50,198	53.887	57,160	59.936

(7) 1-10 Drought Year Demand

<u>Notes:</u> MGD = million gallons per day

(1) 2015 Estimated as per day (2) 2015 Estimate as generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017.

Population Studies, Volume 50, Bulletin 177, April 2017. (2) Estimated using average 2011–2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011–2015. (3) Source-Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area. (4) For utilities with at least OI mgd average annual withdaw al. year 2011–2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011–2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita water use. (6) Commuter das projected population multiplied by 2011–2015 average per capita water use. (6) Commuter das projected population multiplied by 2011–2015 average per capita water use. (6) County residential per capita rate from the District's annual 'Estimated Water Use Report' for years 2011–2015, was used to calculate average estimated 2011–2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used. (7) 1-10 Drought Year Demand is caleudated as 106 x Projected Tuture Water Use. (8) Additional Irrigation Demand is defined as the residential fingation veloculated by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gallons per vell per day. (9) Manatee County water use permits 5387, 7345, and 7470 were consolidated into water use permit number 13343. (10) The sum of the populations for each utility is greater than the total functional population from GISA. This results in negative domestic self supply populations. County totals adjusted upwards to cover definit plus domestic self-supply.

self-supply. (11) This estimates exceeds BEBR High and GISA 2017 functional population estimatates and projections for Manatee County.

(12) This is a small general permit. It is nor required to submit an annual per capita report. Per capita information is from the last issued permit. If no per capita information was found in WMIS, the per capita is assumed to equal the average county per capita. a) Walker Communities (WUP# 13154): Per capita information was obtained from permit issued in 2018.

b) ERS/Palmetto Pak (WUP# 20235): Per capita information was obtained from permit issued in 2011.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 31 of 41 July 3, 2019

#### TABLE 13. MARION COUNTY POPULATION ESTIMATES AND PROJECTIONS

			(1)	(2) 2015 POPULATION TIMES 2011-2015		PROJEC	(3)			(4)	PR	OJECTE	(5) D VATER (MGD)	DEMAN	DS
	VUP			GPCD (MGD)	2020	2025	2030	2035	2040	2011-2015 AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	46,069	5.139	52,241	57,863	62,862	67,733	72,330	112	5.827	6.454	7.012	7.555	8.068
	1156	Bay Laurel Community Developmer	11,147	2.499	11,801	12,374	12,870	13,348	13,815	224	2.646	2.774	2.886	2.993	3.097
	2999	Marion Utilities Inc	1,106	0.095	1,119	1,131	1,142	1,153	1,163	86	0.096	0.097	0.098	0.099	0.099
	5643	Utilities Inc of Florida, ATTN: Patric	1,050	0.157	1,054	1,058	1,062	1,065	1,069	149	0.157	0.158	0.158	0.159	0.159
(9)	5731	Foxwood Mobile Home	513	0.057	513	513	513	513	513	112	0.057	0.057	0.057	0.057	0.057
	6151	Marion Co Utilities Dept	35,018	4.717	38,080	40,802	43,152	45,513	47,759	135	5.130	5.497	5.813	6.131	6.434
(9)	6574	Marion Utilities, Inc Libra Oaks	122	0.009	122	122	122	122	122	75	0.009	0.009	0.009	0.009	0.009
	6792	Sun Communities Saddle Oak	598	0.086	598	598	598	598	598	144	0.086	0.086	0.086	0.086	0.086
(9)	6884	Marion Utilities Inc	350	0.053	350	350	350	350	350	150	0.053	0.053	0.053	0.053	0.053
	7849	Marion Utilities Inc	1,044	0.118	1,223	1,304	1,309	1,309	1,309	113	0.139	0.148	0.148	0.148	0.148
	8005	Century Fairfield Village Ltd	475	0.058	475	475	475	475	475	122	0.058	0.058	0.058	0.058	0.058
	8020	Association of Marion Landing Ow	1,127	0.156	1,127	1,127	1,127	1,127	1,127	138	0.156	0.156	0.156	0.156	0.156
(9)	8139	The Falls of Ocala HOA, Inc	208	0.030	208	208	208	208	208	146	0.030	0.030	0.030	0.030	0.030
	8339	City Of Dunnellon	6,553	0.838	7,116	7,637	8,101	8,594	9,032	128	0.910	0.977	1.037	1.100	1.156
	8481	Marion Utilities Inc & Spruce Creek	5,688	0.605	6,460	7,208	7,771	8,018	8,236	106	0.688	0.767	0.827	0.853	0.877
(9)	9425	Sweetwater Oaks	371	0.056	371	371	371	371	371	150	0.056	0.056	0.056	0.056	0.056
(9)	10083	Water Wheel RV Park	2	0.000	2	2	2	2	2	100	0.000	0.000	0.000	0.000	0.000
(9)	10110	The Centers	129	0.013	129	129	129	129	129	100	0.013	0.013	0.013	0.013	0.013
(9)	10852	Dogwood Acres MHP	198	0.022	198	198	198	198	198	111	0.022	0.022	0.022	0.022	0.022
(9)	11523	Vestwood MHP	143	0.014	143	143	143	143	143	100	0.014	0.014	0.014	0.014	0.014
(9)	20098	Satake Village Utilities	80	0.012	80	80	80	81	81	150	0.012	0.012	0.012	0.012	0.012
(9)	20213	City of Dunnellon - Juliette Falls	51	0.008	58	66	73	79	85	150	0.009	0.010	0.011	0.012	0.013
(8)		Additional Irrigation Demand		0.470							0.518	0.561	0.599	0.634	0.668
(7)	Total Co 1-10 Droug	<b>ounty</b> ht Year Demand	112,040	15.213	123,467	133,759	142,657	151,129	159,115		<b>16.686</b> 17.687	<b>18.010</b> 19.090	<b>19.155</b> 20.304	<b>20.251</b> 21.466	<b>21.286</b> 22.563

<u>Notes:</u> MGD = million gallons per day

MGD = million gallons per day (1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 117, April 2017. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Source: Population Projections calculated using GIX Associates, Inc.'s population model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area. (4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's nanual 'Estimated Water Use Report' for years 2011-2015, were used to project damands. See footnates 6 and 6 for descriptions of the per capita water use. (5) Computed as projected population multiplied by 2011-2015 average per capita water use.

 (a) Computed as projected population multiplied by 2011-2015 versage per capita vater use.
 (b) County residential per capita rate from the District's annual Estimated Water Use. Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used.
 (f) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.
 (g) Additional inrigation Demand is defined as water demand inrigation wells willized by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gallons per well per day.
 (g) Small general water use partices are not required to submit annual information on their per capita. Consequently, per capita information for the following small general WUPs was obtained as follows: (3) Small general water use permits are not required to submit annual information on their per capita. Consequently, per capits in a) Foxwood Mobile Home (WUP# 5731): Per capits information obtained from permit issued in 2017. b) Marion Utilities, Inc. (WUP# 5574): Per capits information was obtained from permit issued in 2016. c) Marion Utilities, Inc. (WUP# 6584): Per capits and population information ware obtained from permit issued in 2010. d) The Falls of Ocals HOA, Inc (WUP# 6584): Per capits and population information ware obtained from permit issued in 2010. d) The Falls of Ocals HOA, Inc (WUP# 6584): Per capits and population information ware obtained from permit issued in 2010. f) The Centers (WUP# 1010): Per capits and population information ware obtained from permit issued in 2010. g) Degwood Areas MHP (WUP# 1052): Per capits and population information ware obtained from permit issued in 2010. h) Vestwood MHP (WUP# 1052): Per capits information was obtained from permit issued in 2010. i) Statek Village Utilities (WUP# 1052): Per capits information was obtained from permit issued in 2010. i) Statek Village Utilities (WUP# 1052): Per capits information was obtained from permit issued in 2010. i) Statek Village Utilities (WUP# 2013): Per capits information was obtained from permit issued in 2010. i) Citty of Dunnellon - Juliet Falle (VUP# 2013): Per capits information was obtained from permit issued in 2010.

j) City of Dunnellon - Julliet Falls (WUP# 20213): Per capita information obtained from permit issued in 2012.

#### TABLE 14, PASCO COUNTY POPULATION ESTIMATES AND PROJECTIONS

Total Co	ounty	515,412	56.597	565,764	612,750	652,965	690,156	723,710		61.928	66.863	71.061	74.921	78.378
	Additional Irrigation Demand		4.276							4.694	5.083	5.417	5.725	6.004
99915	Orchid Lake Utilities	688	0.059	688	688	688	688	688	86	0.059	0.059	0.059	0.059	0.059
33306	Arbor Oaks	363	0.031	364	365	366	367	369	86	0.031	0.031	0.031	0.031	0.032
11863	Pasco Co Utilities	285,780	33.210	309,863	331,048	348,522	364,101	377,544	116	36.008	38.470	40.501	42.311	43.873
11082	Florida Governmental Utility Authorit	: 849	0.028	1,030	1,142	1,142	1,142	1,142	33	0.034	0.038	0.038	0.038	0.038
3666	Southfork Mobile Home Community	733	0.103	734	735	737	739	741	140	0.103	0.103	0.103	0.103	0.104
9183	Sunburst Ry Park	269	0.028	271	280	291	303	316	106	0.029	0.030	0.031	0.032	0.033
8514	Ramblewood Village	244	0.029	247	249	250	250	250	117	0.029	0.029	0.029	0.029	0.029
8491	Parrish Properties	495	0.031	496	497	498	499	500	63	0.031	0.031	0.031	0.031	0.031
8417	Florida Governmental Utility Authorit	7,832	0.415	8,008	8,176	8,289	8,365	8,403	53	0.424	0.433	0.439	0.443	0.445
8134	Spanish Trails W Mobile Home	382	0.028	401	421	439	454	461	74	0.030	0.031	0.032	0.034	0.034
7999	Florida Governmental Utility Authorit	1,980	0.120	2,015	2,060	2,100	2,138	2,171	60	0.122	0.124	0.127	0.129	0.131
7982	Land O' Lakes Village Apartments	640	0.064	640	640	640	640	640	100	0.064	0.064	0.064	0.064	0.064
7773	Barrington Hills MHC	435	0.032	435	435	435	435	435	74	0.032	0.032	0.032	0.032	0.032
7745	Florida Governmental Utility Authorit	652	0.080	683	701	701	701	701	122	0.083	0.086	0.086	0.086	0.086
7718	Florida Governmental Utility Authorit	636	0.045	654	667	671	671	671	70	0.046	0.047	0.047	0.047	0.047
7588	Cav. Homeowners Cooperative	584	0.042	592	600	603	603	603	72	0.043	0.043	0.043	0.043	0.043
7359	Timber Lake Estates	1,081	0.086	1,087	1,112	1,138	1,163	1,199	80	0.087	0.089	0.031	0.033	0.036
7299	L W V Utilities Inc	305	0.087	905	919	936	356	977	96	0.087	0.088	0.030	0.032	0.034
6982	Jeffery A. Cole	263	0.010	263	269	263	263	269	36	0.010	0.010	0.010	0.010	0.010
6881	Ramblewood Mobile Home Communi	i 294	0.049	294	295	296	297	298	167	0.049	0.049	0.049	0.050	0.050
6867	Utilities Inc of Florida	1,593	0.089	1,604	1,620	1,636	1,651	1,666	56	0.090	0.091	0.092	0.092	0.093
6640	Gem Estates	385	0.058	396	405	408	408	409	150	0.059	0.061	0.061	0.061	0.061
6230	Settlers Rest Ry Park	394	0.039	394	394	394	394	394	100	0.039	0.039	0.039	0.039	0.039
6223	<ul> <li>Florida Governmental Utility Authorit</li> </ul>	: 837	0.059	840	850	861	872	884	70	0.059	0.059	0.060	0.061	0.062
6040	City of Zephyrhills	27,004	2.652	29,746	32,056	33,904	35,436	36,531	98	2.921	3.148	3.329	3.480	3.587
5953	Hacienda Utilities	912	0.078	912	914	916	919	922	86	0.078	0.079	0.079	0.079	0.079
5294	Florida Villas Mobile Home Park	73	0.007	73	74	74	74	74	99	0.007	0.007	0.007	0.007	0.007
4734	City Of New Port Richey	33,172	2.940	34,831	36,179	36,956	37,450	37,870	89	3.087	3.206	3.275	3.319	3.356
4669	Hudson Water Works Inc	7,806	0.675	8,336	9,014	9,670	10,331	10,749	86	0.721	0.779	0.836	0.893	0.929
4550	City Of San Antonio	2,205	0.205	2,253	2,398	2,541	2,698	2,852	93	0.210	0.223	0.237	0.251	0.266
3692	City Of Port Richey	11,761	0.571	12,236	12,790	13,286	13,767	14,202	49	0.594	0.621	0.645	0.668	0.689
3677	Florida Governmental Utility Authorit	1,603	0.086	1,647	1,651	1,651	1,651	1,651	54	0.088	0.089	0.089	0.089	0.089
3619	Country Aire Service MHP	168	0.025	170	181	193	207	221	150	0.026	0.027	0.029	0.031	0.033
3590	Utilities Inc of Florida, ATTN: Patrick	3,746	0.198	3,788	3,832	3,871	3,906	3,922	53	0.201	0.203	0.205	0.207	0.208
3528	Lippecanoe Village Homenowners	525	0.058	525	527	529	531	533	111	0.058	0.058	0.059	0.059	0.059
3302	Baker Acres	542	0.022	545	548	551	553	554	41	0.022	0.022	0.023	0.023	0.023
3273	Holiday Springs RV Park	462	0.046	462	462	462	462	462	100	0.046	0.046	0.046	0.046	0.046
3182	Florida Governmental Utility Authorit	: 30,408	2.643	33,438	35,136	31,603	39,221	40,685	100	2.307	3.106	3.263	3.410	3.536
2918	Florida Governmental Utility Authorit	5,438	0.511	5,61	5,880	5,348	6,010	6,063	106	0.602	0.624	0.631	0.638	0.643
2567	Country-Aire	259	0.029	269	302	336	375	413	113	0.030	0.034	0.038	0.042	0.047
2319	Florida Governmental Utility Authorit	255	0.025	262	266	266	266	266	100	0.026	0.027	0.027	0.027	0.027
2043	Urangewood Lakes Mobile Home Co	1,022	0.011	1,022	1,027	1,032	1,038	1,045	63	0.071	0.071	0.072	0.072	0.072
1631	City of Dade City	12,184	1.349	12,791	14,393	16,081	17,939	19,828	111	1.411	1.594	1.781	1.987	2.196
364	C S Water Company Inc.	931	0.074	912	1,049	1,126	1,211	1,293	19	0.077	0.083	0.090	0.036	0.103
323	Traveler's Rest Resort	1,364	0.048	1,364	1,364	1,365	1,365	1,365	35	0.048	0.048	0.048	0.048	0.048
590	Florida Governmental Utility Authorit	8,226	0.873	8,792	8,930	8,950	8,950	8,950	106	0.933	0.948	0.950	0.350	0.350
543	Crestridge Utility Corporation	1,184	0.088	1,197	1,207	1,214	1,214	1,214	74	0.089	0.089	0.030	0.090	0.090
540	Holiday Gardens Utilities, Inc.	855	0.078	884	885	885	885	885	91	0.080	0.081	0.081	0.081	0.081
279	Florida Governmental Utility Authorit	3,502	0.247	3,603	3,608	3,608	3,608	3,608	70	0.254	0.254	0.254	0.254	0.254
DSS	Domestic Self-Supply	51,487	3.834	67,059	82,908	97,637	111,971	125,821	74	4.993	6.174	7.270	8.338	9.369
WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
		2015	GPCD		THOPE	01201010	Linition.		2011-2015			((()))		
		cn.	2011-2015		PDO IE				60	,	NOJECTE	(MCD)	DEMININD	•
		F	TIMES			(3)						UNATED		~
			DODULATION			(2)						(5)		
			[2]											
			;	(2) 2015 POPULATION TIMES	(2) 2015 POPULATION TIMES	(2) 2015 POPULATION TIMES	(2) 2015 POPULATION (3) TIMES (3)	(2) 2015 POPULATION (3) TIMES	(2) 2015 POPULATION (3) TIMES (3)	(2) 2015 POPULATION (3) TIMES	(2) 2015 POPULATION (3) TIMES F	(2) 2015 POPULATION (3) TIMES PROJECTEI	(2) 2015 POPULATION (3) (5) TIMES PROJECTED WATER	(2) 2015 POPULATION (3) (5) TIMES PROJECTED WATER DEMAND

1-10 Drought Year Demand

Nator:

MGD - million gallons per day (2) Estimated wind 2016-2020 grauth reter from The University of Florida Bureau of Economic and Buriness Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017. (2) Estimated using average 2011-2015 GPCD, or provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015.

(3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include searonal residence, tourist

ad not cammutors, if applicable to the service area. (4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water we rater, as provided in Table A-1 of the District's annual "Estimated Water Use Report" for years 2011-2015, were wed to

project demands. See footnotes 6 and 8 for descriptions of the per capita wed for the Domestic Self-Supply and Additional Irrigation Demand.

project some har, see researcher's one or an ascription of the per capital war for the Damards 2017-2019 years and search and the Damards. (6) Computed a project of papulation multiple by 2017-2019 severage per capital value of the war. (6) Computed a project of papulation multiple by 2017-2019 severage per capital value of the war. (6) Computed a project of papulation multiple by 2017-2019 severage per capital value of the war. (6) Computed a project of papulation multiple by 2017-2019 severage per capital value of the severage pertimeted 2011-2015 wage, Table A-2. If a county revidential per capital rate war not available, the District's 2011-2015 werage ravidential per capital rate war. (7) 1+10 Draught Year Bennand is calculated at 10.8. Projected Potter Water Ure.

(1) For the formation of the second of the se

county average. a) Holiday Gardens Utilities, LLC (WUP# 540): Per capita was obtained from permit issued in 2015.

(b) Holiday Gardens Utilities, LLC (VUP# 540): Per capits was obtained from permit issued in 2015.
(c) Florida Governmental Utility Authority (WUP# 3219): Per capits was obtained from permit issued in 2014.
(d) Gantyr-Rive (WUP# 3517): Per capits use abtained from permit issued in 2015.
(e) Florida Governmental Utility Authority (WUP# 3219): Per capits was obtained from permit issued in 2014.
(f) Florida Governmental Utility Authority (WUP# 3239): Per capits was obtained from permit issued in 2014.
(f) Florida Giver (WUP# 3267): Per capits was abtained from permit issued in 2016.
(f) Elster Arex: (WUP# 3267): Per capits was obtained from permit issued in 2016.
(f) Countyr-Air Service MUP# 3595): Per capits was obtained from permit issued in 2016.
(f) Florida Villas Mobile Home Park (WUP# 5234): Per capits was obtained from permit issued in 2015.
(f) Hocinda Villas Mobile Home Park (WUP# 5234): Per capits was obtained from permit issued in 2015.
(f) Hocinda Villas Mobile Home Park (WUP# 5234): Per capits was obtained from permit issued in 2015.
(f) Hocinda Villas Mobile Home Park (WUP# 5232): Per capits was obtained from permit issued in 2014.
(f) Glorida Villas Mobile Home Community (WUP# 6223): Per capits was obtained from permit issued in 2014.
(f) Utilities (WUP# 6667): Per capits was obtained from permit issued in 2014.
(f) Utilities (WUP# 5332): Per capits was obtained from permit issued in 2004.
(f) Utilities (WUP# 5333): Per capits was obtained from permit issued in 2014.
(f) Utilities (WUP# 5333): Per capits was obtained from permit issued in 2014.
(f) Utilities (WUP# 5333): Per capits was obtained from permit issued in 2014.
(f) Utilities (WUP# 5333): Per capits was obtained from permit issued in 2014.
(f) Florida Governmental Utility Authority (WUP# 7714): Per capita was obtained from permit issued in 2014.
(f) Flor

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 33 of 41 July 3, 2019

#### TABLE 15. PINELLAS COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2)											
			P	OPULATION			(3)						(5)		
				TIMES							F	PROJECTE	D WATER	DEMANDS	
			(1)	2011-2015		PROJEC	CTED POPUL	ATION		(4)			(MGD)		
			2015	GPCD						2011-2015					
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	5.582	0.300	5.611	5.890	6.260	6.587	6.663	54	0.302	0.317	0.337	0.354	0.359
	742	City Of Tarpon Springs	33,476	2.852	34,789	36,180	36,655	36,915	36,963	85	2.964	3.082	3.123	3.145	3.149
	2980	City Of Dunedin	43,382	3.607	44,162	44,757	44,945	45,061	45,076	83	3.671	3.721	3.736	3.746	3.747
	2981	City of Clearwater	141,696	11.193	142,356	143,007	143,162	143,239	143,329	79	11.245	11.297	11.309	11.315	11.322
	7692	Town Of Belleair	5,455	0.746	5,493	5,526	5,537	5,544	5,544	137	0.751	0.756	0.757	0.758	0.758
(9)	9423	Southern Comfort MHP	491	0.069	491	491	491	491	491	140	0.069	0.069	0.069	0.069	0.069
(9)	10350	Utilities Inc of Florida	1,370	0.058	1,382	1,385	1,385	1,385	1,385	42	0.058	0.058	0.058	0.058	0.058
	10795	City Of Gulfport	14,493	1.002	14,668	14,745	14,753	14,756	14,757	69	1.014	1.019	1.020	1.020	1.020
	11218	City Of Oldsmar	17,000	1.300	17,589	18,516	19,028	19,470	20,157	76	1.345	1.416	1.455	1.489	1.542
	11245	City of Safety Harbor	15,801	1.364	16,224	16,577	16,699	16,765	16,776	86	1.401	1.431	1.442	1.448	1.449
	12351	City of Pinellas Park	84,864	4.555	86,799	88,883	89,575	90,070	90,181	54	4.658	4.770	4.807	4.834	4.840
	20142	Pinellas County	500,277	39.309	504,863	514,010	526,816	539,181	543,701	79	39.670	40.388	41.395	42.366	42.721
	20143	City of St. Petersburg	344,056	28.267	347,930	350,963	352,040	352,947	353,570	82	28.585	28.835	28.923	28.998	29.049
(8)		Additional Irrigation Demand		6.628							6.707	6.809	6.899	6.982	7.016
(10)	Total Cou	unty	1,207,943	101.250	1,222,356	1,240,929	1,257,345	1,272,410	1,278,592		102.441	103.969	105.330	106.582	107.098
(7)	1-10 Drou	ght Year Demand									108.588	110.207	111.650	112.977	113.524

Notes: MGD = million gallons per day (1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area. 1015 Population Projection and Population and Population Projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.

residents, tousits and net commuters, if applicable to the service area.
(4) For utilities with at least 0, 1mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 or descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand.
(5) Computed as projected population multiplied by 2011-2015 average per capita water use.
(6) County residential per capita rate from the District's annual 'Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average testidential per capita rate was used.
(7) 1-10 Drought Year Demand is calculated as 10.6 x Projected Future Water Use.
(8) Additional Irrigation Demand is defined as water demand from residential per capita rate was used.
(9) Table Table Tables, the District's 2011-2015 average to the Vater Use.
(9) Additional Irrigation Demand is defined as water demand from residential per capita rate was used.
(9) Additional Irrigation Demand is defined as water demand from residential intrigation wells utilized by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gallons per well per day.

(9) This is a small general permit. It is nor required to submit an annual per capita report. Per capita information is from the last issued permit. If no per capita information w Sound in WMIS, the per capita is assumed to equal the a) Southern Comfort MHP (WUP# 9423): Per capita information was obtained from permit issued in 2009.

b)Utilities Inc of Florida (WUP# 10350): Per capita information was obtained from permit issued in 2014.. (10) These estimates and projections exceed BEBR High and GISA 2017 functional population estimates and projections for Pinellas County.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 34 of 41 July 3, 2019

#### TABLE 16. POLK COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2)											
				2015											
				POPULATION									[4]		
				TIMES								PROJECT	ED WATER	DEMAND:	s
			(1)	2011-2015		PROJEC	STED POPUL	ATION		[3]			(MGD)		
			2015	GPCD						Gross					
	WUP		POPULATION	[MGD]	2020	2025	2030	2035	2040	Per Capita	2020	2025	2030	2035	2040
(6)		Domestic Self-Supply & Small Utility	34,523	2.9	37,839	41,022	43,631	46,127	48,538	NA .	3.24	3.51	3.73	3.94	4.15
		CFWI Large Utilities (Below)													
	341	City Of Bartow	24,706	2.435	26,835	28,744	30,461	32,227	33,843	116	3.11	3.33	3.53	3.74	3.93
	587	Lelynn RV Resort	317	0.016	320	320	320	320	320	50	0.02	0.02	0.02	0.02	0.02
	645	City Of Fort Meade	7,818	0.436	8,121	8,509	8,865	9,283	9,725	68	0.55	0.58	0.60	0.63	0.66
	1616	Lake Region Mobile Home Owners Inc	916	0.074	937	946	953	962	972	30	0.08	0.09	0.09	0.09	0.09
	2332	Town Of Lake Hamilton	1,262	0.345	1,348	1,461	1,561	1,685	1,816	206	0.28	0.30	0.32	0.35	0.37
	1625	Four Lakes Golf Club	1,170	0.298	1,183	1,183	1,183	1,183	1,183	318	0.38	0.38	0.38	0.38	0.38
	3415	Orchid Springs Development Corp	943	0.067	353	363	365	365	365	75	0.07	0.07	0.07	0.07	0.07
	4005	Crooked Lake Park Water Company	3,439	0.215	3,766	4,080	4,370	4,660	4,933	61	0.23	0.25	0.27	0.28	0.30
	4607	City Of Winter Haven	73,604	9.001	80,157	85,774	30,112	94,361	98,053	123	9.86	10.55	11.08	11.61	12.06
	4658	City of Lake Wales	23,542	2.410	25,808	28,368	30,691	33,289	35,354	106	2.74	3.01	3.25	3.53	3.81
	4912	City Of Lakeland Water Utilities Water Admin	165,037	20.147	177,109	187,746	195,476	203,077	210,204	127	22.49	23.84	24.83	25.79	26.70
	5251	Grenelefe Resort LLC	2,580	1.123	2,611	2,617	2,622	2,628	2,635	402	1.05	1.05	1.05	1.06	1.06
	5750	City of Davenport	6,218	0.814	7,361	8,391	9,318	10,373	11,444	109	0.80	0.91	1.02	1.13	1.25
	5870	City Of Frostproof	3,861	0.372	4,138	4,400	4,642	4,917	5,201	85	0.35	0.37	0.39	0.42	0.44
	5893	Town of Dundee Public Works Dept	4,862	0.542	5,583	6,421	7,183	8,046	8,932	100	0.56	0.64	0.72	0.80	0.89
	6023	North Pointe HOA	14.4	0.018	146	146	146	146	146	126	0.02	0.02	0.02	0.02	0.02
	6124	City Of Mulberry	4,230	0.389	4,589	4,903	5,189	5,496	5,798	106	0.49	0.52	0.55	0.58	0.61
	6174	Saddlebag Lake Resort	684	0.086	638	633	633	633	633	145	0.10	0.10	0.10	0.10	0.10
	6505	Polk County Utilities - NWRUSA	42,656	2.491	47,790	52,459	56,512	60,013	63,016	64	3.06	3.36	3.62	3.84	4.03
	6506	Polk County Utilities -SWRUSA	42,610	3.113	48,255	52,631	56,260	58,173	60,010	75	3.62	3.95	4.22	4.36	4.50
	6507	Polk County Utilities -CRUSA	15,593	1.003	17,042	18,662	20,131	21,707	23,165	64	1.09	1.19	1.29	1.39	1.48
	6508	Polk County Utilities - SERUSA	6,143	0.542	6,382	6,615	6,829	7,063	7,298	87	0.56	0.58	0.53	0.61	0.63
	6509	Polk County Utilities - NERUSA	35,936	6.696	42,371	47,775	52,154	55,877	58,544	200	8.47	9.56	10.43	11.18	11.71
	6624	City of Lake Alfred	8,663	1.023	10,018	11,005	11,903	12,800	13,637	117	1.17	1.29	1.39	1.50	1.60
	6920	City of Eagle Lake	4,447	0.316	5,002	6,008	6,912	7,997	9,140	81	0.41	0.49	0.56	0.65	0.74
	7119	City of Auburndale	33,529	4.556	36,795	40,058	42,950	45,881	48,670	136	5.00	5.45	5.84	6.24	6.62
	7187	CHC VII Ltd Century Realty Fund	1,243	0.225	1,263	1,263	1,263	1,263	1,263	266	0.34	0.34	0.34	0.34	0.34
	7328	Carefree RV Country Club	876	0.079	894	895	896	897	899	124	0.11	0.11	0.11	0.11	0.11
	7878	Florida Governmental Utility Authority	1,898	0.151	1,993	2,045	2,050	2,050	2,050	80	0.16	0.16	0.16	0.16	0.16
	8054	Polk County Utilities - ERUSA	6,525	0.435	7,828	9,101	10,294	11,060	11,448	74	0.58	0.67	0.76	0.82	0.85
	8344	S V Utilities Ltd	923	0.104	947	354	961	368	973	193	0.18	0.18	0.19	0.19	0.19
	8468	City Of Polk City	7,614	0.357	8,365	9,203	9,950	10,747	11,514	47	0.39	0.43	0.47	0.51	0.54
	8522	City of Haines City	26,020	4.350	29,716	33,796	37,462	41,303	44,820	170	5.05	5.75	6.37	7.02	7.62
	8967	Sweetwater Community LLC	525	0.121	532	532	533	533	533	244	0.13	0.13	0.13	0.13	0.13
	10141	Ovation Water Production Facility	1	0.000	1	1	1	1	1	89	0.00	0.00	0.00	0.00	0.00
	12964	Alafia Preserve LLC; Eagle Ridge LLC; and Dc	79	0.000	747	1,398	2,022	2,630	3,207	135	0.10	0.19	0.27	0.36	0.43
	13043	Cypress Lakes Utilities Inc	2,778	0.174	2,834	2,847	2,858	2,870	2,882	76	0.22	0.22	0.22	0.22	0.22
	Total Co	enty in SWFWMD (all utilities and DS	597,981	67.484	658,283	714,001	760,328	804,277	844,431		77.055	83.583	88.978	94.144	98.812
	DPCVU	CA	85,266	5.604	96,045	105,150	112,772	118,186	123,026		6.678	7.309	7.836	8.204	8.534
	SWUCA		508,696	56.376	557,199	602,397	640,046	675,912	709,138		63.755	68.774	72.936	76.995	80.766
	CEAL	rge Utilities (Public Supply)	563,458	64.584	620,444	672,979	716,697	758,150	795,893		73.82	80.07	85.25	90.20	94.66
	1-10 Droug	ht Year Demand									81.68	88.60	94.32	99.79	104.74
(5)	DPCWUC,	A 1-10 Drought Year Demand									7.08	7.75	8.31	8.70	9.05
	SWUCA 1-	10 Drought Year Demand	_								67.58	72.90	77.31	81.61	85.61
	CFWILa	rge Utilities 1-10 Drought Year Demand	1								78.24	84.88	90.36	35.62	100.34

Hatar: MGD - million gallons per day (1) Ertimate & projections of demonticsolf-supplied &small utility population for District partion of county from draft 2020 Regional Water Supply Plan for the Central Floride Water Initiative (April 2018). (2) Ertimate & projections of domenticsolf-supplied &small utility population for District partion of county from draft 2020 Regional Water Supply Plan for the Central Floride Water Initiative (April 2018). (3) Unlear otherwise noted, granz per capitar are from the draft 2020 Regional Water Supply Plan for the Central Floride Water Initiative (April 2018). (4) For Iarge utilities, projected water domand is calculated as projected population timer utility specific grazz per capita. (5) 140 Dravght Year Domand is calculated at 1.06 % Projected Future Water Use.
#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 35 of 41 July 3, 2019

#### TABLE 17. SARASOTA COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2) 2015											
				POPULATION			(3)						(5)		
				TIMES							PF	ROJECTE	D WATER	DEMANDS	3
			(1)	2011-2015		PROJEC	TED POPUL	ATION		(4)			(MGD)		
			2015	GPCD						2011-2015					
	WUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	39 355	2 066	47 765	55 812	61 930	67 654	71 313	52	2 507	2 9 2 9	3 251	3 551	3743
(0)	2923	City of North Port	47 761	3.038	56 560	65 724	75 600	84 505	91 634	64	3 597	4 180	4 808	5 375	5 828
	4318	City of Sarasota Public Works	76 162	6 259	77 421	78 134	78 279	78 426	78 573	82	6.363	6 4 2 2	6 4 3 3	6 4 4 6	6 458
	4866	Englewood Water District	37,935	2.589	39,601	41,480	44,275	45.368	46,736	68	2,703	2.831	3.022	3.097	3,190
	5393	City Of Venice	34.667	2.093	35,226	35,992	36,276	36.523	36,708	60	2,127	2.173	2,190	2.205	2.216
(9)	5456	Venice Ranch Mobile Home Estates	370	0.025	370	370	370	370	370	67	0.025	0.025	0.025	0.025	0.025
	5807	Camelot Communities	1,829	0.271	1,829	1,829	1,829	1,829	1,829	148	0.271	0.271	0.271	0.271	0.271
(11)	7448	Royalty Resorts	1,254	0.094	1,254	1,254	1,254	1,254	1,254	75	0.094	0.094	0.094	0.094	0.094
	8836	Sarasota County Board of County Co	222,255	17.286	231,014	236,945	239,025	240,437	241,369	78	17.967	18.428	18.590	18.700	18.772
(10)	99914	Pluris - South Gate Utilities	10,600	0.824	10,744	10,783	10,782	10,782	10,784	78	0.836	0.839	0.839	0.839	0.839
(8)		Additional Irrigation Demand		5.709							6.067	6.387	6.645	6.857	7.019
	Total Coun	ty	472,188	40.254	501,783	528,324	549,621	567,149	580,570		42.556	44.579	46.168	47.458	48.455
(7)	1-10 Droud	ht Year Demand				,	,	,			45.109	47.254	48.938	50.305	51.362

Notes: MGD = million gallons per day (1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Builetin 177, April 2017.

Population studies, volume 30, builetin 177, April 2017. (2) Estimated using average 2011-2015 GPC), as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015. (3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents,

tourists and net commuters, if applicable to the service area.

(4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use.

(6) County residential per capita rate from the District's annual 'Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was used.

(9) This is a small general period part of the structure of the structure

(a) This is a sinal generation promotion to the required is solving on the many perception.
 (b) This is a sinal generation perception.
 (c) This is a sinal generation perception.
 (c) This service areas is a wholesale importer from Sarasola County Utilities (WUP# 6836). There is no water use permit associated with this service area. Per capita is assumed to equal WUP# 6836 per capita.
 (11) Although Royalty Resorts is permitted above 100,000 gpd, it did not report a per capita in 2015. Therefore, the permitted per capita issued in 2012 was used in the absence of a five year average.

#### SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 36 of 41 July 3, 2019

#### TABLE 18. SUMTER COUNTY POPULATION ESTIMATES AND PROJECTIONS

				(2)											
			F	POPULATION TIMES			(3)				P		(5) D VATER	DEMAND	e
			(1) 2015	2011-2015		PROJEC	TED POPU	ATION		(4) 2011-2015		1002012	(MGD)		
	VUP		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	DSS	Domestic Self-Supply	12,447	1.900	18,930	28,897	37,600	50,036	61,083	153	2.890	4.411	5.740	7.638	9.324
(9)	1368	Lake Panasoffkee Water Assoc Inc	3,681	0.231	4,689	6,006	7,216	8,443	9,326	63	0.294	0.377	0.453	0.530	0.585
(9)	6519	City Of Bushnell	2,533	0.375	3,719	5,741	7,674	8,770	9,717	148	0.551	0.850	1.136	1.299	1.439
	7185	City Of Webster	1,290	0.119	1,718	2,286	2,843	2,960	3,061	92	0.158	0.211	0.262	0.273	0.282
(11)	7799	Cedar Acres, Inc.	524	0.066	580	581	581	581	581	125	0.073	0.073	0.073	0.073	0.073
	8135	City Of Wildwood City Mng	17,776	2.213	31,749	44,660	57,550	67,164	75,634	124	3.952	5.560	7.165	8.361	9.416
(11)	8193	City of Center Hill	1,001	0.119	1,298	1,751	2,201	2,450	2,667	119	0.154	0.208	0.262	0.292	0.317
(11)	10488	City of Coleman	608	0.040	670	886	1,105	1,208	1,300	65	0.044	0.058	0.072	0.079	0.085
(11)	12434	Jumper Creek Manor	104	0.016	155	221	271	281	290	150	0.023	0.033	0.041	0.042	0.043
(11)	12584	Village Parc Center	285	0.023	285	285	285	285	285	80	0.023	0.023	0.023	0.023	0.023
(10)	13005	The Villages of Marion and Sumter	82,654	22.420	89,945	91,481	91,549	91,720	91,800	271	24.397	24.814	24.832	24.879	24.900
(11)	13123	Florida Grande Motor Coach Resort	0	0.000	2	5	8	60	104	114	0.000	0.001	0.001	0.007	0.012
(11)	20095	Southern Motor Coach Resort	800	0.070	800	800	800	800	800	88	0.070	0.070	0.070	0.070	0.070
(12)	20597	City of Wildwood:Continental Country	J 1,825	0.204	1,856	1,926	1,995	2,010	2,022	112	0.208	0.216	0.223	0.225	0.226
(8)		Additional Irrigation Demand		0.166							0.207	0.245	0.280	0.313	0.342
	Total Co	unty	125,529	27.961	156,397	185,527	211,678	236,768	258,670		33.045	37.149	40.632	44.103	47.139
(7)	1-10 Drough	nt Year Demand									35.027	39.378	43.070	46.749	49.967

<u>Notes:</u> MGD = million gallons per day

(2) (2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 117, April 2017. (2) Estimated using average 2011-2015 GPCD, as provided in Table A-1 of the District's reports titled Estimated Water Use, 2011-2015.

(3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include sessonal residents, tourists and net mmuters, if applicable to the service area.

(4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use.

(6) County residential per capita rate from the District's annual "Estimated Water Use Report' for years 2011-2015, was used to calculate average estimated 2011-2015 usage, Table A-2. If a county residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was not available, the District's 2011-2015 average residential per capita rate was not available, the (7) 1-10 Drought Year Demand is calculated as 1.06 x Projected Future Water Use.

(1) 1-10 Drought Year Demand is calculated as 10.6 x Projected Future Water Use.
(8) Additional Irrigation Demand is calculated as 1.0 for x Projected Future Water Use.
(8) Additional Irrigation Demand is defined as water domaind from residential irrigation wells willised by residents that depend upon a centralized system for indoor water needs. It is calculated based on 332 gpd per well.
(9) Additional Irrigation Demand is from the Table A-1 of the 2010 Estimated Water Use. The projections are based on the 2010 population served estimated and growth from the 20
The growth rates are from GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS (GIS layer (Dste: 24.JAN2013).
(10) At a meeting on the Withlacoochee Regional Water Supply Authority on April 24, 2012, Trey Amett stated The Villages is scheduled to built out at 32,152 by 2017.
(11) Small general water use permits are not required to submit annual information on their per capita. Consequently, per capita information for the following small general WUPs was obtained as follows:
a) Cadar Acres (WUP# 1739): Per capita information obtained from permit issued in 2016.
b) City of Centern HIII (WUP# 8183): Per capita information obtained from permit issued in 2012.
b) City of Centern MIII (WUP# 18434): Per capita information were obtained from permit issued in 2012.
c) Jumper Cree Manor (WUP# 12434): Per capita information were obtained from permit issued in 2018.

Compared Sectionary (WDPF integer) is a captural monoton ward occurs and non-partial resolution 2004. (J) Yillage Parc Canter (WUPF it2564). Population and per captis information were obtained from permit issued in 2018. e) Florida Grande Motor Cosch Recort (WUPF it3123). Population and per captis information were obtained from permit issued in 2015. f) Southern Motor Cosch Recort (WUPF it3025). Population and per captis information were obtained from permit issued in 2015. (12) This is a new general permit and does not have per capita information from 2011-2015. Therefore, the permitted per capita was used as a proxy.

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 37 of 41 July 3, 2019

#### TABLE 19. DISTRICT TOTAL POPULATION ESTIMATES AND WATER DEMAND PROJECTIONS

		1	(2) 2015 POPULATION TIMES			(3)				P	ROJECTE	(5) D WATER	DEMAND	s
		(1) 2015	2011-2015 GPCD		PROJEC	CTED POPU	LATION		(4) 2011-2015			(MGD)		
		POPULATION	(MGD)	2020	2025	2030	2035	2040	AVG GPCD	2020	2025	2030	2035	2040
(6)	Domestic Self-Supply Utilities	515,348 5,099,713	40.037 506.110	595,510 5,452,149	680,555 5,776,854	758,295 6,054,366	847,080 6,279,361	930,348 6,469,361	68 99	46.649 546.169	53.810 579.908	60.351 608.550	67.950 631.680	75.073 651.379
(8)	Additional Irrigation Demand		31.217							33.182	35.016	36.584	37.954	39.096
(7)	Total District 1-10 Drought Year Demand	5,615,061	577.363	6,047,660	6,457,409	6,812,661	7,126,441	7,399,709		626.001 663.561	668.734 708.858	705.484 747.813	737.584 781.839	765.548 811.481

Notes: MGD = million gallons per day

(1) 2015 Estimate was generated using 2016-2020 growth rates from The University of Florida Bureau of Economic and Business Research, Projections of Florida Population by County, 2016-2045, Florida Population Studies, Volume 50, Bulletin 177, April 2017.

(3) Source: Population Projections calculated using GIS Associates, Inc.'s population projection model data and the PS\_SERVICEAREAS GIS layer (Date: 02FEB2018). The functional population estimates include seasonal residents, tourists and net commuters, if applicable to the service area.

(4) For utilities with at least 0.1 mgd average annual withdrawal, year 2011-2015 average estimated per capita water use rates, as provided in Table A-1 of the District's annual 'Estimated Water Use Report' for years 2011-2015, were used to project demands. See footnotes 6 and 8 for descriptions of the per capita used for the Domestic Self-Supply and Additional Irrigation Demand. (5) Computed as projected population multiplied by 2011-2015 average per capita water use.

546.169 579.908 608.550 631.680 651.379

(a) Compared as projected population imagines by compared as projected population and from residential imagines by compared as projected population and from residential imagines by compared as projected population and from residential imagines by compared as projected population and from residential imagines by compared as projected population and population by compared as projected population and from residential imagines by compared as projected population and from residential imagines by compared as projected population and population by compared as projected population and population by compared by compa

See table named "IRRIGATION WELL TYPES LESS THAN 5" WITHIN SWFWIND'S PSSAS AND OUTSIDE WUP CONTROL AREAS" created by Ryan Pearson (File: Additional\_irrigation\_Demand\_2017\_Analysis\_Update.xlsx)

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 38 of 41 July 3, 2019

TABLE 20. DISTRICT TOTAL PUBLIC SUPPLY WATER DEMAND PROJECTIONS BY COUNTY (Includes All Utilities and Domestic Self Supply)

County	20	15	20	20	20	25	20	30	20	35	20	40	Chang Dema	je in and	% Ch	ange
	Avg	1-10	Avg	1-10	Avg	1-10										
Charlotte	19.206	20.359	20.561	21.794	21.748	23.053	22.774	24.140	23.646	25.065	24.429	25.894	5.222	5.536	27.2%	27.2%
Citrus	19.945	21.142	20.874	22.126	21.737	23.042	22.462	23.809	23.060	24.444	23.534	24.946	3.589	3.804	18.0%	18.0%
DeSoto	2.765	2.931	2.840	3.011	2.901	3.075	2.963	3.141	3.019	3.200	3.057	3.241	0.292	0.310	10.6%	10.6%
Hardee	1.999	2.119	2.013	2.133	2.019	2.140	2.032	2.154	2.039	2.161	2.046	2.169	0.048	0.051	2.4%	2.4%
Hernando	24.318	25.777	26.196	27.768	27.943	29.619	29.424	31.189	30.753	32.598	31.884	33.797	7.566	8.020	31.1%	31.1%
Highlands	12.452	13.200	12.989	13.769	13.418	14.223	13.766	14.591	14.033	14.875	14.239	15.093	1.787	1.894	14.3%	14.3%
Hillsborough	146.675	155.476	161.514	171.205	175.533	186.065	187.897	199.171	197.585	209.440	206.514	218.905	59.839	63.429	40.8%	40.8%
Lake	0.140	0.148	0.170	0.180	0.200	0.212	0.240	0.254	0.270	0.286	0.310	0.329	0.170	0.180	121.4%	121.4%
Levy	1.623	1.721	1.677	1.777	1.725	1.829	1.767	1.873	1.797	1.905	1.824	1.934	0.201	0.213	12.4%	12.4%
Manatee	39.480	41.849	43.456	46.064	47.357	50.198	50.837	53.887	53.924	57.160	56.543	59.936	17.063	18.087	43.2%	43.2%
Marion	15.213	16.126	16.686	17.687	18.010	19.090	19.155	20.304	20.251	21.466	21.286	22.563	6.073	6.437	39.9%	39.9%
Pasco	56.597	59.993	61.928	65.643	66.863	70.875	71.061	75.324	74.921	79.416	78.378	83.081	21.781	23.088	38.5%	38.5%
Pinellas	101.250	107.325	102.441	108.588	103.969	110.207	105.330	111.650	106.582	112.977	107.098	113.524	5.848	6.199	5.8%	5.8%
Polk	67.484	71.533	77.055	81.679	83.583	88.598	88.978	94.316	94.144	99.793	98.812	104.741	31.328	33.208	46.4%	46.4%
Sarasota	40.254	42.669	42.556	45.109	44.579	47.254	46.168	48.938	47.458	50.305	48.455	51.362	8.201	8.693	20.4%	20.4%
Sumter	27.961	29.639	33.045	35.027	37.149	39.378	40.632	43.070	44.103	46.749	47.139	49.967	19.177	20.328	68.6%	68.6%
Total	577.363	612.005	626.001	663.561	668.734	708.858	705.484	747.813	737.584	781.839	765.548	811.481	188.185	199.476	32.6%	32.6%

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 39 of 41 July 3, 2019

#### TABLE 21. DISTRICT TOTAL POPULATION PROJECTIONS BY REGION (Includes all Utilities and Domestic Self Supply)

Water Use by Planning Region	2015	2020	2025	2030	2035	2040	Change 2015-2040	% Change
Heartland Planning Region	729,124	794,358	853,953	903,551	949,959	992,036	262,912	36%
Northern Planning Region	599,932	665,228	726,223	779,844	829,796	873,535	273,603	46%
Southern Planning Region	1,123,883	1,210,776	1,292,096	1,361,997	1,422,251	1,472,277	348,394	31%
Tampa Bay Planning Region	3,162,123	3,377,297	3,585,136	3,767,269	3,924,435	4,061,861	899,738	28%
Districtwide	5,615,061	6,047,660	6,457,409	6,812,661	7,126,441	7,399,709	1,784,648	32%
Central Florida Water Initiative (CFWI)	599,040	659,579	715,580	762,181	806,399	846,814	247,774	41%
Dover Plant City Water Use Caution Area (DWUCA)	127,570	144,688	161,976	177,829	189,647	200,738	73,168	57%
North Central Florida Coordination Area (NCFCA)	237,569	279,865	319,286	354,335	387,897	417,785	180,216	76%
Southern Water Use Caution Area (SWUCA)	2,356,446	2,566,877	2,757,525	2,917,205	3,058,893	3,182,476	826,030	35%

#### Notes:

Planning Regions:

Heartland Planning Region = Hardee, Highlands, Polk

Northern Planning Region = Citrus, Hernando, Lake, Levy, Marion, Sumter

Southern Planning Region = Charlotte, DeSoto, Manatee, Sarasota

Tampa Bay Planning Region = Hillsborough, Pasco, Pinellas

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 40 of 41 July 3, 2019

TABLE 22. DISTRICT TOTAL WATER DEMAND PROJECTIONS BY REGION (Includes All Utilities and Domestic Self Supply)

Water Use by Planning	20	015	202	20	20	)25	203	30	20	35	2	040	Change i	n Demand	% Ch	ange
Region	Avg	1-in-10	Avg	1-in-10	Avg	1-10										
Heartland Planning Region	81.9	86.9	92.1	97.6	99.0	105.0	104.8	111.1	110.2	116.8	115.1	122.0	33.2	35.2	40%	40%
Northern Planning Region	89.2	94.6	98.6	104.6	106.8	113.2	113.7	120.5	120.2	127.4	126.0	133.5	36.8	39.0	41%	41%
Southern Planning Region	101.7	107.8	109.4	116.0	116.6	123.6	122.7	130.1	128.0	135.7	132.5	140.4	30.8	32.6	30%	30%
Tampa Bay Planning Region	304.5	322.8	325.9	345.4	346.4	367.1	364.3	386.1	379.1	401.8	392.0	415.5	87.5	92.7	29%	29%
Districtwide	577.4	612.0	626.0	663.6	668.7	708.9	705.5	747.8	737.6	781.8	765.5	811.5	188.2	199.5	33%	33%
Central Florida Water Initiative (CFWI)	67.6	71.7	77.2	81.9	83.8	88.8	89.2	94.6	94.4	100.1	99.1	105.1	31.5	33.4	47%	47%
Dover Plant City Water Use Caution Area (DWUCA)	11.0	11.6	12.9	13.7	14.6	15.5	16.2	17.2	17.4	18.4	18.5	19.7	7.6	8.0	69%	69%
Northern Tampa Bay (NTB) Water Use Caution Area	290.4	307.9	309.8	328.4	328.1	347.7	343.9	364.5	356.0	377.3	366.1	388.1	75.7	80.2	26%	26%
Southern Water Use Caution Area	228.7	242.5	251.0	266.0	269.3	285.4	284.6	301.6	298.3	316.2	310.3	328.9	81.6	86.5	36%	36%

<u>Notes:</u> Planning Regions: Heartland Planning Region = Hardee, Highlands, Polk Northern Planning Region = Citrus, Hernando, Lake, Levy, Marion, Sumter Southern Planning Region = Charlotte, DeSoto, Manatee, Sarasota Tampa Bay Planning Region = Hillsborough, Pasco, Pinellas

SUBJECT: 2020 Regional Water Supply Plan: Public Supply Water Demand Projections Page 41 of 41 July 3, 2019

IRRJ	GATION WEL	L TYPES LE	SS THAN 5" WITI	IIN SWFWMD's PSSA:	AND OUTSIDE V	VUP CONTROL A	REAS (1)
				2015		2020	
	Functional Po	opulation (2)	2015-2020	332 gp	d	332	gpd
			Population	2015 Irrigatio	on Wells	2020 Irrigation	Well Estimates
	2015	2020	Growth Rate (3)	# Wells	Withdrawl (mgd)	# Wells	Withdrawl (mgd)
Charlotte	191,446	205,401	0.07289	6,725	2.23	7,215	2.40
Citrus	154,717	161,834	0.04600	3,685	1.22	3,855	1.28
DeSoto	36,508	37,551	0.02857	221	0.07	227	0.08
Hardee	28,360	28,617	0.00907	129	0.04	130	0.04
Hemando	182,854	197,648	0.08091	8,436	2.80	9,119	3.03
Highlands	102,783	107,458	0.04548	10,710	3.56	11,197	3.72
Hillsborough	1,438,767	1,589,177	0.10454	6,732	2.24	7,436	2.47
Lake	1,059	1,296	0.22380	0	N/A	0	N/A
Levy	23,732	24,585	0.03594	54	0.02	56	0.02
Manatee	423,741	466,041	0.09983	5,379	1.79	5,916	1.96
Marion	112,040	123,467	0.10199	1,416	0.47	1,560	0.52
Pasco	515,412	565,764	0.09769	12,879	4.28	14,137	4.69
Pinellas	1,207,943	1,222,356	0.01193	19,965	6.63	20,203	6.71
Polk	597,981	658,283	0.10084	7,743	N/A	8,524	N/A
Sarasota	472,188	501,783	0.06268	17,195	5.71	18,273	6.07
Sumter	125,529	156,397	0.24590	500	0.17	623	0.21
Total (6)	5,615,061	6,047,660		101,769	31.22	108,471	33.18

Table 23. Residential Irrigation Well Data

Notes:

(1) Additional Irrigation Demand is defined as water demand from residential irrigation wells utilized by residents that depend upon a centralized system for indoor water needs. Demand is calculated based on 332 gallons per day per well

(Determination of Landscape Irrigation Water Use in Southwest Florida, May 31, 2018, Michael Dukes & Mackenzie Boyer). (2) Countywide permanent and total functional population in SWFWMD.

(3) 2015-2020 population growth rate used to estimate 2020 well count.

(4) Analysis of District well inventory conducted September 2017.

(5) Additional irrigation demand was not calculated in the draft Regional Water Supply Plan for the Central Florida Water Initiative (October 2018).

(6) Total Withdrawals exclude Lake and Polk amounts





**Bartow Service Office** 170 Century Boulevard Bartow, Florida 33830-7700 (863) 534-1448 or 1-800-492-7862 (FL only) 2379 Broad Street, Brooksville, Florida 34604-6899 (352) 796-7211 or 1-800-423-1476 (FL only)

WaterMatters.org

Sarasota Service Office 6750 Fruitville Road Sarasota, Florida 34240-9711 (941) 377-3722 or 1-800-320-3503 (FL only) Tampa Service Office 7601 U.S. 301 North (Fort King Highway) Tampa, Florida 33637-6759 (813) 985-7481 or 1-800-836-0797 (FL only)

### July 3, 2019

TO:	Interested Parties	
THROUGH:	Jay Hoecker, Water Supply Manager, Water Resources Bureau	
FROM:	Kevin Wills, Senior Economist, Water Resources Bureau Ryan Pearson, Economist, Water Resources Bureau	
SUBJECT:	2020 Regional Water Supply Plan: Landscape/Recreation Demand Projections	

#### Introduction

Chapter 373, Florida Statutes (F.S.) sets forth the requirement for regional water supply planning. Under the provisions of this chapter, a Regional Water Supply Plan (RWSP) must be developed for those areas where available water supplies are not expected to meet projected demands over a 20-year planning horizon. Guidance for developing projections is contained in the publication, Format and Guidelines for Regional Water Supply Plans (Florida Department of Environmental Protection (DEP) et al., June 2009). This guidance document was produced by representatives from the DEP and each of the five water management districts. Following a Districtwide water supply assessment that identified water demands and existing sources, the Governing Board of the Southwest Florida Water Management District (SWFWMD or District) determined the need for a RWSP in the southern ten counties of the District, and the District produced its first RWSP in 2001. The statute requires that the determination of the need for a RWSP be made every five years. Accordingly, in 2003, the Governing Board determined that the need for a RWSP existed in the same ten-county area. Starting with the 2010 edition of the RWSP, the Governing Board has directed District staff to include demand projections for all sixteen counties within the District.

In support of this effort, the Southwest Florida Water Management District (District) participated in the development of the RWSP for the Central Florida Water Initiative (CFWI) in conjunction with representatives from the Florida Department of Environmental Protection (FDEP), major stakeholders and the South Florida and St. John's River water management districts. The CFWI region includes portions of Lake and Polk Counties which are under District jurisdiction. Consequently, the population and water demands for Lake and Polk County are from Draft Central Florida Water Initiative Demand Projections as of October 2018.

#### Purpose

This memo details the methodology used to develop water demand projections for the Landscape/Recreation (L/R) water use sector within the District. The L/R sector includes water use for parks, large lawns and landscaped areas, cemeteries, medians, public rights-of-way, athletic fields, golf courses, playgrounds and other ornamental or decorative purposes such as fountains and waterfalls.

SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 2 of 13 July 3, 2019

#### Background

The District is divided into four planning regions: Heartland, Northern, Southern, and Tampa Bay. The Heartland Planning Region includes Hardee, Highlands, and Polk counties; the Northern Planning Region includes Citrus, Hernando, Lake, Levy, Marion, and Sumter counties; the Southern Planning Region includes Charlotte, DeSoto, Manatee, and Sarasota counties; and the Tampa Bay Planning Region includes Hillsborough, Pasco, and Pinellas counties. For the 2020 RWSP, 2015 is the baseline year, for the purpose of developing and reporting water demand projections. This is consistent with the methodology in the Format and Guidelines (DEP et al., June 2009). The data for the baseline year consists of reported and estimated usage for a 2015 baseline, whereas data for the years 2020 through 2040 are projected demands (estimated needs).

#### **Data Sources**

The methodology to develop landscape/recreation water demand projections utilizes many data sources. The District's Estimated Water Use Reports (2011-2015) were used to gather metered plus estimated landscape/recreation water use for each county (SWFWMD, 2011-2015). The University of Florida's Bureau of Economic and Business Research (BEBR) publications (2015 & 2017) were used to gather base year (2015) population and county population projections for the planning horizon (2020 – 2040). In the case of Lake and Polk counties, to assure consistency, the demand projections were taken from the Central Florida Water Initiative (CFWI) Demand Projections (St. John's River Water Management District (SJRWMD), South Florida Water Management District (SFWMD), SWFWMD and DEP, 2018).

#### Methodology

Water demand from the L/R sector is positively correlated with population growth. However, further research into golf course water demands indicated that future demand is also tied to facility closures, conservation and reclaimed water use and changing future demographic characteristics. To address these findings, it was decided to forecast golf and other landscape/recreation separately. As the CFWI estimates and projections for the overall L/R sector were not divided into golf and other landscape/recreation subsector demands, the total L/R demands for the SWFWMD portions of CFWI counties (Lake and Polk) were divided into golf and other landscape/recreation based upon each county's average historic percent of the total L/R demand within the District.

#### Golf

The District reviewed historic (2000-2016) metered and estimated golf course water use to identify trends. District golf course water use followed a decreasing trend over the 17-year period, from approximately 50 mgd in 2000 to 32 mgd in 2016. County-level golf course water use was analyzed further to identify if each county followed a similar downward trend. In all but three counties golf course water use was found to be following a decreasing trend. Citrus, Marion and Sumter counties were identified to have increasing trends in golf course water use. For these counties, the projected future demands were developed by increasing the baseline water use by the BEBR county-level population growth rate. For the remaining 13 District counties, the projected future golf course demands were developed by holding the baseline water use constant. For all counties, excluding Polk and Lake, the baseline water use was developed as a 5-year average of metered and estimated golf course water from 2011 to 2015. Baseline water use for Polk and Lake counties is based on 2015 water use (CFWI).

SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 3 of 13 July 3, 2019

As noted in the section titled, "Drought (1-in-10) Demands", drought year projections are estimated to be 30 percent higher than average year quantities. The average and drought year golf demand projections by county are displayed in Tables A-1 and A-2 in Appendix A.

#### Other Landscape/Recreation

The projected water demands for the non-golf course landscape/recreation water use were developed using a combination of historic metered and estimated water use data and county-level projections of population growth during the planning horizon. For all counties, excluding Polk and Lake, the baseline water use was developed as a 5-year average of metered and estimated water use from 2011 to 2015. Baseline water use for Polk and Lake counties is based on 2015 water use (CFWI). The projected future demands were developed by increasing the baseline water use by the BEBR county-level population growth rate.

For example, the baseline 2015 Other L/R demand for Charlotte County was estimated to be 0.549 mgd.<sup>1</sup> According to BEBR, the 2020 population for Charlotte County should be 7.75 percent higher than in 2015.

The 2020 Other L/R forecast is therefore calculated as follows:

2020 Other L/R use = 0.549 mgd increased by 7.75 percent = 0.591 mgd

As noted in the section titled, "Drought (1-in-10) Demands", drought year projections are estimated to be 26 percent higher than average year quantities. Tables A-3 and A-4 in Appendix A display the projected average and drought year demands for the Other L/R sector.

#### Drought (1-in-10) Demands

The 1-in-10 year drought event is an event that results in an increase in water demand of a magnitude that would have a 10 percent probability of occurring during any given year. The Format and Guidelines (DEP et al., June 2009) indicate that methodologies for estimating the 1-in-10 year demand for recreational self-supply are similar to methodologies used to estimate agricultural demand. The optimum irrigation requirements for the 1-in-10 year event, as opposed to the average year event, were 30 percent higher for golf courses and 26 percent higher for landscape irrigation. The projected water use for an average year was multiplied by this percentage value to produce a projected water use for a 1-in-10 drought year.

#### Summary

The total L/R water use sector (both Golf and Other L/R) is expected to use an additional 13.51 million gallons per day. Average water demand is projected to increase from the 57.26 mgd in 2015 to 70.77 mgd in 2040.

Total average and drought year L/R projections are displayed in Tables A-5 and A-6 in Appendix A. Golf and Other L/R demand projections are also presented for the four planning regions in Tables A-7 through A-10 in Appendix A.

<sup>&</sup>lt;sup>1</sup> For all counties, excluding Polk and Lake, the baseline water use was developed as a 5-year average of metered and estimated golf course water from 2011 to 2015. Baseline water use for Polk and Lake counties is based on 2015 water use (CFWI).

SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 4 of 13 July 3, 2019

#### References

DEP et al., June 2009. Format and Guidelines for Regional Water Supply Plans.

SJRWMD, SFWMD, SWFWMD and DEP, *Draft 2020 CFWI Regional Water Supply Plan Demand Projections, October 31, 2018.* 

SWFWMD, Estimated Water Use Reports (2001-2015)

University of Florida, Florida Estimates of Population 2015, Bureau of Economic and Business Research, April 1, 2015

University of Florida, Projections of Florida Population by County, 2020-2045, with estimates for 2016, Bureau of Economic and Business Research, Volume 50, Bulletin 177, April 2017

# APPENDIX A Landscape/Recreation Demand Projection Tables

#### SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 6 of 13 July 3, 2019

							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015- 2040	2015- 2040
Charlotte	1.238	1.238	1.238	1.238	1.238	1.238	0.000	0%
Citrus	4.084	4.283	4.459	4.606	4.727	4.822	0.739	18%
Desoto	0.140	0.140	0.140	0.140	0.140	0.140	0.000	0%
Hardee	0.271	0.271	0.271	0.271	0.271	0.271	0.000	0%
Hernando	3.069	3.069	3.069	3.069	3.069	3.069	0.000	0%
Highlands	1.827	1.827	1.827	1.827	1.827	1.827	0.000	0%
Hillsborough	3.200	3.200	3.200	3.200	3.200	3.200	0.000	0%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.171	0.171	0.171	0.171	0.171	0.171	0.000	0%
Manatee	1.650	1.650	1.650	1.650	1.650	1.650	0.000	0%
Marion	2.413	2.539	2.714	2.866	3.003	3.123	0.709	29%
Pasco	1.956	1.956	1.956	1.956	1.956	1.956	0.000	0%
Pinellas	1.330	1.330	1.330	1.330	1.330	1.330	0.000	0%
Polk <sup>1</sup>	4.086	4.086	4.086	4.086	4.086	4.086	0.000	0%
Sarasota	3.329	3.329	3.329	3.329	3.329	3.329	0.000	0%
Sumter	2.443	2.977	3.551	4.069	4.563	4.994	2.551	104%
District Total	31.208	32.065	32.991	33.808	34.561	35.206	3.999	13%

 Table A-1. 2015-2040 Average (5-in-10) Projected Golf Course Demand (mgd)

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

J.

#### SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 7 of 13 July 3, 2019

							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015- 2040	2015- 2040
Charlotte	1.610	1.610	1.610	1.610	1.610	1.610	0.000	0%
Citrus	5.309	5.568	5.796	5.988	6.145	6.269	0.960	18%
Desoto	0.182	0.182	0.182	0.182	0.182	0.182	0.000	0%
Hardee	0.352	0.352	0.352	0.352	0.352	0.352	0.000	0%
Hernando	3.990	3.990	3.990	3.990	3.990	3.990	0.000	0%
Highlands	2.375	2.375	2.375	2.375	2.375	2.375	0.000	0%
Hillsborough	4.160	4.160	4.160	4.160	4.160	4.160	0.000	0%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.223	0.223	0.223	0.223	0.223	0.223	0.000	0%
Manatee	2.145	2.145	2.145	2.145	2.145	2.145	0.000	0%
Marion	3.137	3.301	3.528	3.725	3.904	4.059	0.922	29%
Pasco	2.543	2.543	2.543	2.543	2.543	2.543	0.000	0%
Pinellas	1.728	1.728	1.728	1.728	1.728	1.728	0.000	0%
Polk <sup>1</sup>	5.312	5.312	5.312	5.312	5.312	5.312	0.000	0%
Sarasota	4.328	4.328	4.328	4.328	4.328	4.328	0.000	0%
Sumter	3.176	3.870	4.617	5.290	5.932	6.493	3.316	104%
District Total	40.570	41.685	42.888	43.950	44.929	45.768	5.199	13%

# Table A-2. 2010-2035 Drought (1-in-10) Projected Golf Course Demand (mgd)

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

Y

#### SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 8 of 13 July 3, 2019

							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015- 2040	2015- 2040
Charlotte	0.549	0.591	0.627	0.658	0.684	0.708	0.159	29%
Citrus	0.230	0.242	0.252	0.260	0.267	0.272	0.042	18%
Desoto	0.185	0.191	0.195	0.199	0.203	0.206	0.021	11%
Hardee	0.020	0.020	0.020	0.020	0.020	0.020	0.000	2%
Hernando	1.153	1.246	1.334	1.410	1.480	1.540	0.387	34%
Highlands	0.340	0.355	0.369	0.381	0.390	0.396	0.057	17%
Hillsborough	5.246	5.806	6.344	6.819	7.222	7.598	2.352	45%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.041	0.042	0.043	0.044	0.045	0.046	0.005	13%
Manatee	8.202	8.629	9.223	9.739	10.206	10.612	2.410	29%
Marion	0.761	0.800	0.855	0.903	0.947	0.984	0.224	29%
Pasco	1.569	1.721	1.865	1.989	2.104	2.207	0.638	41%
Pinellas	0.846	0.866	0.879	0.891	0.902	0.907	0.061	7%
Polk <sup>1</sup>	3.123	3.544	3.934	4.254	4.564	4.844	1.721	55%
Sarasota	3.204	3.438	3.633	3.791	3.922	4.022	0.818	26%
Sumter	0.589	0.718	0.857	0.982	1.101	1.205	0.615	104%
District Total	26.056	28.208	30.430	32.341	34.057	35.567	9.511	37%

# Table A-3. Projected Average (5-in-10) Other L/R Demand (mgd)

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

#### SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 9 of 13 July 3, 2019

							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015- 2040	2015- 2040
Charlotte	0.691	0.745	0.790	0.829	0.862	0.892	0.200	29%
Citrus	0.290	0.304	0.317	0.327	0.336	0.343	0.053	18%
Desoto	0.233	0.240	0.246	0.251	0.256	0.259	0.026	11%
Hardee	0.025	0.025	0.025	0.025	0.025	0.025	0.001	2%
Hernando	1.453	1.570	1.681	1.777	1.865	1.941	0.488	34%
Highlands	0.428	0.448	0.465	0.480	0.491	0.499	0.072	17%
Hillsborough	6.610	7.315	7.993	8.592	9.100	9.574	2.964	45%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.051	0.053	0.054	0.056	0.057	0.058	0.007	13%
Manatee	10.335	10.872	11.620	12.271	12.860	13.372	3.037	29%
Marion	0.959	1.008	1.078	1.138	1.193	1.240	0.282	29%
Pasco	1.977	2.168	2.351	2.507	2.651	2.781	0.804	41%
Pinellas	1.066	1.091	1.108	1.123	1.137	1.142	0.076	7%
Polk <sup>1</sup>	3.935	4.465	4.957	5.360	5.751	6.103	2.168	55%
Sarasota	4.037	4.332	4.577	4.777	4.942	5.067	1.031	26%
Sumter	0.743	0.905	1.079	1.237	1.387	1.518	0.775	104%
District Total	32.831	35.542	38.342	40.750	42.912	44.815	11.984	37%

# Table A-4. Projected Drought (1-in-10) Other L/R Demand (mgd)

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

#### SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 10 of 13 July 3, 2019

							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015- 2040	2015- 2040
Charlotte	1.787	1.830	1.865	1.896	1.922	1.946	0.159	9%
Citrus	4.314	4.524	4.710	4.866	4.994	5.094	0.780	18%
Desoto	0.325	0.331	0.335	0.339	0.343	0.345	0.021	6%
Hardee	0.291	0.291	0.291	0.291	0.291	0.291	0.000	0%
Hernando	4.222	4.315	4.403	4.480	4.549	4.609	0.387	9%
Highlands	2.167	2.182	2.196	2.208	2.217	2.223	0.057	3%
Hillsborough	8.446	9.005	9.544	10.019	10.422	10.798	2.352	28%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.212	0.213	0.214	0.215	0.216	0.217	0.005	2%
Manatee	9.852	10.279	10.873	11.389	11.857	12.263	2.410	24%
Marion	3.174	3.339	3.569	3.769	3.950	4.107	0.933	29%
Pasco	3.525	3.677	3.822	3.946	4.060	4.163	0.638	18%
Pinellas	2.175	2.195	2.209	2.221	2.232	2.236	0.061	3%
Polk <sup>1</sup>	7.209	7.630	8.020	8.340	8.650	8.930	1.721	24%
Sarasota	6.533	6.767	6.962	7.120	7.251	7.351	0.818	13%
Sumter	3.033	3.695	4.408	5.050	5.664	6.199	3.166	104%
District Total	57.264	60.273	63.421	66.149	68.618	70.774	13.510	24%

## Table A-5. 2010-2035 Average (5-in-10) Projected Total L/R Demand (mgd)

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

¢'

#### SUBJECT: 2020 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 11 of 13 July 3, 2019

							Change	% Change
County	2015	2020	2025	2030	2035	2040	2015- 2040	2015- 2040
Charlotte	2.301	2.355	2.400	2.439	2.472	2.502	0.200	9%
Citrus	5.599	5.872	6.113	6.315	6.481	6.612	1.013	18%
Desoto	0.415	0.422	0.427	0.433	0.438	0.441	0.026	6%
Hardee	0.377	0.377	0.377	0.377	0.377	0.378	0.001	0%
Hernando	5.443	5.560	5.671	5.767	5.855	5.931	0.488	9%
Highlands	2.803	2.823	2.841	2.855	2.866	2.875	0.072	3%
Hillsborough	10.770	11.475	12.153	12.751	13.260	13.734	2.964	28%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0%
Levy	0.274	0.275	0.277	0.278	0.279	0.280	0.007	2%
Manatee	12.480	13.017	13.766	14.416	15.005	15.517	3.037	24%
Marion	4.096	4.309	4.606	4.864	5.097	5.300	1.204	29%
Pasco	4.520	4.711	4.894	5.050	5.194	5.324	0.804	18%
Pinellas	2.794	2.819	2.836	2.851	2.865	2.871	0.076	3%
Polk <sup>1</sup>	9.247	9.777	10.269	10.672	11.062	11.415	2.168	23%
Sarasota	8.364	8.660	8.905	9.105	9.269	9.395	1.031	12%
Sumter	3.919	4.774	5.696	6.526	7.319	8.010	4.091	104%
District Total	73.401	77.227	81.230	84.700	87.841	90.583	17.182	23%

# Table A-6. 2015-2035 Drought (1-in-10) Projected Total L/R Demand (mgd)

<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

SUBJECT: 2015 Regional Water Supply Plan: Landscape/Recreation Water Demand Projections Page 12 of 13 July 28, 2015

|--|

County	2015		2020		2025		2030		2035		2040		Change 2015-2040		% Change 2015-2040	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10
Hardee	0.291	0.377	0.291	0.377	0.291	0.377	0.291	0.377	0.291	0.377	0.291	0.378	0.000	0.001	0%	0%
Highlands	2.167	2.803	2.182	2.823	2.196	2.841	2.208	2.855	2.217	2.866	2.223	2.875	0.057	0.072	3%	3%
Polk <sup>1</sup>	7.209	9.247	7.630	9.777	8.020	10.269	8.340	10.672	8.650	11.062	8.930	11.415	1.721	2.168	24%	23%
Total	9.666	12.427	10.103	12.977	10.507	13.486	10.839	13.904	11.158	14.306	11.444	14.667	1.778	2.241	18%	18%
<sup>1</sup> Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)																

Table A-8. Projected L/R Demand in the Northern Planning Region (5-in-10) and (1-in-10) (mgd)

County	2015		2020		2025		2030		2035		2040		Change 2015-2040		% Change 2015-2040	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10
Citrus	4.314	5.599	4.524	5.872	4.710	6.113	4.866	6.315	4.994	6.481	5.094	6.612	0.78	1.01	18%	18%
Hernando	4.222	5.443	4.315	5.560	4.403	5.671	4.480	5.767	4.549	5.855	4.609	5.931	0.39	0.49	9%	9%
Lake <sup>1</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0%	0%
Levy	0.212	0.274	0.213	0.275	0.214	0.277	0.215	0.278	0.216	0.279	0.217	0.280	0.01	0.01	2%	2%
Marion	3.174	4.096	3.339	4.309	3.569	4.606	3.769	4.864	3.950	5.097	4.107	5.300	0.93	1.20	29%	29%
Sumter	3.033	3.919	3.695	4.774	4.408	5.696	5.050	6.526	5.664	7.319	6.199	8.010	3.17	4.09	104%	104%
Total	14.955	19.331	16.087	20.791	17.305	22.363	18.380	23.751	19.373	25.032	20.227	26.133	5.272	6.803	35%	35%
1 Drojectione fe	the CIA/EIA	MD parties	from Droft	CEVAL DVA	CD (10/21/4)	0)										

Projections for the SWFWMD portion from Draft CFWI RWSP (10/31/18)

#### Table A-9. Projected L/R Demand in the Southern Planning Region (5-in-10) and (1-in-10) (mgd)

								-	•	· ·		· • /				
County	2015		2020		2025		2030		2035		2040		Change 2015-2040		% Change 2015-2040	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10
Charlotte	1.787	2.301	1.830	2.355	1.865	2.400	1.896	2.439	1.922	2.472	1.946	2.502	0.159	0.200	9%	9%
Desoto	0.325	0.415	0.331	0.422	0.335	0.427	0.339	0.433	0.343	0.438	0.345	0.441	0.021	0.026	6%	6%
Manatee	9.852	12.480	10.279	13.017	10.873	13.766	11.389	14.416	11.857	15.005	12.263	15.517	2.410	3.037	24%	24%
Sarasota	6.533	8.364	6.767	8.660	6.962	8.905	7.120	9.105	7.251	9.269	7.351	9.395	0.818	1.031	13%	12%
Total	18.496	23.560	19.206	24.454	20.035	25.498	20.745	26.393	21.373	27.184	21.905	27.854	3.408	4.295	18%	18%
						1										

#### Table A-10. Projected L/R Demand in the Tampa Bay Planning Region (5-in-10) and (1-in-10) (mgd)

County	2015		2020		2025		2030		2035		2040		Change 2015-2040		% Change 2015-2040	
	5-10	1-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10	5-10	1-10	5-10	1-10	5-10	1-10	5-10
Hillsborough	8.446	10.770	9.005	11.475	9.544	12.153	10.019	12.751	10.422	13.260	10.798	13.734	2.352	2.964	28%	28%
Pasco	3.525	4.520	3.677	4.711	3.822	4.894	3.946	5.050	4.060	5.194	4.163	5.324	0.638	0.804	18%	18%
Pinellas	2.175	2.794	2.195	2.819	2.209	2.836	2.221	2.851	2.232	2.865	2.236	2.871	0.061	0.076	3%	3%
Total	14.146	18.084	14.878	19.005	15.574	19.883	16.185	20.652	16.714	21.319	17.198	21.929	3.051	3.845	22%	21%

Public Review Draft

# **Criteria for Determining Potential Water Availability from Rivers**

2020

The available yield for each river was calculated using its established minimum flow and its current permitted allocation. If the minimum flow for the river was not yet established, planning-level minimum flow criteria were utilized. The five-step process used to estimate potential surface water availability is described in the following paragraphs.

### Step 1. Estimation of Unimpacted Flow

Flow records reflecting conditions unimpacted by withdrawal effects were constructed or updated. For rivers without established minimum flows, an adjusted flow record was constructed. For rives with established minimum flows, unimpacted flow records used for development of the minimum flows were used and updated, as necessary. Unimpacted flow record construction or updating was done by adding historical withdrawals into the flow record, removing excess runoff associated with agricultural groundwater withdrawals, and accounting for non-gaged portions of watersheds.

### Step 2. Selection of Analysis Period

The period used to quantify available yield from rivers when this method was originally developed (1965-2003) was selected based on previous work by the District and others that found average annual rainfall prior to 1960 to be higher than after the early 1960s (Palmer and Nguyen 1986; Barcelo and others 1990; Hancock and Smith 1996; and Basso and Schultz 2003). Enfield (2001) indicated that in Florida, the period from the late 1920s to the early 1960s was a relatively wet period, whereas, the period from 1965 to 1995 was a drier period. Kelly (2004) documented trends in flow patterns for rivers throughout the District and Florida. He concluded that river flows in the District were about 30 percent higher during the period from 1940 to 1969 as compared to the period from 1970 to 1999. Surface water availability estimates were based on the period of lower rainfall in order to provide a more reliable planning level quantity that could reasonably be expected to be available during both wet and dry periods. Using the higher rainfall period to estimate available surface water supplies would result in yield estimates that would likely not be sustainable during extended dry periods without impacting natural systems. For those rivers where data for the period from 1965-2003 were incomplete, the available period of record was used.

Since the river yield method was originally developed, staff has determined that extending the period of record for flow data to include more recent data is appropriate. Where available these data were included to best represent recent hydrologic conditions.

#### Step 3. Application of Minimum Flow or Planning Level Criteria

For rivers with established or proposed minimum flows, availability of water for withdrawal was determined using the specific minimum flow requirements. Planning level minimum flows were developed to estimate availability in rivers without established or proposed minimum flows or surface water availability studies. Planning-level minimum flow criteria include a series of constraints designed to ensure that existing uses and water supply needs of natural systems would be protected (CH2M Hill 2000). The minimum flow was assumed to be the flow that is equaled or exceeded 85 percent of the time (P85). Diversions for water supply were zero when flows were below the assumed minimum flow. Therefore, 15 percent of the time, which occurs



primarily in the dry season months of April, May, and early June, water would not be available for withdrawal from the rivers. This ensured that during periods of low flow, sufficient water would be available to sustain natural systems.

Availability was further constrained by limiting new and existing withdrawals to ten percent of the total daily flow of the river when the flow exceeded the P85. Individual withdrawals were limited to ten percent of the total daily flow at the point of the withdrawal. This is consistent with the ecological guideline used by the District during the 1980s and early 1990s to evaluate potential surface water withdrawals. Based on a comparison of potentially available yields calculated using the P85/ten percent criteria and available yields calculated using the established minimum freshwater flows, the P85/ten percent criteria are considered reasonable.

### Step 4. Consideration of Existing Legal Users

202

Once available yields were calculated, permitted withdrawals (if applicable) were subtracted from the quantity of water available. For cases where a flow schedule is prescribed in a water use permit, the flow schedule was used to determine the quantity of water that has been permitted and is unavailable for future allocation.

Most permitted quantities are not being used at full capacity, leaving some permitted but unused quantities that could be used to meet future demand. The actual amount of water that could be developed in the future will be determined through the permitting processes, recognizing both available supply, established minimum flows, and other environmental constraints.

### Step 5. Application of Engineering Limitations

Maximum withdrawals were restricted to twice the median flow of the river as a practical engineering limitation. Determination of actual yields from surface water sources will require reservoir and pump station reliability analyses, which were not performed as part of this report on potential river yields. The river yields provided are based on the assumption of an unlimited storage reservoir. Storage is needed to ensure a reliable source during dry or drought years when water is not available.