



UPPER EAST COAST WATER SUPPLY PLAN UPDATE

Appendices



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Water Demand Projections

The South Florida Water Management District (SFWMD or District) completes the complex process of developing water demand projections in coordination with stakeholder groups, other agencies, utilities, and local governments. This appendix describes the methods used to compile estimates of water demands using the 2010 census as a base, a historical year of 2013, and projection year of 2040 for the Upper East Coast (UEC) Water Supply Planning Area.

This appendix presents water demand assessments for the following water use categories:

- ◆ **Public Water Supply (PWS)** – Publicly or privately held utilities producing water in amounts of 0.1 million gallons per day (MGD) or greater for distribution to its customers
- ◆ **Domestic Self-Supply (DSS)** – Individual private wells and small utilities with an average flow less than 0.1 MGD
- ◆ **Agricultural Self-Supply (AGR)** – Water demands for crop irrigation and incidental uses associated with crop production
- ◆ **Industrial/Commercial/Institutional Self-Supply (ICI)** – Self-supplied water for business operations and institutional operations
- ◆ **Recreational/Landscape Self-Supply (REC)** – Water to fulfill irrigation demands for large landscaped areas such as community and homeowners association common grounds, ball fields, parks, cemeteries, and golf courses
- ◆ **Power Generation Self-Supply (PWR)** – Water used at power plants primarily for cooling purposes

DATA SOURCES AND METHODS

In general, preparing water demand estimates and projections heavily depends on land use activities and population growth and dispersion. For example, estimates of irrigated acreages are fundamental to projecting water supply demand for AGR, while information about existing and future projections of population are key to projecting reasonable PWS demand.

To meet the planning goal, the water supply needs of existing and future reasonable-beneficial uses are based on meeting those needs in a 1-in-10 year drought event [Section 373.709, Florida Statutes (F.S.)]. The water demand estimates for 2013 and projections through 2040 are provided for each use category in 5-year increments for average rainfall conditions and 1-in-10 year drought conditions. Data sources for each category may include the Florida 2010 Census of Population and Housing (United States [U.S.] Census Bureau 2012), federal and state agency reports, water use permitting files, PWS utility information, and municipal planning documents. In some instances, reliable historical information or indicators of future activity and market studies were available to assist in predicting water use.

NOTE

Average Rainfall and 1-in-10 Year Drought

An average rainfall year is defined as a year with rainfall equal to the mean annual rainfall for the period of record. A 1-in-10 year drought condition is defined as below normal rainfall with a 90 percent probability of being exceeded over a 12-month period. This means there is a 10 percent chance that less than this amount will be received in any given year. Section 373.0361(2)(a), F.S., states the level of certainty planning goal associated with identifying demands shall be based on meeting demands during a 1-in-10 year drought event.

The water demands are described and analyzed in two ways: gross demand and net demand. Gross or raw water demand is the water allocated in a consumptive use permit and is the volume of water withdrawn from a source. Net demand is the volume of water needed by an end user to meet their needs after deducting treatment and process water losses as well as accounting for estimated delivery system inefficiencies. Net demand is commonly referred to as finished water in a utility system.

PUBLIC WATER SUPPLY AND DOMESTIC SELF-SUPPLY

This section describes the methodology used to estimate the 2013 population, projected populations, and raw and finished water demand estimates and projections for PWS and DSS categories. This appendix also describes the approach and assumptions used for this 2016 Upper East Coast Water Supply Plan Update (2016 UEC Plan Update). Population projections form the initial and key step in developing demand projections, especially for the PWS and DSS water use categories.

An important element of water supply planning is using the best available data to estimate future populations and demands. The projections used in this plan update are believed to represent a reasonable balance of long- and short-term factors affecting the development of the UEC Planning Area. However, there is always uncertainty in 20-year population projections as growth patterns could change significantly. Factors such as global and local economic trends, housing demand, migration and immigration patterns, and cultural shifts all have an effect on populations within a county and state.

Section 373.709(2)(a)1, F.S., prescribes the use of population projections in determining needs in regional water supply plans:

Population projections used for determining public water supply needs must be based upon the best available data. In determining 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 (1) if the data and analysis support the local government's comprehensive plan. Any adjustment of or deviation from the BEBR projections must be fully described, and the original BEBR data must be presented along with the adjusted data.

Population Projection Methodology

The year 2010 was established as the baseline demographic condition for this plan because of available data from the United States census and to maintain consistency with the SFWMD's other regional water supply plans. The 2010 U.S. census (U.S. Census Bureau 2012) permanent resident population was used for the control population of each county within the UEC Planning Area, as follows:

- ◆ St. Lucie County: 277,789 residents
- ◆ Martin County: 146,318 residents
- ◆ Northeastern (NE) Okeechobee County: 552 residents

Only the NE portion of Okeechobee County is included in the UEC Planning Area; other portions of the county are included in the Lower Kissimmee Basin Planning Area and the St. Johns River Water Management District (SJRWMD). The 2010 population for NE Okeechobee County was developed using geographic information system (GIS) analysis of the census blocks within the UEC Planning Area.

The Town of Jupiter and the Village of Tequesta have service areas in both Martin County and Palm Beach County. The portions of Martin County served by these utilities are addressed in this UEC Plan while the whole utility (areas served in both Martin and Palm Beach counties) is addressed in the Lower East Coast Water Supply Plan Update.

2010 Public Water Supply Utility Service Areas

Maps of areas currently served by each PWS utility were developed using data supplied by utilities in Annual Progress Reports, from SFWMD's Water Use Regulatory Database, and from water supply facility work plans from the counties and PWS utilities. The service area maps were verified by the PWS utilities during follow-up meetings and correspondence with planning, operations, and GIS staff. Information supplied by the PWS utilities was especially important to identify current and future areas served and to develop 2040 service area maps for each utility. Maps of these service areas are provided in **Appendix E**. In many instances, differences exist between areas currently served, the area planned to be served in 2040, and franchised or legislated service areas. The focus on areas served by PWS utilities improves the accuracy of distributing county base populations into PWS and DSS populations.

Public Water Supply Population Estimates 2013 to 2040

Using the work completed to establish 2010 populations, 2013 estimates for each utility were developed using the 2014 Land Use Update (data from 2012), census block data (U.S. Census Bureau 2012), BEBR report (April 2014), current (2013) and future (2040) utility service area maps, and growth plans for UEC local governments as well as PWS utilities. Based on knowledge of planned growth as identified in the 2040 service area maps, a 2040 population for each utility was projected. Five-year incremental projections for each PWS utility were based on a general linear interpolation of the change in population from the 2010 census, 2013 estimates to 2040 (BEBR 2014) adjusted projections, keeping each county controlled to the medium BEBR county projections.

These results were shared with and reviewed by local utility and county government staff and adjustments were made as appropriate. Additionally, results were shared with SJRWMD. **Table A-1** shows the results of the population distributions by county and by local utility service provider. For this plan update, it was assumed that all populations outside PWS service areas had self-supplied potable water. Because some utilities are expanding their distribution lines and encouraging people with potable wells to connect to the utility, it is anticipated the number of people in the DSS category will decrease substantially by 2040.

Table A-1. PWS and DSS population projections for the UEC Planning Area between 2010 and 2040.

County	PWS Utility or DSS	Population Projections*							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Fort Pierce Utilities Authority	41,858	43,074	45,439	51,351	57,263	63,176	69,088	75,000
	Harbour Ridge	936	1,071	1,161	1,196	1,200	1,200	1,200	1,200
	Martin County Consolidated System	1,737	1,797	1,837	2,067	2,280	2,480	2,668	2,840
	Meadowood Community Association	529	668	741	791	799	800	800	800
	Port St. Lucie Utility Systems Dept., City of	167,205	171,016	183,545	209,272	238,538	263,782	283,958	304,296
	Reserve Community Dev. District	3,011	4,465	5,118	5,466	5,497	5,500	5,500	5,500
	Spanish Lakes Country Club	1,481	1,532	1,566	1,762	1,944	2,114	2,274	2,422
	Spanish Lakes Fairways	2,012	2,082	2,128	2,394	2,641	2,873	3,090	3,290
	St. Lucie County Utilities District	13,364	17,093	19,578	25,792	32,007	37,280	39,875	39,853
	St. Lucie West Services District	12,378	13,398	13,739	14,591	15,443	16,296	17,148	18,000
	PWS Total	244,511	256,196	274,852	314,682	357,612	395,501	425,601	453,201
	DSS Total	33,278	26,566	18,948	15,817	7,087	1,100	1,000	1,000
	St. Lucie Total	277,789	282,762	293,800	330,499	364,699	396,601	426,601	454,201
Martin	Indiantown Company	6,374	6,507	6,595	6,944	7,257	7,545	7,780	8,181
	Jupiter, Town of	2,155	2,161	2,165	2,175	2,185	2,195	2,205	2,215
	Martin County Consolidated System	86,535	88,887	90,802	97,339	102,661	106,925	110,074	112,572
	Sailfish Point	1,002	1,002	1,002	1,002	1,002	1,002	1,002	1,002
	South Martin Regional Utility	19,877	23,629	24,064	25,151	26,238	27,326	28,413	29,500
	Stuart, City of	15,603	16,841	17,149	17,919	18,689	19,460	20,230	21,000
	Tequesta, Village of	4,011	4,095	4,150	4,370	4,567	4,748	4,896	5,030
	PWS Total	135,557	143,122	145,927	154,900	162,599	169,201	174,600	179,500
	DSS Total	10,761	7,588	5,473	4,500	4,000	4,000	4,000	4,000
	Martin Total	146,318	150,710	151,400	159,400	166,599	173,201	178,600	183,500
NE Okeechobee	PWS Total**	-	-	-	-	-	-	-	-
	DSS Total	552	543	555	573	588	600	611	618
	NE Okeechobee Total	552	543	555	573	588	600	611	618
UEC Planning Area PWS Total		380,068	399,318	420,779	469,582	520,211	564,702	600,201	632,701
UEC Planning Area DSS Total		44,591	34,697	24,976	20,890	11,675	5,700	5,611	5,618
UEC Planning Area Total		424,659	434,015	445,755	490,472	531,886	570,402	605,812	638,319

* U.S. Census Bureau (2012) was used for the 2010 Census data; Bureau of Economic and Business Research (BEBR), Volume 47, Bulletin 168, April 2014 was used for 2013 estimates and BEBR medium projections 2015-2040.

** There are no PWS utilities in NE Okeechobee County.

Per Capita Use Rate

The planning per capita use rate (PCUR) expresses the total annual water (finished water) use of a utility divided by the number of permanent residents served by the utility. This method includes all finished water used by permanent and seasonal residents, industrial, landscaping and irrigation water from PWS, and any water losses in delivery supplied or lost by the system. It does not include water treatment losses. Irrigation demands for PWS-served households that do not use PWS for irrigation were not assessed due to a lack of available data.

PCURs were calculated for each utility using the average of reported water use from 2010 through 2013. Finished water use came from the Florida Department of Environmental Protection (FDEP) PWS utility monthly operating reports. **Table A-2** provides the derived average 2010-2013 finished water PCURs for individual utilities. The planning PCURs for DSS within St. Lucie and Martin counties were assumed to be the same as for the countywide PWS weighted average, which is shown in **Table A-2**. The planning PCUR for DSS within NE Okeechobee County was assumed to be the same as the state average PCUR.

Table A-2. Derived average finished water PCURs for PWS utilities (2010 to 2013).

County	PWS Utility or DSS	2010-2013 Average PCUR
St. Lucie	Fort Pierce Utilities Authority	115
	Harbour Ridge	103
	Meadowood Community Association	129
	Port St. Lucie Utility Systems Dept., City of	79
	Reserve Community Development District	72
	Spanish Lakes Country Club	127
	Spanish Lakes Fairways	97
	St. Lucie County Utilities District	74.5
	St. Lucie West Services District	115
	St. Lucie Domestic Self-Supply	102
	St. Lucie County Average	102
Martin	Indiantown Company	79
	Jupiter, Town of	167
	Martin County Consolidated System	103
	Sailfish Point	150
	South Martin Regional Utility	150
	Stuart, City of	196
	Tequesta, Village of	171
	Martin Domestic Self-Supply	145
	Martin County Average	145
NE Okeechobee	NE Okeechobee Domestic Self-Supply	89
	NE Okeechobee Average	89
UEC Planning Area PWS Average		118

Finished and Raw Water Comparison

The allocations in water use permits are based on raw water needs; therefore, it is important to understand raw water withdrawals. For each PWS utility, 2010 raw water withdrawals were compared to 2010 FDEP data for finished water production to calculate the raw to finished water ratio for each UEC Planning Area PWS utility. The ratios were used with the finished water projections for average conditions as a basis to project raw water demand for average conditions for each PWS utility.

Raw-to-finished water adjustment factors (ratios) for UEC PWS utilities are presented in **Table A-3**. In several instances, rounded pumping data for small PWS utilities revealed no difference between raw water withdrawal and finished water production. In these instances, the raw-to-finished ratio was assumed to be 1.00. For DSS, the finished to raw water ratio is also assumed to be 1.00.

Table A-3. Raw to finished water adjustment factors (ratios) for each PWS utility.

County	PWS Utility	Raw to Finished
St. Lucie	Fort Pierce Utilities Authority	1.13
	Harbour Ridge	1.03
	Meadowood Community Association	1.03
	Port St. Lucie Utility Systems Dept., City of	1.23
	Reserve Community Development District	1.03
	Spanish Lakes Country Club	1.03
	Spanish Lakes Fairways	1.18
	St. Lucie County Utilities District	1.24
	St. Lucie West Services District	1.30
Martin	Indiantown Company	1.03
	Jupiter, Town of	1.24
	Martin County Consolidated System	1.23
	Sailfish Point	1.32
	South Martin Regional Utility	1.12
	Stuart, City of	1.03
	Tequesta, Village of	1.15

2040 Projected Raw and Finished Demand

To calculate the projected raw water demand for each PWS utility, the projected 2040 permanent population for each PWS utility was multiplied by the average PCUR for 2010-2013. This conservative assumption reflects the expectation that PCURs will remain constant over the planning horizon. To determine raw (gross) water demand for average conditions for each PWS utility, finished water projections were multiplied by the raw to finished percent in **Table A-3**. This methodology assumes no changes in treatment efficiency from plant changes (e.g., lime softening to membrane) or source shifting (e.g., fresh surficial aquifer system [SAS] water to brackish Floridan aquifer system [FAS] water).

Average Rainfall and 1-and-10 Year Drought Conditions

Net and gross water projections for average rainfall conditions were used to calculate 1-in-10 year drought condition demand. A 1-in-10 year drought is defined by diminished rain and increased evapotranspiration relative to the historical record for a particular location from Tables V-2-1, V-2-3, V-2-5, and V-2-7 in the *Districtwide Water Supply Assessment* (SFWMD 1998). In this report, a drought increased demand factor was developed for each county, as follows:

- ◆ St. Lucie County: 1.090
- ◆ Martin County: 1.167
- ◆ NE Okeechobee County: 1.172

NOTE

Perceived discrepancies in table totals are due to rounding.

Projection Results

Tables A-4 through A-7 provide 5-year incremental water demand projections by PWS utility and DSS populations for gross and net water demands under average rainfall conditions and 1-in-10 year drought conditions. Okeechobee County has no PWS utilities in the UEC Planning Area.

Table A-4. Gross water demand projections for PWS and DSS under average rainfall conditions in the UEC Planning Area between 2010 and 2040.

County	PWS Utility or DSS	Gross (Raw) Water Demand Projections							
		Average Rainfall Conditions (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Fort Pierce Utilities Authority	5.44	5.60	5.90	6.67	7.44	8.21	8.98	9.75
	Harbour Ridge	0.10	0.11	0.12	0.13	0.13	0.13	0.13	0.13
	Martin County Consolidated System	0.22	0.23	0.23	0.26	0.29	0.31	0.34	0.36
	Meadowood Community Association	0.07	0.09	0.10	0.11	0.11	0.11	0.11	0.11
	Port St. Lucie Utility Systems Dept., City of	16.25	16.62	17.84	20.33	23.18	25.63	27.59	29.57
	Reserve Community Dev. District	0.22	0.33	0.38	0.41	0.41	0.41	0.41	0.41
	Spanish Lakes Country Club	0.19	0.20	0.20	0.23	0.25	0.28	0.30	0.32
	Spanish Lakes Fairways	0.23	0.24	0.24	0.27	0.30	0.33	0.35	0.38
	St. Lucie County Utilities District	1.23	1.58	1.81	2.38	2.96	3.44	3.68	3.68
	St. Lucie West Services District	1.85	2.00	2.05	2.18	2.31	2.44	2.56	2.69
	PWS Total	25.81	27.00	28.88	32.98	37.37	41.28	44.45	47.38
	DSS Total	3.39	2.71	1.93	1.61	0.72	0.11	0.10	0.10
	St. Lucie Total	29.20	29.71	30.82	34.59	38.10	41.39	44.55	47.48
Martin	Indiantown Company	0.52	0.53	0.54	0.57	0.59	0.61	0.63	0.67
	Jupiter, Town of	0.45	0.45	0.45	0.45	0.45	0.45	0.46	0.46
	Martin County Consolidated System	10.96	11.26	11.50	12.33	13.01	13.55	13.95	14.26
	Sailfish Point	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	South Martin Regional Utility	3.34	3.97	4.04	4.23	4.41	4.59	4.77	4.96
	Stuart, City of	3.15	3.40	3.46	3.62	3.77	3.93	4.08	4.24
	Tequesta, Village of	0.79	0.81	0.82	0.86	0.90	0.93	0.96	0.99
	PWS Total	19.40	20.61	21.01	22.25	23.33	24.27	25.05	25.77
	DSS Total	1.56	1.10	0.79	0.65	0.58	0.58	0.58	0.58
	Martin Total	20.96	21.71	21.80	22.90	23.91	24.85	25.63	26.35
NE Okeechobee	PWS Total*	-	-	-	-	-	-	-	-
	DSS Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
	NE Okeechobee Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
UEC Planning Area PWS Total		45.21	47.61	49.89	55.22	60.70	65.55	69.50	73.15
UEC Planning Area DSS Total		5.00	3.86	2.78	2.32	1.36	0.75	0.74	0.74
UEC Planning Area Total		50.22	51.47	52.67	57.54	62.05	66.29	70.24	73.89

*There are no PWS utilities in NE Okeechobee County.

Table A-5. Gross water demand projections for PWS and DSS under 1-in-10 year drought conditions in the UEC Planning Area between 2010 and 2040.

County	PWS Utility or DSS	Gross (Raw) Water Demand Projections							
		1-in-10 Drought Conditions (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Fort Pierce Utilities Authority	6.35	6.53	6.89	7.79	8.68	9.58	10.48	11.37
	Harbour Ridge	0.12	0.13	0.14	0.15	0.15	0.15	0.15	0.15
	Martin County Consolidated System	0.26	0.27	0.27	0.31	0.34	0.37	0.39	0.42
	Meadowood Community Association	0.08	0.10	0.11	0.12	0.12	0.12	0.12	0.12
	Port St. Lucie Utility Systems Dept., City of	18.96	19.39	20.81	23.73	27.05	29.91	32.20	34.51
	Reserve Community Dev. District	0.26	0.39	0.44	0.47	0.48	0.48	0.48	0.48
	Spanish Lakes Country Club	0.23	0.23	0.24	0.27	0.30	0.32	0.35	0.37
	Spanish Lakes Fairways	0.27	0.28	0.28	0.32	0.35	0.38	0.41	0.44
	St. Lucie County Utilities District	1.44	1.84	2.11	2.78	3.45	4.02	4.30	4.30
	St. Lucie West Services District	2.16	2.34	2.40	2.55	2.69	2.84	2.99	3.14
	PWS Total	30.12	31.51	33.71	38.48	43.61	48.18	51.87	55.29
	DSS Total	3.96	3.16	2.26	1.88	0.84	0.13	0.12	0.12
	St. Lucie Total	34.08	34.67	35.96	40.37	44.46	48.31	51.99	55.41
Martin	Indiantown Company	0.62	0.63	0.64	0.67	0.70	0.73	0.75	0.79
	Jupiter, Town of	0.53	0.53	0.53	0.54	0.54	0.54	0.54	0.55
	Martin County Consolidated System	13.05	13.40	13.69	14.67	15.48	16.12	16.59	16.97
	Sailfish Point	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	South Martin Regional Utility	3.97	4.72	4.81	5.03	5.25	5.46	5.68	5.90
	Stuart, City of	3.75	4.05	4.12	4.30	4.49	4.68	4.86	5.04
	Tequesta, Village of	0.94	0.96	0.97	1.02	1.07	1.11	1.15	1.18
	PWS Total	23.09	24.53	25.00	26.48	27.76	28.88	29.81	30.67
	DSS Total	1.86	1.31	0.94	0.78	0.69	0.69	0.69	0.69
	Martin Total	24.95	25.84	25.94	27.25	28.45	29.57	30.50	31.36
NE Okeechobee	PWS Total*	-	-	-	-	-	-	-	-
	DSS Total	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	NE Okeechobee Total	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
UEC Planning Area PWS Total		53.21	56.03	58.71	64.96	71.37	77.05	81.68	85.96
UEC Planning Area DSS Total		5.88	4.53	3.26	2.72	1.60	0.88	0.87	0.87
UEC Planning Area Total		59.09	60.56	61.97	67.68	72.97	77.94	82.56	86.83

*There are no PWS utilities in NE Okeechobee County.

Table A-6. Finished water demand projections for PWS and DSS under average rainfall conditions in the UEC Planning Area between 2010 and 2040.

County	PWS Utility or DSS	Net (Finished) Water Demand Projections							
		Average Rainfall Conditions (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Fort Pierce Utilities Authority	4.81	4.95	5.23	5.91	6.59	7.27	7.95	8.63
	Harbour Ridge	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.12
	Martin County Consolidated System	0.18	0.19	0.19	0.21	0.23	0.26	0.27	0.29
	Meadowood Community Association	0.07	0.09	0.10	0.10	0.10	0.10	0.10	0.10
	Port St. Lucie Utility Systems Dept., City of	13.21	13.51	14.50	16.53	18.84	20.84	22.43	24.04
	Reserve Community Dev. District	0.22	0.32	0.37	0.39	0.40	0.40	0.40	0.40
	Spanish Lakes Country Club	0.19	0.19	0.20	0.22	0.25	0.27	0.29	0.31
	Spanish Lakes Fairways	0.20	0.20	0.21	0.23	0.26	0.28	0.30	0.32
	St. Lucie County Utilities District	1.00	1.27	1.46	1.92	2.38	2.78	2.97	2.97
	St. Lucie West Services District	1.42	1.54	1.58	1.68	1.78	1.87	1.97	2.07
	PWS Total	21.39	22.38	23.94	27.32	30.95	34.18	36.81	39.25
	DSS Total	3.39	2.71	1.93	1.61	0.72	0.11	0.10	0.10
	St. Lucie Total	24.78	25.09	25.87	28.94	31.67	34.29	36.91	39.35
Martin	Indiantown Company	0.50	0.51	0.52	0.55	0.57	0.60	0.61	0.65
	Jupiter, Town of	0.36	0.36	0.36	0.36	0.36	0.37	0.37	0.37
	Martin County Consolidated System	8.91	9.16	9.35	10.03	10.57	11.01	11.34	11.59
	Sailfish Point	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	South Martin Regional Utility	2.98	3.54	3.61	3.77	3.94	4.10	4.26	4.43
	Stuart, City of	3.06	3.30	3.36	3.51	3.66	3.81	3.97	4.12
	Tequesta, Village of	0.69	0.70	0.71	0.75	0.78	0.81	0.84	0.86
	PWS Total	16.65	17.73	18.07	19.12	20.04	20.85	21.54	22.16
	DSS Total	1.56	1.10	0.79	0.65	0.58	0.58	0.58	0.58
	Martin Total	18.21	18.83	18.86	19.77	20.62	21.43	22.12	22.74
NE Okeechobee	PWS Total*	-	-	-	-	-	-	-	-
	DSS Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
	NE Okeechobee Total	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
UEC Planning Area PWS Total		38.04	40.10	42.01	46.45	50.99	55.03	58.34	61.41
UEC Planning Area DSS Total		5.00	3.86	2.78	2.32	1.36	0.75	0.74	0.74
UEC Planning Area Total		43.04	43.96	44.78	48.76	52.35	55.78	59.08	62.15

*There are no PWS utilities in NE Okeechobee County.

Table A-7. Finished water demand projections for PWS and DSS under 1-in-10 year drought conditions in the UEC Planning Area between 2010 and 2040.

County	PWS Utility or DSS	Net (Finished) Water Demand Projections							
		1-in-10 Drought Conditions (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Fort Pierce Utilities Authority	5.62	5.78	6.10	6.89	7.68	8.48	9.27	10.07
	Harbour Ridge	0.11	0.13	0.14	0.14	0.14	0.14	0.14	0.14
	Martin County Consolidated System	0.21	0.22	0.22	0.25	0.27	0.30	0.32	0.34
	Meadowood Community Association	0.08	0.10	0.11	0.12	0.12	0.12	0.12	0.12
	Port St. Lucie Utility Systems Dept., City of	15.42	15.77	16.92	19.29	21.99	24.32	26.18	28.05
	Reserve Community Dev. District	0.25	0.38	0.43	0.46	0.46	0.46	0.46	0.46
	Spanish Lakes Country Club	0.22	0.23	0.23	0.26	0.29	0.31	0.34	0.36
	Spanish Lakes Fairways	0.23	0.24	0.24	0.27	0.30	0.33	0.35	0.37
	St. Lucie County Utilities District	1.16	1.49	1.70	2.24	2.78	3.24	3.47	3.46
	St. Lucie West Services District	1.66	1.80	1.84	1.96	2.07	2.19	2.30	2.42
	PWS Total	24.96	26.11	27.94	31.89	36.12	39.89	42.95	45.80
	DSS Total	3.96	3.16	2.26	1.88	0.84	0.13	0.12	0.12
	St. Lucie Total	28.92	29.28	30.20	33.77	36.96	40.02	43.07	45.92
Martin	Indiantown Company	0.60	0.61	0.62	0.65	0.68	0.71	0.73	0.77
	Jupiter, Town of	0.43	0.43	0.43	0.43	0.43	0.44	0.44	0.44
	Martin County Consolidated System	10.61	10.89	11.13	11.93	12.58	13.11	13.49	13.80
	Sailfish Point	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	South Martin Regional Utility	3.55	4.22	4.30	4.49	4.68	4.88	5.07	5.27
	Stuart, City of	3.64	3.93	4.00	4.18	4.36	4.54	4.72	4.90
	Tequesta, Village of	0.82	0.83	0.84	0.89	0.93	0.97	1.00	1.02
	PWS Total	19.82	21.09	21.50	22.75	23.85	24.81	25.63	26.37
	DSS Total	1.86	1.31	0.94	0.78	0.69	0.69	0.69	0.69
	Martin Total	21.67	22.40	22.44	23.53	24.54	25.50	26.32	27.06
NE Okeechobee	PWS Total*	-	-	-	-	-	-	-	-
	DSS Total	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	NE Okeechobee Total	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
UEC Planning Area PWS Total		44.77	47.21	49.44	54.64	59.97	64.70	68.58	72.17
UEC Planning Area DSS Total		5.88	4.53	3.26	2.72	1.60	0.88	0.87	0.87
UEC Planning Area Total		50.65	51.74	52.70	57.36	61.56	65.59	69.45	73.05

*There are no PWS utilities in NE Okeechobee County.

AGRICULTURAL SELF-SUPPLY

The UEC Planning Area is an important producer of citrus, cattle, vegetables, and sugarcane. The region is one of the most important citrus producers in the country. While citrus dominates the region, it also represents a diverse mosaic of commercially grown crops. Agricultural water use includes water for irrigated, commercially grown crop categories such as citrus, sugarcane, vegetables, melons, berries, sod, greenhouses and nurseries, and irrigated pasture.

Background

The following statistics from the U.S. Department of Agriculture (USDA) and the SFWMD demonstrate the importance of agriculture to the UEC Planning Area:

- ◆ St. Lucie County ranks 7th in the state in total citrus production, producing 7.84 million boxes in the 2013 season (June to September) (USDA/National Agricultural Statistics Service [NASS] 2015a).
- ◆ St. Lucie County is number one in Florida and the U.S. in the production of grapefruit (USDA 2012a,b).
- ◆ The USDA places citrus production within the category of fruits, tree nuts, and berries. The total market value of this category was \$136.1 million for St. Lucie County (ranked 6th in the state), and \$66.6 million for Martin County (10th in the state) in 2012 (USDA 2012a,b).
- ◆ Martin County is a leading producer of nursery/greenhouse, floriculture, and sod, producing \$40.2 million in sales in 2012 (10th in the state) (USDA 2012a).
- ◆ NE Okeechobee, Martin, and St. Lucie counties are major producers of cattle with approximately 63,000 head under management. Significant land areas comprising ranchlands and pasture within the UEC Planning Area are devoted to sustaining these populations.

Projection Methodology

In 2013, legislation was enacted to require the Florida Department of Agriculture and Consumer Services (FDACS) to develop agricultural water demand projections for all water management districts. Section 373.709 states:

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. 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.

In accordance with the new rule, the FDACS Office of Agricultural Water Policy developed a process to estimate the 2010 agricultural irrigated acreage and water demand, and then project acreage and water demand to 2035 for the entire state. The project, called the Florida Statewide Agricultural Irrigation Demand (FSAID), provided the first set of data and projections to the water management districts in September 2014 and the second set in July 2015 (FSAID2). Beginning with the second projections, the agricultural acreage and water supply demand projections were calculated for an average year and a 1-in-10 year drought in one scenario. The results of the effort are contained in the FSAID2 database, which includes standardized statewide parcel-level GIS coverage of all non-irrigated agricultural and irrigated agricultural lands for 2015, estimates of 2015 irrigated agricultural acreage by a variety of crop types or categories spatially for each county, and future projections of irrigated agricultural acreage to 2035. Details of the project and data can be found in the FSAID report by The Balmoral Group, LLC (2015).

The SFWMD developed agricultural acreage estimates and water demands for the UEC Planning Area in early 2014 because the information was needed for FAS modeling that was underway. In this effort, the District coordinated with agricultural stakeholders, governmental agencies, and other industry professionals. The agricultural acreage was estimated using a number of sources, including land use maps prepared by the SFWMD in 2013 (2012 data), acreage from water use permit information, property tax parcel databases, and the recent agricultural census reports (USDA/NASS). Acreage estimates for 2010 were derived from earlier NASS reports and land use maps with 2006 data.

Agricultural acreage projections by crop type were prepared using the land use maps developed by the SFWMD in 2013, historical data, marketing information, citrus research, and trends in value per acre for key crops to identify incentives for growers to plant certain crops. These projections run to 2040 in 5-year increments. The *Agricultural Field-Scale Irrigation Requirements Simulation (AFSIRS) model was used to develop the water demand projections*. The FAS model used the 2013 acreage by crop estimates and the 2040 acreage by crop projections.

Current (2013) acreage from regulatory permitting databases and property tax parcel databases were reviewed and compared to other data sources to fill in recent years and reveal trends since the 2012 agricultural census (USDA/NASS 2012c). Data source include the following:

- ◆ USDA 5-year census and annual surveys for select crops
- ◆ Local agricultural extension offices, county agricultural economic development coordinators, Florida Farm Bureau, and other agricultural stakeholders
- ◆ County land use appraiser/assessment files
- ◆ U.S. Geological Survey (USGS) time series of irrigated acres by county by crop type
- ◆ Crop studies and future scenario outlooks from the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS), including their Citrus Research and Education Center, as well as the USDA and FDACS
- ◆ SFWMD permitting since the last plan update and current leasing arrangements
- ◆ FDACS Florida Agriculture by the Numbers annual publications
- ◆ Other special reports produced by research groups (i.e., Florida Citrus Commission and Florida Department of Citrus) and topical reports on agricultural land use and market trends

Factors and variables that could affect the future acreage projections were considered in developing projections. Permit renewal activity to grow select crops can signal future market intentions. To be able to project specific crop acreage, market information for the key crops within the planning area was assessed to identify the relative supply and demand balance, price trends, and likely profit margins for growers over the planning horizon. Trends in land use and crop type distributions since the 2011 UEC Plan Update were examined. Historic agricultural census acres at 5-year intervals (by county and crop type) were compared to longer-term irrigated acreage data from the USGS and the USDA annual surveys of irrigated acres by county for crops such as citrus and sugarcane. Economic data on per capita consumption trends (pounds per person consumed over a year) were reviewed to identify crops that are rising in popularity and use and may reflect changes in dietary habits and

preferences. In addition, economic data are available for select imports by crop type by region into the U.S. as well as exports to top foreign markets. Many imports compete with Florida products and influence relative prices and grower behavior. The supply and demand data are relevant to assessing the particular crop market “windows” that exist for Florida crops to supply U.S. consumers and to meet demands from foreign sources. In addition, where available, the market value of crops sold is compared to acres under management to assess relative profitability trends (per managed acre) and crop price trends.

The long-term time series showed important trends regarding how irrigated acres have been affected over time by major noneconomic events such as disease incidence (greening, canker) hurricanes, droughts, restoration, and water management projects. For citrus acres, the analysis relied on input from stakeholders regarding the state of citrus greening and the associated research as well as annual citrus inventories and the abandoned acreage reports provided by the USDA/NASS on an annual basis. The agricultural demand assessment developed acreage projections from the following datasets, information, and sources:

- ◆ Inputs on market conditions and trends from growers, cooperatives, and participants
- ◆ County land use plans and future land use targets, including comprehensive master development plans, stakeholder plans, and special area plans
- ◆ SFWMD land management and permitting, including acquisitions and projects completed since the last plan update, areas targeted for land acquisition, current leasing arrangements, permitted acreage, and permit expirations
- ◆ University of Florida’s Institute of Food and Agricultural Sciences (UF/IFAS)
- ◆ USDA Economic Research Service information, including market outlooks for select crops, agricultural projections to 2020, select yearbooks with historic information (i.e., vegetables and melons yearbook to assess consumption trends), and inputs and feedback from agricultural economists
- ◆ Macro- and microeconomic conditions and supply, demand, and commodity price trends
- ◆ Consumption trends (tastes and preferences), pounds consumed per person over time, and production patterns (yields per acre and imports)
- ◆ Citrus Industry Magazine and annual citrus industry conference proceedings materials and presentations on key issues
- ◆ Commodity price reports and trends (i.e., World Bank pink sheets)

Specific crops and their related acreages are difficult to project 20 years into the future. Growers seek crops that will provide a profitable return on investment. The most appropriate crops for each grower may stay the same or may change over the planning period. Market conditions may change dramatically; this has been demonstrated in the UEC Planning Area with the significant decline in citrus because of crop diseases. With that in mind, the total agricultural acreage and total average water demand projections are more important than specific crop acreages.

While citrus greening has hit the UEC agricultural community very hard, input indicates that the land will likely not go out of agriculture use but will be diverted to other crops until

resistant rootstock is available. It is anticipated that the irrigated acreage will decline through 2020 and then begin to slowly increase. At this time, it is unclear what crops will replace citrus, on a short-term basis or more permanently. Water use permits do not require modifications when crops are changed as long as the permittee does not exceed their allocation. Additionally, some citrus growers are changing growing methods to see if that will help sustain a viable crop. Therefore, the agricultural projections in this plan update remain the same as the crops and acres used in the FAS modeling.

The FSAID2 projections are substantially different from the projections developed by SFWMD staff. The FSAID2 results, as seen in **Table A-8**, show a steady decline in agricultural irrigated acreage for the region while District projections anticipate a small decline in acreage and then steady recovery and overall growth in total acreage. While the FSAID2 acreage projections decline, the water demand increases because of crop changes, as seen in **Table A-9**. Because this plan update projects demands to 2040 and the acreage projections developed by the District were used in the FAS modeling, the SFWMD numbers will be used and are described in greater detail in the following pages.

Table A-8. Summary of agricultural acreage projections between 2010 and 2040.

Projection Source	2010	2015	2020	2025	2030	2035	2040
FSAID2	N/A	103,869	99,533	95,553	91,165	87,012	N/A
SFWMD projection	126,471	122,868	120,352	122,392	124,692	129,992	138,292

N/A = not projected.

Table A-9. Summary of agricultural water average demand projections (in MGD) between 2010 and 2040.

Projection Source	2010	2015	2020	2025	2030	2035	2040
FSAID2	N/A	126.0	119.3	114.5	130.5	141.0	N/A
SFWMD projection	159.9	170.5	168.7	170.9	173.3	178.6	186.7

N/A = not projected.

Agricultural water demand calculations for this update were generated using the AFSIRS model. The model uses soil types, growing seasons, irrigation system types, and irrigation system efficiencies. The AFSIRS model calculates the net irrigation requirements for each crop category and irrigation system. The net irrigation requirement is an estimate of the amount of water (expressed in inches per year) that should be delivered to a plant's root zone to sustain yield. The gross irrigation requirement is the amount of water that must be withdrawn from the source in order to be delivered to the plant's root zone. It includes the net irrigation requirement and the losses incurred irrigating the plant's root zone. Irrigation application efficiency, as a modeled factor, refers to the average percent of total water applied that is delivered to the plant's root zone. This relationship is expressed as follows:

$$\text{Gross Irrigation Requirement} = \text{Net Irrigation Requirement} / \text{Irrigation Efficiency}$$

The AFSIRS model was used to calculate gross irrigation requirements for a year with average rainfall and a year with 1-in-10 year drought conditions. Historical weather data from rainfall stations that most accurately represent the average rainfall and 1-in-10 year drought conditions for each crop and county combination are used to calculate the irrigation requirements.

Projections of gross irrigation demand are based on assumed irrigation system types obtained from SFWMD's Regulatory Permitting Database. The most common types of irrigation systems used in UEC Planning Area crop production are seepage (generally described as gravity flow systems), sprinklers, and low volume systems such as micro-jet systems. A weighted irrigation efficiency factor was calculated for each crop type category based on the percent use by acres for the different irrigation systems, as reported in the SFWMD's Water Use Permit Regulatory Database (**Table A-10**).

Table A-10. Estimated irrigation efficiency for each type of irrigation system.*

Irrigation Category	Irrigation Efficiency
Low volume micro-irrigation	0.85
Seepage (gravity flow)	0.50
Sprinkler	0.75

*Reflects AFSIRS default values before weighting by crop acres per irrigation type.

Water Demand Calculations

A detailed example of water demand calculation procedures is presented in this section. First, the acreage of each crop in each county within the UEC Planning Area was determined. Next, the area-weighted irrigation efficiency for the crop type in a particular county was calculated from irrigation system information contained in the SFWMD's Water Use Regulatory Database.

Water use permit data categorized as citrus in a given county show that 90 percent of permittees use low-volume irrigation systems and 10 percent use seepage systems. Using the permit data, the area-weighted irrigation efficiency (from **Table A-10**) is as follows:

$$\text{Irrigation Efficiency} = (0.9 \times 0.85) + (0.1 \times 0.5) = 81.5 \text{ percent}$$

Based on this data, 81.5 percent of the water withdrawn (gross demand) from a surface water or groundwater source is available to citrus crops. Losses occur due to evaporation, drainage, and line system leakage.

Continuing with the citrus crop example, the average rainfall and 1-in-10 year drought conditions net irrigation requirements calculated by the AFSIRS model are 10.82 and 16.01 inches per year, respectively. The AFSIRS average irrigation requirement and 40,000 acres are used to estimate the gross irrigation demand for an average rainfall year for citrus in the county as follows:

$$\text{Gross Irrigation Requirement (MGD)} = \frac{\text{Net Irrigation Requirement (MGD)}}{\text{Irrigation Efficiency}}$$

$$\frac{10.82 \text{ in/yr} \times 40,000 \text{ acres} \times \left[\frac{1 \text{ yr}}{365 \text{ days}} \right] \times \left[\frac{1 \text{ ft}}{12 \text{ in}} \right] \times \left[\frac{43,560 \text{ ft}^2}{\text{acre}} \right] \times \left[\frac{7.4805 \text{ gal}}{\text{ft}^3} \right]}{0.815} \times 10^{-6} \approx 40 \text{ MGD}$$

Calculation of Net Demand Example

The irrigation requirements tables in the following section provide the gross irrigation requirement (or gross irrigation demand), and the crop irrigation efficiency in each county. To calculate net irrigation demand, use the Water to Sustain the Crop (net irrigation requirement) data (average rainfall year and 1-in-10 year drought conditions), which can be found in the left column of the irrigation requirements tables. This information can be used to calculate the net irrigation demand as follows:

Net Irrigation Requirement (MGD) = Gross Irrigation Requirement (MGD) × Irrigation Efficiency

For example, the following formula shows the net demand for an average rainfall year when the gross demand is 40 MGD and the average irrigation efficiency is 81.5 percent.

Net Irrigation Requirement = 40 MGD × 81.5 percent ≈ 32.6 MGD

Other Factors Affecting Agricultural Projections and Water Demands

In the UEC Planning Area, there is uncertainty associated with the agricultural acreage crop projections and water demands. Many acres of former citrus lands are fallow and it is difficult to predict if/when a cure for citrus greening will arise. Subsequent to the development of the acreage and demand projections developed for this Plan Update as well as the associated FAS modeling and FSAID 2 projections, permitting data showed some changes in land ownership. Based on recent input from industry representatives, the ownership changes could lead to some acres formerly dedicated to citrus being converted to a variety of small vegetables.

Crops have different water quality needs. Some are more salt tolerant than others and some require the pH to be within a specific range. Many vegetables are less tolerant of chlorides in the water than citrus. This may limit the volume of brackish water from the FAS that a grower may use to supplement the primary source (surface water). In the short term, growers can manage the number of acres or crops grown per year to stay at or below their existing surface water allocation. Additionally, on-site surface water storage could increase water availability during dry periods. In the long term, additional fresh water may be necessary if the acreage dedicated to vegetables continues to grow. The SFWMD will continue to work with agricultural stakeholders to better define water quality tolerances for crops.

While crops such as citrus use water consistently throughout the year, other crops have different water needs. Vegetables have a specific growing season, and their water needs will vary based on the month and crop. Additionally, it is standard practice to grow two or more crops of a particular vegetable each year, further complicating water usage and needs.

Projection Results by Crop Type

Citrus

Citrus is the main irrigated crop grown in the UEC Planning Area, and all categories of citrus (e.g., oranges, grapefruit, and tangerines) are included for projection purposes. The water supply plans rely on tabulating and assessing citrus acreage data, compiled perennially by the USDA/NASS as part of their annual survey program. The USDA/NASS, in cooperation with

the FDACS, publishes an annual Commercial Citrus Inventory as well as the complementary report on abandoned citrus acres. This commercial inventory report addresses all irrigated acres, including newly planted juvenile trees (Candi Erick, pers. comm., March 6, 2015). The abandoned groves report is provided separately (Florida Citrus Commission 2013; Citrus Industry 2015).¹

Since 1994, the UEC Planning Area has continually lost citrus acres (**Figure A-1**). This decline is for a variety of reasons, including the transition of agricultural land into urban development, citrus canker, citrus greening, hurricanes, frost events, international competition, and ecosystem restoration projects. However, when appropriate rootstock is available, citrus-producing acres are expected to stabilize after their long decline and to eventually increase. This expected pattern is based on how citrus greening is being combated (chemotherapies and grove management), the arrival of new more tolerant rootstock, other tactics to halt the advance of the disease and arrest its progression over time, and the demand for citrus. Water use permits for citrus groves are still in effect and most are valid for 20-year durations (Hodges 2014).

Citrus greening, or Huanglongbing (HLB), is a bacteria carried by the Asian psyllid vector that has ravaged groves within the UEC Planning Area. Thus far, research has centered on chemotherapies, chemotherapies, and rootstocks that show evidence of tolerance to greening. To maintain production, many growers have removed the affected trees and planted new trees, called resets closer together. This has the potential to require more water. These trends are visible in the tree density calculations that have risen over time (**Figure A-2**) (USDA/NASS 2012a,b,c; USDA/NASS 2013a,b; USDA 2015).

¹ According to the USDA, “a grove is considered abandoned when the following conditions exist: no production care during the past 2 years, no weed control or grass mowing, livestock present, weather damage, neglected trees that are not economically feasible to maintain, or no commercial harvest during the last 2 seasons.”

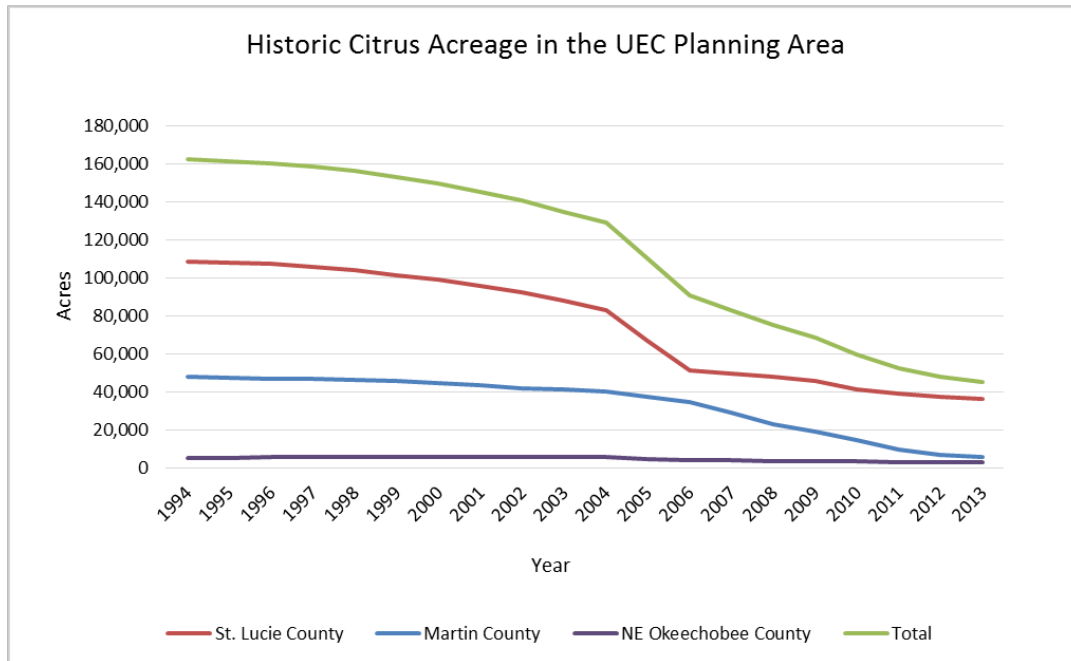


Figure A-1. Historic citrus acreage in St. Lucie, Martin, and NE Okeechobee counties between 1994 and 2013. Data from: USDA/NASS – Commercial Citrus Inventory Reports.

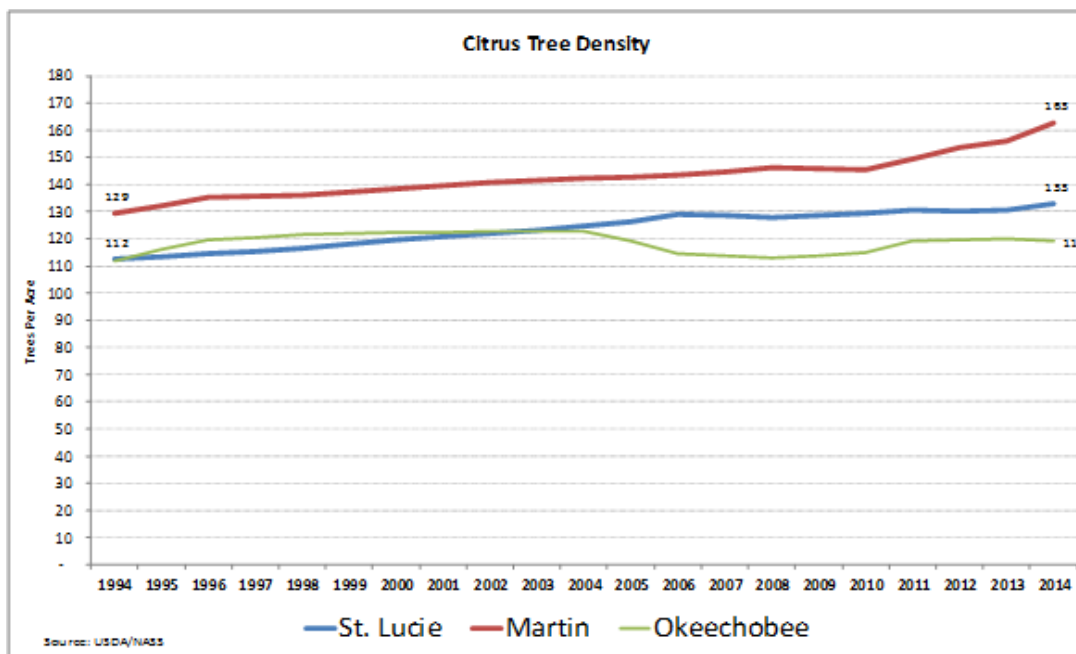


Figure A-2. Citrus tree density within St. Lucie, Martin, and Okeechobee counties between 1994 and 2014.

Table A-11 presents the SFWMD acreage projections for citrus, the projected net irrigation requirement (the amount of water needed to sustain crops based on rainfall) under average rainfall and 1-in-10 year drought conditions, and the projected gross irrigation demand (water withdrawal demand) under average rainfall and 1-in-10 year drought conditions.

The projections in **Table A-11** are based on the assumption that citrus acres will reach a minimum in 2020 and then begin to increase. Very recent anecdotal input indicates the citrus acres may continue to decline to approximately 2025 and that acres coming out of citrus generally would continue as agriculture.

Table A-11. Gross irrigation requirements for citrus crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County									
Irrigated Acreage		41,535	36,247	34,500	32,000	33,000	34,000	37,000	42,000
Average	10.3	38.77	33.83	32.20	29.87	30.80	31.74	34.54	39.20
1-in-10 year drought	17.7	66.62	58.14	55.34	51.33	52.93	54.54	59.35	67.37
Martin County									
Irrigated Acreage		14,613	5,949	4,926	4,660	5,500	6,500	8,500	11,500
Average	10.6	13.88	5.65	4.68	4.42	5.22	6.17	8.07	10.92
1-in-10 year drought	17.4	22.78	9.27	7.68	7.26	8.57	10.13	13.25	17.93
NE Okeechobee County									
Irrigated Acreage		3,651	3,183	3,050	3,100	3,200	3,400	3,600	3,800
Average	12.8	4.09	3.57	3.42	3.47	3.58	3.81	4.03	4.26
1-in-10 year drought	18.7	5.98	5.21	4.99	5.07	5.24	5.56	5.89	6.22
UEC Planning Area Total									
Irrigated Acreage		59,799	45,379	42,476	39,760	41,700	43,900	49,100	57,300
Average		56.74	43.05	40.30	37.77	39.61	41.72	46.64	54.38
1-in-10 year drought		95.38	72.63	68.01	63.67	66.74	70.24	78.49	91.52

Sugarcane

Within the UEC Planning Area, sugarcane is grown only in Martin County, and is the second largest crop in the region, by acreage. For this 2016 UEC Plan Update, USDA/NASS (2012c) census data as well as permit information for 2010 through 2015 from the SFWMD Water Use Regulatory Database were used. After many years of stable acreage, sugarcane production has increased.

Sugarcane is propagated by planting stalk cuttings, and four harvests can be obtained from a planting. The first harvest takes place approximately 13 months after planting and then three ratoons (shoots from the root of the plant after it has been cropped) provide the harvest during the next 3 years. Sugar production per unit of land surface declines gradually with each harvest. In approximately four years, the increased yields associated with replanting outweigh the costs of obtaining the crop from ratoons. Because land may lie fallow for several

months between crop rotation cycles, approximately 20 percent of the land associated with sugarcane production will not be harvested in any given year. Additionally, approximately 1 in 10 acres of sugarcane is grown for seed production.

Flood irrigation is the dominate irrigation system for sugarcane; therefore, the irrigation efficiency for this crop was assumed to be 50 percent for calculating water needs. **Table A-12** summarizes the projected water demand for sugarcane crop acreage in Martin County; sugarcane is not grown in St. Lucie or NE Okeechobee County.

Table A-12. Gross irrigation requirements for sugarcane crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
Martin County									
Irrigated Acreage		10,379	17,952	17,952	17,952	17,952	17,952	17,952	17,952
Average	9.7	12.24	21.18	21.18	21.18	21.18	21.18	21.18	21.18
1-in-10 year drought	17.7	22.34	38.65	38.65	38.65	38.65	38.65	38.65	38.65

Vegetables, Melons, and Berries

The main crops in this category are tomatoes, peppers, eggplant, squash, melons, and tropical vegetables. Because the USDA's agricultural census (USDA/NASS 2012c) did not include any information for the acreage of vegetable crop production in Martin and St. Lucie counties, the SFWMD's water use permits were used to estimate the acreage of these crops in 2010 and 2013.

Estimates for vegetables, melons, and berries were generated using land use maps prepared by the SFWMD in 2013 and the District's water use permit database to estimate production in 2010 and 2013 (**Table A-13**). The projections reflect information from the water use permitting database. Based on the type of irrigation system shown in water use permits, the irrigation efficiency was assumed to be 50 percent for these types of crops.

Table A-13. Gross irrigation requirements for vegetables, melons, and berry crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County									
Irrigated Acreage		3,625	4,365	4,600	4,800	4,900	5,000	5,100	5,200
Average	24.1	12.29	14.81	15.60	16.28	16.62	16.96	17.30	17.64
1-in-10 year drought	31.0	15.81	19.04	20.07	20.94	21.38	21.81	22.25	22.69
Martin County									
Irrigated Acreage		4,214	4,173	6,793	6,793	6,793	6,793	6,793	6,793
Average	23.7	13.26	13.13	21.37	21.37	21.37	21.37	21.37	21.37
1-in-10 year drought	30.7	17.18	17.01	27.69	27.69	27.69	27.69	27.69	27.69
NE Okeechobee County									
Irrigated Acreage		1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030
Average	24.9	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24
1-in-10 year drought	30.8	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
UEC Planning Area Total									
Irrigated Acreage		8,869	9,568	12,422	12,622	12,722	12,822	12,922	13,022
Average		27.80	30.18	39.22	39.90	40.24	40.57	40.91	41.25
1-in-10 year drought		35.77	38.83	50.53	51.40	51.84	52.27	52.71	53.15

Sod Production

Estimates of sod acres refer to irrigated sod production within the UEC Planning Area. These estimates do not include sod harvested from pasture without irrigation. Irrigated sod is harvested in all three counties within the UEC Planning Area (**Table A-14**). Information used to develop the estimates of 2010 and 2013 sod production was obtained from the USDA/NASS (2012c), SFWMD land use cover mapping, the USGS, and local UF/IFAS extension agents.

Sod irrigation is provided by several methods, including low-volume, sprinkler, and flood irrigation. Based on the irrigation systems indicated in the water use permits, the average irrigation efficiency for sod was calculated to be 77 percent in Martin County, 53 percent in St. Lucie County, and 50 percent in NE Okeechobee County.

Large changes in sod production acres are linked to the business cycle and housing activity. The SFWMD examined long-term and recent trends in sod acreage in relation to the housing market, considered potential new housing developments and activity measured by building permits, and reviewed fertilizer regulations and local ordinances that can impact plantings and acres under management. Given the current market, regulatory environment, and pace

of the economic and housing recovery, the demands for sod production are expected to remain relatively constant over the planning horizon.

Table A-14. Gross irrigation requirements for sod crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County									
Irrigated Acreage		1,208	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Average	21.4	3.40	3.43	3.43	3.43	3.43	3.43	3.43	3.43
1-in-10 year drought	26.9	4.27	4.32	4.32	4.32	4.32	4.32	4.32	4.32
Martin County									
Irrigated Acreage		1,877	2,742	3,591	3,591	3,591	3,591	3,591	3,591
Average	20.9	3.94	5.76	7.54	7.54	7.54	7.54	7.54	7.54
1-in-10 year drought	26.3	4.96	7.24	9.49	9.49	9.49	9.49	9.49	9.49
NE Okeechobee County									
Irrigated Acreage		2,126	639	639	639	639	639	639	639
Average	21.3	6.74	2.03	2.03	2.03	2.03	2.03	2.03	2.03
1-in-10 year drought	26.0	8.22	2.47	2.47	2.47	2.47	2.47	2.47	2.47
UEC Planning Area Total									
Irrigated Acreage		5,211	4,601	5,450	5,450	5,450	5,450	5,450	5,450
Average		14.08	11.21	13.00	13.00	13.00	13.00	13.00	13.00
1-in-10 year drought		17.45	14.03	16.27	16.27	16.27	16.27	16.27	16.27

Greenhouse/Nursery

This category includes a wide variety of nursery, ornamental, and horticulture/floriculture operations. Crops in this category include palm trees and shrubs grown in the ground, container nurseries producing ornamentals in open fields, and greenhouse and shade house nurseries producing foliage plants, orchids, and bromeliads. Crops grown in greenhouses may include vegetables, herbs, fruits, berries, garden plants for sale, and cut flowers. The same crops may be grown in the open in a nursery setting. Sales of these products fluctuate with economic cycles and conditions tied to the housing market and urban landscapes, within and outside of south Florida.

For this plan update, a variety of information, including the SFWMD Water Use Regulatory Database and county assessor's office's land use data, was used to estimate 2010 greenhouse/nursery acreage and project future acreage. Information from the SFWMD water use permit database and the USDA/NASS (2012c) were the primary sources to estimate greenhouse/nursery acreage (**Table A-15**).

Greenhouse/nursery irrigation generally is provided by low-volume methods. Based on the information obtained from the SFWMD Water Use Regulatory Database, the average irrigation efficiency for this crop category was calculated to be 85 percent in St. Lucie and Okeechobee counties and 83 percent in Martin County.

Table A-15. The estimated acreage and gross irrigation requirements greenhouse/nursery crops between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County									
Irrigated Acreage		759	2,280	2,280	2,280	2,280	2,280	2,280	2,280
Average	27.7	2.76	8.30	8.30	8.30	8.30	8.30	8.30	8.30
1-in-10 year drought	31.1	3.10	9.32	9.32	9.32	9.32	9.32	9.32	9.32
Martin County									
Irrigated Acreage		1,124	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Average	27.1	3.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06
1-in-10 year drought	30.5	3.44	5.70	5.70	5.70	5.70	5.70	5.70	5.70
NE Okeechobee County									
Irrigated Acreage		60	125	125	125	125	125	125	125
Average	28.0	0.25	0.52	0.52	0.52	0.52	0.52	0.52	0.52
1-in-10 year drought	31.1	0.28	0.58	0.58	0.58	0.58	0.58	0.58	0.58
UEC Planning Area Total									
Irrigated Acreage		1,943	4,264	4,264	4,264	4,264	4,264	4,264	4,264
Average		6.07	13.88	13.88	13.88	13.88	13.88	13.88	13.88
1-in-10 year drought		6.82	15.60	15.60	15.60	15.60	15.60	15.60	15.60

Field Crops

Field crops in the UEC Planning Area primarily include potatoes and sweet corn. Acreage and water use are projected to remain stable through 2040. **Table A-16** presents the acreage projections, the projected net irrigation requirement under average rainfall and 1-in-10 year drought conditions, and the projected gross irrigation demand (water withdrawal demand) under average rainfall and 1-in-10 year drought conditions for Martin County; there are no field crops in St. Lucie or NE Okeechobee County (USDA/NASS 2012c; Lambert and Lambert 2014).

Table A-16. Gross irrigation requirements for field crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
Martin County									
Irrigated Acreage		1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
Average	25.8 (potatoes) 18.5 (sweet corn)	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13
1-in-10 year drought	32.9 (potatoes) 24.1 (sweet corn)	6.55	6.55	6.55	6.55	6.55	6.55	6.55	6.55

Other Fruits and Nuts

Within the UEC Planning Area, the production of non-citrus fruit crops such as tropical fruits, mangos, papayas, and peaches is estimated to be fewer than 200 acres (USDA 2012b; USDA/NASS 2012c) (**Table A-17**).

Table A-17. Gross irrigation requirements for other fruits and nuts crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County									
Irrigated Acreage		55.10	70.50	70.50	70.50	70.50	70.50	70.50	70.50
Average	10.7	0.05	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-in-10 year drought	18.5	0.09	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Martin County									
Irrigated Acreage		59.1	75.7	75.7	75.7	75.7	75.7	75.7	75.7
Average	10.9	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1-in-10 year drought	18.5	0.10	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NE Okeechobee County									
Irrigated Acreage		0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Average	12.9	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
1-in-10 year drought	18.8	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002
UEC Planning Area Total									
Irrigated Acreage		115.0	147.2	147.2	147.2	147.2	147.2	147.2	147.2
Average		0.11	0.14	0.14	0.14	0.14	0.14	0.14	0.14
1-in-10 year drought		0.19	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Irrigated Pasture

This plan update includes an estimate and projection of irrigated pasture, which the SFWMD defines as any pasture with the facilities in place to carry out irrigation. The irrigated pasture acreage within the UEC Planning Area was estimated from permits and is projected to remain stable over the planning horizon (Smajstrla 1990; USDA/NASS 2012c) (**Table A-18**).

Table A-18. Gross irrigation requirements for irrigated pasture crop acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Net Irrigation Requirement (inches)	Gross Demand (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County									
Irrigated Acreage		20,539	20,539	20,539	20,539	20,539	20,539	20,539	20,539
Average	7.7	20.79	20.79	20.79	20.79	20.79	20.79	20.79	20.79
1-in-10 year drought	14.6	39.42	39.42	39.42	39.42	39.42	39.42	39.42	39.42
Martin County									
Irrigated Acreage		16,371	16,371	16,371	16,371	16,371	16,371	16,371	16,371
Average	7.1	11.67	11.67	11.67	11.67	11.67	11.67	11.67	11.67
1-in-10 year drought	13.8	22.69	22.69	22.69	22.69	22.69	22.69	22.69	22.69
NE Okeechobee County									
Irrigated Acreage		1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787
Average	9.1	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42
1-in-10 year drought	15.1	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02
UEC Planning Area Total									
Irrigated Acreage		38,698	38,698	38,698	38,698	38,698	38,698	38,698	38,698
Average		34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88
1-in-10 year drought		66.13	66.13	66.13	66.13	66.13	66.13	66.13	66.13

Miscellaneous

Water required for cattle and aquaculture is included within the miscellaneous water use category. Demand projections for cattle watering are assumed to be 12 gallons per head per day for beef cattle and 185 gallons per head per day for dairy cattle (35 gallons for drinking and 150 gallons for related barn and equipment washing). The *2014 Florida Livestock, Dairy, and Poultry Summary* (USDA/NASS 2015b) was used to obtain the cattle head numbers for 2012. The USDA/NASS livestock summary did not list dairy for St. Lucie and Martin counties because there are only a few dairy farms in each county. The number of beef and dairy cattle has increased slightly since the 2011 UEC Plan Update and is projected to remain constant though the planning period. Therefore, water demands for cattle also are anticipated to remain fairly stable as shown in **Table A-19**.

Table A-19. Water requirements (in MGD) for cattle watering.

County	Head of Cattle			Water Needed
	Beef Cattle	Dairy Cattle	Total	
St. Lucie	23,000*	--	23,000	0.28
Martin	23,000*	--	23,000	0.28
NE Okeechobee	10,033	6,862	16,895	1.16
Total	56,033	6,862	62,895	1.72

* From USDA/NASS 2015b.

-- data not listed.

Demands associated with aquaculture (fish and aquatic plant farming) are shown in **Table A-20**. Water withdrawals are made for recirculation purposes and to replace losses to evaporation. Existing demands for aquaculture were determined using active water use permits. The demands are projected to remain relatively stable. The acres associated with aquaculture are not included in the acreage tables because this land is not irrigated.

Table A-20. Water requirements for aquaculture.

County	Acres in 2010	Permitted Use Totals (MGD)		
		2010	2013	2040
St. Lucie	36	0.53	0.53	0.53
Martin	1,698	0.56	0.56	0.56
NE Okeechobee	0	0.00	0.00	0.00
Total	1,734	1.09	1.09	1.09

Summary of Agricultural Results

The estimates and projections for each crop category have been discussed earlier in this chapter. However, it is important to summarize the results in terms of total acreage and gross water demand as well as understand the factors that may drive increases or decreases in irrigated agricultural acreage or water use. **Tables A-21 to A-23** summarize projected agricultural irrigated acres and water demands for all agricultural uses through 2040.

Table A-21. UEC Planning Area crop category and irrigated acreage summary between 2010 and 2040.

Crop Category	2010	2013	2015	2020	2025	2030	2035	2040
Citrus	59,799	45,379	42,476	39,760	41,700	43,900	49,100	57,300
Sugarcane	10,379	17,952	17,952	17,952	17,952	17,952	17,952	17,952
Vegetables, Melons, and Berries	8,869	9,568	12,422	12,622	12,722	12,822	12,922	13,022
Sod	5,211	4,601	5,450	5,450	5,450	5,450	5,450	5,450
Greenhouse/Nursery	1,943	4,264	4,264	4,264	4,264	4,264	4,264	4,264
Other Field Crops	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
Other Fruits and Nuts	115	147	147	147	147	147	147	147
Irrigated Pasture	38,698	38,698	38,698	38,698	38,698	38,698	38,698	38,698
UEC Total Irrigated Acres	126,471	122,068	122,868	120,352	122,392	124,692	129,992	138,292

Table A-22. Summary of agricultural acres in the UEC Planning Area by county between 2010 and 2040.

County	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	67,721	64,723	63,210	60,910	62,010	63,110	66,210	71,310
Martin	50,095	50,580	53,026	52,760	53,600	54,600	56,600	59,600
Eastern Okeechobee	8,655	6,765	6,632	6,682	6,782	6,982	7,182	7,382
Total Irrigated Acres	126,471	122,068	122,868	120,352	122,392	124,692	129,992	138,292

Table A-23. Gross irrigation requirements for all agricultural acreage in the UEC Planning Area between 2010 and 2040.

Rainfall Year	Gross Demand (MGD)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie County								
Irrigated Acreage	67,721	64,723	63,210	60,910	62,010	63,110	66,210	71,310
Average	78.88	82.04	81.21	79.55	80.83	82.10	85.24	90.24
1-in-10 year drought	130.14	131.17	129.39	126.26	128.30	130.34	135.59	144.04
Martin County								
Irrigated Acreage	50,095	50,580	53,026	52,760	53,600	54,600	56,600	59,600
Average	64.08	68.49	77.55	77.29	78.01	79.04	80.94	83.79
1-in-10 year drought	100.88	108.07	119.40	118.98	120.29	121.85	124.97	129.65
NE Okeechobee County								
Irrigated Acreage	8,655	6,765	6,632	6,682	6,782	6,982	7,182	7,382
Average	16.89	11.93	11.78	11.78	11.83	12.17	12.39	12.62
1-in-10 year drought	22.42	16.20	15.98	16.07	16.23	16.56	16.88	17.21
UEC Planning Area Total								
Irrigated Acreage	126,471	122,068	122,868	120,352	122,392	124,692	129,992	138,292
Average	159.86	162.46	170.53	168.68	170.86	173.31	178.57	186.65
1-in-10 year drought	253.43	255.45	264.78	261.31	264.82	268.75	277.44	290.90

In the past, there was an expectation that agricultural lands would be lost to urbanization. The restrained housing market and rather slow economic recovery in south Florida has diminished competition for agricultural land from developers, as compared to the 2006 UEC Water Supply Plan Amendment. More generally, the loss of arable land over the last years throughout the U.S. and the droughts in other agricultural parts of the country raised the relative value of existing agricultural lands.

Irrigated acreage decreased slightly from 126,471 acres in 2010 to 122,068 acres in 2013. It is expected that the citrus decline will continue to affect total acreage until at least 2020. Water demand is affected by the acreage, type of crop, and irrigation system. Therefore, a decrease in irrigated acres may not cause a decrease in water needs. Additionally, a change in crop type may increase or decrease the water demand. Overall, agricultural water demand is projected to increase from approximately 162 MGD in 2013 to 187 MGD in 2040.

Projections from FDACS

As stated earlier in this chapter, the projections provided by FDACS extend to 2035 (**Tables A-24** and **A-25**) and are significantly lower than the projections developed by SFWMD staff. The 2015 total irrigated acreage is approximately 104,000 acres; much of the difference between the FSAID2 numbers and District estimates is in irrigated pasture and sugarcane. FDACS is projecting a steady decline in overall agricultural irrigated acreage. The associated water demands are lower than District projections. This increase of approximately 126 MGD in 2015 and 141 MGD in 2035 is primarily for citrus crops (The Balmoral Group, LLC 2015).

Table A-24. FSAID2 projections – UEC Planning Area irrigated acreage.

Crop Category	2015	2020	2025	2030	2035
Citrus	70,296	66,839	64,096	60,284	56,842
Sugarcane	10,545	10,427	10,134	10,134	9,962
Vegetables	6,681	6,681	6,290	5,269	5,269
Sod	6,430	6,243	6,073	5,980	5,980
Greenhouse/Nursery	4,597	4,308	4,042	3,765	3,722
Potatoes (Field Crops)	1,100	1,100	1,100	2,081	2,081
Fruit (Non-Citrus)	10	10	10	0	0
Hay (Irrigated Pasture)	4,210	3,924	3,808	3,651	3,155
UEC Total Irrigated Acres	103,869	99,533	95,553	91,165	87,012

Table A-25. UEC Planning Area demand FSAID2 projections – average year (in MGD).

Crop	2015	2020	2025	2030	2035
Citrus	78.65	74.18	70.97	86.51	96.91
Sugarcane	14.7	14.5	14.12	14.12	13.87
Vegetables	10.74	10.74	10.19	8.46	8.61
Sod	8.01	7.74	7.54	7.72	7.9
Greenhouse/Nursery	7.15	6.5	6.15	6.42	6.41
Potatoes (Field Crops)	1.8	1.8	1.89	3.88	4.29
Fruit (Non-Citrus)	0.02	0.02	0.02	0	0
Hay (Irrigated Pasture)	4.95	3.82	3.62	3.41	2.97
Total	126.01	119.29	114.49	130.52	140.97

INDUSTRIAL/COMMERCIAL/INSTITUTIONAL SELF-SUPPLY

This category includes self-supplied industrial, commercial, and institutional water demands not supported by a public utility such as food processing and mining operations. Water used for industrial, commercial, and institutional uses but supplied by utilities is included under PWS.

Projection Methodology

In the UEC Planning Area, ICI water use declined after 2010 but is projected to increase at the same rate as each county's population. Currently, the largest amounts of ICI water in the UEC Planning Area are for citrus processing, aerospace industry, natural gas storage, and municipal uses. These ICI uses account for approximately 66 percent of the total demand. Permitted water use in this category determined the ICI demand. Average pumpage data were compared to permitted allocations for the largest users. For the remaining ICI permittees, statistical distributions on size and water use were assessed by year for the smaller users. ICI projections assume demand under average rainfall and 1-in-10 drought conditions remains the same because withdrawals are equal to user demand so no distinction is made between net (finished) and gross (raw) water amounts.

Projection Results

Table A-26 summarizes the current and projected ICI demand in the UEC Planning Area in 5-year increments during the planning horizon.

Table A-26. ICI demand projections between 2010 and 2040.

County	Demand Projections (MGD)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	2.60	1.52	1.56	1.64	1.72	1.78	1.84	1.89
Martin	4.10	2.55	2.61	2.74	2.85	2.95	3.04	3.11
NE Okeechobee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UEC Planning Area Total	6.70	4.07	4.17	4.38	4.57	4.73	4.88	5.00

RECREATIONAL/LANDSCAPE SELF-SUPPLY

The REC category includes self-supplied irrigation demand for landscaped recreational areas and golf courses. Landscape irrigation includes water demand for all parks (small and large), communities and homeowners associations with common areas or a master irrigation system, and areas with green space such as ball fields, stadiums, and cemeteries. These REC uses are identified through water use permits. With the exception of private home landscape irrigation conducted by homeowners associations, private home landscape irrigation demand is not included in this water use category.

The UEC Planning Area has achieved substantial progress in reclaimed water use. The *2013 FDEP Reuse Inventory Report* (FDEP 2014) indicates that 27 percent of the wastewater generated in St. Lucie County and 52 percent of the wastewater generated in Martin County is reused primarily for landscape irrigation and to recharge aquifers.

Projection Methodology

Landscape and golf course acres were identified using the SFWMD's Water Use Regulatory Database (**Table A-27**). General landscape self-supply growth is governed by population growth in the area. Potential growth in golf courses does not follow the same trends.

Table A-27. Acreage for landscape self-supply (golf acres not included) in the UEC Planning Area between 2010 and 2040.

County	Acreage (acres)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	6,797	6,581	6,877	7,736	8,536	9,283	9,985	10,631
Martin	5,598	4,036	4,126	4,344	4,541	4,720	4,868	5,001
NE Okeechobee	50	50	50	50	50	50	50	50
UEC Planning Area Total	12,445	10,667	11,054	12,131	13,127	14,054	14,903	15,683

Future demand projections in this category considered county population growth rates, information provided by local planning officials, and golf course publications. Golf course demands by county are projected separately and added to the other landscape and recreation demands (**Table A-28**). A slower growth rate was assumed for golf courses than the population growth rate based on industry and local planning estimates of new or closed courses during the twenty-year planning horizon. New areas of landscape that are planned to be served by reclaimed water are not included in the acreage tables.

Table A-28. Acreage for golf self-supply in the UEC Planning Area between 2010 and 2040.

County	Acreage (acres)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	2,435	2,678	2,678	2,678	2,678	2,678	2,678	2,678
Martin	4,163	4,582	4,582	4,582	4,582	4,582	4,582	4,582
NE Okeechobee	-	-	-	-	-	-	-	-
UEC Planning Area Total	6,598	7,260	7,260	7,260	7,260	7,260	7,260	7,260

REC gross and net irrigation demand calculations for this plan update were developed in the same manner as the agricultural demands using the AFSIRS model. The model uses assumed crop coefficients of sod to represent turf and landscape plants, and calculates demand for average rainfall and 1-in-10 year drought conditions for each county.

Projection Results

REC acreage projections are shown in **Table A-29**. Gross irrigation demand (withdrawal demand) under average rainfall conditions is shown in **Table A-30**, while **Table A-31** presents gross demand under 1-in-10 year drought conditions.

Table A-29. Total acreage for REC in the UEC Planning Area between 2010 and 2040.

County	Acreage (acres)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	9,232	9,259	9,555	10,414	11,214	11,961	12,663	13,309
Martin	9,761	8,618	8,708	8,926	9,122	9,302	9,449	9,583
NE Okeechobee	50	50	50	50	50	50	50	50
UEC Planning Area Total	19,043	17,926	18,313	19,390	20,387	21,313	22,163	22,942

Table A-30. Gross (raw) irrigation demand under average rainfall conditions for REC in the UEC Planning Area between 2010 and 2040.

County	Gross Irrigation Demand-Average Rainfall Conditions (MGD)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	16.95	14.67	15.22	16.84	18.34	19.75	21.07	22.28
Martin	14.20	9.89	10.05	10.43	10.76	11.07	11.33	11.56
NE Okeechobee	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10
UEC Planning Area Total	31.15	24.65	25.37	27.36	29.20	30.92	32.49	33.94

Table A-31. Gross (raw) irrigation demand under 1-in-10 year drought conditions for REC in the UEC Planning Area between 2010 and 2040.

County	Gross Irrigation- 1-in-10 Drought Conditions (MGD)							
	2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	21.19	18.38	19.08	21.10	22.98	24.74	26.39	27.91
Martin	19.23	13.38	13.59	14.10	14.56	14.98	15.32	15.64
NE Okeechobee	0.00	0.12	0.12	0.12	0.12	0.12	0.12	0.12
UEC Planning Area Total	40.42	31.88	32.79	35.32	37.66	39.83	41.83	43.66

POWER GENERATION SELF-SUPPLY

At thermoelectric power plants, water is primarily used for cooling purposes. Additional water uses at power plants include boiler make-up water and ancillary uses such as domestic-type use by employees.

Florida Power & Light (FPL) is a major electrical power supplier, serving three regions within south Florida. Currently, two power plants withdraw water within the UEC Planning Area: FPL Martin Plant in the Indiantown area, Martin County and Treasure Coast Energy Center (TCEC) in Fort Pierce, St Lucie County.

The FPL Martin Plant uses fresh water for cooling purposes and the TCEC uses water from the FAS. Both power plants anticipate using reclaimed water for part of their needs at some point in the future. Neither facility used reclaimed water in 2013.

The Indiantown Cogeneration Plant located in Martin County relies on surface water that is withdrawn from the L-63N Canal (Taylor Creek) within the Lower Kissimmee Basin (LKB) Planning Area; thus, this water (4.3 to 5.3 MGD) is included in the 2014 LKB Plan Update. The St. Lucie Nuclear Plant located in St. Lucie County uses ocean water, which is not addressed in SFWMD water supply plans.

FPL has proposed a new plant for construction within the next 10 years in NE Okeechobee County. The site is within the SJRWMD, approximately 6 miles outside the UEC Planning Area. The proposed plant is estimated to need 9 MGD of water supply on average (11 MGD peak) for operation and water demands for this plant are not included within this 2016 UEC Plan Update.

Projection Results

Table A-32 shows that anticipated PWR water demands for the 2040 planning horizon. PWR water demands are assumed to be the same for average rainfall and 1-in-10 year drought conditions.

Table A-32. PWR gross water demand projections between 2010 and 2040.

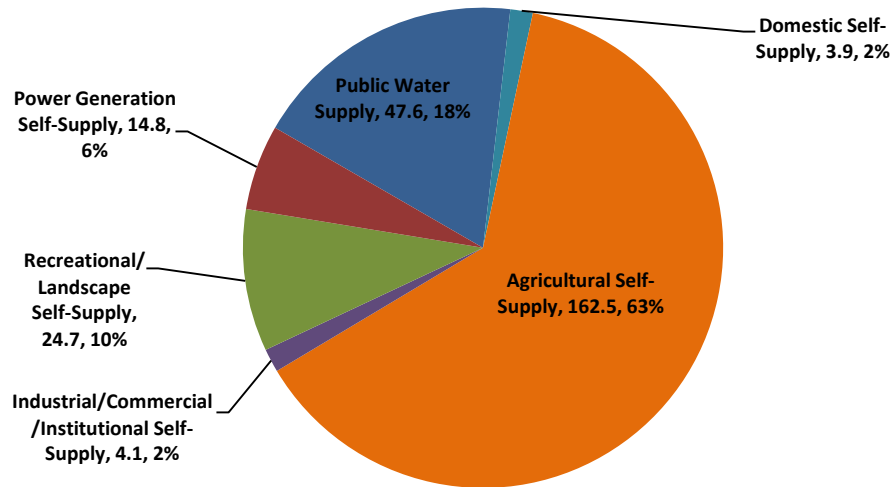
Facility Name	Water Demand Projections (MGD)							
	2010	2013	2015	2020	2025	2030	2035	2040
FPL Martin (Existing)	24.4	12.0	17.4	18.4	19.4	20.4	21.4	22.4
FPL Proposed	0.0	0.0	0.0	0.0	0.0	0.0	15.0	30.0
Treasure Coast Energy Center	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
UEC Planning Area Total	27.2	14.8	20.2	21.2	22.2	23.2	39.2	55.2

TOTAL PLANNING AREA DEMAND AND PLAN COMPARISONS

Total Planning Area Demand

This section summarizes the total net and gross water demands for each county as well as the entire UEC Planning Area for average rainfall and 1-in-10 year drought conditions. Gross water demands under average conditions for in the UEC Planning Area by water use category are represented in **Figure A-3** for the years 2013 and 2040. Gross water demands by county are provided in **Table A-33** for average rainfall conditions and **Table A-34** for 1-in-10 drought conditions.

**UEC Planning Area: 2013 Gross Demands Average
Conditions (MGD)**



**UEC Planning Area: 2040 Gross Demands Average
Conditions (MGD)**

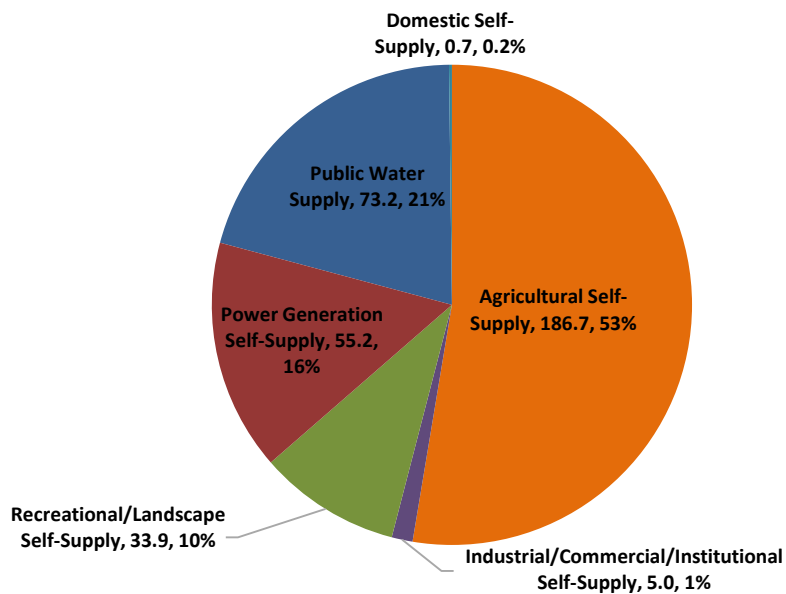


Figure A-3. UEC Planning Area: 2013 and 2040 gross demands average conditions (in MGD).

Table A-33. Summary of gross demand for average rainfall conditions by water use category between 2010 and 2040.

County	Water Use Category	Gross Water Demand-Average Rainfall Conditions (MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Public Water Supply	25.81	27.00	28.88	32.98	37.37	41.28	44.45	47.38
	Domestic Self-supply	3.39	2.71	1.93	1.61	0.72	0.11	0.10	0.10
	Agricultural Self-supply	78.88	82.04	81.21	79.55	80.83	82.10	85.24	90.24
	Industrial/Commercial/Institutional Self-supply	2.60	1.52	1.56	1.64	1.72	1.78	1.84	1.89
	Recreational/Landscape Self-supply	16.95	14.67	15.22	16.84	18.34	19.75	21.07	22.28
	Power Generation Self-supply	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
	St. Lucie Total	130.43	130.73	131.61	135.42	141.79	147.82	155.50	164.70
Martin	Public Water Supply	19.40	20.61	21.01	22.25	23.33	24.27	25.05	25.77
	Domestic Self-supply	1.56	1.10	0.79	0.65	0.58	0.58	0.58	0.58
	Agricultural Self-supply	64.08	68.49	77.55	77.29	78.09	79.04	80.94	83.79
	Industrial/Commercial/Institutional Self-supply	4.10	2.55	2.61	2.74	2.85	2.95	3.04	3.11
	Recreational/Landscape Self-supply	14.20	9.89	10.05	10.43	10.76	11.07	11.33	11.56
	Power Generation Self-supply	24.40	12.00	17.40	18.40	19.40	20.40	21.40	22.40
	Martin Total	127.74	114.64	129.41	131.76	135.01	138.31	142.34	147.21
NE Okeechobee	Public Water Supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Domestic Self-supply	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
	Agricultural Self-supply	16.89	11.93	11.78	11.83	11.94	12.17	12.39	12.62
	Industrial/Commercial/Institutional Self-supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Recreational/Landscape Self-supply	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Power Generation Self-supply	0.00	0.00	0.00	0.00	0.00	0.00	15.00	30.00
	NE Okeechobee Total	16.94	12.07	11.92	11.98	12.09	12.32	27.54	42.77
UEC Planning Area Total		275.12	257.45	272.95	279.15	288.89	298.45	325.38	354.68

Table A-34. Summary of gross demands for 1-in-10 year drought conditions by county between 2010 and 2040.

County	Water Use Category	Gross Water Demand-1-in-10 Drought Conditions							
		(MGD)							
		2010	2013	2015	2020	2025	2030	2035	2040
St. Lucie	Public Water Supply	30.12	31.51	33.71	38.48	43.61	48.18	51.87	55.29
	Domestic Self-supply	3.96	3.16	2.26	1.88	0.84	0.13	0.12	0.12
	Agricultural Self-supply	130.14	131.17	129.39	126.26	128.30	130.34	135.59	144.04
	Industrial/Commercial/Institutional Self-supply	2.60	1.52	1.56	1.64	1.72	1.78	1.84	1.89
	Recreational/Landscape Self-supply	21.19	18.38	19.08	21.10	22.98	24.74	26.39	27.91
	Power Generation Self-supply	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
	St. Lucie Total	190.81	188.54	188.79	192.16	200.26	207.96	218.61	232.05
Martin	Public Water Supply	23.09	24.53	25.00	26.48	27.76	28.88	29.81	30.67
	Domestic Self-supply	1.86	1.31	0.94	0.78	0.69	0.69	0.69	0.69
	Agricultural Self-supply	100.88	108.07	119.40	118.98	120.29	121.85	124.97	129.65
	Industrial/Commercial/Institutional Self-supply	4.10	2.55	2.61	2.74	2.85	2.95	3.04	3.11
	Recreational/Landscape Self-supply	19.23	13.38	13.59	14.10	14.56	14.98	15.32	15.64
	Power Generation Self-supply	24.40	12.00	17.40	18.40	19.40	20.40	21.40	22.40
	Martin Total	173.56	161.84	178.95	181.47	185.55	189.75	195.24	202.15
NE Okeechobee	Public Water Supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Domestic Self-supply	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	Agricultural Self-supply	22.42	16.20	15.98	16.07	16.23	16.56	16.88	17.21
	Industrial/Commercial/Institutional Self-supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Recreational/Landscape Self-supply	0.00	0.12	0.12	0.12	0.12	0.12	0.12	0.12
	Power Generation Self-supply	0.00	0.00	0.00	0.00	0.00	0.00	15.00	30.00
	NE Okeechobee Total	22.48	16.37	16.16	16.25	16.41	16.74	32.06	47.39
UEC Planning Area Total		386.85	366.75	383.89	389.88	402.21	414.45	445.91	481.59

Comparison of Projected Water Demands from the 2011 and 2016 UEC Plan Updates

Table A-35 shows the projected demands for the six use categories for the 2011 UEC Plan Update and this 2016 UEC Plan Update. The demands are shown for average year and 1-in-10 year drought conditions. The most significant differences between the demand estimates in the 2011 UEC Plan Update and this plan update relate to the following developments:

- ◆ Subsequent to final completion of the 2011 UEC Plan Update, population growth in the area slowed significantly. Concurrently, the consumption of potable water as measured by in gallons per person per day also declined. Reasons for this decrease in PWS consumption likely include long-term water conservation projects such as the SFWMD's Year-Round Landscape Irrigation Conservation Measures, increased use of reclaimed water, and new housing with more water-efficient fixtures and appliances.
- ◆ The primary reason for the rise in AGR demands between the two plans reflects the fact that irrigated pasture was not estimated as part of AGR under the 2011 UEC Plan Update but is now included in this water supply plan.
- ◆ The differences in the total REC demand is attributed to fewer golf courses in operation as well as an increase in the use of reclaimed water among the remaining courses in the Planning Area.

- The increase in PWR Self-Supply relates to the expected expansion of facilities that will meet future demands from population growth expected later within the planning horizon. These demands are not expected to arise until 2025 and the exact location of these facilities has not yet been determined by FPL. However, the continued trends in the use of alternative sources such as reclaimed water, seawater, and coastal brackish water for cooling purposes and improvements in process efficiencies (less water demanded per kilowatt-hour of energy produced) continue to grow.

Table A-35. End point projections of gross water demand under average rainfall and 1-in-10 year drought conditions in the 2011 UEC Plan Update and this update.

Water Use Category	2011 UEC Plan Update Demand for 2030 (MGD)	2016 UEC Plan Update Demand for 2040 (MGD)
Average Conditions		
Public Water Supply	96.4	73.2
Domestic Self-Supply	0.7	0.7
Agricultural Self-Supply ¹	137	186.7
Industrial/Commercial/Institutional Self-Supply	9.4	5.0
Recreational/Landscape Self-Supply	45.0	33.9
Power Generation Self-Supply	51.3	55.2
UEC Planning Area Total	339.7	354.7
1-in-10 Year Drought Conditions		
Public Water Supply	104.74	86.0
Domestic Self-Supply	0.51	0.9
Agricultural Self-Supply ¹	188	290.8
Industrial/Commercial/Institutional Self-Supply	9.4	5.0
Recreational/Landscape Self-Supply	57.95	43.7
Power Generation Self-Supply	51.3	55.2
UEC Planning Area Total	411.9	481.6

¹ Irrigated pasture was not included in the 2011 UEC Plan Update for AGR total but is part of the 2016 AGR total.

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Minimum Flows and Levels Criteria and Recovery and Prevention Strategies

Section 373.709, Florida Statutes (F.S.), requires each South Florida Water Management District (SFWMD or District) regional water supply plan to be based on at least a 20-year planning period and include, among other items, the minimum flows and levels (MFL) criteria and associated recovery or prevention strategies adopted within the planning region. The plan must also identify any surface water or aquifers for which MFLs are scheduled to be adopted. This appendix provides additional and updated information for the Upper East Coast (UEC) planning region since the development of the *2011 Upper East Coast Water Supply Plan Update* (SFWMD 2011).

MINIMUM FLOWS AND LEVELS CRITERIA

The overall goal of Chapter 373, F.S., is to ensure the sustainability of water resources of the state [Section 373.016, F.S.]. Chapter 373, F.S., provides the SFWMD with several tools to carry out this responsibility, including authority to establish MFLs. MFL criteria are flows or levels at which water resources or the ecology of the area would experience significant harm from further withdrawals. Significant harm is defined in Subsection 40E-8.021(31), Florida Administrative Code (F.A.C.), as the temporary loss of water resource functions, which results from a change in surface or ground water hydrology, that takes more than two years to recover, but which is considered less severe than serious harm. Significant harm is considered more severe than the no harm standard imposed in the water use permitting process, associated with a 1-in-10 year drought level of certainty. Therefore, MFLs in a recovered natural system would not be exceeded until rainfall conditions exceeded the 1-in-10 year drought level of certainty permitting criteria.

Serious harm, the ultimate harm to the water resources contemplated under Chapter 373, F.S., is defined as long-term, irreversible, or permanent loss to water resource functions. MFL water bodies approaching their MFL threshold criteria are factors the District Governing Board considers when contemplating water shortage restrictions. However, the MFL criteria are not utilized to trigger water shortage restrictions during climatic conditions less severe than a 1-in-10 year level of drought. The District Governing Board may impose water shortage restrictions if an MFL exceedance occurs, or is projected to occur, during climatic

conditions more severe than a 1-in-10 year drought, to the extent consumptive uses contribute to such exceedance.

MFL criteria are applied individually to affected water bodies and define the minimum flow or level for surface water bodies or minimum level for groundwater in aquifers. When establishing MFLs, the District Governing Board considers changes and structural alterations to watersheds, surface waters, and aquifers as well as the effects such changes or alterations have had, and the constraints such changes or alterations have placed on the hydrology of an affected watershed, surface water, or aquifer [Section 373.0421, F.S.].

The SFWMD developed water resource protection standards, consistent with legislative direction, that are implemented in phases to prevent various levels of harm (**Figure B-1**) Each standard plays a role toward achieving sustainable water resources. The role of MFL criteria is shown conceptually in **Figure B-1**.

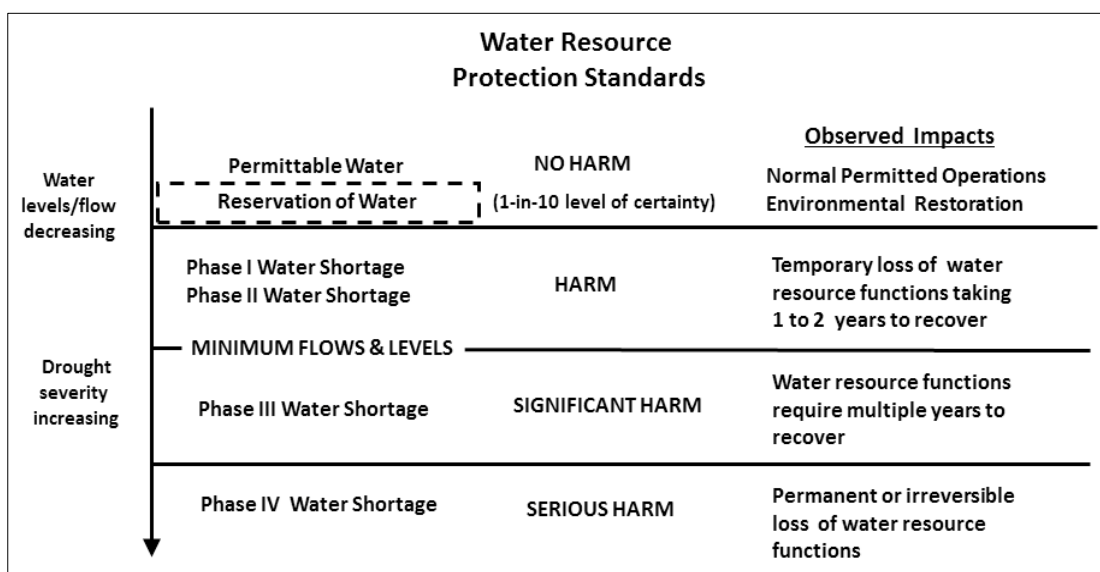


Figure B-1. Conceptual relationship among water resource protection standards at various levels of harm.

The water use permitting program protects water resources from harm by ensuring water use is reasonable-beneficial, does not interfere with existing legal users, and is consistent with the public interest. During the 2000 districtwide water supply planning process, rulemaking to incorporate additional resource protection criteria, level of certainty, special designations, and permit durations were recommended as part of the plan implementations. A series of rulemaking efforts was completed in September 2003, resulting in amendments to Chapters 40E-1, 40E-2, 40E-5, 40E-8, 40E-20, and 40E-21, F.A.C., and the *Applicant's Handbook for Water Use Permit Applications within the South Florida Water Management District* (Applicant's Handbook) (SFWMD 2015). Among the most significant changes were the amendments to permit duration, permit renewal criteria, wetland protection, supplemental irrigation requirements, saltwater intrusion, aquifer storage and recovery, and model evaluation criteria.

During this time, it was recommended that additional rulemaking should proceed when further information was available and evaluated in the planning process. As a result,

additional rules were adopted as technical information to establish MFL criteria became available. From 2001 through 2003, MFLs were adopted for the St. Lucie Estuary (SFWMD 2002a), Northwest Fork of the Loxahatchee River (SFWMD 2002b), and Lake Okeechobee (SFWMD 2000b) in the UEC Planning Area.

St. Lucie Estuary MFL

The St. Lucie Estuary, as defined in Rule 40E-8.021(29), F.A.C., and shown in **Figure B-2**, is the surface water body south of the confluence of the St. Lucie River North Fork and the C-24 Canal, north of the confluence of the St. Lucie River South Fork and the C-44 Canal, and west of the western boundary of the Intracoastal Waterway, exclusive of canals.

In 2002, the SFWMD adopted MFL criteria for the St. Lucie Estuary [Chapter 40E-8, F.A.C.]. The criteria are intended to protect its valued ecosystem components (VECs) from significant harm. A VEC can be defined as a species, community, or set of environmental conditions and associated biological communities that are considered to be critical for maintaining the integrity of an ecosystem. The valued ecosystem components identified for the St. Lucie Estuary include organisms inhabiting the low salinity oligohaline zone (submerged aquatic vegetation, phytoplankton, zooplankton, macroinvertebrates, and larval and juvenile fish and shellfish).

The MFL criteria for the St. Lucie Estuary were based on the determination that significant harm occurs to the oligohaline zone of the estuary when reduced net freshwater flows to the estuary are reduced. These circumstances can occur when freshwater deliveries to the North Fork of the St. Lucie River decline substantially. To ensure adequate freshwater deliveries to the North Fork, and to the downstream estuary, a minimum mean monthly flow criterion of 28 cubic feet per second (cfs) at the Gordy Road Structure was established. An MFL exceedance occurs when this minimum criterion is not met. An MFL violation occurs when the mean monthly flow at the Gordy Road Structure declines below 28 cfs, for two consecutive months, during a 365-day period, for two consecutive years.

A review of historical flow data obtained from the North Fork at the Gordy Road Structure, as shown in **Table B-1**, indicates that a violation of the MFL has not occurred since 2011, despite periods of drought in basins with surface water deficits. Modeling results indicate that groundwater is not a significant source of water to the North Fork of the St. Lucie River. Further details about the MFL for the St. Lucie River can be found at www.sfwmd.gov/mfls.

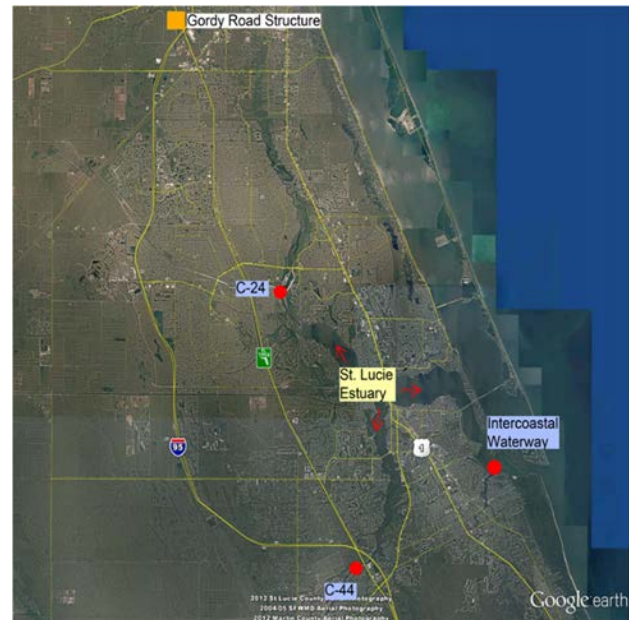


Figure B-2. St. Lucie Estuary.

Table B-1. Mean monthly flow (in cfs) measurements over the Gordy Road Structure.

Month	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	93.3	83.7	65.5	70.9	116.96	63.21	86.53	77.11	170.94
Feb	154.5	52.0	73.0	61.1	128.22	61.15	132.03	68.74	160.95
Mar	65.6	41.3	92.0	43.9	143.29	53.46	108.53	62.49	86.34
Apr	62.0	57.0	239.5	41.3	117.65	68.04	80.46	58.39	87.19
May	43.7	37.3	46.9	92.2	65.72	39.80	92.80	93.84	100.40
Jun	48.8	118.8	140.6	282.7	134.22	44.58	197.83	116.79	188.33
Jul	132.4	243.7	325.8	M	84.25	182.99	147.01	118.00	171.77
Aug	168.3	221.7	1,048.0	M	66.80	158.81	147.32	126.32	110.21
Sep	147.3	211.6	205.7	151.4	92.74	223.06	166.84	148.16	152.67
Oct	39.8	341.4	316.3	64.2	45.92	209.78	175.59	103.29	120.42
Nov	90.8	135.5	96.0	48.8	42.05	131.77	82.77	68.89	96.43
Dec	131.3	72.1	80.9	141.9	42.83	141.18	68.94	119.87	110.67

M = data were missing from DBHYDRO database.

Northwest Fork of the Loxahatchee River MFL

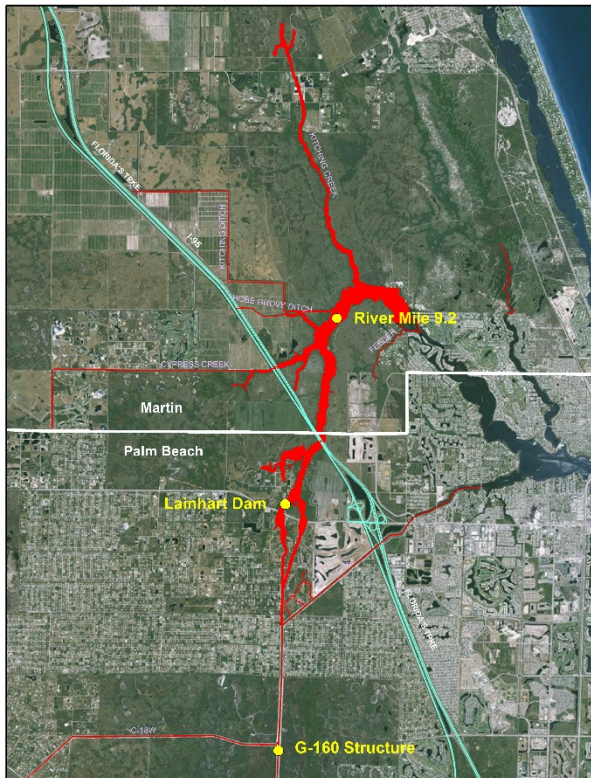


Figure B-3. Northwest Fork of the Loxahatchee River.

The Loxahatchee River and Estuary (**Figure B-3**) and its upstream watershed are located along the southeastern coast of Florida within the Lower East Coast (LEC) and UEC planning areas. The watershed connects to the Atlantic Ocean via the Jupiter Inlet and partially flows into Martin County. The Loxahatchee River is referred to as the “last free flowing river in southeastern Florida” and represents one of the last vestiges of native cypress river swamp within southeastern Florida. In 2003, SFWMD adopted MFL criteria for the Northwest Fork of the Loxahatchee River [Subsection 40E-8.221(4), F.A.C.]. The MFL criteria for the Northwest Fork include a minimum flow of 35 cfs over Lainhart Dam and an average daily salinity less than or equal to 2 at river mile 9.2. An MFL exceedance occurs when flows decline below 35 cfs for more than 20 consecutive days or salinity, expressed as 20-day rolling average, exceeds 2 parts per thousand (ppt) at river mile 9.2. An MFL violation occurs when an exceedance occurs more than once in a 6-year period.

Since the 2011 UEC Plan Update was approved, two MFL violations have occurred: a flow violation in February 2011 (flow less than 35 cfs for more than 20 consecutive days) and a salinity violation in May 2011 (20-day rolling average salinity exceeded 2 ppt at river mile 9.2). In evaluating these violations, consideration should be given to the fact that the Northwest Fork is in a recovery status and MFL violations are anticipated until the facilities that are part of the recovery strategy are fully constructed and operational. Flows were hindered during this period by a lack of sufficient water conveyance infrastructure and regional storage facilities. While construction of needed facilities is underway, construction is not complete and the facilities will not be fully functional for several years. Also, climatic conditions during this period were extreme. A review of climatic conditions shows that 2011 was the warmest calendar year on record, spring 2011 was unusually warm and the period from October 2010 through May 2011 was the driest on record. Further details about the MFL for the Northwest Fork of the Loxahatchee River can be found at www.sfwmd.gov/mfls and in the *2013 Lower East Coast Water Supply Plan Update* (SFWMD 2013).

Lake Okeechobee MFL

The largest lake in the southeastern U.S., Lake Okeechobee (**Figure B-4**) is a central component of the hydrology and environment of south Florida. Lake Okeechobee receives water from a 5,400-square mile watershed that includes the Kissimmee Chain of Lakes,



Figure B-4. Lake Okeechobee.

Kissimmee River, Lake Istokpoga, Fisheating Creek, and other drainage basins. Lake surface water can be delivered south to the Everglades Protection Area, east to the St. Lucie River (C-44 Canal), and west of the Caloosahatchee River (C-43 Canal).

An MFL criterion of 11 feet National Geodetic Vertical Datum (NGVD) was adopted for Lake Okeechobee in 2001 (Subsection 40E-8.221(1), F.A.C.). An MFL exceedance occurs when the lake level is below 11 feet NGVD for more than 80 consecutive or non-consecutive days during an 18-month period. When accessing compliance with the MFL, the 18-month period analyzed cannot include more than one wet season (May 31 through October 31). An MFL violation occurs when an exceedance happens more than once every 6 years. The Lake Okeechobee MFL criterion was based on the relationship between water levels in the lake and the ability to protect the

coastal aquifer against saltwater intrusion, supply water to Everglades National Park, provide littoral zone habitat for fish and wildlife, and ensure navigational and recreational access (SFWMD 2000a). Consideration was given to the lake's function as a storage area for supplying water to adjacent areas such as the Everglades Agricultural Area, the Seminole Tribe of Florida reservations, and the Lake Okeechobee Service Area (LOSA).

Lake Okeechobee is subject to a recovery strategy and climatic conditions in 2011 were extreme, with record-breaking temperatures and drought conditions. A lake level violation occurred in July 2011. Further details about the MFL for Lake Okeechobee can be found at www.sfwmd.gov/mfls and in the *2013 Lower East Coast Water Supply Plan Update* (SFWMD 2013).

Revised Lake Okeechobee Regulation Schedule Effects

In 2000, with the transition to the Water Supply and Environment regulation schedule, an analysis was conducted to determine whether the proposed Lake Okeechobee MFL criteria could be expected to be violated over the next 20 years. This information was needed to assess whether a prevention or recovery strategy would be needed for Lake Okeechobee. The South Florida Water Management Model was used to evaluate the proposed MFL criteria in 5-year increments through 2020. The analysis considered projected growth in water use demands on the lake, the scheduled delivery and performance of the Central and Southern Florida Flood Control Project Comprehensive Review Study project components (U.S. Army Corps of Engineers [USACE] and SFWMD 1999), and the Water Supply and Environment regulation schedule proposed for the lake. Details regarding the modeling analysis are available in the *2000 Lower East Coast Water Supply Plan* (SFWMD 2000a).

Under these assumptions, the SFWMD found the proposed Lake Okeechobee MFL criteria would not be violated, and existing as well as projected users would have a 1-in-10 year drought level of certainty provided the water shortage trigger line for Lake Okeechobee that existed in 2000 [Chapter 40E-22, F.A.C.] was lowered 0.5 feet. The proposed Water Supply and Environment regulation schedule was adopted by the USACE in July 2000. The SFWMD conducted rulemaking to modify the water shortage trigger line and adopted the Lake Okeechobee MFL criteria with the associated prevention strategy in 2001.

However, in response to a series of hurricanes, high lake stage events, and the resulting high discharges to the Caloosahatchee and St. Lucie estuaries during 2004 and 2005, the USACE initiated a process to revise the Water Supply and Environment regulation schedule to improve management of Lake Okeechobee during high water conditions. The goals of the regulation schedule modification process—known as the Lake Okeechobee Regulation Schedule Study—were later amended to address public health and safety concerns related to the structural competency of the Herbert Hoover Dike. In July 2007, after extensive public participation, the USACE published the Final Environmental Impact Statement Including Appendices A through G – Lake Okeechobee Regulation Schedule (LORS) (USACE 2007). The 2008 LORS would effectively reduce lake stages until the completion of Herbert Hoover Dike repairs for Reaches 1, 2, and 3.

In developing the environmental impact statement, the SFWMD and the USACE conducted modeling to evaluate the effects of the proposed regulation schedule in terms of frequency, duration, and severity of water shortage cutbacks, and the lake's MFL performance. Results of the modeling indicated that while the regulation schedule would effectively provide protection for public health and safety, the Lake Okeechobee MFL criteria were projected to be violated and existing legal uses were projected to experience significantly greater water shortage cutbacks. Attempts to mitigate the impacts to existing legal users of Lake Okeechobee water were evaluated, including the use of portable water supply pumps (to access lake water at lower stages) and dropping the water shortage trigger line an additional foot. While lowering the water shortage trigger line would reduce the duration and severity of water shortage cutbacks associated with the proposed schedule, the SFWMD rejected it as an option because it was found that lowering it was inconsistent with the MFL criteria. Despite the increased water shortage impacts to existing legal users, the protection of public safety as related to the structural integrity of the Herbert Hoover Dike was the overarching factor. The USACE issued its record of decision approving the 2008 LORS on April 28, 2008.

Because of the change in schedule, it became necessary to change the prevention strategy for the lake to a recovery strategy. Simultaneously, the District amended the LEC Plan Update to include a recovery strategy for Lake Okeechobee, which is described in detail in the following section. While the 2008 LORS is temporary, it is unclear when a revision can be made or what the new schedule will entail.

RECOVER AND PREVENTION STRATEGIES

Section 373.0421, F.S., requires the water management districts to develop and expeditiously implement a recovery or prevention strategy for water bodies currently violating, or expected to violate, the MFL criteria. Rule 62-40.473, F.A.C., requires adoption of recovery and prevention strategies simultaneously with MFL adoption. Analyses of current and future conditions are conducted for each water body for which MFL criteria are defined. MFL recovery strategies are developed when the evaluation indicates MFL criteria are not currently being met or will not be met in the future. MFL prevention strategies are developed when evaluations demonstrate the MFL criteria are not currently being violated and are not expected to be violated for the next 20 years. The recovery or prevention strategy must include a list of projects that develop additional water supplies and other actions. The phasing or timetable for each project must be included within the strategy. Section 373.0421(2), F.S., in part, provides the following:

The recovery or prevention strategy shall include phasing or a timetable which will allow for the provision of sufficient water supplies for all existing and projected reasonable-beneficial uses, including development of additional water supplies and implementation of conservation and other efficiency measures concurrent with, to the extent practical, and to offset, reductions in permitted withdrawals, consistent with the provisions of this chapter.

Section 373.709, F.S., requires regional water supply plans to contain recovery and prevention strategies needed to achieve compliance with MFLs during the planning period. These strategies may include development of additional water supplies and implementation of conservation and other efficiency measures. The implementation of projects will allow for the orderly replacement or enhancement of existing water sources with alternative supplies to provide sufficient water for all existing and projected reasonable-beneficial uses consistent with Section 373.0421, F.S.

The following sections discuss the MFL recovery and prevention strategies developed for MFL water bodies relevant to the UEC Planning Area. The strategies include a prevention strategy for the St. Lucie Estuary [Subsection 40E-8.421(5), F.A.C.] and recovery strategies for Lake Okeechobee [Subsection 40E-8.421(2), F.A.C.] and the Northwest Fork of the Loxahatchee River [Subsection 40E-8.221(4), F.A.C.]. Recovery and prevention strategies consist of multiple components that may fall within the following elements: 1) capital projects, 2) regulatory, 3) water shortage, and 4) environmental projects. Additional information concerning the MFL prevention and recovery strategies can be found in Rule 40E-8.421, F.A.C.

Capital Projects Element

Projects have been identified for water bodies in the UEC Planning Area that will provide water to meet MFL criteria, some of which have been completed and are operational. The scale of these projects ranges from relatively simple water control structures to overall rehabilitation of the Herbert Hoover Dike. Multiple agencies support the projects, including Comprehensive Everglades Restoration Plan (CERP) projects, USACE projects, and SFWMD initiatives and programs. Details and the status of projects and programs identified can be found in Chapter 4.

Regulatory Element

Where a recovery strategy has been established for an MFL water body, existing permitted allocations will not be modified or revoked prior to permit expiration unless a new or alternative source is in place and operating to supply the water historically provided from the MFL water body or the permit use changes. For new water use permit applications, the permittees are required to comply with all conditions of issuance. When existing permits are renewed or modified, the modifications are based on conditions at issuance. The rules implementing water resource protection tools, including Chapters 40E-2 and 40E-8, F.A.C., and the Applicant's Handbook (SFWMD 2015), identify the specific factors and conditions that will be applied to evaluate consumptive uses making withdrawals from MFL water bodies.

Water Shortage Element

Water use cutbacks during conditions exceeding a 1-in-10 year drought (i.e., phased water shortage restrictions to prevent serious harm) can be implemented to minimize or avoid MFL criteria being exceeded, to the extent consumptive uses contribute to such exceedance. The SFWMD may impose water shortage declarations to curb water use withdrawals pursuant to Sections 373.175 and 373.246, F.S.

The SFWMD implements its water shortage authority by restricting water uses based on the concept of shared adversity between users and the water resources [Chapters 40E-21 and 40E-22, F.A.C.]. Under this program, different levels or phases of water shortage restrictions with varying levels of severity are imposed relative to drought conditions. The four phases of water shortage restrictions are based on progressively increasing resource impacts leading up to serious harm. Under the current program, Phases I and II primarily reduce water use through conservation techniques and minor use restrictions that affect all users, including residential, commercial/industrial, landscape/recreation, and agriculture. While each phase has cutbacks for irrigated lands, Phases III and IV, require use cutbacks associated with increased likelihood of more significant economic impact to the users such as the potential for crop and turf damage due to irrigation restrictions.

Established MFLs are considered in the evaluation of current water conditions [Subsection 40E-21.221(3)(d), F.A.C.], and as one of the criteria for imposing water use restrictions [Subsection 40E-21.271(3)(d), F.A.C.]. This plan update does not propose use of Chapter 40E-21, F.A.C., as an MFL recovery strategy nor does Chapter 40E-8, F.A.C. However, when a drought occurs, the SFWMD will rely on the water shortage plan of Chapter 40E-21, F.A.C., as needed to address regional system water availability. To the extent practicable, the

SFWMD attempts to implement water deliveries to reduce or prevent the MFL criteria from being exceeded. For example, Lake Okeechobee operational guidelines needed to implement water supply deliveries to avoid MFL exceedances, in concert with meeting other required water demands, are identified in the *Final Adaptive Protocols for Lake Okeechobee Operations* (SFWMD 2010).

Environmental Element

As part of this element, operational protocols and habitat enhancement projects are implemented to improve flows and levels, mitigate impacts from flow or level extremes, and protect key habitats. Periodic assessment of flows and levels as well as monitoring vegetation and infauna populations may be included to assess the effects of MFLs and to ensure sufficient water is available from the regional system.

SPECIFIC RECOVERY AND PREVENTION STRATEGIES

St. Lucie Estuary Prevention Strategy

A prevention strategy for the St. Lucie Estuary [Subsection 40E-8.421(5), F.A.C.] was adopted simultaneously with the MFL rule to minimize the likelihood that a violation of the estuary's MFL criteria would occur in the future. Based on an evaluation of future demands associated with this MFL water body, the MFL criteria are not anticipated to be exceeded in the next 20 years. The prevention strategy for the St. Lucie Estuary consists of the following major components:

- ◆ Discharges from the North Fork will be managed within the operational protocols of the Ten Mile Creek Project
- ◆ Flow targets will be consistent with the CERP performance requirements for Indian River Lagoon as part of the CERP Indian River Lagoon – South (IRL-S) Project
- ◆ A research and monitoring strategy for the North and South Forks of the St. Lucie River will be developed and implemented in coordination with the UEC Plan Update

Capital Project Element

Ten Mile Creek Water Preserve Area

The Ten Mile Creek Water Preserve Area (WPA) (**Figure B-5**) is located in St. Lucie County near Fort Pierce adjacent to Ten Mile Creek, a tributary to the North Fork of the St. Lucie River. The Ten Mile Creek WPA consists of a 526-acre water storage area and 132-acre polishing cell, and was originally constructed by the USACE under the Water Resources Development Act of 1996. Currently, the U.S. Senate 2016 Appropriations Bill has a provision



Figure B-5. Ten Mile Creek Water Preserve Area.

to de-authorize the project and return operation and maintenance responsibilities to the SFWMD. The proposed project will eventually provide up to 4 feet of storage. The Ten Mile Creek WPA is designed to assist in controlling the quantity and timing of water deliveries to the St. Lucie River, help establish a more natural freshwater flow pattern to the St. Lucie River, provide up to 2,515 acre-feet of static storage, and improve water quality by moving water from the water storage area through the polishing cell prior to discharge back into Ten Mile Creek.

CERP Indian River Lagoon – South Project

CERP is one of the largest environmental restoration programs in history. Congress authorized CERP in 2000, and the plan serves as a framework for modifications and operational changes to the Central and Southern Florida Flood Control Project (C&SF Project) to restore, preserve, and protect the land and water within the boundary of the SFWMD while providing for other water-related needs of the region. The USACE is the lead federal agency and the SFWMD is the lead state agency for this multi-decadal effort.

The USACE and SFWMD jointly implement CERP, a 50-50 cost share plan that includes the planning and design of projects. The CERP IRL-S Project is included in the integrated delivery schedule and is located within the UEC Planning Area. Based on the current CERP integrated delivery schedule, the C-23 and C-24 components of the IRL-S Project are scheduled for design in 2018 and construction after 2020.

Structural changes proposed for the watershed as part of the CERP IRL-S Project Implementation Report (USACE and SFWMD 2004) are designed to provide additional retention basins (above-ground reservoirs), improved water conveyance facilities, and operational strategies within the watershed. The changes are expected to capture, store, and attenuate excess water previously discharged directly to tide and redistribute this water northward via its historical flow pathways to be discharged down the St. Lucie River to the North Fork and South Fork. The objectives of the retention basins are to help reduce the volume and frequency of damaging freshwater discharges to the St. Lucie Estuary, and restore a more natural volume, timing, and distribution of freshwater flow to the estuary, enhancing the opportunity for recovery of estuarine biota. Section 7.8.6 of the Final IRL-South Project Implementation Report and EIS (2004) stated the “SFWMD and USACE staff will need to develop processes that can allow non-traditional involvement of private interest while maintaining compliance with existing procurement regulations protecting fair and unbiased contracting procedures.”

The CERP IRL-S Project Implementation Report (USACE and SFWMD 2004) details five features and operational modifications that together are expected to achieve the project’s stated objectives:

- 1) Reservoirs
- 2) Stormwater treatment areas
- 3) Natural storage and treatment areas, including restoration within the North Fork floodplain
- 4) Diversion
- 5) Muck removal and the creation of artificial habitat within the estuary

The general location of the CERP IRL-S Project and its major components are shown in **Figure B-6**. Once constructed and in operation, six of the project features will convey water

to the North Fork of the St. Lucie River to restore more natural volume, timing, and distribution of water, which will help meet the downstream estuary's MFL criteria. The six components as well as the remaining components of the IRL-S project are described in the following subsections.

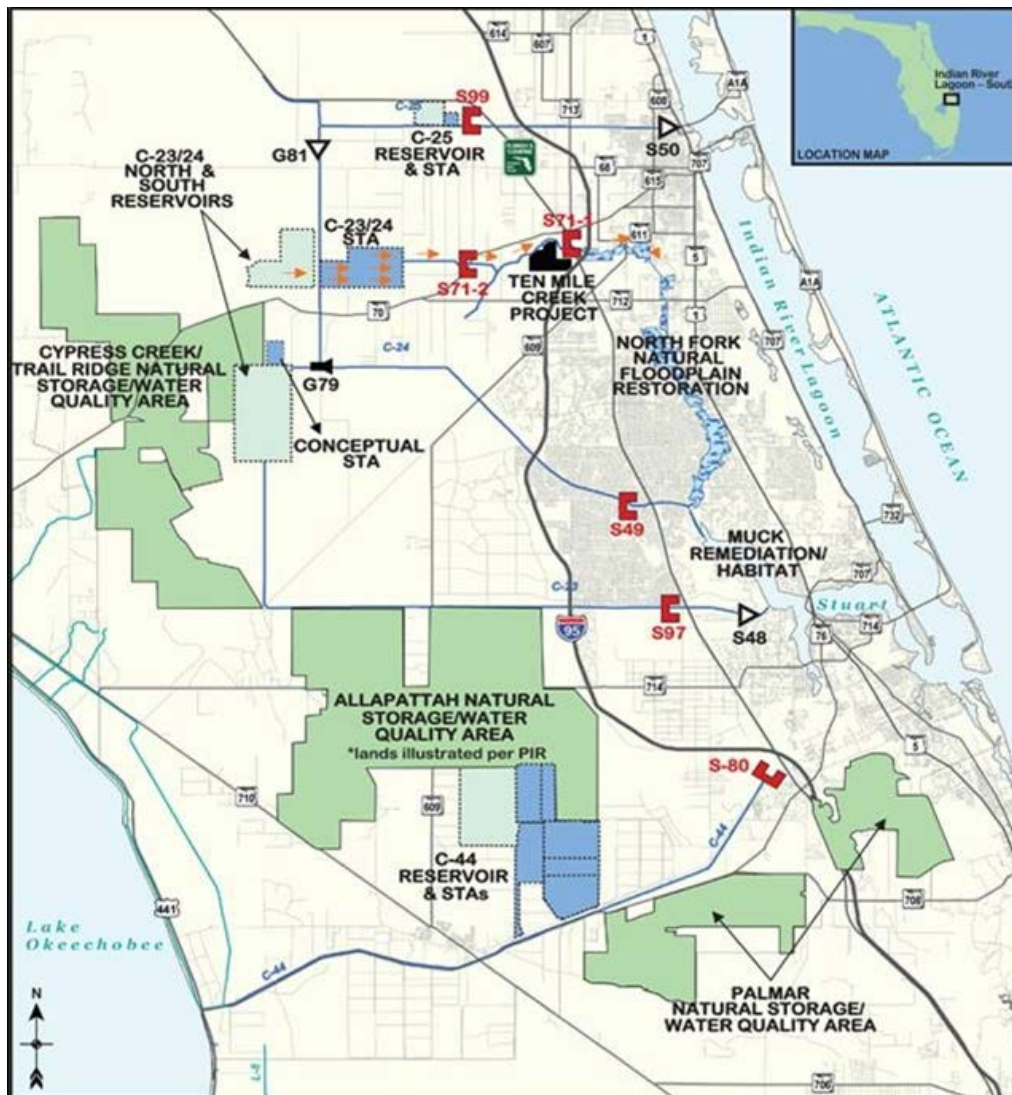


Figure B-6. St. Lucie Watershed and proposed Indian River Lagoon – South Project components.

C-23/C-24 North Reservoir and C-23/C-24 South Reservoir

The C-23/C-24 North and South Reservoirs will capture water from the C-23 and C-24 canals, reducing the extreme peaks of freshwater discharge to the estuary and delivering water to meet fish and wildlife needs. Water stored in the reservoirs could be available to agriculture, which would reduce dependency on well water from the FAS (USACE and SFWMD 2004).

Stormwater Treatment Areas

A Stormwater Treatment Area (STA) will be built to treat water from the C-23/C-24 North and South Reservoirs. Operation of the C-23/C-24 STA is expected to reduce sediment,

phosphorus, and nitrogen deliveries to the estuary and allow restoration of estuarine water quality. Construction and operation of the STA in conjunction with the reservoirs is essential for delivering water of adequate quality for the restoration of this portion of the Greater Everglades ecosystem.

C-25 Reservoir

An above-ground reservoir capable of storing approximately 5,400 acre-feet on 741 acres as well as an STA of 163 acres, designed to capture the first 0.4 inches of runoff from the C-25 and Fort Pierce Farms basins. A reservoir location is identified on the north side of the C-25 Canal and adjacent to the S-99 structure. Water captured in the reservoir is to be delivered back to the IRL at Fort Pierce Inlet or could be made available to augment water supply.

Diversions

Diversion of existing flows via a canal connection as well as operating rules on new reservoirs and STAs will reduce the negative impacts of flows to the mid-estuary and provide for a more natural freshwater flow pattern to the North Fork of the St. Lucie River. Discharges from the C-24 outlet (S-49) will shift to the North Fork through the associated C-23/C-24 STA outlet. This northerly diversion will direct approximately 64,500 acre-feet of water from the C-23 and C-24 basins into the North Fork. This redirected water will provide increased dry season flows to the North Fork of the St. Lucie River and downstream estuary. Residual C-23 flows greater than natural system flows through Basin 4 will be directed to the C-44 Reservoir, STAs, and canal via the new proposed canal before discharge to the estuary through the S-80 structure.

Natural Storage and Treatment Areas, North Fork Floodplain Restoration

Approximately 92,130 acres disturbed by land use practices were identified within the C-23, C-24, and C-44 basins for acquisition and restoration. The planned natural storage and water quality areas include the Pal-Mar Complex, Allapattah Complex, and Cypress Creek/Trail Ridge Complex. By restoring hydrologic conditions through the modification of on-site drainage features, these natural lands are expected to provide approximately 30,000 acre-feet of water storage within the watershed through retention in natural wetland systems. These lands also are expected to improve water quality by reducing the amount of nutrient loading currently caused by large amounts of runoff. Additionally, the project includes preserving approximately 3,100 acres of floodplain wetlands and low-salinity habitat within the North Fork of the St. Lucie River. Preserving this portion of the river will provide additional water storage, maintain wading bird habitat, improve water quality, and protect areas that serve as nurseries for larval and juvenile fishes.

C-44 (St. Lucie Canal) Reservoir and STA

This component project of the CERP IRL-S Project consists of a 3,400-acre aboveground reservoir, capable of storing 50,600 acre-feet of water, and 6,300 acres of STA divided into six cells that will operate independently. The project is located in central Martin County on the north side of the C-44 Canal. It is intended to capture, store, and treat flood runoff from the C-44 Basin prior to its discharge back to the C-44 Canal and ultimately to the St. Lucie Estuary. Implementation of this project is expected to reduce damaging freshwater

discharges, decrease nutrient loads, and maintain desirable salinity regimes within the St. Lucie Estuary and Indian River Lagoon. The SFWMD has acquired all of the required land and has completed the design for the project. Various construction contracts to implement the project have been underway since 2010.

In late 2010, the SFWMD completed realignment of Troup Indiantown Water Control District drainage and irrigation features to prepare the site for project construction. This allowed the drainage district to maintain autonomy by providing a separation from the project lands. A final contract to provide a permanent pumping station for the Troup Indiantown Water Control District will be initiated in Fiscal Year (FY) 2016. In 2011, the USACE initiated the first major contract (Contract 1) for the C-44 project: constructing the project's intake canal and access road, including the Citrus Boulevard Bridge, the C-133 Canal, and the eastern access roads. In 2012, the SFWMD initiated construction of the project communication tower; construction was completed in December 2013. Contract 1 construction was completed by the USACE in July 2014. SFWMD currently has two active construction contracts for the C-44 project. The system discharge structure and canal were completed in November 2015. Additionally, contractors are constructing the STA (to be completed in August 2017) and the reservoir pump station (to be completed in September 2018). The USACE will initiate construction of the 3,400-acre reservoir in October 2015, and construction of the entire project is expected to be completed in 2020 (federal and state funds are used for this project). Additional information on the C-44 Reservoir and STA is available at http://bit.ly/C-44_IRLS.

Water Reservation Rule for the North Fork of the St. Lucie River

The CERP IRL-S Project was authorized by Congress in the Water Resources Development Act of 2007. To initiate construction of this federal project as part of CERP, the SFWMD was required to reserve or allocate water for the natural systems associated with implementation of the project. A prospective water reservation rule [Chapter 40E-10, F.A.C.] was adopted in 2010 by the SFWMD for the North Fork of the St. Lucie River to fulfill its commitments to the CERP IRL-S Project. The purpose of the prospective water reservation is to ensure that the CERP IRL-S Project provides the intended benefits for the natural system, which requires the identification of water for the natural system, including water to be reserved or allocated. The prospective reservation was completed in advance of the projects being constructed to ensure the water needed for these future projects is protected for fish and wildlife.

The District used a resource-based approach to develop the water reservation rule for the North Fork of the St. Lucie River. The water reservation rule was based on information contained in a District technical publication titled *Technical Document to Support a Water Reservation Rule for the North Fork of the St. Lucie River* (SFWMD 2009), which is available at www.sfwmd.gov/mfls. This information was used to establish relationships among freshwater flows discharged from the watershed, salinity, and downstream estuarine ecological response. Technical evaluations included a summary of the available literature, review of empirical data, and development of watershed and hydrodynamic models that were used to define hydrologic targets for the river and quantify the volume of available water produced by the project. An independent expert panel reviewed the publication and related documents to determine if best available technical information supports the relationship between water supply projections resulting from the completed CERP project and water supply reserved to protect fish and wildlife in the North Fork. The water reservation is a mean monthly flow of 130 cfs over the Gordy Road structure from November 1 through May 31 of each year (Section 40E-10.051, F.A.C.). Results of the technical analysis showed that once all

the components of the project are constructed, the CERP IRL-S Project will have the ability to provide dry season mean monthly flows that equate to 130 cfs discharged over the Gordy Road Structure to the North Fork of the St. Lucie River.

Environmental Element

Ongoing research and monitoring are conducted in the estuarine portions of the St. Lucie Estuary (North and South Forks of the St. Lucie River), including monitoring populations of oysters, benthic infauna, and submerged aquatic vegetation as well as collecting associated water quality, flow, and salinity data as part of the CERP Restoration Coordination and Verification (RECOVER) program. A key component of RECOVER is the Monitoring Assessment Plan, which was implemented to determine how well CERP is meeting restoration goals and objectives.

Oyster Monitoring

Oysters are excellent indicators of system health because salinity conditions suitable for oysters produce optimal conditions for a suite of other desirable estuarine organisms. Also, given their sedentary nature, it is easy to determine cause-and-effect relationships between water quality and health of oysters. Five aspects of oyster ecology are being monitored in the St. Lucie Estuary: 1) density of adult oysters, 2) reproduction and recruitment, 3) juvenile oyster growth and survival, 4) physiological condition as measured by condition index, and 5) distribution and frequency of the oyster diseases dermo (*Perkinsus marinus*) and multinucleate sphere x (MSX) (*Haplosporidium nelsoni*) (RECOVER 2012).

One of the goals of CERP is restoring hydrology in the northern estuaries of the Everglades, including the St. Lucie Estuary, to improve the spatial and structural characteristics of oyster reefs and improve recruitment and survivorship of oysters and associated fauna (Volety et al. 2009). Restoration success or failure related to the oyster indicator can be evaluated by comparing recent monitoring efforts, future trends, and health status of oyster reefs in the northern estuaries, unaltered or control estuaries, and model predictions (e.g., Habitat Suitability Index), as stated in the CERP hypotheses related to oysters (Volety et al. 2009).

Benthic Infauna Monitoring

Benthic infaunal communities (worms and mollusks that live in the soft sediment on the estuary bottom) are predominately stationary and therefore continuously exposed to changes in the environment. This characteristic is one of the main reasons why benthic infaunal monitoring is regarded as a good tool for evaluating the health and long-term changes within the marine environment. The main objectives of this monitoring are to evaluate the present health status of the St. Lucie Estuary, determine the cause of long-term changes, pinpoint and evaluate anthropogenic disturbances, and calculate a health index for each monitored site in order to track change over time (RECOVER 2012).

Submerged Aquatic Vegetation Monitoring

Historically, natural freshwater discharges facilitated the presence of healthy floral and faunal communities, including submerged aquatic vegetation, which is a key indicator of restoration success (RECOVER 2012). As development increased, however, management

practices resulted in coastal areas with frequent high and low salinity extremes and degraded ecology. This monitoring effort aims to collect baseline data, quantify relationships between freshwater discharges and subsequent salinity and water quality patterns, and quantify how salinity and water quality patterns in turn impact submerged aquatic vegetation distribution, community structure, and variability.

Further details about the prevention strategy for the St. Lucie Estuary can be found at www.sfwmd.gov/mfls.

Lake Okeechobee Recovery Strategy

As previously discussed, implementation of the 2008 LORS is projected to result in MFL violations. As a result, the MFL recovery strategy is used to mitigate impacts of MFL violations during drought conditions and, depending on the USACE's lake regulation schedule in effect, minimize or avoid MFL violations.

When repairs to the Herbert Hoover Dike are complete and the lake's regulation schedule is revised, the resulting schedule is expected to raise lake levels. The additional water held in the lake is expected to return the lake from recovery status to prevention status, enhance the level of certainty to existing permitted users now receiving less than 1-in-10 level of certainty, and support environmental objectives. While the 2008 LORS is temporary, it is unclear when a revision can be made to the regulation schedule or what the revised schedule will entail. In the meantime, the recovery strategy will remain in effect until the MFL criteria is met pursuant to Section 373.0421, F.S. Further details about the recovery strategy for Lake Okeechobee can be found at www.sfwmd.gov/mfls and in the *2013 Lower East Coast Water Supply Plan Update* (SFWMD 2013).

Northwest Fork of the Loxahatchee River Recovery Strategy

An MFL recovery strategy [Subsection 40E-8.421(6), F.A.C.] was adopted simultaneously with the MFL rule for the Northwest Fork of the Loxahatchee River. The recovery strategy includes implementation of structural improvements, operational protocols, and regulatory activities. These strategies are intended to allow the water body to meet the MFL criteria as soon as practicable. Further details about the recovery strategy for the Northwest Fork of the Loxahatchee River can be found at www.sfwmd.gov/mfls and in the *2013 Lower East Coast Water Supply Plan Update* (SFWMD 2013).

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C

Potable and Wastewater Treatment Facilities

POTABLE WATER TREATMENT FACILITIES

Potable water used in the Upper East Coast (UEC) Planning Area is produced by large water treatment facilities, smaller “package” water treatment facilities, and self-supply (i.e., private wells supplying individual users). This appendix focuses on large facilities with average pumpages greater than or equal to 0.1 million gallons per day (MGD).

Descriptions of Existing Water Facilities

Raw water withdrawal sources in the UEC Planning Area include water from the surficial aquifer system (SAS) and Floridan aquifer system (FAS). **Table C-1** presents summary descriptions for each of the potable water treatment facilities located in the UEC Planning Area. **Figures C-1** and **C-2** show the locations of potable water treatment facilities in Martin County and St. Lucie County, respectively.

Additional information about each Public Water Supply (PWS) utility is available from <http://www.sfwmd.gov> under consumptive water use permits.

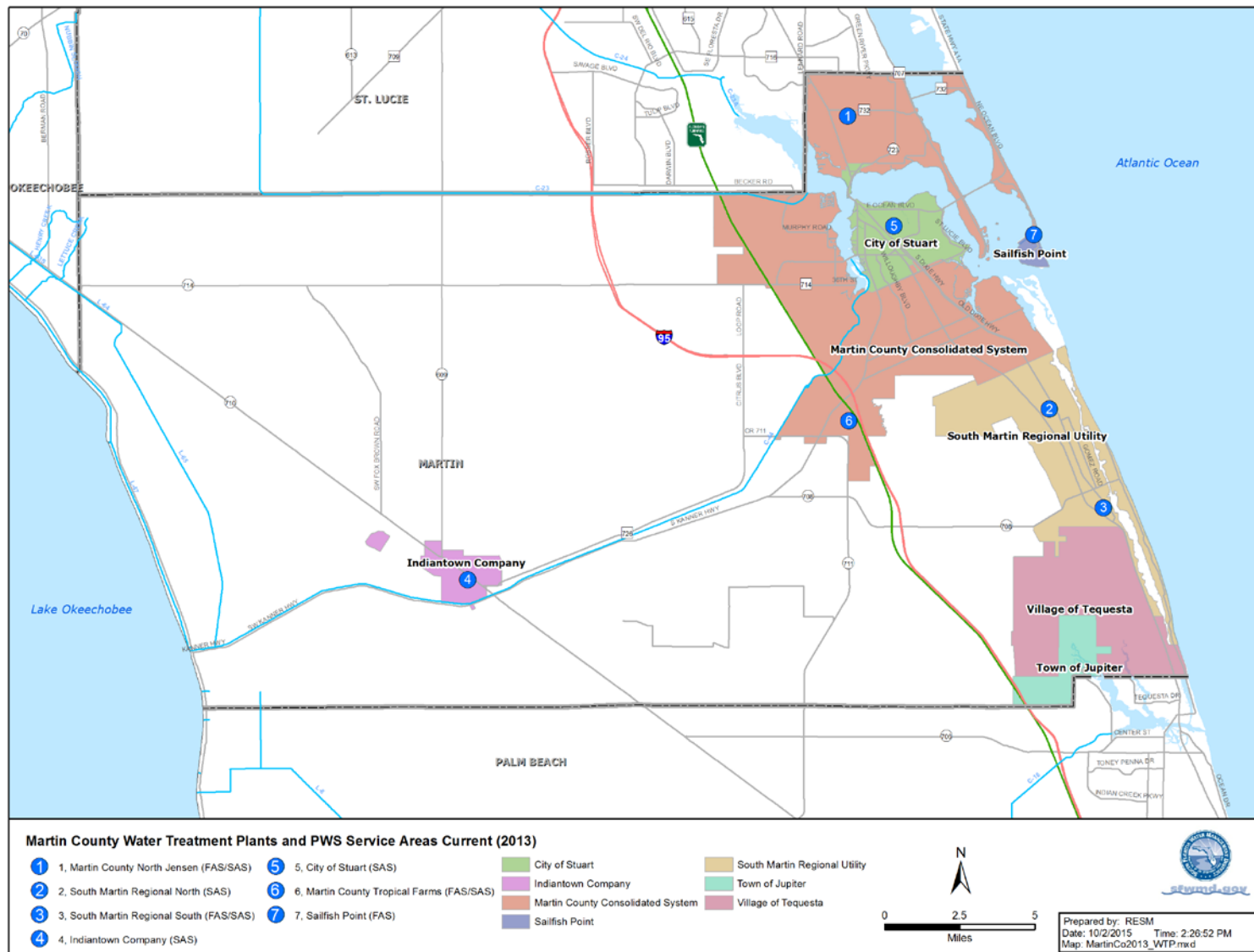
Table C-1. Potable water treatment facilities in the UEC Planning Area.

Supply Entity	SFWMD			Withdrawal Sources		FDEP	
	Permit Number ^a	Permit Expiration	Annual Allocation (MGD)	Surficial Aquifer System (MGD)	Floridan Aquifer System (MGD)	Permit Number ^a	Rated Capacity (MGD)
Martin County							
Indiantown Company	43-00041-W	2028	1.18	1.18	0.00	4430667	1.30
Martin County Utilities and Solid Waste Dept.	43-00102-W	2035	21.00	4.42	15.09	4431891	22.93
Sailfish Point	43-00146-W	2022	0.22	0.00	0.22	4434000	0.35
South Martin Regional Utility	43-00066-W	2032	8.64	4.83	4.76	4430624	8.14
Stuart, City of	43-00053-W	2029	3.67	3.67	0.00	4430259	6.00
St. Lucie County							
Fort Pierce Utilities Authority	56-00085-W	2027	21.13	8.00	13.13	4560490	19.00
Harbour Ridge	56-00449-W	2029	0.13	0.13	0.00	4565002	0.36
Meadowood Community Association	56-00462-W	2032	0.14	0.14	0.00	4564397	0.43
Port St. Lucie Utility Systems Department, City of	56-00142-W	2028	51.38	5.00	46.38	4560954	41.65
Reserve Community Development District	56-00552-W	2029	0.17	0.17	0.00	4565030	0.41
Spanish Lakes Fairways	56-00627-W	2018	0.38	0.38	0.00	4565043	0.57
Spanish Lakes Country Club ^a	56-00401-W	2026	0.31/0.22 ^b	0.31/0.22 ^b	0.00	4564006	0.48
St. Lucie County Utilities	56-00406-W	2028	6.82	0.17	6.65	4561689	0.29
St. Lucie West Services District	56-00614-W	2025	2.33	0.00	2.33	4565031	3.40

FDEP = Florida Department of Environmental Protection; MGD = million gallons per day; SFWMD = South Florida Water Management District.

^a All information was taken from SFWMD consumptive use permits in August 2015 and FDEP permit design capacity was taken from the FDEP website in August 2015 although it was dated 2014 (FDEP 2014).

^b The surficial aquifer allocation was bifurcated on July 15, 2011 with a decrease in allocation from 0.31 to 0.22 MGD. This utility is in the process of modifying this permit.



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Figure C-1. Potable water treatment facilities in Martin County.

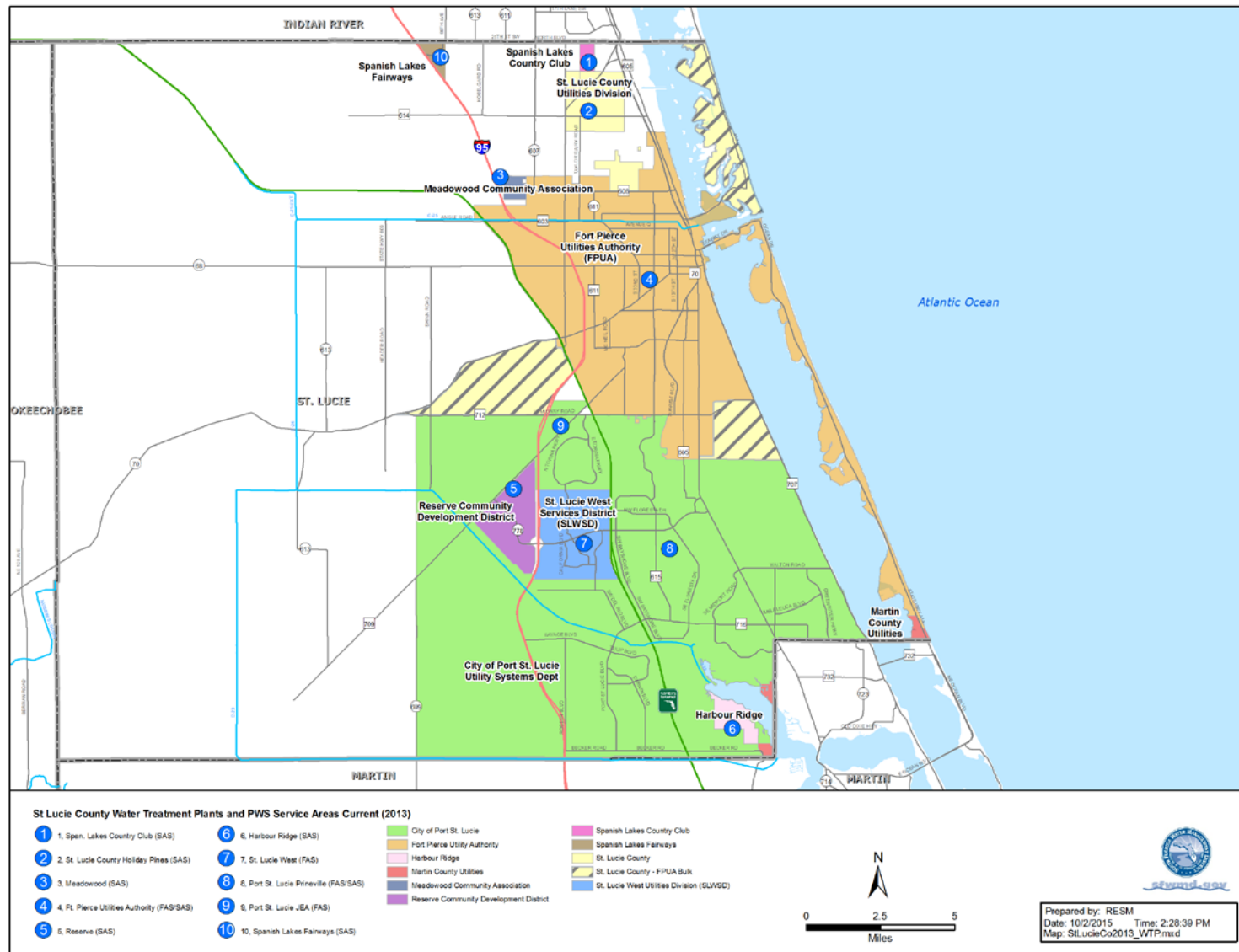


Figure C-2. Potable water treatment facilities in St. Lucie County.

WASTEWATER TREATMENT FACILITIES

Wastewater treatment is accomplished through regional wastewater treatment facilities (WWTFs), smaller “package plants,” and septic tanks. This appendix focuses on the larger system facilities within the region because they allow economy of operation and have sufficient flows that could positively impact water resources through reuse and support for a regional reuse program.

As of 2013, there were 21 WWTFs with a capacity of 0.1 MGD or more in the UEC Planning Area. According to the Florida Department of Environmental Protection (FDEP), 20 of the 21 WWTFs reuse at least part of their wastewater (FDEP 2014). **Table C-2** (at the end of this appendix) lists the UEC Planning Area’s 21 wastewater treatment facilities; **Figures C-3** and **C-4** show the locations of facilities. **Tables C-3** through **C-7** (at the end of this appendix) summarize the 2010, 2013, and projected 2040 wastewater/reuse flows for the facilities profiled in this appendix. **Table C-3** presents reuse percentages as well as wastewater and reuse flows. **Tables C-4** and **C-5** show the flows for the different reuse types for each of the facilities. **Tables C-6** and **C-7** present flows for the various disposal options.

Although the regional capacity of the WWTFs in the UEC Planning Area totals 48.2 MGD, an average of 22.4 MGD of wastewater was treated in 2013. Regionally, 7.8 MGD (35 percent) was reused; the majority of which was used for public access irrigation, including irrigation of golf courses, parks, schools, and residences. While public access irrigation accounted for 6.6 MGD of the 7.8 MGD, groundwater recharge through percolation ponds used 0.6 MGD, and other miscellaneous uses such as agriculture and industrial used 0.6 MGD. Treated effluent not reused was disposed of through deep well injection.

Wastewater utilities flows are projected to more than double in the UEC Planning Area by 2040. Similarly, utilities estimate water reuse flow will increase to approximately 39 MGD by 2040, 79 percent of wastewater flow.

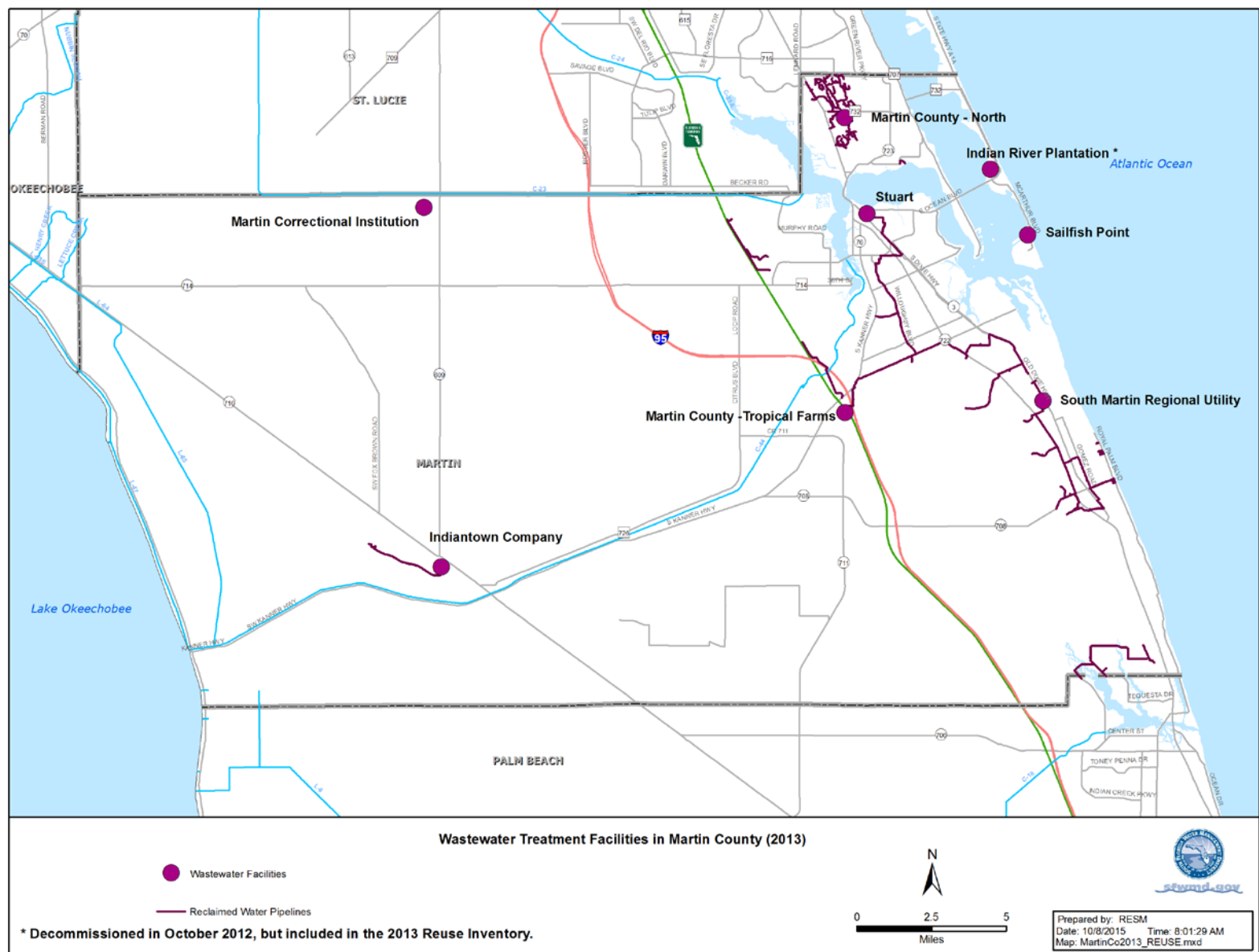


Figure C-3. Wastewater treatment facilities in Martin County.

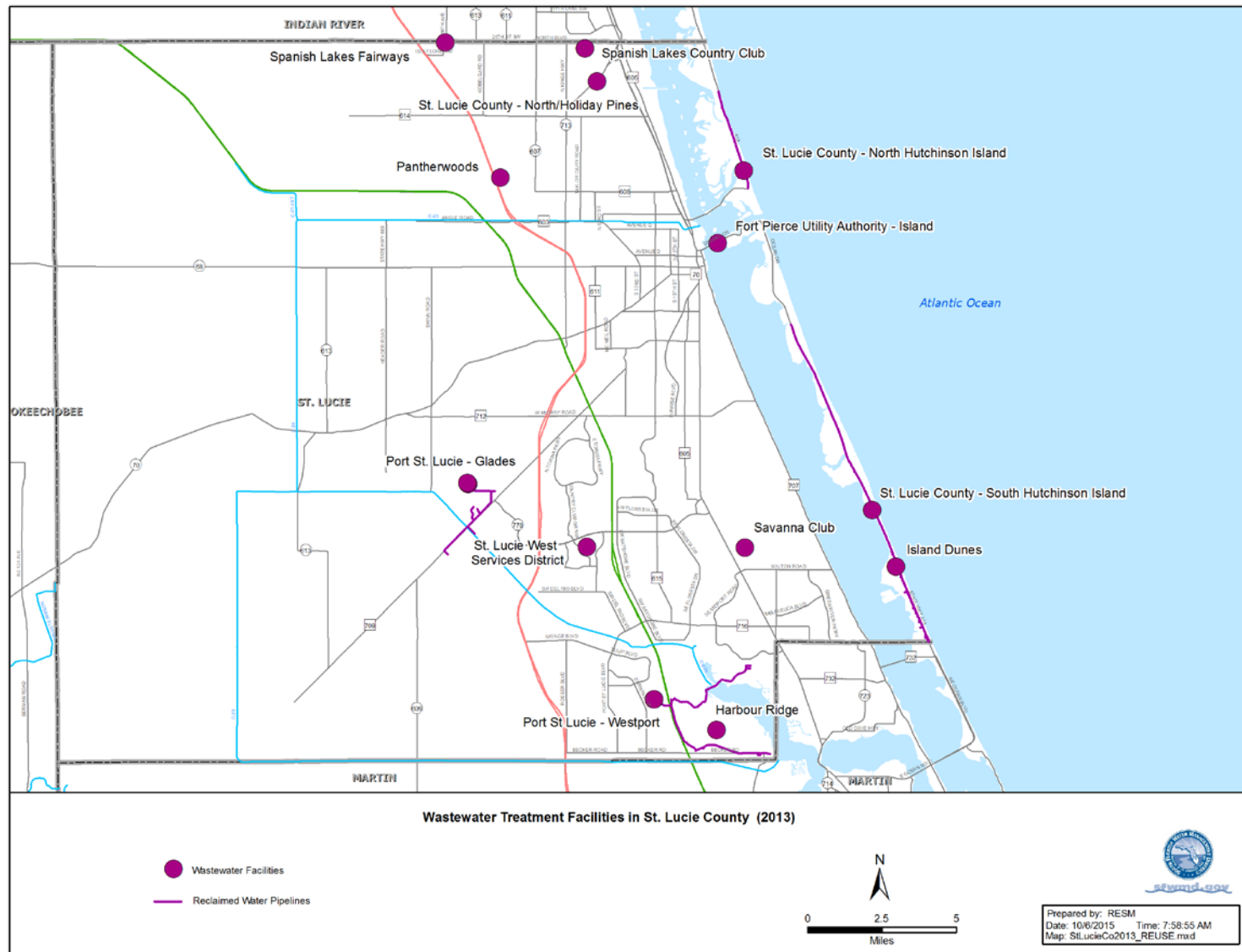


Figure C-4. Wastewater treatment facilities in St. Lucie County.

Profiles of Water Reuse Facilities

This appendix contains profiles of the following wastewater utilities/facilities in the UEC Planning Area:

- ◆ Indiantown Company
- ◆ Martin County Utilities
- ◆ City of Stuart
- ◆ South Martin Regional Utility
- ◆ Fort Pierce Utilities Authority
- ◆ Port St. Lucie Utilities
- ◆ St. Lucie County Utilities
- ◆ St. Lucie West Services District

The information provided in each profile was obtained from the following sources:

- ◆ 2013 Reuse Inventory (FDEP 2014)
- ◆ Communication with the utility
- ◆ Planning documents (e.g., 10-Year Water Supply Facility Work Plans)

The profiles are organized alphabetically by county, then by utility. Each profile contains the following information:

- ◆ **Treatment/Flows** – This section presents FDEP-rated capacity, average daily flows of wastewater and reclaimed water, and the methods and flows of disposal, if applicable. Capacity and flow information was gathered from the 2010 and 2013 Reuse Inventories.
- ◆ **Reuse/Disposal** – This section presents information about the types and flows of water reuse and disposal. A list of bulk end users, if available, is included.
- ◆ **Proposed/Future** – This section provides a summary of any proposed/future plans for the facility, which may include increased capacities, flows, or reclaimed-water customers.

The types of information provided to the SFWMD varied by utility, particularly those that provided a list of existing or proposed end users; some utilities provided reuse types while others provided reuse flows.

Martin County Wastewater Treatment Facilities

Indiantown

Treatment/Flows

Indiantown Company, Inc. owns and operates the Indiantown WWTF. This facility has an FDEP-rated capacity of 0.75 MGD and processed 0.57 MGD of wastewater on average in 2013.

Reuse/Disposal

Reclaimed water is used for groundwater recharge utilizing rapid infiltration basins (RIBs) and for cooling water at the Indiantown Cogeneration Plant.

Proposed/Future

Future expansion of the Indiantown reuse system depends on the economic growth in the area. Wastewater flows are projected to increase to 1.25 MGD by 2040. The utility is planning to increase the capacity of the treatment facility as needed to a maximum of 1.50 MGD. Future reclaimed water users will likely be new residential developments. The timing of these new users and developments is currently unknown.

Martin County Utilities – North County

Treatment/Flows

The North County WWTF has an FDEP-rated capacity of 2.76 MGD. The 2013 average processed wastewater flow was 1.28 MGD.

Reuse/Disposal

Reclaimed water is provided for irrigation to various end users, including those listed below. An average of 0.68 MGD was reused for irrigation at approximately 1,000 homes, 1 golf course, and 1 park. The remaining effluent (0.60 MGD) was disposed using deep well injection.

Existing End User

West Jensen/Eagle Marsh Land Co.
Pines and Windemere
Pineapple Cove
Jensen Beach High School
Goldenrod Road
Pineapple Commons
CVS/Pharmacy
Pineapple Park

Reuse Type

Golf Course & Residential Irrigation
Residential Irrigation
Residential Irrigation
School Irrigation
Public Access Area Irrigation
Public Access Area Irrigation
Public Access Area Irrigation
Public Access Area Irrigation

Proposed/Future

Wastewater flows to the North County WWTF are projected to increase to 1.62 MGD by 2040. The capacity of the facility is not expected to increase more than the current 2.76 MGD. The amount of water reused from the facility is anticipated to increase as flows increase and additional reuse customers are identified.

Martin County Utilities – Tropical Farms

Treatment/Flows

The Tropical Farms WWTF has an FDEP-rated capacity of 5.00 MGD. The 2013 average processed wastewater flow was 2.87 MGD, with 1.21 MGD reused.

Reuse/Disposal

In 2013, treated wastewater was reused for irrigation at more than 250 residences, 8 golf courses, and 1 park. Effluent that was not reused was disposed of using deep well injection and averaged 1.66 MGD in 2013. Reclaimed water was provided to the following end users:

<u>Existing End User</u>	<u>Reuse Type</u>
Heritage Ridge	Golf Course Irrigation
Lost Lake	Golf Course Irrigation
Martin Downs – Tower	Golf Course Irrigation
Crane Creek	Golf Course Irrigation
Florida Club	Golf Course Irrigation
Mariner Sands	Golf Course Irrigation
Willoughby	Golf Course Irrigation
Halpatiokee Park	Park Irrigation
Martin's Crossing	Residential Irrigation
Sand Trail (Copperleaf)	Residential Irrigation
Anderson Middle School	School Grounds Irrigation
Miles Grant	Golf Course Irrigation
Highlands Reserve	Public Access Irrigation
Banyan Bay	Public Access Irrigation

Proposed/Future

Wastewater flows to the Tropical Farms WWTF are expected to increase to 4.52 MGD by 2040. The FDEP-rated capacity of the facility is expected to increase to 5.30 MGD by 2040, and to 6.90 MGD by 2050. Martin County has entered into an agreement with the City of Stuart allowing the county to send wastewater to the city's wastewater facility. The 2008 agreement states that the City of Stuart will reserve an annual average capacity of 0.035 MGD in 2015, gradually increasing capacity to 1.00 MGD by 2028.

Potential Future End Users

White Marsh Reserve
Hammock Creek
Evergreen Club
Summerfield Golf Course
Monarch Country Club
Cutter Sound Golf and Yacht
Piper's Landing Yacht and Country Club

South Martin Regional Utility

Treatment/Flows

The South Martin Regional Utility (SMRU) Water Reclamation Facility has an FDEP-rated capacity of 1.40 MGD. The 2013 average wastewater and reuse flow was 0.80 MGD. The treated wastewater is 100 percent reused.

Reuse/Disposal

The 0.80 MGD (annual average daily flow) of reclaimed water is reused for the following:

- ◆ Golf course irrigation – 0.61 MGD
- ◆ Residential irrigation – 0.18 MGD
- ◆ At the WWTF – 0.01 MGD

The majority of reclaimed water is used for golf course irrigation. End users receiving the reclaimed water include the following:

<u>Existing End User</u>	<u>Reuse Type</u>
Loblolly Pines	Golf Course Irrigation
McArthur Golf Club	Golf Course Irrigation
The Medalist	Golf Course Irrigation
Eaglewood	Golf Course Irrigation
Pine School	School Irrigation
Shellbridge	Apartments/Condos Irrigation
Tranquility	Apartments/Condos Irrigation
Bridgetown	Apartments/Condos Irrigation

Proposed/Future

Wastewater flows to the SMRU facility are not projected to increase appreciably by 2040. An additional 1.0 MGD of supplemental water from the SAS is projected to be used by 2040, but the capacity of the facility is anticipated to remain at 1.40 MGD. The reuse system is expected to continue reusing all of its treated wastewater via public-access irrigation.

City of Stuart – Wastewater Treatment Facility

Treatment/Flows

The City of Stuart WWTF has an FDEP-rated capacity of 4.00 MGD. Wastewater flow to the facility averaged 1.64 MGD in 2013. The city has an inter-local agreement with Martin County to reserve treatment capacity at their facility for wastewater flows from the county. The agreement states that the city will reserve an annual average capacity increasing up to 1.00 MGD by 2028.

Reuse/Disposal

Reclaimed water from the City of Stuart facility is used for irrigation to various end users. An average of 0.21 MGD was reused at athletic fields in the city and through an interconnect with Martin County in 2013. The remaining effluent was disposed of using deep well injection (1.43 MGD). Martin County distributes the imported reclaimed water for irrigation of golf courses and residences.

Proposed/Future

The treatment capacity of the City of Stuart facility is not expected to increase beyond the current capacity (4.00 MGD) by 2040. As previously mentioned, the city has agreed to reserve a portion of their treatment capacity for wastewater from Martin County. Wastewater flows are expected to increase to 3.60 MGD by 2040, with reuse increasing to 2.30 MGD. The city expects to continue use of the deep injection well for excess flows at an expected rate of 1.30 MGD by 2040.

Potential Future End User

Willoughby Golf & Country Club (2016)
Martin County High School (2016)
Martin Memorial Hospital (2017)
City of Stuart (2018)

Reuse Type

Golf Course Irrigation
Athletic Fields Irrigation
Landscape Irrigation
Roadway Median Irrigation

St. Lucie County Wastewater Treatment Facilities

Fort Pierce Utilities Authority – Island

Treatment/Flows

The Fort Pierce Utilities Authority (FPUA) Island Water Reclamation Facility has an FDEP-rated capacity of 10.00 MGD and had a wastewater flow average of 4.51 MGD in 2013.

Reuse/Disposal

In 2013, 0.15 MGD of treated wastewater flow was reused for on-site processes and irrigation, with disposal of the remaining flow (4.02 MGD) through deep well injection.

Proposed/Future

Although the Island Facility may be abandoned in the future, it is currently proposed that it will continue to operate along with the Mainland Facility in the future. On-site water reuse at the Island facility is expected to remain fairly constant (0.17 MGD) to 2040. The remaining wastewater flow (7.33 MGD) will likely be disposed through deep well injection.

Fort Pierce Utilities Authority – Mainland (Proposed)

Proposed/Future

The Mainland Water Reclamation Facility construction has been delayed due to the economic downturn. When constructed, the Mainland Water Reclamation Facility is planned for full reuse of the reclaimed water. By 2040, it is expected that a 10.0 MGD capacity facility will be in operation. The Treasure Coast Energy Center (TCEC) is estimated to have two units installed by 2040, with cooling water needs of 5.8 MGD. The remaining reclaimed water would supply irrigation of golf courses, parks, or residences.

Potential Future End User

Treasure Coast Energy Center
Golf Courses or Parks
Residential

Reuse Type

Cooling Water
Irrigation
Irrigation

City of Port St. Lucie – Glades

Treatment/Flows

The Glades WWTF began operations in 2007 and has an FDEP-rated capacity of 12.00 MGD. The facility received average flows of 3.64 MGD in 2013.

Reuse/Disposal

This facility is equipped has a permitted capacity to provide 5.75 MGD of reclaimed water that could be used for public-access irrigation; however, with slowed development, there are no users at this time. Currently, all effluent is being disposed of through deep well injection (3.64 MGD).

Proposed/Future

Wastewater treatment capacity at the Glades WWTF is projected to increase to 18.00 MGD by 2040. The wastewater flow is expected to increase to 10.00 MGD. Water reuse flows are anticipated to increase with wastewater flow. There are plans to include the use of aquifer storage and recovery (ASR) for balancing the supply and demands of reclaimed water throughout the year. The potential end users of reclaimed water include the following:

<u>Potential Future End User</u>	<u>Projected Flows (MGD)</u>
Graves Bros	0.37
Kenco/West Creek/Founder's Crossing	1.00
North Pointe	1.00
Copper Creek	0.38
Verano	1.00
Tradition/Southern Grove	2.00
Wilson/Kennedy/Riverland	2.00
Kelly	0.25
The Reserve	0.50
Western Grove	0.75
Luff's Grove	0.50

City of Port St. Lucie – Westport

Treatment/Flows

The Westport WWTF has an FDEP-rated capacity 6.00 MGD. The 2013 average wastewater flow to the facility was 3.97 MGD. The City of Port St. Lucie took the Southport WWTF out of service in 2011, at which time flows were diverted to the Westport WWTF.

Reuse/Disposal

In 2013, reclaimed water from the Westport WWTF was reused for irrigation of the Tesoro, Ballantrae, and Florida National Golf Club golf course developments. An average of 1.03 MGD of reclaimed water was reused. The remaining effluent (2.50 MGD) was disposed of through deep well injection.

Proposed/Future

The capacity of the Westport WWTF is planned to remain the same (6.00 MGD) by 2040. Reuse flow is projected to increase to 5.60 MGD, including 0.20 MGD of supplemental water via ASR. The potential end users of reclaimed water from this facility are as follows:

<u>Potential Future End User</u>	<u>Projected Flow in 2040 (MGD)</u>
Saints Golf Course	1.00
Veranda Planned Unit Development	0.65
Club Med	1.00
Sawgrass Lakes	0.30

St. Lucie County Utilities – North (Holiday Pines)

Treatment/Flows

The North (Holiday Pines) WWTF has an FDEP-rated capacity of 0.30 MGD. The 2013 annual average wastewater flow to the facility was 0.11 MGD.

St. Lucie County has an existing bulk service agreement with the FPUA in which wastewater flows from a portion of the St. Lucie County Utilities northern service area are sent to the FPUA Island Facility for treatment.

Reuse/Disposal

In 2013, all flow was reused. An average reclaimed water flow of 0.11 MGD was used for groundwater recharge through RIBs (percolation ponds) at the facility. Reverse osmosis concentrate from treatment of SAS groundwater is also sent to the RIB. Since 2013, the treatment facility was upgraded to allow public-access irrigation. The Island Pines Golf Club was added as a customer of reclaimed water for irrigation.

Proposed/Future

St. Lucie County purchased a parcel of land northwest of the airport with the intention of co-locating a regional water treatment facility and WWTF. If built, wastewater flows from Holiday Pines may be redirected to the North County Regional Wastewater Treatment Facility, and diversion of St. Lucie County North flows to the FPUA Island Facility would cease. The 2040 capacity of the Holiday Pines facility, if still in service, is expected to be 0.30 MGD, with wastewater flows of 0.30 MGD. St. Lucie County is proposing to construct a North County Regional 2.00 MGD WWTP with 4 MGD in expansions by 2040 for a total of 6.00 MGD.

St. Lucie County Utilities – North Hutchinson Island

Treatment/Flows

The North Hutchinson Island facility has an FDEP-rated capacity of 0.50 MGD. The 2013 annual average wastewater flow to the facility was 0.26 MGD. The facility is equipped to provide 0.50 MGD of reclaimed water that could be used for public-access irrigation.

Reuse/Disposal

In 2013, all flow was reused for multi-family common area irrigation. A list of existing users is as follows:

Altamira I & II	Ocean Pearl
Aquanique	Ocean Real Estate
Atlantic View Beach Club	Ocean Resorts
Atrium I & II	Pepper Park
Avalon Beach	Queens Cove (common area)
Avalon Beach Park	Riverpointe
Breakers	Riverwalk
Grande Isle	Sands Condo
Harbour Cove	Sea Palms
Hibiscus	Tarpon Flats
Oceanique	Treasure Cove Dunes
Ocean Estate	Visions
Ocean Harbor North	Water Edge
Ocean Harbor Villas	

Proposed/Future

St. Lucie County Utilities expanded the North Hutchinson Island facility in 2015 from 0.50 MGD to 0.85 MGD to serve the ultimate build-out needs of the island. A list of future reclaimed water users is as follows:

- Grande Beach
- Greenwood Development (Meridian)
- Ocean Palms
- Paradiso
- Round Island
- Queen's Preserve

St. Lucie County Utilities – South Hutchinson Island

Treatment/Flows

The South Hutchinson Island WWTF has an FDEP-rated capacity of 1.60 MGD. The 2013 annual average wastewater flow to the facility was 0.33 MGD.

Reuse/Disposal

Reclaimed water is used for landscape and multi-family common area irrigation. The water reused from the facility averaged 0.32 MGD in 2013. The remaining effluent (0.01 MGD) was disposed of through the Florida Power & Light (FPL) ocean outfall canal just north of the facility. A list of existing users is provided below based on irrigation type.

<u>Multi-Family</u>		<u>Common Area</u>
Atlantis Bldg A	Ocean Dunes	Holiday Out
Atlantis Bldg B	Ocean Towers	Hutchinson Island Club
Atlantis III	Oceana I	Ocean Property
Diamonds Sand	Oceana II	Tradewinds
Empress	Oceanrise	Venture INC
Island Crest	Princess	Watersong
Island Village	River Watch	
Islandia I	Sea Oats	
Islandia II	Sea Winds	
Miramar	Tailers Cove	
Miramar II	Turtle Reef Club	
Miramar Royale	Villa Del Sol	
Nettles Island	Vistana Beach Club	

Proposed/Future

The St. Lucie County Utilities South Hutchinson Island Water Reclamation Facility is expected to have the same treatment capacity (1.60 MGD) in 2040. Wastewater flows are projected to increase to 0.96 MGD by that time, with reuse of 0.90 MGD.

St. Lucie County Utilities – North County Regional (Proposed)

Proposed/Future

St. Lucie County is in the planning stages of the North County Regional WWTF. The county purchased a parcel of land northwest of the airport with the intention of co-locating a regional water treatment facility and WWTF. The proposed facility would be built with an initial capacity of 2.00 MGD, and would target to reuse 100 percent of its flow, with wet weather disposal of excess flows through deep well injection. The facility would also treat redirected wastewater from the North (Holiday Pines) and other small facilities, which are planned to be decommissioned once the regional facility is functional treatment capacity in 2040 is projected to be 6.00 MGD with wastewater flow of 5.6 MGD. Reuse is projected to be 4.7 MGD, with the remaining 0.9 MGD disposed through deep well injection.

St. Lucie County Utilities – Central County Regional (Proposed)

Proposed/Future

St. Lucie County is in the planning stages of the Central County Regional WWTF. By 2040, the county estimates that the Central County WWTF will have a capacity of 6.00 MGD and an average flow of 3.70 MGD. Water reuse for irrigation is estimated to be 2.94 MGD. The remaining effluent (0.76 MGD) would be disposed through deep well injection.

St. Lucie West Services District

Treatment/Flows

The St. Lucie West Services District WWTF has an FDEP-rated treatment capacity of 2.00 MGD. The facility processed 1.71 MGD in 2013, which was reused for irrigation of the St. Lucie West development. Reclaimed water is discharged into a lined pond, where it blends with storm water and is used for irrigation.

Reuse/Disposal

Reclaimed water is used to supplement irrigation for more than 5,000 residences, 6 schools, 3 golf courses, and 9 parks. All effluent from the facility is discharged into the lined stormwater pond.

Proposed/Future

The capacity of the treatment facility is expected to be expanded to 2.13 MGD by 2032. Wastewater flows are expected to increase to 1.91 MGD by 2032, with all the reclaimed water used for irrigation.

Wastewater and Water Reuse Data

The tables on the following pages provide information about wastewater and water reuse in the UEC Planning Area. The primary sources of information for these tables are the FDEP Reuse Inventories (FDEP 2011, 2014). The FDEP inventory information is based on data from October 1 through September 30 and submitted as an Annual Reuse Report by each wastewater utility to the FDEP. Secondary sources of information for future plans came from planning documents such as Water Supply Facility Work Plans.

Table C-2 lists all the WWTFs in the UEC Planning Area with treatment capacity greater than or equal to 0.1 MGD. Some facilities are trending toward regionalization, where flows from smaller facilities are diverted to the regional treatment facilities. As a result, water reuse percentages at the larger regional facilities may decrease until reclaimed water distribution systems are established.

Table C-3 shows 2010, 2013, and 2040 data from the larger profiled WWTFs in the UEC Planning Area. The table shows a slight increase in wastewater flow and decrease in water reuse flows in the region from 2010 to 2013, but a significant increase in both by 2040. Regionalization is evident by the existing and proposed treatment facilities in Martin County, Port St. Lucie, and St. Lucie County. Also, the FPUA has proposed construction of a larger inland facility and an increase its water reuse substantially.

Tables C-4 and **C-5** show the types of water reuse practiced by the profiled facilities in Martin and St. Lucie counties. The tables show that public-access irrigation (e.g., golf courses, parks, schools) has been and will continue to be the primary means of water reuse in the region. **Tables C-6** and **C-7** provide the types of effluent disposal used by the profiled facilities in Martin and St. Lucie counties. Disposal is for reclaimed water/effluent that is not reused, and is used only as a backup to reuse. As shown, the primary means of disposal is through deep well injection. The amount of deep well injection in the region is not projected to increase by 2040.

Table C-2. Existing wastewater facilities in the UEC Planning Area.^a

County/Facility	2013			
	FDEP-Rated WWTF Capacity (MGD)	Average Daily WWTF Flow (MGD)	Average Daily Reuse Flow (MGD)	Reuse Percentage ^b (%)
Martin County				
Indiantown Company (FLA029939)	0.75	0.57	0.57	100
Martin County – Indian River Plantation (FLA013792) ^c	0.30	0.01	0.01	100
Martin County – North County (FLA043192)	2.76	1.28	0.68	53
Martin County – Tropical Farms (FL0043214)	5.00	2.87	1.21	42
South Martin Regional Utility (FLA013859)	1.40	0.80	0.80	100
Martin Correctional Institution (FLA013881)	0.45	0.18	0.18	100
Sailfish Point (FLA017466)	0.25	0.08	0.08	100
Stuart, City of (FLA041459)	4.00	1.64	0.21	13
Martin County Subtotal (8 Facilities)	14.91	7.43	3.74	50
St. Lucie County				
FPUA – Island (FL0027278)	10.00	4.51	0.15	3
Port St. Lucie, City of – Glades (FLA326321)	12.00	3.64	0.00	0
Port St. Lucie, City of – Westport (FLA139653)	6.00	3.97	1.03	26
St. Lucie County – North/Holiday Pines (FLA013969)	0.30	0.11	0.11	100
St. Lucie County – North Hutchinson Island (FLA013946)	0.50	0.26	0.26	100
St. Lucie County – South Hutchinson Island (FL0139475)	1.60	0.33	0.32	97
St. Lucie West Services District (FLA013993)	2.00	1.71	1.71	100
Harbour Ridge (FLA013986)	0.12	0.07	0.07	100
Island Dunes (FLA013980)	0.12	0.05	0.05	100
Meadowood (FLA013982)	0.11	0.06	0.06	100
Savanna Club (FLA013958)	0.15	0.06	0.06	100
Spanish Lakes Country Club (FLA013977)	0.16	0.10	0.10	100
Spanish Lakes Fairways (FLA013998)	0.25	0.12	0.12	100
St. Lucie County Subtotal (13 Facilities)	33.31	14.99	4.04	27
UEC Planning Area Total (21 Facilities)	48.22	22.42	7.78	35

FDEP = Florida Department of Environmental Protection; MGD = million gallons per day; UEC = Upper East Coast; WWTF = wastewater treatment facility.

^a All wastewater facilities with a capacity of 0.1 MGD or greater as reported in the 2013 Reuse Inventory (FDEP 2014).

^b Reuse percentage is calculated by dividing “Reuse Flow” (including any supplemental flow) by “WWTF Flow.”

^c The facility was decommissioned on October 17, 2012, but is included in the 2013 Reuse Inventory.

Table C-3. Profiled (featured larger utilities) facilities – wastewater/reclaimed water flows (in MGD) and reuse percentage.

County/ Facility	2010					2013					2040				
	FDEP Rated WWTF Capacity	Average Daily WWTF Flow	Average Daily Reuse Flow	Supp. Flow	Reuse (%)	FDEP Rated WWTF Capacity	Average Daily WWTF Flow	Average Daily Reuse Flow	Supp. Flow	Reuse (%)	WWTF Capacity	Average Daily WWTF Flow	Average Daily Reuse Flow	Supp. Flow	Reuse (%)
Martin County															
Indiantown ^a	0.75	0.45	0.45	0.00	100	0.75	0.57	0.57	0.00	100	1.50	1.25	1.25	0.00	100
Martin County – North County	2.76	1.09	0.82	0.00	75	2.76	1.28	0.68	0.00	53	2.76	1.62	0.99	0.00	61
Martin County – Tropical Farms/ Consolidated	5.00	3.47	1.67	0.08	48	5.00	2.87	1.21	0.00	42	5.30	4.52	2.53	0.04	56
South Martin Regional Utility	1.40	0.71	0.71	0.00	100	1.40	0.80	0.80	0.00	100	1.40	0.79	1.79	1.00	100
Stuart, City of	4.00	1.49	0.00	0.00	0	4.00	1.64	0.21	0.00	13	4.00	3.60	2.30	0.00	64
St. Lucie County															
FPUA – Island	10.00	4.10	0.30	0.00	7	10.00	4.51	0.15	0.00	3	10.00	7.50	0.17	0.00	2
FPUA – Mainland (proposed)	--	--	--	--	--	--	--	--	--	--	10.00	8.00	8.00	0.00	100
Port St. Lucie, City of – Glades	6.00	3.74	0.00	0.00	0	12.00	3.64	0.00	0.00	0	18.00	10.00	9.75	0.00	98
Port St. Lucie, City of – Southport ^b	3.14	0.76	0.50	0.00	66	--	--	--	--	--	--	--	--	--	--
Port St. Lucie, City of – Westport	3.93	2.64	0.82	0.00	31	6.00	3.97	1.03	0.00	26	6.00	5.40	5.60	0.20	100
St. Lucie County – North (Holiday Pines) ^c	0.30	0.10	0.10	0.00	100	0.30	0.11	0.11	0.00	100	0.30	0.30	0.30	0.00	100
St. Lucie County – North Hutchinson Island	0.50	0.28	0.28	0.00	100	0.50	0.26	0.26	0.00	100	0.85	0.60	0.60	0.00	100
St. Lucie County – South Hutchinson Island	1.60	0.37	0.36	0.00	97	1.60	0.33	0.32	0.00	97	1.60	0.96	0.90	0.00	94

County/ Facility	2010					2013					2040				
	FDEP Rated WWTF Capacity	Average Daily WWTF Flow	Average Daily Reuse Flow	Supp. Flow	Reuse (%)	FDEP Rated WWTF Capacity	Average Daily WWTF Flow	Average Daily Reuse Flow	Supp. Flow	Reuse (%)	WWTF Capacity	Average Daily WWTF Flow	Average Daily Reuse Flow	Supp. Flow	Reuse (%)
St. Lucie County – North County Regional (proposed)	--	--	--	--	--	--	--	--	--	--	6.00	5.60	4.70	0.00	84
St. Lucie County – Central County Regional (proposed)	--	--	--	--	--	--	--	--	--	--	6.00	3.70	2.94	0.00	79
St. Lucie West ^d	2.00	1.21	1.21	0.00	100	2.00	1.71	1.71	0.00	100	2.13	1.91	2.29	0.38	100

FDEP = Florida Department of Environmental Protection; FPUA = Fort Pierce Utilities Authority; MGD = million gallons per day; UEC = Upper East Coast;
WWTF = wastewater treatment facility.

^a A 2030 projection was used for the Indiantown facility

^b The Port St. Lucie Southport WWTF was taken out of service in 2011; wastewater was diverted to the Port St. Lucie Westport WWTF.

^c The St. Lucie County North/Holiday Pines WWTF may be decommissioned following the construction of the North County Regional WWTF.

^d A 2032 projection was used for the St. Lucie West facility.

Table C-4. Utilization of reclaimed water (in MGD) for profiled (featured larger system) facilities in Martin County.

County/Facility	2010			2013			2040		
	Public Access Irrigation ^a	Groundwater Recharge ^b	Other ^c	Public Access Irrigation ^a	Groundwater Recharge ^b	Other ^c	Public Access Irrigation ^a	Groundwater Recharge ^b	Other ^c
Indiantown ^{d,e}	0.00	0.25	0.20	0.00	0.32	0.25	0.62	0.00	0.63
Martin County – North County	0.82	0.00	0.00	0.68	0.00	0.00	0.99	0.00	0.00
Martin County – Tropical Farms	1.67	0.00	0.00	1.21	0.00	0.00	2.53	0.00	0.00
South Martin Regional Utility	0.66	0.02	0.03	0.79	0.00	0.01	0.79	0.00	0.00
Stuart, City of	0.00	0.00	0.00	0.21	0.00	0.00	2.30	0.00	0.00

^a Golf courses, residential, parks, common areas, and other public access areas.

^b Through rapid infiltration basins (RIBs), percolation ponds, and proposed ASR wells.

^c Agriculture, wetlands, cooling water, treatment processes, toilet flushing, etc.

^d Switched from agricultural irrigation (“Other” category in 2010) to industrial application (“Other” category in 2013).

^e A 2030 projection was used for the Indiantown facility.

Table C-5. Utilization of reclaimed water (in MGD) for profiled (featured larger system) facilities in St. Lucie County.

County/Facility	2010			2013			2040		
	Public Access Irrigation ^a	Groundwater Recharge ^b	Other ^c	Public Access Irrigation ^a	Groundwater Recharge ^b	Other ^c	Public Access Irrigation ^a	Groundwater Recharge ^b	Other ^c
FPUA – Island	0.00	0.00	0.30	0.00	0.00	0.15	0.00	0.00	0.17
FPUA – Mainland	--	--	--	--	--	--	2.20	0.00	5.80
Port St. Lucie, City of – Glades	0.00	0.00	0.00	0.00	0.00	0.00	9.75	0.00	0.00
Port St. Lucie, City of – Southport ^d	0.49	0.00	0.00	--	--	--	--	--	--
Port St. Lucie, City of – Westport	0.82	0.00	0.00	1.03	0.00	0.00	5.60	0.00	0.00
St. Lucie County – North (Holiday Pines)	0.00	0.10	0.00	0.00	0.11	0.00	0.24	0.06	0.00
St. Lucie County – North Hutchinson Island	0.28	0.00	0.00	0.26	0.00	0.00	0.35	0.00	0.25
St. Lucie County – South Hutchinson Island	0.35	0.00	0.00	0.32	0.00	0.00	0.90	0.00	0.00
St. Lucie County – North County Regional	--	--	--	--	--	--	4.70	0.00	0.00
St. Lucie County – Central County Regional	--	--	--	--	--	--	2.94	0.00	0.00
St. Lucie West ^e	1.21	0.00	0.00	1.71	0.00	0.00	2.23	0.06	0.00

FPUA = Fort Pierce Utilities Authority; MGD = million gallons per day; UEC = Upper East Coast; -- No data as facilities are only proposed and not yet constructed.

^a Golf courses, residential, parks, common areas, and other public access areas.

^b Rapid infiltration basins, percolation ponds, shallow injection wells, Aquifer Storage and Recovery wells.

^c Agriculture, wetlands, cooling water, treatment processes, toilet flushing, etc.

^d The Port St. Lucie Southport facility was taken out of service in 2011.

^e A 2032 projection was used for the St. Lucie West facility.

Table C-6. Method of wastewater disposal (measured in MGD) for profiled (featured larger system) facilities in Martin County.

County/Facility	2010			2013			2040		
	Deep Well Injection	Ocean Discharge	Surface Water Discharge ^a	Deep Well Injection	Ocean Discharge	Surface Water Discharge ^a	Deep Well Injection	Ocean Discharge	Surface Water Discharge ^a
Indiantown	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Martin County – North County	0.27	0.00	0.00	0.60	0.00	0.00	0.63	0.00	0.00
Martin County – Tropical Farms	1.80	0.00	0.00	1.66	0.00	0.00	1.99	0.00	0.00
South Martin Regional Utility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stuart, City of	1.49	0.00	0.00	1.43	0.00	0.00	1.30	0.00	0.00

^a Surface water discharge not including ocean outfalls.

Table C-7. Method of wastewater disposal (measured in MGD) for profiled (featured larger system) facilities in St. Lucie County.

County/Facility	2010			2013			2040		
	Deep Well Injection	Ocean Discharge	Surface Water Discharge ^a	Deep Well Injection	Ocean Discharge	Surface Water Discharge ^a	Deep Well Injection	Ocean Discharge	Surface Water Discharge ^a
FPUA – Island	3.62	0.00	0.00	4.02	0.00	0.00	7.33	0.00	0.00
FPUA – Mainland	--	--	--	--	--	--	0.00	0.00	0.00
Port St. Lucie, City of – Glades	3.74	0.00	0.00	3.64	0.00	0.00	0.25	0.00	0.00
Port St. Lucie, City of – Southport ^b	0.27	0.00	0.00	--	--	--	--	--	--
Port St. Lucie, City of – Westport	1.82	0.00	0.00	2.50	0.00	0.00	0.00	0.00	0.00
St. Lucie County – North (Holiday Pines)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
St. Lucie County – North Hutchinson Island	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
St. Lucie County – South Hutchinson Island	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.06
St. Lucie County – North County Regional	--	--	--	--	--	--	0.90	0.00	0.00
St. Lucie County – Central County Regional	--	--	--	--	--	--	0.76	0.00	0.00
St. Lucie West ^c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FPUA = Fort Pierce Utilities Authority; MGD = million gallons per day; UEC = Upper East Coast.

^a Surface water discharge not including ocean discharge.

^b The Port St. Lucie Southport facility was taken out of service in 2011.

^c A 2032 projection was used for the St. Lucie West facility.

REFERENCES

FDEP (Florida Department of Environmental Protection). 2011. *2010 Reuse Inventory*. Water Reuse Program, FDEP, Tallahassee, Florida.

FDEP. 2014. *2013 Reuse Inventory*. Water Reuse Program, FDEP, Tallahassee, Florida.

D

Water Conservation

INTRODUCTION

Water conservation, covered in Chapter 5 of the *2016 Upper East Coast Water Supply Plan Update* and in the Support Document, is essential to water supply planning and water resource management. Water conservation is considered a water source option because it reduces or delays the need for future expansion of the water supply infrastructure.

WATER CONSERVATION RATE STRUCTURES

Table D-1 provides information on single family residential water rates for each utility in the Upper East Coast Planning Area. A few public water supply utilities listed in **Table D-1** provide water (for a fee) to other utilities or municipalities who then resell it to their residents. These entities often create water rate structures that anticipate the cost of the purchased water plus an added handling fee. The rate structures, in turn, have an impact on conservation measures residents use, which influences the per capita use rate of the utility.

Table D-1. Single-family residential water rates in the UEC Planning Area (\$/1,000 gallons).

Utility Name	Effective Date	Utility Tax	Single Family Residential Water Rates \$/1,000 gallons ^a						\$/3,000 gal	\$/7,000 gal	\$/10,000 gal
			Base Charge	1	2	3	4	5			
Martin County											
City of Stuart (in city)	October 2013	–	\$12.56	\$2.41 0–4,000	\$2.53 4,001–8,000	\$4.35 8,001–12,000	\$5.08 12,001–25,000	\$5.79 >25,000	\$19.79	\$29.79	\$41.02
City of Stuart (unincorp. area)	October 2013	–	\$15.70	\$3.01 0–4,000	\$3.16 4,001–8,000	\$5.44 8,001–12,000	\$6.35 12,001–25,000	\$7.24 >25,000	\$24.73	\$37.22	\$51.26
Indiantown Company	N/A		\$12.50	\$2.29 0–8,000	\$4.79 8,001–15,000	\$5.31 >15,000	–	–	\$19.37	\$28.53	\$40.40
Martin County Utilities	N/A	–	\$16.30	\$2.10 0–10,000	\$2.95 10,001–15,000	\$3.79 15,001–25,000	\$4.62 >25,000	–	\$22.60	\$31.00	\$37.30
Sailfish Point	July 2013	–	\$5.00	\$6.68	–	–	–	–	\$25.04	\$51.76	\$71.80
South Martin Regional Utility	February 2010	–	\$19.51	\$0.88 0–3,000	\$2.06 3,001–10,000	\$3.09 10,001–20,000	\$4.12 20,001–40,000	\$5.15 >40,000	\$22.15	\$30.39	\$36.57
St. Lucie County											
City of Port St. Lucie Utility Systems Department	January 2011	–	\$6.87	\$3.89 0–5,000	\$5.08 5,001–12,000	\$6.25 >12,000	–	–	\$18.54	\$36.48	\$51.72
Fort Pierce Utility Authority (in city)	May 2014	10%	\$13.09	\$10.05 ^b 0–3,000	\$3.35 3,001–10,000	\$4.19 10,001–15,000	\$5.03 >15,001	–	\$25.45	\$40.19	\$51.25
Fort Pierce Utility Authority (unincorp. area)	May 2014	25% surcharge	\$13.09	\$10.05 ^b 0–3,000	\$3.35 3,001–10,000	\$4.19 10,001–15,000	\$5.03 >15,001	–	\$31.82	\$50.24	\$64.06

Utility Name	Effective Date	Utility Tax	Single Family Residential Water Rates \$/1,000 gallons ^a						\$/3,000 gal	\$/7,000 gal	\$/10,000 gal
			Base Charge	1	2	3	4	5			
Reserve Community Development District	February 2012	–	\$14.84	\$2.72	–	–	–	–	\$23.00	\$33.88	\$42.04
St. Lucie County Utilities Department	July 2010	–	\$19.49	\$3.37 0–5,000	\$6.06 5,001–10,000	\$8.08 10,001–15,000	\$9.43 >15,000	–	\$29.60	\$48.46	\$66.64
St. Lucie West Services District	October 2009	–	\$15.42	\$3.47	–	–	–	–	\$25.83	\$39.71	\$50.12
Martin County/Palm Beach County ^d											
Town of Jupiter (in city)	N/A	–	\$18.28	\$1.14 0–6,000	\$1.55 6,001–14,000	\$2.74 14,001–30,000	\$3.62 >30,000	–	\$21.70	\$26.67	\$31.32
Town of Jupiter (unincorp. area)	N/A	25% surcharge	\$18.28	\$1.14 0–6,000	\$1.55 6,001–14,000	\$2.74 14,001–30,000	\$3.62 >30,000	–	\$27.13	\$33.34	\$39.15
Village of Tequesta (in city)	October 2013	9%	\$14.15	\$2.25 0–12,000	\$3.77 12,001–25,000	\$5.13 25,001–40,000	\$6.58 >40,000	–	\$22.78	\$32.59	\$39.95
Village of Tequesta (unincorp. area)	October 2013	25% surcharge	\$14.15	\$2.25 0–12,000	\$3.77 12,001–25,000	\$5.13 25,001–40,000	\$6.58 >40,000		\$28.48	\$40.74	\$49.94

^a Information collected from utilities; valid as of May 2014.

^b Customer is charged a flat rate if usage is between 0 and 3,000 gallons.

^c Four small private utilities that pump 0.10 to 0.22 MGD and serve small residential communities (700 to 2,000 people) are not listed here and collect fees for water use via other methods.

^d Utilities are wholly addressed in the Lower East Coast water supply plan.

E

Information for Local Government Comprehensive Plans

The South Florida Water Management District (SFWMD or District) prepares water supply plans for each of its five planning areas to effectively support planning initiatives and address local issues. The water supply plans address a planning horizon of at least 20 years and are updated every 5 years. Most local governments are required by statute to update their water supply facilities work plan (work plan) and adopt revisions to their comprehensive plan within 18 months following the approval of the applicable water supply plan.

This appendix contains water supply planning information useful to local governments in preparing and amending comprehensive plans. In addition to this appendix, the following chapters and appendices are particularly relevant for local governments:

Water Sources	Chapters 4 and 6; Appendix C
Utility Areas Served (2013 and 2040)	Chapter 6; Appendices C and E
Population Projections (2013–2040)	Chapter 2; Appendix A
Demand Projections (2013–2040)	Chapter 2; Appendix A
Water Supply Projects (2013–2040)	Chapter 6; Appendices D and F

This appendix includes the following information for the review and revision of local government comprehensive plans:

1. The SFWMD Checklist of Needed Comprehensive Plan Data
2. Relevant portions of cited statutory provisions
3. Tables identifying which utilities serve each Upper East Coast (UEC) Planning Area jurisdiction
4. Maps of utility areas currently served (2013) and future utility service areas expected to be served (2040)

NECESSARY DATA FOR COMPREHENSIVE PLANS

Local governments are required to plan for their water and wastewater needs as well as other infrastructure and public service elements of their comprehensive plan. To assist in that effort, the SFWMD developed a general checklist of the type of data and information District staff looks for during review of the water supply element, policies, and other topics in the local government comprehensive plans. This checklist is not all-inclusive, but provides a broad, general framework for use with the more detailed Florida Department of Economic Opportunity (FDEO) guidelines and SFWMD comments on specific water supply topics.

Checklist guidance is given for three water supply-related aspects of comprehensive plans:

1. Work plans and other potable water sub-element revisions
2. Evaluation and appraisal of comprehensive plan requirements
3. Plan amendments (future land use change)

Work Plan and Other Potable Water Sub-Element Revisions

This 2016 UEC Plan Update provides water demand estimates, water source options, and water supply development projects to ensure adequate water supplies to support the region. Local governments are to develop or update their work plans within 18 months following approval of this update [Section 163.3177, Florida Statutes (F.S.)]. The data included in the work plans such as population and water demand projections and future projects generally should be consistent with the 2016 UEC Plan Update. In their review of the work plans, the SFWMD coordinates with local governments, utilities, and the FDEO. The following guidance is to assist local governments as they update their work plans.

Review this 2016 UEC Plan Update and Confirm Public Water Supply Entities Providing Service Within Local Government's Jurisdiction

A local government's work plan needs to identify the major Public Water Supply (PWS) entities serving their population. To be consistent with the 2016 UEC Plan Update, the local government's work plan should identify, at a minimum, the water demand and adequacy of PWS water sources to meet water demand within the local government's boundary. If appropriate, the sale or purchase of water from PWS entities with service areas outside of the local government's boundary should be identified. This 2016 UEC Plan Update identifies PWS entities with projected average pumpage greater than 0.1 MGD. Therefore, some smaller utilities may not be included in the plan. The FDEO and SFWMD guidance for work plans recommends including all small community systems and Domestic Self-Supply (DSS) users on private wells. This 2016 UEC Plan Update provides information about PWS entities and the local governments they serve by PWS service area.

Review PWS Utility Summaries Provided in Chapter 6 of this 2016 UEC Plan

In the development of this plan update, a summary was prepared for each utility to provide information such as estimated current and proposed population projections, per capita use rates (PCURs), finished water demands, permitted sources and allocations, and recently constructed and proposed water supply development projects that create water capacity as well as other related information (see **Chapter 6**). The District coordinated with utilities to ensure the information contained in these summaries was current. PWS entity staff should confirm the information provided in the utility summaries of this 2016 UEC Plan. Within 12 months of approval of this plan, PWS entities must respond to the SFWMD with their intentions to develop and implement the projects identified by this plan, or provide a list of other projects or methods to meet water demands.

The local government's work plan should be in general agreement with this 2016 UEC Plan Update's identified water sources and schedule of water sources to be made available to meet projected water demands. However, it is not necessary to use the same population projections or per capita use rates used by the water supply plan to project water demand. Generally accepted professional planning methods may be used as input to the local planning process, which may result in differences between the demand and supply estimates provided in this 2016 UEC Plan Update's utility summaries. If planning assumptions or information is different from this 2016 UEC Plan Update, the work plan should identify and explain the basis for any differences.

The minimum planning period for water supply plans is 20 years (referred to as the 20-year planning horizon). However, for local government work plans, a minimum 10-year planning horizon is required [Section 163.3177(6)(c)(3), F.S.] and a 20-year planning horizon is preferred. Therefore, the work plans and the 2016 UEC Plan Update are not required to have the same planning horizon.

To assist local governments in updating their work plans, the SFWMD has developed technical assistance tools and informational documents. The technical assistance information is available on the SFWMD website at www.sfwmd.gov/work_plan_support. Additional information about developing a work plan is available from the FDEO website at <http://www.floridajobs.org/community-planning-and-development/programs/technical-assistance/planning-initiatives/natural-resource-planning/water-supply-planning>.

Checklist of Key Considerations

Water Supply Demand Projections

- ◆ Review the 2016 UEC Plan and revise the local government's adopted work plan to be consistent with the water demand estimates and population projections listed in this plan.
- ◆ Plan for both raw and finished water supply demands within the city or county jurisdiction for each supplier.
- ◆ The projections should cover at least a 10-year planning period, but projections for the entire established local government comprehensive plan's planning period are preferred.

- ◆ The projections should plan for the building of all public, private, and water supply facilities.
- ◆ The projections should include the purchase of bulk water that will be necessary to provide water supply service within the local government's jurisdiction.
- ◆ Provide separate projections for existing and future DSS.

Water Source Identification

- ◆ Review the water supply sources identified by the local government or its water suppliers as necessary to meet and achieve the existing and projected water use demand for the established planning period.
 - ◆ Compare this information with the available sources in this 2016 UEC Plan Update.
- ◆ Identify the general areas served by DSS.

Water Supply Project Identification

- ◆ Incorporate water supply project(s) selected by the utility or utilities providing PWS to the local government, as identified in the water supply plan, or propose alternatives for inclusion in the work plan.
 - ◆ All other public and private water supply capital improvements, including wells, treatment plants, and distribution systems, necessary to maintain level of service standards within the service area should also be included in the work plan.
- ◆ Coordinate the work plan water supply projects with this 2016 UEC Plan Update and the water supplier(s) annual progress reports.
 - ◆ Update the work plan accordingly.
- ◆ Identify sufficient water conservation, reclaimed water, and water supply projects necessary to meet projected demands.
- ◆ Update the capital improvements element as required.

Water Supply Intergovernmental Coordination

The work plan should address current and future coordination with existing and future water supply and reuse providers for meeting future demands. This should occur before, during, and after the water supply plan update process.

- ◆ Review existing and future (2040) service area maps, found at the end of this appendix, for each utility. Compare and update the work plan as needed.
 - ◆ Identify existing or potential service area conflicts and solutions. Include a conflict resolution policy.
 - ◆ Ensure the water supply for all areas of the local government are accounted for by the local governments' own utility or other providers.

- ◆ Review and update the work plan language concerning needed coordination with water supplier(s), local governments and entities, and others.
 - ◆ Include updates to agreements (e.g., bulk service agreements and interconnect agreements).
- ◆ Private utilities located within local government service areas should cooperate and provide utility information to the local government responsible for the work plan.

Related Comprehensive Plan Amendments

This 2016 UEC Plan Update will require changes to the work plan and possibly other elements within the comprehensive plan. Revisions may include population projections, established planning periods, existing and future water resource projects, intergovernmental coordination activities, conservation and reuse measures, and the capital improvements element.

- ◆ If additional revisions are needed for coordination with this 2016 UEC Plan but are not listed here, incorporate changes into the comprehensive plan and work plan, as appropriate.
- ◆ Review the comprehensive plan for consistency between all sections of the work plan and other comprehensive plan elements in consideration of all proposed modifications to the comprehensive plan. Other comprehensive plan elements include future land use, potable water, sanitary sewer, conservation, intergovernmental coordination, and capital improvements.

Sector Plan(s)

Local governments with a Sector Plan authorized by Section 163.3245, F.S., should include information from the Sector Plan, the adopted Master Plan, and any adopted Detailed Specific Area Plan(s) into the work plan for the planning period of the Sector Plan and for the 2016 UEC Plan Update. The focus should be on water needs, water source and resource development, and water supply development projects needed to address projected development in the Sector Plan area.

The local government's work plan should include the following information for each Sector Plan:

- ◆ The phasing or staging schedule allocating a portion of the local government's future growth and population to the planning area through the planning period
- ◆ Projections of water demand and the identification of viable water sources to meet demands
- ◆ Proposed water conservation measures
- ◆ Capital improvements needed to meet demands and be included in the Local Government's 5-Year Capital Improvements Schedule
- ◆ Identification of general procedures and policies to coordinate with the SFWMD and to incorporate the Sector Plan area's proposed development into the 2016 UEC Plan Update.

Exemptions to Updating Work Plans

A small number of local governments are exempt from amending their comprehensive plan and updating or maintaining their work plan if they meet certain criteria. A local government that does not own, operate, or maintain its own water supply facilities and is served by a PWS entity with a permitted allocation of greater than 300 MGD is not required to amend its comprehensive plan when a water supply plan is updated if the local government's usage of water is less than 1 percent of the PWS entity's total permitted allocation. However, the local government must cooperate with the local government or utility provider that provides service within its jurisdiction and must keep the Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Aquifer Recharge Element up to date as required by Section 163.3191, F.S., (evaluation and appraisal). In the UEC Planning Area, there are no local governments that qualify for this exemption.

Evaluation and Appraisal Review of Comprehensive Plans

Section 163.3191(1), F.S.

At least every 7 years, pursuant to Chapter 73C-49, Florida Administrative Code (F.A.C.), local governments must determine whether the need exists to amend their comprehensive plan. The evaluation should address changes in state requirements since the last update of the comprehensive plan. While an evaluation and appraisal report is not required, local governments are encouraged to comprehensively evaluate and, as necessary, update comprehensive plans to reflect changes in local conditions.

Water Supply Project Identification and Selection

The evaluation of water supply projects could address the following issues:

- ◆ Identify the extent to which the local government has been successful in identifying water supply projects, including water conservation and reuse, necessary to meet projected demands.
- ◆ Evaluate the degree to which the work plan has been implemented for building all public, private, and water supply facilities within the jurisdiction necessary to meet projected demands.
- ◆ Provide recommendations for revising the work plan and the applicable comprehensive plan elements to address the conclusions of the evaluation, as necessary.

Plan Amendments (Future Land Use Change)

Water Supply Demand Projections

- ◆ Address both raw and finished (i.e., after any losses due to water treatment) water supply needs for potable and non-potable (i.e., irrigation) demands, using professionally acceptable methodologies for population projections and per capita use rates.

- ◆ Address existing and future water conservation and reuse commitments, and levels of service (i.e., PCURs), for the proposed future land use change and the comprehensive plan.
- ◆ Address both the build-out time frame for a proposed future land use change and the established planning period for the comprehensive plan.

Water Source Identification

- ◆ For existing demands, reflect water source(s) from supplier's water use permit.
- ◆ For future demands covered by a supplier's commitment to provide service under remaining available capacity of an existing consumptive use permit, reflect the source(s) from the supplier's water use permit, including bulk supply contracted quantities, duration, and provider.
- ◆ Provide sufficient planning-level data and analysis to demonstrate the availability of a sustainable water source as identified in the appropriate SFWMD water supply plan when the future demands are not covered by an existing water use permit.

Availability of Water Supply and Public Facilities

- ◆ Demonstrate that there is an available raw water supply from the proposed source(s) for the future land use change, given all other approved land use commitments within the local government's jurisdiction over both the proposed amendment's build-out and the established planning period of the comprehensive plan [Sections 163.3167(9) and 163.3177(3)(a), F.S.].
- ◆ Demonstrate that there is an availability of both treatment facility capacity and permitted finished water supply for future land use change, given all other commitments for that capacity and supply over the proposed build-out timeframe.
- ◆ If the availability of water supply and/or public facilities is not currently demonstrable, phasing of the future land use [Section 163.3177, F.S.] and/or appropriate amendments to the capital improvements element/potable water sub-element will be required to ensure the necessary capital planning and timely availability of the needed infrastructure and water supply [Sections 163.3177(3)(a), 163.3177(6)(c), and 163.3177(6)(h), F.S.].
- ◆ If the water provider is an entity other than the local government responsible for the comprehensive plan amendment, demonstrate that coordination of the plan amendment has occurred between the water provider and the local government [Section 163.3177(6)(h), F.S.].

Related Comprehensive Plan Amendments

- ◆ A future land use change may require amendments to specific elements within the comprehensive plan if there is an adjustment to the plan's future population or demand projections, the comprehensive plan's established planning period, the water supply sources, or water providers required to be addressed in the comprehensive plan [Sections 163.3167(9), 163.3177(5)(a), 163.3177(6)(a), 163.3177(6)(c), 163.3177(6)(d), and 163.3180, F.S.].

CITED FLORIDA STATUTE PROVISIONS (RELEVANT PORTIONS)

163.3167(9): Each local government shall address in its comprehensive plan, as enumerated in this chapter, the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the applicable plan developed pursuant to Section 373.709, F.S.

163.3177(3)(a): The comprehensive plan shall contain a capital improvements element designed to consider the need for and the location of public facilities in order to encourage the efficient use of such facilities and set forth:

1. A component that outlines principles for construction, extension, or increase in capacity of public facilities, as well as a component that outlines principles for correcting existing public facility deficiencies, which are necessary to implement the comprehensive plan. The components shall cover at least a 5-year period.
2. Estimated public facility costs, including a delineation of when facilities will be needed, the general location of the facilities, and projected revenue sources to fund the facilities.
3. Standards to ensure the availability of public facilities and the adequacy of those facilities to meet established acceptable levels of service.
4. A schedule of capital improvements which includes any publicly funded projects of federal, state, or local government, and which may include privately funded projects for which the local government has no fiscal responsibility. Projects necessary to ensure that any adopted level-of-service standards are achieved and maintained for the 5-year period must be identified as either funded or unfunded and given a level of priority for funding.

163.3177(3)(b): The capital improvements element must be reviewed by the local government on an annual basis. Modifications to update the 5-year capital improvement schedule may be accomplished by ordinance and may not be deemed to be amendments to the local comprehensive plan.

163.3177(4)(a): Coordination of the local comprehensive plan with the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region; with the appropriate water management district's regional water supply plans approved pursuant to Section 373.709, F.S.; and with adopted rules pertaining to designated areas of critical state concern shall be a major objective of the local comprehensive planning process. To that end, in the preparation of a comprehensive plan or element thereof, and in the comprehensive plan or element as adopted, the governing body shall include a specific policy statement indicating the relationship of the proposed development of the area to the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region, as the case may require and as such adopted plans or plans in preparation may exist.

163.3177(5)(a): Each local government comprehensive plan must include at least two planning periods, one covering at least the first 5-year period occurring after the plan's

adoption and one covering at least a 10-year period. Additional planning periods for specific components, elements, land use amendments, or projects shall be permissible and accepted as part of the planning process.

163.3177(6)(a): A future land use plan element designating proposed future general distribution, location, and extent of the uses of land for residential uses, commercial uses, industry, agriculture, recreation, conservation, education, public facilities, and other categories of the public and private uses of land. The approximate acreage and the general range of density or intensity of use shall be provided for the gross land area included in each existing land use category. The element shall establish the long-term end toward which land use programs and activities are ultimately directed.

163.3177(6)(a)2: The future land use plan and plan amendments shall be based upon surveys, studies, and data regarding the area, as applicable including:

- a. The amount of land required to accommodate anticipated growth.
- b. The projected permanent and seasonal population of the area.
- c. The character of undeveloped land.
- d. The availability of water supplies, public facilities, and services.
- e. The need for redevelopment, including the renewal of blighted areas and the elimination of nonconforming uses which are inconsistent with the character of the community.

163.3177(6)(c): A general sanitary sewer, solid waste, drainage, potable water, and natural groundwater aquifer recharge element correlated to principles and guidelines for future land use, indicating ways to provide for future potable water, drainage, sanitary sewer, solid waste, and aquifer recharge protection requirements for the area. The element may be a detailed engineering plan including a topographic map depicting areas of prime groundwater recharge.

1. Each local government shall address in the data and analyses required by this section those facilities that provide service within the local government's jurisdiction. Local governments that provide facilities to serve areas within other local government jurisdictions shall also address those facilities in the data and analyses required by this section, using data from the comprehensive plan for those areas for the purpose of projecting facility needs as required in this subsection. For shared facilities, each local government shall indicate the proportional capacity of the systems allocated to serve its jurisdiction.
2. The element shall describe the problems and needs and the general facilities that will be required for solution of the problems and needs including correcting existing facility deficiencies. The element shall address coordinating the extension of, or increase in the capacity of, facilities to meet future needs while maximizing the use of existing facilities and discouraging urban sprawl; conserving potable water resources; and protecting the functions of natural groundwater recharge areas and natural drainage features.

3. Within 18 months after the governing board approves an updated regional water supply plan, the element must incorporate the alternative water supply project or projects selected by the local government from those identified in the regional water supply plan pursuant to Section 373.709(2)(a) or proposed by the local government under Section 373.709(8)(b). If a local government is located within two water management districts, the local government shall adopt its comprehensive plan amendment within 18 months after the later updated regional water supply plan. The element must identify such alternative water supply projects and traditional water supply projects and conservation and reuse necessary to meet the water needs identified in Section 373.709(2)(a) within the local government's jurisdiction and include a work plan, covering at least a 10 year planning period, for building public, private, and regional water supply facilities, including development of alternative water supplies, which are identified in the element as necessary to serve existing and new development. The work plan shall be updated, at a minimum, every five years within 18 months after the governing board of a water management district approves an updated regional water supply plan. Local governments, public and private utilities, regional water supply authorities, special districts, and water management districts are encouraged to cooperatively plan for the development of multijurisdictional water supply facilities that are sufficient to meet projected demands for established planning periods, including the development of alternative water sources to supplement traditional sources of groundwater and surface water supplies.
4. A local government that does not own, operate, or maintain its own water supply facilities, including, but not limited to, wells, treatment facilities, and distribution infrastructure, and is served by a public water utility with a permitted allocation of greater than 300 million gallons per day is not required to amend its comprehensive plan in response to an updated regional water supply plan or to maintain a work plan if any such local government's usage of water constitutes less than 1 percent of the public water utility's total permitted allocation. However, any such local government is required to cooperate with, and provide relevant data to, any local government or utility provider that provides service within its jurisdiction, and to keep its general sanitary sewer, solid waste, potable water, and natural groundwater aquifer recharge element updated in accordance with Section 163.3191.

163.3177(6)(d): A conservation element for the conservation, use, and protection of natural resources in the area, including air, water, water recharge areas, wetlands, water wells, estuarine marshes, soils, beaches, shores, flood plains, rivers, bays, lakes, harbors, forests, fisheries and wildlife, marine habitat, minerals, and other natural and environmental resources, including factors that affect energy conservation.

1. The following natural resources, where present within the local government's boundaries, shall be identified and analyzed and existing recreational or conservation uses, known pollution problems, including hazardous wastes, and the potential for conservation, recreation, use, or protection shall also be identified:

- a. Rivers, bays, lakes, wetlands including estuarine marshes, groundwaters, and springs, including information on quality of the resource available.
 - b. Floodplains.
- 2. The element must contain principles, guidelines, and standards for conservation that provide long-term goals and which:
 - b. Conserves, appropriately uses, and protects the quality and quantity of current and projected water sources and waters that flow into estuarine waters or oceanic waters and protect from activities and land uses known to affect adversely the quality and quantity of identified water sources, including natural groundwater recharge areas, wellhead protection areas, and surface waters used as a source of public water supply.
 - c. Provides for the emergency conservation of water sources in accordance with the plans of the regional water management district.
- 3. Current and projected needs and sources for at least a 10-year period based on the demands for industrial, agricultural, and potable water use and the quality and quantity of water available to meet these demands shall be analyzed. The analysis shall consider the existing levels of water conservation, use, and protection and applicable policies of the regional water management district and further must consider the appropriate regional water supply plan approved pursuant to Section 373.709, or, in the absence of an approved regional water supply plan, the district water management plan approved pursuant to Section 373.036(2). This information shall be submitted to the appropriate agencies.

163.3177(6)(h)1: An intergovernmental coordination element showing relationships and stating principles and guidelines to be used in coordinating the adopted comprehensive plan with the plans of school boards, regional water supply authorities, and other units of local government providing services but not having regulatory authority over the use of land, with the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region, with the state comprehensive plan and with the applicable regional water supply plan approved pursuant to Section 373.709, as the case may require and as such adopted plans or plans in preparation may exist...

- a. The intergovernmental coordination element must provide procedures for identifying and implementing joint planning areas, especially for the purpose of annexation, municipal incorporation, and joint infrastructure service areas.

163.3177(6)(h)3.b: Ensure coordination in establishing level of service standards for public facilities with any state, regional, or local entity having operational and maintenance responsibility for such facilities.

163.3180, F.S.: Concurrency.—

163.3180(1): Sanitary sewer, solid waste, drainage, and potable water are the only public facilities and services subject to the concurrency requirement on a statewide basis...

163.3180(1)(b): The local government comprehensive plan must demonstrate, for required or optional concurrency requirements, that the levels of service adopted can be reasonably met. Infrastructure needed to ensure that adopted level-of-service standards are achieved

and maintained for the 5-year period of the capital improvement schedule must be identified pursuant to the requirements of Section 163.3177(3). The comprehensive plan must include principles, guidelines, standards, and strategies for the establishment of a concurrency management system.

163.3180(2): Consistent with public health and safety, sanitary sewer, solid waste, drainage, adequate water supplies, and potable water facilities shall be in place and available to serve new development no later than the issuance by the local government of a certificate of occupancy or its functional equivalent. Prior to approval of a building permit or its functional equivalent, the local government shall consult with the applicable water supplier to determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance by the local government of a certificate of occupancy or its functional equivalent...

163.3180(3): Governmental entities that are not responsible for providing, financing, operating, or regulating public facilities needed to serve development may not establish binding level-of-service standards on governmental entities that do bear those responsibilities.

163.3191: Evaluation and appraisal of comprehensive plan.—

163.3191(1): At least once every 7 years, each local government shall evaluate its comprehensive plan to determine if plan amendments are necessary to reflect changes in state requirements in this part since the last update of the comprehensive plan, and notify the state land planning agency as to its determination.

163.3191(2): If the local government determines amendments to its comprehensive plan are necessary to reflect changes in state requirements, the local government shall prepare and transmit within 1 year such plan amendment or amendments for review pursuant to Section 163.3184.

163.3191(3): Local governments are encouraged to comprehensively evaluate and, as necessary, update comprehensive plans to reflect changes in local conditions...

163.3191(4): If a local government fails to submit its letter prescribed by subsection (1) or update its plan pursuant to subsection (2), it may not amend its comprehensive plan until such time as it complies with this section.

163.3245 Sector Plans. –

163.3245(1): In recognition of the benefits of long-range planning for specific areas, local governments or combinations of local governments may adopt into their comprehensive plans a sector plan in accordance with this section. This section is intended to promote and encourage long-term planning for conservation, development, and agriculture on a landscape scale; to further support innovative and flexible planning and development strategies, and the purposes of this part and part I of Chapter 380; to facilitate protection of regionally significant resources, including, but not limited to, regionally significant water courses and wildlife corridors; and to avoid duplication of effort in terms of the level of data and analysis required for a development of regional impact, while ensuring the adequate mitigation of impacts to applicable regional resources and facilities, including those within the jurisdiction

of other local governments, as would otherwise be provided. Sector plans are intended for substantial geographic areas that include at least 15,000 acres of one or more local governmental jurisdictions and are to emphasize urban form and protection of regionally significant resources and public facilities. A sector plan may not be adopted in an area of critical state concern.

163.3245 (3)(a)2.: A general identification of the water supplies needed and available sources of water, including water resource development and water supply development projects, and water conservation measures needed to meet the projected demand of the future land uses in the long-term master plan.

163.3245(3)(a)3.: A general identification of other regionally significant public facilities necessary to support the future land uses, which may include central utilities provided onsite within the planning area, and policies setting forth the procedures to be used to mitigate the impacts of future land uses on public facilities.

163.3245 (3)(a)4.: A general identification of regionally significant natural resources within the planning area based on the best available data and policies setting forth the procedures for protection or conservation of specific resources consistent with the overall conservation and development strategy for the planning area.

(163.32453)(b)3.: Detailed identification of water resource development and water supply development projects and related infrastructure and water conservation measures to address water needs of development in the detailed specific area plan.

163.3245 (4): Upon the long-term master plan becoming legally effective:

163.3245 (4)(b): The water needs, sources and water resource development, and water supply development projects identified in adopted plans pursuant to Subparagraphs (3)(a)2. and (b)3. shall be incorporated into the applicable district and regional water supply plans adopted in accordance with Subsections 373.036 and 373.709. Accordingly, and notwithstanding the permit durations stated in Section 373.236, an applicant may request and the applicable district may issue consumptive use permits for durations commensurate with the long-term master plan or detailed specific area plan, considering the ability of the master plan area to contribute to regional water supply availability and the need to maximize reasonable-beneficial use of the water resource. The permitting criteria in Section 373.223 shall be applied based upon the projected population and the approved densities and intensities of use and their distribution in the long-term master plan; however, the allocation of the water may be phased over the permit duration to correspond to actual projected needs. This paragraph does not supersede the public interest test set forth in Section 373.223.

163.3245(13): An applicant with an approved master development order may request that the applicable water management district issue a consumptive use permit as set forth in Section 373.236(8) for the same period of time as the approved master development order.

UTILITY SERVICE AREAS

This section addresses local government jurisdictions and the utilities that provide raw or finished water to local governments. These utilities have a treatment capacity greater than 0.1 MGD. **Table E-1** is organized according to local governments within the UEC Planning Area. **Table E-2** is organized by utilities serving specific local government jurisdictions within the UEC Planning Area.

District staff worked with the utilities to map service boundaries for the utility service areas, as shown in **Figures E-1** through **E-4**. In particular, the St. Lucie County utility service area boundary reflects a water supply planning boundary for this 2016 UEC Plan Update. However, the permit utility boundary for St. Lucie County (SFWMD Consumptive Use Permit for St. Lucie County 56-00406-W) encompasses all of St. Lucie County, which is not served by another existing utility in the utility service areas of St. Lucie County, as shown in **Figures E-3** and **E-4**.

Table E-1. Utilities and entities that serve local governments in the UEC Planning Area.

Local Government	Local Government Utility	Other Utilities Serving Local Government
Martin County		
Martin County (unincorporated)	Yes	South Martin Regional Utility, Indiantown Company, City of Stuart, Town of Jupiter, and Village of Tequesta, City of Port St. Lucie
Jupiter Island, Town of	Local Government Owned	South Martin Regional Utility (owned by Town of Jupiter Island)
Ocean Breeze Park	No	Martin County Utilities
Sewall's Point, Town of	No	Martin County Utilities
Stuart, City of	Yes	N/A
Jupiter, Town of ^a	Yes	N/A
Tequesta, Village of ^a	Yes	N/A
Okeechobee County		
Okeechobee County ^b (unincorporated)	No	N/A
St. Lucie County		
St. Lucie County (unincorporated)	Yes	Fort Pierce Utilities Authority
Fort Pierce, City of	Yes	N/A
Port St. Lucie, City of	Yes	St. Lucie West Services District, Reserve Community Development District
St. Lucie Village	No	Fort Pierce Utilities Authority

^a The Town of Jupiter and the Village of Tequesta have utility service areas in both Martin and Palm Beach counties. This document only references the portion located within Martin County. (The 2018 LEC Water Supply Plan Update will address the whole utility, including both counties for Jupiter and Tequesta.)

^b The utilities in Okeechobee County are addressed in the 2014 Lower Kissimmee Basin Water Supply Plan and future updates. Presently, there are no utilities in the northeastern portion of Okeechobee County, which is part of the UEC Planning Area.

Table E-2. Utilities and local governments that serve the UEC Planning Area.

Utility/Entity Name	Local Government Utility	Local Governments Served
Martin County		
Indiantown Company	No	Unincorporated Martin County
Jupiter, Town of ^a	Yes	Unincorporated Martin County
Tequesta, Village of ^a	Yes	Unincorporated Martin County
Martin County Consolidated System	Yes	Unincorporated Martin County (portions serving Floridian Golf Resort, Jensen Beach, Martin Downs, Palm City, Port Salerno, Tropical Farms, Miles Grant Golf and Country Club, Piper's Landing, Indian River Plantation, South Hutchinson Island), City of Stuart (portion), Ocean Breeze Park, and Town of Sewall's Point
City of Port St. Lucie	Yes	Martin Correctional Institution
Sailfish Point	No	Unincorporated Martin County (serving Sailfish Point development)
South Martin Regional Utility (SMRU)	Yes	Town of Jupiter Island, Hobe Sound vicinity, and portions of southeastern unincorporated Martin County
Stuart, City of	Yes	City of Stuart and unincorporated Martin County (portion)
St. Lucie County		
Fort Pierce Utilities Authority (FPUA)	Yes	City of Fort Pierce, St. Lucie Village, and bulk water to St. Lucie County Utilities
Harbour Ridge	No	Unincorporated St. Lucie County (serving Harbour Ridge Country Club)
Martin County Consolidated System	Yes	City of Ft. Pierce
Meadowood Community Association	No	Unincorporated St. Lucie County (serving Meadowood)
Port St. Lucie Utility Systems Department, City of	Yes	City of Port St. Lucie (including the larger portion of The Reserve development) and portions of unincorporated St. Lucie County
Reserve Community Development District (CDD)	No	City of Port St. Lucie (serving a portion of The Reserve development)
Spanish Lakes Country Club	No	Unincorporated St. Lucie County (serving Spanish Lakes Country Club Village)
Spanish Lakes Fairways	No	Unincorporated St. Lucie County (serving Spanish Lakes Fairways)
St. Lucie County Utilities District	Yes	Unincorporated St. Lucie County (serving north county area, mainland county area, and South Hutchinson Island). Distributes bulk water purchases from FPUA to unincorporated St. Lucie County (serving North Hutchinson Island, Indian River Estates, Portofino Shores, and the Midway Road–Okeechobee Road Corridor)
St. Lucie West Services District (SLWSD)	No	City of Port St. Lucie (serving St. Lucie West development). The SLWSD has an agreement with the Reserve CDD to provide water to the original section of The Reserve

^a The Town of Jupiter and the Village of Tequesta have utility service areas in both Martin and Palm Beach counties. This document only references the portion located within Martin County. (The 2013 LEC Water Supply Plan Update and future updates will address the whole utility, including both counties for Jupiter and Tequesta.)

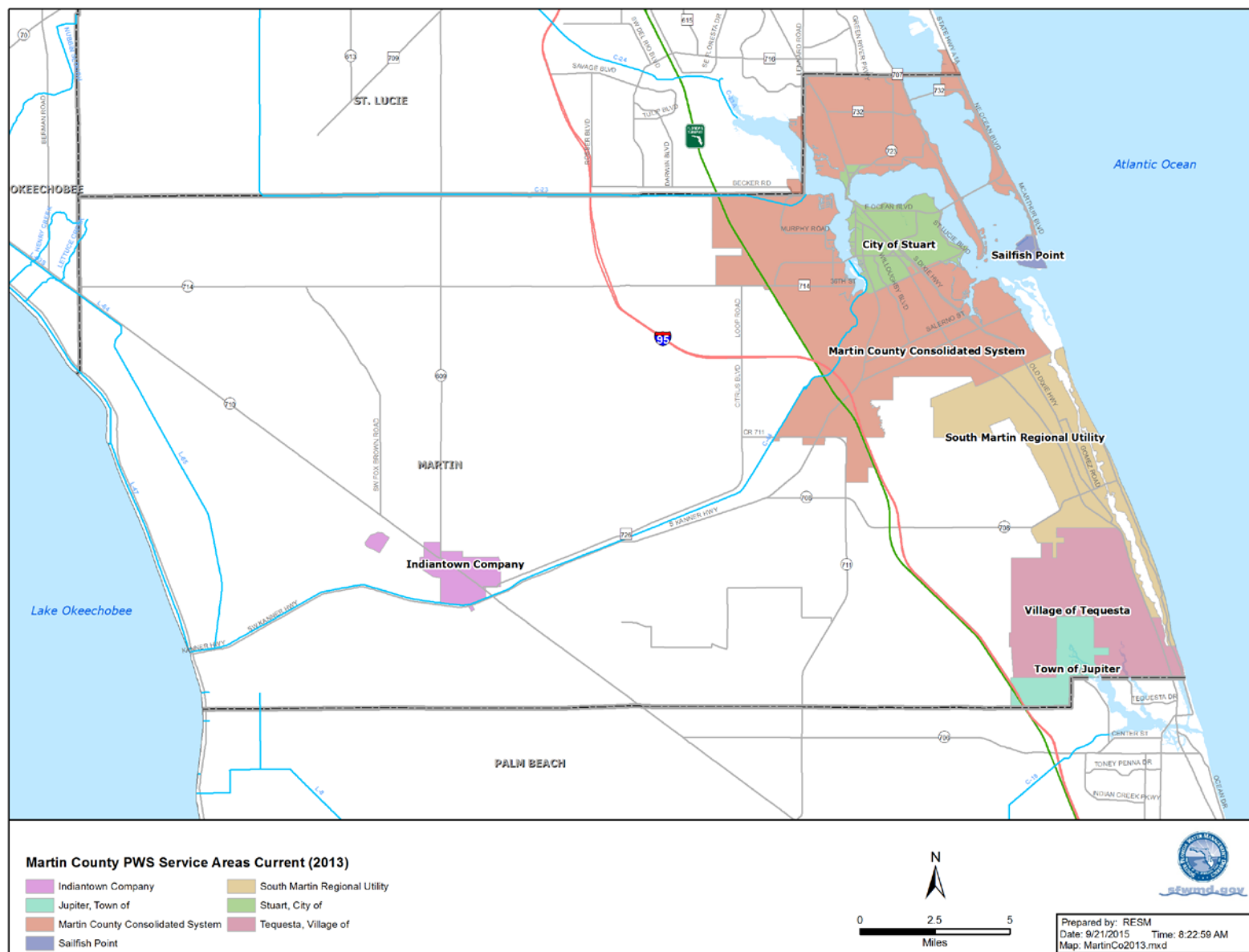


Figure E-1. 2013 utility service areas in Martin County.

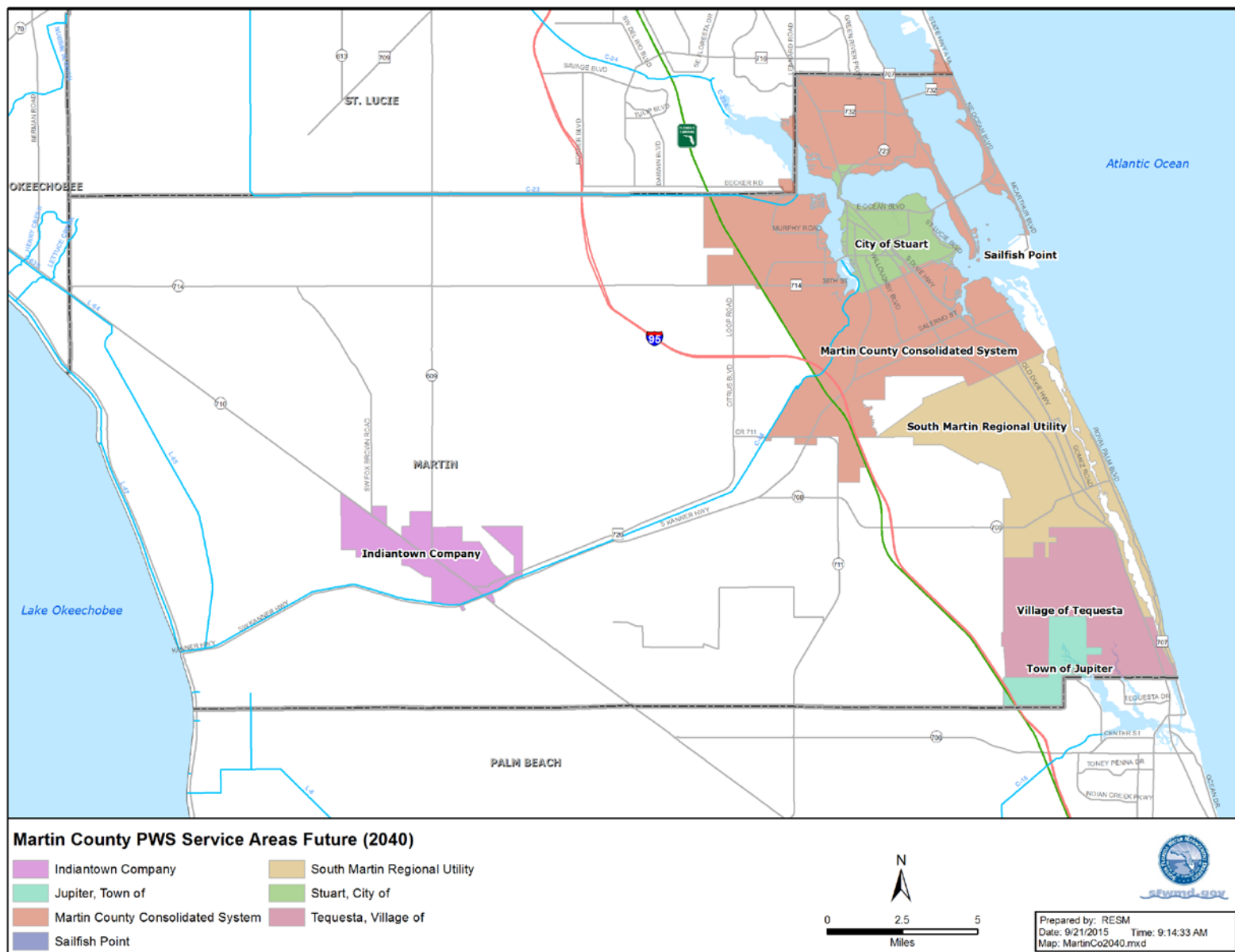


Figure E-2. 2040 utility service areas in Martin County.

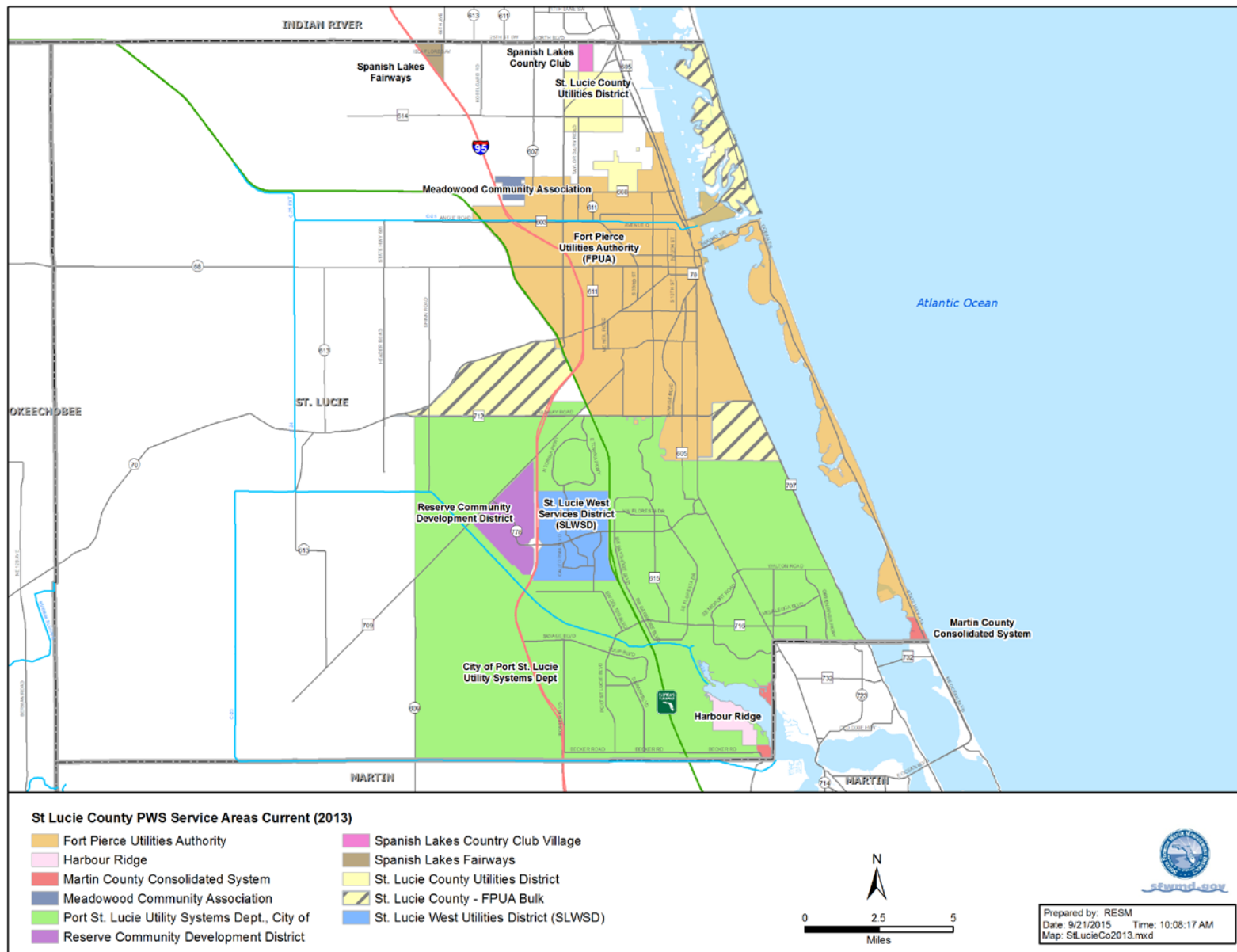


Figure E-3. 2013 utility service areas in St. Lucie County.

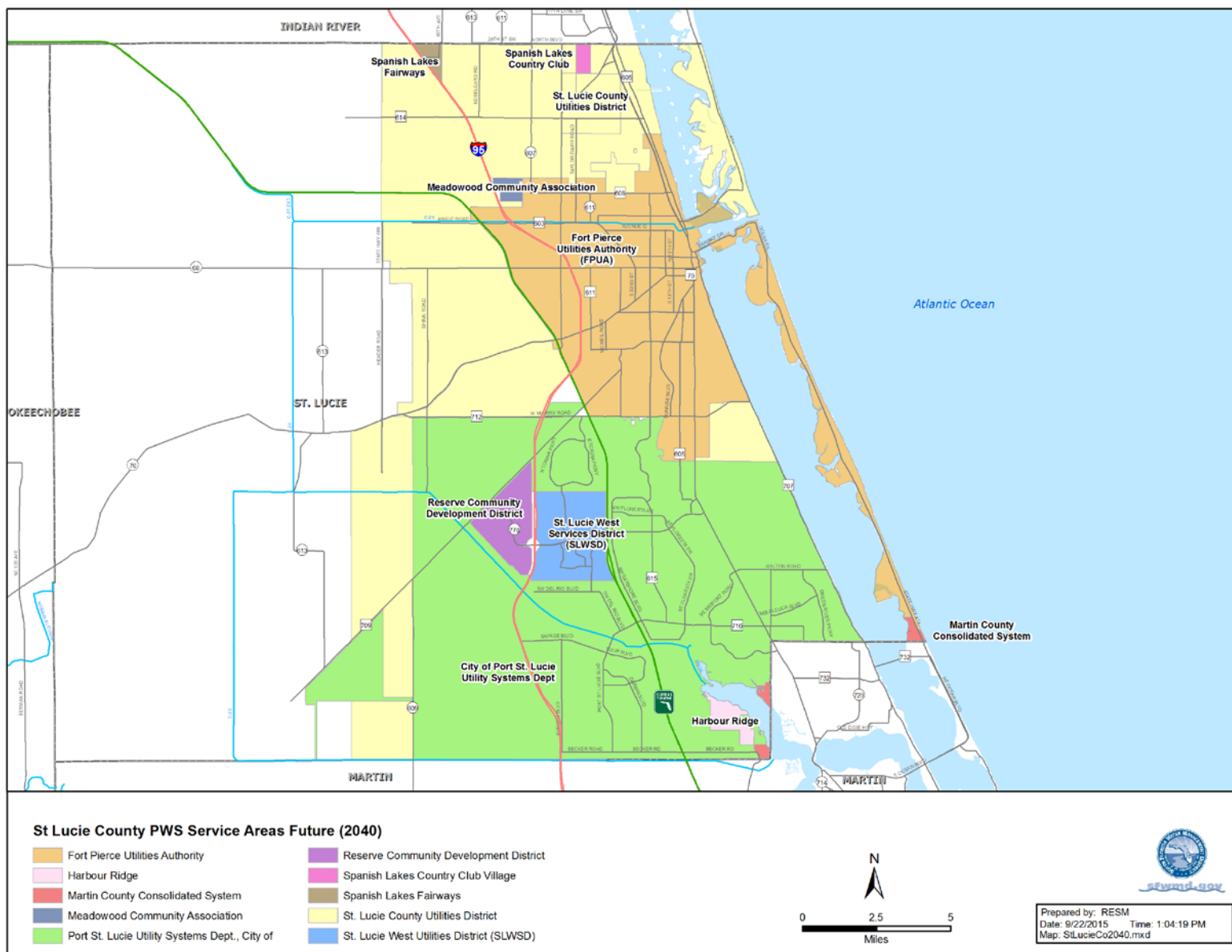


Figure E-4. 2040 utility service areas in St. Lucie County.

F

Water Supply Development Projects

This *2016 Upper East Coast Water Supply Plan* promotes the diversification of sources for the water supply projects needed to meet future demands. Public water supply and non-potable irrigation related projects proposed for inclusion in this update were evaluated based on the level of detail provided by the utilities (e.g., project scope, cost, and schedule) and whether the project is expected to contribute to new water supply, resulting in a potentially permissible increase in their allocations or a treatment system's rated capacity.

Table F-1 summarizes the water supply development projects that are proposed to be complete by 2040 for the UEC Planning Area. **Table F-1** is divided to identify the proposed projects by type, such as Public Water Supply (PWS), Reclaimed, Water Supply and River Augmentation, PWS and Interconnect, and PWS/Aquifer Storage and Recovery (ASR).

A project identified for inclusion in this plan update may not be selected for development by the utility. In accordance with Section 373.709(6), Florida Statutes (F.S.), nothing contained in the water supply component of a regional water supply plan should be constructed to require local governments, public or privately owned utilities, special districts, self-suppliers, multi-jurisdictional entities, or other water suppliers to select the identified project. If the projects identified in this plan update are not selected by a utility, the utility will need to identify another method to meet its needs and advise the SFWMD of the alternative project(s). In addition, the respective local government will need to include such information in its water supply facilities work plan.

A project may not be selected for implementation if there is no need. Several utilities have proposed projects that exceed the projected demands for 2040 (see Chapter 6). As with the previous plan update, utilities may replace or eliminate projects that are not needed, or defer projects beyond the 2040 planning horizon of this update.

Table F-1. Summary of UEC WSP Planning Area water supply project options.

Project #	County	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (MGD)	Total Capital Cost (\$ million)	Estimated Completion Date
Surficial Groundwater								
1	Martin	Indiantown WTP Expansion	Indiantown Company	Expand SAS WTP by 0.6 MGD (2040) from 1.3 MGD to a total of 1.9 MGD contingent upon growth	PWS	0.60	\$3.20	2040
2	St. Lucie	Holiday Pines WTP Expansion	St. Lucie County Utilities District	Expand Holiday Pines SAS WTP by 0.5 MGD (2018)	PWS	0.50	\$1.00	2018
3	St. Lucie	Installation of 3 Irrigation Wells	Harbour Ridge Utility	Installation of 3 irrigation SAS wells for a total of 0.94 MGD (2013)	REC/ Landscape	0.94	\$0.30	2013
Total for Surficial Groundwater Projects						2.04	\$4.50	
Brackish Groundwater								
4	Martin	No. Jensen Drill & Well Construction	Martin County Consolidated System	Drill and construct North Jensen FAS Well RO-5 2.0 MGD (2021)	PWS	2.00	\$2.25	2021
5	Martin	Tropical Farms WTP Expansion	Martin County Consolidated System	Expand Tropical Farms FAS RO WTP from 10 to 12 MGD (2 MGD) (2025) and expand from 12 to 14 MGD (2 MGD) (2035)	PWS	4.00	\$9.50	Phase I: 2025 Phase II: 2035
6	Martin	WTP Expansion	South Martin Regional Utility	Expand existing 2.0 MGD FAS RO WTP by 2.2 MGD (2025) to a total of 4.2 MGD	PWS	2.20	\$3.50	2025
7	St. Lucie	Henry Gahn WTP Expansion	Ft. Pierce Utilities Authority	Expand Henry Gahn FAS RO WTP from 6.00 to 10.33 MGD (4.33 MGD) includes 2.0 MGD FAS well, raw water pipeline, spare feed pump for emergencies (2021) and 2nd DIW (3 MGD) for concentrate disposal (2027 - \$3.6M)	PWS	4.33	\$12.10	Phase I: 2025 Phase II: 2035
8	St. Lucie	North County Regional WTP Construction	St. Lucie County Utilities District	Construct North County Regional Utility FAS RO WTP phased 5 MGD (2020), expand by 5 MGD (2028) and expand by 7 MGD (2040) for a total of 17 MGD	PWS	17.00	\$136.00	Phase I: 2020 Phase II: 2028 Phase III: 2040

Project #	County	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (MGD)	Total Capital Cost (\$ million)	Estimated Completion Date
9	St. Lucie	Construct SLC Central County Regional WTP	St. Lucie County Utilities District	Construct Central County Regional FAS RO WTP phased 2 MGD (2030) and 2 MGD expansion (2040) to a total of 4 MGD	PWS	4.00	\$16.00	Phase I: 2030 Phase II: 2040
10	St. Lucie	South County Regional WTP Construction	St. Lucie County Utilities District	Construct South County Regional FAS RO WTP phased 2 MGD (2034) and expand by 2 MGD (2039) to a total of 4 MGD	PWS	4.00	\$16.00	Phase I: 2034 Phase II: 2039
Total for Brackish Groundwater Projects						37.53	\$195.35	
Reclaimed Water								
11	Martin	WWTP Expansion	South Martin Regional Utility	Expand WWTP by 1.0 MGD for supplemental Irrigation Quality (IQ) sources using SAS source (2025)	Reclaimed	1.00	\$1.00	2025
12	St. Lucie	Mainland Water Reclamation WWTP Construction	Ft. Pierce Utilities Authority	Construct Mainland Water Reclamation WWTP Phase 1 – 5 MGD (2021) and Phase 2 expansion by 5 MGD (2031) for a total of 10 MGD	Reclaimed	10.00	\$56.50	Phase I: 2021 Phase II: 2031
13	St. Lucie	Construct SLC Central County Regional WWTP	St. Lucie County Utilities District	Construct Central County Regional 2.0 MGD WWTP (2020) and expand by 2.0 MGD (2028) and expand by 2 MGD (2040) to a total of 6.0 MGD	Reclaimed	6.00	\$72.00	Phase I: 2020 Phase II: 2028 Phase III: 2040
14	St. Lucie	North County Regional WWTP Construction	St. Lucie County Utilities District	Construct North County 2.0 MGD WWTP (2016-2020) and expand by 2.0 MGD (2028) and expand by 2.0 MGD (2040) to a total of 6.0 MGD	Reclaimed	6.00	\$72.00	Phase I: 2020 Phase II: 2028 Phase III: 2040
15	St. Lucie	SLC North Hutchinson Island WWTP Expansion	St. Lucie County Utilities District	Expand North Hutchinson Island WWTP from 0.5 to 0.85 MGD and updates	Reclaimed	0.35	\$4.30	2015

Project #	County	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (MGD)	Total Capital Cost (\$ million)	Estimated Completion Date
16	St. Lucie	Westport WWTP ASR well drilling	City of Port St. Lucie Utility Systems Dept.	Drill and construct 4.0 MGD ASR well at Westport WWTP FDEP permitted (2017 or as funds become available - \$1.6M) and development of annual ASR cycle 2018 (\$0.6M)	Reclaimed/ ASR Storage	4.00	\$2.20	Phase I: 2017 Phase II: 2018
Total for Reclaimed Water Projects						27.35	\$208.00	
Surface Water/Stormwater								
17	St. Lucie	McCarty Ranch Reservoir Preparation	City of Port St. Lucie Utility Systems Dept.	Construct McCarty Ranch Reservoir in preparation for future surface WTP, includes dredging, culverts, pond dredging, berm construction, and stormwater pumping station and WCS No. 9 replacement for future SW WTP with storage of water from the C-23 canal (2017-2030)	PWS	0.00	\$60.00	Phased: 2017-2030
18	St. Lucie	McCarty Ranch Reservoir WTP	City of Port St. Lucie Utility Systems Dept.	Construct 20 MGD McCarty Ranch Surface Water WTP (2031) for treatment of surface water and for potable water use and a 10 MGD expansion (2033). Other potential project benefits include groundwater recharge, reduce discharges to estuaries, nutrient removal, MFL compliance, and water management flexibility.	PWS	30.00	\$147.00	Phase I: 2031 Phase II: 2033

Project #	County	Project Name	Implementing Agency or Entity	Project Description	Project Type	Project Capacity (MGD)	Total Capital Cost (\$ million)	Estimated Completion Date
19	Okeechobee Indian River	Grove Land Reservoir and Stormwater Treatment Area	Grove Land Utilities	A reservoir assisted STA project designed for 75,000 acre-feet storage capacity. Will provide surface water to St. Johns River and the UEC Planning Area. Other potential project benefits include groundwater recharge, reduce discharges to estuaries, nutrient removal, MFL compliance, and water management flexibility.	Water Supply and River Augmentation	122.40 raw water	\$435.43	TBD
20	St. Lucie	Drill ASR well at McCarty Ranch WTP	City of Port St. Lucie Utility Systems Dept.	Drill ASR wells at McCarty Ranch WTP - 6.25 MGD (2025) and an additional 10 MGD (2031) for a total of 16.25 MGD to store surface water/stormwater	PWS/ASR	16.25	\$14.00	Phase I: 2025 Phase II: 2031
Total for Surface/Stormwater Projects						152.40	\$642.43	
Management Strategies								
21	St. Lucie	Ft. Pierce Bulk Potable Water to St. Lucie County	Ft. Pierce Utilities Authority /St. Lucie County Utilities District	A 15-year inter-local agreement to receive bulk potable water from FPUA up to 1.01 MGD (2013-2027)	PWS & Interconnect	1.01	Not Specified	2027
22	Martin	Martin County Bulk Potable Water to Stuart	Martin County Consolidated System/Stuart Utility	20-year inter-local agreement with Martin County for purchase of up to 0.8 MGD bulk potable water (2008-2028)	PWS & Interconnect	0.80	Not Specified	2028
23	St. Lucie	SLWSD Bulk Potable Water to RCDD	St. Lucie West Service District/Reserve Community Development District	Potable bulk water agreement with SLWSD through 2024 up to 0.30 MGD with automatic 5-year renewals	PWS & Interconnect	0.30	Not Specified	TBD
Total for Management Strategies Projects						2.11	Not Specified	
TOTAL						221.43	\$1,050.28	2/2/2016

Estimates of Florida Statewide Agricultural Irrigation Demand

In 2013, legislation was enacted requiring the Florida Department of Agriculture and Consumer Services (FDACS) to develop agricultural water demand projections for all water management districts. In accordance with the new rule, the FDACS Office of Agricultural Water Policy developed a process to estimate the 2010 agricultural irrigated acreage and water demand as well as project acreage and water demand to 2035 for the entire state. The project, called the Florida Statewide Agricultural Irrigation Demand (FSAID), produced estimates of irrigated agricultural acreage and water demand by crop type, spatially for each county. The estimates were used to project the crop acreage and water demand for an average year and a dry year in 5-year increments to 2035.

The first set of data and projections were released to the water management districts in September 2014 (FSAID) and included six future scenarios. Beginning with FSAID2 (released in July 2015), the agricultural acreage and water supply demand projections were calculated for an average year and a dry year in one scenario. The results of the effort are contained in the FSAID2 database, which includes standardized statewide parcel-level geographic information system (GIS) coverage of all non-irrigated agricultural and irrigated agricultural lands for 2015, estimates of 2015 irrigated agricultural acreage by a variety of crop types or categories spatially for each county, and future projections of irrigated agricultural acreage to 2035.

The data from FSAID2 are available via an online user interface available at www.fsaid2.com. The following data were accessed from the FSAID2 database on July 30, 2015:

- ◆ Total irrigated acreage in Upper East Coast (UEC) Planning Area by crop type (**Table G-1**)
- ◆ Irrigated acreage in Martin County by crop type (**Table G-2**)
- ◆ Irrigated acreage in St Lucie County by crop type (**Table G-3**)
- ◆ Irrigated acreage in northeastern Okeechobee County by crop type (**Table G-4**)
- ◆ Agricultural average year demand (in million gallons per day [MGD]) for UEC Planning Area and by county (**Table G-5**)
- ◆ Agricultural dry year demand (in MGD) for UEC Planning Area and by county (**Table G-6**)

Table G-1. FSAID2 and SFWMD total irrigated acreage in UEC Planning Area by crop type.

Crop	2010	2013	2015	2020	2025	2030	2035	2040
FSAID2								
Citrus	--	--	70,296	66,839	64,096	60,284	56,842	--
Fruit (Non-citrus)	--	--	10	10	10	0	0	--
Greenhouse or Nursery	--	--	4,597	4,308	4,042	3,765	3,722	--
Hay	--	--	4,210	3,924	3,808	3,651	3,155	--
Potatoes	--	--	1,100	1,100	1,100	2,081	2,081	--
Sod	--	--	6,430	6,243	6,073	5,980	5,980	--
Sugarcane	--	--	10,545	10,427	10,134	10,134	9,962	--
Vegetables (Fresh Market)	--	--	6,681	6,681	6,290	5,269	5,269	--
Total	--	--	103,869	99,533	95,553	91,165	87,012	--
SFWMD								
Citrus	59,799	45,379	42,476	39,760	41,700	43,900	49,100	57,300
Greenhouse or Nursery	1,943	4,264	4,264	4,264	4,264	4,264	4,264	4,264
Sod	5,211	4,601	5,450	5,450	5,450	5,450	5,450	5,450
Sugarcane	10,379	17,952	17,952	17,952	17,952	17,952	17,952	17,952
Vegetables, Melons, and Berries	8,869	9,568	12,422	12,622	12,722	12,822	12,922	13,022
Field Crops	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
Other Fruits and Nuts	115.0	147.2	147.2	147.2	147.2	147.2	147.2	147.2
Irrigated Pasture	38,698	38,698	38,698	38,698	38,698	38,698	38,698	38,698
Total	126,472	122,067	122,867	120,351	122,391	124,691	129,991	138,291

Table G-2. FSAID2 and SFWMD irrigated acreage in Martin County by crop type.

Crop	2010	2013	2015	2020	2025	2030	2035	2040
FSAID2								
Citrus	--	--	17,570	17,331	17,331	16,916	16,726	--
Fruit (Non-citrus)	--	--	10	10	10	0	0	--
Greenhouse or Nursery	--	--	2,044	2,031	1,912	1,906	1,876	--
Hay	--	--	1,334	1,334	1,334	1,334	1,334	--
Potatoes	--	--	1,100	1,100	1,100	1,796	1,796	--
Sod	--	--	4,587	4,400	4,400	4,393	4,393	--
Sugarcane	--	--	10,545	10,427	10,134	10,134	9,962	--
Vegetables (Fresh Market)	--	--	3,615	3,615	3,615	2,920	2,920	--
Total	--	--	40,806	40,249	39,837	39,399	39,007	--
SFWMD								
Citrus	14,613	5,949	4,926	4,660	5,500	6,500	8,500	11,500
Greenhouse or Nursery	1,124	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Sod	1,877	2,742	3,591	3,591	3,591	3,591	3,591	3,591
Sugarcane	10,379	17,952	17,952	17,952	17,952	17,952	17,952	17,952
Vegetables, Melons, and Berries	4,214	4,173	6,793	6,793	6,793	6,793	6,793	6,793
Field Crops	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
Other Fruits and Nuts	59.1	75.7	75.7	75.7	75.7	75.7	75.7	75.7
Irrigated Pasture	16,371	16,371	16,371	16,371	16,371	16,371	16,371	16,371
Total	50,095	50,581	53,027	52,761	53,601	54,601	56,601	59,601

Table G-3. FSAID2 and SFWMD irrigated acreage in St Lucie County by crop type.

Crop	2010	2013	2015	2020	2025	2030	2035	2040
FSAID2								
Citrus	--	--	50,439	47,363	44,635	41,551	38,365	--
Fruit (Non-citrus)	--	--	0	0	0	0	0	--
Greenhouse or Nursery	--	--	2,356	2,080	1,998	1,726	1,713	--
Hay	--	--	2,378	2,093	1,976	1,933	1,682	--
Potatoes	--	--	0	0	0	238	238	--
Sod	--	--	1,704	1,704	1,663	1,578	1,578	--
Sugarcane	--	--	0	0	0	0	0	--
Vegetables (Fresh Market)	--	--	3,018	3,018	2,627	2,349	2,349	--
Total	--	--	59,895	56,258	52,899	49,376	45,925	--
SFWMD								
Citrus	41,535	36,247	34,500	32,000	33,000	34,000	37,000	42,000
Greenhouse or Nursery	759	2,280	2,280	2,280	2,280	2,280	2,280	2,280
Sod	1,208	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Vegetables, Melons, and Berries	3,625	4,365	4,600	4,800	4,900	5,000	5,100	5,200
Other Fruits and Nuts	55.1	70.5	70.5	70.5	70.5	70.5	70.5	70.5
Irrigated Pasture	20,539	20,539	20,539	20,539	20,539	20,539	20,539	20,539
Total	67,721	64,722	63,210	60,910	62,010	63,110	66,210	71,310

Table G-4. FSAID2 and SFWMD irrigated acreage in NE Okeechobee County by crop type.

Crop	2010	2013	2015	2020	2025	2030	2035	2040
FSAID2								
Citrus	--	--	2,287	2,145	2,131	1,817	1,751	--
Fruit (Non-citrus)	--	--	0	0	0	0	0	--
Greenhouse or Nursery	--	--	197	197	133	133	133	--
Hay	--	--	497	497	497	383	139	--
Potatoes	--	--	0	0	0	48	48	--
Sod	--	--	140	140	10	10	10	--
Sugarcane	--	--	0	0	0	0	0	--
Vegetables (Fresh Market)	--	--	48	48	48	0	0	--
Total	--	--	3,168	3,026	2,817	2,390	2,080	--
SFWMD								
Citrus	3,651	3,183	3,050	3,100	3,200	3,400	3,600	3,800
Greenhouse or Nursery	60	125	125	125	125	125	125	125
Sod	2,126	639	639	639	639	639	639	639
Vegetables, Melons, and Berries	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030
Other Fruits and Nuts	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Irrigated Pasture	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787
Total	8,655	6,765	6,632	6,682	6,782	6,982	7,182	7,382

Table G-5. FSAID2 and SFWMD agricultural average year demand (in MGD) for the UEC Planning Area by county.

County	2010	2013	2015	2020	2025	2030	2035	2040
FSAID2								
Martin County	--	--	52.4	51.1	50.7	56.6	61.1	--
St. Lucie County	--	--	69.6	64.5	60.5	70.5	76.2	--
Okeechobee County in UEC	--	--	4.0	3.7	3.3	3.4	3.6	--
Total	--	--	126.0	119.3	114.5	130.5	141.0	--
SFWMD								
Martin County	64.08	68.49	77.55	77.29	78.01	79.04	80.94	83.79
St. Lucie County	78.88	82.04	81.21	79.55	80.83	82.10	85.24	90.24
NE Okeechobee County	16.89	11.93	11.78	11.78	11.83	12.17	12.39	12.62
Total*	159.86	162.46	170.53	168.68	170.86	173.31	178.57	186.65

* Perceived discrepancies in table totals are due to rounding.

Table G-6. FSAID2 and SFWMD agricultural dry year demand (in MGD) for the UEC Planning Area by county.

County	2010	2013	2015	2020	2025	2030	2035	2040
FSAID2								
Martin County	--	--	60.3	58.8	58.3	65.0	70.3	--
St. Lucie County	--	--	80.1	74.2	69.5	81.1	87.7	--
Okeechobee County in UEC	--	--	4.6	4.2	3.9	4.0	4.2	--
Total	--	--	144.9	137.2	131.7	150.1	162.1	--
SFWMD								
Martin County	100.88	108.07	119.40	118.98	120.29	121.85	124.97	129.65
St. Lucie County	130.14	131.17	129.39	126.26	128.30	130.34	135.59	144.04
NE Okeechobee County	22.42	16.20	15.98	16.07	16.23	16.56	16.88	17.21
Total*	253.43	255.45	264.78	261.31	264.82	268.75	277.44	290.90

* Perceived discrepancies in table totals are due to rounding.

Meeting South Florida's water supply needs
while safeguarding its natural systems requires
innovative solutions, cohesive planning,
and a shared vision.



South Florida Water Management District

*Committed to managing and
protecting our region's water resources*



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