

Water Professional Workforce In Florida

Introduction:

Over the years the age distribution of the United States population has undergone significant changes. Twenty years after the baby boomer generation was born there was a significant increase in numbers of skilled workers that actively participated in the workforce. This generation has been responsible for much of the growth in the nation's economy over the past 30 years. Today there is concern that as this generation of workers begins to retire: there will not be enough new workers to replace them.

Florida's situation is similar to rest of the United States. As shown in Figure 1, in the year 2000 Florida's population was around 16 million (US census bureau). This number will increase to 23.4 million by the year 2020. At the same time as the population increases, however, the proportion of those over the age of 65 will increase from 17.6% to 21.8%, while the population under 18 years and between 18 and 64, will fall from 22.8 and 59.6% to 20.9% and 57.7% respectively. Florida is also likely to experience an increase in immigration of retirees from northern states as they move south to seek a milder climate. This change in the structure of Florida's population will pose challenges to the adequate staffing and provision of public services in many areas of the state.

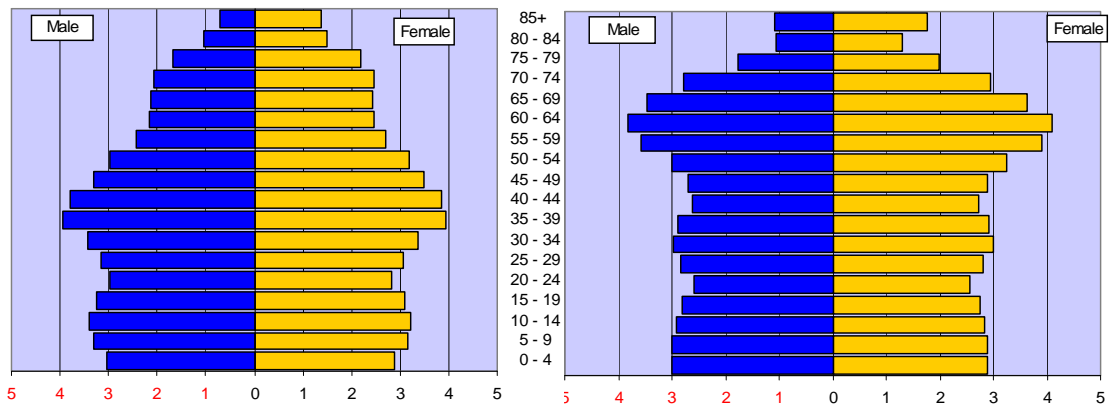


Figure 1. Population Pyramids. Percent of Florida's Population. Left: 2000, right: 2020

Florida's water utility industry will likely suffer from these effects. There will be increases in potable water demand and wastewater discharges and quality standards will become more stringent. At the same time, these needs will have to be met with a smaller workforce. As shown in Figure 2, the median age of water and wastewater operators is 49.5 years. In the next 20 years 70% of these operators will have reached retirement age, and will take with them knowledge and experience acquired over the years. The industry therefore not only faces an impending labor shortage, but also a potential shortage of skills ranging from management position, to the operation of the machinery in treatment plants.

Operator Ages 1/19/06 Active & Inactive

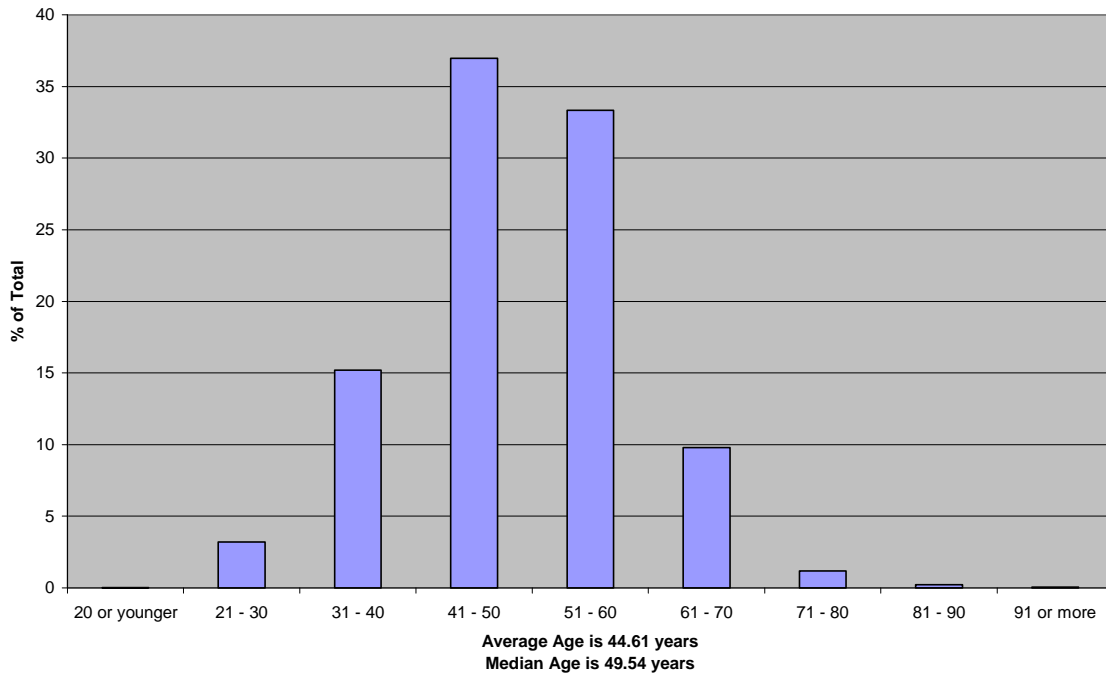


Figure 2. Distribution of water and wastewater operator ages in Florida, both active and inactive (January, 2006)

Water and Wastewater Treatment Operators Overview:

Active Operators:

The state of Florida currently has 6478 active licensed operators (DEP 2007). Of these 2282 had drinking water licenses, 2448 had wastewater licenses, and 1748 held a dual license (DEP2007). They operate 6186 public water systems (DEP 2005), and 2700 domestic wastewater treatment facilities (DEP 1999). Table 1 below summarizes the latest data for active licensed operators in 2007:

Table 1:	CLASS				Total Licenses
License Type	D	C	B	A	
WW	118	1860	863	1355	4196
DW	305	1989	781	955	4030
Total	423	3849	1644	2310	8226
% of Total WW	3%	44%	21%	32%	100%
% of Total DW	8%	49%	19%	24%	100%
Drinking Water Operators	2282				
Wastewater Operators	2448				
Dual License Operators:	1748				
Total Active Operators:	6478				Source: FDEP

Operators in the C class were most numerous group for both drinking water and wastewater comprising 49% and 44% of the issued licenses respectively in each category. Operators in the D class group were the least numerous, accounting for just 8% and 3% of licenses for drinking water and wastewater respectively. A Class operators compromised 24% and 32% of the total licenses for drinking water and wastewater respectively, while B Class operators represented 19% and 21% of drinking water and wastewater licenses respectively. Dual licensed operators numbered 1748 individuals, representing 27% of total number of operators.

Operator employment Statistics:

According to the Florida Department of Labor water, wastewater, and other liquid waste treatment operators held 5100 jobs in Florida in 2007. Tables 2 and 3 below show the historical employment and wage data for Operators in the state of Florida:

Table 3	Occupational Code	Occupational Title	Year	Employment	Wage (hourly)			
					Mean	Median	Entry	Exp.
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	1999	4,940	14.06	13.52	10.41	16.25
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2000	5,010	15.44	14.90	11.14	18.22
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2001	N/A	15.72	15.16	11.40	18.38
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2002	5,020	16.17	15.68	11.59	19.01
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2003	4,940	17.19	16.59	12.14	20.47
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2004	4,770	17.90	17.38	12.76	20.47
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2005	4,930	18.00	17.63	12.85	20.58
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2006	5,100	18.66	18.34	13.44	21.28
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2007	5,100	19.01	18.68	13.69	21.68
		% average per year increase		0.4%	3.3%	3.5%	3.0%	3.1%
	51-8031	Water/Liquid Waste Treatment Plant and System Operators	2014	5,829				
		Wage increase (1999 - 2005)			28%	30%	23%	27%
		US Inflation (1999 - 2005)		17.80%				
		Projected annual Job increase (2007 - 2014)		91				
		Projected annual % Job increase (2007 - 2014)		1.8%				

Source: Florida department of Labor

Table 4			
New D Licensed Operators			
Year	DW	WW	Total
2002	8	4	12
2003	35	5	40
2004	17	18	35
2005	23	7	30
2006	13	10	23
2007	10	8	18
Average Annual Increase:	18	9	26

Source: FDEP

The number of employed operators experienced only a small increase over the past 8 years. In this time period 160 new jobs were created in the industry. In the previous 6 years the job market has increased on average by 13 new jobs per year. This number is twice the number of new active license holders which according to figures from the Florida Department of Environmental Protection (FDEP) increased by 26 licensees per year over the same period. These numbers, however, do not account for the number of operators that have retired over the given period, and therefore the number of job openings will likely have been greater than the number of new jobs created.

The number of employed operators in Florida appears to conflict with the data from the FDEP in table 1 which implies that currently there are 1378 more licensed operators than actual employed operators. This discrepancy may arise from the manner in which operator jobs are considered. It is possible that some operators with A and B licenses in management and supervisory positions were not included in the estimates from the Florida Department of Labor.

In the next 7 years, according to Department of Labor trends Table 3 the number of new operators jobs, will increase by 1.8% per year and about 730 new jobs will be created by the year 2014.

The increase in operator jobs is a cause of concern. According to data from the FDEP in Table 4 the number of new licensed operators in the last 6 years has not been large, and has been falling since its peak in 2003 when there were 40 new licensed holders. Since then the number has been falling by about 4 new licensees every year to just 18 in 2007.

If the FDEP average annual number of new licensed operators remains the same, the state of Florida will, in the best scenario, need to import at least 65 new operators every year.

The need to attract new operators to the state is reflected in the wage increase experienced by operators in Florida, which due to the demand for the profession have increased considerably as shown in Table 3. From 1999 to 2005 the cumulative US inflation has been 17.8%, yet the mean operator wage in Florida has increased by 28% over the same time period.

Operator Hourly Wage Distribution within Florida:

Operator wages from different water utilities were obtained from the Florida Water Forum (FWF) Salary Survey (Table 5).

Table 5		Operator Pay Rates														
								Chief Operator				Plant Supervisor				
Utility	Laborer		Trainee (UnLicensed)		"C" License		"B" License		"A" License		Pay		Salary (E)xempt Salary (N)on-Exempt (H)ourly	Pay		Salary (E)xempt Salary (N)on-Exempt (H)ourly
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High		Low	High	
Belle Glade					14.00											
Boca Raton					13.96	24.69						19.01	25.35		20.99	28.01
Broward County			11.17	20.39	13.28	24.24						19.04	31.80		26.16	42.90
Cape Coral			13.03	18.89	15.17	22.75	16.59	25.02	18.73	29.00					27.69	45.70
Charlotte County					15.05	26.15						20.33	31.78			
Daytona Beach					12.87	21.49										
Fort Lauderdale															26.5	37.46
Fort Myers					14.26	17.82	15.26	19.07	16.15	20.60					18.84	22.44
Fort Pierce					14.91	23.11	15.95	24.72	17.07	26.46						
Hollywood					16.09	22.69										
Jupiter			11.12	16.67	15.10	22.65	16.10	24.15	17.09	25.64	22.08	33.11				
Lakeland			12.25	17.23	14.18		19.95		18.09	25.46	19.95	29.47		23.09	32.49	
Lee County			11.11	17.39	13.78	21.56	15.11	23.64	15.78	24.68	19.44	30.93		22.11	35.10	
Manatee County			11.28	16.35	13.73	20.92	14.53	22.09	15.38	23.47	18.33	27.93		23.08	35.26	
Marco Island					17.00	26.62										
Margate					15.63	21.93					15.40	24.98				
Miami Dade					17.32	29.03	19.87	33.46			23.67	39.09				
Naples			12.28	18.64	14.58	22.35	15.72	23.88	16.87	25.62				21.98	33.38	
North Miami			14.64	21.89	15.74	23.53	16.10	24.08	16.84	25.17						
North Miami Beach					16.10	17.70	18.63	20.50								
Ocala					13.10	15.42										
Orlando			10.05	16.35	11.54	18.03	12.89	20.43	14.29	22.40	19.02	32.33		22.81	38.78	
Palm Beach County W&WW			13.313	20.193	17.375	26.358	18.437	27.96	20.147	30.556	20.147	30.556	H	26.288	39.866	E
Plantation					15.42	22.06	16.78	23.43	18.00	25.36				23.67	34.63	
Pompano Beach					17.36	26.61	27.24	27.24	27.86	27.86				26.75	37.65	E
Port St. Lucie, City of	11.3	12.82	12.3	14.97	14.46	15.65	16.24	19.52	17.86	22.12	19.68	33.31	H	25.65	37.81	H (Superintendent)
Riviera Beach					15.78	24.45	16.57	25.67	17.36	26.90	18.98	29.41		22.43	33.65	
Seacoast	12.46	20.76	10.98	18.3	14.13	23.55	15.19	25.31	16.33	27.21	21.24	35.4	Salary ??			
St. Cloud					13.50	20.26	14.04	21.07	15.91	22.79						
US Sugar	9.20		16.19		17.28		20.06		21.19		28.00		H	29.80	??	E
Vero Beach					16.31											
Wellington									19.09	30.3						
West Palm Beach W			11.40	17.10	15.33	23.00	23.47		23.94		18.23	27.34	H	22.76	34.15	E
West Palm Beach WW			11.69	17.53	15.33	23.00	23.47		23.94		18.23	27.34	H	22.76	34.15	E

These data were adjusted using the Florida Price Level index (FPLI) of 2006 for each of the 67 counties in the state of Florida. For simplicity the index was adjusted relative to Dade County so that the adjusted wage database presents all wages' equivalent values in Dade County.

Table 7			2006 Florida Price Level Index		
County	FPLI 2006	Dade = 1	County	FPLI 2006	Dade = 1
Alachua	97.76	0.961826	Lake	97.69	0.961137
Baker	97.37	0.957989	Lee	101.76	1.001181
Bay	92.93	0.914305	Leon	94.4	0.928768
Bradford	96.8	0.952381	Levy	94.38	0.928571
Brevard	98.26	0.966745	Liberty	89.47	0.880264
Broward	103.26	1.015939	Madison	88.55	0.871212
Calhoun	88.84	0.874065	Manatee	100.25	0.986324
Charlotte	96.51	0.949528	Marion	94.82	0.9329
Citrus	94.37	0.928473	Martin	99.06	0.974616
Clay	99.42	0.978158	Monroe	100.96	0.99331
Collier	106.5	1.047816	Nassau	99.02	0.974223
Columbia	93.77	0.92257	Okaloosa	94.54	0.930146
Dade	101.64	1	Okeechobee	96.33	0.947757
DeSoto	97.13	0.955628	Orange	101.19	0.995573
Dixie	92.4	0.909091	Osceola	98.84	0.972452
Duval	101.79	1.001476	Palm Beach	104.63	1.029418
Escambia	92.32	0.908304	Pasco	99.4	0.977961
Flagler	94.34	0.928178	Pinellas	100.65	0.99026
Franklin	87.85	0.864325	Polk	97.58	0.960055
Gadsden	91.91	0.90427	Putnam	95.64	0.940968
Gilchrist	94.53	0.930047	St. Johns	98.37	0.967828
Glades	98.32	0.967336	St. Lucie	98.82	0.972255
Gulf	89.52	0.880756	Santa Rosa	91.69	0.902105
Hamilton	91.44	0.899646	Sarasota	100.44	0.988194
Hardee	96.05	0.945002	Seminole	99.98	0.983668
Hendry	100.04	0.984258	Sumter	95.52	0.939787
Hernando	97.45	0.958776	Suwannee	91.37	0.898957
Highlands	94.62	0.930933	Taylor	89.2	0.877607
Hillsborough	102.13	1.004821	Union	95.72	0.941755
Holmes	88.29	0.868654	Volusia	94.77	0.932409
Indian River	98.16	0.965762	Wakulla	91.97	0.90486
Jackson	88.92	0.874852	Walton	91.6	0.90122
Jefferson	91.66	0.90181	Washington	89.29	0.878493
Lafayette	90.97	0.895022			
					0.864325

The highest FPLI was found in Collier County and the lowest was in Franklin County with values of 1.0478 and 0.864, respectively.

Due to the incompleteness of the wage data, not all utilities in the state of Florida are represented. Some utilities do not have pay rates for certain classes of operators; it is therefore assumed that they do not have employees in those classes. Most utilities have a salary range from an entry level (Low) position to a senior (High) position for each Class category; the utilities that do not have both figures have not been used for the purposes of

comparison. There may also be variations of price level within each county, but these have not been taken into account. The analysis of the data reflects the information in Graphs 7 through 13 in appendix 2. All wages are quoted on a per hourly basis;

1. Of the three utilities that employed laborers, Seacoast paid the highest salary at \$21.47 while US Sugar paid the least at \$9.16.
2. Fifteen utilities employed Unlicensed operators (Trainees). The highest salary was paid by North Miami at \$21.89, while the lowest was paid by Orlando at \$16.42. The utility with the largest salary range was also North Miami where the entry salary was \$14.64. The utility with the lowest entry salary was also Orlando at \$10.09.
3. Thirty-two utilities employed C licensed operators. The highest salary was paid by Miami Dade at \$29.03, while the lowest was paid by Ocala at \$16.53. The utility with the largest salary range was also Miami Dade where the entry salary was \$17.32. The utility with the lowest entry salary was Orlando at \$11.59.
4. Twenty-three utilities employed B licensed operators. The highest salary was paid by Miami Dade at \$33.46, while the lowest was paid by Fort Myers at \$19.05. The utility with the largest salary range was also Miami Dade where the entry salary was \$19.87. The utility with the lowest entry salary was Orlando at \$12.95.
5. Twenty-two utilities employed A licensed operators. The highest salary was paid by Palm Beach County W&WW at \$29.68, while the lowest was paid by Fort Pierce at \$19.05. The utility with the largest salary range was Seacoast where the entry salary was \$16.89 and the senior salary was \$28.15. The utility with the lowest entry salary was Orlando at \$14.35.
6. Seventeen utilities employed Chief operators. The highest salary was paid by Miami Dade at \$39.09, while the lowest was paid by Margate at \$24.59. The utility with the largest salary range was also Miami Dade where the entry salary was \$23.67. The utility with the lowest entry salary was Margate at \$15.16
7. Eighteen utilities employed Plant Supervisors. The highest salary was paid by Cape Coral at \$45.65, while the lowest was paid by Fort Myers at \$22.41. The utility with the largest salary range was also Cape Coral where the entry salary was \$27.66. The utility with the lowest entry salary was Fort Myers at \$18.82

Operator Requirements:

There requirements to advance into a higher operator class can be found in the Operators Certification Handbook. Table 7 shown below gives a summary of these requirements:

Table 8	Operator Experience Requirements			
	Class			
Requirements	D	C	B	A
CEUs/year	0.5	1	2	2
CEUs(Dual Licensce)/year	0.5	1	3 (1.5 in DW, 1.5 WW)	3 (1.5 in DW, 1.5 WW)
Highschool/GED	Yes	Yes	Yes	Yes
Examination	D Exam	C Exam	B Exam	A Exam
Experience*	A peer reference letter (if experience not signed by a certified operator) 3 Calender months OR Successful completion of an approved Class D Course accompanied by one hour of experience.	A peer reference letter (if experience not signed by a certified operator) 2,080 hours of appropriate operational experience	A peer reference letter (if experience not signed by a certified operator) 6,240 hours of actual operational experience	A peer reference letter (if experience not signed by a certified operator) 10,400 hours of actual operational experience
			Source: Operator certification Handbook	

* Experience must be signed by a certified operator with the equivalent desired license

A list of the CEU Providers and Sponsors can be found in Table 8. There are currently 6 CEU Providers, 7 CEU correspondent course providers, and 29 CEU certified Sponsors. The requirements for Operators Certified in another state are specified in the Florida Administrative Code (FAC) section 62-602.360 shown in appendix 2.

As of 2007 there were 610 inactive operators (DEP 2007) who did not renew their licenses; the reasons for this may be that the operators have retired, left the industry, or failed to complete their Continuing Education requirements (CEUs). Of these operators, 120 were dual license holders.

Civil and Environmental Engineering Statistics Overview:

Civil Engineering Employment Statistics:

According to the Florida Department of Labor water, civil engineers held 5100 jobs in Florida in 2007. Tables 9 and 10 show the historical employment and wage data for civil engineers in the state of Florida and the numbers of new engineers graduating from Florida colleges:

Table 9		Year	Employment	Wage (hourly)			
Occupational Code	Occupational Title			Mean	Median	Entry	Exp.
17-2051	Civil Engineers	1999	10,240	27.06	26.12	18.23	34.32
17-2051	Civil Engineers	2000	12,540	29.49	27.83	19.94	35.23
17-2051	Civil Engineers	2001	11,030	29.99	28.62	20.45	36.17
17-2051	Civil Engineers	2002	13,070	30.52	29.05	20.71	36.67
17-2051	Civil Engineers	2003	14,000	31.69	30.33	21.83	38.34
17-2051	Civil Engineers	2004	13,750	32.12	30.75	21.93	37.22
17-2051	Civil Engineers	2005	14,020	32.17	30.71	21.93	37.28
17-2051	Civil Engineers	2006	15,780	35.52	33.36	23.09	41.73
17-2051	Civil Engineers	2007	15,780	36.67	34.44	23.84	43.08
	% increase		35%	26%	24%	24%	20%
17-2051	Civil Engineers	2014	19,051				
	Wage increase (1999 - 2005)			19%	18%	20%	9%
	US Inflation (1999 - 2005)		17.80%				
	Projected annual increase (2007 - 2014)		409				
	Projected annual % increase (2007 - 2014)		2.6%				

Source Florida Department of Labor

Table 10		Number of Graduates*								
Abet Civil Engineering Degrees										
College Name	Year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	
University of Central Florida	0	34	67	47	62	68	62	114	120	
Florida A & M University/Florida State University (FAMU-FSU)	72	57	71	87	58	53	57	86	86	
Florida Atlantic University	NA	NA	NA	0	0	2	7	33	37	
Florida Institute of Technology	16	32	17	16	0	9	18	21	24	
Florida International University	NA	54	54	54	72	61	76	89	94	
University of Florida	125	141	183	153	136	158	180	160	196	
University of Miami	NA	20	23	29	23	19	17	16	18	
University of South Florida	80	70	104	82	69	52	72	74	16	
Embry-Riddle Aeronautical University - Daytona Beach	NA	NA	6	13	14	6	10	15	7	
University of North Florida	NA	0	0	0	0	11	18	14	25	
Total	293	408	525	481	434	439	517	622	623	
Average graduates per year					=	482				
Average Increase in Jobs per year (1999-2007)					=	616				
Average Shortfall					=	134	=	22%		
Projected Annual increase (2007-2014)					=	409				
Projected Potential Annual Surplus					=	73	=	18%		
*Includes Master students and PHDs										Source:www.asee.org

It should be noted that the data in Table 8 is representative of the entire civil engineering field of which the water utility industry is a part of. The number of employed civil engineers experienced significant growth over the past 8 years. In this time period 5,540 new jobs were created in the industry or an average of 616 new jobs per year. At the same time, mean wages have risen slightly faster than the average US inflation. From

1999 to 2005 wage increases averaged 19%, while the cumulative inflation was 17.8% for the same time period.

The numbers of graduating civil engineers has also risen considerably. According to the American Society for Engineering Education (ASEE), in 1998 there were only 293 graduating civil engineers in Florida, however, by 2006 this number increased 113% to 623. The average number of graduates in this time period, however, has been 22% smaller than the actual number of new jobs created in the industry. The short fall is likely to be even larger if the number of graduates that have left the state after receiving their degree, or those that have chosen to continue their education, rather than to enter the workforce is taken into account. Also not accounted for is the number of retiring engineers, so the number of job openings is likely to be larger than the number of new jobs created.

In the next 7 years, according to Department of Labor trends the number of new civil engineering jobs, will increase by 2.6% per year and about 3270 new jobs will be created by the year 2014. If the average ASEE figures for the annual number of new civil engineers remain the same, the state of Florida will have a potential surplus of 73 engineers per year, however, due to the issues stated before; this number will likely not be as large.

Environmental Engineering Employment Statistics:

According to the Florida Department of Labor water, environmental engineers held 5100 jobs in Florida in 2007. Tables 11 and 12 show the historical employment and wage data for civil engineers in the state of Florida and the numbers of new engineers graduating from Florida colleges:

Table11		Year	Employment	Wage (hourly)			
Occupational Code	Occupational Title			Mean	Median	Entry	Exp.
17-2081	Environmental Engineers	1999	2,520	27.16	23.05	15.87	29.6
17-2081	Environmental Engineers	2000	2,290	27.57	24.74	17.65	30.89
17-2081	Environmental Engineers	2001	2,160	31.83	29.39	19.97	39.04
17-2081	Environmental Engineers	2002	2,330	30.03	26.86	19.32	33.85
17-2081	Environmental Engineers	2003	2,050	29.38	26.62	19.58	33.8
17-2081	Environmental Engineers	2004	2,720	30.42	27.86	20.27	35.49
17-2081	Environmental Engineers	2005	2,760	31.53	29.29	20.79	36.9
17-2081	Environmental Engineers	2006	3,180	33.22	29.56	20.65	39.51
17-2081	Environmental Engineers	2007	3,180	34.3	30.52	21.32	40.79
	% increase		21%	21%	24%	26%	27%
17-2081	Environmental Engineers	2014	3,935				
	Wage increase (1999 - 2005)			16%	27%	31%	25%
	US Inflation (1999 - 2005)		17.80%				
	Projected annual increase (2007 - 2014)		94				
	Projected annual % increase (2007 - 2014)		3.0%				

Source Florida Department of Labor

Table 12 Abet Environmental Engineering Degrees		Number of Graduates*								
College Name	Year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	
University of Central Florida	0	16	39	23	26	22	33	31	19	
University of Florida	71	78	72	72	63	51	53	46	47	
University of Miami	NA	NA	8	5	3	5	3	5	5	
Dual Degrees										
Florida A & M University/Florida State University (FAMU-FSU) Civil-Env							4	8	0	
Florida A & M University/Florida State University (FAMU-FSU) Chem-Env							7	4	4	
University of South Florida Civil-Environmental (Graduate Only)					20	13	35	52	12	
Total	71	94	119	100	112	91	135	146	87	
		Average graduates per year		=	106					
		Average Increase in Jobs per year (1999-2007)		=	73					
		Average Surplus		=	33	=	45%			
		Projected Annual increase (2007-2014)		=	94					
		Projected Annual Surplus		=	12	=	13%			
		*Includes Master students and PHDs								
							Source:www.asee.org			

As in with civil engineering data it should be noted that the data set in for environmental engineers in Table 11 is representative of the entire environmental engineering field of which the water utility industry is a part. The number of employed Environmental engineers experienced a 21% growth over the past 8 years in which 660 new jobs were created in the industry or an average of 73 new jobs per year. At the same time, mean wages have risen slightly faster than the average US inflation. From 1999 to 2005 wage increases averaged 19%. This is slightly higher than the cumulative inflation value of 17.8% for the same time period, however, there was a 30% and a 25% increase in the entry and senior level wages respectively, which indicates a strong demand for environmental engineers.

The numbers of graduating environmental engineers in Florida has been rising. According to the American Society for Engineering Education (ASEE), in 1998 there were only 71 graduating environmental engineers in Florida, however, by 2005 this number increased 106% to 146. From 1998 to 2006 number of graduates averaged, 106 per year, which is 45% greater than the actual number of new jobs created in the industry in Florida, however, as with civil engineers, graduates that have left the state after receiving their degree, or those that have chosen to continue their education, rather than to enter the workforce have not been taken into account. In addition, the environmental engineering field has considerably expanded into air pollution control and solid waste management in recent years, so the percentage of total environmental engineering graduates that are working in the water related professions has decreased. Also not accounted for is the number of retiring engineers, so the number of job openings is likely to be larger than the number of new jobs created.

In the next 7 years, according to Department of Labor trends the number of new environmental engineering jobs, will increase by 2.6% per year and about 755 new jobs

will be created by the year 2014. If the average ASEE figures for the annual number of new environmental engineers remain the same, the state of Florida will have a potential surplus of 12 engineers per year, however, due to the issues stated before; this number will likely not be as large, and it is possible that Florida will be a net importer of environmental engineers.

Civil and Environmental Wage Distribution within Florida:

Engineering wages from different locations in Florida obtained from the VaultSalary.com Water. These data were adjusted using the Florida Price Level index (FPLI) of 2006 for each of the 67 counties in the state of Florida. For simplicity the index was adjusted relative to Dade County so that the adjusted wage data set presents all wages' equivalent values in Dade County. The adjusted data and the FPLI are presented in Table 6, and the adjusted wages for civil and environmental engineers are presented Figures. All wages are listed on a yearly basis.

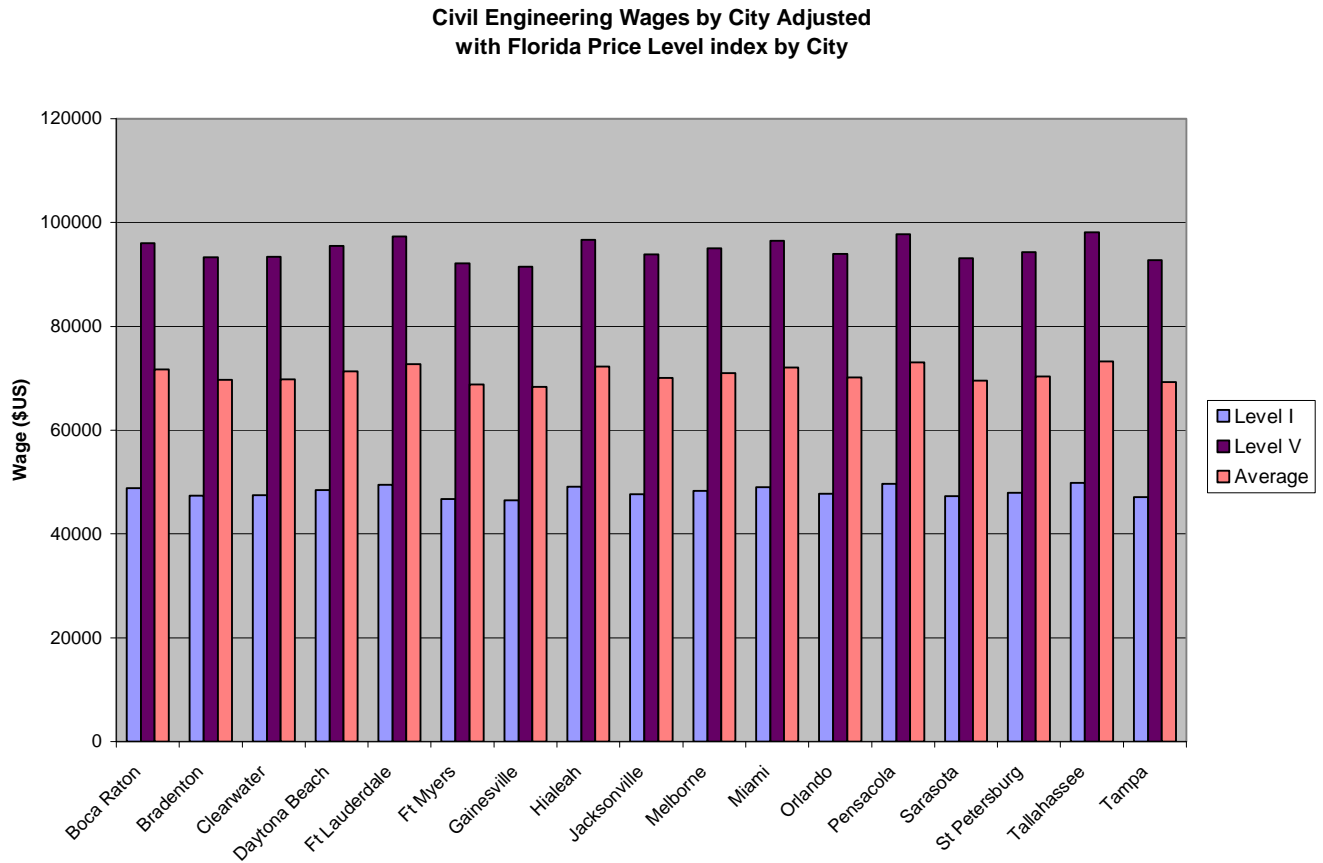


Figure 3. Civil engineering wages adjusted with Florida Price Level Index by city.

**Environmental Engineering Wages Adjusted
with Florida Price Level Index by City**

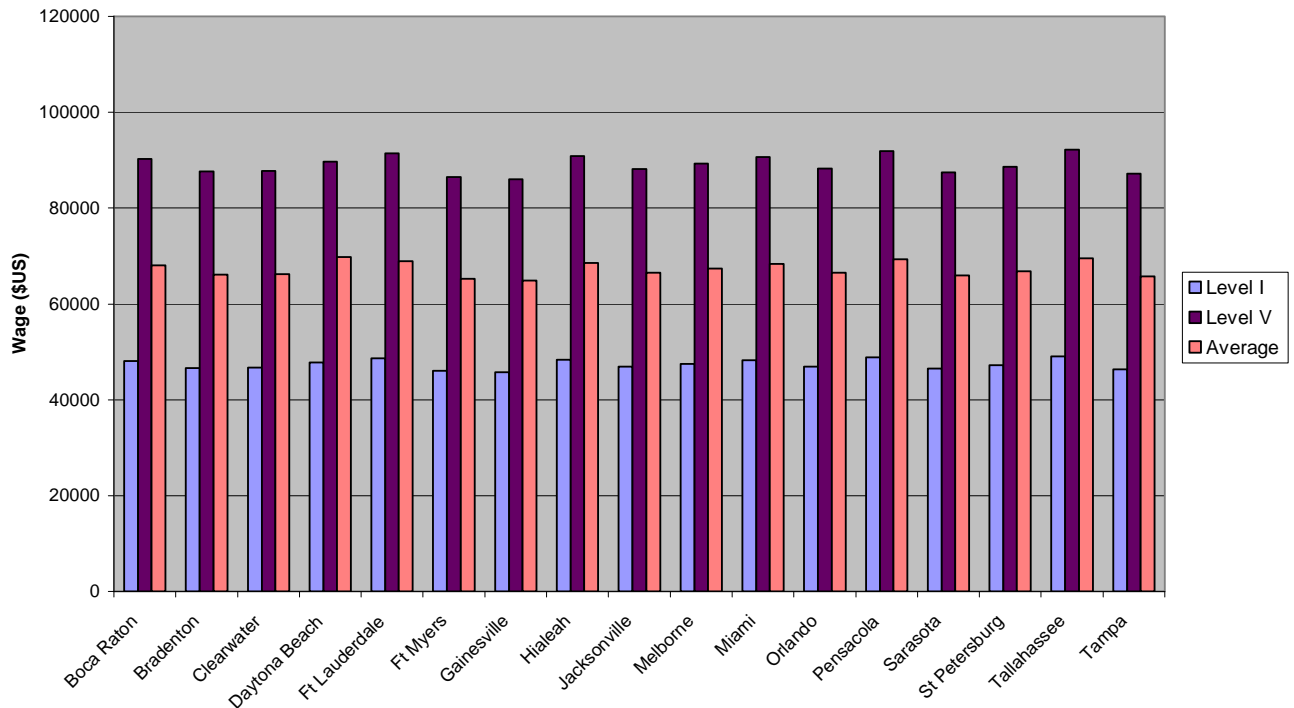


Figure 4. Environmental Engineering wages adjusted with Florida Price Level Index by city.

In the 17 locations listed civil engineering salaries were on average 5% higher than environmental engineering salaries. The highest the location with the highest average salary was Daytona Beach at \$73,267 for civil and 69,799 for environmental engineers. The highest senior salary was paid in Tallahassee where the figure was \$98,108 for civil and \$92,162 for environmental engineers. The lowest senior salary was paid in Fort Myers where the figure was \$68,786 for civil and \$65,265 for environmental engineers.

Water Demand in Florida Statistics:

Historical Trends:

According to the US Geological Survey (USGS) 1950 to 2000 the population of Florida has increased from 2.77 million to 15.98 million as shown in Figure 5.

Population Served by Public Water Supply

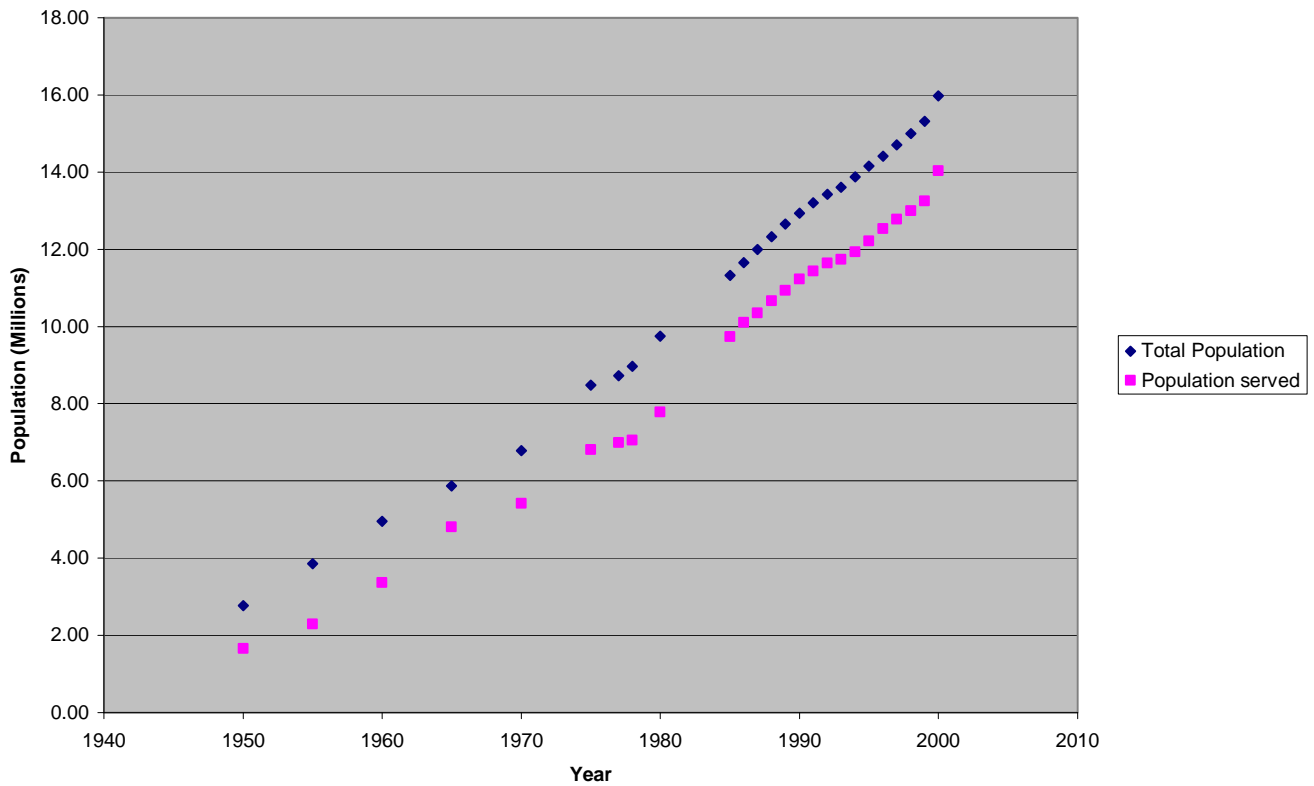


Figure 6. Total population and population served by public water supply in Florida

The increase in population has also been accompanied by an increase in the proportion of the population connected to a public water supply and an increase in the water consumption per head. In 1950, only 59.9% of the population was connected to the public water supply, and these consumed an average of 102 gallons per day (gpd) per person. In 2000 these numbers had risen to 87.8% and 174gpd per person respectively, and the state's total water consumption increased over 1400% from just 170 gallons per day (GPD) to almost 2440 GPD. Most of the increase has come from ground water sources which in 2000 accounted for over 90% of public water use. The relative increase in demand per person since 1980, however, seems to have stabilized at around 175gpd, and has come down from a peak of 181gpd in 1980 and therefore most of the increase in demand has been a direct result of population growth.

Table 16 in appendix 4 show the growth in the historical population served for each of Florida's 67 counties. In 1970, the counties with the largest served populations were in Dade, Broward, and Pinellas counties, each with 1.38 million, 0.55 million and 0.41 million people respectively. Thirty years later, Broward and Dade counties experienced the largest increases in the numbers of people served having grown by 1.05 and 0.82 million people respectively. The county with the third largest population served is Palm Beach, which experienced a 298% increase from 1970 to 2000, and now has 775 thousand people served. The highest percentage increase occurred in Citrus county where

the population increased by almost 2450%. The only decrease occurred in Union county where it fell by 111 people.

Current Statistics:

The latest figures available from the USGS for the current water demands in Florida were from the year 2000. These data can be found in Figures 7 through 9. As expected, the largest water consumption occurs in the tri-county area of Dade, Broward, and Palm Beach which are the largest population centers in Florida. Consumption for these counties reached 377MGD, 258 MGD, and 222MGD respectively and accounted for 38% of the state total.

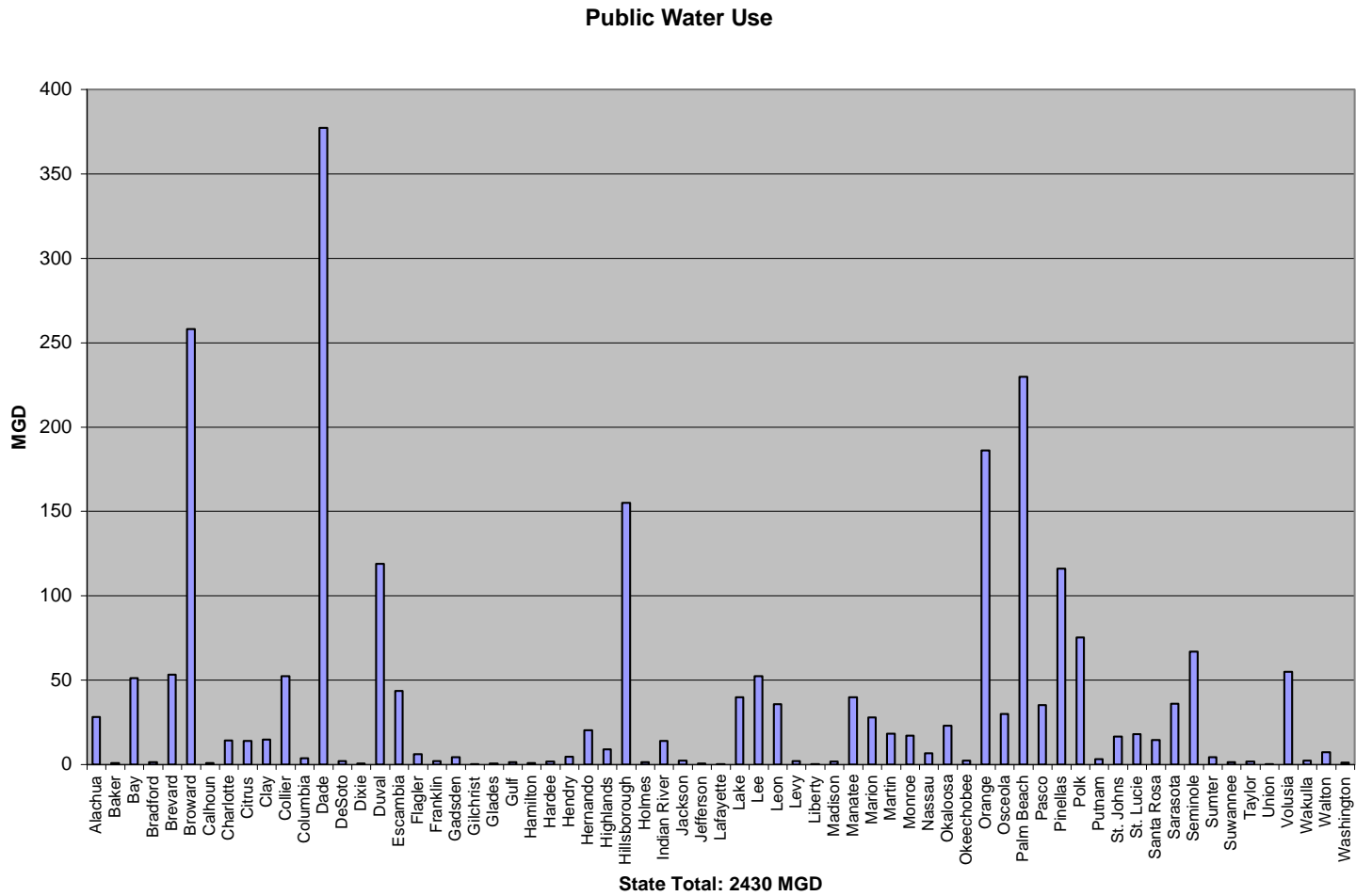


Figure 7. Public water use by county in Florida (USGS, 2000)

Population Served by Public Water Supply

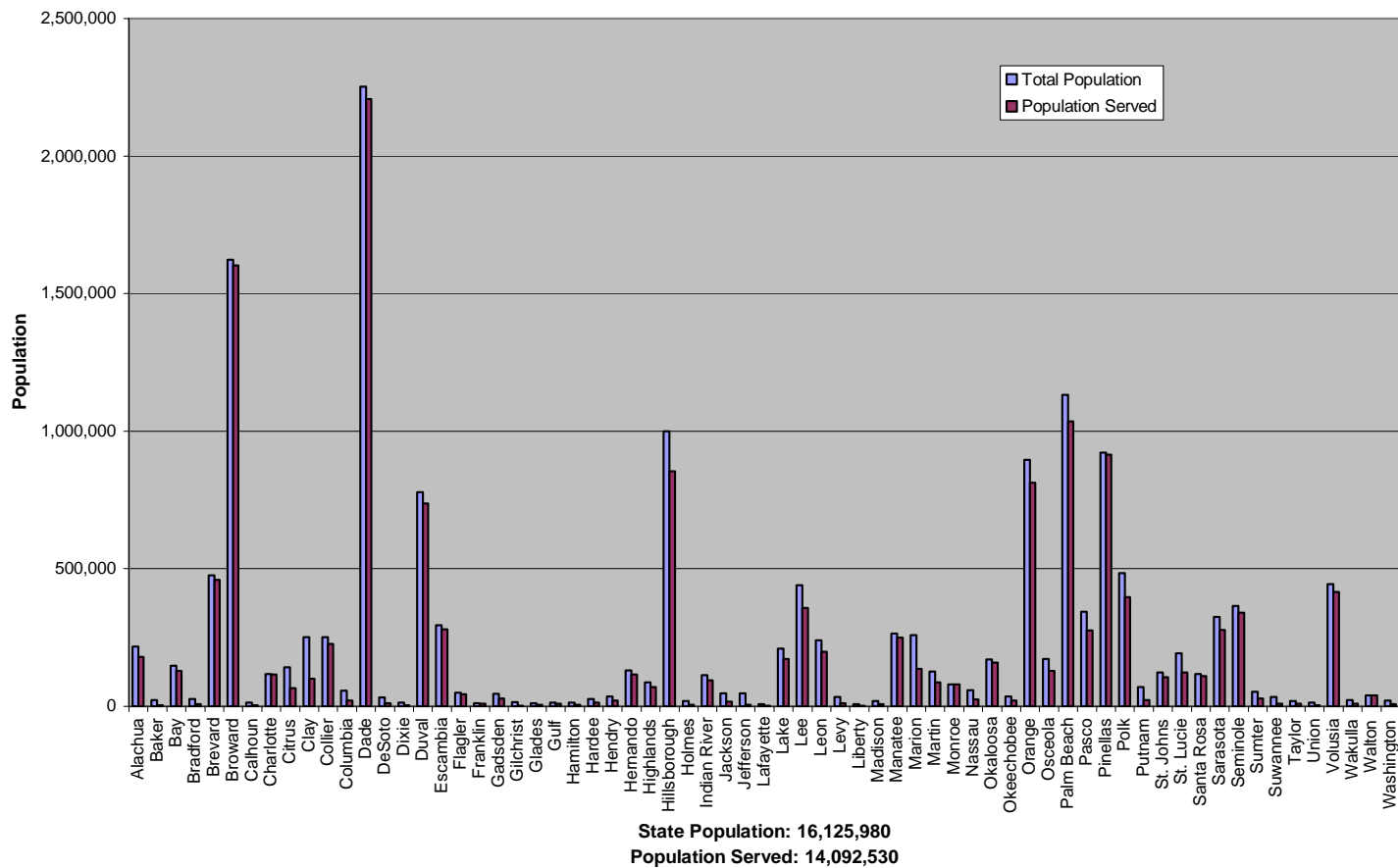


Figure 8. Total population and population served by public water supply by county in Florida.

Water Consumption per person per day

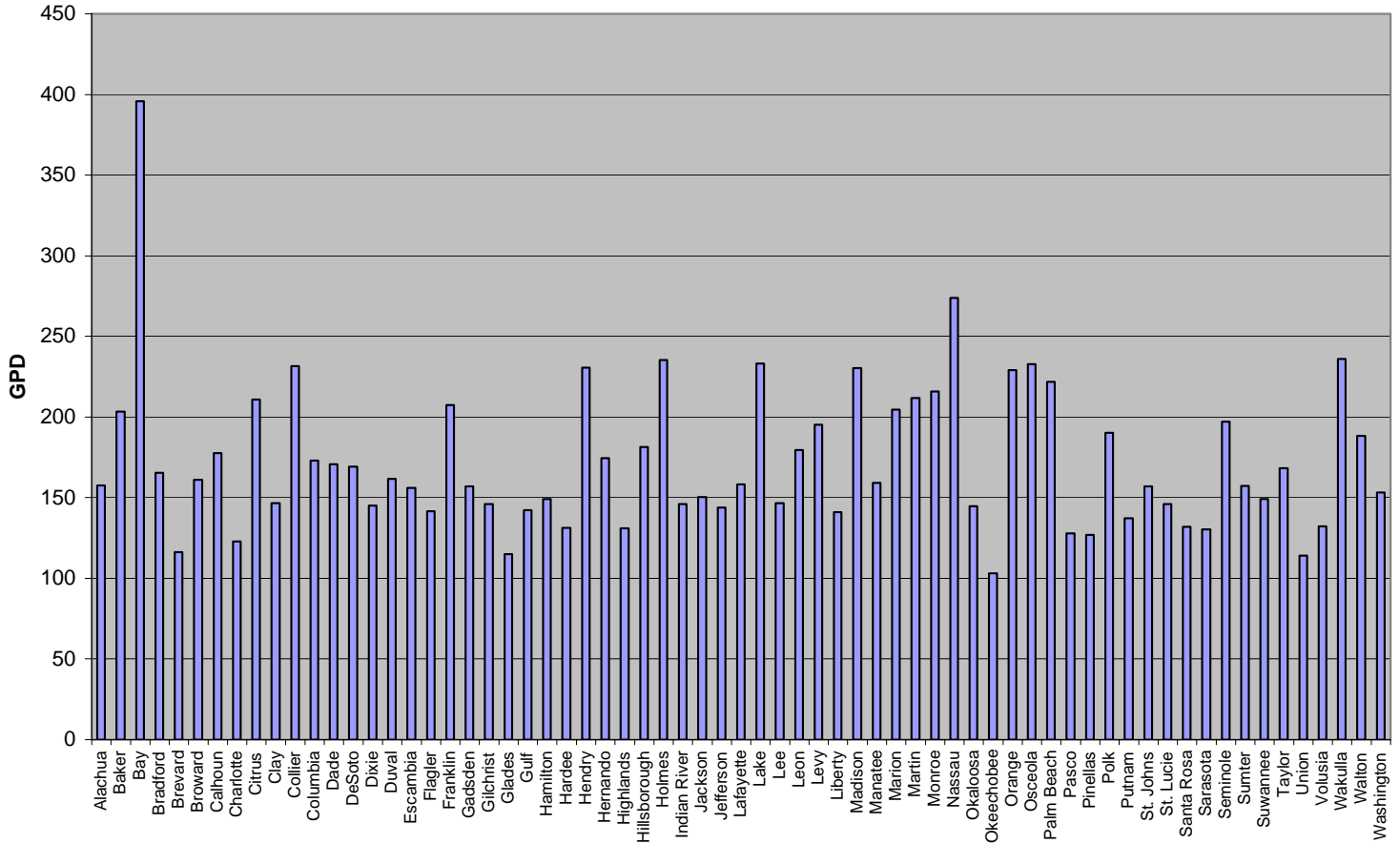


Figure 9. Water consumption per person per day by county in Florida

Dade, Broward, and Palm Beach also had the highest wastewater discharges in the state, with 331MGD, 190MGD and 108MGD respectively, accounting for 41% of the state total. The consumption per head in both Dade and Broward County, however, were both slightly below the state average, reaching only 171gpd and 161gpd respectively.

The highest consumption and discharge per head occurred in Bay County where in reached 396gpd and 391gpd per head respectively.

Future Trends:

Future trends for the water demand in Florida were assembled from data obtained from the Supply Plans each district is required to provide for the FDEP. A summary of the information is found in Figures 10 & 11. No data has been found for the Suwannee Water Management District.

From 2005 to 2025, water consumption is projected to increase in all the districts analyzed. The highest increase will likely be in South Florida with nearly 1,300 MGD expected in 2024 while the smallest will be in North West Florida where consumption is only expected to rise to 254 MGD. The Water Consumption is almost entirely due to increase in population. By 2025 South Florida's population will have increased by nearly

1.7 million people, while North West Florida's is only expected to grow by about 250 thousand people.

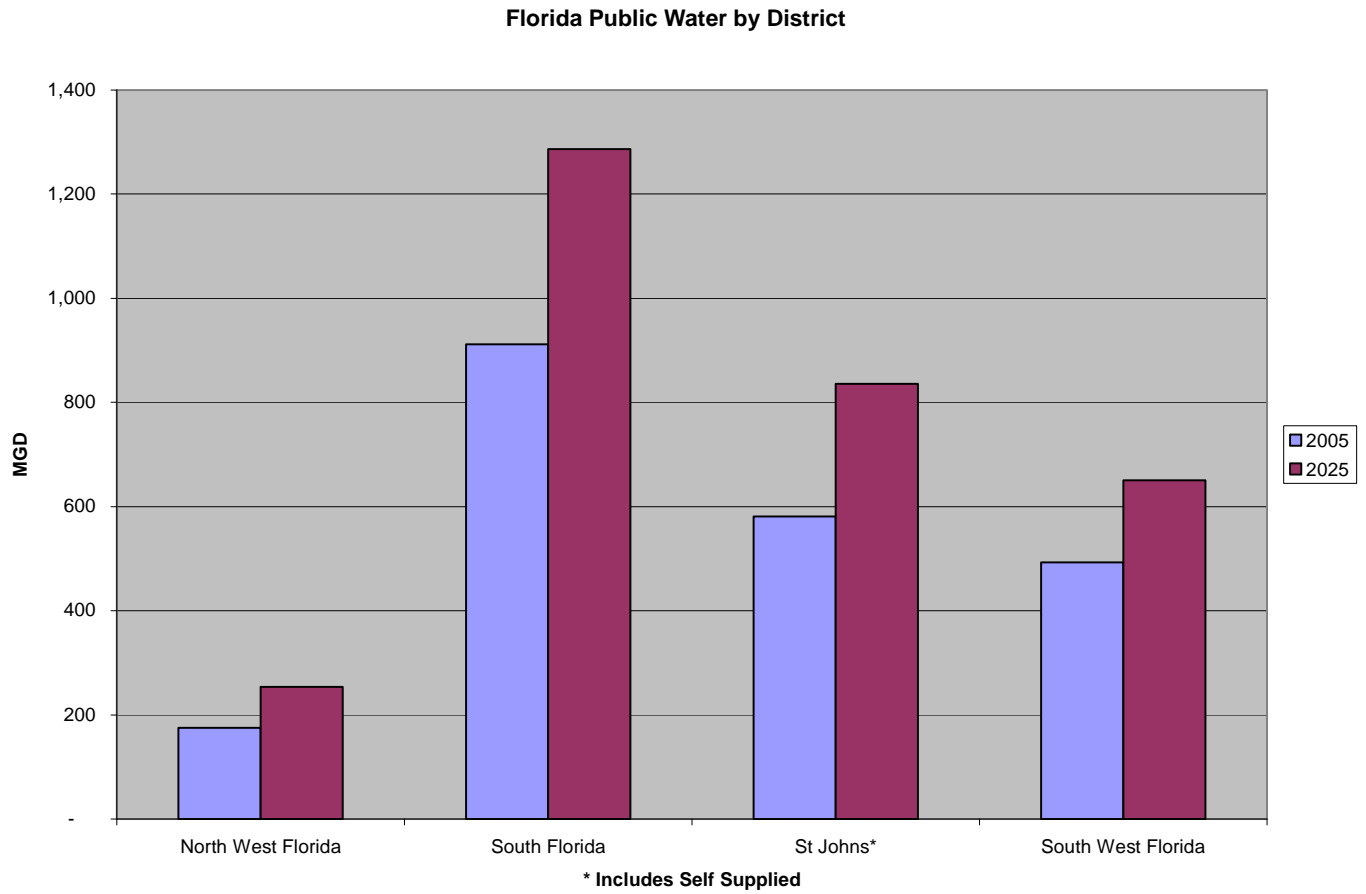


Figure 10. Public water use by water management district in Florida

Florida Public Water Supply, Population Served by District

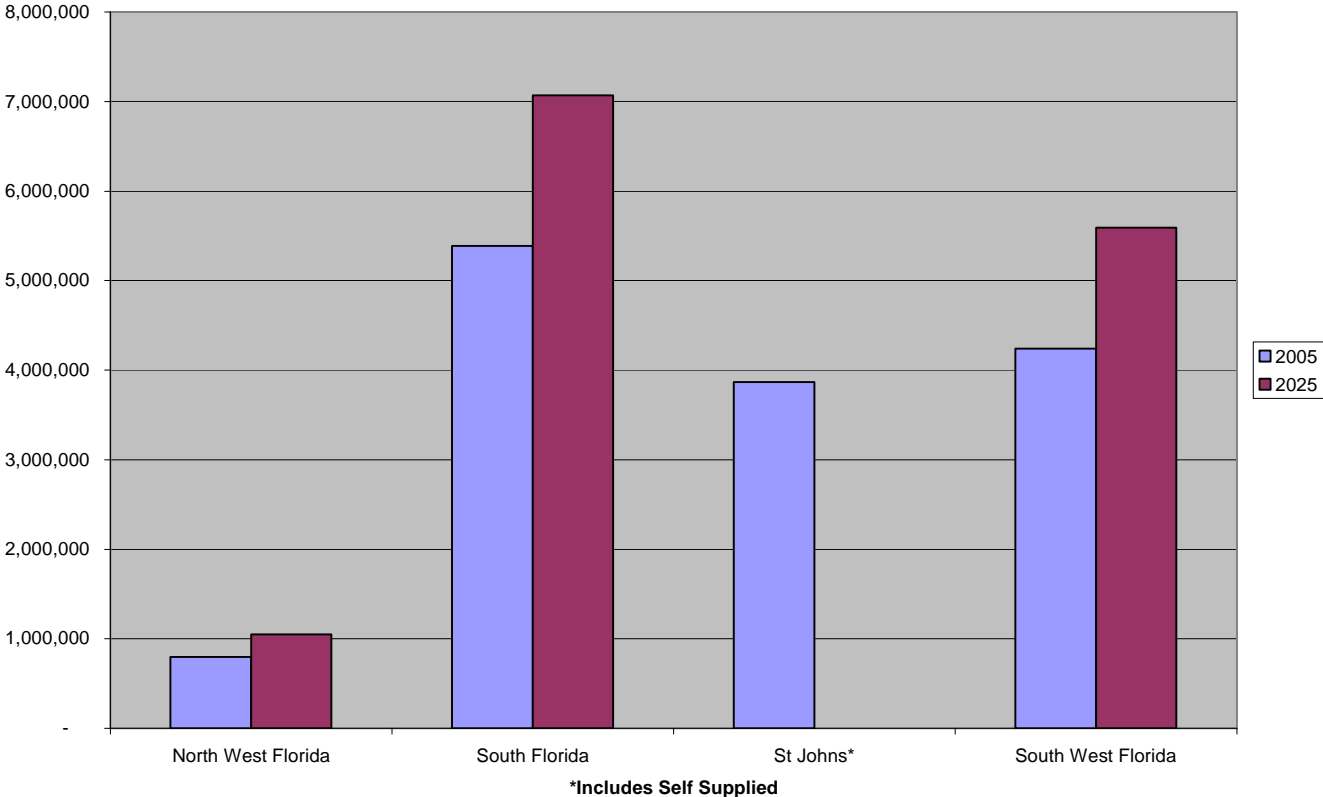


Figure 11. Population served by public water supply in Florida water management districts