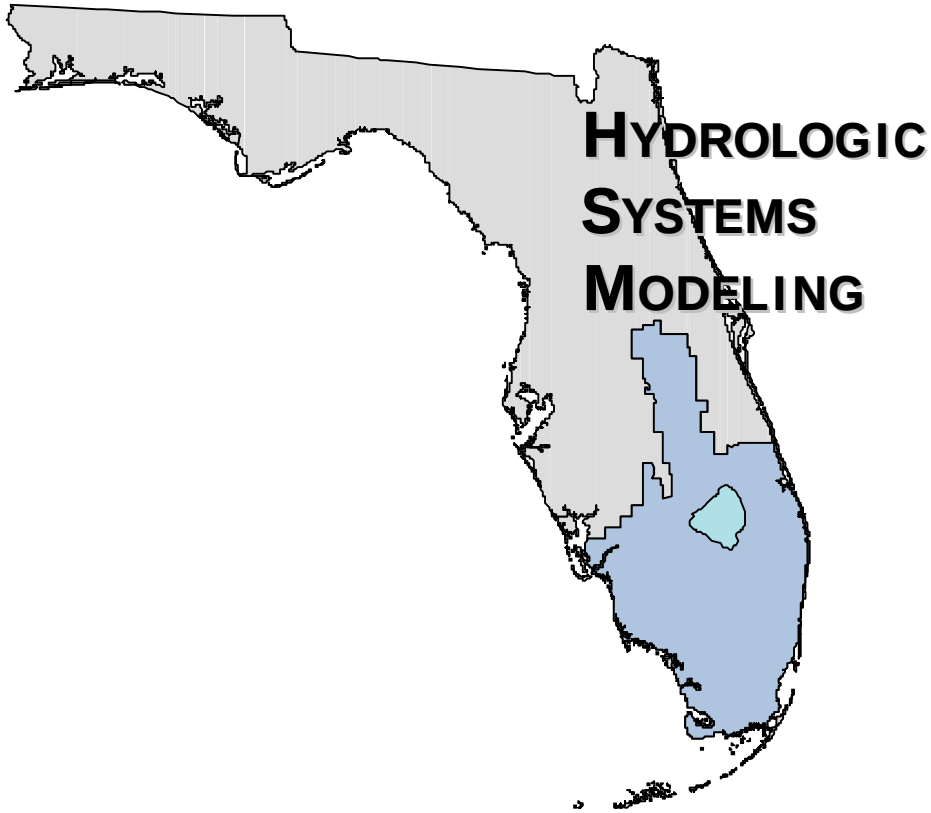
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Preparation of Well Pumpage Data for Input into the South Florida Water Management Model



Lehar Brion
Jenifer Barnes
Oct. 24, 2002

SFWMM Input File (e.g. wellprdt_95base_v3.3)

Number of Records → 1077; Adjustment Factor → 1.00

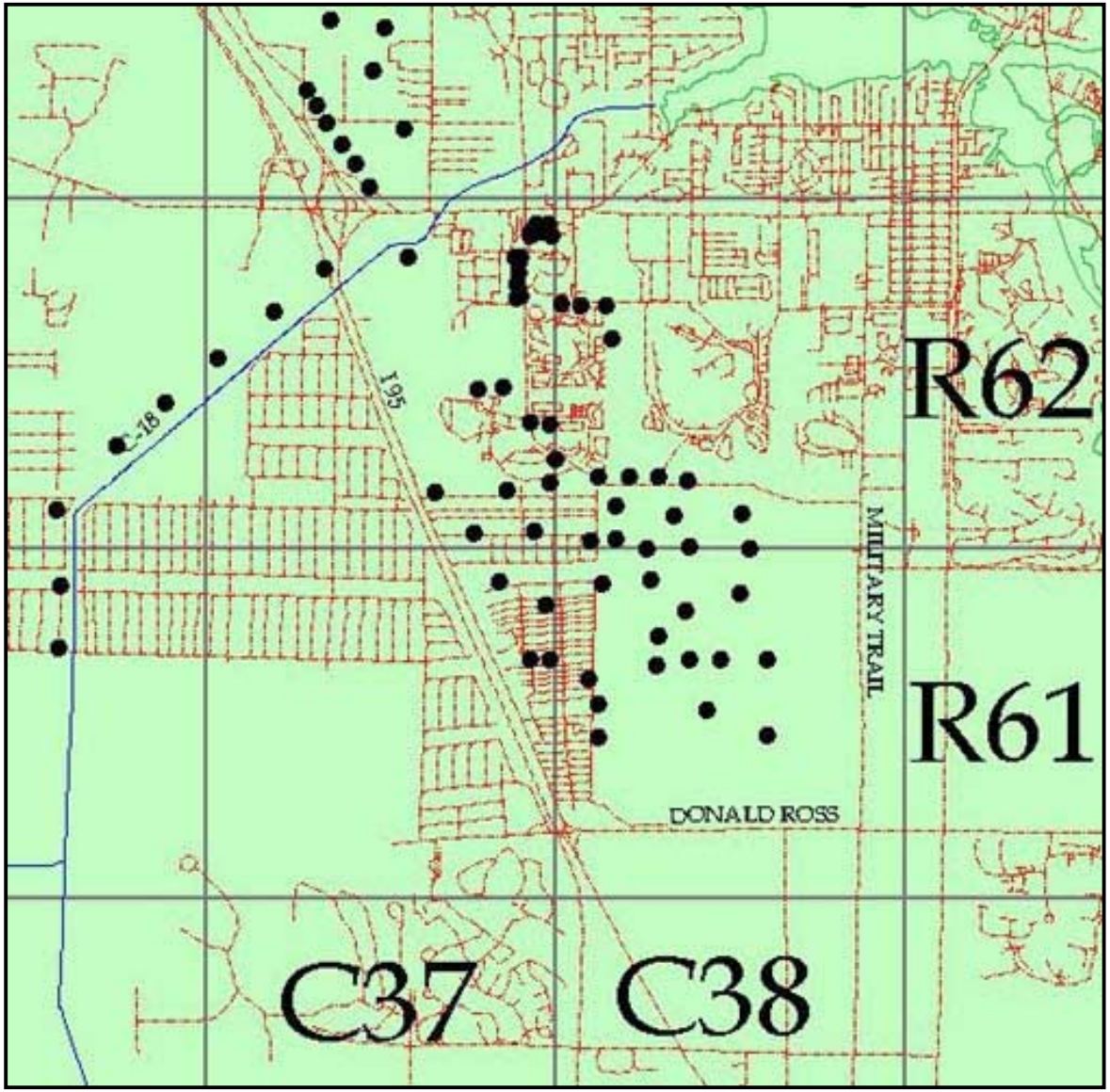
```
1077   1.00
06-00001- 95  35      31  0.262  0.246  0.200  0.175  0.162  0.125  0.127  0.110  0.108  0.142  0.210  0.215  PWS
06-00001- 95  35      31  0.262  0.246  0.200  0.175  0.162  0.125  0.127  0.110  0.108  0.142  0.210  0.215  PWS
06-00001- 95  35      31  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  PWS
13-00017- 95  31      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  31      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  30      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  31      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  29      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
13-00017- 95  31      20  6.123  5.619  6.267  6.051  6.267  5.835  6.123  6.051  5.691  5.907  5.979  6.051  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      62  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      61  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  38      61  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      61  0.246  0.241  0.238  0.246  0.266  0.221  0.227  0.210  0.196  0.213  0.230  0.230  PWS
50-00010- 95  37      61  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      61  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
50-00010- 95  37      61  0.338  0.330  0.326  0.338  0.364  0.303  0.311  0.288  0.269  0.292  0.315  0.315  PWS
                          Jan    Feb    Mar    Apr    May    Jun    Jul    Aug    Sep    Oct    Nov    Dec    Type
```

Permit Number | Year | Column | Row | Average Pumpage (mgd) (Jan–Dec) | Type

Well Distribution Data

- Obtain well locations from Regulation Department
- Overlay well locations with SFWMM Grid to obtain a row and column value for each well
- Allocate a percentage of the total permit pumpage that falls into a given grid cell
- Generate well distribution file (e.g. wells.txt)

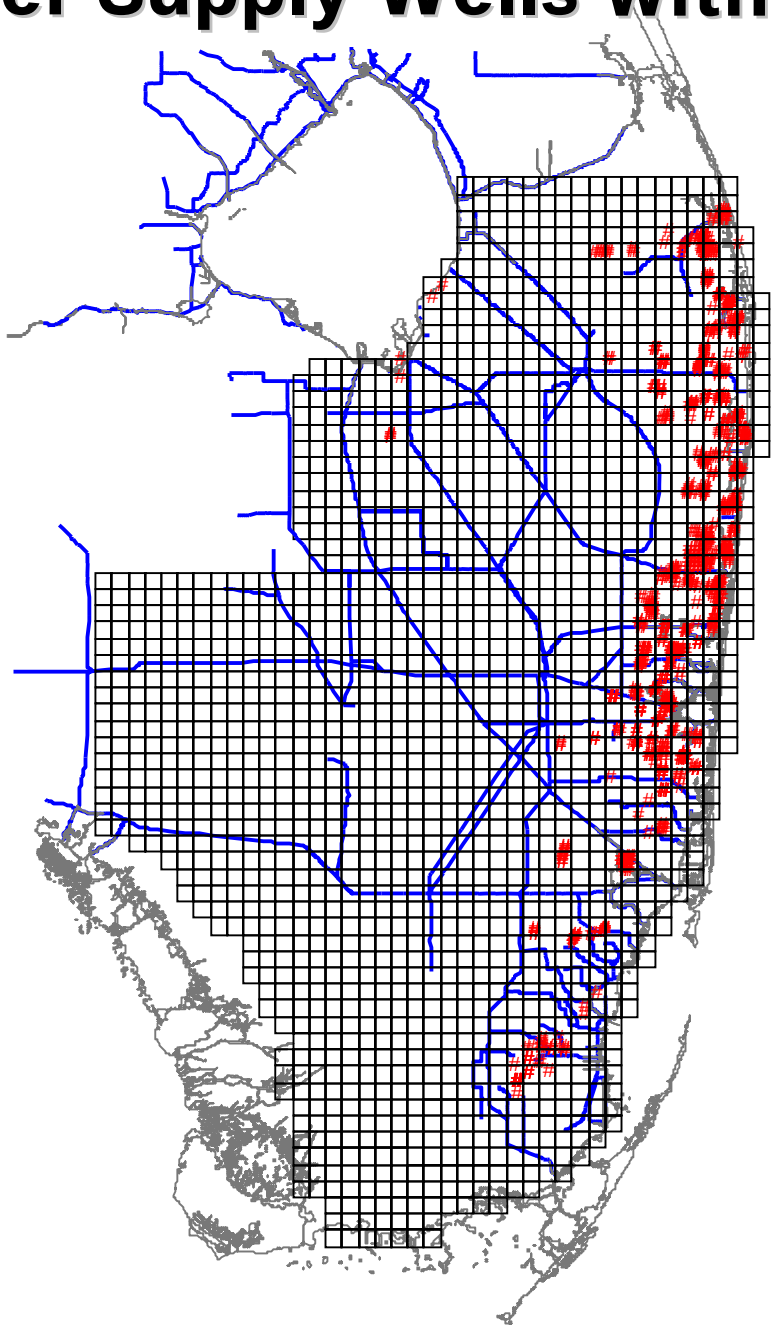
Construction of Wells.txt
(Jupiter Wellfield Example)



2000 Actual Distribution

47.1%	33.7%	R62
12.5%	6.7%	R61
C37	C38	

Public Water Supply Wells with SFWMM Grid



Well Distribution File (e.g. wells.txt)

PERMIT_NUM	==========	PERCENT	====	RoCo
06-00001-W	16	50.00	50.00	33135
06-00001-W	19	50.00	50.00	33135
06-00001-W	2	0.00	0.00	33135
06-00003-W	1	33.00	33.00	34034
06-00003-W	2	33.00	33.00	34034
06-00003-W	3	33.00	33.00	34034
06-00004-W	1	33.00	33.00	33835
06-00004-W	2	33.00	33.00	33835
06-00004-W	3	33.00	33.00	33835
06-00038-W	1	2.00	2.00	33136
06-00038-W	10	3.00	3.00	33136
06-00038-W	12	2.00	2.00	33136
06-00038-W	13	2.00	2.00	33136
06-00038-W	14	2.00	2.00	33136
06-00038-W	15	3.00	3.00	33136
06-00038-W	16	3.00	3.00	33136
06-00038-W	17	3.00	3.00	33136
06-00038-W	18	3.00	3.00	33136
06-00038-W	19	3.00	3.00	33136
06-00038-W	2	3.00	3.00	33136
06-00038-W	20	6.00	6.00	33136
06-00038-W	21	6.00	6.00	33136
06-00038-W	22	6.00	6.00	33136
06-00038-W	23	6.00	6.00	33136
06-00038-W	24	6.00	6.00	33136
06-00038-W	25	6.00	6.00	33136
06-00038-W	26	6.00	6.00	33036
06-00038-W	27	6.00	6.00	33136
06-00038-W	28	0.00	0.00	33036
06-00038-W	29	0.00	0.00	33036
06-00038-W	3	3.00	3.00	33136
06-00038-W	30	0.00	0.00	03136
06-00038-W	31	0.00	0.00	03136
06-00038-W	32	0.00	0.00	03136
06-00038-W	33	0.00	0.00	03136
06-00038-W	34	0.00	0.00	03136
06-00038-W	35	0.00	0.00	03036
06-00038-W	36	0.00	0.00	03136
06-00038-W	37	0.00	0.00	03136
06-00038-W	38	0.00	0.00	03136
06-00038-W	39	0.00	0.00	03136
06-00038-W	4	3.00	3.00	33136
06-00038-W	40	0.00	0.00	03136
06-00038-W	41	0.00	0.00	03136

Well Pumpage Data

- Generate well pumpage file from raw data (Regulation Database and USGS published reports)
- Remove ground water remediation permits
- Use only permits pumping from the Surficial Aquifer

palm-beach-ps96.xls
7/9/02

Monthly Public-Supply Water Use (withdrawals) in Palm Beach County, 1996
(Monthly values in million gallons)

Utility/Owner/Plant	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Mgal/d	water source	FDEP PWS ID#	WMD Permit #	Population served
Acme Improvement District													1,552.9	4.24			50-00464	N/A
Lime Plant	94.4	100.8	105.1	104.9	98.5	86.3	97.5	94.7	98.4	97.1	117.8	118.1	1,213.6		S	4500014-1		N/A
R/O Plant (withdrawal)	46.3	43.4	36.8	39.7	29.6	29.8	20.7	24.3	14.6	17.7	8.2	28.2	339.3		S (R/O)	4500014-2		N/A
Belle Glade, city of	126.6	113.4	145.4	157.9	161.9	141.7	116.2	112.1	102.2	105.9	119.9	134.8	1,538.0	4.20	SW	4500105	50-00454	N/A
Boca Raton, city of	1,152.7	1,243.9	1,324.3	1,307.8	1,229.8	1,034.7	1,341.3	1,310.9	1,107.0	1,121.5	1,316.4	1,360.4	14,850.7	40.58	B	4500130	50-00367	N/A
Boynton Beach, city of													4,267.6	11.66			50-00498	N/A
Lime Plant	247.7	276.7	261.2	261.0	205.0	217.3	254.0	242.5	230.4	225.2	269.9	286.3	2,977.2		S	4500145-1		N/A
R/O Plant (withdrawal)	117.0	100.2	118.7	104.4	114.4	108.0	114.7	100.7	91.8	116.0	115.5	89.0	1,290.4		S (R/O)	4500145-2		N/A
Bryant, town of (USSC)	35.2	31.2	27.4	4.9	3.7	4.2	3.8	3.6	3.9	5.1	2.7	33.6	159.3	0.44	SW	4501520	50-00267	N/A
Colonial MHP	1.5	1.7	1.7	1.5	1.1	1.1	1.3	1.1	1.1	1.0	1.2	1.2	15.5	0.04	S	4500264		N/A
Delray Beach, city of	393.9	384.8	423.4	413.2	392.8	329.5	423.3	463.0	415.3	432.7	465.1	458.8	4,995.8	13.65	S	4500351	50-00177	N/A
Golf, village of	15.7	15.5	16.5	15.5	13.2	12.0	12.5	12.1	11.7	10.8	11.2	15.8	162.5	0.44	S	4501528	50-00612	N/A
Highland Beach, city of	41.3	40.0	43.0	38.4	33.1	28.4	35.0	35.4	32.3	33.7	39.7	41.5	441.8	1.21	B	4500609	50-00346	N/A
Jupiter, town of													4,816.9	13.16		4501489	50-00010	N/A
Lime Plant	309.2	306.2	318.1	308.0	305.2	274.8	391.1	302.2	278.0	286.7	316.0	303.5	3,699.0		S			N/A
R/O Plant (withdrawal)	69.7	108.8	79.0	121.7	100.8	73.2	106.4	100.8	98.6	59.6	84.8	114.5	1,117.9		F (R/O)			N/A
Lake Worth Utilities	207.9	194.8	194.4	199.9	202.0	185.2	224.2	217.6	202.8	187.5	199.5	203.3	2,419.1	6.61	S	4500773	50-00234	N/A
Lake Worth Village	7.8	10.6	9.9	9.9	6.0	4.3	6.3	5.7	5.4	5.7	8.3	9.2	89.1	0.24	S	4500960	50-00572	N/A
Lantana, town of	61.3	65.6	66.5	72.8	66.2	58.4	71.8	70.7	64.8	55.2	61.0	64.7	779.0	2.13	S	4500784	50-00575	N/A
Magnolia Park Utilities	9.9	11.0	11.2	11.5	10.6	10.7	11.7	11.5	9.6	10.3	10.4	9.9	128.3	0.35	S	4500841	50-00030	N/A
Manalapan, town of	34.7	37.3	39.0	40.4	34.4	29.0	35.5	40.5	39.1	32.6	36.6	36.0	435.1	1.19	S	4500840	50-00506	N/A
Pahokee, city of	25.1	22.5	23.9	24.1	24.8	22.9	24.7	25.4	25.0	25.9	25.2	27.3	296.8	0.81	SW	4501023	50-00473	N/A
Palm Beach County Utilities													13,772.4	37.63				N/A
BW Wellfield	397.0	378.4	343.0	384.0	362.0	301.5	324.0	334.5	314.0	313.5	333.1	361.9	4,146.9		S	4504393	50-00135	N/A
System 2	214.4	235.9	272.9	243.6	222.7	205.0	249.9	218.8	215.6	214.7	212.0	265.3	2,770.8		S	4501047	50-00135	N/A
System 3	159.6	160.7	165.3	154.6	150.3	134.9	123.6	216.7	204.5	203.7	277.1	293.2	2,244.2		S	4501046	50-00511	N/A
System 7	13.7	26.9	36.1	33.3	25.2	29.9	43.8	40.4	21.5	15.7	33.6	31.3	351.4		S	4500225	50-00178	N/A
System 9	396.9	377.9	393.1	374.6	341.6	293.9	366.0	332.6	308.6	332.9	362.1	378.9	4,259.1		S	4501332	50-00401	N/A
Palm Springs Village													1,486.1	4.06			50-00036	N/A
Palm Springs	65.9	69.9	72.9	79.2	65.0	58.9	69.3	65.7	60.9	59.2	69.5	69.1	805.5		S	4501058-1		N/A
Robert Pratt	56.3	54.3	58.5	55.7	58.8	56.2	57.3	58.4	55.0	58.2	55.8	56.1	680.6		S	4501058-2		N/A
Riviera Beach, city of													2,732.2	7.47				N/A
Main System	225.8	215.2	235.4	239.7	235.5	194.4	234.7	238.7	207.9	205.9	217.9	218.2	2,669.3		S	4501229	50-00460	N/A
System 2	0.0	6.6	8.9	9.0	8.1	7.9	5.7	7.6	8.1	1.0	0.0	0.0	62.9		S	4500278	50-00713	N/A
Royal Palm Beach Utilities													809.2	2.21			50-00444	N/A
Lime Plant	64.7	61.8	64.8	66.1	74.9	45.3	60.6	57.7	58.5	64.6	64.5	69.7	753.2		S	4501242-1		N/A
R/O Plant (withdrawal)	5.8	4.7	5.6	6.0	7.0	17.6	6.9	2.4	0.0	0.0	0.0	0.0	56.0		S (R/O)	4501242-2		N/A
Seacoast Utilities													5,242.6	14.32			50-00365	N/A
Hood Road	280.1	299.2	299.0	319.3	300.2	271.7	342.2	324.6	304.5	310.6	256.7	365.2	3,673.3		S	4501124-1		N/A
Richards Road	131.7	127.5	130.6	136.7	132.8	122.4	137.7	144.6	124.9	123.1	129.2	128.1	1,569.3		S	4501124-2		N/A
South Bay, city of	13.9	13.1	13.9	12.5	12.6	11.6	13.1	14.3	12.0	11.9	12.8	14.9	156.6	0.43	SW	4501911	50-00131	N/A
Tequesta, village of	48.2	50.9	57.4	57.7	49.6	25.4	42.1	44.6	39.6	38.6	52.9	42.0	549.0	1.50	S	4501438	50-00046	N/A
Tropical Breeze Estates	3.5	3.9	3.9	3.5	2.8	2.3	3.3	3.0	3.0	3.2	3.8	3.3	39.5	0.11	S	4500981	50-00137	N/A
West Palm Beach, city of	731.2	769.7	808.9	830.3	778.0	703.7	851.1	818.5	740.4	742.0	795.7	838.7	9,408.2	25.71	SW	4501558	50-00615	N/A
Woodhaven Villas	1.3	1.3	1.5	1.2	1.3	0.8	1.3	1.0	1.0	1.0	1.0	1.2	13.9	0.04	S	4500261		N/A
Monthly totals	5,807.9	5,966.3	6,217.2	6,244.5	5,861.5	5,134.9	6,224.6	6,098.9	5,512.0	5,530.0	6,087.1	6,473.2	105,838.0	**194.43**				**897,610**

The town of Jupiter R/O withdrawals are estimated based on 75 percent efficiencies of the R/O plant.
Royal Palm Beach Utilities R/O withdrawals are estimated based on the monthly efficiencies of the R/O plant.
Mgal/d, million gallons per day; B, Biscayne; S, Surficial; F, Floridan; SW, surface water; GW, ground water;
R/O, Reverse Osmosis; WF, Wellfield; MHP, mobile home park; USSC, U.S. Sugar Company; N/A, data not available.
Sources; The U.S. Geological Survey (Tallahassee) and the Palm Beach County Public Health Unit (West Palm Beach).

Sub totals	
SW	31.59
GW	162.84
R/O	7.66

Total Population	981,793
Population served	897,610
Per capita	217
Self-supplied pop.	84,183
Self-supplied Mgal/d	18.27

Well Pumpage File (e.g. outfile3)

Total Annual Pumpage

Monthly Distribution Factors

Permit Number

PUMPAGE YEAR:	2050												
06-00001-W	126.655	0.126	0.118	0.096	0.084	0.078	0.060	0.061	0.053	0.052	0.068	0.101	0.103
06-00003-W	149.249	0.122	0.078	0.079	0.092	0.088	0.069	0.065	0.072	0.075	0.075	0.094	0.089
06-00004-W	1277.500	0.082	0.074	0.084	0.094	0.096	0.078	0.079	0.079	0.076	0.079	0.094	0.087
06-00038-W	7545.420	0.083	0.077	0.086	0.087	0.087	0.078	0.085	0.079	0.073	0.086	0.092	0.089
06-00054-W	3250.279	0.080	0.075	0.084	0.087	0.089	0.080	0.085	0.085	0.083	0.083	0.085	0.084
06-00070-W	6059.000	0.084	0.078	0.084	0.091	0.094	0.081	0.080	0.081	0.077	0.076	0.089	0.085
06-00071-W	2367.609	0.087	0.082	0.087	0.093	0.087	0.076	0.075	0.081	0.077	0.080	0.086	0.090
06-00082-W	4343.500	0.081	0.079	0.086	0.091	0.097	0.079	0.081	0.082	0.078	0.076	0.089	0.083
06-00100-W	1870.000	0.083					0.084	0.080	0.081	0.074	0.078	0.090	0.090
06-00101-W	359.950	0.084					0.073	0.083	0.080	0.075	0.068	0.079	0.085
06-00102-W	2890.000	0.081	0.077	0.087	0.088	0.093	0.082	0.082	0.082	0.080	0.079	0.087	0.082
06-00103-W	5624.000	0.082	0.076	0.081	0.089	0.095	0.083	0.083	0.078	0.077	0.079	0.091	0.087
06-00120-W	7300.000	0.082	0.079	0.082	0.086	0.088	0.078	0.082	0.081	0.084	0.081	0.090	0.089
06-00121-W	3600.000	0.084	0.079	0.084	0.089	0.093	0.080	0.078	0.078	0.079	0.077	0.093	0.087
06-00123-W	19134.030	0.086	0.082	0.088	0.089	0.092	0.081	0.083	0.078	0.073	0.076	0.090	0.084
06-00129-W	3111.078	0.082	0.077	0.085	0.087	0.093	0.080	0.081	0.080	0.078	0.078	0.090	0.088
06-00134-W	1152.232	0.079	0.074	0.083	0.087	0.090	0.081	0.084	0.083	0.082	0.084	0.088	0.084
06-00135-W	3650.475	0.081	0.076	0.084	0.086	0.086	0.081	0.086	0.084	0.082	0.087	0.084	0.084
06-00138-W	1270.000	0.086	0.077	0.083	0.081	0.084	0.076	0.069	0.086	0.083	0.085	0.104	0.086
06-00142-W	4015.000	0.084	0.080	0.086	0.089	0.095	0.078	0.078	0.079	0.078	0.079	0.090	0.084
06-00145-W	1358.576	0.083	0.077	0.083	0.087	0.088	0.081	0.080	0.078	0.077	0.081	0.088	0.095
06-00146-W	3487.210	0.085	0.082	0.089	0.090	0.093	0.081	0.080	0.081	0.076	0.077	0.085	0.081
47-W	1005.429	0.108	0.119	0.116	0.115	0.116	0.096	0.113	0.116	0.086	0.015	0.000	0.000
70-W	400.551	0.090	0.081	0.084	0.090	0.078	0.072	0.083	0.090	0.086	0.075	0.083	0.088
87-W	730.000	0.072	0.082	0.094	0.090	0.096	0.084	0.085	0.065	0.078	0.084	0.088	0.083
42-W	112.310	0.076	0.072	0.082	0.101	0.086	0.080	0.076	0.084	0.083	0.084	0.087	0.089
06-00274-W	1441.287	0.077	0.072	0.078	0.085	0.090	0.080	0.083	0.085	0.082	0.085	0.095	0.089
06-00365-W	1538.000	0.074	0.073	0.084	0.092	0.092	0.076	0.084	0.080	0.078	0.078	0.096	0.093
06-00435-W	531.842	0.072	0.074	0.082	0.100	0.095	0.077	0.084	0.076	0.076	0.073	0.101	0.089
06-01474-W	6443.985	0.084	0.080	0.086	0.089	0.095	0.078	0.078	0.079	0.078	0.079	0.090	0.084
06-01634-W	2595.150	0.084	0.080	0.086	0.089	0.095	0.078	0.078	0.079	0.078	0.079	0.090	0.084
13-00005-W	5778.000	0.086	0.081	0.091	0.089	0.087	0.081	0.085	0.082	0.071	0.080	0.084	0.083
13-00017-W	74135.880	0.085	0.078	0.087	0.084	0.087	0.081	0.085	0.084	0.079	0.082	0.083	0.084
13-00029-W	757.000	0.073	0.066	0.085	0.094	0.086	0.083	0.083	0.080	0.084	0.089	0.087	0.089
13-00037-W	60200.000	0.082	0.077	0.086	0.086	0.089	0.081	0.086	0.083	0.080	0.083	0.083	0.085
13-00040-W	3872.869	0.093	0.083	0.082	0.080	0.082	0.079	0.083	0.083	0.084	0.086	0.080	0.086
13-00046-W	2480.000	0.079	0.067	0.078	0.080	0.084	0.082	0.089	0.086	0.084	0.088	0.089	0.095
13-00059-W	3390.000	0.086	0.079	0.086	0.084	0.088	0.082	0.085	0.084	0.083	0.081	0.080	0.081
13-00060-W	6450.000	0.089	0.081	0.087	0.087	0.088	0.083	0.088	0.078	0.079	0.078	0.081	0.081
13-00068-W	1027.570	0.112	0.078	0.093	0.090	0.083	0.080	0.077	0.075	0.073	0.081	0.083	0.075
50-00010-W	6278.000	0.089	0.087	0.086	0.089	0.096	0.080	0.082	0.076	0.071	0.077	0.083	0.083
50-00030-W	229.658	0.081	0.071	0.077	0.082	0.095	0.084	0.080	0.086	0.085	0.086	0.087	0.086
50-00036-W	1606.000	0.084	0.079	0.091	0.102	0.097	0.081	0.070	0.080	0.077	0.076	0.081	0.082
50-00046-W	1768.000	0.067	0.068	0.078	0.100	0.107	0.103	0.087	0.066	0.070	0.076	0.090	0.088
50-00083-W	267.800	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50-00131-W	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50-00135-W	9219.900	0.083	0.079	0.092	0.094	0.094	0.077	0.079	0.080	0.080	0.077	0.079	0.086
50-00137-W	23.700	0.089	0.088	0.115	0.106	0.095	0.060	0.064	0.060	0.068	0.069	0.089	0.097
50-00177-W	5449.304	0.083	0.076	0.089	0.091	0.095	0.079	0.079	0.077	0.075	0.075	0.089	0.090
50-00178-W	594.000	0.071	0.079	0.090	0.158	0.162	0.049	0.001	0.032	0.084	0.068	0.141	0.063
50-00179-W	28.100	0.072	0.067	0.074	0.083	0.114	0.082	0.088	0.091	0.087	0.090	0.074	0.078

Fortran Code Used to Convert Raw Pumpage Data into SFWMM Format

```
      PROGRAM WELLS
      INTEGER IROW(1500),ICOL(1500),IYEAR,Icnt
      CHARACTER*10 ANAME(1500),CNAME,PWS
      CHARACTER*200 ACARD
      REAL per2010(1500),DEMAND,MON(12)
c DEMAND = total demand, in MG, for a given permit
c per2010(1500) = grid distribution percentage for a given permit
c MON(12) = monthly distribution factor for a given permit
cccc
c initialize variables
cccc
      PWS = 'PWS'
cccc
c initialize files
cccc
      OPEN(15,FILE='wells.txt')
      OPEN(17,FILE='outfile3.in')
      OPEN(21,FILE='welldat1.out')
c other output files (for diagnostics)
c fort.69 - list of permits that are stored in memory
c   Entries do not give unique permit numbers because a
c   permit number may be assigned to multiple grid cells.
c fort.86 - list of permits with NO match in memory
c fort.87 - list of permits with match in memory
c fort.88 - list of permits with match in memory
c           but grid distribution percentage for
c           corresponding grid cell is zero
cccc
c Read wells.txt for percent of demand by well into memory
cccc
c head wells.txt
c6-00001-W     16                50.00   50.00     33135
c6-00001-W     19                50.00   50.00     33135
c23456789*123456789*123456789*123456789*123456789*123456789*
c       10        20        30        40        50        60
      DO 200 I = 1, 1500
        READ (15,'(A10,28x,F8.2,6x,I2,I2)',END=11)
     +    ANAME(i),PER2010(i),IROW(i),ICOL(i)
c convert to fraction
        PER2010(i)=PER2010(i)/100
        Icnt = Icnt + 1
200   CONTINUE
c write full list of permits that are stored in memory
11    DO 201 i=1,Icnt
        write (69,*) ANAME(I),i
201   CONTINUE
```

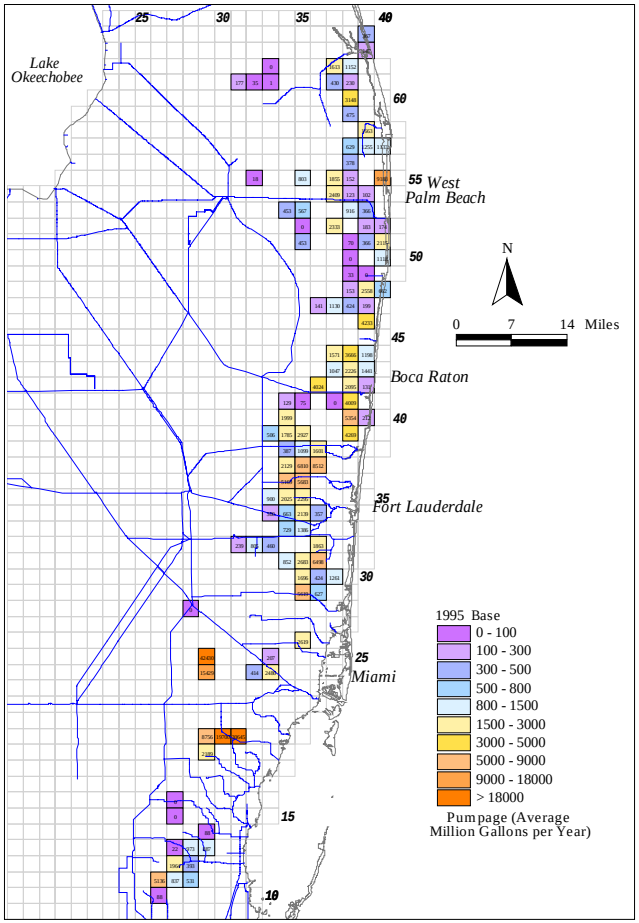
Fortran Code Used to Convert Raw Pumpage Data into SFWMM Format (cont.)

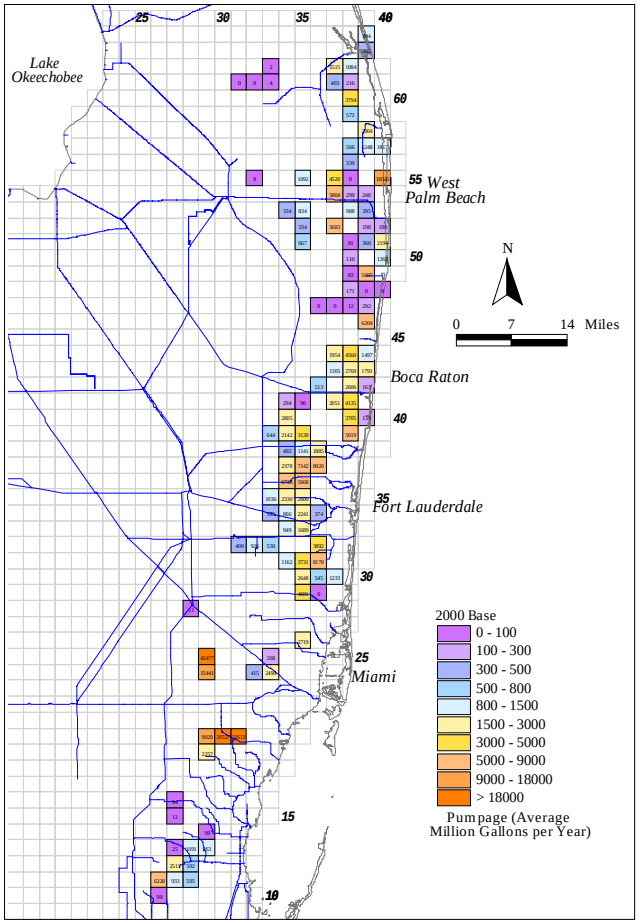
```
cccc
c Read each record
cccc
c head outfile3
cPUMPAGE YEAR:          2050
c6-00001          162.700    0.089    0.089    0.087    0.091    0.092    0.093
0.082    0.076    0.065    0.072    0.080    0.000
c6-00003          163.600    0.076    0.067    0.073    0.101    0.102    0.095
0.084    0.083    0.076    0.081    0.082    0.000
c23456789*123456789*123456789*123456789*123456789*123456789*
c       10        20        30        40        50        60
510   READ(17,'(A200)',END=900) ACARD
      IF (ACARD(2:2) .EQ. 'P') THEN
        READ(ACARD,'(25x,i2)') IYEAR
        write(*,*) IYEAR
c read first actual data
        READ(17,'(A10,4X,F11.3,12F9.3)',END=900) CNAME,DEMAND,
     +    (MON(IMON), IMON= 1,12)
      ELSE
c just parse read-in string into appropriate variables
c applies from second up to the last record
        READ(ACARD,'(A10,4X,F11.3,12F9.3)',END=900) CNAME,DEMAND,
     +  (MON(IMON), IMON= 1,12)
      ENDIF
c convert demand for a typical day for a given month
      DEMAND=DEMAND/30.4167
cccc
c Search memory for permit number
cccc
      ICAUGHT = 0
      DO 610 I = 1, Icnt
        IF (CNAME(1:8) .EQ. ANAME(i)(1:8)) THEN
c match found
          ICAUGHT = 1
          IF (PER2010(i) .NE. 0) THEN
c            WRITE(21,'(A9,1X,I2,I4,I7,12F7.3,2x,A3)') CNAME,
            WRITE(21,'(A9,1X,I2,I4,I7,12F10.6,2x,A3)') CNAME,
     +        IYEAR,ICOL(i),IROW(i)
     +        ,(MON(IMON)*DEMAND*PER2010(i), IMON=1,12),PWS
          ELSE
c permit found in memory but grid distribution percentage for
c corresponding grid cell is zero
            write(88,*) CNAME, ICOL(i), IROW(i)
          ENDIF
        ENDIF
```

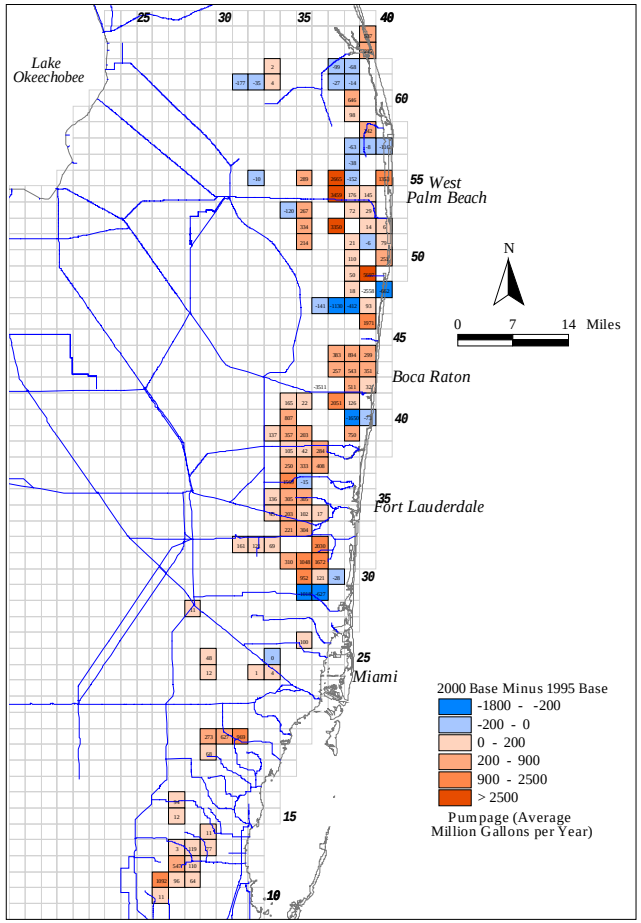
Fortran Code Used to Convert Raw Pumpage Data into SFWMM Format (cont.)

```
c try another permit in memory for possible match
610   CONTINUE
c normal exit of 610 do loop means there was no match
c write list of permits without and with match in wells.txt
      IF ( ICAUGHT .eq. 0 )  then
c write list of permits with NO match in memory
        write (*,*) CNAME
        write (86,*) CNAME
      else
c write list of permits with match in memory
        write (87,*) CNAME
      endif
c next permit to assign to appropriate SFWMM grid cells
      GOTO 510
c all done
900   STOP
      END
```

Average Annual Pumpage Per Cell (1995, 2000 & 2000-1995)







Variations of Pumpage File

- Industrial/Residential Self-Supplied
- Calibration/Verification PWS
- Wellfield Relocation
- Utility ASR
- Actual vs. Permitted

Industrial & Residential Self-Supplied Pumpage

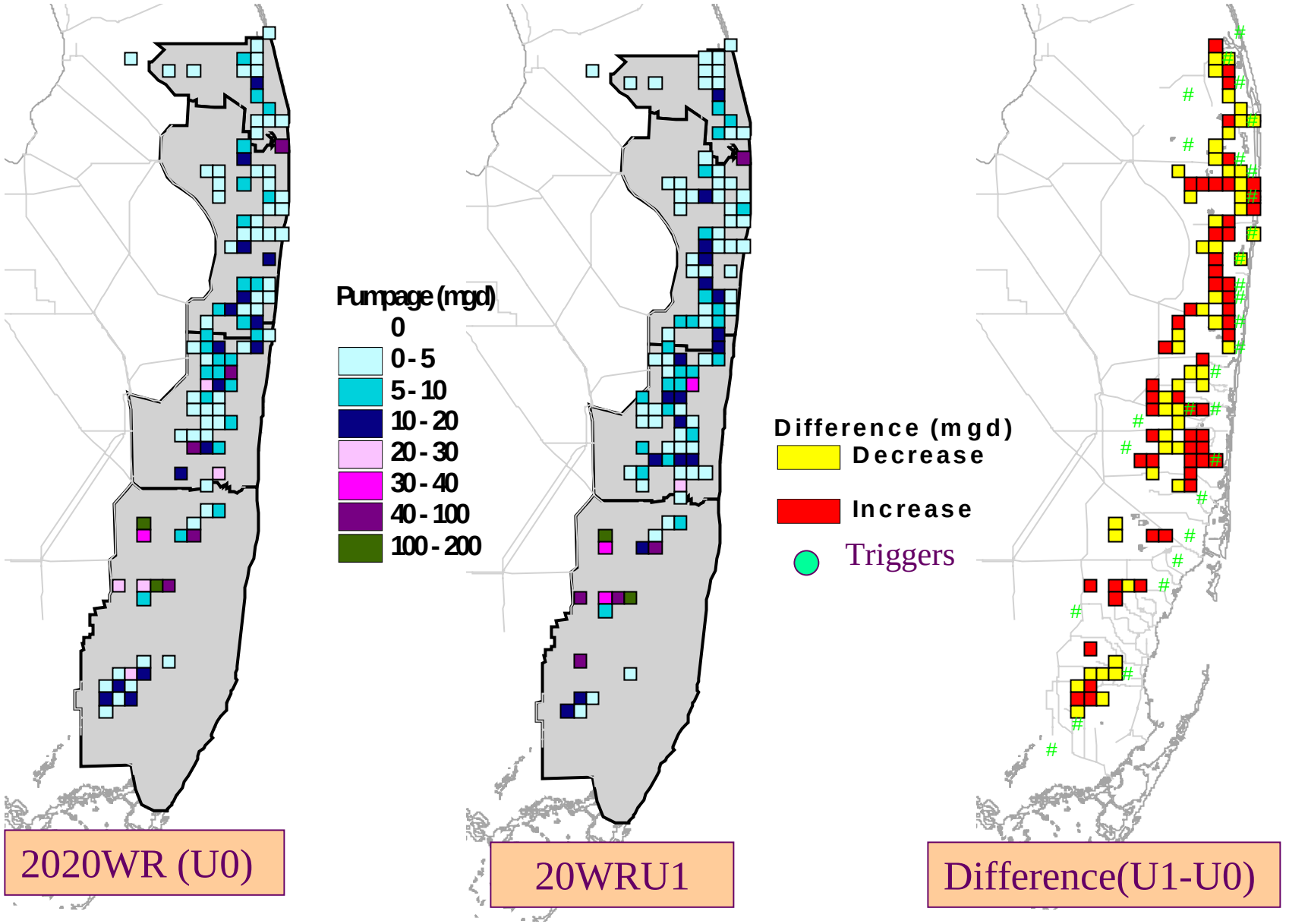
- **Industrial**
  - total pumpage distributed over 12 months with no seasonal variation for all industrial permits
  - uses same format as the welldat file (well_ind_rss.curr_base_v2.3)
- **Residential Self-Supplied**
  - for areas not covered by local utilities a per capita estimation of water use (100 to 200 gpd) is used
  - uses same format as the welldat file (well_ind_rss.curr_base_v2.3)

Average Daily Withdrawal (in MGD) from LEC Surficial Aquifer for Public Water Supply in Eastern Palm Beach, Broward and Miami-Dade Counties

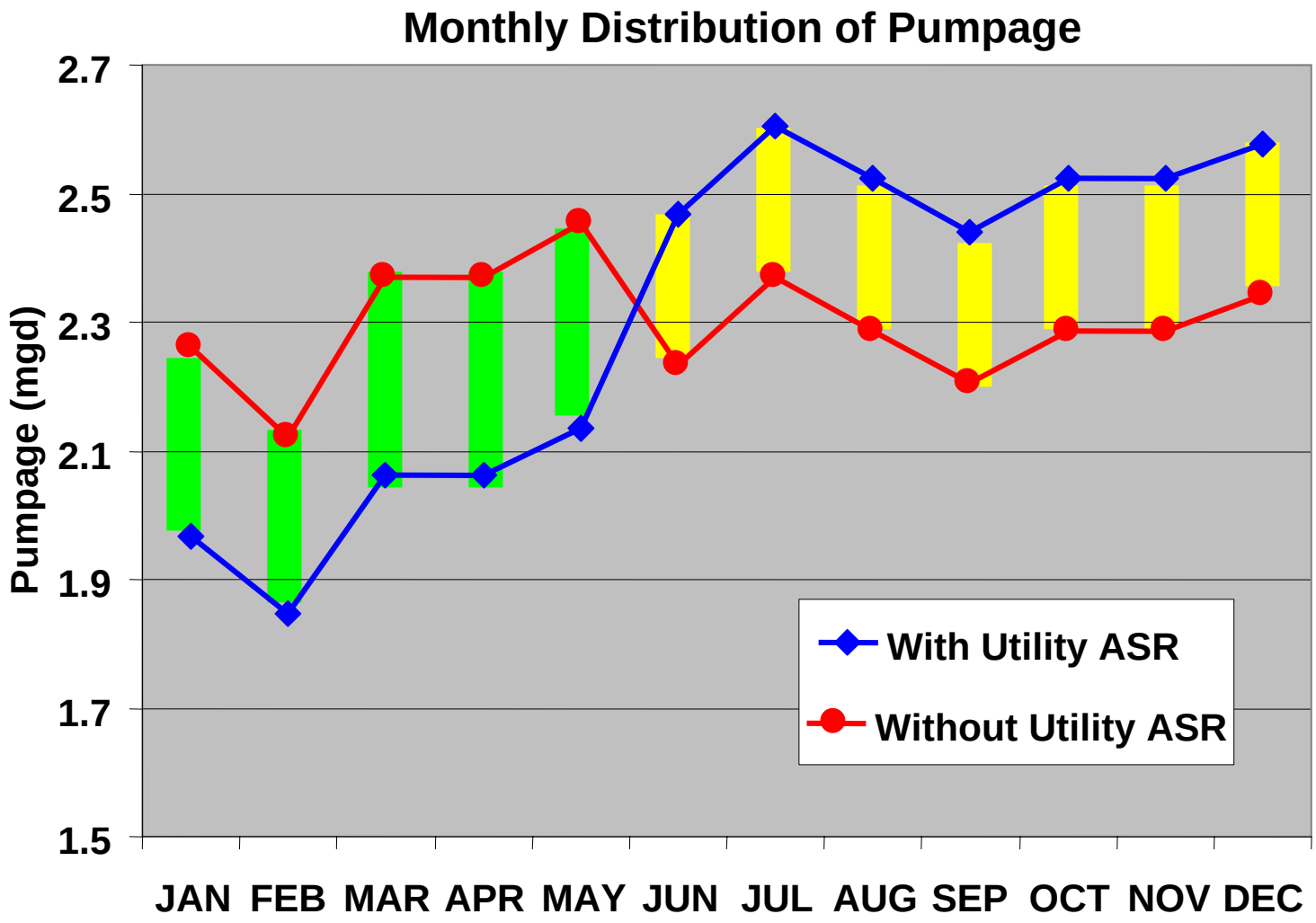
Year	Pumpage	Year	Pumpage	Year	Pumpage
1979	607	1987	735	1995	782
1980	607	1988	751	1996	810
1981	624	1989	774	1997	799
1982	614	1990	676	1998	832
1983	604	1991	728	1999	841
1984	639	1992	770	2000	874
1985	674	1993	782		
1986	686	1994	780		

Source: http://www.sfwmd.gov/org/pld/hsm/pubs/memo/sfwmm2000_pws1996-2000.pdf

Comparison of Public Water Supply Wellfield Distributions



How Utility ASR Was Modeled



Fortran Code Used to Change Well File to Account for ASR

```
          program asr
*****
* program to change well file to account for ASR
* for the restudy w/o project only has ASR
* for WASA at 150 MGD
**
          real ja,fe,ma,ap,my,ju,jy,au,se,oc,no,de
          real total,well,asr
          character*10 permit,pws
          integer i1,i2,i3
          open(15,file='welldat.2050')
          open(20,file='welldat.asr')
          read(15,'(i4)') i1
          write(20,'(i4)') i1
************
* for different scenerio's
***********
       write(*,*) 'enter 1 for Restudy Plan A or B '
       write(*,*) 'enter 2 for Restudy Plan C or D '
       write(*,*) 'enter 3 for LEC 2020 base '
       write(*,*) 'enter 4 for LEC alt 1 '
       read (*,*) ans
       if (ans .eq. 1 ) then
       well=0.70
       asr=0.30
       endif
       if (ans .eq. 2) then
       well=0.68
       asr=0.32
       endif
       if (ans .eq. 3) then
       well=0.72
       asr=0.28
       endif
```

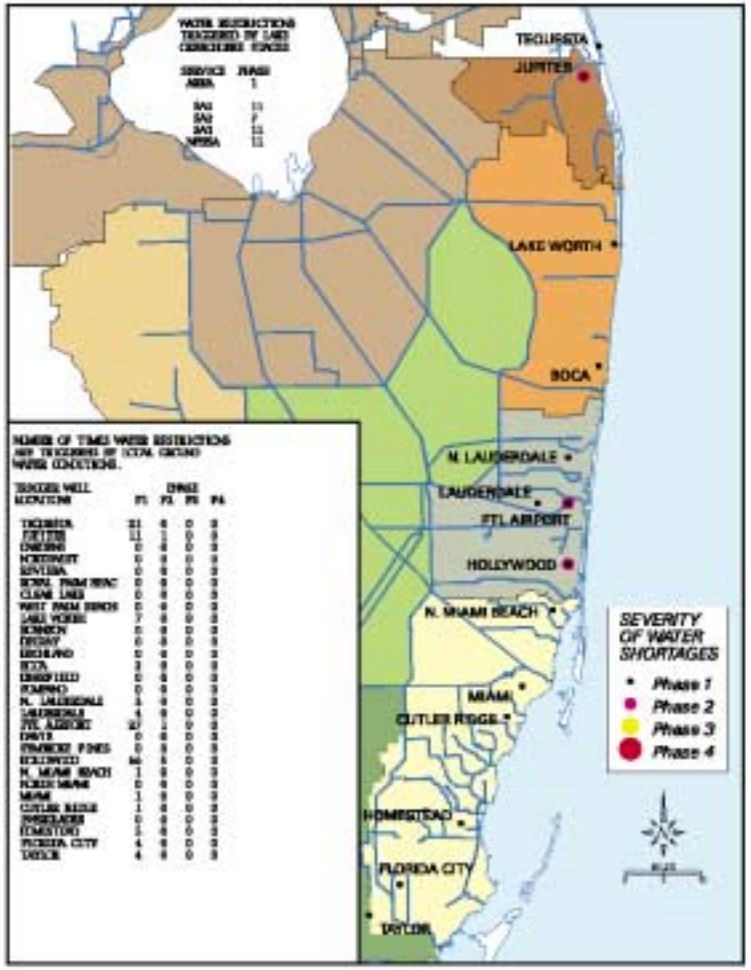
Fortran Code Used to Change Well File to Account for ASR (cont.)

```
      if (ans .eq. 4) then
      well=0.87
      asr=0.13
      endif



         do 100 i = 1,5000
         read(15,'(a9,i3,i4,i7,12f7.3,a5)',end=200) permit,i1,i2,i3,
     + ja,fe,ma,ap,my,ju,jy,au,se,oc,no,de,pws
*  percent met from wellfield and asr
      if (permit .eq. '13-00017-') goto 22
      if (permit .eq. '13-00037-') goto 22
      if (permit .eq. '13-00040-') goto 22
         write(20,'(a9,i3,i4,i7,12f7.3,a5)') permit,i1,i2,i3,
     + ja,fe,ma,ap,my,ju,jy,au,se,oc,no,de,pws
           goto 100
22     continue
** calculate remainder of demand met from asr during asr period
      total=(ja*asr)+(fe*asr)+(ma*asr)+(ap*asr)+(my*asr)
** assume an asr loss componant
      total = total * 1.10
** equally inject during wet period
      total = total / 7
** adjust monthly withdrawals
      ja=ja*well
      fe=fe*well
      ma=ma*well
      ap=ap*well
      my=my*well
      ju=ju+total
      jy=jy+total
      au=au+total
      se=se+total
      oc=oc+total
      no=no+total
      de=de+total
```

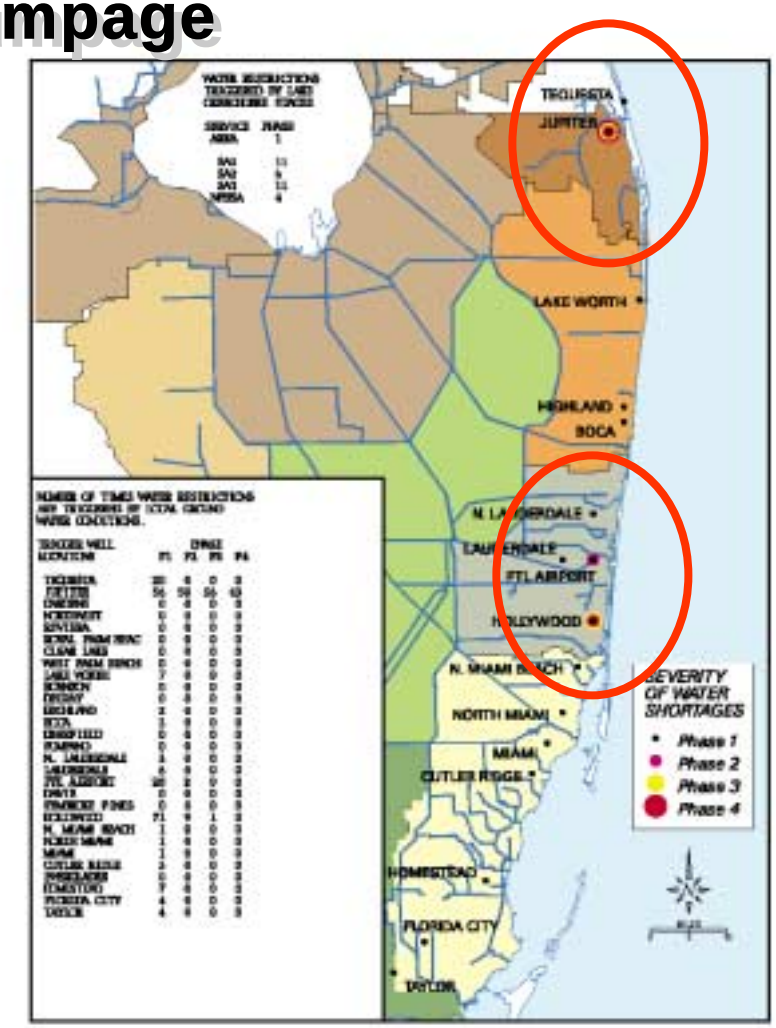
Fortran Code Used to Change Well File to Account for ASR (cont.)

```
            write(20,'(a9,i3,i4,i7,12f7.3,a5)') permit,i1,i2,i3,
     + ja,fe,ma,ap,my,ju,jy,au,se,oc,no,de,pws
100     continue
200     continue
        stop
        end
```

Comparison of System Response to Actual Versus Permitted Pumpage



Frequency & Severity of Water Restriction Triggers for
'v3.7 - P2000'



Frequency & Severity of Water Restriction Triggers for
'v3.7 - PERM2 (Derived from P2000)'

Thank You !