

TECHNICAL PUBLICATION SJ 86-1
ANNUAL REPORT OF HYDROLOGIC CONDITIONS
1984 WATER YEAR

By

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INTRODUCTION

The Water Resources Department of the St. Johns River Water Management District has prepared this annual report for the water year 1984 (October 1983 through September 1984). This report is directed toward state, regional and local governmental units, planning agencies, agricultural and business concerns, and interested members of the public; and is intended to provide information on hydrologic conditions in the District.

The report is divided into two sections. The first section deals with the status of the resource: 1. Rainfall, 2. Floridan aquifer, 3. Surface Water, and 4. Water Use data. The second section, the Appendices, contains rainfall statistics for 1951 to 1980 (the period used for calculating normal rainfall) and for the available period of record, and a list of current technical reports and papers available through the Department.

STATUS OF THE RESOURCE

RAINFALL

Precipitation in the St. Johns River Water Management District occurs primarily as rainfall. The isohyetal map of the normal rainfall which is the annual mean for the period 1951-1980 is shown in Figure 1.

The annual rainfall variation in the District for the water year 1984 is shown in Figure 2. Rainfall within the District during the 1984 water year ranged from a low of 38.57 inches at structure S-157 on Canal C-54, seventeen miles south of Melbourne in South Brevard County, to a high of 78.90 inches at Orange City in Southwest Volusia County. Average rainfall for the 1984 water year calculated using the isohyetal map (Figure 2) was about 60.0 inches as compared to a District mean of 52.0 inches (based on Figure 1) for the period of 1951-1980. The rainfall was above normal for three consecutive years since the 1981 drought, the mean rainfall for 1982 and 1983 being 62 and 55 inches, respectively.

The departure from the normal rainfall for the 1984 water year is illustrated on Figure 3. Rainfall was above normal throughout most of the District. Portions of Alachua, Marion, Lake, Brevard, Osceola, and Indian River counties received below normal. Several areas received rainfall of 15 to 20 inches above normal. In summary, rainfall for most of the District during the 1984 water year was greater than the average of 1951 - 1980, which is the current normal.

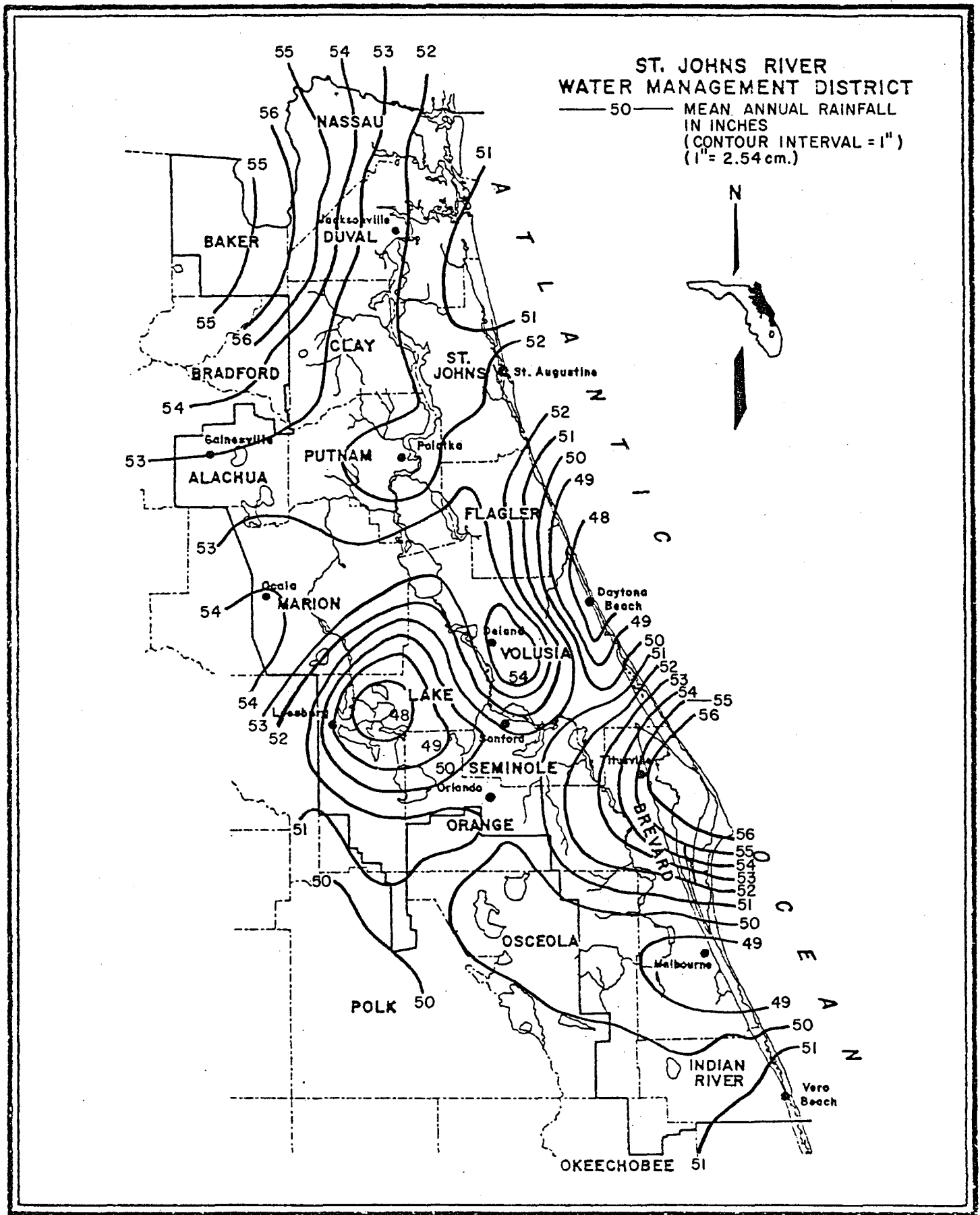


Figure 1. Mean Annual Rainfall in the SJRWMD, 1951-1980

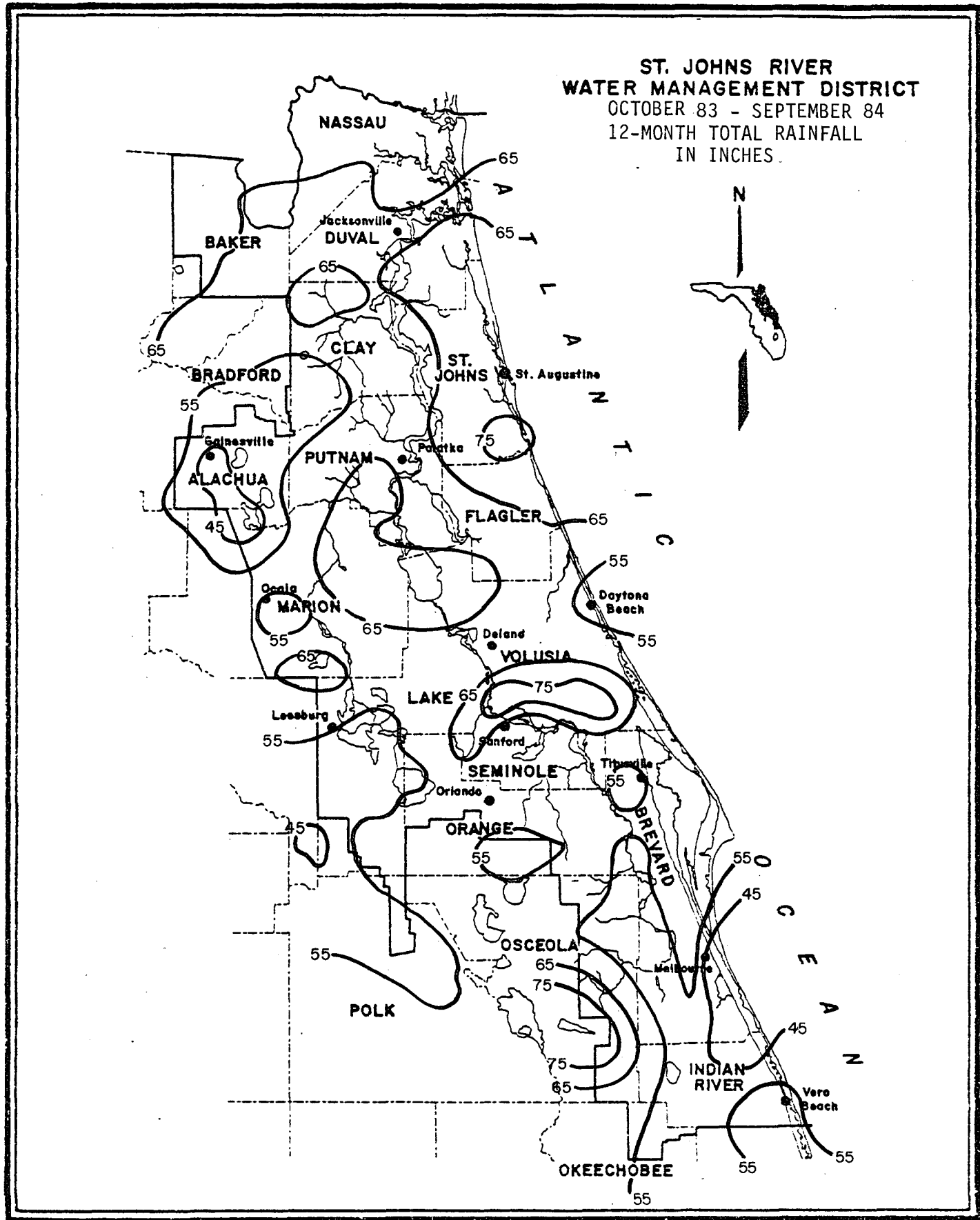


Figure 2. 1984 Rainfall in Inches: October 1983-September 1984

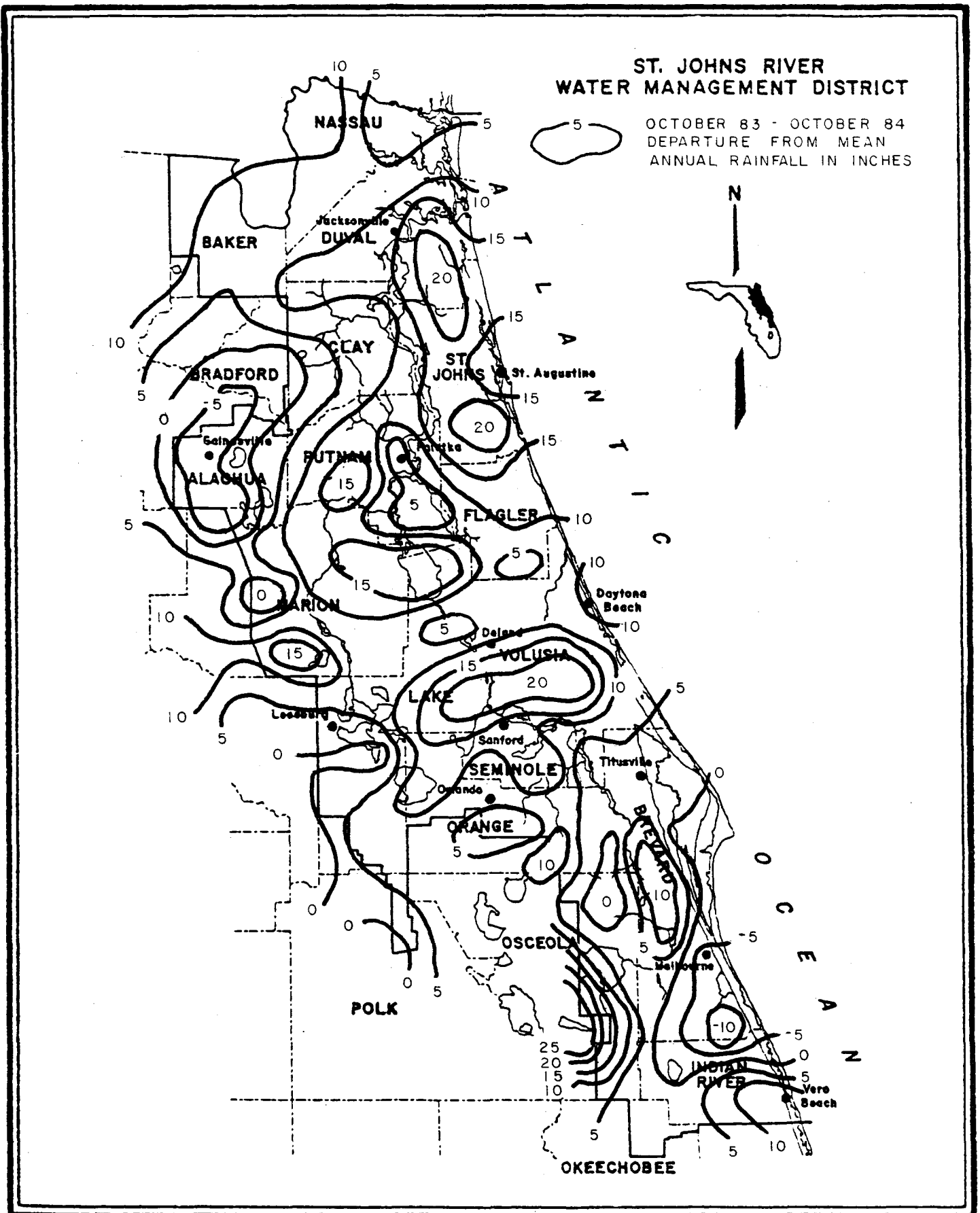


Figure 3. Departure from Mean Annual Rainfall in Inches (October 1983-September 1984)

FLORIDAN_AQUIFER

Figures 4 and 5 display the potentiometric surface of the Floridan aquifer during May and September 1984, respectively. The change in potentiometric water levels between the normal seasonal low in May and the seasonal high in September is shown in Figure 6. While most areas of the District experienced a rise in potentiometric levels between May and September, the levels in the western portions of the District, Alachua, Baker, Bradford, Clay, Marion, Putnam, Western Duval, and Nassau counties dropped. The area of greatest rise in the Floridan potentiometric levels occurred in Indian River, central Orange, and western St. Johns counties. Table 1 summarizes the monthly and annual changes in the Floridan potentiometric levels for selected observation wells throughout the District.

Figure 7 shows the locations of four long-term monitor wells in the District. The Alamana well, V-0101 in Volusia County, showed little overall change in potentiometric levels during the 1984 water year (Figure 8). Potentiometric levels in Well D-0160, at Neptune Beach in Duval County, dropped approximately 4 feet from February 1984 through September 1984. However, overall levels from September 1983 to September 1984 remained nearly constant with only a 0.40 foot rise. In the Brooklyn well, C-0120 at Keystone Heights in Clay County, the potentiometric level dropped nearly 0.8 foot from September 1983 to September 1984. The Platt well, BR-0645 near Melbourne in Brevard County, also had decreasing potentiometric levels during Water Year 1984.

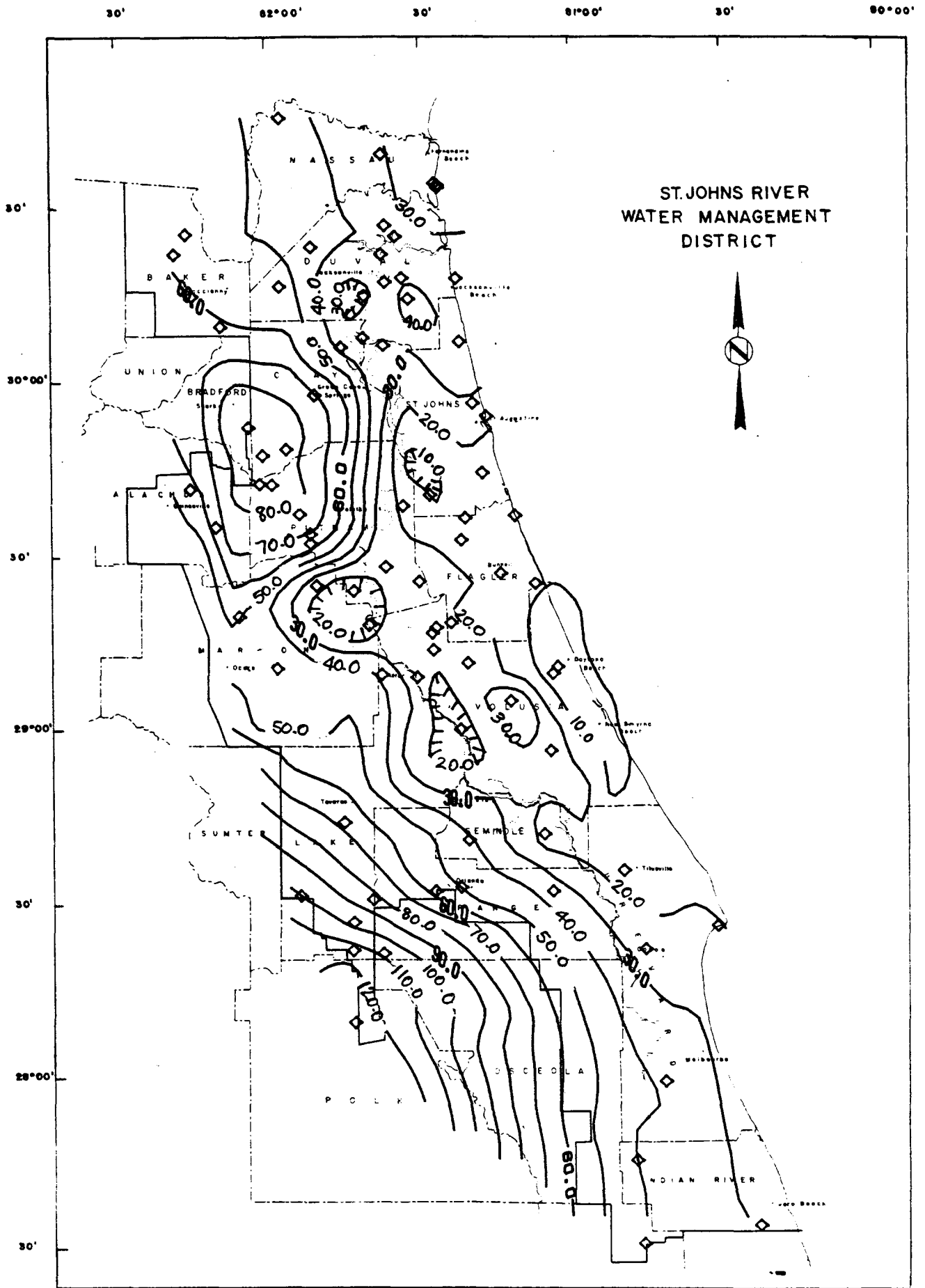


Figure 4. Potentiometric Level of the Floridan Aquifer, May 1984

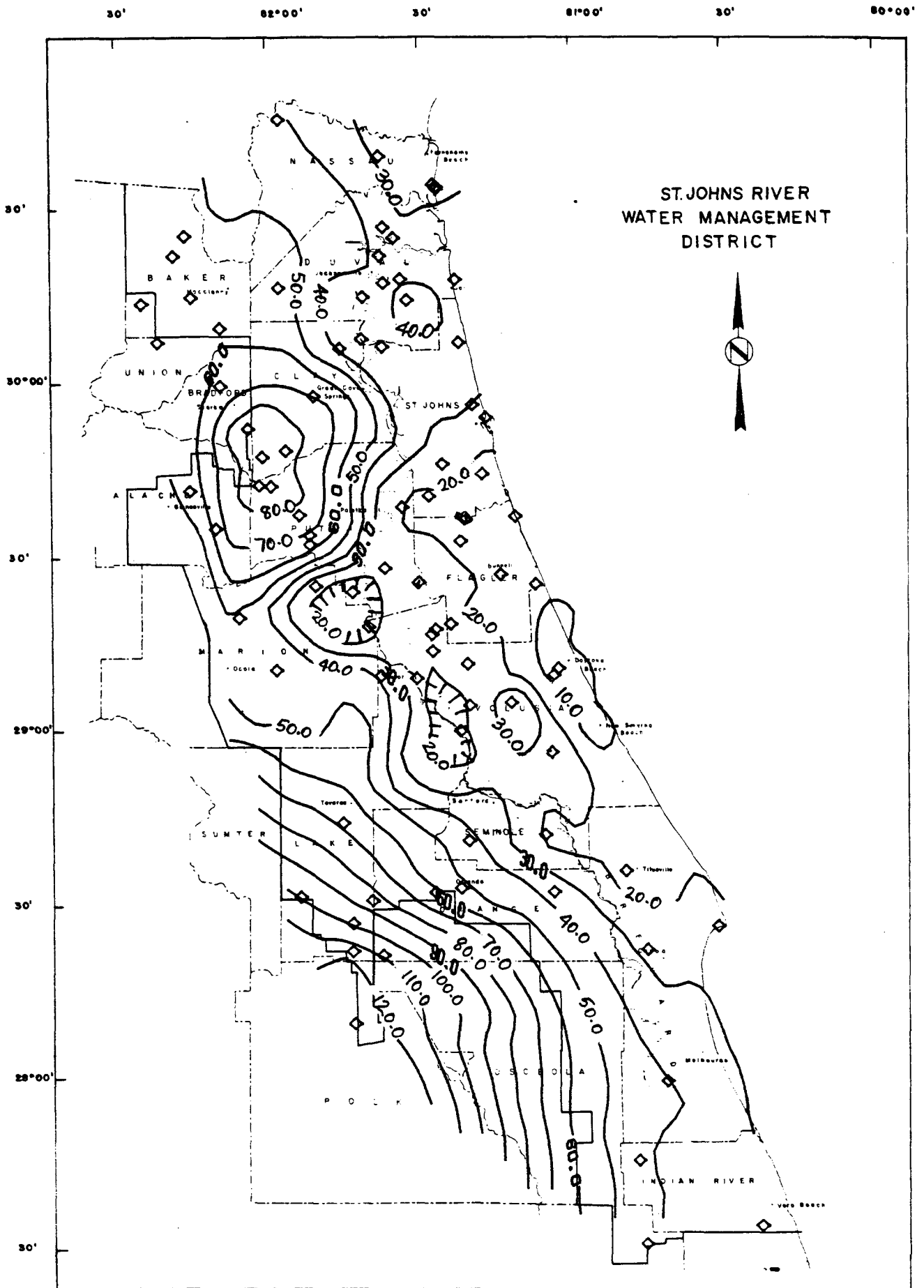


Figure 5. Potentiometric Level of the Floridan Aquifer, September 1984

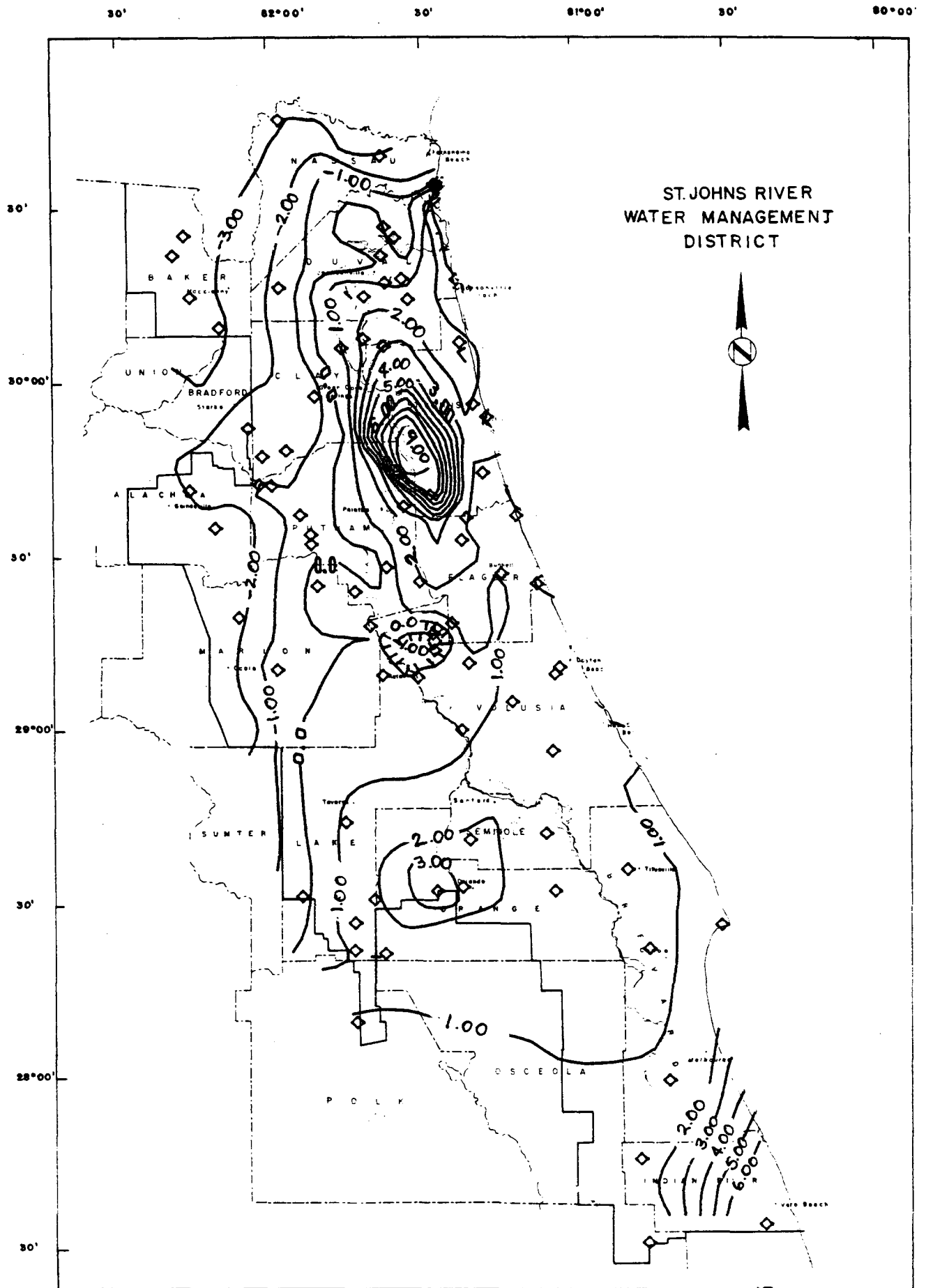


Figure 6. Change in the Potentiometric Surface of the Floridan Aquifer, May 1984-September 1984

TABLE 1 : FLORIDAN POTENTIOMETRIC SUMMARY - SEPTEMBER 1984

COUNTY	BY	WELL DESCRIPTION	LOWEST LEVEL		HIGHEST LEVEL		12 MONTH AVERAGE	CURRENT LEVEL	MONTHLY CHANGE	YEARLY CHANGE
			LAST 12 MONTH M S L	DATE	LAST 12 MONTH M S L	DATE				
ALACHUA	USGS	A-1 SPERRY RAND	54.24	SEP 1984	58.09	JAN 1984	56.07	54.24	-0.10	-1.03
	SJR	OWENS-ILLINOIS #1	71.71	SEP 1984	75.22	MAR 1984	74.18	71.71	-2.55	-2.93
BAKER	USGS	BA-9 TAYLOR	52.75	OCT 1983	57.14	MAR 1984	54.56	53.27	N/D	0.32
	USGS	BA-11 SANDERSON	55.75	OCT 1983	61.26	APR 1984	57.44	56.16	N/D	0.35
	SMR	BA-15 OCEAN POND	57.12	OCT 1983	66.15	APR 1984	59.99	58.00	-0.86	N/D
	USGS	ONF # 6 FLORIDIAN	53.12	AUG 1984	59.73	APR 1984	55.05	53.73	0.61	0.33
	SJR	BA-19 MANNING	55.38	OCT 1983	62.66	APR 1984	59.30	58.46	-0.13	0.55
BRADFORD	SMR	B-10 RAIFORD	60.14	DEC 1983	63.71	APR 1984	61.54	61.82	-0.29	N/D
	SJR	B-11 STARKE WELL	86.07	SEP 1984	88.50	APR 1984	87.13	86.07	-0.23	N/D
BREVARD	USGS	BR-1 TITUSVILLE	15.17	JUN 1984	19.37	AUG 1984	16.60	16.74	-2.63	-0.02
	SJR	CAPE CANAVERAL AFB	19.80	JUN 1984	23.00	SEP 1984	21.37	23.00	2.50	N/D
	SJR	BR-202 COCOA RECORD	26.48	MAY 1984	29.05	JAN 1984	28.12	28.35	0.23	-0.02
	SJR	PLATT NR MELBOURNE	38.33	MAY 1984	42.53	FEB 1984	41.41	40.53	-1.90	-1.60
CLAY	USGS	C-7 DOCTOR'S INLET	29.60	JUL 1984	35.00	JAN 1984	32.36	31.00	0.60	0.10
	SJR	C-9 MELROSE	87.38	SEP 1984	88.62	APR 1984	88.01	87.38	-0.23	N/D
	SJR	ST MARYS-KRAFT #2	70.96	SEP 1984	72.30	MAY 1984	71.79	70.96	-1.23	N/D
	SJR	GOLD HEAD ST PK #10	81.65	SEP 1984	83.43	MAR 1984	82.66	81.65	-0.58	-1.33
	USGS	C-94 NR MIDDLEBURG	37.18	JUN 1984	40.95	DEC 1983	39.34	38.63	0.83	0.74
	SJR	C-120 BROOKLYN LK	85.12	SEP 1984	86.91	APR 1984	86.05	85.12	-0.35	-0.78
DUVAL	USGS	D-94 ARLINGTON	31.99	MAY 1984	35.99	JAN 1984	33.73	32.59	0.50	-0.60
	USGS	D-129 ORTEGA AREA	25.63	MAY 1984	32.73	APR 1984	29.84	27.83	-0.02	-0.70
	USGS	D-145 OCEAN WAY	36.79	MAY 1984	40.19	JAN 1984	38.31	37.29	-0.40	-0.03
	USGS	D-160 NEPTUNE BEACH	30.15	MAY 1984	36.15	MAR 1984	33.53	32.95	1.60	0.40
	USGS	D-254 SCL BALDWIN	53.34	SEP 1983	57.06	APR 1984	54.50	53.79	0.25	0.45
	USGS	D-262 EASTPORT	35.82	SEP 1984	40.82	MAR 1984	38.13	35.82	N/D	-2.27
	USGS	D-291 HUMPHRIES	45.18	MAY 1984	48.81	FEB 1984	47.29	46.62	0.65	-0.82
	USGS	D-348 MONTICELLO DR	36.83	AUG 1984	40.09	APR 1984	38.15	37.32	0.49	-0.26
	USGS	D-122A CITY OF JAX	38.57	AUG 1984	41.47	FEB 1984	39.97	39.37	0.80	-1.33
	USGS	D-425 TOP ZONE	34.95	AUG 1984	38.80	FEB 1984	36.88	36.50	1.55	-0.30
FLAGLER	SJR	USGS FLAG TRIB 14	13.75	MAY 1984	15.73	FEB 1984	14.72	14.68	0.30	N/D
	SJR	F-176 BLOWN RUINS CF	8.39	MAY 1984	11.09	JAN 1984	10.01	9.96	0.61	0.25
	SJR	WASH OAKS SP CF	13.59	MAY 1984	15.54	FEB 1984	14.80	15.09	0.25	0.43
	SJR	F-204 DINNER ISL CF	14.48	MAY 1984	17.79	FEB 1984	16.66	17.44	1.18	0.88
INDIAN RIVER	USGS	IR-189 USGS	40.06	MAY 1984	43.47	SEP 1983	41.89	42.66	0.70	-0.81
	SJR	IR-312 NR OSLO	28.63	MAY 1984	38.54	NOV 1983	35.33	37.13	1.00	6.63
LAKE	SJR	LK YALE GROVES	66.90	JUN 1984	68.85	SEP 1984	67.79	68.85	N/D	N/D

TABLE 1 (Continued)

COUNTY	BY	WELL DESCRIPTION	LOWEST LEVEL		HIGHEST LEVEL		12 MONTH AVERAGE	CURRENT LEVEL	MONTHLY CHANGE	YEARLY CHANGE
			LAST 12 MONTH M S L DATE	LAST 12 MONTH M S L DATE	LAST 12 MONTH M S L DATE	LAST 12 MONTH M S L DATE				
LAKE	SJR	L-45 AT ASTOR	14.06	JUN 1984	15.24	SEP 1984	14.73	15.24	0.04	N/D
	SJR	L-51 SAND MINE CF	115.46	MAY 1984	117.44	OCT 1983	116.39	116.52	-0.03	N/D
	SJR	L-52 JOHNS LAKE	83.04	MAY 1984	85.28	AUG 1984	84.01	84.98	-0.30	N/D
	SJR	L-53 LK LOUISA ST PK	97.41	MAY 1984	99.88	AUG 1984	98.25	99.09	-0.79	N/D
	SJR	NFS - CROWS BLUFF	16.89	JUN 1984	18.46	JAN 1984	17.85	17.93	0.12	N/D
	USGS	L-62 MASCOTTE DEEP	100.14	SEP 1984	101.46	DEC 1983	100.75	100.14	-1.01	-0.98
LEVY	USGS	ROMP 134 SHFWMD	53.24	MAY 1984	54.70	SEP 1983	53.80	53.45	-0.76	-1.25
MARION	SJR	M-14 SPARR USGS CE66	48.64	SEP 1984	52.32	MAR 1984	50.74	48.64	-0.63	-2.24
	SJR	M-21 NR SALT SPRINGS	16.09	MAR 1984	17.12	APR 1984	16.86	17.04	0.10	N/D
	SJR	M-23 USGS CE67	21.51	APR 1984	21.89	SEP 1984	21.63	21.89	N/D	N/D
	USGS	SHARPES FRY MARION 5	49.39	SEP 1984	50.74	SEP 1983	50.06	49.39	-0.36	-1.35
	SJR	M-49 RT 19 & 40	39.11	JUN 1984	40.32	DEC 1983	39.58	39.58	-0.01	-0.05
	USGS	ROMP 120 COTTON PL.	46.98	SEP 1984	49.31	OCT 1983	48.11	46.98	-1.02	N/D
NASSAU	USGS	N-2 AMELIA CITY	11.88	JUL 1984	15.81	SEP 1983	13.12	11.98	N/D	-3.83
	USGS	N-9 AMELIA CITY	24.37	JUN 1984	37.72	SEP 1983	29.37	28.37	3.10	-9.35
	USGS	N-46 AMELIA ISL CORP	23.90	AUG 1984	34.60	DEC 1983	28.79	28.85	4.95	N/D
	USGS	N-53 YULEE	29.17	OCT 1983	32.32	FEB 1984	30.93	29.22	-1.85	-1.60
	USGS	WN-18 BOULOGNE	40.70	NOV 1983	44.55	MAY 1984	42.05	41.40	-0.80	-0.90
OKEECHOBEE	USGS	OK-1 FT DRUM	41.20	MAY 1984	43.92	MAR 1984	42.59	43.50	0.88	N/D
ORANGE	USGS	OR-7 BITHLO 1	34.91	JUN 1984	37.35	JAN 1984	36.50	36.67	0.13	0.00
	USGS	LAKE ADAIR 9	48.49	APR 1984	52.77	JUL 1984	51.39	52.63	0.86	1.24
	USGS	OR-47 ORLO VISTA CF	57.51	APR 1984	62.01	AUG 1984	60.26	61.51	-0.50	0.58
	USGS	LAKE OLIVER	109.01	MAY 1984	110.90	JUL 1984	109.78	110.05	-0.45	0.00
OSCEOLA	USGS	USGS LAKE JOEL	42.83	MAY 1984	46.13	JAN 1984	44.99	45.30	0.31	0.08
POLK	USGS	LAKE ALFRED DEEP	126.01	DEC 1983	129.48	FEB 1984	128.28	128.62	-0.43	-0.02
PUTNAM	SJR	P-1 SWAN LK DRAINAGE	85.85	JAN 1984	88.44	APR 1984	87.58	87.08	-0.26	-0.60
	SJR	KELLER # 1	74.09	NOV 1983	77.62	MAR 1984	75.72	76.67	0.95	0.23
	SJR	DEEP CK HWY 315	68.30	AUG 1984	69.81	SEP 1983	69.06	68.68	0.38	-1.13
	SJR	P-172 ORANGE MILLS	12.00	APR 1984	21.24	JAN 1984	19.40	20.06	0.51	-0.41
	SJR	GAUTIER LK STELLA	29.71	MAY 1984	31.84	SEP 1984	30.78	31.84	N/D	N/D
	SJR	P-306 NR KENWOOD	61.60	JUL 1984	62.75	APR 1984	62.39	62.29	-0.03	-0.06
	SJR	P-408 FRUITLAND CF	19.89	DEC 1983	21.05	APR 1984	20.54	20.56	-0.06	0.45
	SJR	P-427 NR FRONTIER	11.58	DEC 1983	12.00	APR 1984	11.72	11.92	0.13	0.30
ST. JOHNS	USGS	SJ-5 PALM VALLEY	34.83	JUN 1984	38.63	FEB 1984	36.84	36.03	0.90	0.03
	SJR	SJ-115 USGS-DOT	15.29	APR 1984	21.53	SEP 1984	18.87	21.53	0.45	3.81

TABLE 1 (Continued)

COUNTY	BY	WELL DESCRIPTION	LOWEST LEVEL		HIGHEST LEVEL		12 MONTH	CURRENT	MONTHLY	YEARLY
			LAST 12 MONTH	LAST 12 MONTH	LAST 12 MONTH	AVERAGE	LEVEL	CHANGE	CHANGE	
			M S L	DATE	M S L	DATE	M S L	M S L	FEET	FEET
ST. JOHNS	SJR	SJ-263 D. REID	7.80	MAY 1984	17.57	SEP 1984	13.32	17.57	2.98	N/D
	SJR	SJ-317 SIKES WELL	24.04	JUN 1984	26.86	JAN 1984	25.58	26.31	1.17	N/D
	USGS	ST AUG. AP. GS SJ-89	29.50	MAY 1984	34.00	NOV 1983	31.99	31.10	N/D	-1.10
	USGS	MANCY USGS SJ-91	21.20	MAY 1984	26.60	OCT 1983	24.14	24.70	0.83	0.80
	USGS	SJ-15 MANDARIN	31.70	MAY 1984	37.60	JAN 1984	35.39	34.70	0.60	0.90
	SJR	SJ-516 DUPONT CTR CF	15.22	MAY 1984	17.50	JAN 1984	16.25	15.00	-0.05	N/D
SEMINOLE	USGS	S-1 GENEVA CF	17.18	MAY 1984	18.81	JAN 1984	18.30	18.69	0.54	0.35
	USGS	S-125 LONGWOOD	40.19	APR 1984	43.83	FEB 1984	42.86	43.79	1.05	0.29
SUMTER	USGS	SU#013 NR WILDWOOD	42.91	SEP 1984	45.13	JUL 1984	43.90	42.91	-0.90	-0.62
UNION	SMR	U-1 LAKE BUTLER	58.28	SEP 1984	63.35	APR 1984	59.72	58.28	-0.46	N/D
VOLUSIA	SJR	V-62 BARBARVILLE CF	24.04	DEC 1983	26.37	FEB 1984	25.76	26.06	0.10	N/D
	SJR	V-64 COWARTS ROAD	22.82	DEC 1983	28.18	APR 1984	25.84	25.10	-0.25	-0.97
	SJR	V-66 PIERSON IRON CF	16.95	DEC 1983	26.11	JUL 1984	24.64	23.48	-1.83	N/D
	USGS	USGS 04 NR DELAND	36.40	JUN 1984	38.01	AUG 1984	37.40	37.65	-0.36	0.20
	SJR	J C MEM AT SEVILLE	22.30	JUL 1984	24.70	MAR 1984	23.66	23.90	-0.30	N/D
	SJR	R NOLAN NR SEVILLE	19.07	MAY 1984	20.85	SEP 1984	20.14	20.85	0.40	N/D
	USGS	GE PLANT 6 DAYTONA	1.04	JUL 1984	6.73	NOV 1983	4.20	6.13	3.46	4.68
	USGS	I 95 AT DAYTONA	3.36	JUL 1984	8.52	NOV 1983	6.50	8.00	3.05	3.21
	USGS	V-101 ALAMANA	28.10	JUN 1984	30.76	DEC 1983	29.82	30.72	1.11	1.24
	SJR	V-156 GLENWOOD 4"	17.20	AUG 1984	18.16	SEP 1984	17.68	18.16	0.96	N/D

This report is compiled from several data sources. Sources other than the S.J.R.W.M.D. should be considered provisional and subject to change.

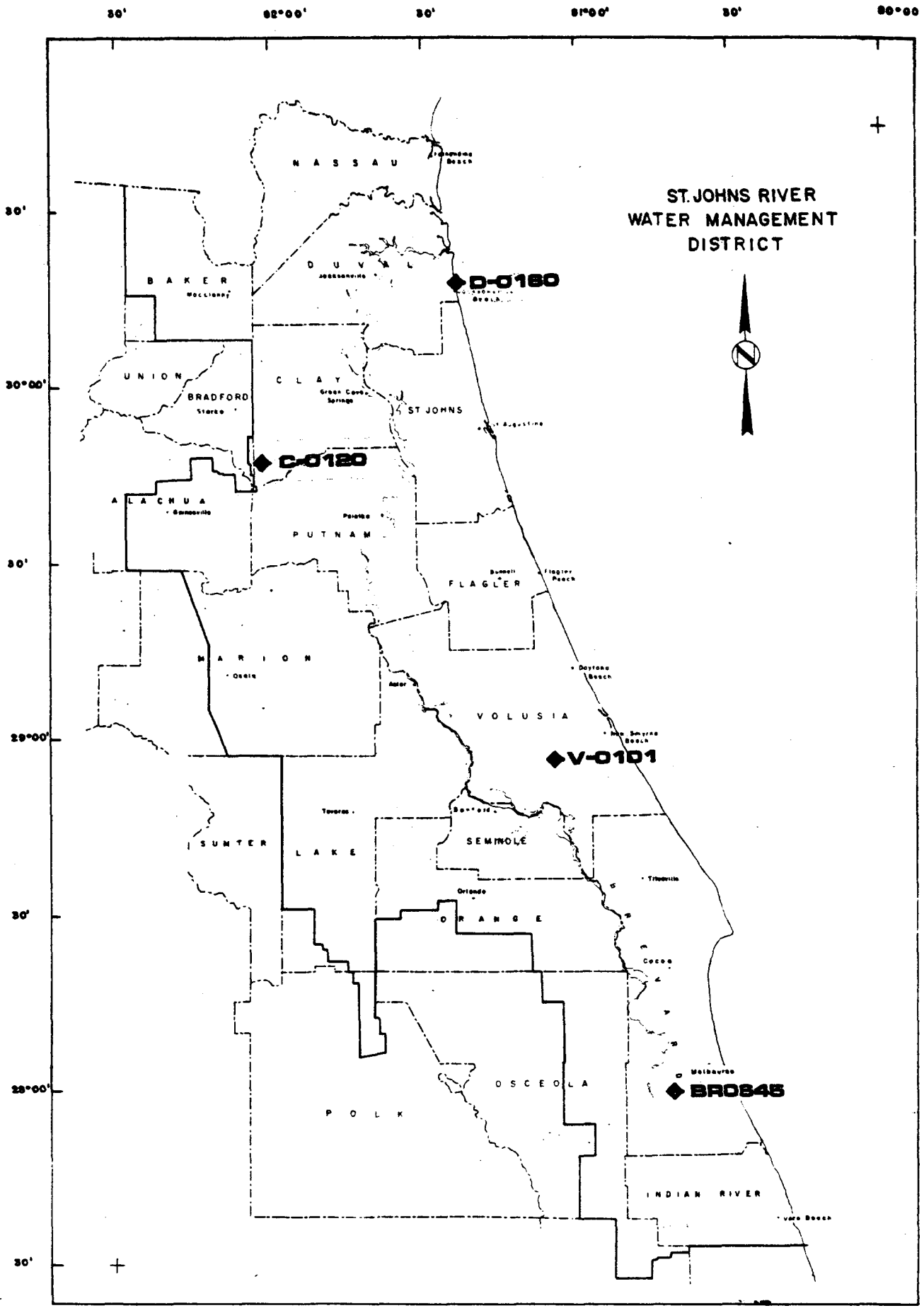


Figure 7. Long Term Monitor Well Location.

WATER LEVELS ABOVE MEAN SEA LEVEL

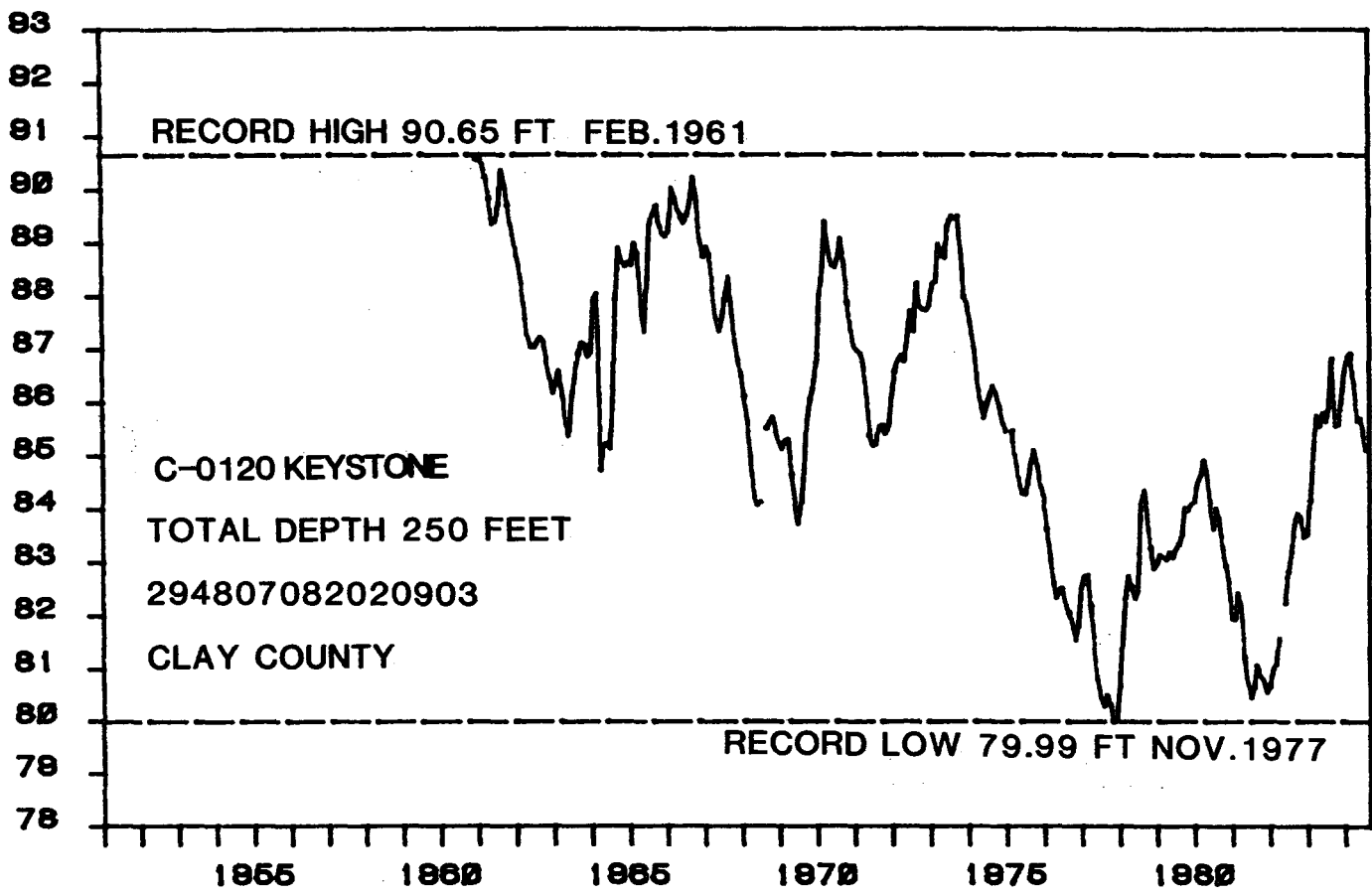
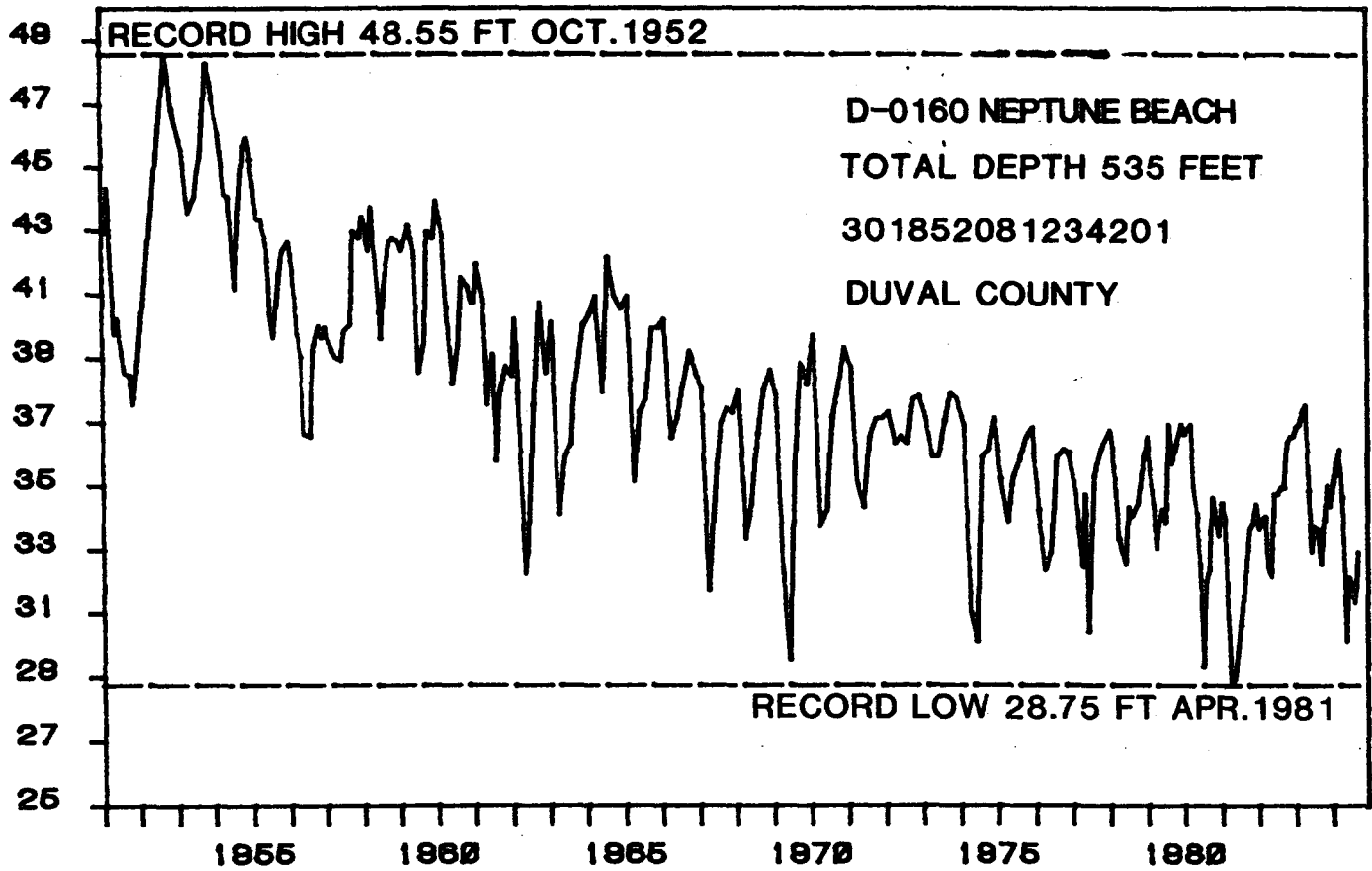


Figure 8. Hydrographs of Selected Wells in the SJRWMD.

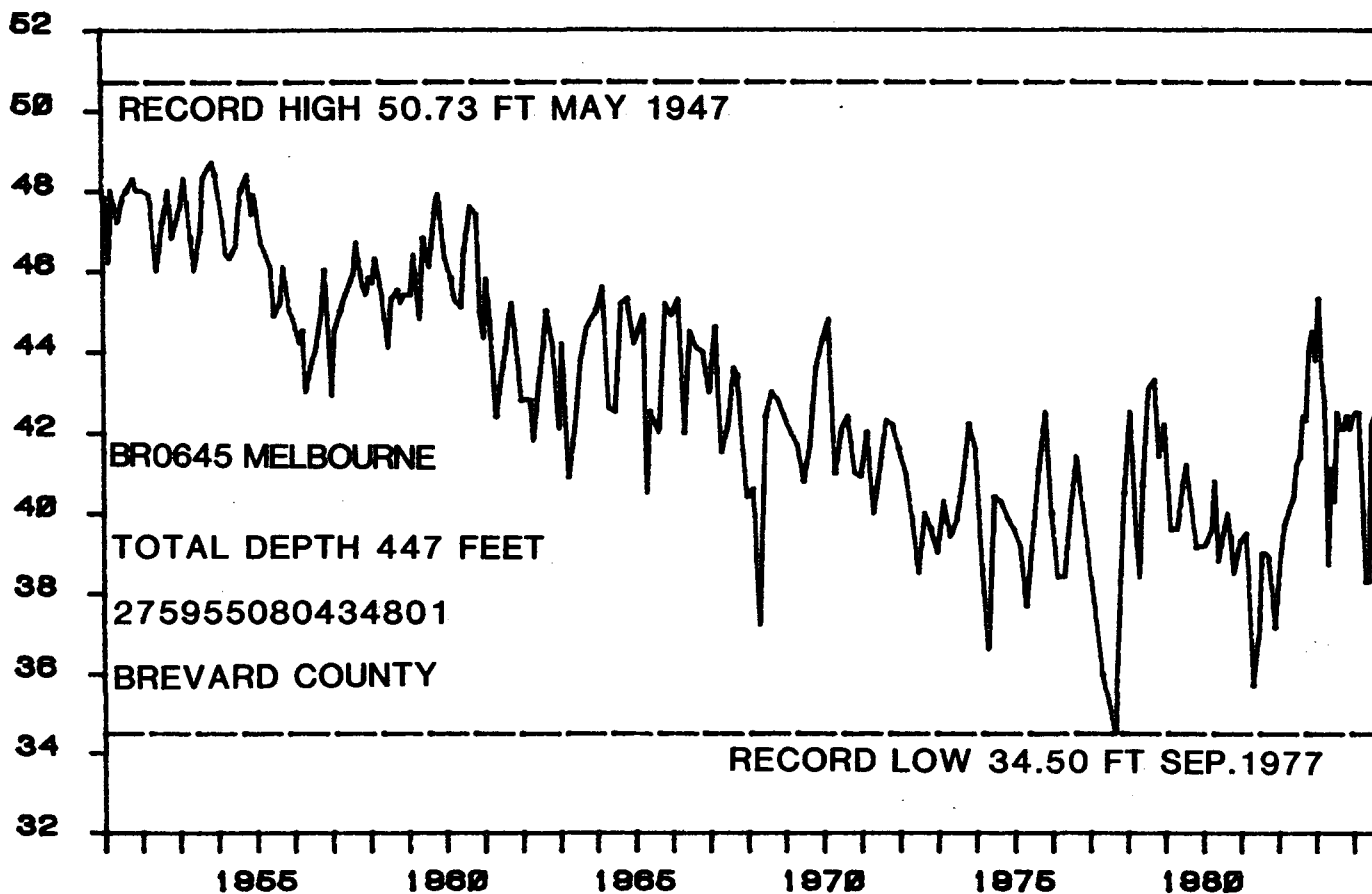
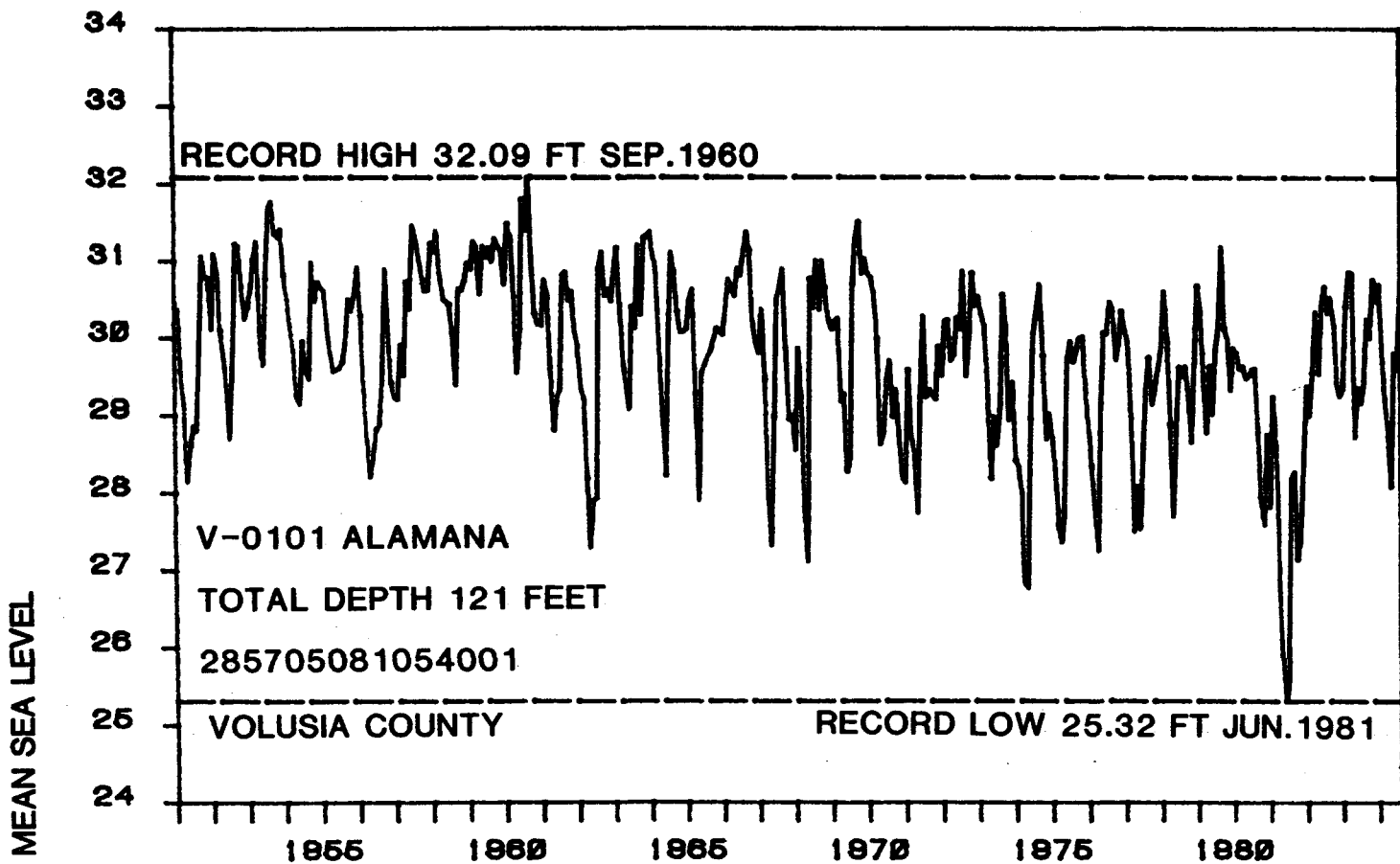


Figure 8. Continued.

At the end of the water year, potentiometric levels in the Platt well were approximately 1.6 feet lower in September of 1984 than in September of 1983.

The Keystone Heights and Alamana wells are located in recharge areas which are sparsely populated. Variations of water levels in these two wells are the result of differences in natural recharge and discharge. The overall decrease in potentiometric levels at the Keystone Heights well indicates greater discharge during the water year than recharge in the hydraulically connected areas down gradient in the Floridan aquifer. The overall increase in potentiometric levels at the Alamana well indicates greater recharge than discharge.

The Neptune Beach and Platt wells are located in areas of high demands on the Floridan aquifer. The fluctuations in water levels are directly affected by heavy ground water pumpage. The Neptune Beach well reflects heavy urban withdrawals. The Platt well reflects predominately agricultural demands.

The period of record trends of all 4 wells indicate slowly dropping potentiometric water levels. The potentiometric levels in the Platt well appears to have stabilized after 1981 or 1982.

SURFACE WATER

The streams and rivers of the St. Johns River Water Management District derive their flows from runoff of precipitation and from ground water discharge. Locations of stream or lake gaging stations used in the preparation of this report are shown in Figure 9.

Figures 10 through 19 present monthly streamflow data for water years 1982-1984 for selected gaging stations in the District. Figures 20 through 29 show monthly elevations for some principal lakes in the District. The median shown on these figures indicates the flow (or stage) value equaled or exceeded for 50 percent of time during the period of record. Overall rainfall was about 15 percent above normal for the District during the 1984 water year. In general, streamflow and lake elevations are above median for most of the months. However, because of relatively low rainfall conditions in the upper St. Johns River Basin in 1984, the mean annual discharges at different locations in this basin are below those of 1982/1983 (Figs. 11-13, 15, and 16). A drawdown program was conducted on Lake Griffin which is reflected by its 1984 elevations in Figure 28.

Table 2 presents the annual mean flow data for different tributaries in the lower St. Johns River Basin.

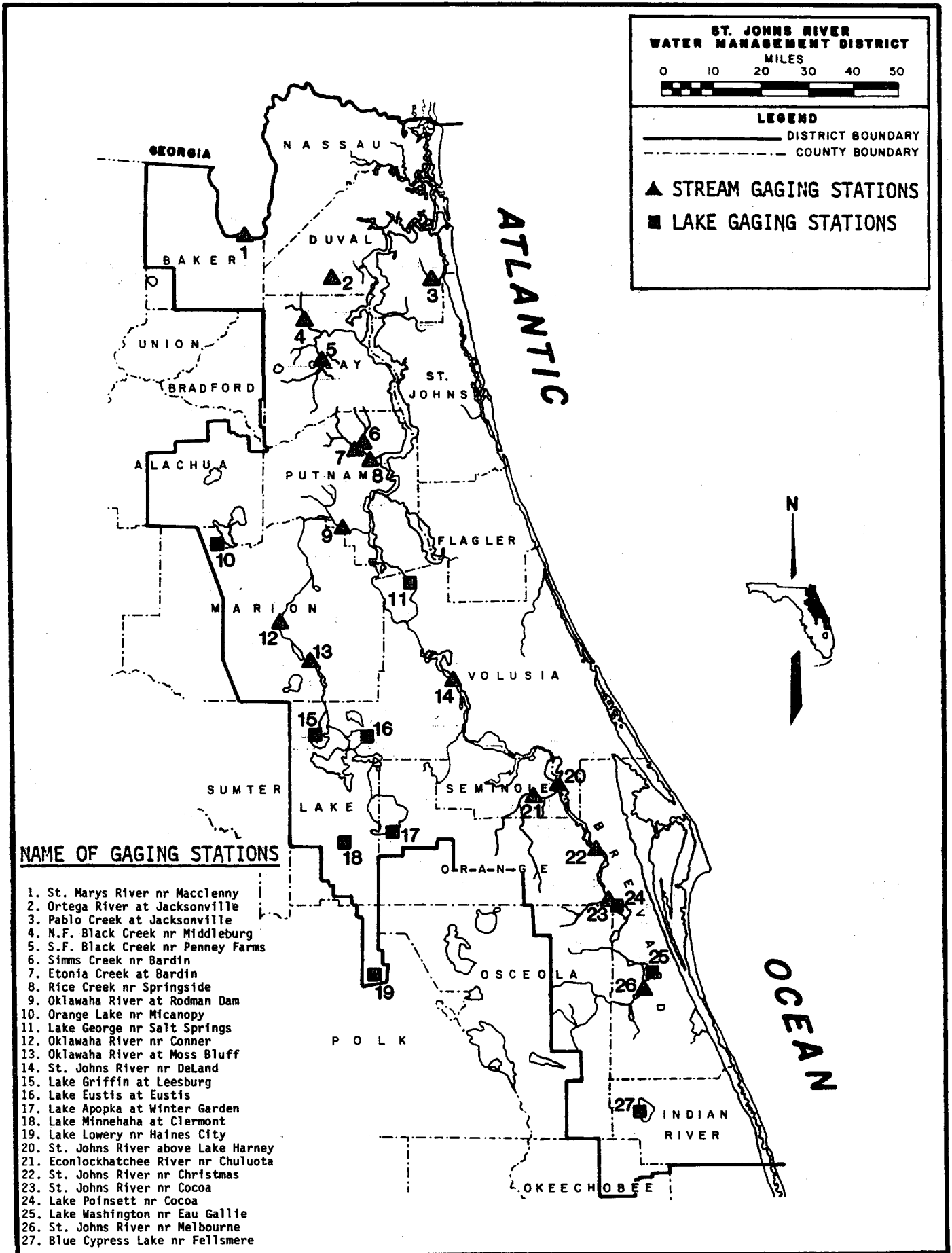


Figure 9. Location of Stream and Lake Gaging Stations Used in this Report.

Figure 10. STREAMFLOW - ST. MARYS RIVER NEAR MACCLENNY
WATER YEARS 1982-1984

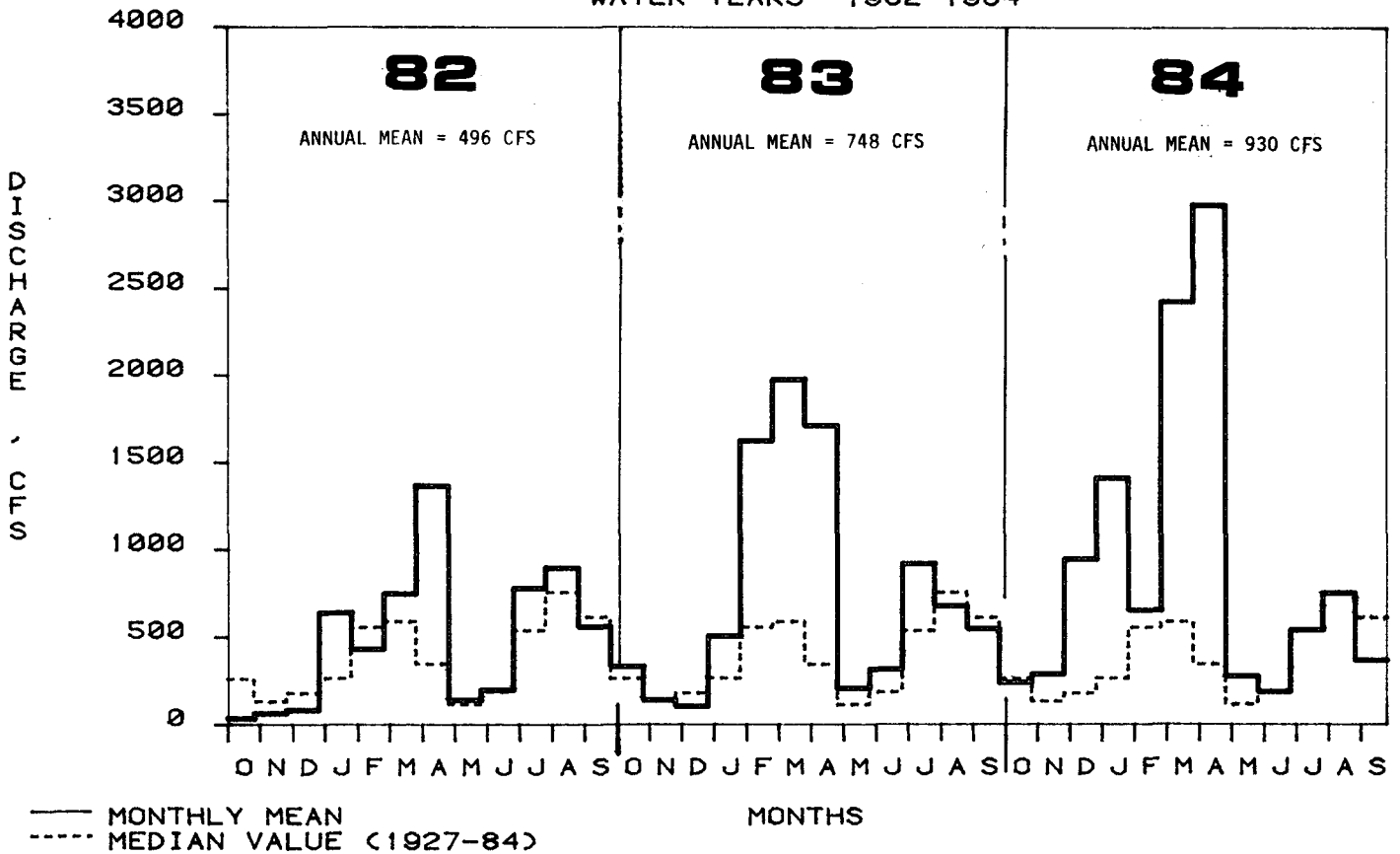


Figure 11. STREAMFLOW - ST. JOHNS RIVER NEAR MELBOURNE
WATER YEARS 1982-1984

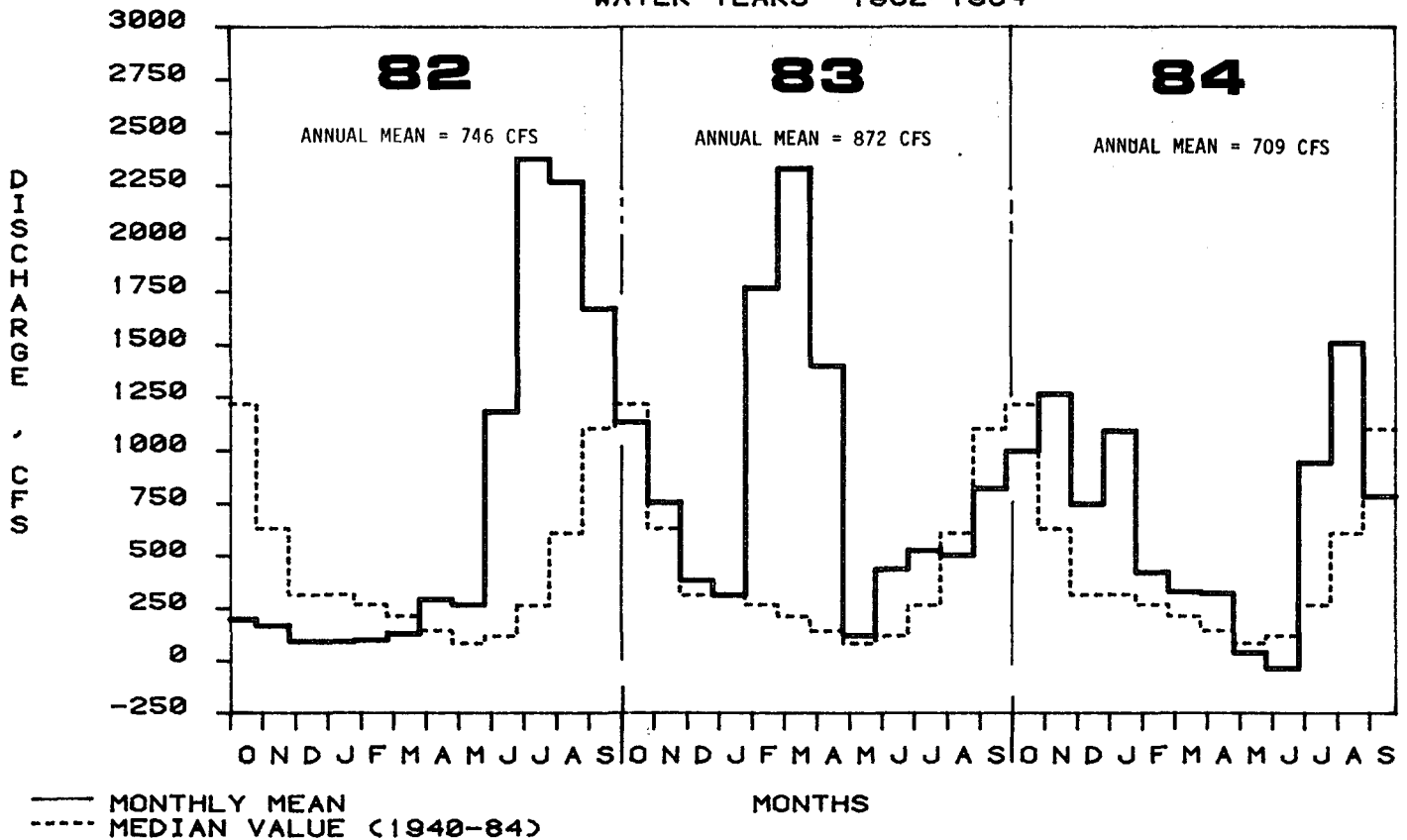


Figure 12. STREAMFLOW - ST. JOHNS RIVER NEAR COCOA
WATER YEARS 1982-1984

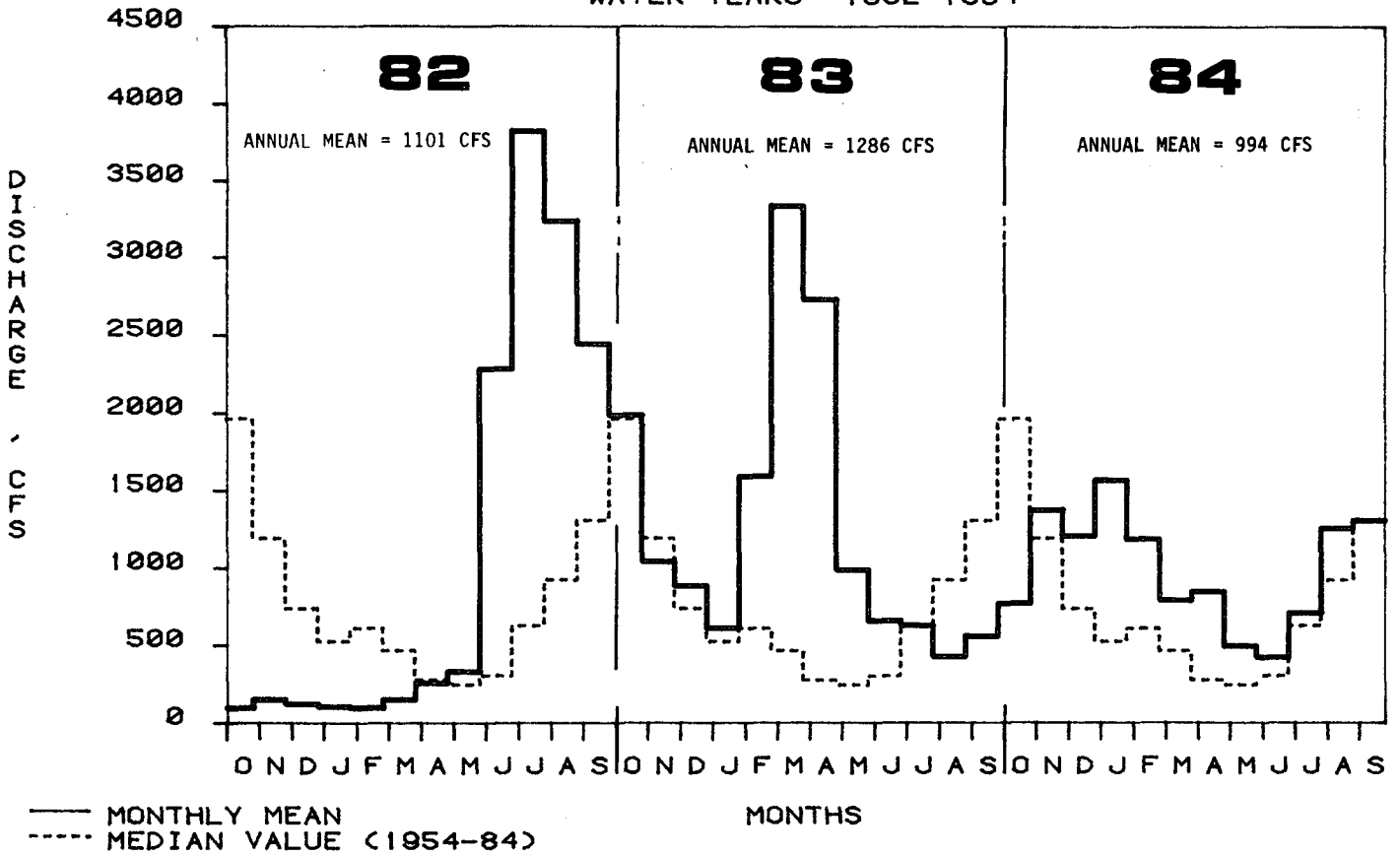


Figure 13. STREAMFLOW - ST. JOHNS RIVER NEAR CHRISTMAS
WATER YEARS 1982-1984

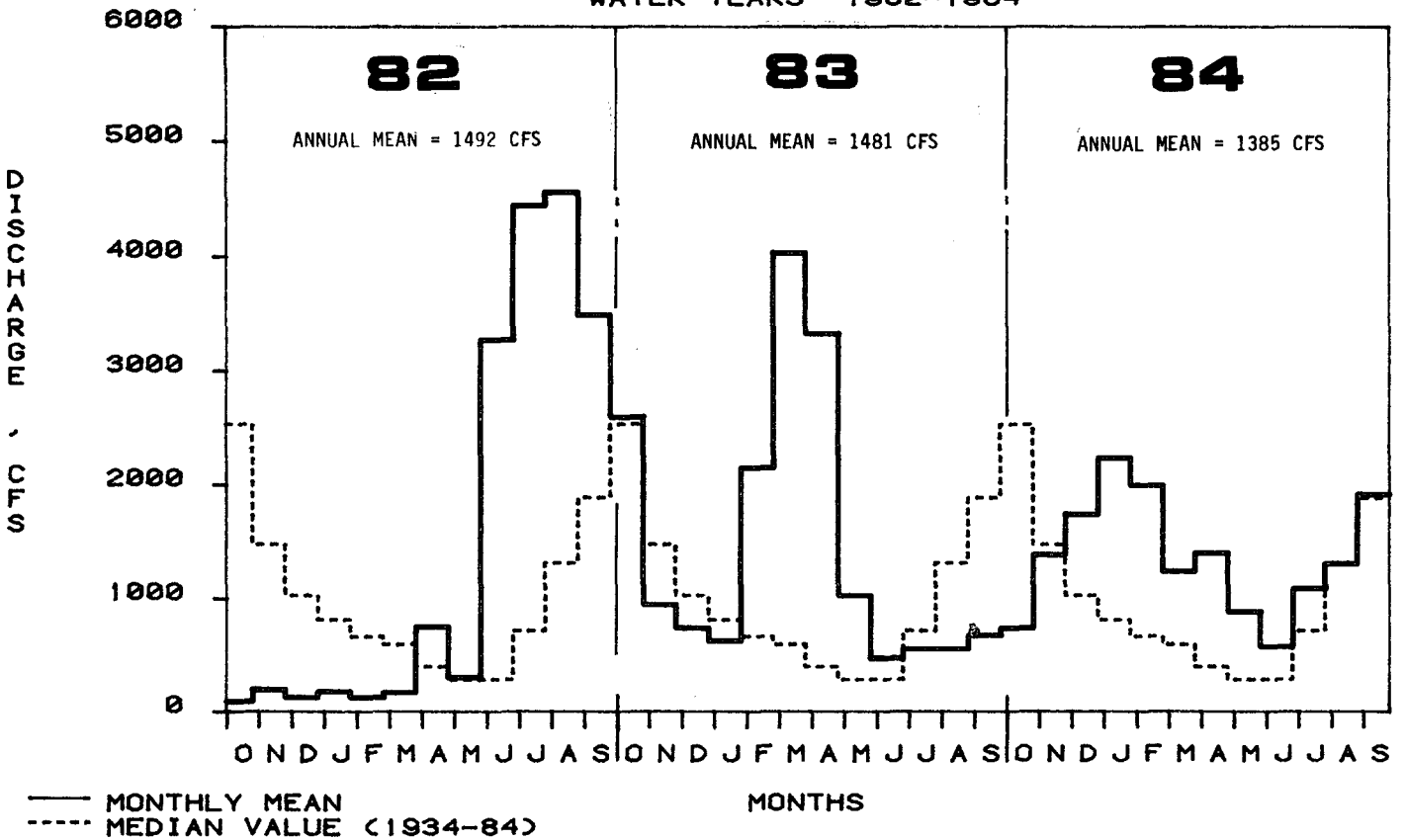


Figure 14. STREAMFLOW - ECONLOCKHATCHEE RIVER NEAR CHULUOTA
WATER YEARS 1982-1984

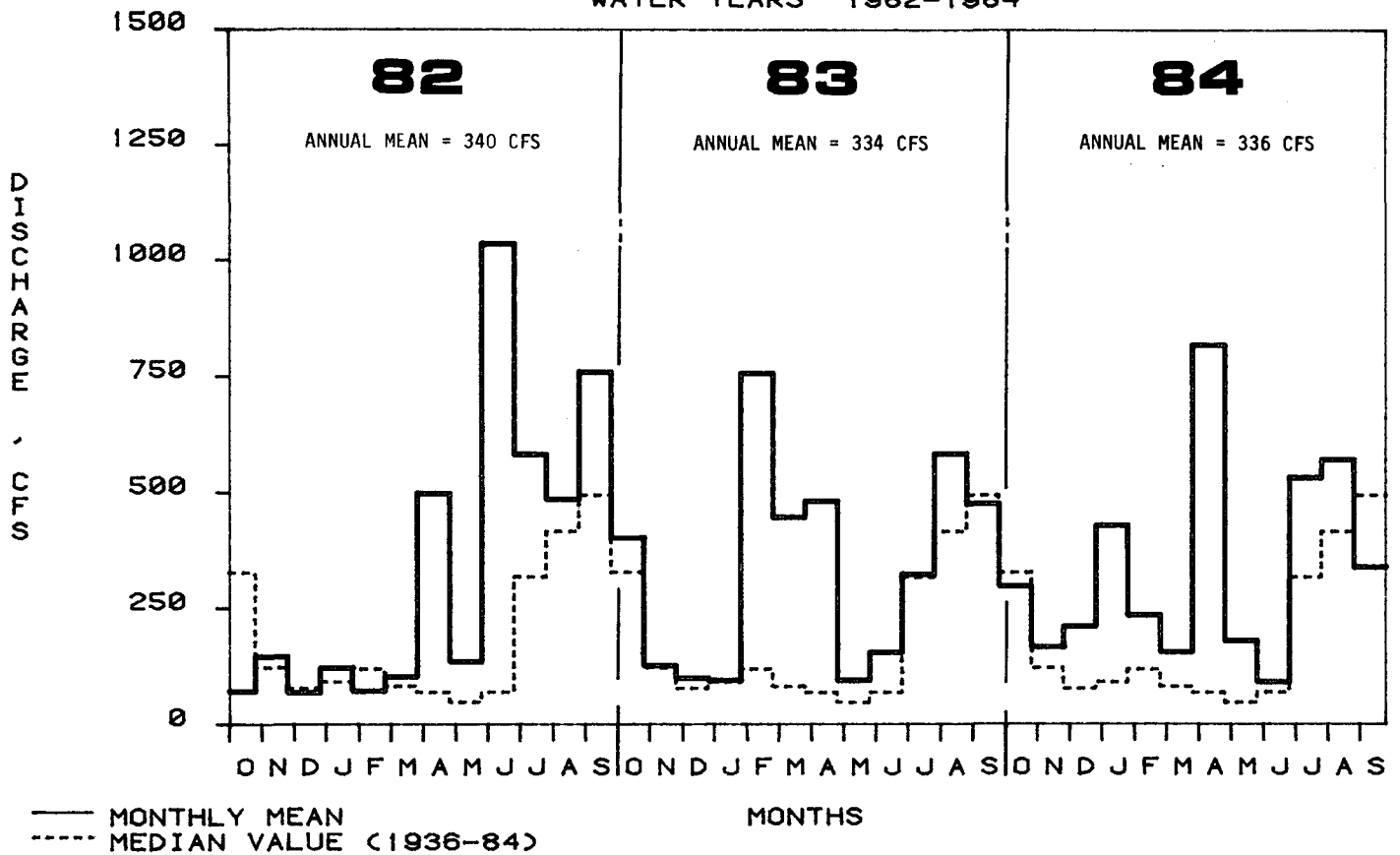


Figure 15. STREAMFLOW - ST. JOHNS RIVER ABOVE LAKE HARNEY
WATER YEARS 1982-1984

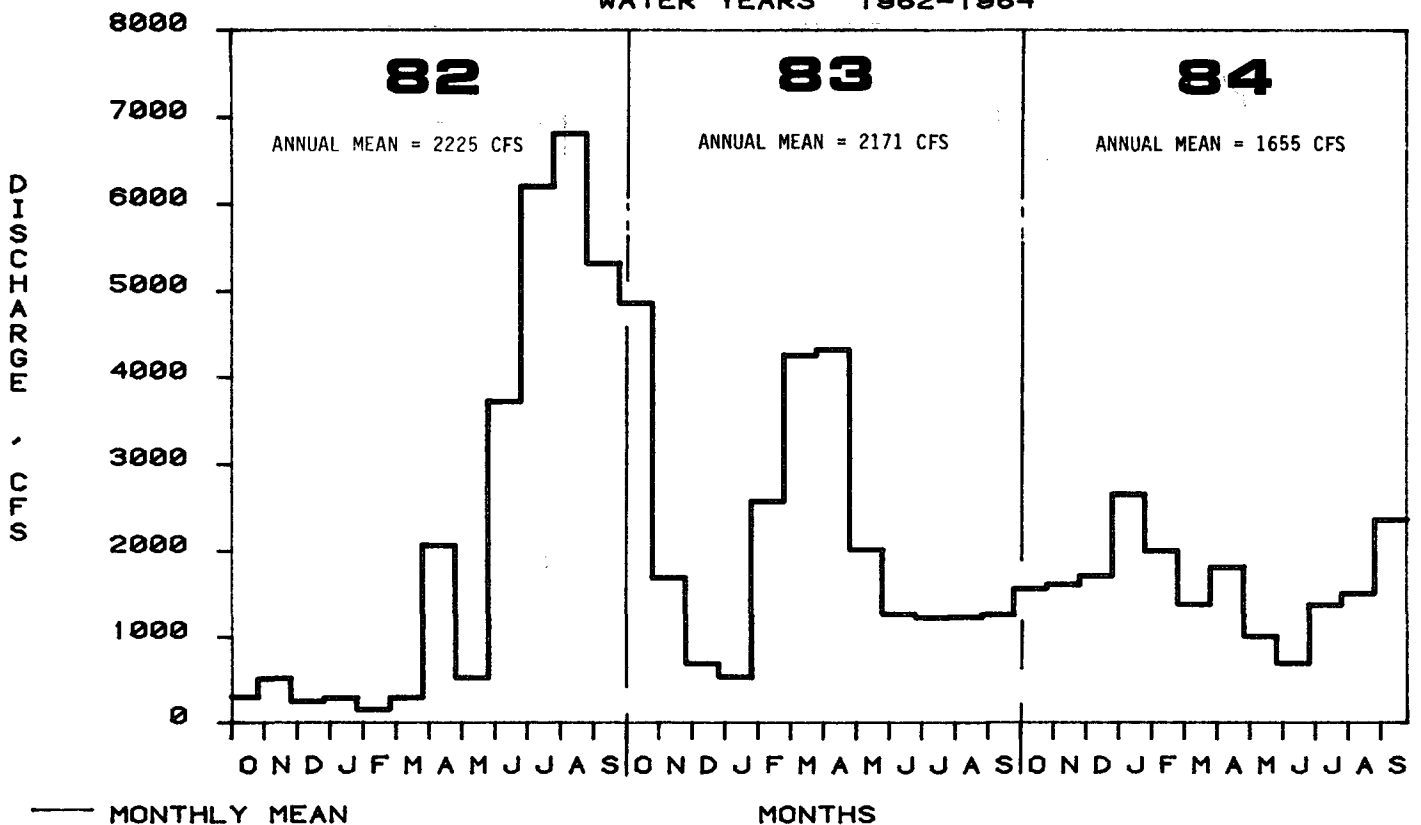


Figure 16. STREAMFLOW - ST. JOHNS RIVER NEAR DELAND
WATER YEARS 1982-1984

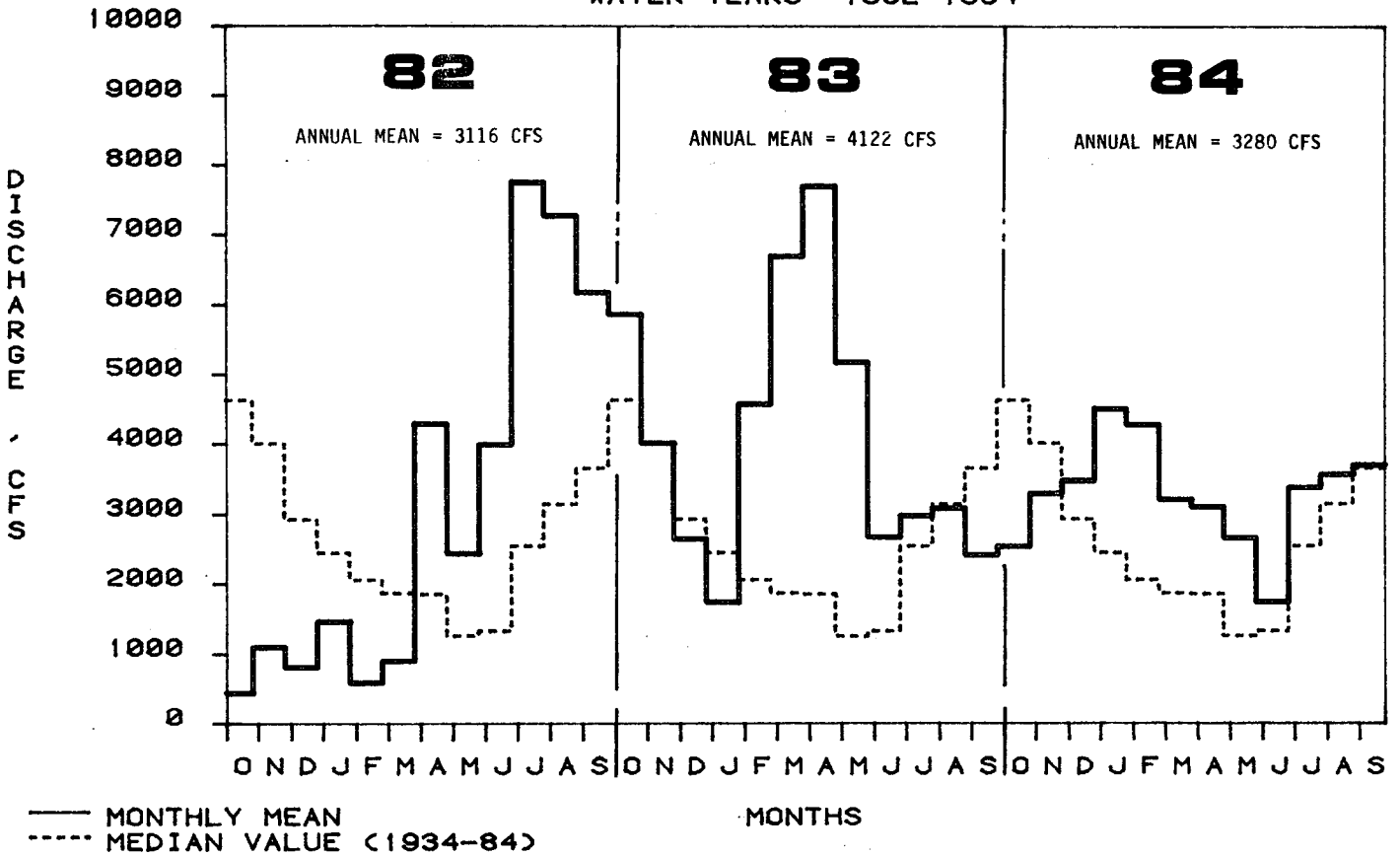


Figure 17. STREAMFLOW - OKLAWAHA RIVER AT MOSS BLUFF
WATER YEARS 1982-1984

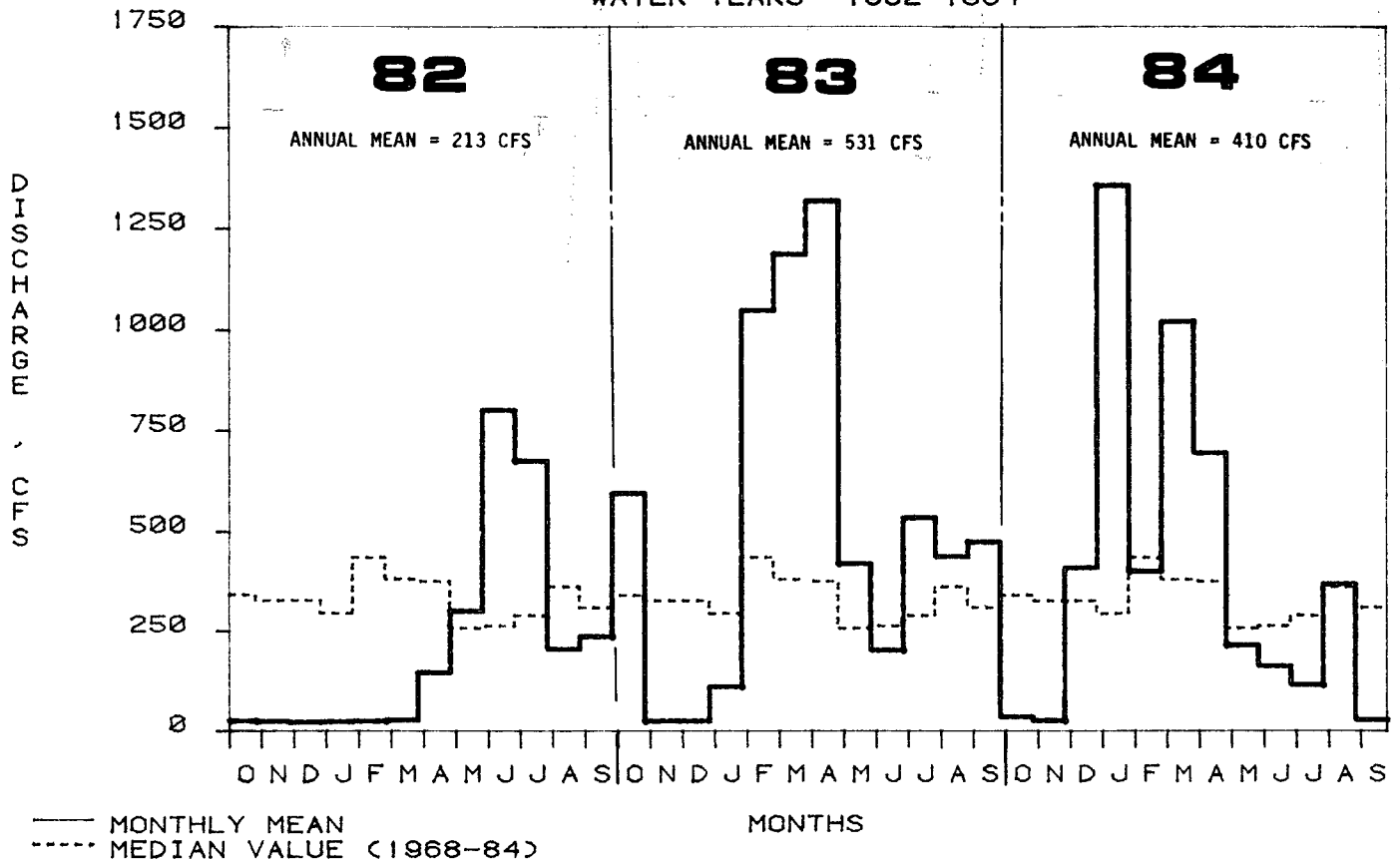


Figure 18. STREAMFLOW - OKLAWAHA RIVER NEAR CONNER
WATER YEARS 1982-1984

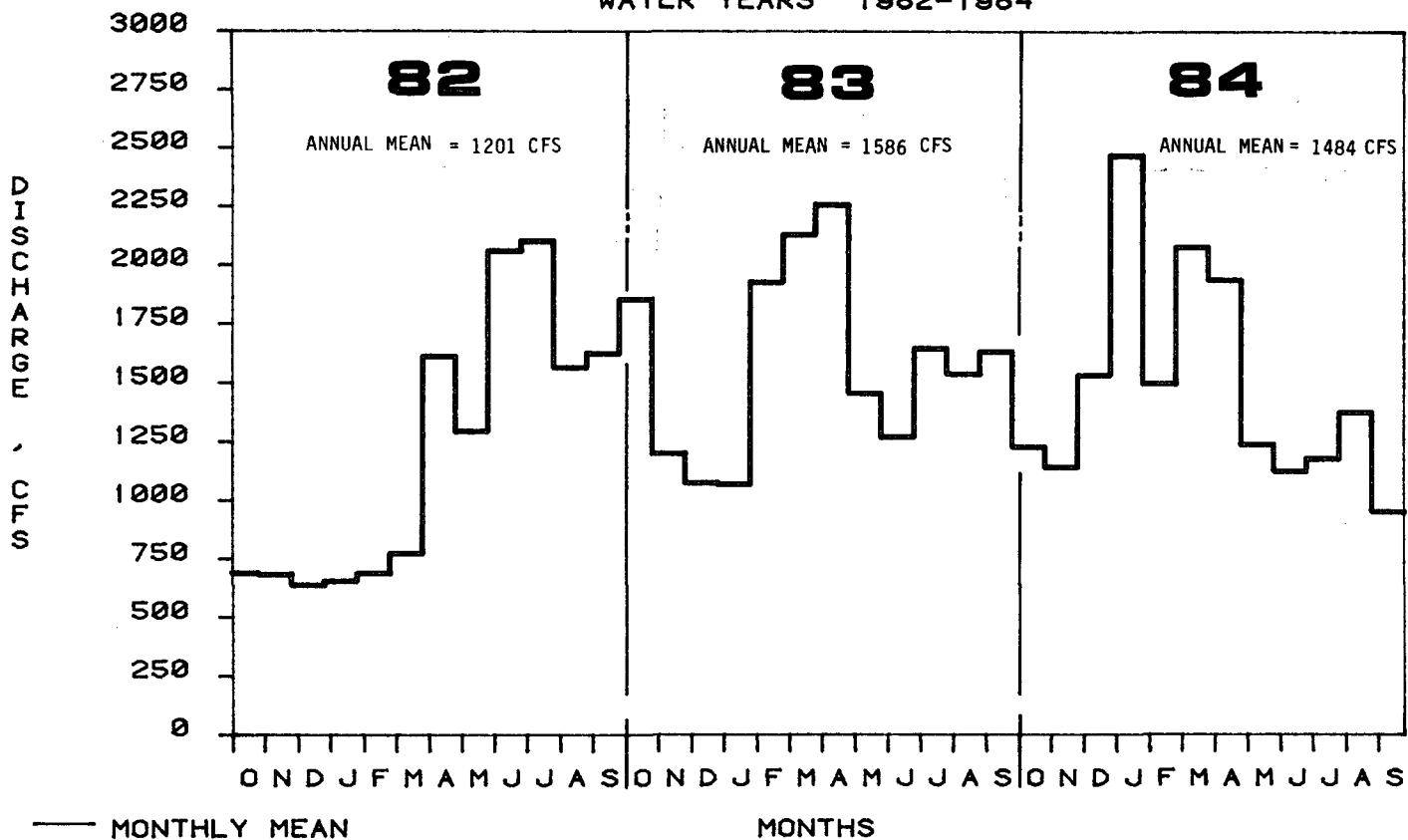


Figure 19. STREAMFLOW - OKLAWAHA RIVER AT RODMAN DAM
WATER YEARS 1982-1984

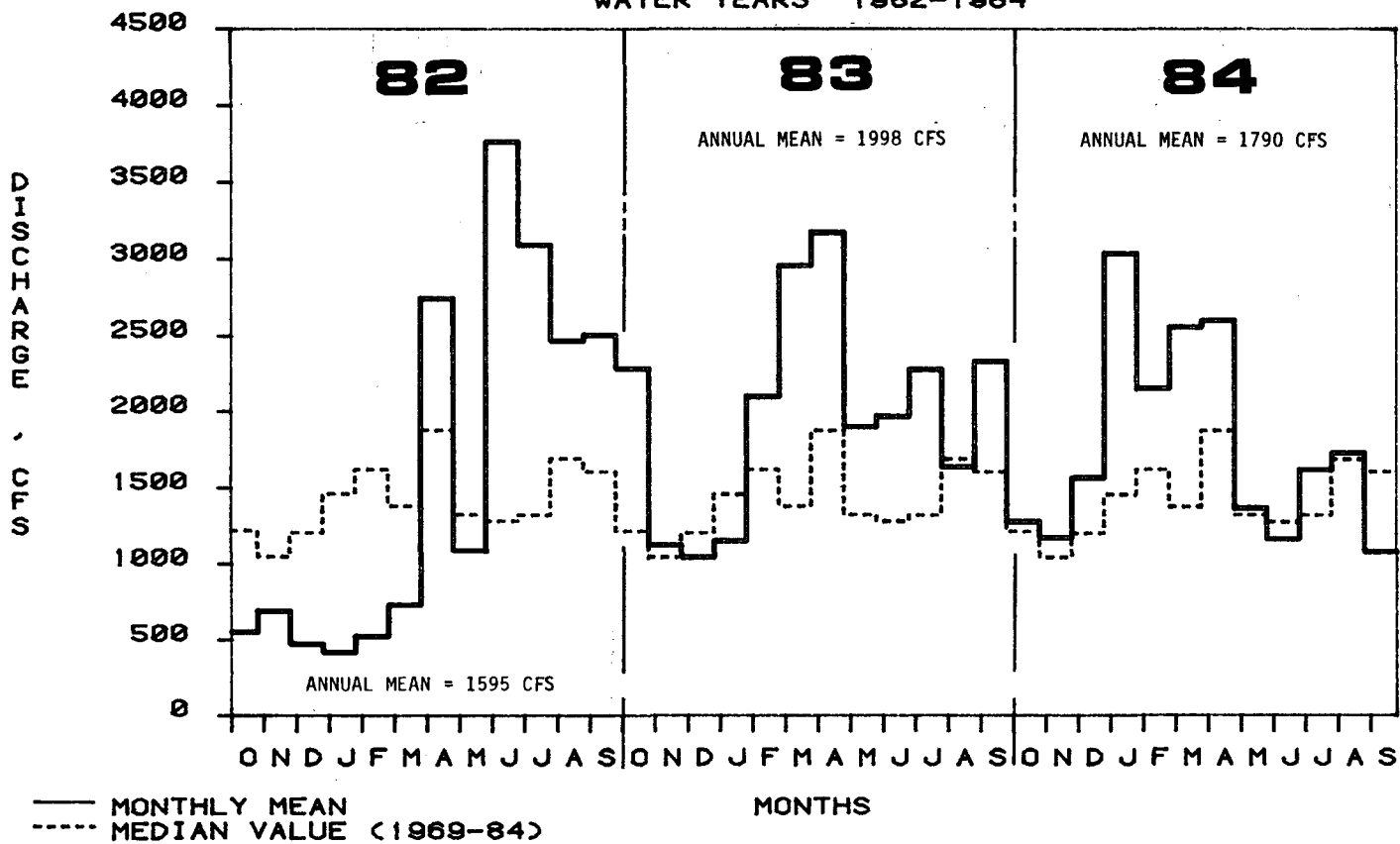


Figure 20. ELEVATION - BLUE CYPRESS LAKE NEAR FELLSMERE
WATER YEARS 1982-1984

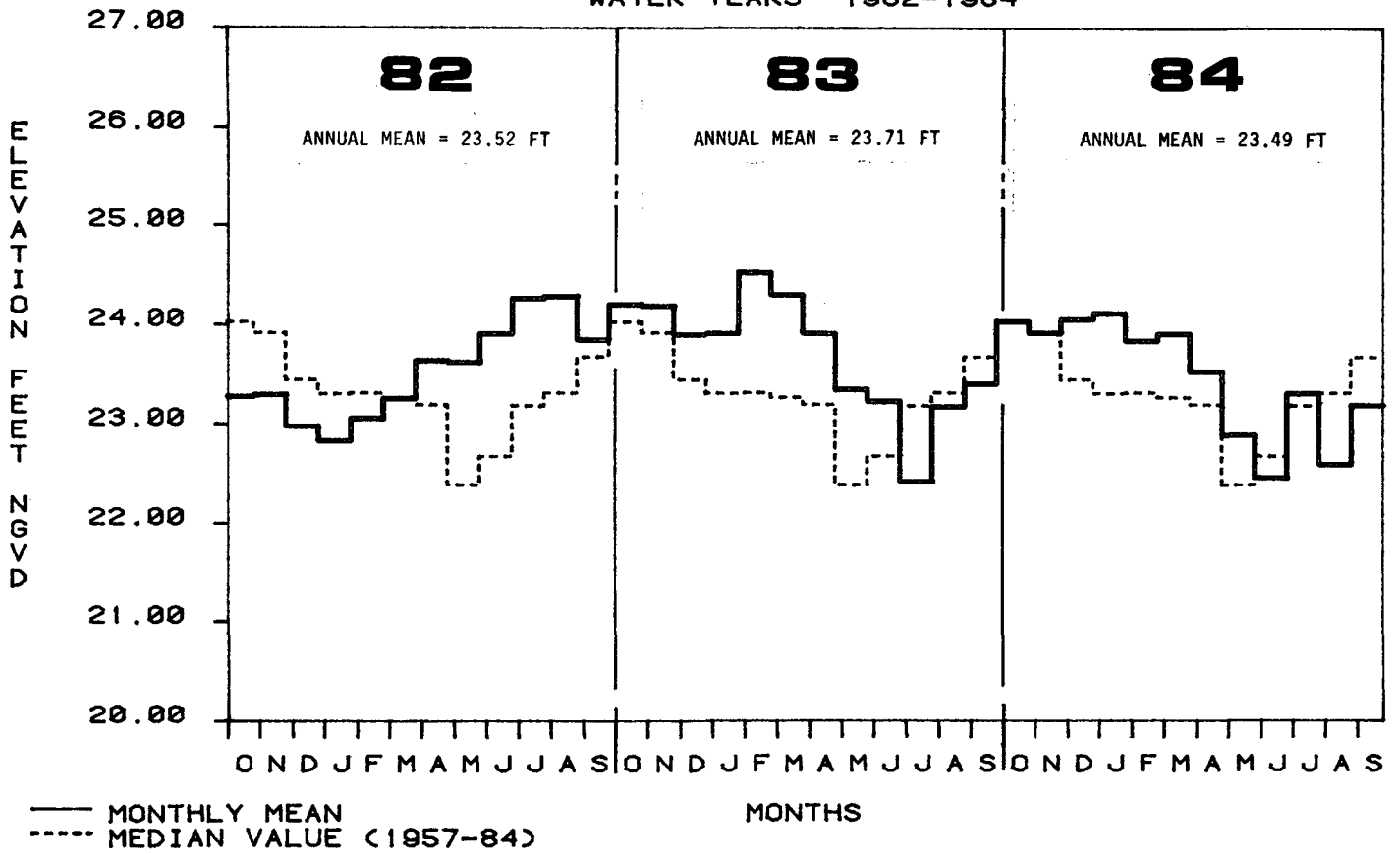


Figure 21. ELEVATION - LAKE WASHINGTON NEAR EAU GALLIE
WATER YEARS 1982-1984

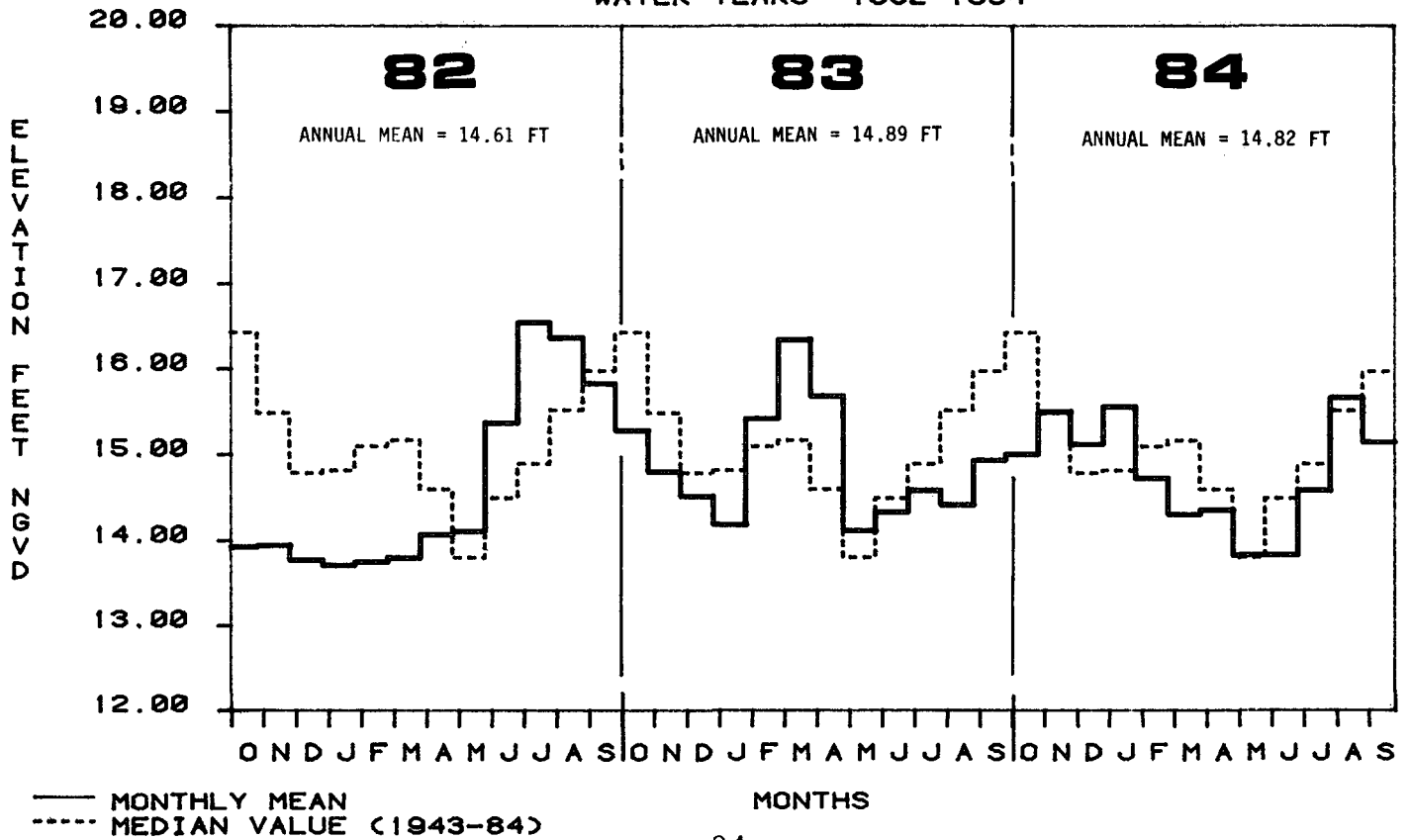


Figure 22. ELEVATION - LAKE POINSETT NEAR COCOA
WATER YEARS 1982-1984

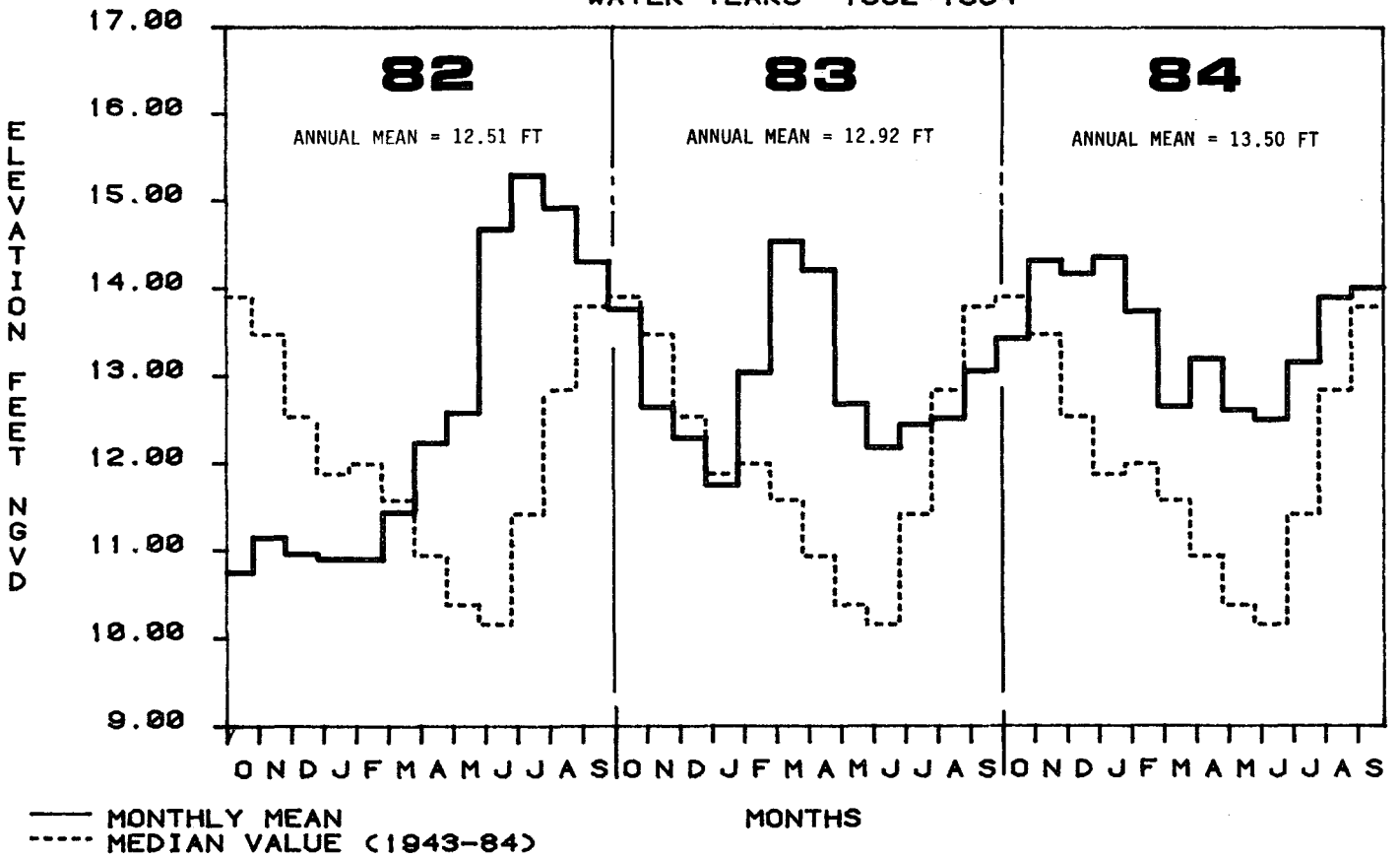


Figure 23. ELEVATION - LAKE GEORGE NEAR SALT SPRINGS
WATER YEARS 1982-1984

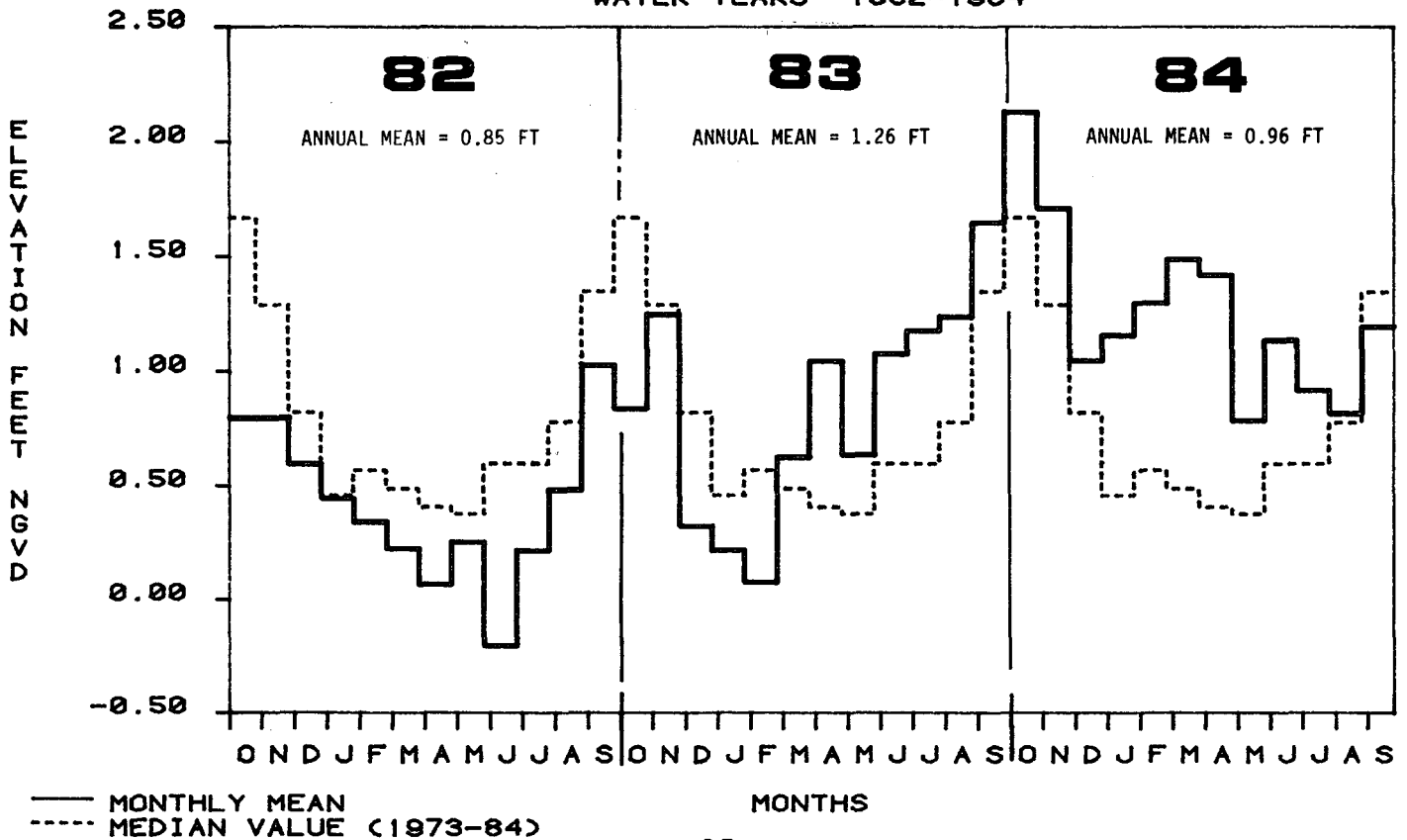


Figure 24. ELEVATION - LAKE LOWERY NEAR HAINES CITY
WATER YEARS 1982-1984

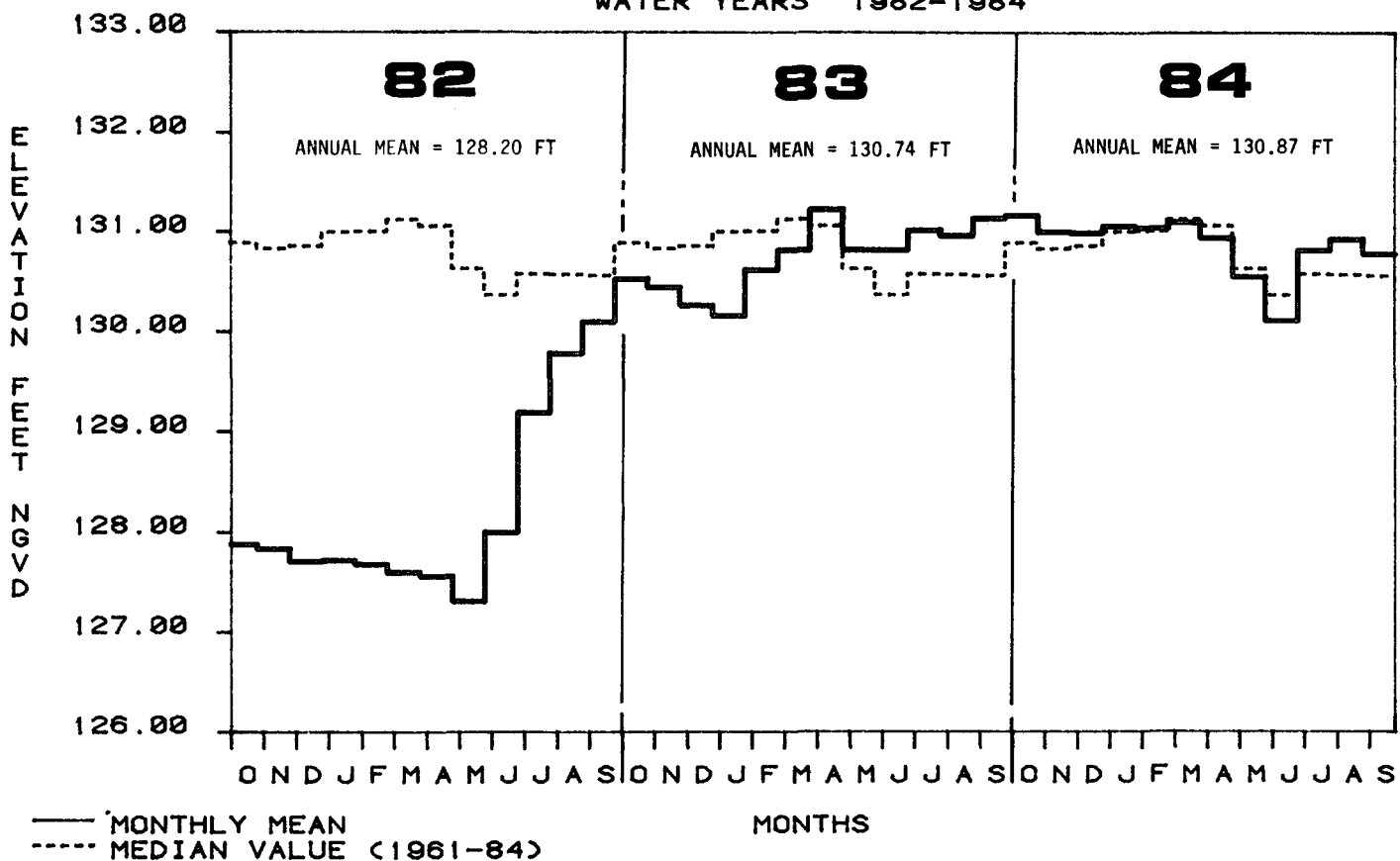


Figure 25. ELEVATION - LAKE MINNEHAHA AT CLERMONT
WATER YEARS 1982-1984

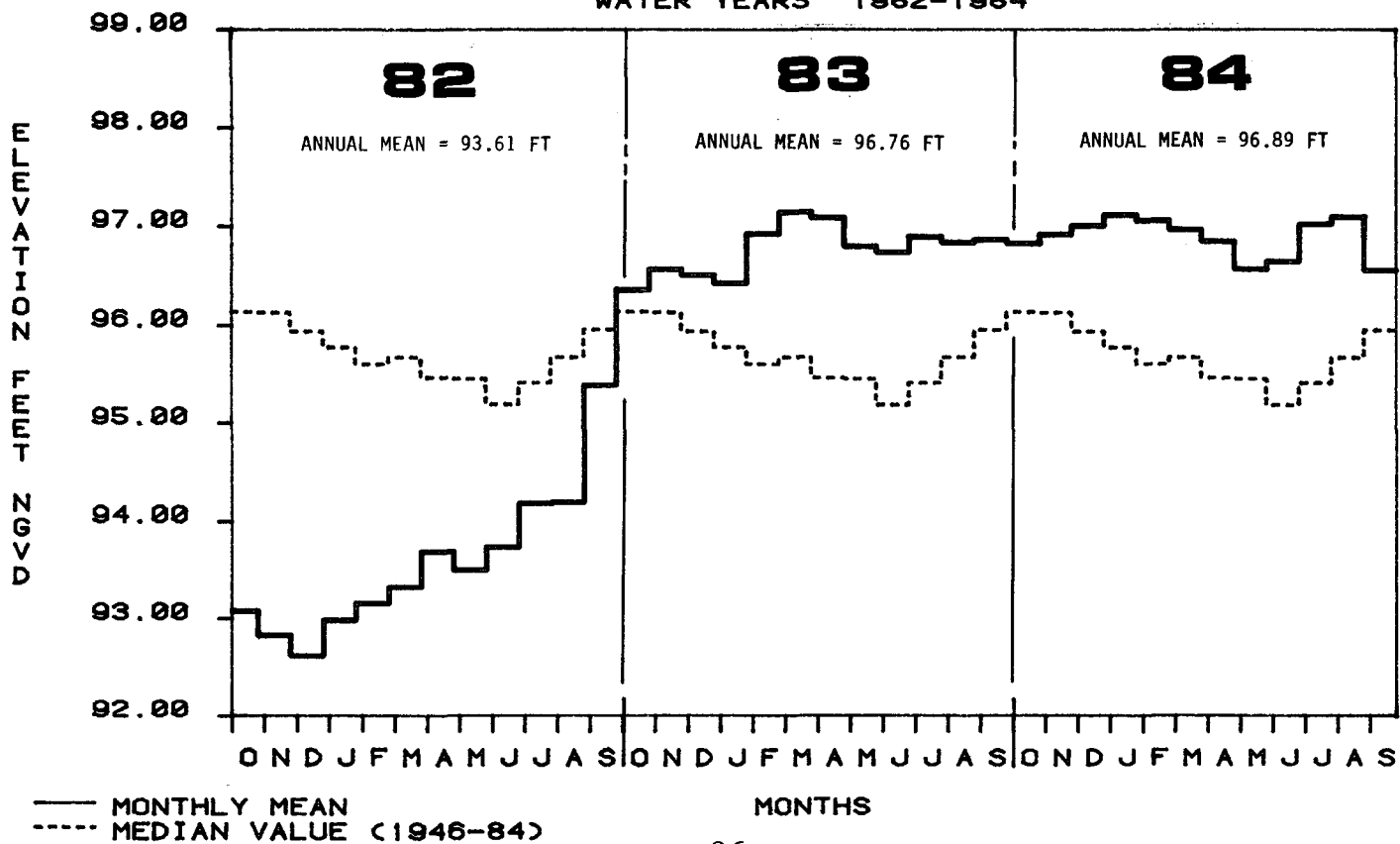


Figure 26. ELEVATION - LAKE APOPKA AT WINTER GARDEN
WATER YEARS 1982-1984

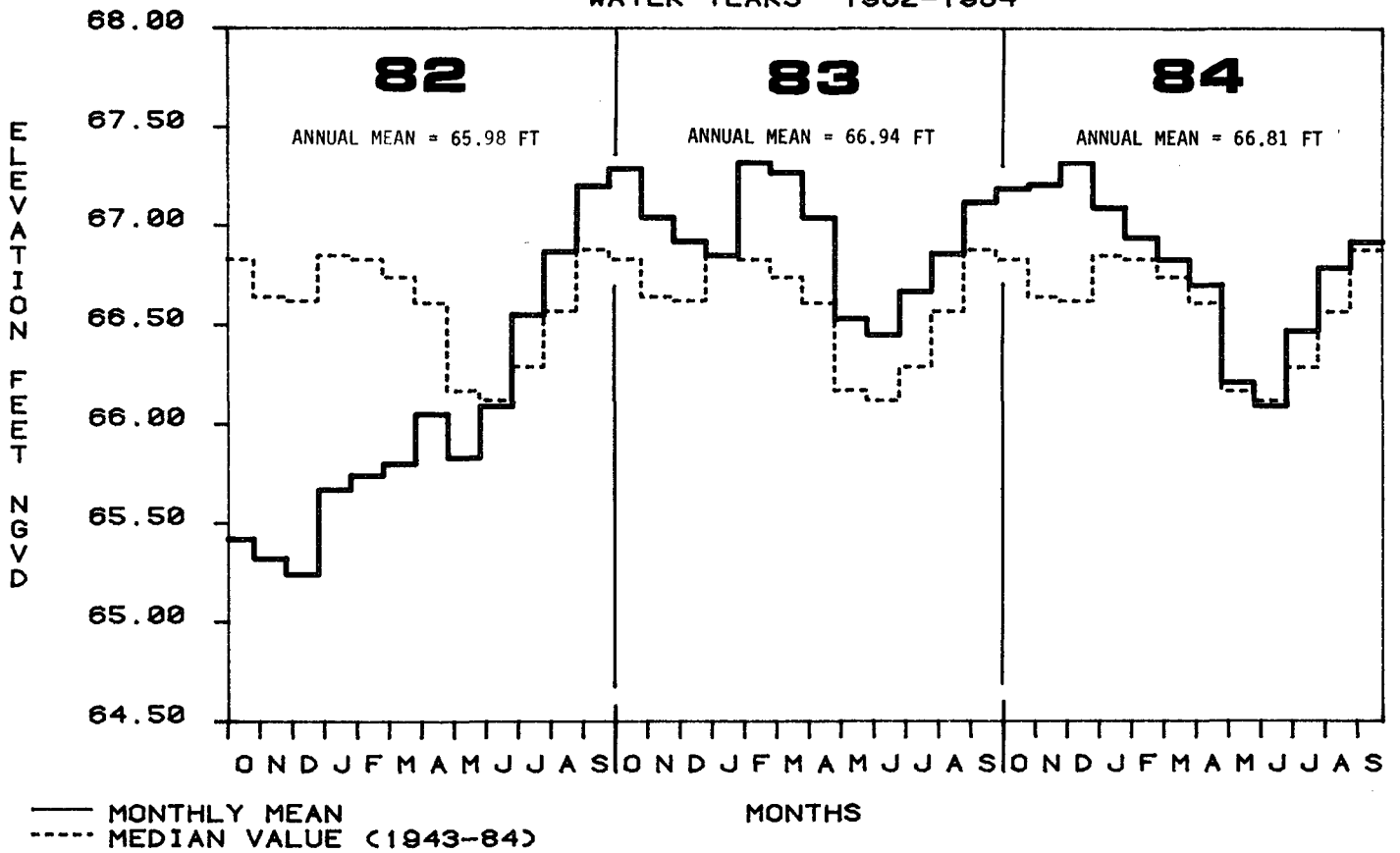


Figure 27. ELEVATION - LAKE EUSTIS AT EUSTIS
WATER YEARS 1982-1984

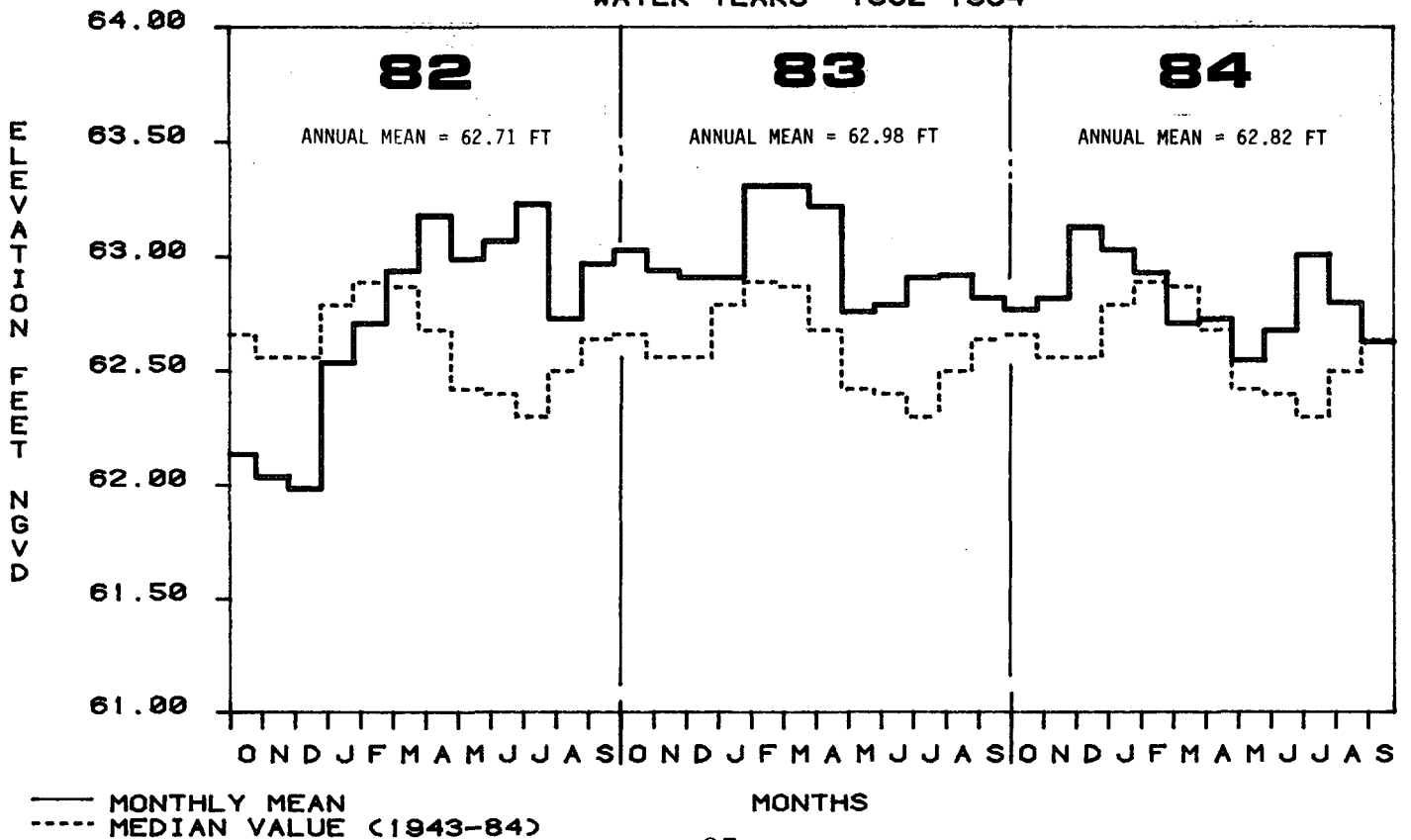


Figure 28. ELEVATION - LAKE GRIFFIN NEAR LEESBURG
WATER YEARS 1982-1984

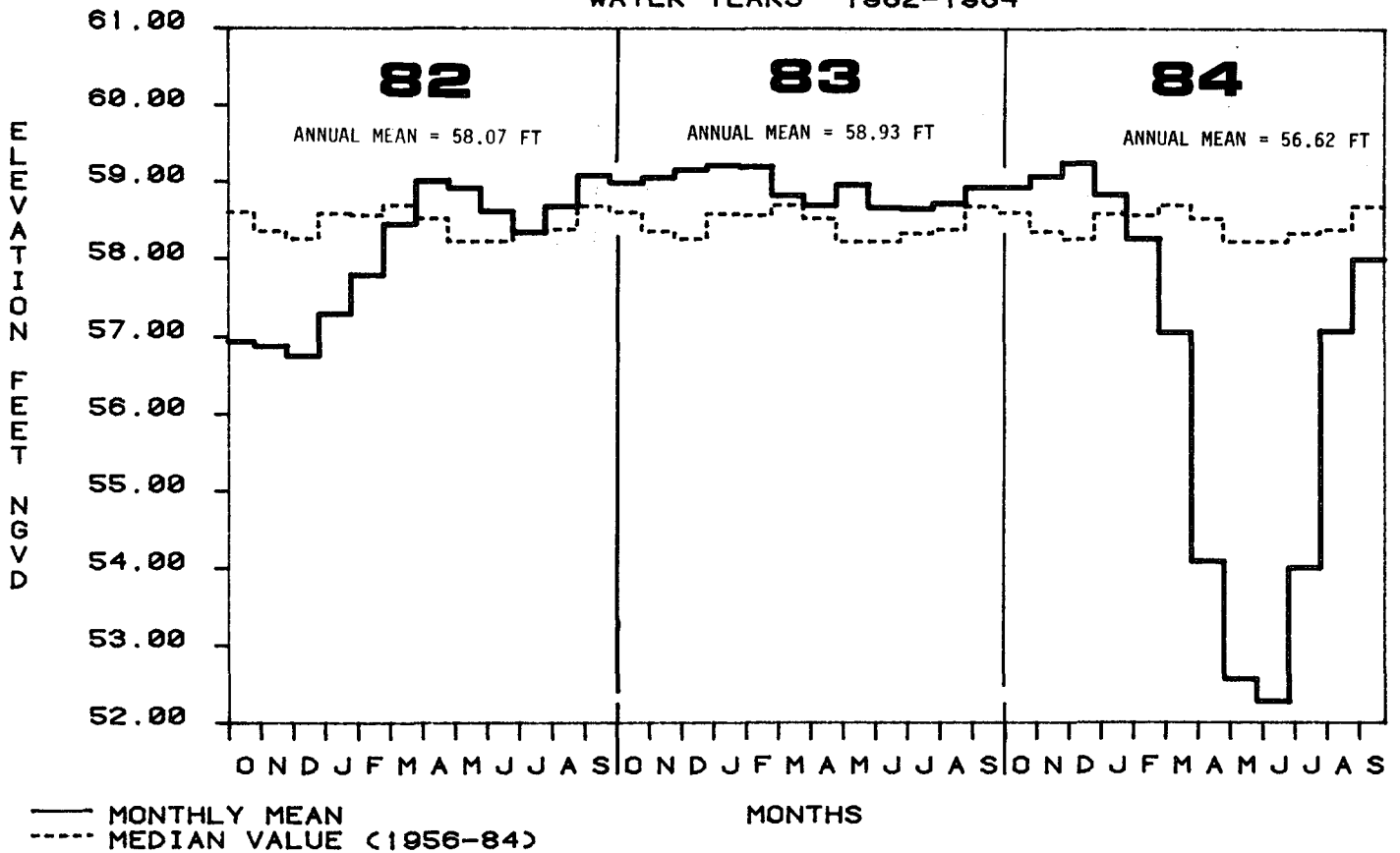


Figure 29. ELEVATION - ORANGE LAKE NEAR MICANOPY
WATER YEARS 1982-1984

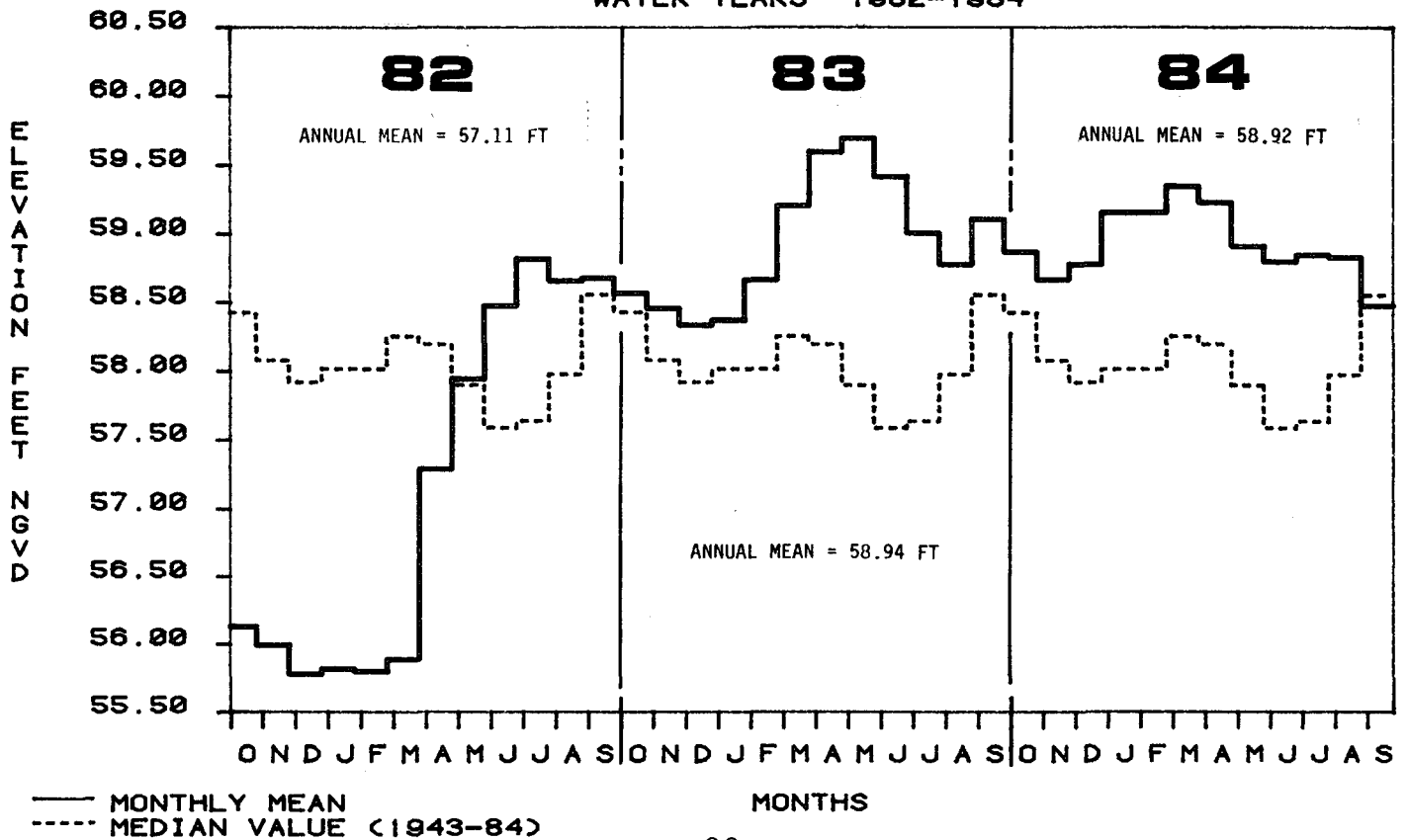


Table 2. Annual Mean Flows for Selected Gaging Stations
in the Lower St. Johns River Basin

Gaging Station	Mean Flow in Cubic Feet per Second Water Year		
	1982	1983	1984
Etonia Crk at Bardin	108	104	108
Rice Crk nr Springside	52.0	57.8	60.6
Simms Crk nr Bardin	41.3	66.1	71.5
South Fork Black Crk nr Penney Farms	171	161	185
North Fork Black Crk nr Middleburg	174	238	274
Black Crk nr Doctor's Inlet	357	422	410
Ortega River at Jacksonville	33.1	44.7	-
Pablo Crk at Jacksonville	30.5	39.0	46.6

WATER_USE

Water use data are collected annually for the 19 counties within the St. Johns Water Management District. Water use is compiled for the following categories: Public Supply; Domestic Self-Supplied; Industrial Self-Supplied (including Institutional/Recreational Self-Supplied); Agricultural Irrigation (including Livestock Use); Thermoelectric Power Generation; Heat Pump/Air Conditioning; and Free-Flowing Wells.

The total fresh water use in the District for 1984 amounted to 1,507.05 MGD (Table 3) of which ground water totaled 1,217.04 MGD (80 percent) and surface water 290.01 MGD (20 percent). There was 6.26 MGD of water reuse in the District for 1984 which was not considered in these figures. Of the 1,217.04 MGD ground water, 0.84 MGD was saline used in Reverse Osmosis for Public Supply.

Table 3. Total Fresh Water Use (MGD) by Category: 1984

	GROUND	SURFACE	REUSE	TOTAL
Public	318.85(1)	13.21	-	332.06
Domestic Self-Supplied	87.72	-	-	87.72
Industrial Self-Supplied	137.33	12.91	-	150.24
Agr. Irrigation	492.58	261.32	6.26	753.90(2)
Thermoelectric	4.55	2.57	-	7.12
Heat Pump/AC	149.96	-	-	149.96
Free-Flowing Wells	26.05	-	-	26.05
TOTAL	1,217.04(1)	290.01	6.26	1,507.05(2)

(1) Includes 0.84 MGD saline ground water

(2) Does not include reuse water in totals

The total population of the St. Johns River Water Management District in 1984 was 2.575 million of which 79% was served by public or private water suppliers. The monthly water use for Public Supply in 1984 fluctuated from a peak in May of 377 MGD to a low in January of 282 MGD (Figure 30). This increase in pumpage is due primarily to lawn irrigation in the late spring and early summer seasons.

For further details in water use refer to the "Annual Water Use Survey: 1984", Technical Publication SJ 84-7 (see Appendix B).

Water Use by Category

Agricultural Irrigation was the largest fresh water use category for 1984, accounting for 41% of the ground water used within the District (Figure 31). The second largest category was Public Supply using 26% of the fresh ground water. Other categories with substantial amounts of ground water use were Heat Pump/Air Conditioning (12%), Industrial Self-Supplied (11%), and Domestic Self-Supplied (7%). Free-Flowing Wells accounted for 2%, and Thermoelectric Power Generation accounted for less than 1% (0.4%) of the total ground water used in 1984.

The major fresh surface water use category in 1984 was Agricultural Irrigation, accounting for 90% of the total surface water use. Public Supply, Industrial Self-Supplied, and Thermoelectric Power Generation accounted for the remaining 10% of total fresh surface water use (Figure 31).

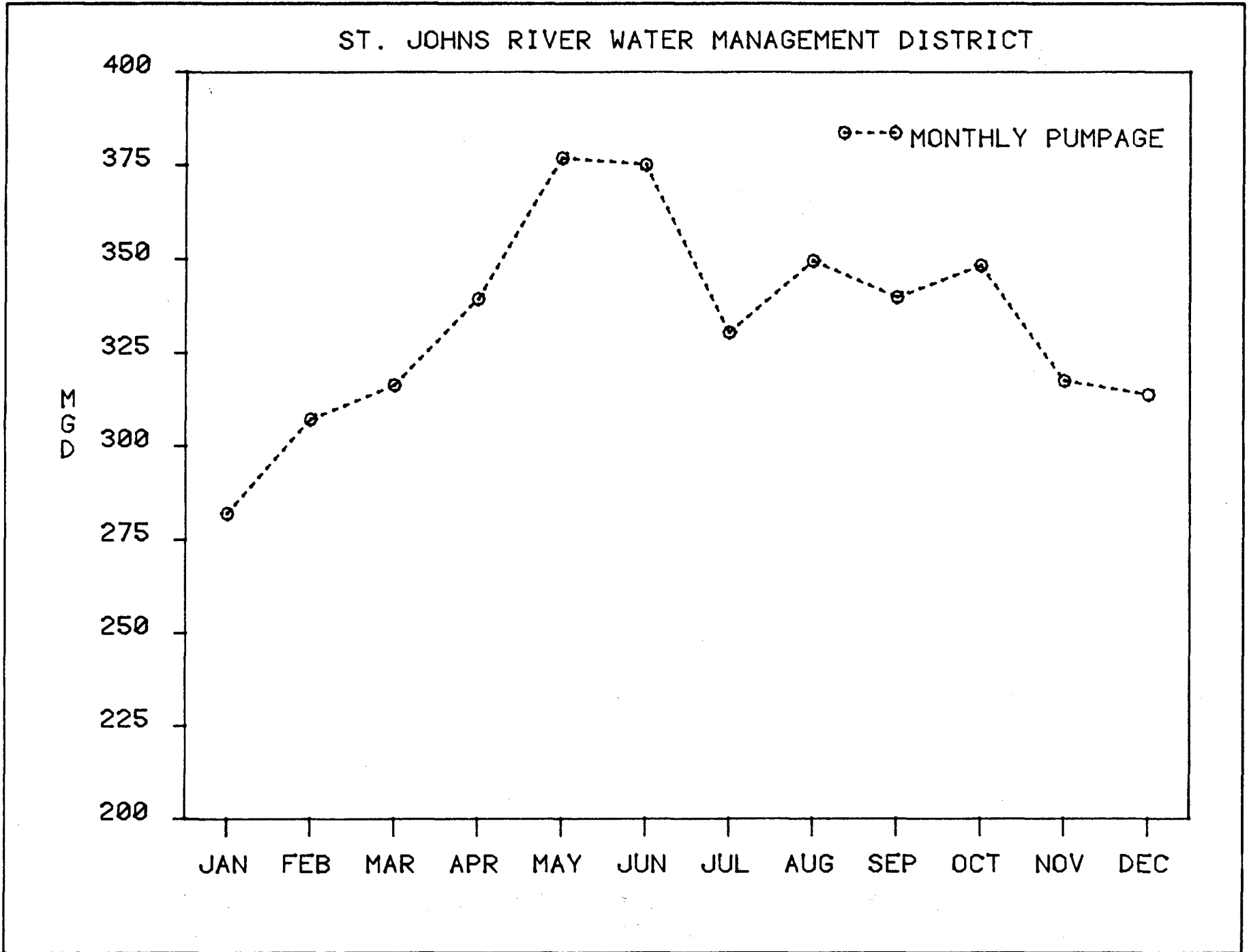
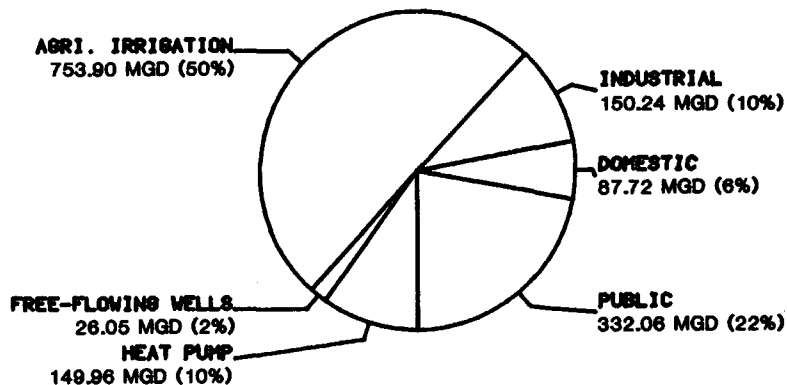


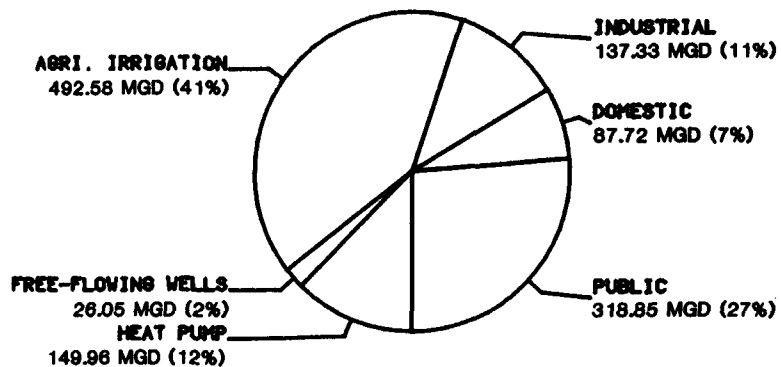
Figure 30. Monthly Fresh Water Use (MGD) For Public Supply in 1984.

FRESH WATER USE (MGD) BY CATEGORY 1984



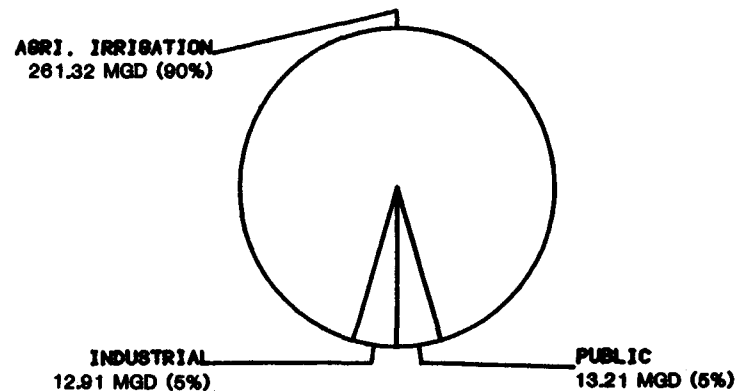
NOTE: THERMOELECTRIC (7.12 MGD) IS TOO SMALL TO DEPICT (LESS THAN 1.8%).

FRESH GROUND WATER USE (MGD) BY CATEGORY 1984



NOTE: THERMOELECTRIC (4.55 MGD) IS TOO SMALL TO DEPICT (LESS THAN 1.8%).

FRESH SURFACE WATER USE (MGD) BY CATEGORY 1984



NOTE: THERMOELECTRIC (2.57 MGD) IS TOO SMALL TO DEPICT (LESS THAN 1.8%).

Figure 31. 1984 Water Use (MGD) by Category.

Water Use By County

Brevard and Indian River counties were the largest users of fresh water for 1984 (Table 4), accounting for 289.63 MGD (19%) and 279.51 MGD (18.5%), respectively. Orange (183.08 MGD), Duval (148.37 MGD), and Lake (143.88 MGD) counties were the next three largest fresh water users. These five counties accounted for 69% of the total fresh water use.

Brevard County, the largest fresh ground water use county in 1984, accounted for 259.97 MGD (21%). Other counties which withdrew over 100 MGD of fresh ground water were Orange (152.86 MGD), Duval (144.71 MGD), Lake (125.87 MGD), and Indian River (105.11 MGD). Indian River and Brevard counties' totals include 0.82 MGD and 0.01 MGD, respectively, of saline ground water used for reverse osmosis.

Indian River County was the largest fresh surface water use county in 1984, accounting for 174.40 MGD (60%). Other counties using substantial amounts of surface water were Orange (30.22 MGD), Brevard (29.66 MGD), and Lake (18.01 MGD). Lake (2.52 MGD) and Duval (1.56 MGD) counties used the largest amount of reuse water (65%).

Figure 32 shows each county's fresh water use by source (refer to Table 4 for actual values). Water use shown for those counties partially within the SJRWMD (Alachua, Baker, Bradford, Lake, Marion, Okeechobee, Orange, Osceola, and Polk) represents the data from the St. Johns River Water Management portion only. The remaining portions of those counties are not accounted for in this report.

Table 4. 1984 County Water Use (MGD) by Category

	PUBLIC	DOMESTIC	INDUSTRIAL	AGRICULTURE IRRIGATION	THERMO ELECTRIC	HEAT PUMP	FREE-FLOWING WELLS	TOTAL
ALACHUA	18.23	2.47	1.39	11.13	0.30	-	-	33.52
Ground	18.23	2.47	1.30	9.80	0.30	-	-	32.10
Surface	-	-	0.09	1.33	-	-	-	1.42
BAKER	0.52	1.50	0.18	3.34	-	-	-	5.54
Ground	0.52	1.50	0.18	2.29	-	-	-	4.49
Surface	-	-	-	1.05	-	-	-	1.05
BRADFORD	-	0.27	-	0.10	-	-	-	0.37
Ground	-	0.27	-	0.10	-	-	-	0.37
Surface	-	-	-	-	-	-	-	-
BREVARD	21.67	5.09	0.14	101.88	0.28	141.51	19.06	289.63
Ground	8.46	5.09	0.14	85.43	0.28	141.51	19.06	259.97(1)
Surface	13.21	-	-	16.45	-	-	-	29.66
CLAY	6.96	4.07	5.42	3.40	-	-	0.79	20.64
Ground	6.96	4.07	5.42	2.00	-	-	0.79	19.24
Surface	-	-	-	1.40	-	-	-	1.40
DUVAL	77.55	19.17	40.07	6.99	2.79	-	0.51	147.08
Ground	77.55	19.17	40.07	4.62	2.79	-	0.51	144.71
Surface	-	-	-	2.37	-	-	-	2.37
FLAGLER	1.77	0.29	0.10	6.61	-	-	0.47	9.24
Ground	1.77	0.29	0.10	6.13	-	-	0.47	8.76
Surface	-	-	-	0.48	-	-	-	0.48
INDIAN RIVER	8.08	7.34	0.26	263.03	0.31	-	0.49	279.51
Ground	8.08	7.34	0.26	88.63	0.31	-	0.49	105.11(2)
Surface	-	-	-	174.40	-	-	-	174.40
LAKE	14.21	8.93	16.43	103.82	-	-	0.49	143.88
Ground	14.21	8.93	16.43	85.81	-	-	0.49	125.87
Surface	-	-	-	18.01	-	-	-	18.01
MARION	9.16	9.58	0.22	15.76	-	-	1.71	36.43
Ground	9.16	9.58	0.22	13.31	-	-	1.71	33.98
Surface	-	-	-	2.45	-	-	-	2.45
NASSAU	2.89	3.75	36.00	2.17	-	-	0.02	44.83
Ground	2.89	3.75	36.00	1.30	-	-	0.02	43.96
Surface	-	-	-	0.87	-	-	-	0.87
OKEECHOBEE	-	0.06	-	16.05	-	-	-	16.11
Ground	-	0.06	-	14.27	-	-	-	14.33
Surface	-	-	-	1.78	-	-	-	1.78
ORANGE	94.81	5.41	5.29	77.55	-	-	0.02	183.08
Ground	94.81	5.41	5.29	47.33	-	-	0.02	152.86
Surface	-	-	-	30.22	-	-	-	30.22
OSCEOLA	-	0.06	-	8.41	-	-	-	8.47
Ground	-	0.06	-	7.54	-	-	-	7.60
Surface	-	-	-	0.87	-	-	-	0.87
POLK	-	0.84	-	15.12	-	-	-	15.96
Ground	-	0.84	-	13.61	-	-	-	14.45
Surface	-	-	-	1.51	-	-	-	1.51
PUTNAM	2.80	6.09	38.84	22.52	2.39	2.29	0.55	75.48
Ground	2.80	6.09	26.02	21.42	0.62	2.29	0.55	59.79
Surface	-	-	12.82	1.10	1.77	-	-	15.69
SEMINOLE	31.85	4.62	5.29	32.24	-	-	0.04	74.04
Ground	31.85	4.62	5.29	31.49	-	-	0.04	73.29
Surface	-	-	-	0.75	-	-	-	0.75
ST. JOHNS	6.98	2.52	0.06	35.92	-	-	0.87	46.35
Ground	6.98	2.52	0.06	34.49	-	-	0.87	44.92
Surface	-	-	-	1.43	-	-	-	1.43
VOLUSIA	34.58	5.66	0.55	27.86	1.05	6.16	1.03	76.89
Ground	34.58	5.66	0.55	23.01	0.25	6.16	1.03	71.24(3)
Surface	-	-	-	4.85	0.80	-	-	5.65
TOTALS	332.06	87.72	150.24	753.90(4)	7.12	149.96	26.05	1,507.05
Ground	318.85(5)	87.72	137.33	492.58	4.55	149.96	26.05	1,217.04(5)
Surface	13.21	-	12.91	261.32	2.57	-	-	290.01

(1) Includes 0.01 MGD saline ground water for Reverse Osmosis used for public supply.

(2) Includes 0.82 MGD saline ground water for Reverse Osmosis used for public supply.

(3) Includes 0.01 MGD saline ground water for Reverse Osmosis used for public supply.

(4) Does not include 6.26 MGD of reused water for irrigation.

(5) Includes 0.84 MGD saline ground water for Reverse Osmosis used for public supply.

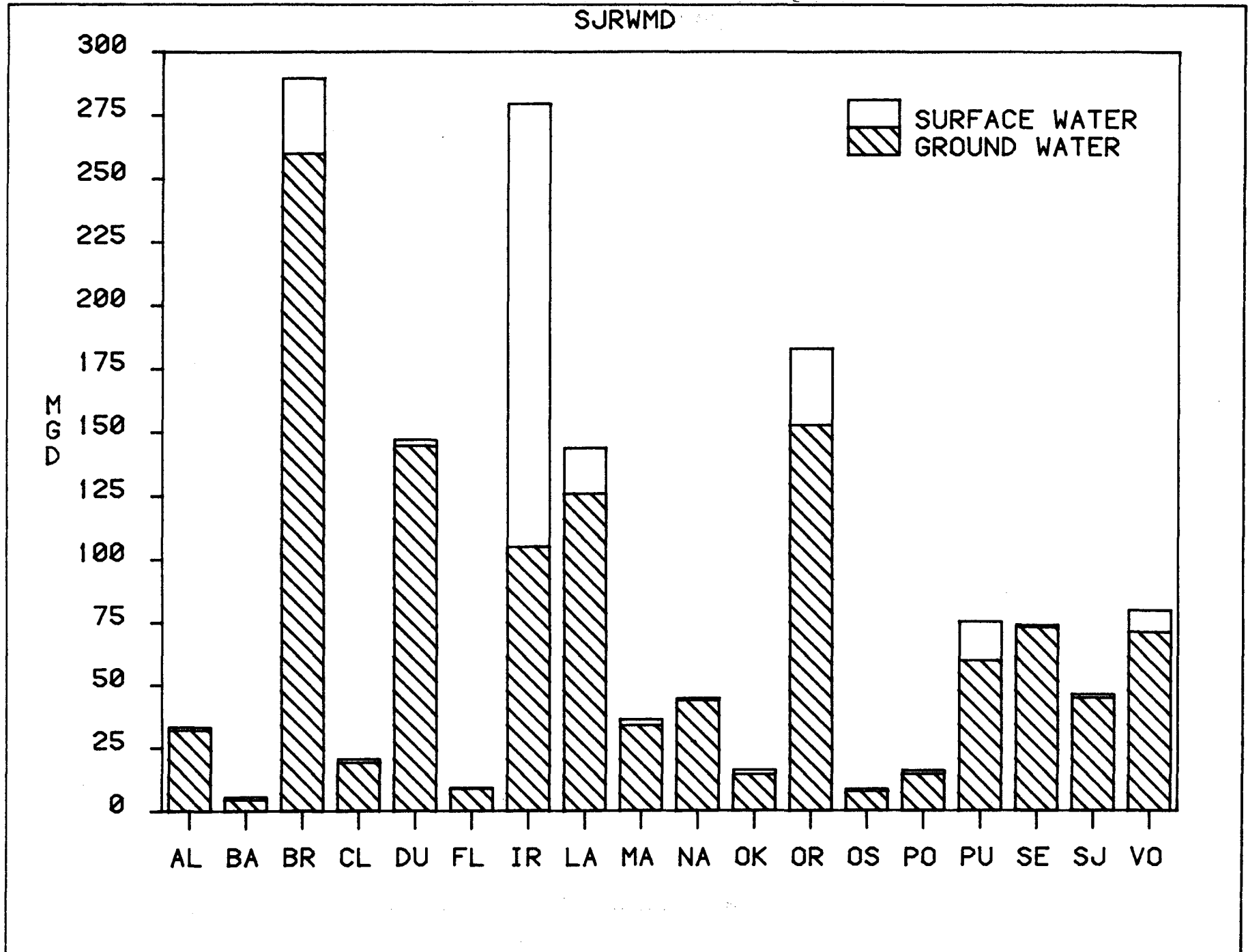


Figure 32. 1984 County Water Use (MGD) by Source.

APPENDIX A

ANNUAL RAINFALL STATISTICS

The mean rainfall for 1951-1980 (the past three decades ending in 1980) is considered as normal for a given gaging station. However, other rainfall statistics, such as the median (value equaled or exceeded for 50% of time), middle or normal range (the range covered by the middle 50% of the annual rainfall values), maximum and minimum during the record period, the lowest mean annual rainfall (drought rainfall) for a specified period, etc., will be of interest for comparison with 1984 water year rainfall data.

For several long term NOAA (National Oceanic and Atmospheric Administration) stations located within and close to the District, the foregoing rainfall statistics including drought rainfall for 3-, 5-, and 10-year continuous periods are presented in Table A-1 for 1951-1980. In addition, Table A-2 considers all rainfall data available through calendar year 1984 and presents similar statistics.

TABLE A-1. -- RAINFALL STATISTICS FOR 1951-1980 (PERIOD USED FOR CALCULATING NORMAL RAINFALL)

(ALL RAINFALL VALUES ARE ANNUAL VALUES IN INCHES)

STATION -----	NORMAL -----	MEDIAN -----	NORMAL RANGE -----	MAXIMUM -----	MINIMUM -----	LOWEST MEAN ANNUAL RAINFALL (DROUGHT RAINFALL) FOR -----		
						3 YEARS (7)	5 YEARS (8)	10 YEARS (9)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
BUSHNELL	51.28	49.76	43.90-58.21	77.11(1960)	35.60(1956)	38.00(1954-56)	45.16(1975-79)	47.80(1970-79)
CLERMONT	51.21	50.41	45.39-55.96	68.09(1959)	32.28(1961)	40.88(1961-63)	45.12(1961-65)	49.65(1954-63)
CRESCENT CITY	53.57	53.10	46.84-59.96	74.47(1964)	37.97(1954)	42.80(1954-56)	48.08(1954-58)	50.93(1954-63)
DAYTONA BEACH	46.81	46.35	37.36-53.94	69.02(1975)	31.36(1952)	36.90(1977-79)	39.83(1976-80)	46.03(1971-80)
DELAND	54.57	54.32	46.04-62.58	74.79(1953)	41.53(1974)	44.88(1954-56)	49.35(1961-65)	52.54(1962-71)
FEDERAL POINT	52.74	53.16	45.06-58.74	73.75(1964)	34.89(1954)	40.01(1954-56)	46.03(1952-56)	50.75(1954-63)
FELLSMERE	50.88	51.14	42.30-56.01	70.93(1959)	27.94(1967)	40.96(1974-76)	42.09(1974-78)	46.24(1969-78)
FERNANDINA BEACH	51.30	49.65	43.45-54.83	82.45(1969)	36.54(1980)	42.58(1954-56)	43.54(1954-58)	47.43(1954-63)
FT. PIERCE	52.56	52.09	46.04-58.50	70.19(1959)	38.30(1961)	43.37(1975-77)	46.77(1973-77)	48.97(1971-80)
GAINESVILLE	52.86	51.10	47.98-60.53	76.95(1964)	33.56(1977)	41.98(1954-56)	46.60(1974-78)	50.01(1954-63)
GLEN ST. MARY	56.56	57.07	47.48-63.06	84.95(1964)	34.35(1954)	41.61(1954-56)	45.90(1951-55)	53.75(1951-60)
ISLEWORTH	51.05	48.85	42.87-56.54	78.78(1953)	35.33(1954)	42.08(1954-56)	44.90(1976-80)	48.09(1971-80)
JACKSONVILLE	52.05	52.13	43.90-56.55	70.57(1973)	36.83(1954)	43.75(1954-56)	46.43(1974-78)	48.62(1954-63)
JACKSONVILLE BEACH	50.01	51.76	42.02-54.80	71.35(1979)	30.01(1954)	39.78(1954-56)	43.71(1954-58)	46.54(1954-63)
KISSIMMEE	48.96	48.63	41.09-54.11	80.38(1960)	28.07(1961)	40.46(1970-72)	42.44(1970-74)	43.58(1971-80)
LAKE ALFRED	50.79	49.07	43.68-57.99	76.57(1959)	35.62(1961)	39.44(1954-56)	44.64(1961-65)	47.17(1969-78)
MELBOURNE	48.16	46.84	41.58-54.84	68.90(1960)	32.52(1965)	40.70(1970-72)	41.31(1970-74)	44.56(1971-80)
OCALA	53.92	51.88	46.06-60.31	71.15(1953)	39.30(1971)	44.04(1971-73)	46.41(1971-75)	50.38(1966-75)
ORLANDO	49.54	49.10	43.91-54.39	68.74(1960)	38.12(1977)	44.08(1975-77)	45.45(1976-80)	46.56(1971-80)
PALATKA	51.52	50.62	45.86-56.82	72.80(1964)	29.22(1954)	38.99(1954-56)	44.26(1952-56)	49.48(1952-61)
SANFORD	51.16	51.00	45.68-54.91	74.06(1953)	35.04(1962)	41.39(1961-63)	46.17(1961-65)	47.36(1961-70)
ST.AUGUSTINE	52.61	50.95	44.21-60.05	79.91(1953)	32.68(1956)	38.12(1954-56)	43.10(1974-78)	49.70(1971-80)
TITUSVILLE	56.67	54.28	48.14-65.63	81.74(1953)	40.15(1980)	45.62(1975-77)	47.50(1974-78)	49.56(1971-80)
VERO BEACH	51.33	50.69	43.97-61.53	68.31(1973)	32.70(1961)	42.68(1961-63)	44.44(1961-65)	48.57(1955-64)
WINTER HAVEN	48.85	48.94	42.60-52.73	73.28(1959)	32.51(1954)	34.45(1954-56)	41.90(1952-56)	46.35(1961-70)

EXPLANATION:-

NORMAL - MEAN FOR 1951-1980

MEDIAN - ANNUAL RAINFALL EQUALED OR EXCEEDED THIS VALUE FOR 50% OF YEARS

NORMAL RANGE - THE RANGE COVERED BY THE MIDDLE 50% OF THE 1951-1980 RAINFALL VALUES

MAXIMUM - HIGHEST RAINFALL DURING 1951-1980

MINIMUM - LOWEST RAINFALL DURING 1951-1980

COLUMN (7) - MEAN RAINFALL FOR 3-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL

COLUMN (8) - MEAN RAINFALL FOR 5-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL

COLUMN (9) - MEAN RAINFALL FOR 10-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL

TABLE A-2. -- RAINFALL STATISTICS FOR THE AVAILABLE PERIOD OF RECORD

(ALL RAINFALL VALUES ARE ANNUAL VALUES IN INCHES)

STATION ----- (1)	MEAN ----- (2)	MEDIAN ----- (3)	MIDDLE RANGE ----- (4)	MAX ----- (5)	MIN ----- (6)	LOWEST MEAN ANNUAL RAINFALL (DROUGHT RAINFALL) FOR -----		
						3 YEARS (7)	5 YEARS (8)	10 YEARS (9)
BARTON, 1887-1984	53.82	52.41	46.22-59.38	83.44	36.43	43.70(1887-89)	46.79(1972-76)	48.14(1887-1986)
BITHLO, 1959-1984	53.02	51.46	47.58-58.43	73.04	36.43	44.91(1979-81)	46.13(1977-81)	48.64(1972-81)
BUSHNELL, 1948-1981	51.71	51.16	44.02-58.21	77.11	35.60	38.00(1954-56)	45.16(1975-79)	47.63(1972-81)
CLERMONT, 1893-1984	50.44	50.49	45.90-55.04	68.09	32.28	40.54(1916-18)	40.92(1913-17)	45.99(1913-22)
CRESCENT CITY, 1897-1984	52.44	52.16	46.47-58.18	75.03	31.90	39.89(1907-9)	43.05(1907-11)	46.21(1902-11)
DAYTONA BEACH, 1923-1984	48.19	47.22	39.91-54.13	74.71	31.36	34.57(1954-56)	39.07(1954-58)	43.58(1925-34)
DELAND, 1909-1984	54.95	54.82	47.35-61.54	84.03	39.40	44.88(1954-56)	47.43(1917-21)	49.76(1913-22)
FEDERAL POINT, 1892-1984	53.10	52.99	45.98-59.68	74.41	34.89	40.01(1954-56)	44.47(1913-17)	46.34(1908-17)
FELLSMERE, 1912-1984	53.94	53.96	47.42-60.59	78.83	27.94	41.20(1974-76)	42.33(1974-78)	44.85(1972-81)
FERNANDINA BEACH, 1902-1984	49.93	49.31	41.69-55.50	83.31	22.79	37.48(1921-23)	42.03(1913-17)	43.40(1909-18)
FT. DRUM, 1943-1984	50.64	51.06	43.80-56.63	64.40	32.73	43.83(1979-81)	46.06(1964-68)	47.03(1961-70)
FT. PIERCE, 1901-1984	51.99	51.46	44.83-57.82	77.51	31.73	40.46(1911-13)	44.52(1909-13)	46.80(1913-22)
GAINESVILLE, 1897-1984	51.01	50.41	45.94-56.11	76.95	32.79	41.98(1954-56)	43.58(1907-11)	46.01(1908-17)
GLEN ST. MARY, 1896-1984	53.83	54.27	45.46-60.45	84.95	34.03	40.54(1915-17)	44.35(1913-17)	45.75(1908-17)
HIGH SPRINGS, 1945-1984	52.92	51.90	45.27-59.99	71.04	32.90	39.44(1954-56)	44.47(1951-55)	48.84(1949-58)
INVERNESS, 1899-1984	53.98	52.45	48.02-59.35	87.27	36.14	41.36(1954-56)	46.72(1916-20)	48.73(1913-22)
ISLEWORTH, 1916-1984	51.04	50.01	43.88-57.16	78.78	33.29	42.08(1954-56)	43.57(1977-81)	46.56(1972-81)
JACKSONVILLE, 1867-1984	52.43	53.74	46.80-57.70	82.27	30.44	38.32(1916-18)	41.08(1913-17)	41.83(1909-18)
JACKSONVILLE BEACH, 1945-1984	51.35	52.59	43.25-57.70	71.35	30.01	39.78(1954-56)	43.71(1954-58)	46.54(1954-63)
KISSIMEE, 1892-1984	49.76	49.04	42.62-55.56	80.38	28.07	40.46(1970-72)	42.44(1970-74)	43.58(1971-80)
LAKE ALFRED, 1925-1984	51.10	50.99	43.52-58.00	76.57	35.12	39.44(1954-56)	44.71(1954-58)	47.30(1969-78)
LAKE CITY, 1893-1984	52.12	51.32	45.73-57.37	84.47	29.83	39.75(1954-56)	44.95(1907-11)	46.16(1934-43)
LISBON, 1959-1984	47.61	46.39	42.50-52.00	67.58	33.11	38.95(1961-63)	43.39(1961-65)	44.93(1961-70)
LYNNE, 1942-1984	52.54	51.77	46.12-58.56	81.96	34.27	38.44(1954-56)	42.34(1954-58)	46.01(1954-63)
MARINELAND, 1942-1984	47.73	47.38	39.60-55.51	70.40	28.07	35.71(1954-56)	42.34(1954-58)	43.97(1954-63)
MELBOURNE, 1939-1984	48.36	46.84	41.58-55.08	74.16	31.97	37.72(1980-82)	40.50(1980-84)	43.95(1973-82)
MOUNTAIN LAKE, 1922-1984	51.67	51.91	43.99-58.24	73.02	32.77	41.48(1970-72)	44.87(1961-65)	47.15(1961-70)
OCALA, 1891-1984	53.42	52.86	47.10-59.35	74.71	37.51	42.77(1909-11)	43.15(1907-11)	48.41(1908-17)
OKEECHOBEE, 1913-1984	46.61	47.70	38.58-53.19	71.11	26.76	31.88(1975-77)	34.44(1942-46)	39.79(1942-51)
ORLANDO, 1892-1984	50.85	50.93	44.41-55.42	74.19	33.84	43.58(1931-33)	44.96(1931-35)	46.55(1971-80)
PALATKA, 1923-1984	52.60	51.60	45.89-58.76	74.61	29.22	38.99(1954-56)	44.26(1952-56)	46.31(1973-82)
SANFORD, 1913-1984	51.47	51.21	45.58-57.54	74.06	34.84	41.32(1961-63)	45.20(1913-17)	47.34(1961-70)
ST. AUGUSTINE, 1877-1984	50.84	51.28	44.24-57.30	79.91	29.20	36.95(1916-18)	42.00(1913-17)	42.65(1909-18)
STARKE, 1896-1984	51.45	52.25	44.03-57.80	71.96	29.04	38.38(1954-56)	42.43(1931-35)	45.14(1908-17)
TITUSVILLE, 1878-1984	54.39	53.38	47.50-62.22	81.74	33.43	41.96(1909-11)	43.76(1906-10)	48.03(1909-18)
VERO BEACH, 1943-1984	52.27	50.69	44.13-62.79	81.74	32.70	42.68(1961-63)	44.44(1961-65)	48.27(1949-58)
WINTER HAVEN, 1941-1984	50.70	49.74	43.81-56.06	73.28	32.51	34.45(1954-56)	41.90(1952-56)	46.35(1961-70)

EXPLANATION:-

MEAN - STATION MEAN FOR PERIOD SHOWN IN COLUMN (1)

MEDIAN - ANNUAL RAINFALL EQUALED OR EXCEEDED THIS VALUE FOR 50% OF YEARS

MIDDLE RANGE - RANGE COVERED BY THE MIDDLE 50% OF THE RAINFALL VALUES

MAX - HIGHEST RAINFALL DURING PERIOD SHOWN IN COLUMN (1)

MIN - LOWEST RAINFALL DURING PERIOD SHOWN IN COLUMN (1)

COLUMN (7) - MEAN RAINFALL FOR 3-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL

COLUMN (8) - MEAN RAINFALL FOR 5-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL

COLUMN (9) - MEAN RAINFALL FOR 10-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL

APPENDIX B

September 28, 1981

TECHNICAL PUBLICATIONS

1978

Month Approved	Publication Number	Title	Author(s)
March	SJ 78-1	(Formerly Information Circular #1) Annual Report of Hydrologic Conditions and Water Resource Activities - 1977 Water Year (Water Resources Department) (Short Title: 1977 Annual Hydrologic Report)	Alfred Canepa, Donthamsetti V. Rao, & Dann K. Yobi
August	SJ 78-2	(Formerly Information Circular #2) (Improvement of Water Quality Through a Cooperative Well Plugging Program (Resources Evaluation Division) (Short Title: Cooperative Well Plugging Program)	Douglas A. Munch

TECHNICAL PUBLICATIONS

1979

Month Approved	Publication Number	Title	Author(s)
March	SJ 79-1	(Formerly Information Circular #3) Annual Report of Hydrologic Conditions and Water Resource Activities - 1978 Water Year (Water Resources Department) (Short Title: 1978 Annual Hydrologic Report)	Alfred Canepa, Frank Fenzel, & Donthamsetti V. Rao
March	SJ 79-2	(Formerly Technical Report #1) Geology of the Oklawaha Basin (Resources Evaluation Division)	Richard Johnson
May	SJ 79-3	(Formerly Technical Memorandum #1) Test Drilling Report of Northwest Volusia County (Resources Evaluation Division)	Douglas A. Munch
July	SJ 79-4	Part 1 (Formerly Technical Report #2) - Text - Saline Contamination of a Limestone Aquifer by Connate Intrusion in Agricultural Areas of St. Johns, Putnam and Flagler Counties, Northeast Florida (Resources Evaluation Division) (Short Title: Connate Intrusion in Northeast Florida) Part 2 (Formerly Technical Memorandum #2) Supplemental Data	Douglas A. Munch, Bruce Ripy, & Richard Johnson
November	SJ 79-5	(Formerly Technical Report #4) Summary of the Hydrology of the Upper Etonia Creek Basin (Resources Evaluation Division) (Short Title: Upper Etonia Creek Study)	Douglas A. Munch, Dann Yobi, & George Chappell
November	SJ 79-6	(Formerly Technical Report #6) Upper Oklawaha River Basin Water Management Study, Part 1: Lake Griffin Region Study (Engineering Division) (Short Title: Lake Griffin Region Study)	C. Charles Tai & Donthamsetti V. Rao

TECHNICAL PUBLICATIONS

1980

Month Approved	Publication Number	Title	Author(s)
January	SJ 80-1	(Formerly Information Circular #4) Salt Water Intrusion in Coastal Aquifers: A Bibliography (Resources Evaluation Division) (Short Title: SWIS Bibliography)	George P. Szell
February	SJ 80-2	(Formerly Information Circular #5) Annual Report of Hydrologic Conditions and Water Resource Activities - 1979 Water Year (Water Resources Department) (Short Title: 1979 Annual Hydrologic Report)	Douglas A. Munch, Frank Fenzel, & Donthamsetti V. Rao
March	SJ 80-3	(Formerly Technical Report #5) Hydrologic Investigation of the Potentiometric High Centered About the Crescent City Ridge, Putnam County, Florida (Resources Evaluation Division) (Short Title: Crescent City High Study)	Fred Ross & Douglas A. Munch
April	SJ 80-4	(Formerly Technical Report #3) Investigation of Ground Water Resources and Salt Water Intrusion in the Coastal Areas of Northeast Florida (Resources Evaluation Division) (Short Title: SWIS I)	James M. Frazee & Donnie McClaugherty
June	SJ 80-5	(Formerly Technical Report #6A) Annual Water Use Survey - 1978 (Planning Department)	Elaine Scott
July	SJ 80-6	(Formerly Technical Report #7) Development of Environmental Constraints for the Proposed Jane Green Detention Areas (Environmental Sciences Division) (Short Title: Jane Green Environmental Constraints)	Carol Biagotti-Griggs & David Girardin
July	SJ 80-7	(Formerly Technical Memorandum #4) Results of Test Drilling and Materials Investigation of Borrow Areas (Resources Evaluation Division)	Fred Ross
August	SJ 80-8	(Formerly Technical Memorandum #3) Log Pearson Type 3 Distribution: Tables of Quantiles (Engineering Division)	Donthamsetti V. Rao
November	SJ 80-9	(Formerly Technical Report #8) Effects on the Floridan Aquifer of Ground Water Withdrawals for Fernery Freeze Protection, Southeast Putnam County, Florida (Resources Evaluation Division) (Short Title: Effects of Fernery Freeze Protection)	Fred Ross

TECHNICAL PUBLICATIONS

1981

<u>Month</u> <u>Approved</u>	<u>Publication</u> <u>Number</u> _____	<u>Title</u>	<u>Author(s)</u>
July	SJ 81-1	(Formerly Technical Report #9) Structural Geologic Features and their Relationship to Salt Water Intrusion in West Volusia, North Seminole and Northeast Lake Counties (Resources Evaluation Division) (Short Title: Salt Water Intrusion from Geologic Features)	Richard Johnson
August	SJ 81-2	(Formerly Technical Report #11) Analysis of Residential Demand of Water in the St. Johns River Water Management District (Resources Evaluation Division) (Short Title: Residential Water Demands)	Kathryn Lewis, Richard Marella, & Roy Carriker
November	SJ 81-3	(Formerly Technical Report #10) Annual Water Use Survey - 1979 (Resources Evaluation Division)	Richard Marella
November	SJ 81-4	(Formerly Information Circular #6) Annual Report of Hydrologic Conditions - 1980 Water Year (Water Resources Department) (Short Title: 1980 Annual Hydrologic Report)	Douglas A. Munch, Donthamsetti V. Rao Alan Aikens, & Richard Marella

TECHNICAL PUBLICATIONS

1982

Month Approved	Publication Number	Title	Author(s)
January	SJ 82-1	(Formerly Technical Report #12) Frequencies of High and Low Stages for Principal Lakes in the St. Johns River Water Management District (Engineering Division) (Short Title: High & Log Lake Stages)	Donthamsetti V. Rao
February	SJ 82-2	(Formerly Technical Report #13) Vegetation Community Structure of the Proposed Jane Green Detention Area (Environmental Sciences Division) (Short Title: Jane Green Vegetative Structure)	Carol Biagotti-Griggs
February	SJ 82-3	(Formerly Technical Memorandum #5) Investigation of Fern Water Use in Southeast Putnam County, Florida (Resources Evaluation Division) (Short Title: Fern Water Use)	Phil Leary
March	SJ 82-4	(Formerly Technical Report #15) Upper St. Johns River Hydrologic Model (USJM) Users Manual (Engineering Division) (Short Title: USJM Users Manual)	C. Charles Tai & Thirasak Suphunvorranop
April	SJ 82-5	(Formerly Technical Report #14) Annual Water Use Survey - 1980 (Resources Evaluation Division)	Richard Marella
October	SJ 82-6	(Formerly Information Circular #7) Annual Report of Hydrologic Conditions - 1981 Water Year (Water Resources Department) (Short Title: 1981 Annual Hydrologic Report)	Douglas A. Munch, Donthamsetti V. Rao, Alan Aikens, & Richard Marella

TECHNICAL PUBLICATIONS

1983

Month Approved	Publication Number	Title	Author(s)
January	SJ 83-1	(Formerly Technical Report #17) Water Quality Monitoring Annual Report (Environmental Sciences Division)	Carol J. Fall
March	SJ 83-2	(Formerly Information Circular #8) St. Johns River Water Management District Current Population and Projections - 1980 (Resources Evaluation Division)	Richard Marella & Bruce Ford
May	SJ 83-3	(Formerly Technical Report #16) A Study of Crown Flood Irrigation Methods (Engineering Division)	David Clapp & Harold A. Wilkening, III
May	SJ 83-4	(Formerly Technical Report #18) The Role of Fire on Land-Use Management (Environmental Sciences Division)	Greenville B. Hall
June	SJ 83-5	(Formerly Technical Report #22) Econlockhatchee River System: Level I Report (Environmental Sciences Division)	Larry Gerry
July	SJ 83-6	Part 1 (Formerly Technical Report #20) Hydrologic and Engineering Study for Extreme Drawdown of Lake Griffin (Engineering Division) (Short Title: Lake Griffin Drawdown Study) Part 2 - Executive Summary	Wayne Ingram
July	SJ 83-7	(Formerly Map Series 83-1) Map Series - Ground Water Withdrawals from the Floridan Aquifer in Duval County - 1980 (Resources Evaluation Division) (Short Title: Map of Duval Ground Water Withdrawals)	Richard Marella
November	SJ 83-8	(Formerly Technical Report #26) Distribution and Structure of Floodplain Plant Communities in the Upper Basin of the St. Johns River, Florida (Environmental Sciences Division) (Short Title: Upper Basin Plant Communities)	Edgar F. Lowe
December	SJ 83-9	(Formerly Technical Report #25) - Annual Water Use Survey - 1981 (Resources Evaluation Division)	Richard Marella

TECHNICAL PUBLICATIONS

1984

Month Approved	Publication Number	Title	Author(s)
January	SJ 84-1	(Formerly Information Circular #9) Annual Report of Hydrologic Conditions - 1982 Water Year (Water Resources Department) (Short Title: 1982 Annual Hydrologic Report)	Donthamsetti V. Rao, William L. Osburn, & Richard Marella
January	SJ 84-2	Part 1 (Formerly Technical Report #27) Annual Water Use Survey - 1982 (Resources Evaluation Division)	Richard Marella
December		Part 2 - Map Series (Formerly Map Series 83-2)	Richard Marella
January	SJ 84-3	(Formerly Information Circular #10) Report on Uncontrolled Free Flowing Artesian-Free Flowing Well Plugging Program (Resources Evaluation Division) (Short Title: Free Flowing Well Plugging Program)	Scott Edwards
April	SJ 84-4	(Formerly Map Series 84-3) Map Series - Ground Water Withdrawals from the Floridan Aquifer in Nassau County Area - 1982	Richard Marella
September	SJ 84-5	Annual Water Use Survey, 1983 (Resource Evaluation Division)	Richard Marella
September	SJ 84-6	Hydrologic Reconnaissance of Marion County (Resource Evaluation Division)	Kevin Rohrer
September	SJ 84-7	Annual Report of Hydrologic Conditions, 1983 Water Year (Resource Evaluation and Engineering Divisions) (Short Title: 1983 Annual Hydrologic Report)	Donthamsetti V. Rao, William L. Osburn, & Richard Marella
August	SJ 84-8	Water Quality of the Southern Reach of the Middle St. Johns River. A Focus on the Drought of 1980 through 1981 (Environmental Science Division) (Short Title: Water Quality of Middle St. Johns)	Joel Steward
August	SJ 84-9	Howell Branch Basin Surface Water Management Study (Engineering Division) (Short Title: Howell Branch Study) (3 Volumes)	Thirasak Suphunvorranop

TECHNICAL PUBLICATIONS

1984 (Continued)

Month Approved	Publication Number	Title	Author(s)
September	SJ 84-10	Interbasin Diversion in the Upper St. Johns River Basin (Engineering Division)	David Clapp Harold Wilkening
November	SJ 84-11	A Preliminary Study of Runoff Hydrographs and Pollutant Concentrations for Turkey Creek Basin (Engineering Division) (Short Title: Turkey Creek Basin)	Thirasak Suphunvorrnop, David Clapp
*	SJ 84-12		
*	SJ 84-13		
November	SJ 84-14	Ground Water Withdrawals from the Floridan Aquifer in Clay & Portions of Bradford Counties - 1983	Richard Marella
December	SJ 84-15	US EPA Clean Lakes Program Phase I - Diagnostic Study of the Upper St. Johns River Chain of Lakes (Volume I - Diagnostic) (Volume II - Feasibility) (Short Title: Clean Lakes Program) (Environmental Science Division)	Edgar Lowe, Carol Fall, Larry Gerry, Greenville Hall, Jerry Brooks
December	SJ 84-16	Stratographic Analysis of Geophysical Logs from Water Wells in Peninsula Florida (Short Title:) (Resource Evaluation Division)	Richard Johnson

*SJ 84-12 and SJ 84-13 Unassigned

TECHNICAL PUBLICATIONS

1985

Month Approved	Publication Number	Title	Author(s)
January	SJ 85-1	Saltwater Intrusion in Volusia County, Florida, Due to Ground Water Withdrawals - Technical Summary	James W. Mercer, Stephen D. Thomas, Barry H. Lester, and Ronald W. Broome (Edited by David Skipp)
August	SJ 85-2	An Environmental Evaluation of Water Reuse in the St. Johns River Water Management District	Joel Steward
March	SJ 85-3	The Mean Annual 10-Year, 25-Year, and 100- Year Flood Profile for the Upper St. Johns River Basin Under the Existing Conditions	Donthamsetti Rao
May	SJ 85-4	Burrell Dam Safety Evaluation	Wayne Ingram
September	SJ 85-5	A Guide to SCS Runoff Procedures	Thirasak Suphunvorranoj
August	SJ 85-6	Test Drilling Report for Observation Wells at Sebastian Inlet State Park, Brevard County, Florida	David Toth
August	SJ 85-7	Annual Water Use Survey: 1984 Individual Public and Industrial Water Users Technical Publication SJ 85-7 Supplement Data, Annual Water Use Survey: 1984	Richard Marella
October	SJ 85-8	Application of Landsat Data in District Water Resources Investigations and Management	Hal Wilkening

OTHER DISTRICT SUPPORTED TECHNICAL PAPERS
(Reprints Available)

The following papers have either been published in technical journals or presented at the National Speciality Conferences.

1. "Upper St. Johns River Water Management Model," presented at the August 9-11, 1978 ASCE Hydraulics Division Speciality Conference on Verification of Mathematical and Physical Models in Hydraulic Engineering, held at College Park, Maryland, by C. C. Tai.
2. "Log Pearson Type 3 Distribution: A Generalized Evaluation," Journal of the Hydraulics Division, ASCE, May 1980, by D. V. Rao.
3. "Log Pearson Type 3 Distribution: Method of Mixed Moments," Journal of the Hydraulics Division, ASCE, June 1980, by D. V. Rao.
4. "Agricultural Reservoir Design and Operation," presented at the June 2-5, 1980 ASCE Symposium on Surface Water Impoundments, held at Minneapolis, Minnesota, by C. C. Tai.
5. "Storm Water Management for a Shallow Lake in the Upper Reaches of a River," presented at the June 2-5, 1980 ASCE Symposium on Surface Water Impoundments," held at Minneapolis, Minnesota, by D. V. Rao and C. C. Tai.
6. "Three Parameter Probability Distributions," Journal of the Hydraulics Division, ASCE, March 1981, by D. V. Rao.
7. "Return Period for Mean Annual Hydrologic Event," Journal of the Hydraulics Division, ASCE, March 1981, by D. V. Rao.
8. "Predicting Precipitation Events: Gumbel vs Log Pearson," presented at the Fourth Conference on Hydrometeorology, October 7-9, 1981, Reno, Nevada, by D. V. Rao.
9. "Upper St. Johns River Water Management Plan Using Off-Line Reservoir Design Concept," presented at the July 20-23, 1982, ASCE Irrigation and Drainage Division Specialty Conference 'Environmentally Sound Water and Soil Management,' held at Orlando, Florida, by C. C. Tai and D. V. Rao.
10. "Hydrologic Change Due to Floodplain Impoundment and Encroachment by Agricultural Activities," presented at the July 20-23, 1982, ASCE Irrigation and Drainage Division Speciality Conference 'Environmentally Sound Water and Soil Management,' held at Orlando, Florida, by C. C. Tai and D. V. Rao.

11. "Water Supply Potential of the Upper St. Johns River," presented at the March 14-16, 1983 ASCE Water Resources Planning and Management Division Speciality Conference, Water Supply - The Management Challenge," held at Tampa, Florida, by C. C. Tai and D. V. Rao.
12. "Three Parameter Probability Distribution of Best Hydrologic Bounds," published in 'Frontiers of Hydraulic Engineering,' proceedings of the ASCE Hydraulics Division Conference, held at Massachusetts Institute of Technology, August 9-12, 1983, by D. V. Rao.
13. "Factors Affecting Surface Water Chloride Levels in Altered Floodplain," presented at the 19th Annual American Water Resources Association Conference, San Antonio, Texas, June 1983, by C. Fall.
14. "Estimating Log Pearson Parameters by Mixed Moments," Journal of Hydraulic Engineering, ASCE, August 1983, by D. V. Rao.
15. "Phosphate and Peat Mining in Florida," presented at EPA National Conference, "Perspectives on Nonpoint Source Pollution," held at Kansas City, Missouri, May 19-22, 1985, by C. Fall.
16. "Review of Computer Programs for Compliance with Management and Storage of Surface Water Permitting Program," published in 'Storm Water Management - An Update,' University of Central Florida, Environmental Systems Engineering Institute, Orlando, July 15, 1985, by C. C. Tai and T. Suphunvorrannop.
17. "Development of a Flood Control Plan for the Upper St. Johns River," published in 'Storm Water Management - An Update,' University of Central Florida, Environmental Systems Engineering Institute, Orlando, July 15, 1985, by C. C. Tai and D. V. Rao.
18. "Today's and Tomorrow's Fresh Water Demand in the St. Johns River Water Management District," presented at the Annual Meeting of the ASCE, Florida Section, September 27-28, 1985, Cocoa Beach, by S. A. Jenab, R. Marella, and J. Steward.