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ANNUAL REPORT OF HYDROLOGIC CONDITIONS AND WATER RESOURCE ACTIVITIES-1978 WATER YEAR

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INTRODUCTION

The Water Resources Department of the St. Johns River Water Management District has prepared an annual report for the water year 1978 (October 1977 through September 1978). 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 current information on hydrologic conditions in the District and on the activities of the Water Resources Department.

This report is divided into two parts. The first section deals with the status of the resource. Ground water, surface water, and precipitation data for the 1978 water year are presented and compared with historical data. In the second section, current projects, cooperative programs, and field station activities are discussed. Rainfall statistics for the period 1941 to 1970 are presented in an appendix. Future annual reports will be expanded and modified, as data become available, to provide more detailed information on water quantity and quality, water use, and other water resource information of interest to the people of the District.

STATUS OF THE RESOURCE

RAINFALL

Precipitation in the St. Johns River Water Management District occurs primarily as rainfall. The isohyetal map of mean annual rainfall for the period 1941-1970 is shown in Figure 1.

The annual rainfall variation in the District for the water year 1978 is shown in Figure 2. Rainfall within the District for the 1978 water year ranged from a high of 62.6 inches at Alexander Springs in Lake County to a low of 43.1 inches at Fellsmere in Indian River County. Average rainfall for the 1978 water year calculated as the average of 18 NOAA stations (located within and close to the District) is 51.4 inches as compared to a District mean of 53.7 inches for the period 1941-1970 calculated for the same stations.

Percent departure from mean annual rainfall for the 1978 water year is illustrated on Figure 3. Rainfall throughout most of the District was within plus or minus 10 percent of the mean annual. Exceptions to this include a band of 10 percent to 25 percent below mean annual rainfall along the northern edge of the District and an area around Fellsmere in the southeast part of the District. An area around Melbourne, also in the southeast part of the District, recorded rainfall between 10 percent to 25 percent above mean annual for the 1978 water year.

Figure 4 shows reported monthly rainfalls at five selected stations within the District for the 1978 water year as compared to mean monthly rainfall. During the months of June through September, the interval during which the greatest rainfall is expected, rainfall was below the mean for Jacksonville, Daytona Beach, and Gainesville, and was above the mean for Melbourne and Orlando.

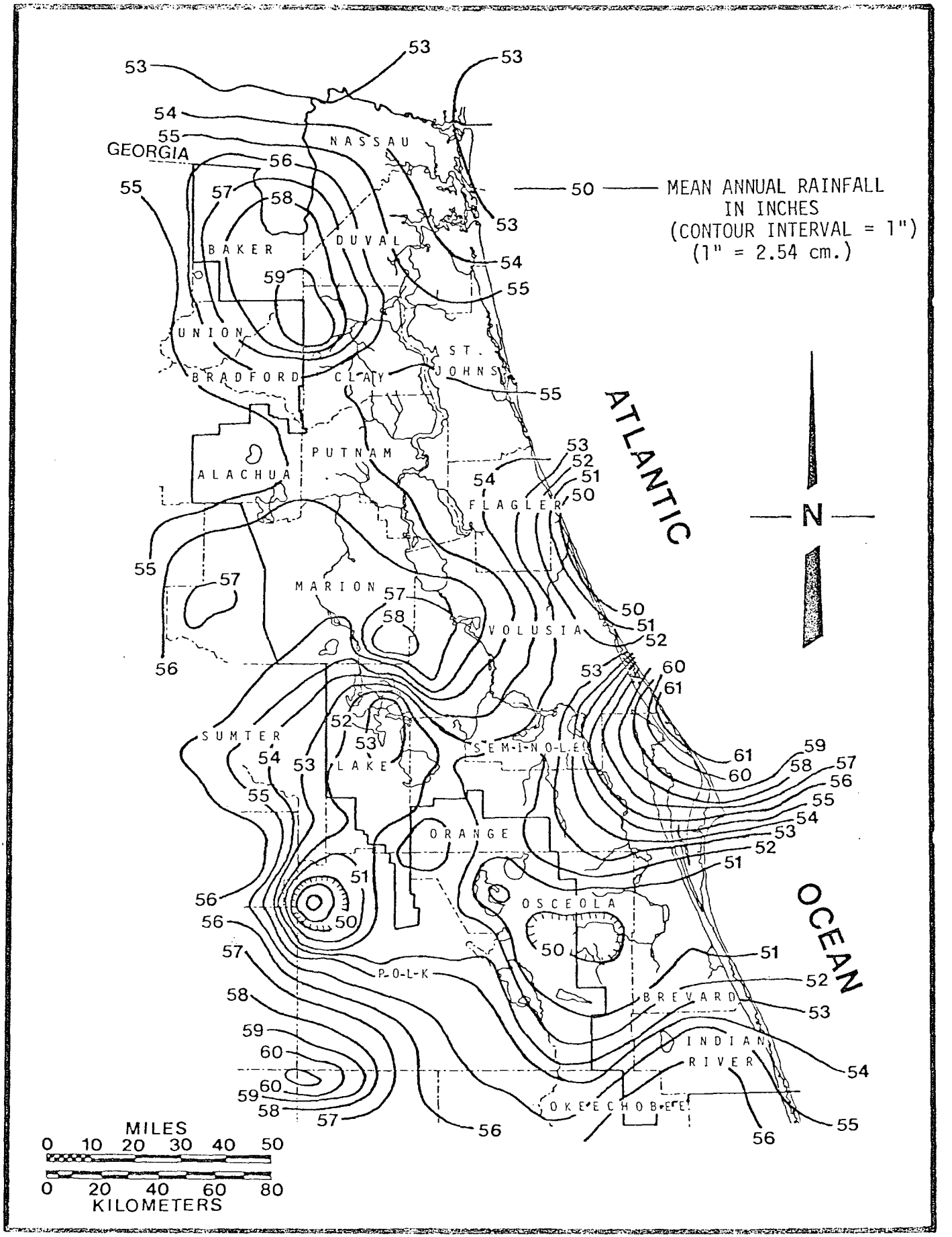

FIGURE 1. -- Mean Annual Rainfall in the SJRWMD, 1941-1970.

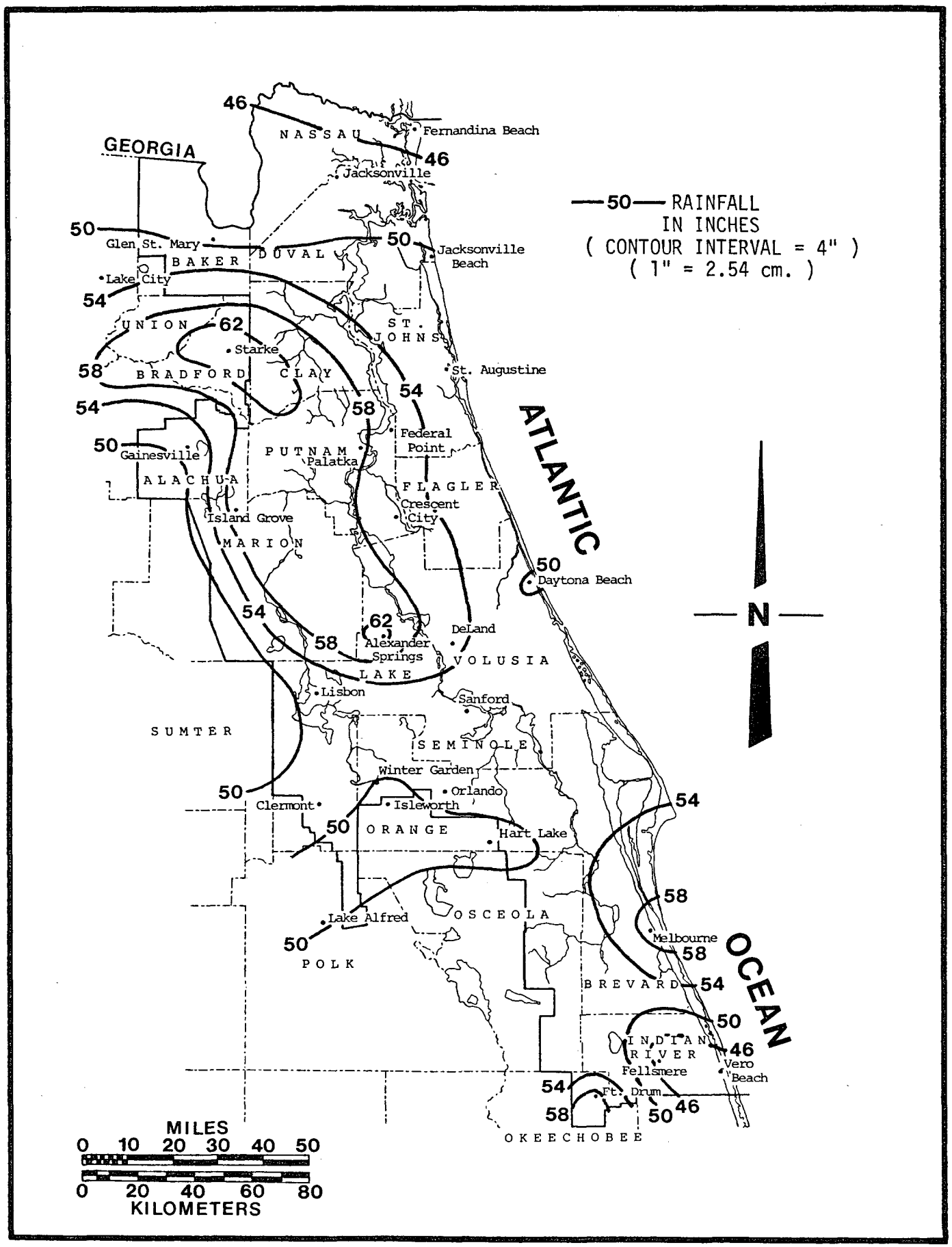

FIGURE 2. -- Rainfall in the SJRWMD, 1978 Water Year.

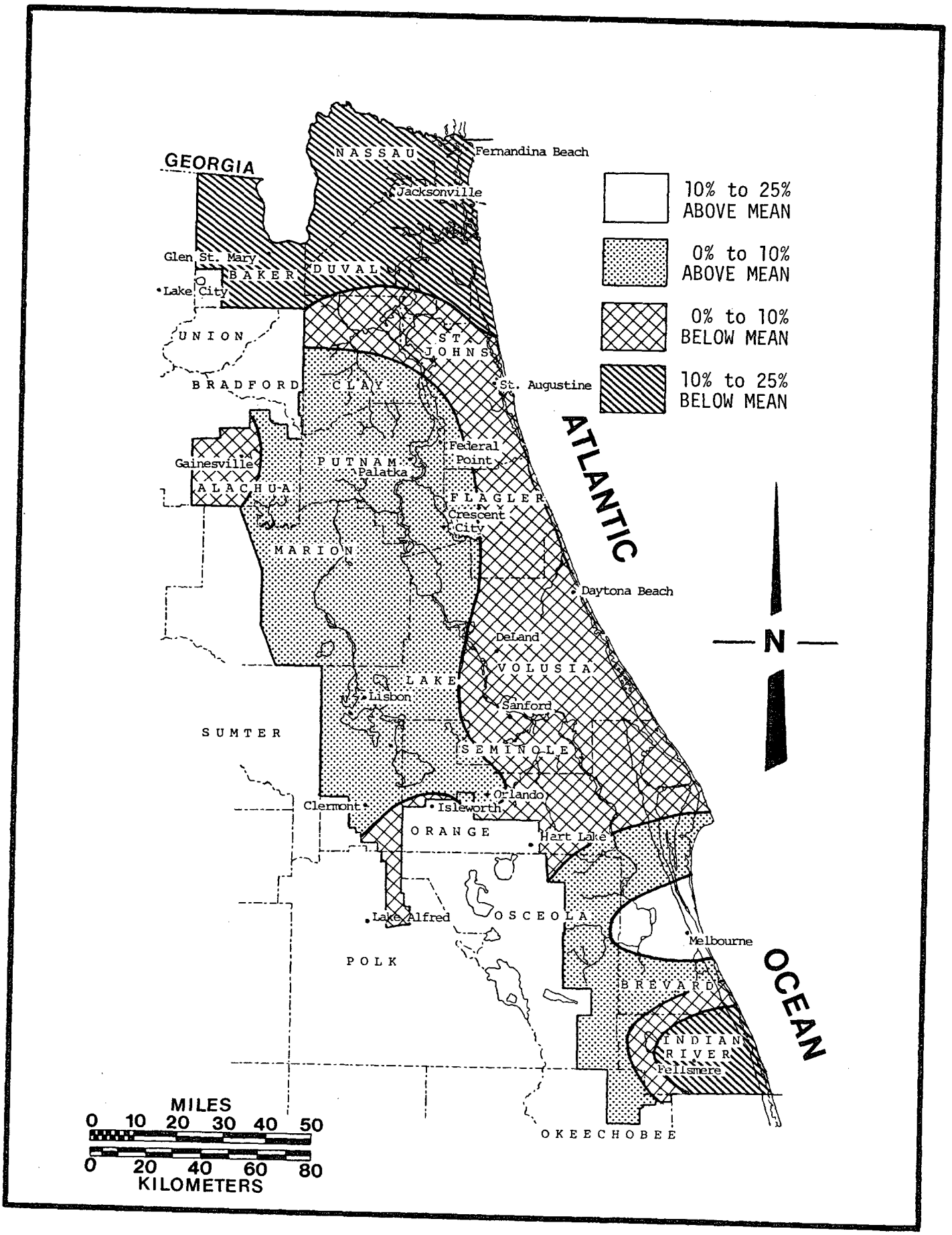

FIGURE 3. -- Percent Departure from Mean Annual Rainfall in the SJRWMD, 1978 Water Year.

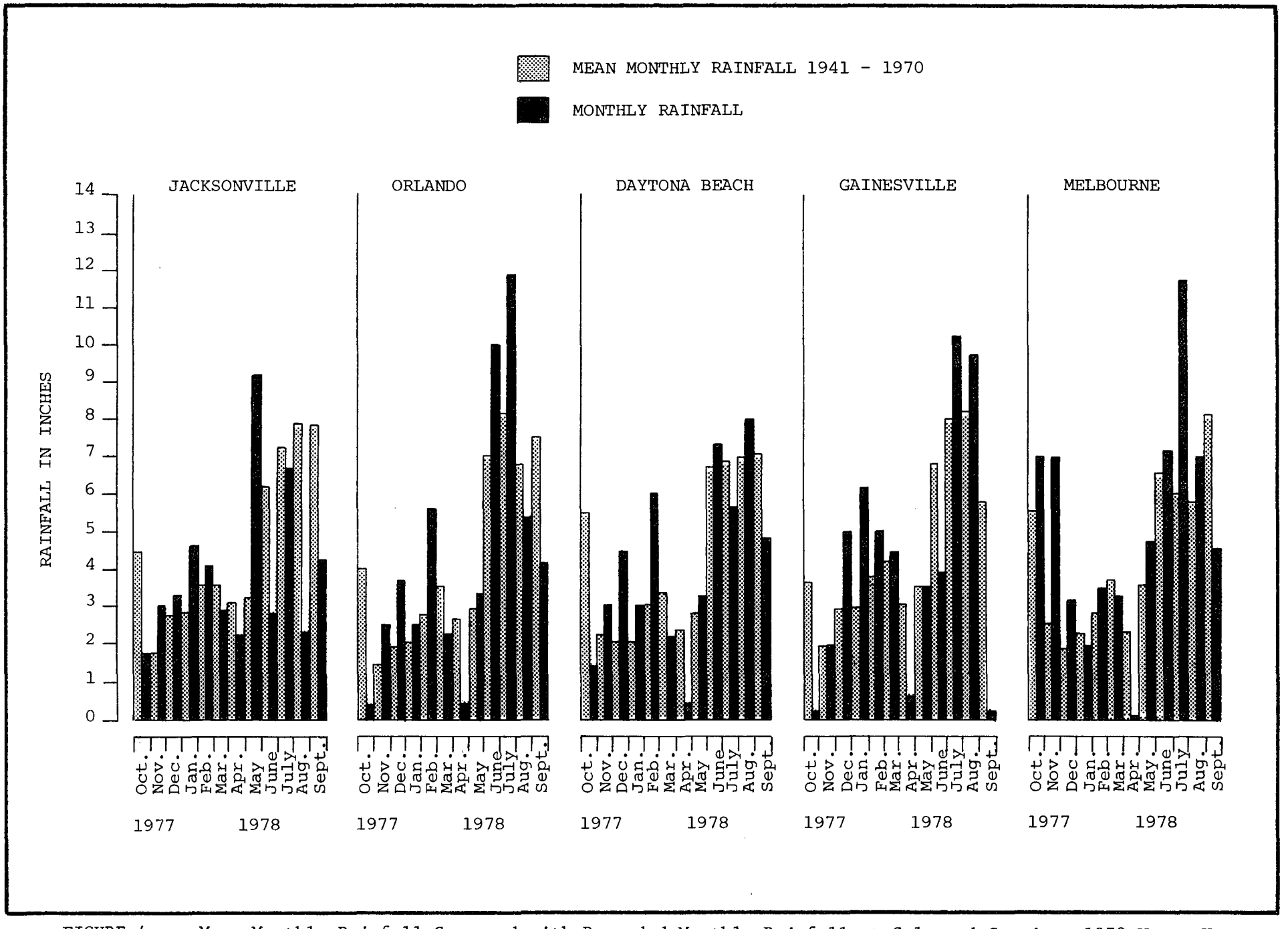

FIGURE 4. -- Mean Monthly Rainfall Compared with Recorded Monthly Rainfall at Selected Stations, 1978 Water Year.

In summary, rainfall throughout most of the District for the 1978 water year was within plus or minus 10 percent of the mean. Average rainfall for the entire District was 2.3 inches below the long term average.

FLORIDAN AQUIFER

Water Levels

Figure 5 shows the potentiometric surface of the Floridan aquifer in the St. Johns River Water Management District for May 1978. Differences in water levels between July 1961 and May 1977 are shown in Figure 6. Over this 16-year period, there has been a general decline in the potentiometric surface throughout the District. Changes of less than ten feet are noted in the central and western portions, while changes of ten feet or slightly more are noted in the remainder. One notable exception is the Fernandina Beach area where the potentiometric surface has dropped approximately 100 feet due to heavy industrial pumpage.

Fluctuations in water levels of four wells with long periods of record are shown in Figure 7. The geographic locations of these wells within the District are shown in Figure 6.

Well No. V-1 is located in a relatively undeveloped area in south central Volusia County about 11 miles southeast of Deland on the flank of a potentiometric high. Comparison of water levels for the 1977 and 1978 water years show that the high water level was 0.17 feet higher, and the low water level was 0.71 feet higher in the 1978 water year than the corresponding levels in the 1977 water year.

Well No. C-5 is located in a relatively undeveloped lakes region of Clay County about one mile northwest of Keystone Heights and is situated within a

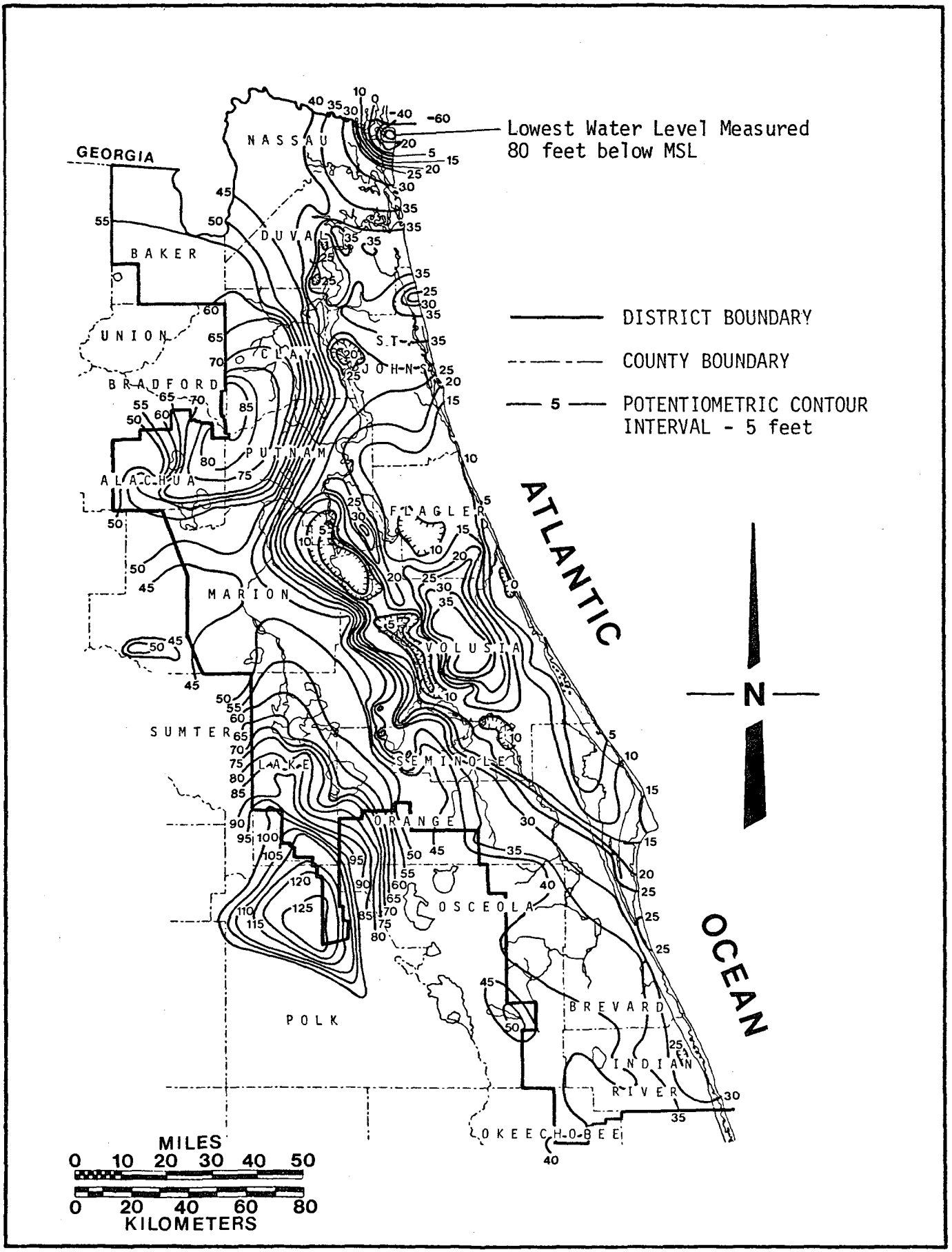

FIGURE 5. -- Potentiometric Surface of the Floridan Aquifer in the SJRWMD, May 1978.

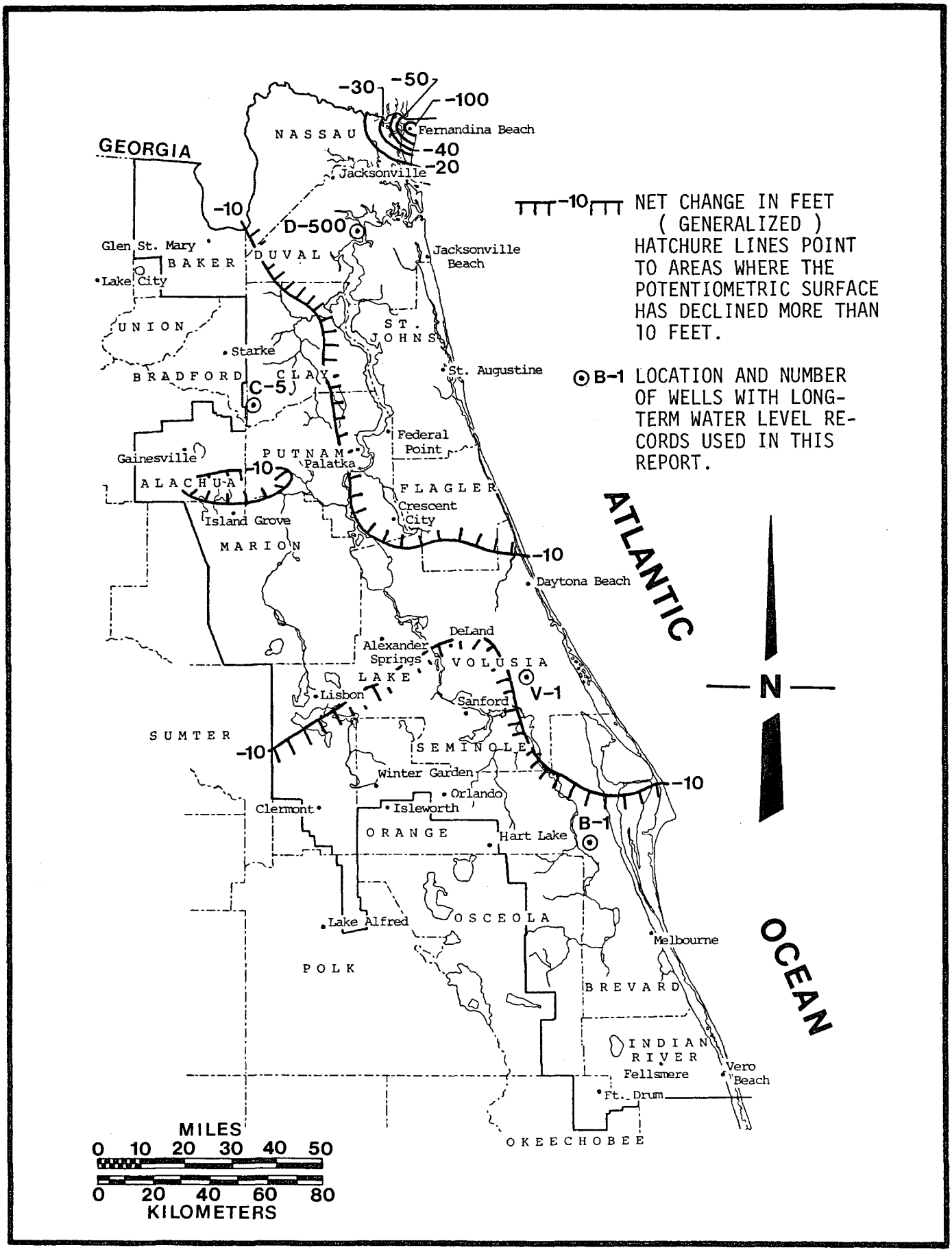

FIGURE 6. -- Net Change of Potentiometric Surface in the Floridan Aquifer Between July 1961 and May 1977.

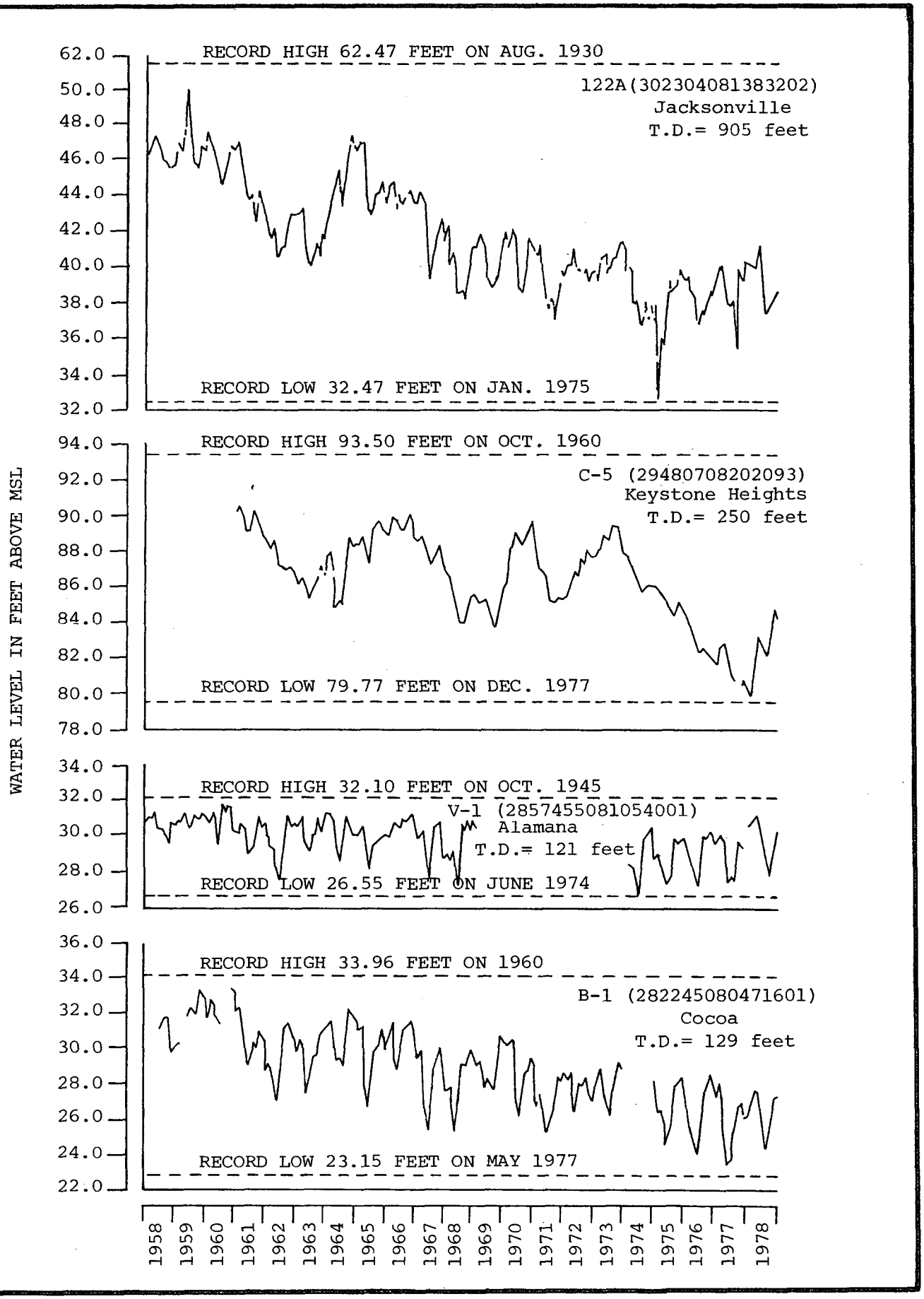

FIGURE 7. -- Hydrographs of Selected Wells in the SJRWMD.

potentiometric high. Comparison of the water levels for the 1977 and 1978 water years show that the high water level was 1.7 feet higher, and the low water level was 0.83 feet higher for the 1978 water year than the 1977 water year.

Because wells C-5 and V-1 are located near or on potentiometric highs (potential recharge areas) in areas where the Floridan aquifer is not unduly stressed by development, variation in water levels in these wells are indicative of difference between natural recharge to and discharge from the Floridan aquifer.

Well 122-A is located in an urban area of Jacksonville in Duval County. Comparison of water levels for the 1977 and 1978 water years show that the maximum water level is 0.20 feet higher, and the minimum is 1.55 feet higher in the 1978 water year than in the 1977 water year.

Well No. B-1 is located near a developed urban area of Brevard County about four miles northwest of Cocoa. Comparison of water levels for the 1977 and 1978 water years show that the high water level is 0.77 feet lower, and the low is 0.95 feet higher in the 1978 water year than in the 1977 water year.

Variation in water levels in wells 122-A and B-1 are indicative of areas where urban, industrial, and agricultural development has placed a stress upon the Floridan aquifer through increased water use.

Water Quality

High chloride concentration in Floridan aquifer water is a major problem in some parts of the St. Johns River Water Management District. Figure 8 shows chloride concentration in ground water in the upper part of the Floridan aquifer for 1970 (modified from DNR, 1970). Data published by the Brevard County Planning Department indicates that Floridan aquifer water along a narrow band (too narrow to show up in Figure 8), extending from Cape Canaveral to Indialantic

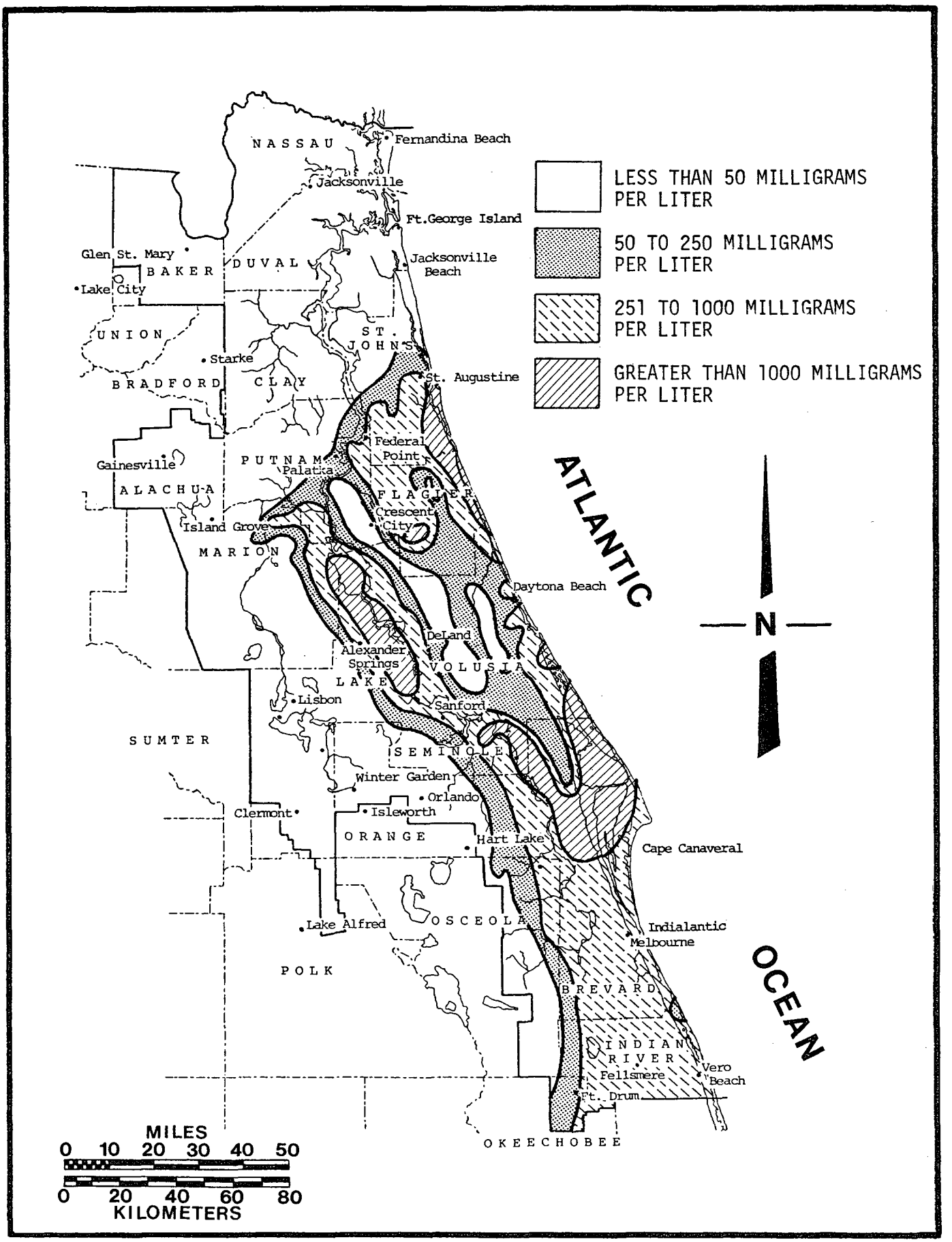

FIGURE 8. -- Chloride Concentration in the Floridan Aquifer in the St. Johns River Basin (Modified from DNR, 1970).

currently exhibits chloride concentrations in excess of 1,000 mg/l as a result of continued and increased pumping stress in that area. On the 1970 chloride map, this area is shown as having chloride concentrations between 251 and 1,000 mg/l. Two additional areas too small to show up as a pattern on the map in which chloride concentrations are of concern are the Fernandina Beach and Ft. George Island areas. Chloride concentration in water samples collected during the 1978 water year from four wells in the Fernandina Beach area ranged from 118 mg/l to 225 mg/l. A water sample collected from one well in the Ft. George Island area during 1978 exhibited a chloride concentration of 166 mg/l.

UNCONFINED AND SECONDARY ARTESIAN AQUIFER

The unconfined or shallow water aquifer consists of surficial clastics; namely, sand, sandy clay, shell beds, or deposits consisting of a mixture of sand and shell. Areally, it is of variable thickness and exhibits variable water-yielding characteristics. The unconfined aquifer occupies a position between land surface and the top of the first major confining bed.

The secondary artesian aquifer generally consists of thin, discontinuous lenses of shell, limestone, sand, or sand and gravel interbedded with clay. The secondary artesian aquifer, where present, generally occupies a position within the Hawthorn Formation or other confining bed and lies between the shallow water table aquifer and the top of the Floridan aquifer.

The shallow water table and the secondary artesian aquifers are most extensively developed for domestic and public supplies in the southeast part of the District where water from the Floridan aquifer has a chloride concentration in excess of drinking water standards (i.e. 250 mg/l).

Locally, water from the unconfined or secondary artesian aquifers may contain undesirable concentrations of chloride and/or iron. High concentrations of these two constituents account for most water quality problems in these aquifers. High chloride concentrations in the coastal unconfined or secondary artesian aquifers may be found in areas: (1) where overpumping of shallow wells has caused salt water intrusion, or (2) natural intrusion has occurred where these aquifers underlie areas of low topographic relief in close proximity to a saline water body.

Available data indicate that iron concentration in waters from wells completed in the secondary artesian or water table aquifers range from 0 to 19 mg/1 within the St. Johns River Water Management District. The U. S. Environmental Protection Agency has proposed that iron concentration in drinking water should not exceed 0.3 mg/1.

SURFACE WATER

The streams and rivers of the St. Johns River Water Management District derive their flows from the runoff of precipitation and from ground water discharge. Overall rainfall was near normal for the District during the 1978 water year. As a result, streamflows were generally higher than during the 1977 water year, when an average District-wide rainfall deficiency of 11 inches was noted. Locations of stream or lake gaging stations used in the preparation of this report are shown in Figure 9.

Figures 10 through 16 present monthly streamflow data for water years 1976-1978 for selected gaging stations in the District. On some of the figures, the monthly median flows for the period of record are also shown. The median flow indicates the flow value equaled or exceeded for 50 percent of time during the period of record. Figures 10 through 14 show that flows were above median for most of the months during the 1978 water year.

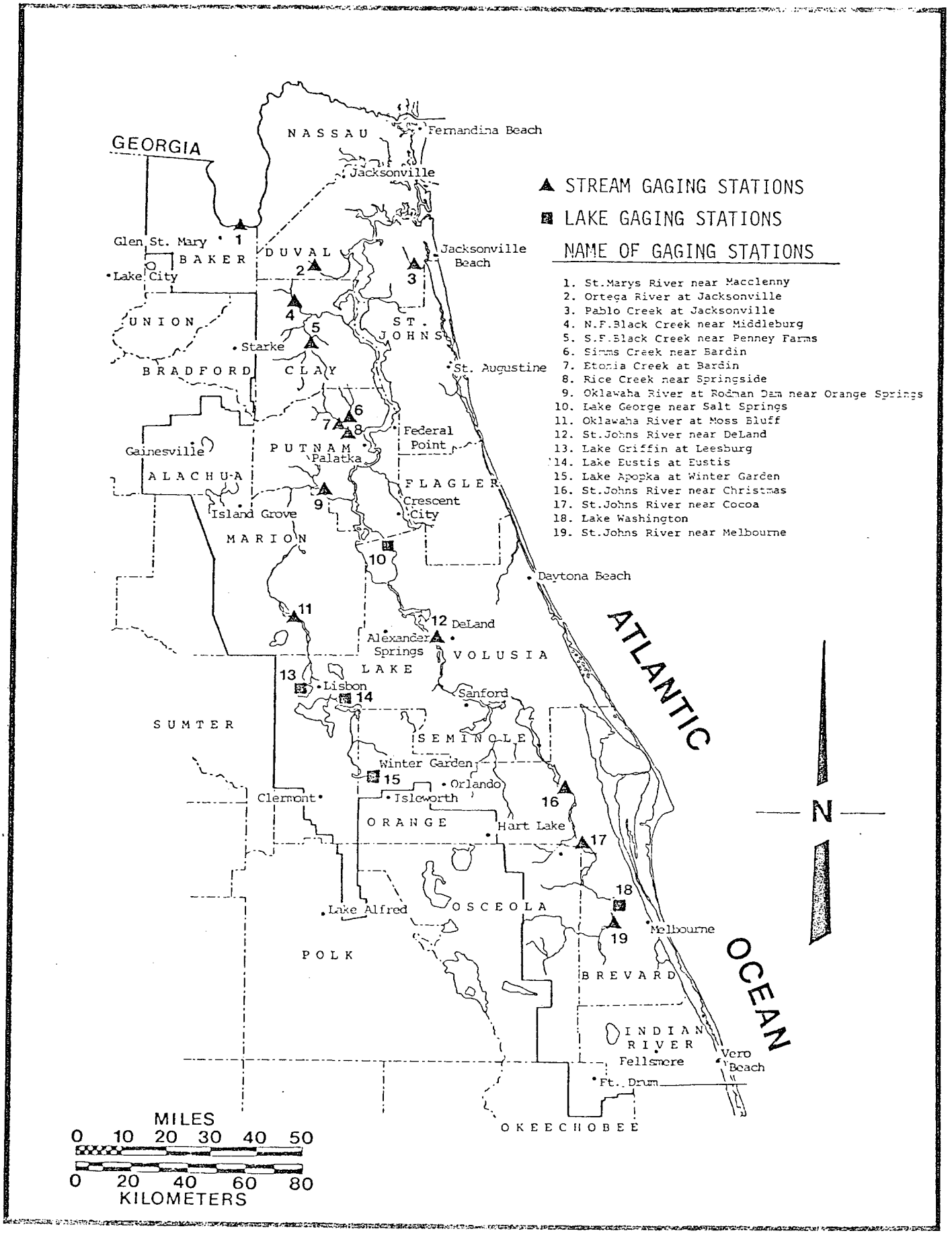

FIGURE 9. -- Location of Stream and Lake Gaging Stations Used in this Report.

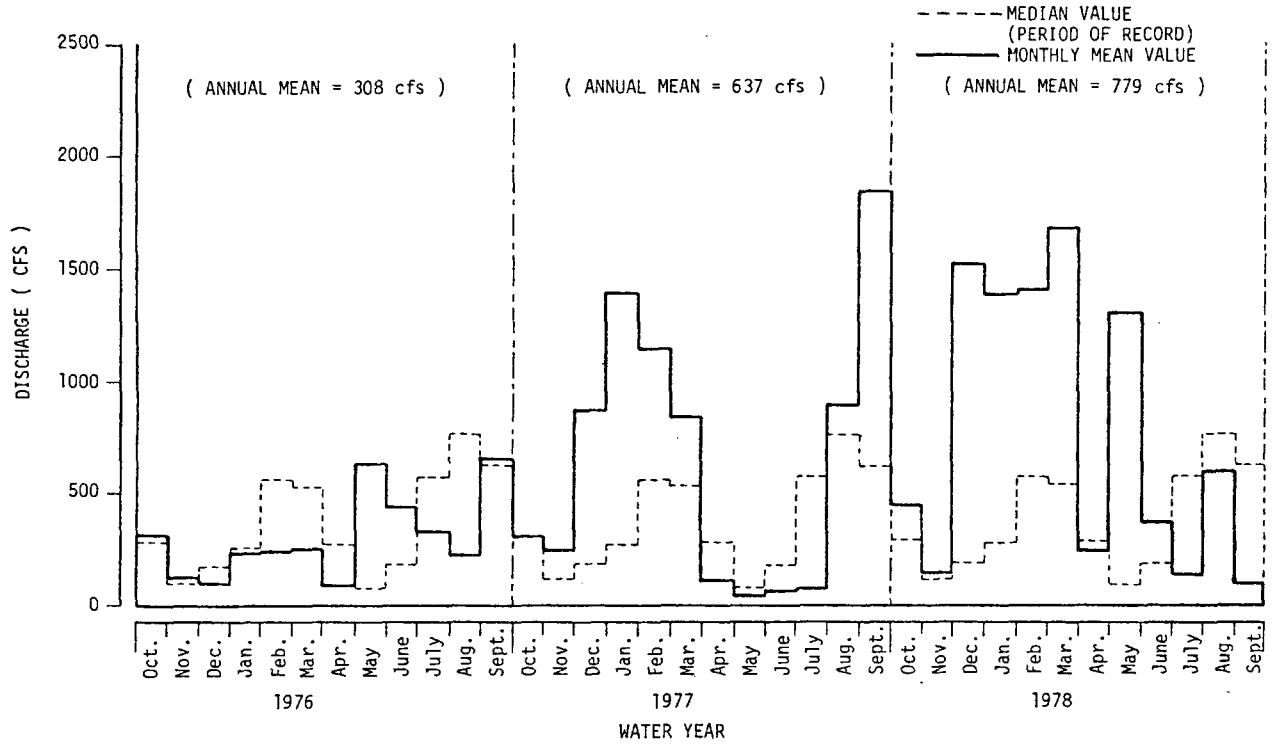

FIGURE 10. -- Streamflows, St. Marys River near Macclenny.

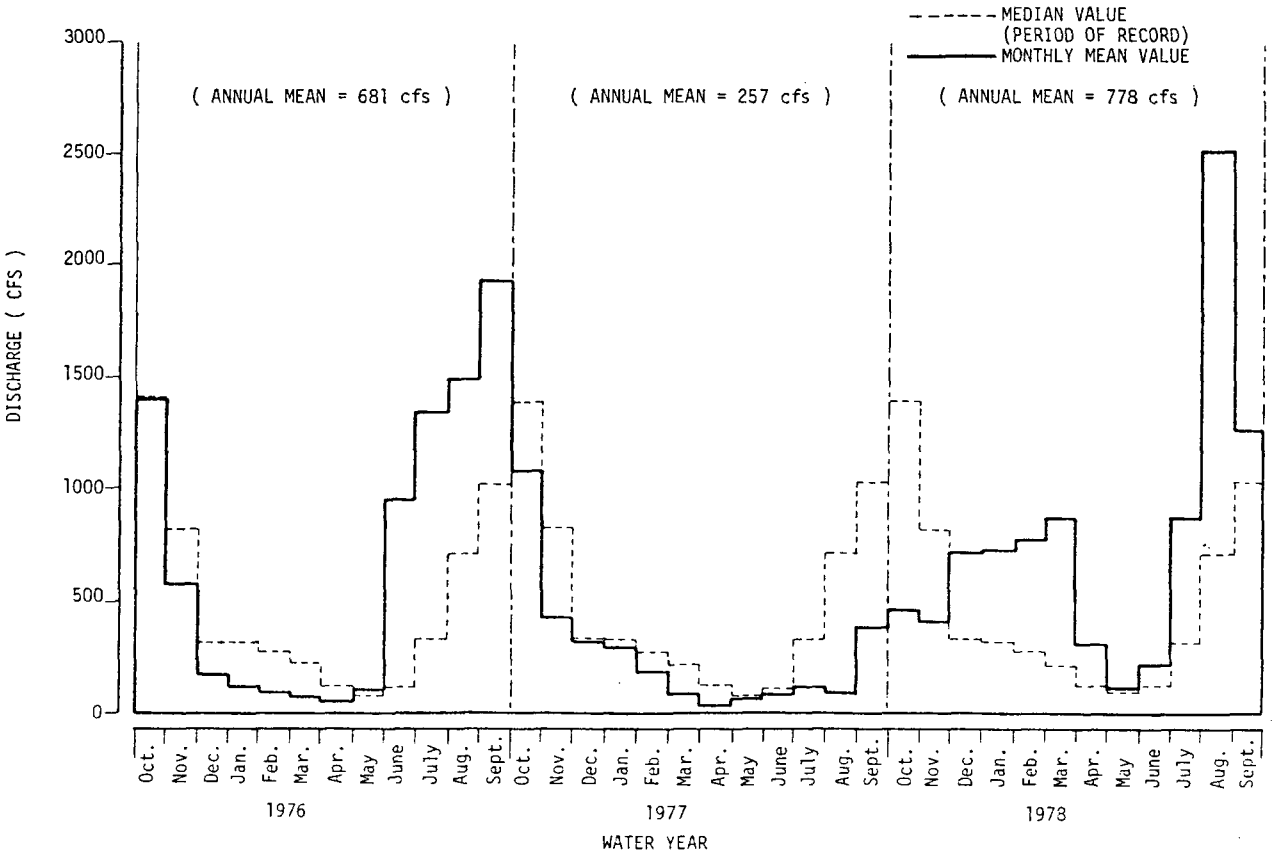

FIGURE 11. -- Streamflows, St. Johns River near Melbourne.

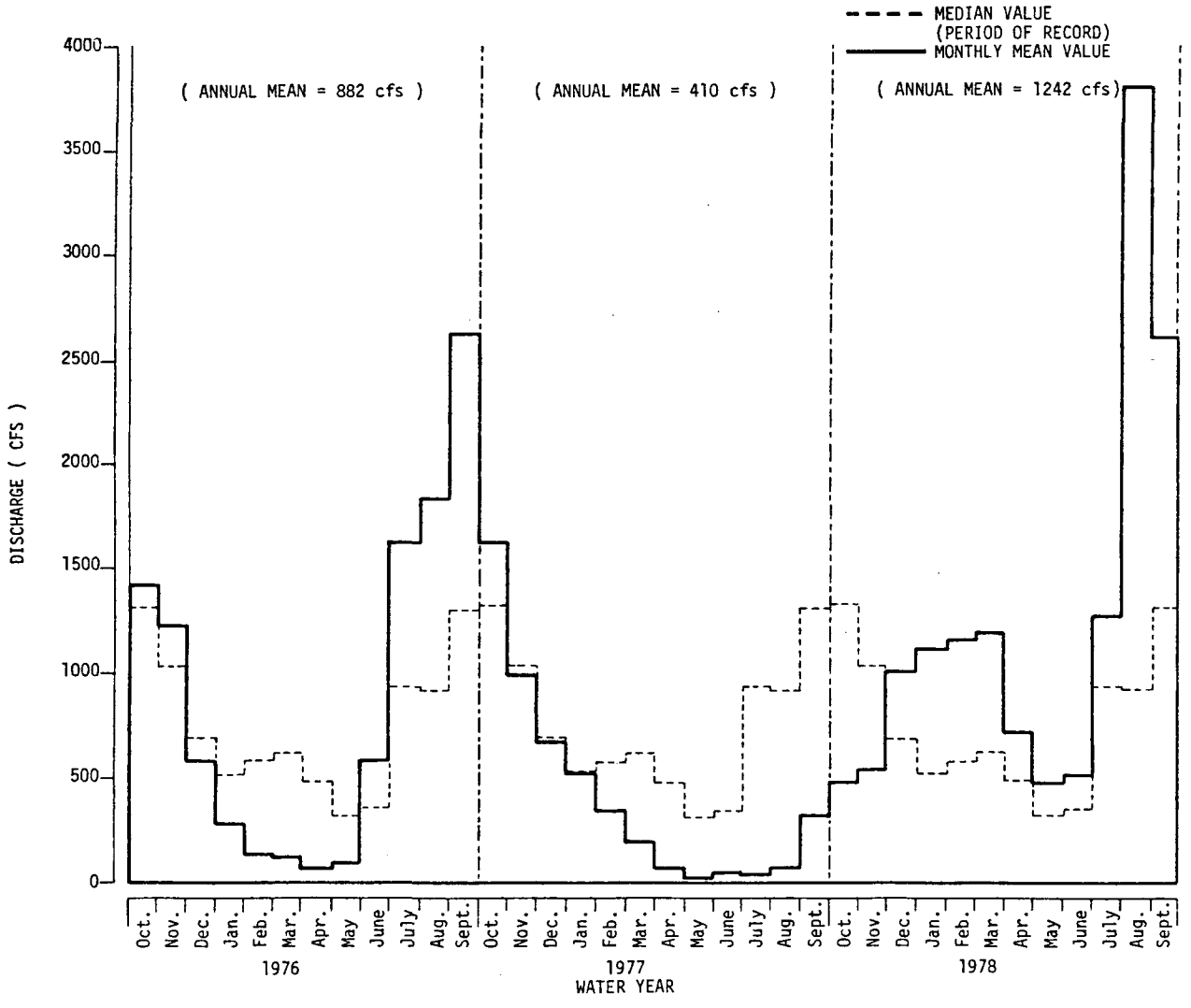

FIGURE 12. -- Streamflows, St. Johns River near Cocoa.

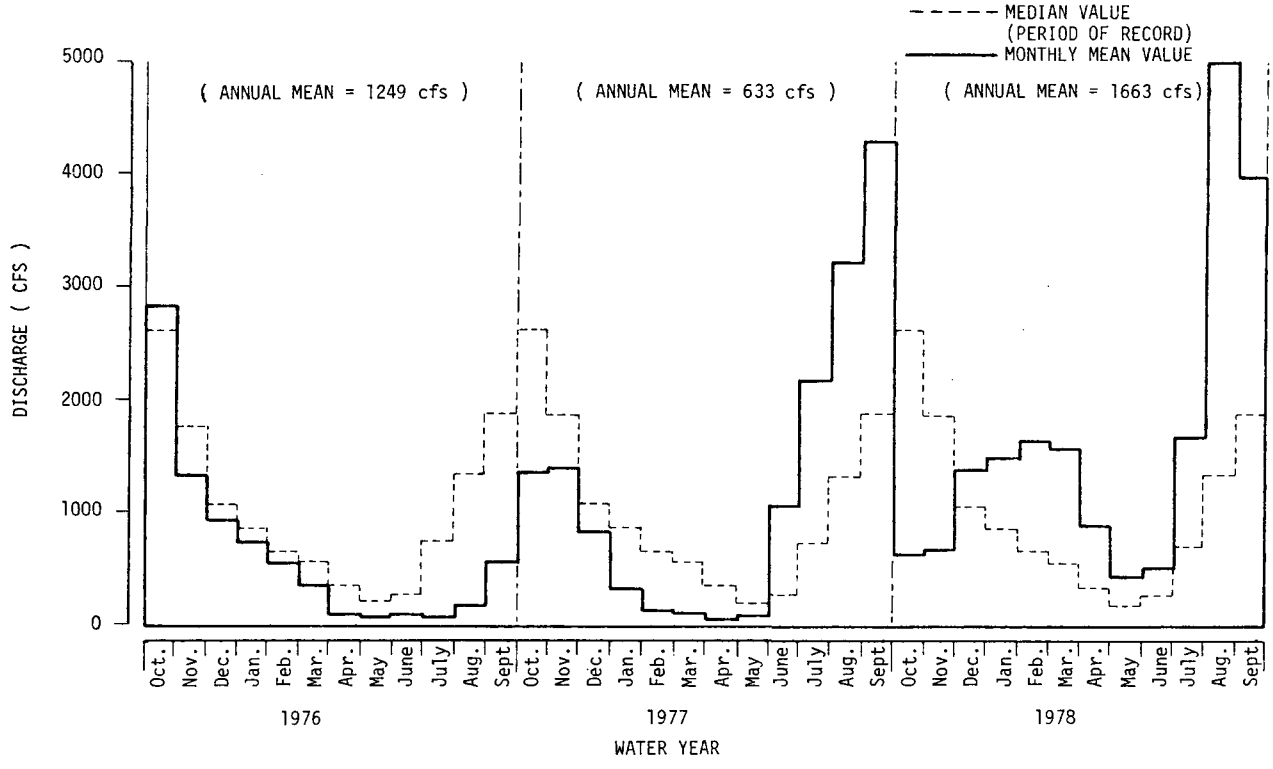

FIGURE 13. -- Streamflows, St. Johns River near Christmas.

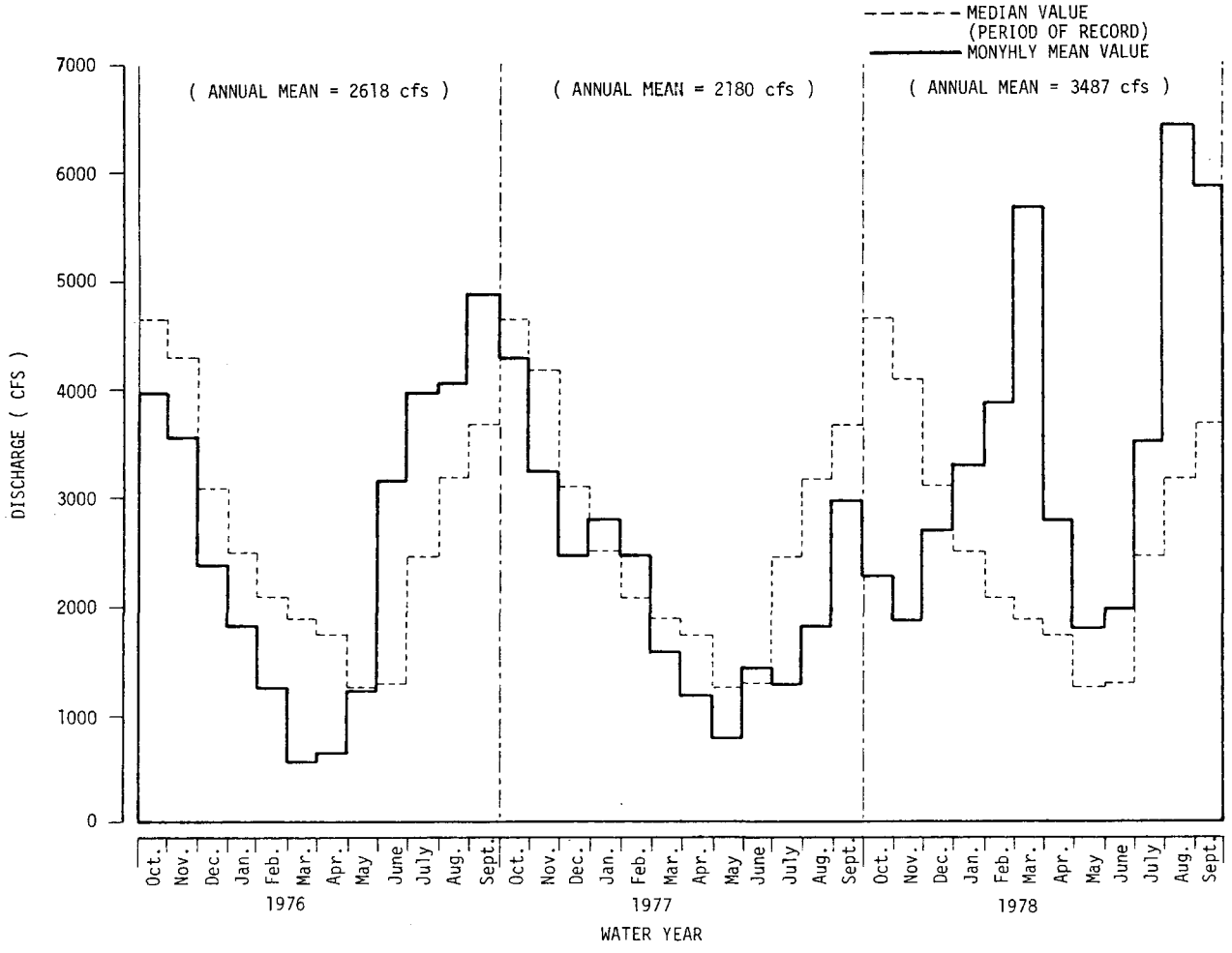

FIGURE 14. -- Streamflows, St. Johns River near Deland.

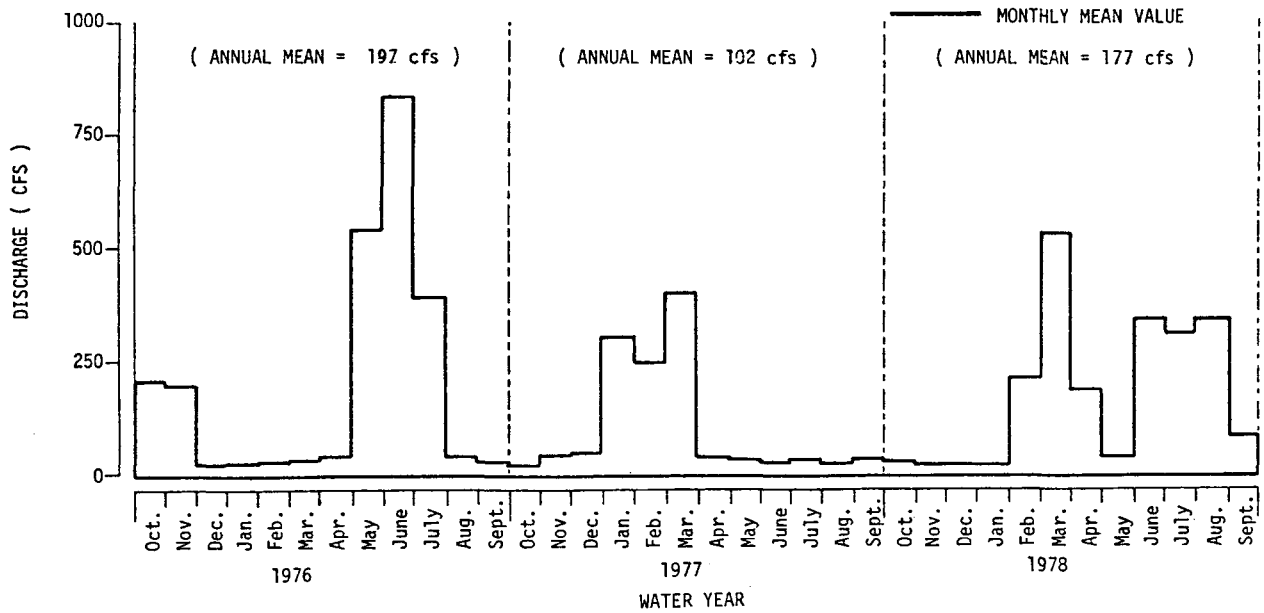

FIGURE 15. -- Streamflows, Oklawaha River at Moss Bluff.

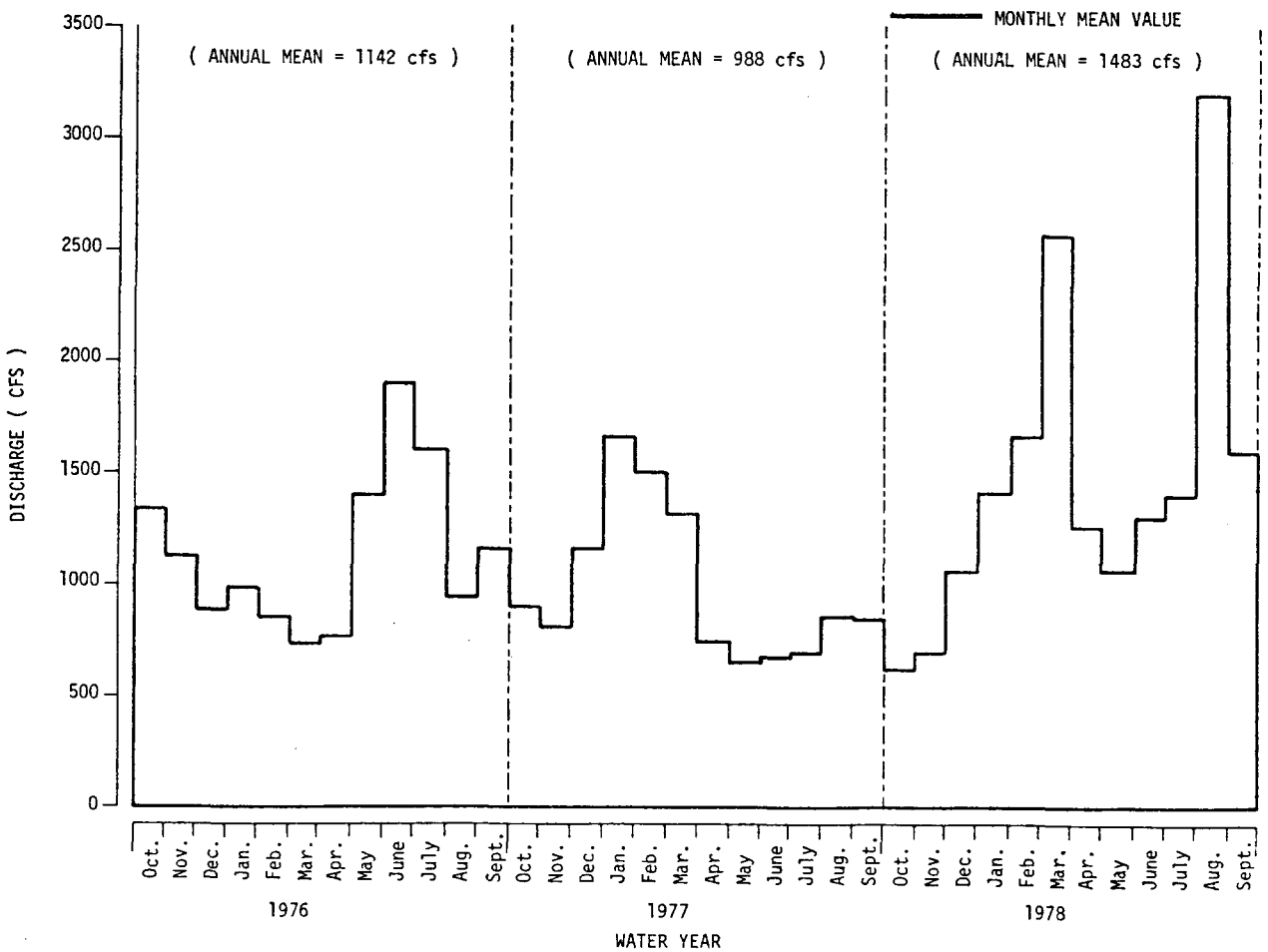

FIGURE 16. -- Streamflows, Oklawaha River at Rodman Dam, near Orange Springs.

Table 1 presents the annual mean flow data for different tributaries in the lower St. Johns River Basin.

TABLE 1. -- Annual Mean Flows for Selected Gaging Stations in the Lower St. Johns River Basin

Gaging Station	Mean Flow in cfs Water Year 1976	1977	1978
Etonia Creek at Bardin	86.1	85.4	115
Rice Creek near Springdale	28.5	43.6	79.8
Simms Creek near Bardin	P.R.	31.9	56.6
South Fork Black Creek near Penney Farms	92.2	74.9	146
North Fork Black Creek near Middleburg	91.6	125	198
Ortega River at Jacksonville	16.4	21.5	28.1
Pablo Creek at Jacksonville	30.4	18.2	22.5

P.R.--Only partial records were available for the water year shown.

Lake elevations in the St. Johns River Basin were, in general, higher during 1978 water year than 1977 water year (Figures 17 and 18 show monthly elevations for two typical lakes.) The principal lakes in the Oklawaha River Basin were maintained at minimum desirable levels in the early part of the 1978 water year to facilitate construction of the new Burrell Dam at Lisbon. In the latter part of the water year, rainfall was well below normal, resulting in generally lower annual mean elevations for the chain of lakes in Oklawaha during water year 1978. Figures 19 through 21 show monthly elevations for Lakes Apopka, Eustis, and Griffin, respectively.

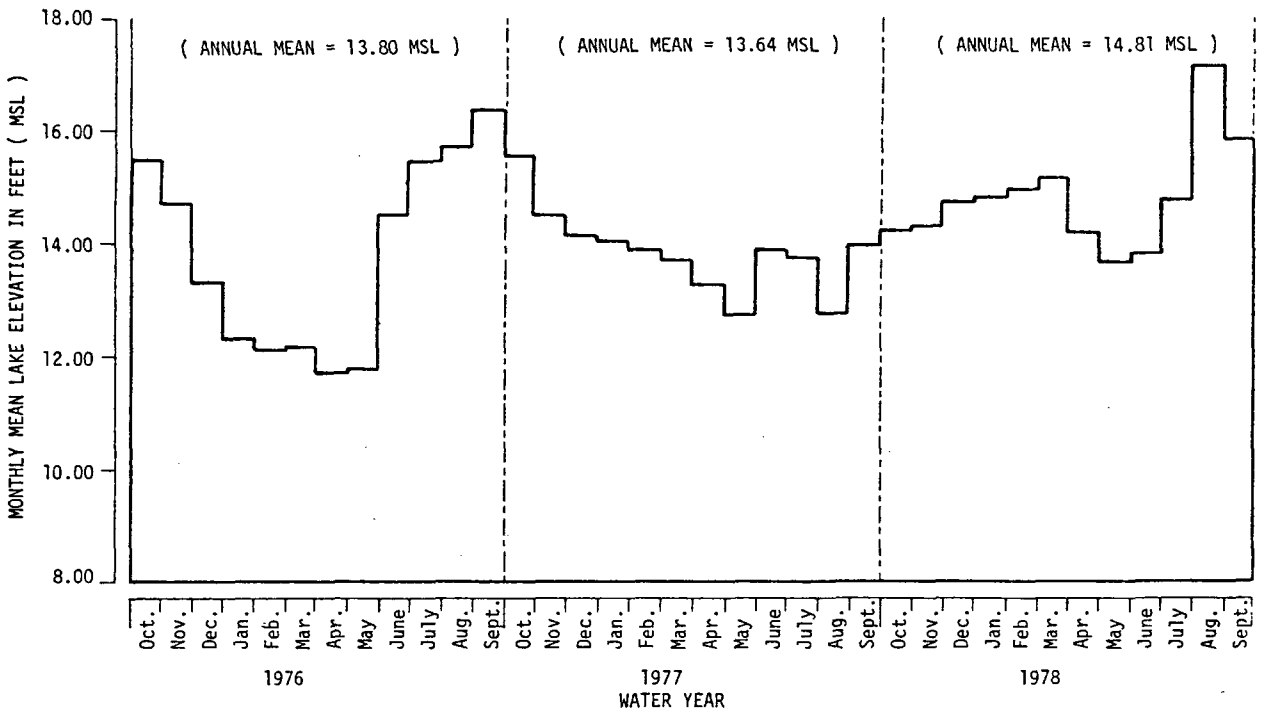

FIGURE 17. -- Elevation, Lake Washington.

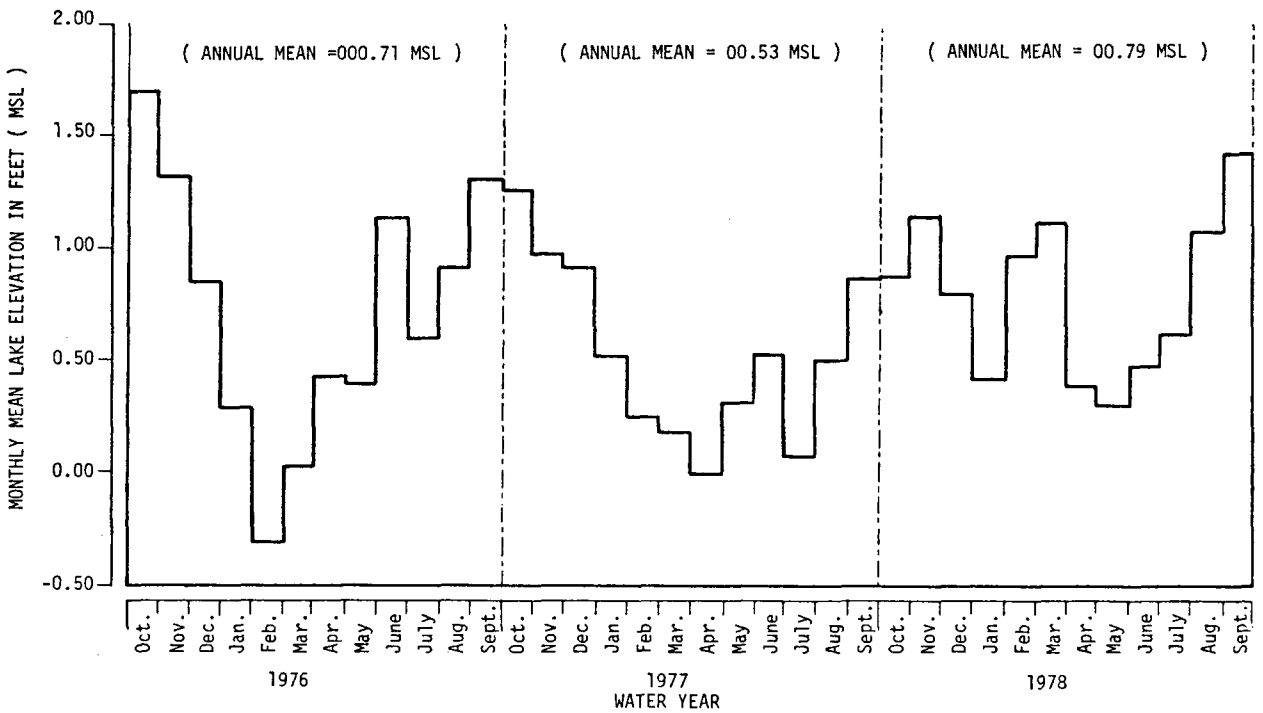

FIGURE 18. -- Elevation, Lake George near Salt Springs.

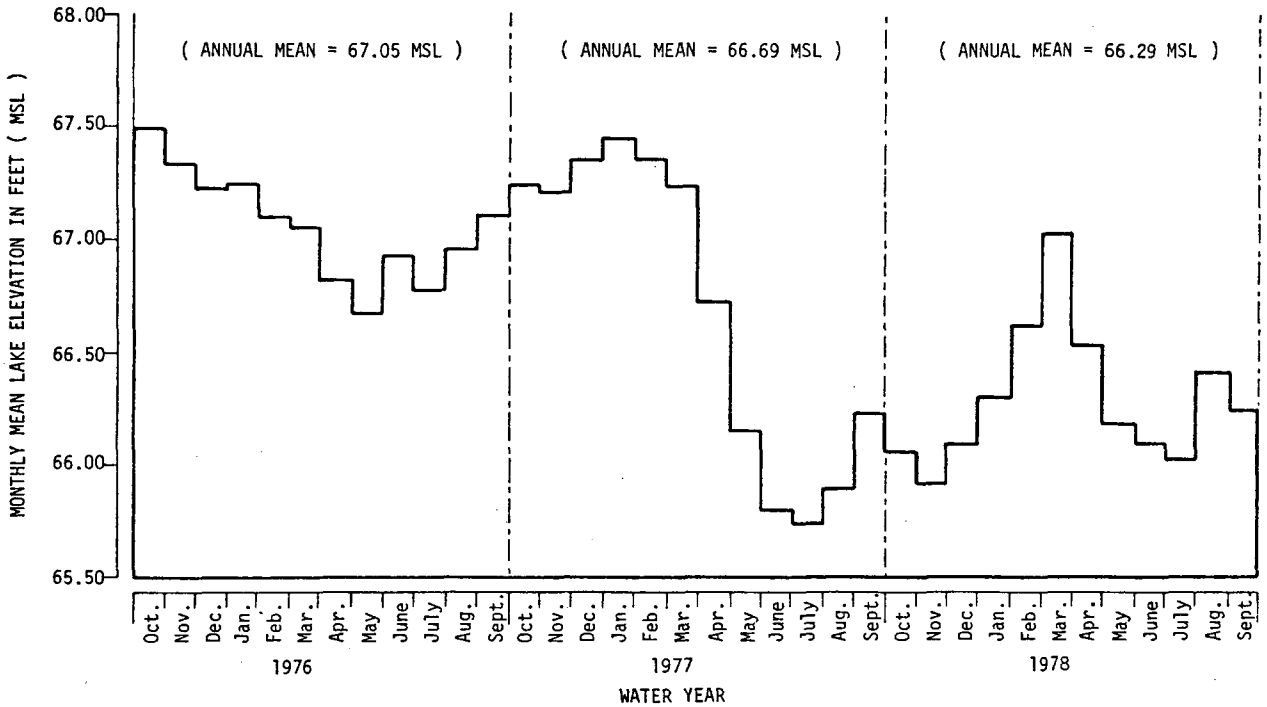

FIGURE 19. -- Elevation, Lake Apopka at Winter Garden.

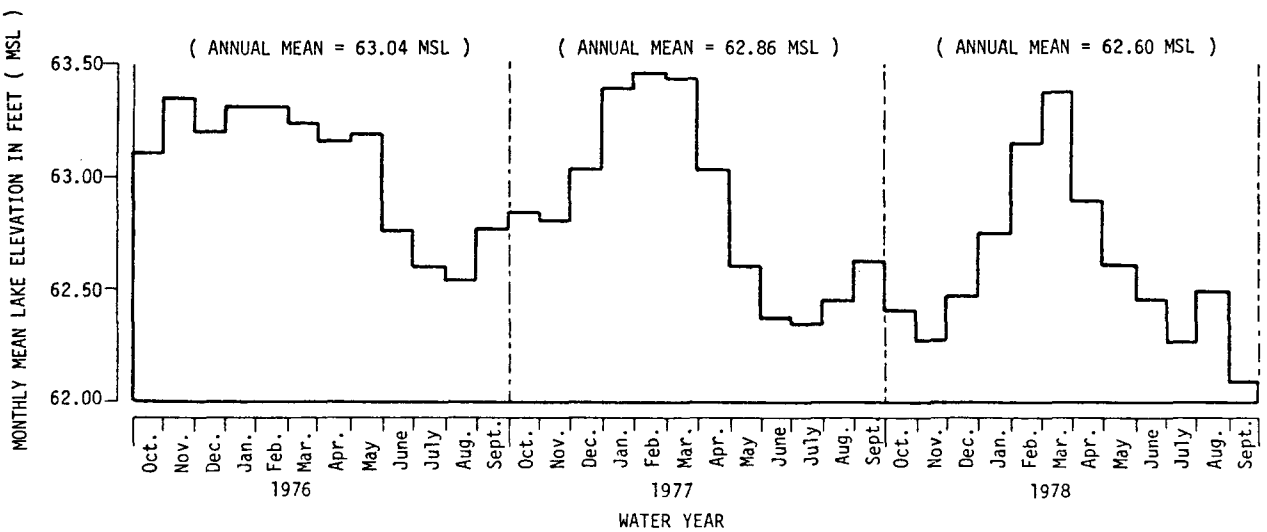

FIGURE 20. -- Elevation, Lake Eustis at Eustis.

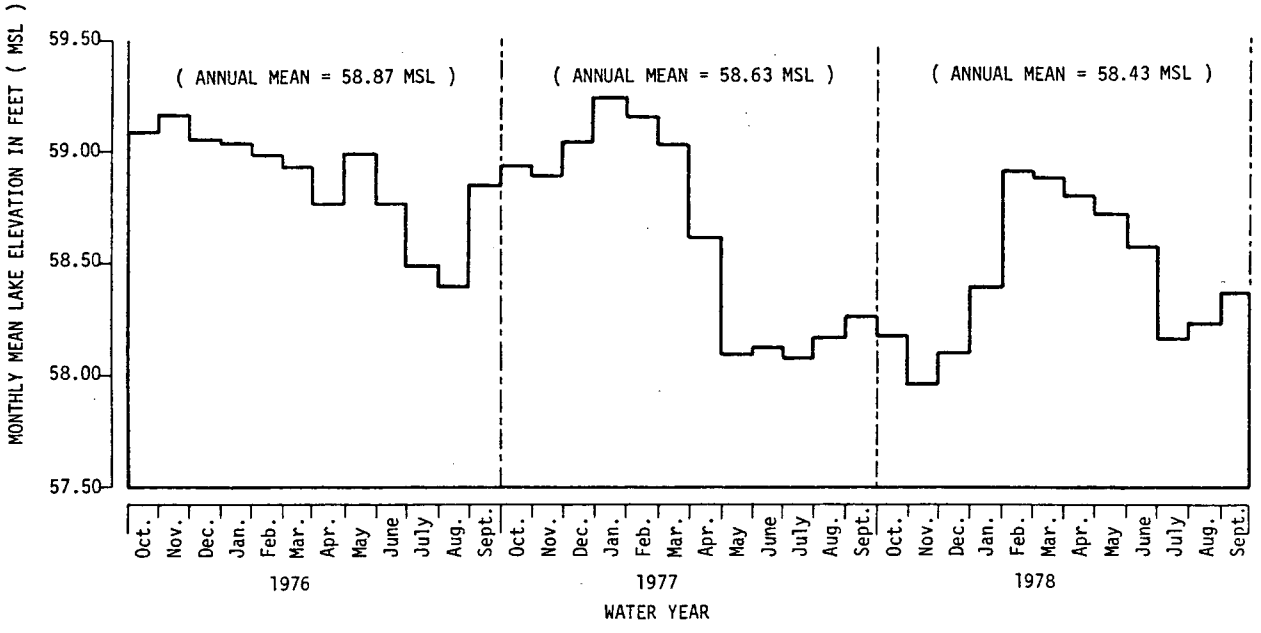

FIGURE 21. -- Elevation, Lake Griffin at Leesburg.

STATUS OF WATER RESOURCES INVESTIGATIONS AND ACTIVITIES

DEPARTMENTAL INVESTIGATIONS

Salt Water Intrusion Study

In the coastal areas of Nassau, Duval, St. Johns, and Flagler Counties, the nature and extent of salt water intrusion is being investigated. The study is being financed in part through a grant from the Coastal Plains Regional Commission with matching funds from the St. Johns River Water Management District.

Preliminary data collected allow some tentative generalizations to be made. The shallow sand and shell aquifers along the coastal barrier island contain limited quantities of fresh water in the form of thin lenses. Iron concentrations in the shallow aquifer range from less than 0.1 mg/l to 15.9 mg/l and vary with depth and local sediment lithology. The pollution potential of the shallow aquifer is greatest along the barrier islands where porous sands and shell beds transmit recharge rapidly.

Most intrusion in the Floridan aquifer is a result of the induced movement of connate salt water rather than modern lateral intrusion of sea water. The final report on this study is scheduled for release in late 1979.

Crescent City Study

A high exists in the potentiometric surface of the Floridan aquifer in the area of the Crescent City Ridge in Putnam County. The hydrologic significance of the high is being investigated by determining the elevation of the top of the Floridan aquifer, the thickness and location of confining units, and the hydrologic characteristics of the aquifers and confining beds in this area. Field work was completed in September 1978.

Preliminary evaluation of the data allow some tentative generalizations to be made. The highest potentiometric levels are found in the west central portion of the study area and result from recharge along the Crescent City Ridge. Water of the Floridan aquifer is generally of excellent quality with the exception of areas directly bordering the St. Johns River. The final report on this study is scheduled for release in mid 1979.

Upper St. Johns River Basin Study

The Upper St. Johns River Basin hydrologic model has been developed and will be used to evaluate alternative water management plans for this basin. The entire basin was divided into a number of sub-basins to simulate the inflows into the river valley. When this model is completed and refined to simulate the existing basin systems, it will then be used to plan alternative designs for flood stage reduction and for maintenance of stage fluctuations which reflect natural conditions. It could also be used to develop an artificial regulation schedule consistent with sound water management. Designs will be developed with consideration given to structural and non-structural approaches which produce the desired hydrological conditions.

The inventory study of the existing system and the recommended alternatives will be presented to the Governing Board for approval, rejection, or modification. After this action, the final report will be presented in a series of public hearings to solicit and accept comments for governmental agencies and all segments of the public.

Streamflow Frequency Analysis

The task of establishing low flows and flood flows for the District's Water Resource Management Plan and for use in developing permit criteria has

led to an investigation of methods used to forecast long term hydrologic events. In order to determine the most applicable statistical method for calculating low flows and flood flows within the District from existing data, a comprehensive study of commonly used 2-parameter and 3-parameter probability distribution is being performed. In addition, an investigation of the more sophisticated statistical methods is also planned. Under this investigation, a study entitled "A Generalized Evaluation of Some Important Properties and Percentiles of the Log Pearson Type 3 Distribution" is in preliminary draft form and is scheduled for release in 1979.

Oklawaha River Basin Study

This program provides hydrologic and engineering input into water management activities in the Oklawaha River Basin including inspection of water control structures, input on regulation schedules for water management releases, and basin water resources investigations and data collection activities.

As part of this program, a study is underway to evaluate the hydrologic characteristics of the basin to determine the adequacy of the existing lake stage regulation schedule. Special attention is being given to the flood storage requirements and peak flow rates through the structures. A mathematical model has been developed which will enable investigators to study basin response to different storm events for a wide variety of initial basin conditions.

Additionally, a study entitled "Geology of the Oklawaha Basin" has been completed and is scheduled for release in mid 1979. The thickness, horizontal extent, and structures formed by Miocene and Eocene Age geologic formations in the Oklawaha Basin were investigated. This information can be used in suggesting best water well construction practices in the area.

Salt Water Intrusion Study in Northeast Lake and Western Volusia Counties

In May 1978, an investigation of salt water intrusion in the Floridan aquifer in Northeast Lake and West Volusia Counties was begun. The objectives of the project are threefold: (1) to locate and delineate the salt water/fresh water interface, (2) to determine the relationship between geologic structure and salt water intrusion, and (3) to determine a maximum recommended depth for new wells in the area. Methods of investigation include geophysical logging and water quality sampling. The study is scheduled for completion in December 1979.

Tri-County Study

In some agricultural areas of Flagler, Putnam, and St. Johns Counties, intensive ground water withdrawals for irrigation have resulted in contamination of fresh upper zones of the Floridan aquifer by lower saline waters. Climate, hydrology, geology, and water use patterns were investigated to obtain a clearer understanding of the problem. Well construction, well spacing, pumping rates, pumping schedules, and irrigation techniques were found to be the major factors contributing to the deterioration of fresh water zones of the Floridan aquifer in these areas. This information was then used to develop suggested water management guidelines which could be used to limit or prevent further contamination of the resource. A report on this study, scheduled for release in 1978, has been rescheduled for release in 1979.

Upper Etonia Creek Basin Study

The Upper Etonia Creek Basin is located in portions of Alachua, Bradford, Clay, and Putnam Counties and is a major recharge area for the Floridan aquifer.

Hydrologic data collected during the study were used to develop a water budget for the basin. Components of the preliminary water budget showed rainfall was equal to 48.0 inches, evapotranspiration was equal to 34.2 inches, runoff was equal to 0.8 inches, and ground water outflow, calculated as the residual of the water budget equation, was equal to 16.8 inches.

Three areas of differing recharge potential were distinguishable and tentatively quantified: 15 to 20 inches per year within the sand hill areas, 6 to 14 inches per year within the karst areas of the Florahome Valley and Levys Prairie, and 1 to 5 inches per year along Mill Creek and the canals north of Florahome. The final report on this study is scheduled for release in 1979.

Monitoring Network

In order to supplement and update the District data base, a hydrologic monitoring network is operated and maintained. Ground water levels, lake stages, and rainfalls are monitored at selected locations throughout the District. This program is in a preliminary stage. The scope of the monitoring network is being modified or expanded according to the changing data needs of the District.

District Observation Well Network (DOWN Program)

In some areas of the District, very little hydrologic information is available on one or more of the aquifers present. To provide data for sound water management decisions in these areas, the DOWN Program is being instituted during the 1979 water year. Permanent observation wells will be drilled and instrumented for the collection of water level and water quality data. At some locations, pumping tests will be run to determine aquifer characteristics. Upon completion, these observation wells will be included in the District monitoring network.

COOPERATIVE ACTIVITIES

U. S. Geological Survey

The cooperative program with the U. S. Geological Survey for the 1978 water year consisted of three parts: network data collection, semi-annual potentiometric mapping, and technical assistance. Network data collection involved the maintenance of existing surface and ground water gaging stations. Data were collected in May and September for the compilation of District potentiometric maps. The May map has been issued as USGS Open File Report No. 79-257, and the September map is in preparation. May and September maps for 1977 were issued as USGS Open File Reports No. 77-629 and No. 78-69, respectively. Finally, technical assistance covered such things as special data collection and analysis.

The District also provides services to the USGS as part of this cooperative program. In Northwest Volusia County, the USGS is conducting a study of the effects of pumpage for frost and freeze protection on the Floridan aquifer. The District has drilled and installed five monitor wells, and has prepared a drilling report for this project.

Florida Bureau of Geology

The Bureau of Geology continued to develop geologic logs from core borings in their inventory, along with geologic cross-sections, and top of rock and structure contour maps for selected areas in the District. These tasks were accomplished through District funding of the part-time services of a Florida State University geology graduate student working under the supervision of the Bureau. The services provided were flexible and varied as the needs of the Water Resources Department changed during water year 1978.

Agricultural Stabilization and Conservation Services/Soil Conservation Service

The cooperative program with these agencies involves the partial plugging of agricultural artesian wells to reduce saline contamination resulting from upconing of saline water in a single aquifer or from the exchange of saline water between aquifers. The District provides technical assistance by geophysically logging wells and writing well plugging specifications, while the other agencies provide services such as funding for well plugging.

This program has proven to be very successful, and a paper entitled "Improvement of Water Quality Through A Cooperative Well Plugging Program" was prepared and released as Water Resources Department Information Circular No. 2. The paper is available to all interested parties. Additionally, this paper was recently presented at the Second Southeastern Ground Water Conference held in Atlanta in October 1978.

National Aeronautics and Space Administration

Due to budget cutbacks, NASA was forced to withdraw from the Florida Water Resources Management Information System, causing indefinite postponement of this project.

FIELD STATION ACTIVITIES

The Field Services Division of the Water Resources Department is located in Melbourne. This division is responsible for the maintenance and operation of District water control structures, navigation structures and appurtenant works in the Upper St. Johns River Basin and the Oklawaha Basin. Division activities include structure operation, aquatic weed control, and maintenance and repair of grounds, buildings, structures, rights-of-way, and equipment.

As part of the levee maintenance and repair program, approximately 4,000 acres were mowed; and 30 acres were reseeded in water year 1978. To repair washouts, 12,000 cubic yards of fill were placed along the levees. In addition, several thousand cubic yards of fill was stockpiled near the levees.

During this water year, approximately 200 miles of fence were checked, and 40 miles were repaired. Also, 400 acres of aquatic weeds were sprayed, and 15 acres were removed mechanically.

Major overhauls of Apopka Lock and Structure 157 were completed. Sand-blasting, repainting, replacement of new sluice gate frames and electrical systems were performed as needed.

REFERENCES

Brevard County Planning Department, 1979. Area-wide waste treatment management plan, draft final report.

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APPENDIX A

RAINFALL STATISTICS FOR 1941-1970

The mean rainfall for 1941-1970 is considered as normal for a given gaging station. However, other rainfall statistics, such as the median, normal range, and the lowest mean annual rainfall (LMAR) for a specified period will be of interest for comparison with 1978 water year rainfall data.

For 19 long term NOAA stations located within and close to the District, the rainfall statistics mean, median, normal range, maximum, minimum, and the LMAR for 3, 5, and 10 years were evaluated for the period 1941-70 by a computer program. These results are presented in Tables A-1 to A-3. Definitions for the above statistics are presented in the tables.

TABLE A-1. -- RAINFALL STATISTICS INCLUDING THE LOWEST MEAN ANNUAL RAINFALL FOR 3 YEARS FOR 1941-70(THE PERIOD USED FOR CALCULATING NORMAL RAINFALL)

(ALL RAINFALL VALUES ARE IN INCHES/YEAR)

STATION	MEAN	MEDIAN	NORMAL RANGE	MAX	MIN	LOWEST MEAN	PERIOD
FELLSMERE	55.86	55.52	50.22-62.49	78.83	27.94	41.77	1965-67
LAKE ALFRED	52.87	53.95	47.96-58.71	76.57	35.62	39.44	1954-56
MELBOURNE	50.79	50.56	44.50-57.76	73.28	32.52	41.61	1954-56
GAINESVILLE	54.60	55.33	47.75-61.14	76.95	35.24	41.98	1954-56
TITUSVILLE	59.20	61.21	49.22-66.03	81.74	41.88	48.95	1954-56
SANFORD	53.32	53.09	47.62-57.89	74.06	35.04	41.39	1961-63
ST.AUGUSTINE	55.22	55.27	46.94-62.64	79.91	32.68	38.12	1954-56
PALATKA	54.84	55.76	48.47-60.75	74.61	29.22	38.99	1954-56
ORLANDO	51.21	50.64	43.96-55.95	68.74	39.61	43.25	1942-44
GLEN ST. MARY	58.74	60.63	47.48-65.66	84.95	34.35	41.61	1954-56
JACKSONVILLE	54.47	54.00	49.00-62.53	77.37	36.83	43.75	1954-56
FERNANDINA BEACH	52.89	50.59	44.81-55.04	82.45	39.83	42.58	1954-56
DELAND	54.87	54.98	47.67-63.99	74.79	41.54	44.88	1954-56
DAYTONA BEACH	50.20	49.84	42.40-58.17	79.29	31.36	34.71	1954-56
CRESCENT CITY	54.67	53.37	46.75-62.43	75.03	37.97	42.80	1954-56
CLERMONT	51.41	51.67	47.11-55.15	68.09	32.28	40.88	1961-63
FEDERAL POINT	54.50	54.97	49.03-60.48	73.75	34.89	40.01	1954-56
HART LAKE	52.27	52.66	43.92-58.68	76.66	32.61	41.20	1961-63
ISLEWORTH	53.14	50.68	45.14-60.82	78.78	35.33	42.08	1954-56

NOTES:-
MEAN - ARITHMETIC AVERAGE OF ANNUAL RAINFALL VALUES FOR THE PERIOD OF RECORD
MEDIAN - RAINFALL WHICH WAS EQUALED OR EXCEEDED FOR 50% OF YEARS DURING THE PERIOD OF RECORD
NORMAL RANGE - RAINFALL WAS GREATER THAN THIS RANGE FOR 25% OF YEARS AND LESS THAN THIS RANGE FOR 25% OF YEARS DURING THE PERIOD OF RECORD
MAX - THE HIGHEST RECORDED ANNUAL RAINFALL FOR THE PERIOD OF RECORD
MIN - THE LOWEST RECORDED ANNUAL RAINFALL FOR THE PERIOD OF RECORD
LOWEST MEAN - MEAN ANNUAL RAINFALL FOR ANY 3-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL
PERIOD - CALENDAR YEARS FOR WHICH THE LOWEST MEAN RAINFALL OCCURRED

TABLE A-2. -- RAINFALL STATISTICS INCLUDING THE LOWEST MEAN ANNUAL RAINFALL FOR 5 YEARS FOR 1941-70(THE PERIOD USED FOR CALCULATING NORMAL RAINFALL)

(ALL RAINFALL VALUES ARE IN INCHES/YEAR)

STATION	MEAN	MEDIAN	NORMAL RANGE	MAX	MIN	LOWEST MEAN	PERIOD
FELLSMERE	55.86	55.52	50.22-62.49	78.83	27.94	43.47	1963-67
LAKE ALFRED	52.87	53.95	47.96-58.71	76.57	35.62	44.64	1961-65
MELBOURNE	50.79	50.56	44.50-57.76	73.28	32.52	45.59	1961-65
GAINESVILLE	54.60	55.33	47.75-61.14	76.95	35.24	47.95	1952-56
TITUSVILLE	59.20	61.21	49.22-66.03	81.74	41.88	53.18	1954-58
SANFORD	53.32	53.09	47.62-57.89	74.06	35.04	46.17	1961-65
ST.AUGUSTINE	55.22	55.27	46.94-62.64	79.91	32.68	46.51	1954-58
PALATKA	54.84	55.76	48.47-60.75	74.61	29.22	44.26	1952-56
ORLANDO	51.21	50.64	43.96-55.95	68.74	39.61	47.17	1942-46
GLEN ST. MARY	58.74	60.63	47.48-65.66	84.95	34.35	45.90	1951-55
JACKSONVILLE	54.47	54.00	49.00-62.53	77.37	36.83	47.35	1954-58
FERNANDINA BEACH	52.89	50.59	44.81-55.04	82.45	39.83	43.54	1954-58
DELAND	54.87	54.98	47.67-63.99	74.79	41.54	49.35	1961-65
DAYTONA BEACH	50.20	49.84	42.40-58.17	79.29	31.36	39.15	1954-58
CRESCENT CITY	54.67	53.37	46.75-62.43	75.03	37.97	48.08	1954-58
CLERMONT	51.41	51.67	47.11-55.15	68.09	32.28	45.12	1961-65
FEDERAL POINT	54.50	54.97	49.03-60.48	73.75	34.89	46.03	1952-56
HART LAKE	52.27	52.66	43.92-58.68	76.66	32.61	43.26	1961-65
ISLEWORTH	53.14	50.68	45.14-60.82	78.78	35.33	46.85	1948-52

NOTES:-
MEAN - ARITHMETIC AVERAGE OF ANNUAL RAINFALL VALUES FOR THE PERIOD OF RECORD
MEDIAN - RAINFALL WHICH WAS EQUALED OR EXCEEDED FOR 50% OF YEARS DURING THE PERIOD OF RECORD
NORMAL RANGE - RAINFALL WAS GREATER THAN THIS RANGE FOR 25% OF YEARS AND LESS THAN THIS RANGE FOR 25% OF YEARS DURING THE PERIOD OF RECORD
MAX - THE HIGHEST RECORDED ANNUAL RAINFALL FOR THE PERIOD OF RECORD
MIN - THE LOWEST RECORDED ANNUAL RAINFALL FOR THE PERIOD OF RECORD
LOWEST MEAN - MEAN ANNUAL RAINFALL FOR ANY 5-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL
PERIOD - CALENDAR YEARS FOR WHICH THE LOWEST MEAN RAINFALL OCCURRED

TABLE A-3. -- RAINFALL STATISTICS INCLUDING THE LOWEST MEAN ANNUAL RAINFALL FOR 10 YEARS FOR 1941-70(THE PERIOD USED FOR CALCULATING NORMAL RAINFALL)

(ALL RAINFALL VALUES ARE IN INCHES/YEAR)

STATION	MEAN	MEDIAN	NORMAL RANGE	MAX	MIN	LOWEST MEAN	PERIOD
FELLSMERE	55.86	55.52	50.22-62.49	78.83	27.94	46.53	1961-70
LAKE ALFRED	52.87	53.95	47.96-58.71	76.57	35.62	48.86	1961-70
MELBOURNE	50.79	50.56	44.50-57.76	73.28	32.52	48.09	1949-58
GAINESVILLE	54.60	55.33	47.75-61.14	76.95	35.24	50.01	1954-63
TITUSVILLE	59.20	61.21	49.22-66.03	81.74	41.88	57.12	1942-51
SANFORD	53.32	53.09	47.62-57.89	74.06	35.04	47.36	1961-70
ST.AUGUSTINE	55.22	55.27	46.94-62.64	79.91	32.68	51.30	1950-59
PALATKA	54.84	55.76	48.47-60.75	74.61	29.22	49.48	1952-61
ORLANDO	51.21	50.64	43.96-55.95	68.74	39.61	48.67	1961-70
GLEN ST. MARY	58.74	60.63	47.48-65.66	84.95	34.35	52.31	1949-58
JACKSONVILLE	54.47	54.00	49.00-62.53	77.37	36.83	48.62	1954-63
FERNANDINA BEACH	52.89	50.59	44.81-55.04	82.45	39.83	47.43	1954-63
DELAND	54.87	54.98	47.67-63.99	74.79	41.54	52.03	1948-57
DAYTONA BEACH	50.20	49.84	42.40-58.17	79.29	31.36	45.08	1954-63
CRESCENT CITY	54.67	53.37	46.75-62.43	75.03	37.97	48.90	1948-57
CLERMONT	51.41	51.67	47.11-55.15	68.09	32.28	48.42	1948-57
FEDERAL POINT	54.50	54.97	49.03-60.48	73.75	34.89	50.13	1950-59
HART LAKE	52.27	52.66	43.92-58.68	76.66	32.61	47.24	1961-70
ISLEWORTH	53.14	50.68	45.14-60.82	78.78	35.33	49.78	1949-58

NOTES:-
MEAN - ARITHMETIC AVERAGE OF ANNUAL RAINFALL VALUES FOR THE PERIOD OF RECORD
MEDIAN - RAINFALL WHICH WAS EQUALED OR EXCEEDED FOR 50% OF YEARS DURING THE PERIOD OF RECORD
NORMAL RANGE - RAINFALL WAS GREATER THAN THIS RANGE FOR 25% OF YEARS AND LESS THAN THIS RANGE FOR 25% OF YEARS DURING THE PERIOD OF RECORD
MAX - THE HIGHEST RECORDED ANNUAL RAINFALL FOR THE PERIOD OF RECORD
MIN - THE LOWEST RECORDED ANNUAL RAINFALL FOR THE PERIOD OF RECORD
LOWEST MEAN - MEAN ANNUAL RAINFALL FOR ANY 10-YEAR CONTINUOUS PERIOD HAVING THE LOWEST RAINFALL
PERIOD - CALENDAR YEARS FOR WHICH THE LOWEST MEAN RAINFALL OCCURRED