THE U.S. GEOLOGICAL SURVEY STREAM-GAGING PROGRAM IN WEST-CENTRAL FLORIDA

By Roman T. Mycyk

With a section on HISTORY OF THE STREAM-GAGING PROGRAM IN FLORIDA

By Richard C. Heath

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 88-4032

Tallahassee, Florida

1988

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On the basis of the analysis presented in this report, it was concluded that all stations in the present stream-gaging program should be continued in operation. Future studies also will be required because of changes in demands for streamflow information with subsequent addition and deletion of gaging stations.

INTRODUCTION

The U.S. Geological Survey is the principal Federal agency collecting surface-water data in the Nation. The collection of these data is a major activity of the Water Resources Division of the Survey. The data are collected in cooperation with State and local governments and other Federal agencies. The Survey is presently (1985) operating approximately 7,000 continuous-record gaging stations throughout the Nation. Some of these records extend back to the turn of the century.

Any activity of long standing, such as the collection of surface-water data, should be reexamined at intervals, if not continuously, because of changes in objectives, technology, or external constraints. The last systematic nationwide evaluation of the streamflow information program was completed in 1970 and is documented by Benson and Carter (1973). In 1983, the Survey began another nationwide analysis of the stream-gaging program that will be completed in 1988. As a part of the nationwide analysis, this analysis was undertaken to define and document the stream-gaging program in west-central Florida.

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Any activity of long standing, such as the collection of surface-water data, should be reexamined at intervals, if not continuously, because of changes in objectives, technology, or external constraints. The last systematic nationwide evaluation of the streamflow information program was completed in 1970 and is documented by Benson and Carter (1973). In 1983, the Survey began another nationwide analysis of the stream-gaging program that will be completed in 1988. As a part of the nationwide analysis, this analysis was undertaken to define and document the stream-gaging program in west-central Florida.

This report is a compilation of the data uses, funding, and data availability for every continuous-record stream-gaging station in west-central Florida. The analysis identifies the principal uses of the data and relates these uses to funding sources. An analysis is performed to identify if there are gaged sites for which data are no longer needed. In addition, gaging stations are categorized as to whether the data are available to users in near-real-time sense, on a periodic basis, or at the end of the water year (October through September).

History of the Stream-Gaging Program in Florida

The U.S. Geological Survey has made water-resources investigations in Florida since the latter part of the 19th century (Claiborne and others, 1983). These consisted of data collection at intermittent intervals at a few springs (Peale, 1886) and at river sites on the Suwannee and Withlacoochee Rivers.

The first discharge measurements also were made during the latter part of the 19th century. Silver Springs near Ocala was measured on December 20, 1898 (discharge of 828 ft^3/s), and Rainbow Springs near Dunnellon (then called Blue Springs) was measured on December 22, 1898 (discharge of 778 ft^3/s).

Gaging stations were first established in 1906 on Silver Springs near Ocala (the largest noncoastal spring in Florida) and on the Suwannee River at White Springs. The latter was the first stream-gaging station established in Florida. Only fragmentary records were collected at these stations and at other sites in the Suwannee, Withlacoochee, and Peace River basins.

During the following 20 years, until 1926, the only streamflow records collected in Florida were measurements of the Everglades canals in 1913, flow of some of the largest springs in 1913, and daily stage and discharge at the gaging station on North Prong St. Marys River (January 1921 to December 1923; published as St. Marys River at Moniac, Ga.).

The first systematic stream-gaging program was begun in 1926 when continuous-record gaging stations were established on a few streams in the northern part of Florida. The Florida District office of the Survey was officially established on August 4, 1930, and all work in this State was transferred from the Chattanooga, Tenn., office to the Ocala, Fla., office. Other programs were developed between about 1935 and 1940, in cooperation with State and Federal agencies, to study many of the large natural streams relative to the compilation of basin runoff information and flood data, increasing the number of stream-gaging stations to 97 by 1941.

In 1941, the Geological Survey began special hydraulic investigations of the more prominent springs of Florida in cooperation with the State. Monitoring program of springs increased, so by 1983, the outflows from 27 springs were measured.

Collection of stage records of lakes began in the mid-thirties. Stage data were obtained for about 15 lakes in 1940, 85 in 1950, and 115 in 1960. By 1970, the network included about 150 lake stations (most being an integral part of stream systems). During this period (1940-70), considerable stage data were collected on the larger streams and canals (Rabon, 1971) relative to

obtaining flood profile information in cooperation with other Federal agencies.

Only 17 stream-gaging stations were established during the World War II years, bringing the total to 114 in 1945 (Rabon, 1971). During 1946 to about 1956, the first three-way cooperation (among county or local agency, the State, and the U.S. Geological Survey) was initiated. These programs were designed to obtain "benchmark" data, including streamflow, stage records on streams and (interconnecting) lakes, and rainfall and evaporation measurements.

The partial-record network in Florida includes, essentially, stations classified as crest stage, low flow, periodic streamflow, and lakes. After a modest beginning in 1953, the crest-stage program, by 1970, included about 100 stations; most were located in northern and northwestern Florida. The low-flow program was started in the mid-1960's and consisted of about 50 data-collection sites by 1970 (which also were located mostly in northern and northwestern areas). As a result of the State and Federal programs, the number of active continuous-record stations increased steadily to 1966 when about 300 stations were in operation (Rabon, 1971).

In 1954, the first tidal discharge station on a major coastal river was established on the St. Johns River at Jacksonville (23 miles upstream from the mouth). Initial computations of daily discharge were in volumes of flow for each ebbtide and floodtide, based on tidal integrated measurements of discharge and data from three recording tide gages.

Other stream-gaging activities in the lower St. Johns River basin and its tributary, Oklawaha River, included the establishment of stations associated with the construction of the cross-Florida canal. Some of the continuing long-term sites were in operation as early as 1930 (including a few on the Withlacoochee River, which would be connected by a canal with the Oklawaha River).

By 1956, the number of active discharge stations had increased to 169. During the next several years, the Geological Survey and the State of Florida together recognized the urgent need for a more systematic program to evaluate the water resources of the State. A classification system for streamflow stations in a hydrologic network consisting of primary (long-term duration), secondary (short-term duration), and partial-record stations was therefore instituted.

Upon beginning construction in 1964 of a new design of a "Cross-Florida Barge Canal," reestablishment of old stations and establishment of additional stream-gaging stations were made. These stations are presently (1985) on a continuing basis even though the canal project was halted in 1971 after more than a third of the construction was completed.

In 1967, a program was begun to develop a data base to extend short-term flood-peak records for small basins by use of the U.S. Geological Survey rainfall-runoff model (Dawdy and others, 1972). Long-term flood records for small basins, especially those basins of less than 10 mi^2, were almost nonexistent in Florida. By 1971, 30 rainfall-runoff stations were in operation (Bridges, 1977).

The first computerized analysis of flow characteristics for Florida streams and canals was completed in 1971 (Heath and Wimberly, 1971) and included 254 stream-gaging station records through 1965. The analysis provided tables of flow duration, lowest mean discharge, and highest mean discharge for selected consecutive n-day periods within each year. In 1981, stream-gaging records for 161 selected continuous-record stations with 7 or more years of data through 1977 were used in a low-flow frequency study (Hughes, 1981).

Flood discharge data for 159 stream-gaging stations and 23 rainfall-runoff stations were used in developing regional equations relating peak discharge to basin characteristics (Bridges, 1982). This study on estimating magnitude and frequency of floods on natural-flow streams in Florida superseded previous Survey reports (Pride, 1957; Barnes and Golden, 1966).

In 1958, about 40 percent of the funds for water-resources investigations in Florida were derived from cooperating State, county, and city agencies and about 60 percent from Federal sources. Because of the increased demand for water information by State and other local agencies, by 1970, about 80 percent came from matching funding from local governments, and 20 percent came from Federal sources (Rabon, 1971). Total funds available for 1970 were about four times those for 1958. Current (1985) cooperation with the U.S. Geological Survey in Florida in water-resources investigations includes 10 State agencies (which include 5 water-management districts), 19 counties, 19 cities, 11 local agencies, 3 Federal agencies, and 2 universities.

Present Stream-Gaging Program in West-Central Florida

The Tampa Subdistrict office of the U.S. Geological Survey was formed in 1967. Personnel were moved in 1966 from the Ocala office and combined with the already existing Tampa field office. This change was a part of the general reorganization that occurred when the three technical disciplines (surface water, ground water, and quality of water) were merged to form the Florida District. The Tampa office area includes the drainage areas of six major rivers (fig. 1)--the Peace, Myakka, Manatee, Alafia, Hillsborough, and Withlacoochee Rivers. Within the Tampa office area are many small coastal basins that are not a part of the drainage areas of the major rivers. The total area covered by the Tampa office is approximately 10,000 mi^2.

Continuous stream-gaging activity within the present Tampa office boundary began in 1931. As of April 1931, the station on the Peace River (creek) at Arcadia constituted the continuous-record stream-gaging program within the present Tampa office boundary. Prior to October 1950, the station was published as Peace Creek at Arcadia. Subsequent expansion of the continuous-record stream-gaging program in the Tampa office to the 57 stations in 1985 is shown in figure 2.

Today (1985) there are over 160 sites at which surface-water data are collected within the Tampa office area. They are as follows:

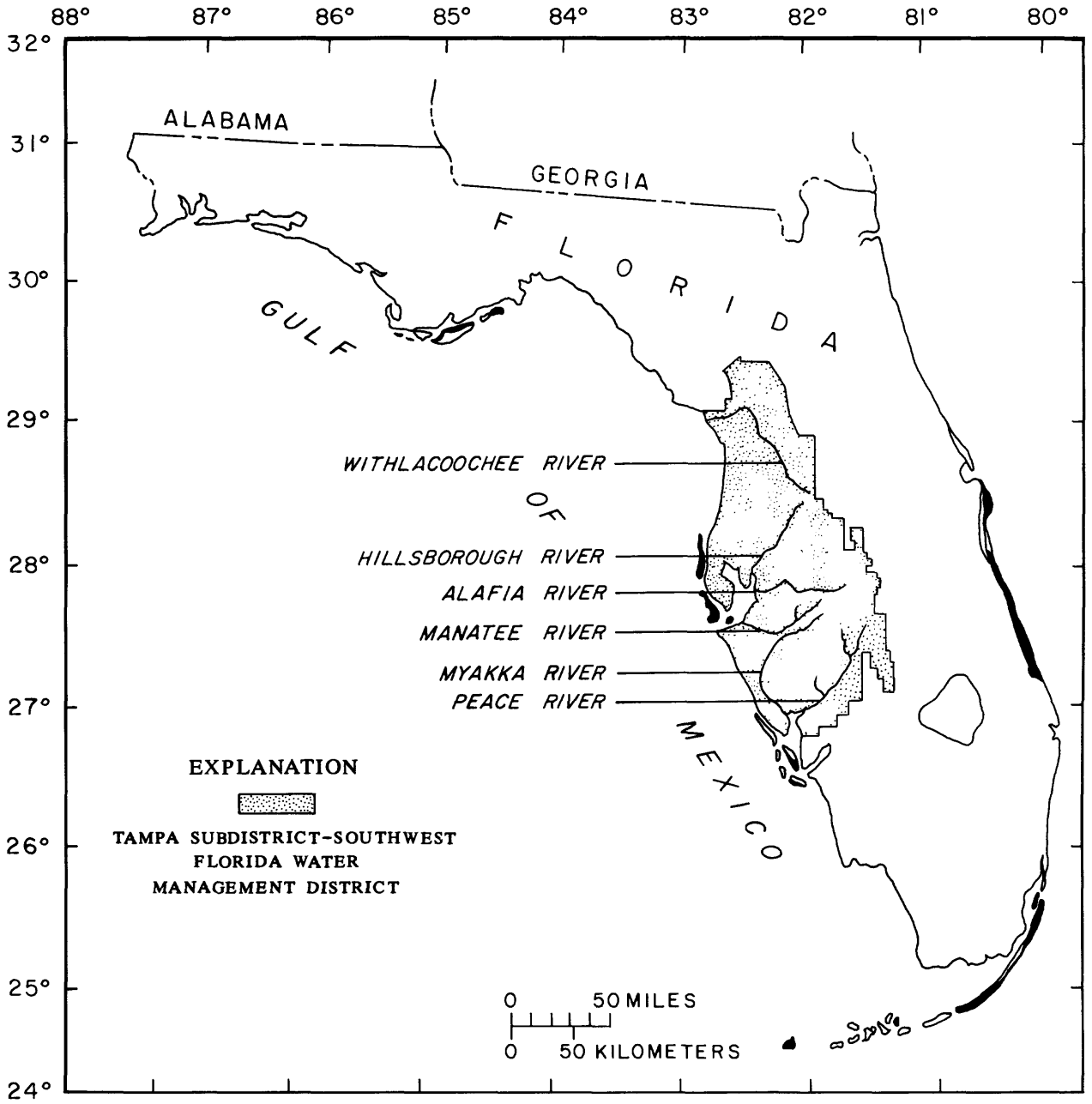

Figure 1.--Peninsular Florida with the Tampa Subdistrict-Southwest Florida Water Management District boundary and the major rivers of west-central Florida superimposed.

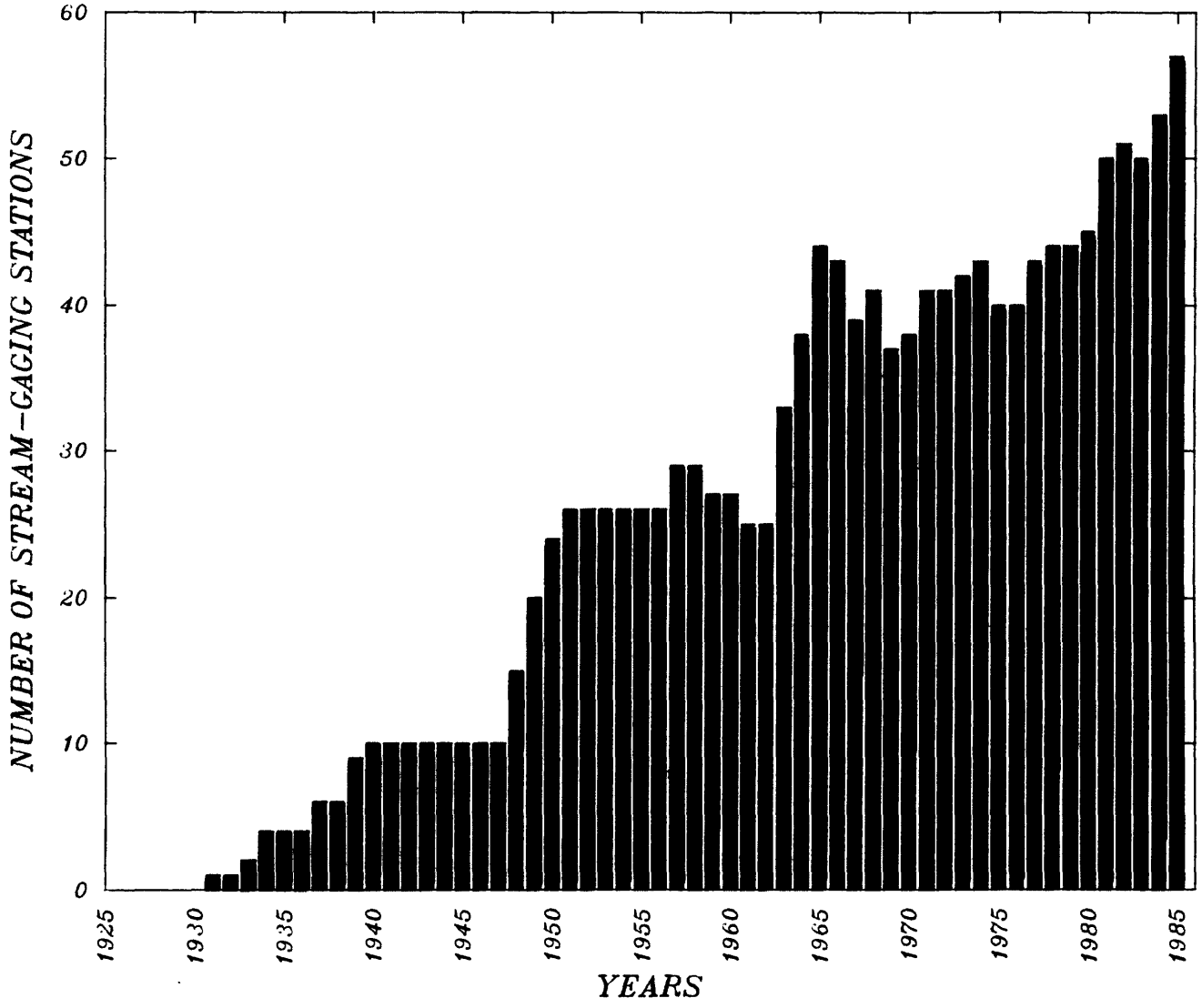

Figure 2.--Number of continuous-record gaging stations operated by the Tampa Subdistrict office of the U.S. Geological Survey.

57 continuous-record discharge
16 periodic discharge (6 to 12 measurements per year)
4 spring discharge
10 crest stage (random discharge measurements)
41 lake stage (25 continuous record and 16 read weekly)
47 stream stage (42 continuous record and 5 partial record).

In addition, ground-water sites include 196 continuous-record wells, 162 periodic wells, and 1,385 semiannual measurement wells. Quality-of-water sites include 2 NASQAN sites and 255 ground-water sites sampled periodically.

Stations in the Withlacoochee River basin and headwaters of the Hillsborough River basin are excluded from this report. An analysis of the continuous-record stream-gaging stations in these areas can be found in Miller and others (1984). Figure 3 shows the locations of the 57 continuous-record gaging stations in the Tampa office area included in this report. Locations of other stations can be found in the annual Water-Data Report (U.S. Geological Survey, 1985).

The present (1985) budget of the Tampa office is about $3.4 million, with $320,000 allotted to the 57 continuous-record gaging stations and $550,000 covering the total surface-water program. About 23 people are involved in collecting, processing, and publishing surface-water data.

Selected hydrologic data, including drainage area, period of record, and mean annual flow, for the 57 stations are given in table 1. Station identification numbers used throughout this report are the last six digits of the Survey's eight-digit downstream-order station number; the first two digits of the standard station number for all stations in the Tampa office area are 02, signifying the area containing coastal streams from Virginia southward and westward to Mississippi. The map reference number used in all illustrations throughout the report are shown in table 1. Selected hydrologic data for the 20 discontinued continuous-record gaging stations are given in table 2.

USES, FUNDING, AND AVAILABILITY OF CONTINUOUS STREAMFLOW DATA

The relevance of a gaging station is defined by the uses that are made of the data that are produced from the station. The uses of the data from each stream-gaging station in the Tampa program were identified by a survey of known data users (table 3). Also recorded as part of the survey were the source of funding and the frequency of data availability for each station. The survey documented the importance of each station and did not identify any gaging stations that may be considered for discontinuation. Data uses identified by the survey were categorized into nine classes, defined below.

Data-Use Classes

The following definitions were used to categorize each known use of streamflow data for each continuous-record gaging station.

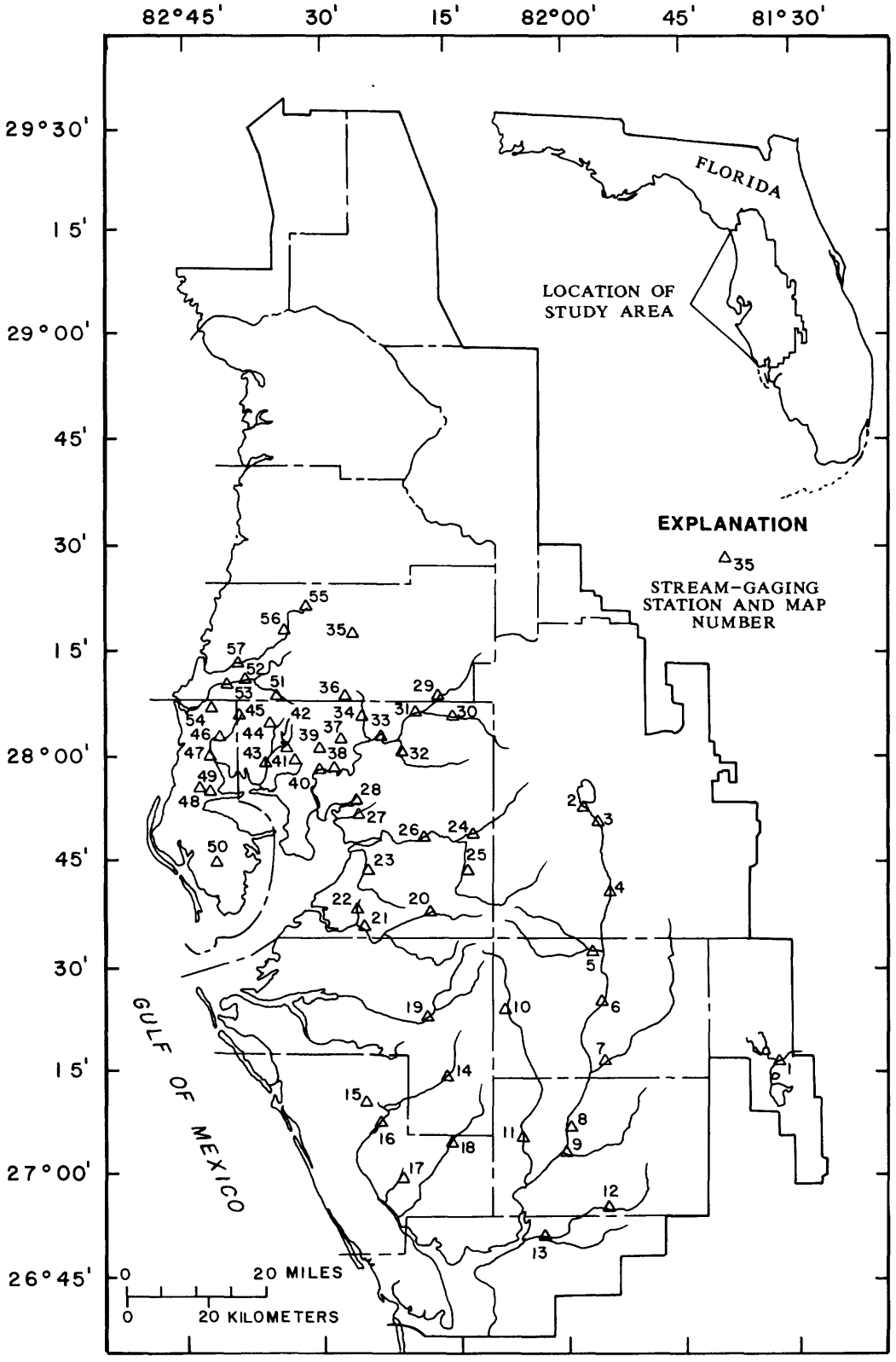

Figure 3.--Location of stream-gaging stations in west-central Florida that are analyzed in this report.

Table 1.--Selected hydrologic data for active continuous-record gaging stations in west-central Florida, 1985

[Mean annual flow computed for 5 or more years of record; only complete water years were used. I = indeterminate, mi^2 = square mile, ft^3/s = cubic feet per second]

Map No.	Station No.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)
1	271500	Josephine Creek near De Soto City	109	1946-75, 1978-	81.5 (1947-75, 1979-85)
2	294491	Saddle Creek at structure P-11 near Bartow	135	1963-	56.9 (1965-85)
3	294650	Peace River at Bartow	390	1939-	244
4	294898	Peace River at Fort Meade	480	1974-	174 (1975-85)
5	295420	Payne Creek near Bowling Green	121	1963-68, 1979-	101 (1964-68, 1980-85)
6	295637	Peace River at Zolfo Springs	826	1933-	659
7	296500	Charlie Creek near Gardner	330	1950-	274
8	296750	Peace River at Arcadia	1,367	1931-	1,126
9	297100	Joshua Creek at Nocatee	132	1950-	105
10	297155	Horse Creek near Myakka Head	42	1977-	29.2
11	297310	Horse Creek near Arcadia	218	1950-	191
12	298123	Prairie Creek near Fort Ogden	233	1963-68, 1977-	196 (1964-68, 1978-85)
13	298202	Shell Creek near Punta Gorda	373	1965-	[1]338
14	298608	Myakka River at Myakka City	125	1963-66, 1977-	124 (1964-66, 1978-85)
15	298760	Howard Creek near Sarasota	20.0	1983-	--
16	298830	Myakka River near Sarasota	229	1936-	248
17	299160	Deer Prairie Slough near North Port Charlotte	33.2	1981-	--
18	299410	Big Slough Canal near Myakka City	36.5	1980-	32.7
19	299950	Manatee River at Myakka Head	65.3	1966-	65.1
20	300100	Little Manatee River near Fort Lonesome	31.4	1963-	28.6

Table 1.--Selected hydrologic data for active continuous-record gaging stations in west-central Florida, 1985--Continued

Map No.	Station No.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)	
21	300500	Little Manatee River near Wimauma	149	1939-	169	
22	300530	Cypress Creek near Wimauma	8.1	1980-	13.6	
23	300700	Bullfrog Creek near Wimauma	29.1	1956-58, 1977-	36.4	(1957-58, 1978-85)
24	301000	North Prong Alafia River at Keysville	135	1950-	163	
25	301300	South Prong Alafia River near Lithia	107	1962-	105	(1964-85)
26	301500	Alafia River at Lithia	335	1932-	356	
27	301750	Delaney Creek near Tampa	16.1	1984-	--	
28	301802	Tampa Bypass Canal at S-160 at Tampa	I	1974-	--	
29	301990	Hillsborough River above Crystal Springs near Zephyrhills	82	1983-	--	
30	302500	Blackwater Creek near Knights	110	1951-	82.2	
31	303000	Hillsborough River near Zephyrhills	220	1939-	257	
32	303300	Flint Creek near Thonotosassa	60	1956-58, 1970-	37.2	(1957-58, 1971-85)
33	303330	Hillsborough River at Morris Bridge near Thonotosassa	375	1972-	259	
34	303350	Trout Creek near Sulphur Springs	23	1974-	20.2	
35	303400	Cypress Creek near San Antonio	56	1962-	22.0	(1964-85)
36	303420	Cypress Creek at Worthington Gardens	117	1974-	53.7	(1975-85)
37	303800	Cypress Creek near Sulphur Springs	160	1964-	94.3	
38	304500	Hillsborough River near Tampa	650	1938-	[1]593	(1939-78)
39	305780	Curiosity Creek near Sulphur Springs	1.37	1980-	1.03	
40	306000	Sulphur Springs at Sulphur Springs	I	1959-	41.0	

Table 1.--Selected hydrologic data for active continuous-record gaging stations in west-central Florida, 1985--Continued

Map No.	Station No.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)
41	306500	Sweetwater Creek near Sulphur Springs	7.43	1951-	6.50
42	306910	Brushy Creek near Tampa	7.16	1981-	--
43	307000	Rocky Creek near Sulphur Springs	35	1953-	37.0
44	307200	Brooker Creek at Van Dyke Road near Citrus Park	5.01	1981-	--
45	307323	Brooker Creek near Lake Fern	17	1970-	7.31
46	307359	Brooker Creek near Tarpon Springs	30	1950-	20.7
47	307498	Lake Tarpon Canal at S-551 near Oldsmar	65	1974-	40.9
48	307671	Alligator Creek below U.S. Highway 19 at Clearwater	6.17	1982-	--
49	307673	Alligator Creek at Clearwater	6.73	1980-	13.2
50	308935	Saint Joe Creek at Pinellas Park	2.55	1984-	--
51	309848	South Branch Anclote River near Odessa	17.1	1970-	3.25
52	309980	Anclote River near Odessa	6.81	1983-	--
53	310000	Anclote River near Elfers	72.5	1946-	70.4
54	310147	Hollin Creek near Tarpon Springs	[2]4.4	1981-	--
55	310240	Jumping Gully at Loyce	43	1964-	7.11
56	310280	Pithlachascotee River near Fivay Junction	150	1983-	--
57	310300	Pithlachascotee River near New Port Richey	180	1963-	31.3

[1]Adjusted for diversion.
[2]Excludes watershed of 3.9 mi^2 that is noncontributing.

Regional Hydrology

To be useful in defining regional hydrology, the data from a gaging station must be largely unaffected by manmade storage or diversion. In this class of uses, the effects on streamflow are limited to those caused primarily

Table 2.--Chronological order of termination of continuous-record gaging stations in west-central Florida, 1985

[Mean annual flow computed for 5 or more years of record; only complete water years were used. I = indeterminate, mi^2 = square miles, ft^3/s = cubic feet per second]

Station No.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)	
304000	Hillsborough River near Harney	630	1933-39	--	
293694	Peace Creek drainage canal near Dundee	58	1946-59	32.5	
303200	Pemberton Creek near Dover	24	1956-58	--	
299700	Cow Pen Slough near Bee Ridge	38	1963-66	--	
300000	Manatee River near Bradenton	80	1939-66	109	(1940-65)
310550	Weeki Wachee River near Bayport	I	1964-66	--	
295013	Bowlegs Creek near Fort Meade	47.2	1964-68	--	
301800	Six Mile Creek at Tampa	28	1956-70	60.4	(1957-69)
310350	Bear Creek near Hudson	22.0	1965-70	--	
293986	Peace Creek drainage canal near Alturas	160	1946-71	96.7	
294068	Lake Lulu outlet at Eloise	23	1946-71	10.7	
308889	Seminole Lake outlet near Largo	14	1950-71	15.8	
299470	Big Slough near Murdock	87.5	1963-72	86.6	
303100	New River near Zephyrhills	15	1964-74	8.98	
307697	Alligator Creek at Safety Harbor	9.0	1949-59, 1960-74	7.98	(1950-58, 1961-74)
301352	Bear Creek at Plaza Drive near Hudson	29.2	1970-77	15.0	
299750	Phillippe Creek near Sarasota	24	1963-68, 1979-81	--	
303408	Cypress Creek near Drexel	73.2	1977-81	--	
296223	Little Charley Bowlegs Creek near Sebring	41.9	1952-83	35.7	
302010	Hillsborough River below Crystal Springs	I	1983-84	--	

by land-use and climate changes. Large amounts of manmade storage may exist in the basin providing the outflow is uncontrolled. These stations are useful in developing regionally transferable information about the relations between basin and climatic characteristics and streamflow. In the Tampa office area, 48 stations are classified in the regional hydrology category.

Hydrologic Systems

Stations that can be used for accounting, that is, to define current hydrologic conditions and the sources, sinks, and fluxes of water through

Table 3.--Data use, source of funding, and frequency of data availability for continuous-record gaging stations in west-central Florida, 1985

[A = annually, P = periodically, T = instantaneously via telemetry]

Map No.	Station No.	Data use									Source of funding				Frequency of data availability
		Regional hydrology	Hydrologic systems	Legal obligations	Planning and design	Project operation	Hydrologic forecasts	Water-quality monitoring	Research	Other	Federal program	OFA program	Co-op program	Other non-federal	
1	271500	*	1					1					1		AP
2	294491		1			1	11	1					1		A
3	294650	*	1				1,11	1					1		AP
4	294898	*	1				1,11	1					1		AP
5	295420	*	1										1		A
6	295637	*	1				1,11	1					1		A
7	296500	*	1				11						1		AP
8	296750	*	1				1,11	1,2			*		1		APT
9	297100	*	1				11						1		AP
10	297155	*	1										1		A
11	297310	*	1				11	1					1		AP
12	298123	*	1					1					1		A
13	298202		1			1		1					1		AP
14	298608	*	1										1		A
15	298760	*	3					3					3		A
16	298830	*	1				1,11	1					1		AP
17	299160	*	4					4					4		A
18	299410	*	4					4					4		A
19	299950	*	5				5,11	5					5		AP
20	300100	*	1					1					1		A
21	300500	*	1				1,11						1		AP
22	300530	*	6					6					6		A
23	300700	*	1					7					1,7		A
24	301000	*	1					1		1			1		A
25	301300	*	1					1		1			1		A
26	301500	*	1				1,11	1,2		1	*		1		AP
27	301750	*	6										6		A
28	301802	*	1			1		1					1		A
29	301990	*	1					1					1		A
30	302500	*	1				11	1					1		A

Footnotes are at the end of the table.

Table 3.--Data use, source of funding, and frequency of data availability for continuous-record gaging stations in west-central Florida, 1985--Continued

Map No.	Station No.	Data use: Regional hydrology	Hydrologic systems	Legal obligations	Planning and design	Project operation	Hydrologic forecasts	Water-quality monitoring	Research	Other	Source of funding: Federal program	OFA program	Co-op program	Other non-federal	Frequency of data availability
31	303000	*	1				1,11	1					1		APT
32	303300		1			1		1					1		A
33	303330		1		1	1	1,11			1			1		APT
34	303350	*	1										1		A
35	303400	*	1					1					1		A
36	303420	*	1				1,11	1					1		AT
37	303800	*	1					1					1		A
38	304500					8		8					8		A
39	305780	*	8										8		A
40	306000		8			8		8		8			8		AP
41	306500		6					6					6		A
42	306910	*	6										6		A
43	307000	*	6					6					6		A
44	307200	*	7										7		A
45	307323	*	9					9					1,9		A
46	307359	*	1					1					1		AP
47	307498		9			9		9		9			9		A
48	307671	*	10					10					10		A
49	307673	*	10					10					10		A
50	308935	*	9					9					9		A
51	309848	*	1					7					1,7		A
52	309980	*	1										1		A
53	310000	*	1				11	1					1		AP
54	310147	*	9					9					9		A
55	310240	*	1					1					1		A
56	310280	*	1					1					1		A
57	310300	*	1					1					1		AP

* No footnote required
1 Southwest Florida Water Management District
2 National Stream Quality Accounting Network
3 City of Sarasota
4 County of Sarasota
5 County of Manatee
6 County of Hillsborough
7 West Coast Regional Water Supply Authority
8 City of Tampa
9 County of Pinellas
10 City of Clearwater
11 National Weather Service--flood forecast

hydrologic systems, including regulated systems, are designated as hydrologic systems stations. They include stations used to gage diversions and return flows and stations that are useful for defining the interaction of water systems. The benchmark and index stations are included in the hydrologic systems category because they document current and long-term conditions of the hydrologic systems that they gage. In the Tampa office area, 56 stations are included in this category.

Legal Obligations

Some stations provide records of flows for the verification or enforcement of existing treaties, compacts, and decrees. The legal obligation category contains only those stations that the Geological Survey is required to operate to satisfy a legal responsibility. There are no stations in the west-central Florida program that exist to fulfill a legal responsibility of the Geological Survey.

Planning and Design

Gaging stations in this category of data use are used for the planning and design of a specific project (for example, a dam, levee, floodwall, navigation system, water-supply diversion, hydropower plant, or waste-treatment facility) or group of structures. The planning and design category is limited to those stations that were instituted for such purposes and where this purpose is still valid. Currently, one station in the west-central Florida program is being operated for planning or design purposes.

Project Operation

Gaging stations in this category are used, on an ongoing basis, to assist water managers in making operational decisions such as reservoir releases, hydropower operations, or diversions. The project-operation use generally implies that the data are routinely available to the operators on a rapid-reporting basis. For projects on large streams, data may only be needed every few days. There are eight stations in the west-central Florida program that are used in this manner.

Hydrologic Forecasts

Gaging stations in this category are regularly used to provide information for hydrologic forecasting, including flood forecasts for a specific river reach or periodic (daily, weekly, monthly, or seasonal) flow-volume forecasts for a specific site or region. The hydrologic-forecast use generally implies that the data are routinely available to the forecasters on a rapid-reporting basis. On large streams, data may only be needed every few days. There are 17 stations in the west-central Florida program that are included in the hydrologic forecast category.

Water-Quality Monitoring

Gaging stations where regular water-quality or sediment-transport monitoring is being conducted and where the availability of streamflow data contributes to the utility, or is essential to the interpretation, of the water-quality or sediment data are designated as water-quality-monitoring sites. Forty-four such stations are a part of the program. Two are National Stream-Quality Accounting Network (NASQAN) stations, part of a nationwide network designed to assess water-quality trends of significant streams.

Research

Gaging stations in this category are operated for a particular research or water-investigations study. Typically, these are only operated for a few years. No stations in the west-central Florida program currently are used in the support of research activities.

Other

Stations in this category provide streamflow information for recreational planning, primarily for canoeists, rafters, and fishermen. Seven stations in west-central Florida are found in this category.

Sources of Funding

The two sources of funding for the Florida streamflow-data program are:

1. Federal program.--Funds that have been directly allocated to the U.S. Geological Survey.
2. Cooperative program.--Funds that come jointly from Geological Survey cooperative-designated funding and from a non-Federal cooperating agency. Cooperating agency funds may be in the form of direct services or money.

In both categories, the identified sources of funding pertain only to the collection of streamflow data; sources of funding for other activities, particularly collection of water-quality samples that might be carried out at the site, may not necessarily be the same as those identified herein. Nine entities currently are contributing funds to the west-central Florida stream-gaging program.

Frequency of Data Availability

Frequency of data availability refers to the times at which the streamflow data may be furnished to the users. In this category, three distinct possibilities exist. Data can be furnished in publication format through the annual data report for Florida (U.S. Geological Survey, 1986), by periodic

release of provisional data, or by direct-access telemetry equipment for immediate use. These three categories are designated A, P, and T, respectively, in table 3. In the current west-central Florida program, data for all 57 stations are made available through the annual report, data from 18 stations are released on a periodic provisional basis, and data from 4 stations are available on a near real-time basis.

SUMMARY AND CONCLUSIONS

Currently (1985), there are 57 continuously recording gaging stations being operated in west-central Florida at a cost of $320,000 per year. Ten separate sources contribute funding to this program. A review of the data used in funding information presented in table 3 indicates that the data from most stations in the west-central Florida network have multiple uses.

No stations were excluded based on the present uses of the data. All stations have been identified as having valid and needed uses, and all stations are properly funded (table 3). Short-term project stations do not exist within the stream-gaging program. The entry of an asterisk in the table indicates that no explanation is required.

On the basis of consultation with cooperating agencies, the distribution of gaging stations probably is sufficient to describe hydrologic conditions in the area at this time. Telecommunication equipment would probably prove beneficial on the Hillsborough River near Tampa (at the dam) for determining if recorders are working properly. This would prevent excessive downtime, which at present can be determined only by a visit to the site.

All stations in the present stream-gaging program should be continued in operation. Future studies also will be required because of changes in demands for streamflow information with subsequent addition and deletion of gaging stations. Such changes will impact the operation of other stations in the program both because of the dependence between stations of the information that is generated (data redundance) and because of the dependence of the costs of collecting the data from which the information is derived.

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