UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

HYDROLOGIC CONDITIONS DURING 1967 IN DADE COUNTY, FLORIDA

By

Claiborne F. Galliher and John E. Hull

OPEN-FILE REPORT

Prepared by the
U.S. GEOLOGICAL SURVEY
in cooperation with
DADE COUNTY, CITIES OF MIAMI AND MIAMI BEACH,
FLORIDA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF INTERIOR RESOURCES
BUREAU OF GEOLOGY,
CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT,
NATIONAL PARK SERVICE,
and
CORPS OF ENGINEERS

Tallahassee, Florida
September 1969

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INTRODUCTION

This report is the second in a series designed to describe the annual hydrologic conditions in Dade County, Fla. A quantitative picture of the general hydrologic conditions which prevailed in Dade County for the 1967 water year (October 1, 1966 to September 30, 1967) is summarized by use of tables, graphs, and maps. The locations and types of data-collection stations are shown in figures 1 and 2. Figure 1 indicates the location of ground-water stations and figure 2 indicates the location of rainfall and surface-water stations.

The water level, discharge and rainfall data were obtained from an extensive network of ground-water observation wells, stream-gaging stations, and rainfall stations. The records from long-term installations (1940 to present) are of special value because they allow analysis of the hydrologic effects of some water-control practices.

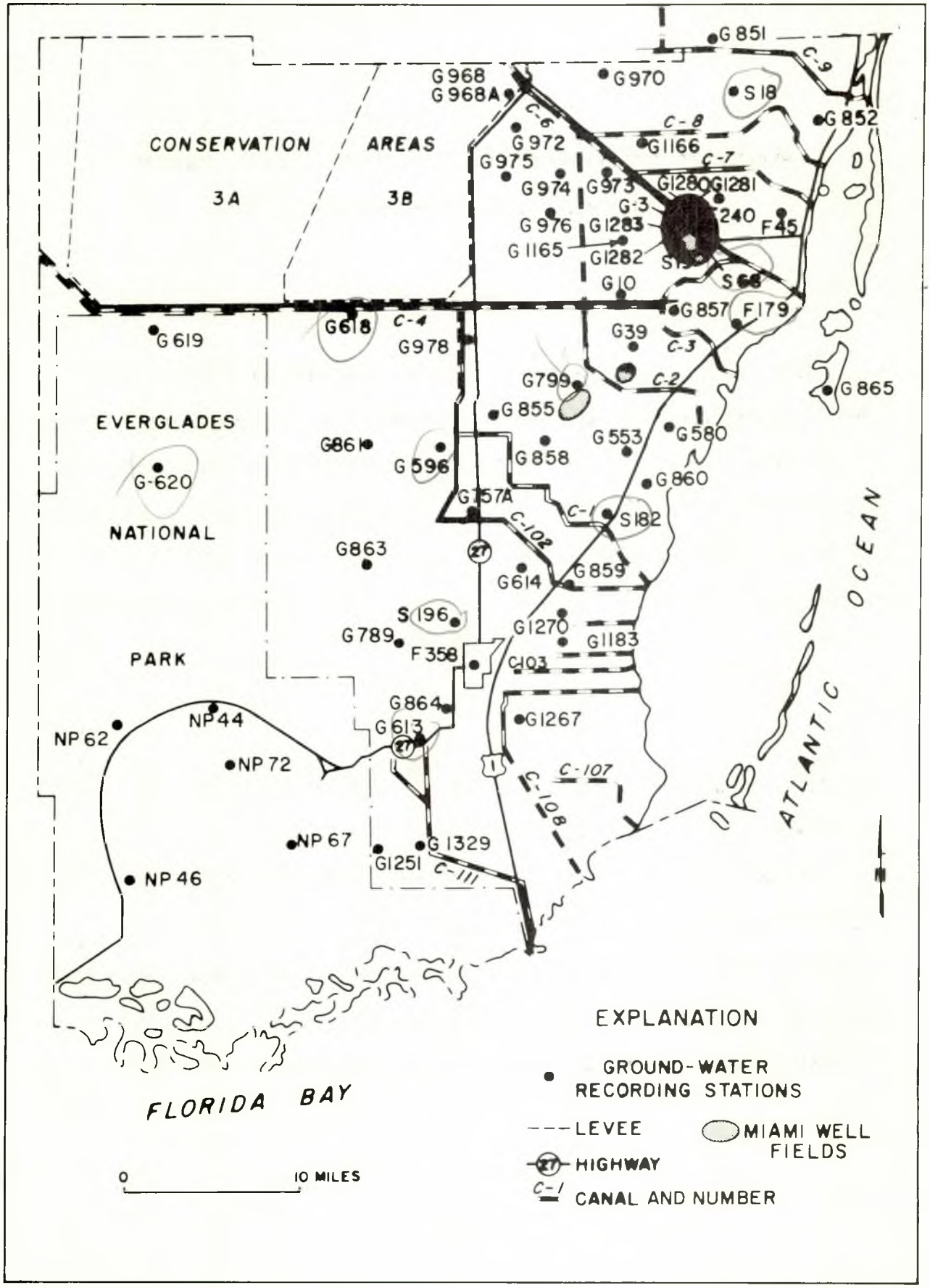


Figure 1.--Map of Dade County showing locations of ground-water stations.

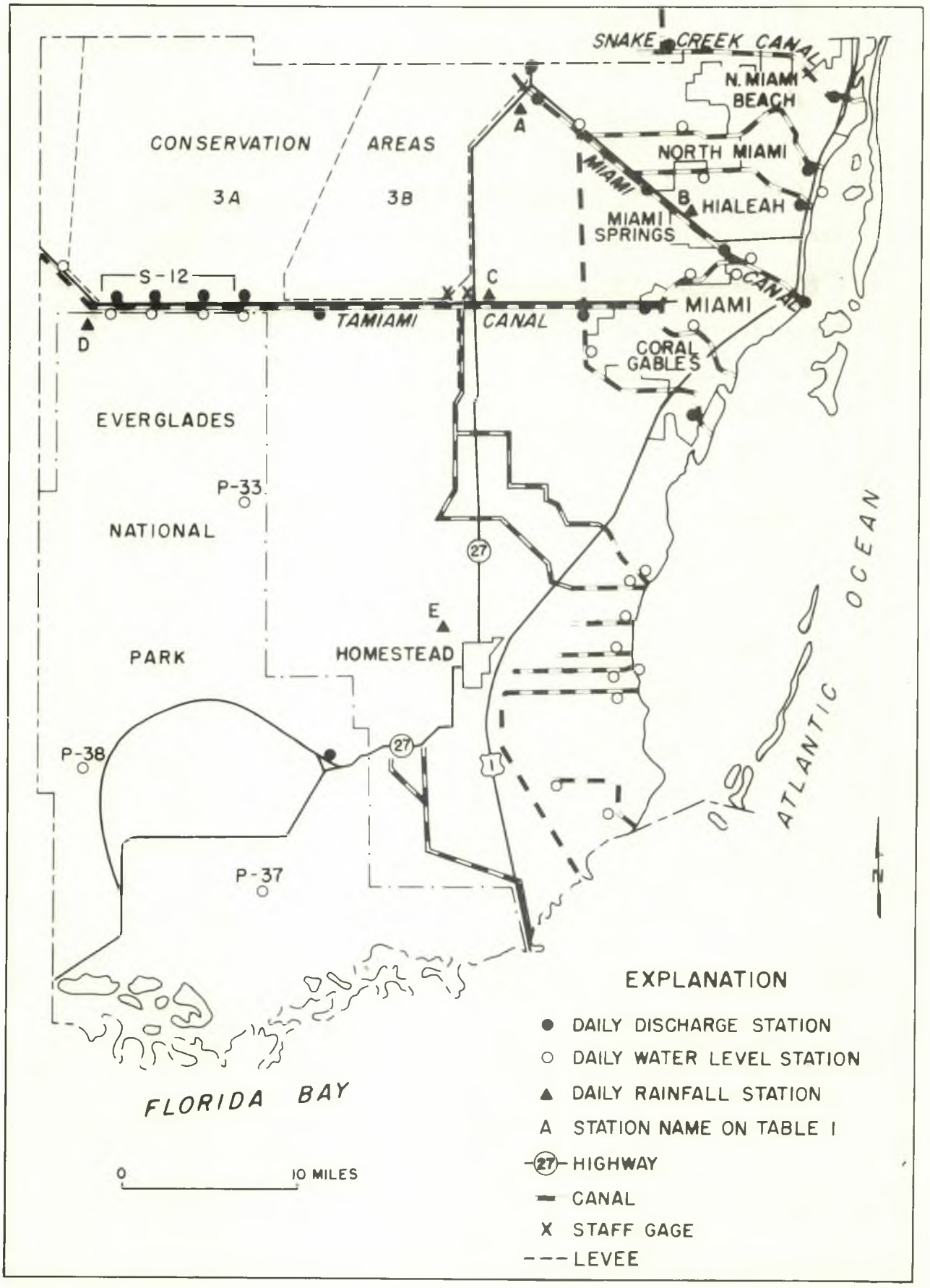


Figure 2. Map of Dade County showing surface-water and selected rainfall stations.

This report was prepared by the U. S. Geological Survey in cooperation with Dade County; Cities of Miami and Miami Beach; Florida Department of Natural Resources, Division of Interior Resources, Bureau of Geology; Central and Southern Florida Flood Control District; National Park Service; and the Corps of Engineers.

RAINFALL

The average annual rainfall for Dade County, based on 27 calendar years of record (1941-67) at five locations is 57 inches (see table 1).

During the 1967 water year the recorded rainfall averaged 51.72 inches; 5 inches below average and 16 inches below the 1966 water year. Rainfall on the area during the 1967 water year ranged from 62.14 inches at the Hialeah Water Plant to 44.01 inches at Tamiami Canal at Dade-Broward Levee (point C on figure 2).

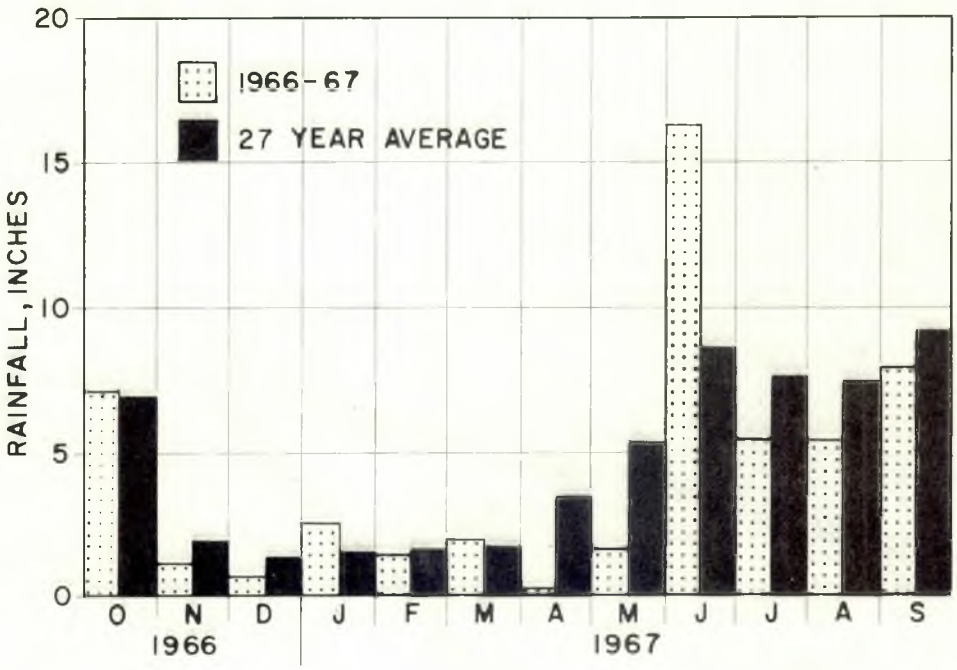
With the exceptions of April, May, and June, rainfall was about average for most months during the water year. The combined rainfall of 1.84 inches for April and May was 79 percent below the 27-year average for those months, while June with an excess of 7.46 inches was 86 percent above the average for June. Figure 3 compares the monthly precipitation during the 1967 water year with the average for 27 calendar years.

During the water year Dade County felt the effects of one hurricane. On October 4, 1966, the center of hurricane "INEZ" passed along the Florida Keys, within 45 miles of Miami (see fig. 4). Rainfall in Dade County during the storm was generally light. The heaviest was 3.87 inches on Key Biscayne, and the lightest was 0.14 inch at Tamiami Canal at Dade-Broward Levee.

Table 1.--Summary of precipitation data by stations.

Location	1967 Water Year	27-Year Average
Miami Canal at Broken Dam (A)	56.17	60.56
Hialeah Water Plant (B)	62.08	56.70
Tamiami Canal at Dade-Broward Levee (C)	44.01	52.36
Tamiami Canal at Forty-Mile Bend (D)	46.48	54.73
Homestead Experiment Station (E)	49.74	60.35

Note.--Letters identify stations on figure 2



Average rainfall at five stations in Dade County, Florida

Figure 3.--Comparison of monthly rainfall for the 1967 water year with the 1941-67 average.

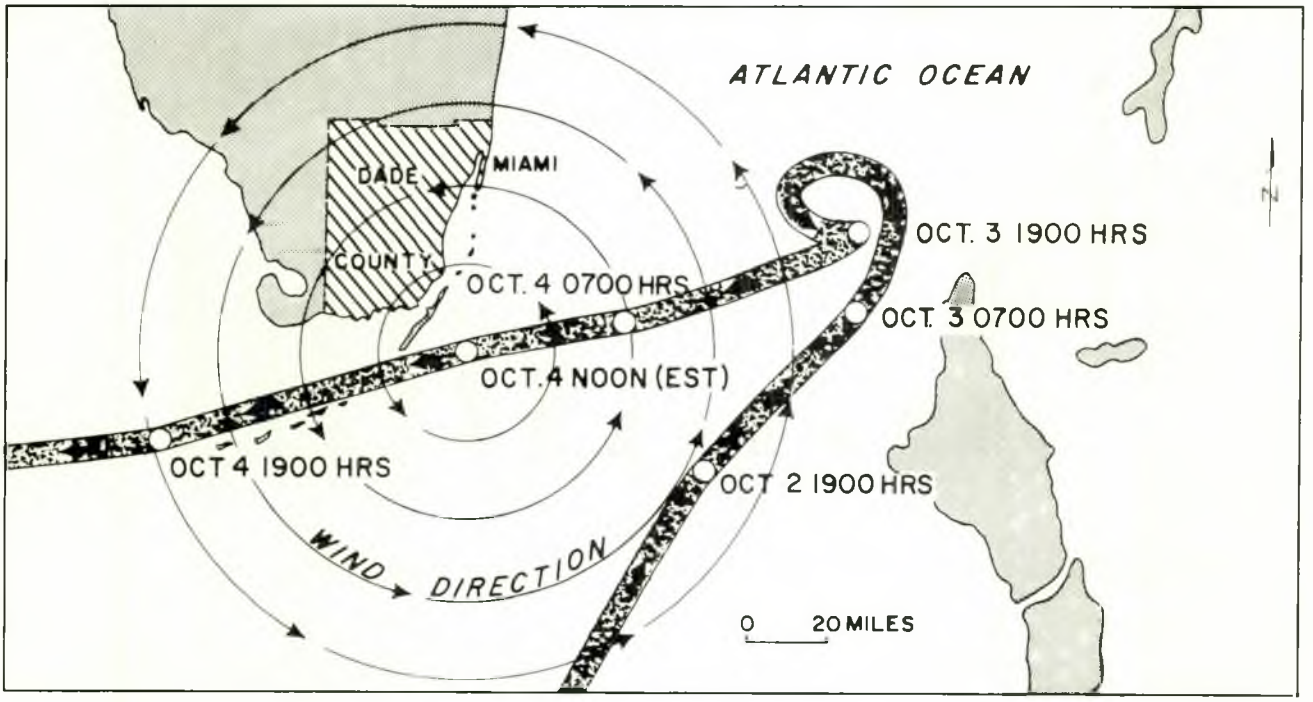


Figure 4.--Path of hurricane "INEZ" Oct. 2-4, 1966.

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GROUND WATER

The chief source of fresh ground water in Dade County is the highly permeable Biscayne aquifer which consists of sandstone and solution-riddled limestone and yields large quantities of water for municipal, industrial, and agricultural uses. The aquifer is about 100 feet thick on the eastern side of the county and less than 10 feet thick on the western side. Because of the highly permeable nature of the aquifer, ground and surface water is interconnected and water levels are closely related. Fluctuations of the water table are caused by gains (recharge) and losses (discharge) of ground water. Generally, the water table in Dade County rises in response to local rainfall and to surface-water inflow and seepage from the conservation areas,

and declines in response to losses by evapotranspiration and by surface-water outflow and seepage to the ocean. The system of controlled drainage canals in the county is used to discharge excess runoff and ground water to the ocean during the wet periods and to distribute stored surface water from the high water table areas in the interior to the coastal area for abatement of salt-water intrusion during the dry periods. During 1967, fluctuations of the water table were recorded continuously in 59 wells in order to determine the effectiveness of the flood-control works.

Construction of the flood-control works in the northeastern part of the county was essentially completed in 1955, however, in 1967 construction of the works was still in progress in the southern part of the county. Figures 5 and 5a are graphs comparing long-term fluctuations of

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ground-water levels and rainfall in the northeastern and southeastern parts of the county respectively.

Figure 5 shows that water levels in northeastern Dade have been relatively stable since completion of the canal system during the mid 1950's. Therefore, seasonal fluctuations during the 1960's was about 50 percent less than those during the 1940's; and the average stage of the water table during 1960's was generally higher.

Figure 5a shows that water levels in southeastern Dade have been greatly influenced by rainfall and that the effects of water management during the period 1940-66 have been minor. During 1967, however, parts of the flood-control works in southeastern Dade were put into operation and there was a significant reduction in the seasonal range of fluctuations. The outlook for water-level conditions in southern Dade is for a reduction in the range between seasonal highs and seasonal lows; and for a net increase in ground-water storage during the dry periods.

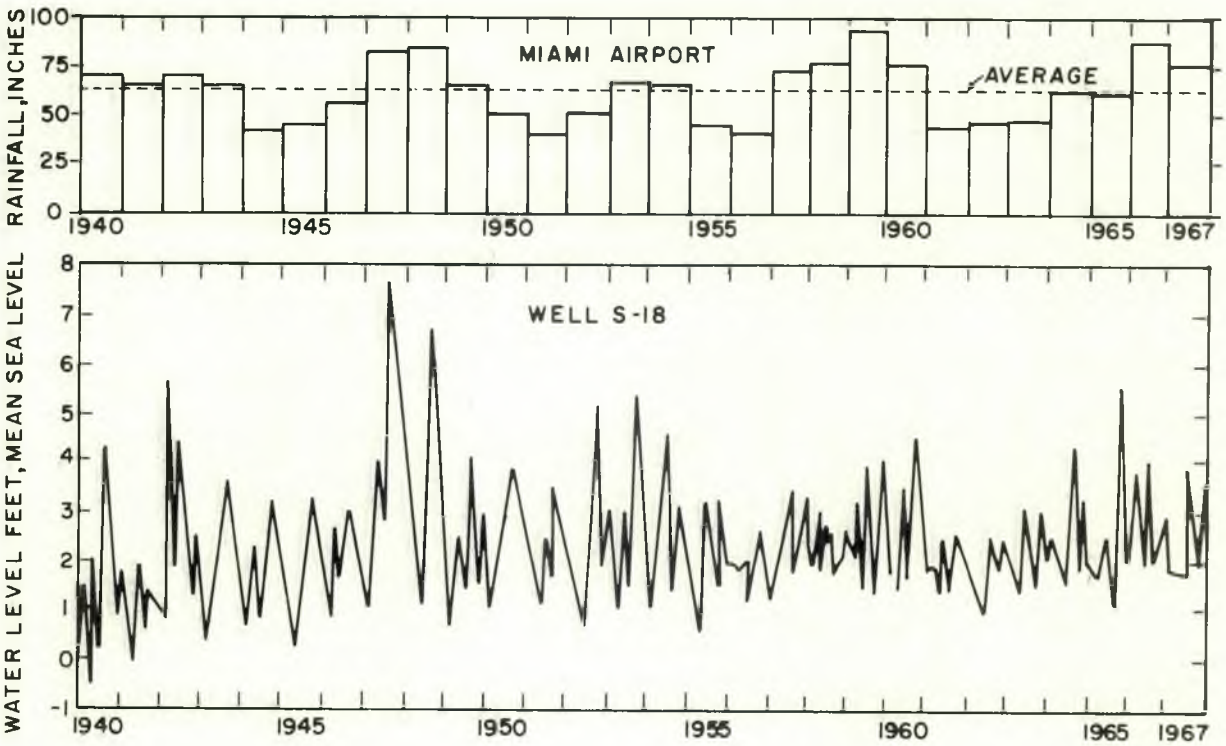

Figure 5.--Graphs of water-level fluctuations and annual rainfall in northeastern Dade County, 1940-67.

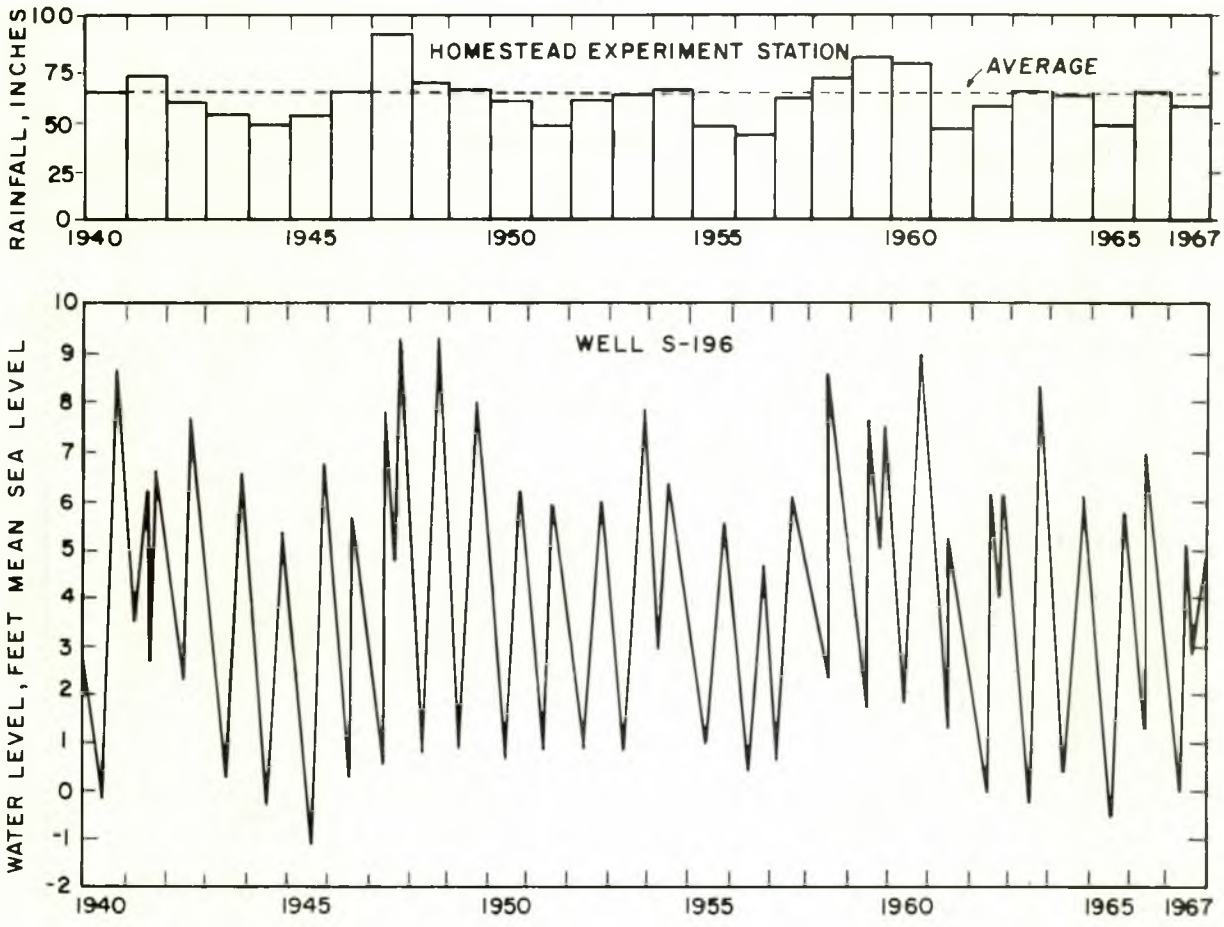

Figure 5a.--Graphs of water-level fluctuations and annual rainfall in southeastern Dade County, 1940-67.

Figures 6 through 8 are water-table contours of eastern Dade showing (1) the average, (2) the average yearly highest, and (3) the average yearly lowest ground-water levels during the period 1959-67 respectively.

The 9-year period (1959-67) was selected for analysis because it included periods of extreme hydrologic conditions namely, the peak water-level conditions resulting from Hurricane Donna in 1960 and record low water-level conditions during the droughts in 1962 and 1965. These maps will be useful to local water managers in evaluating present and future flood-control works; and they will be useful in developing water supplies, drainage works, and flood criteria for zoning purposes.

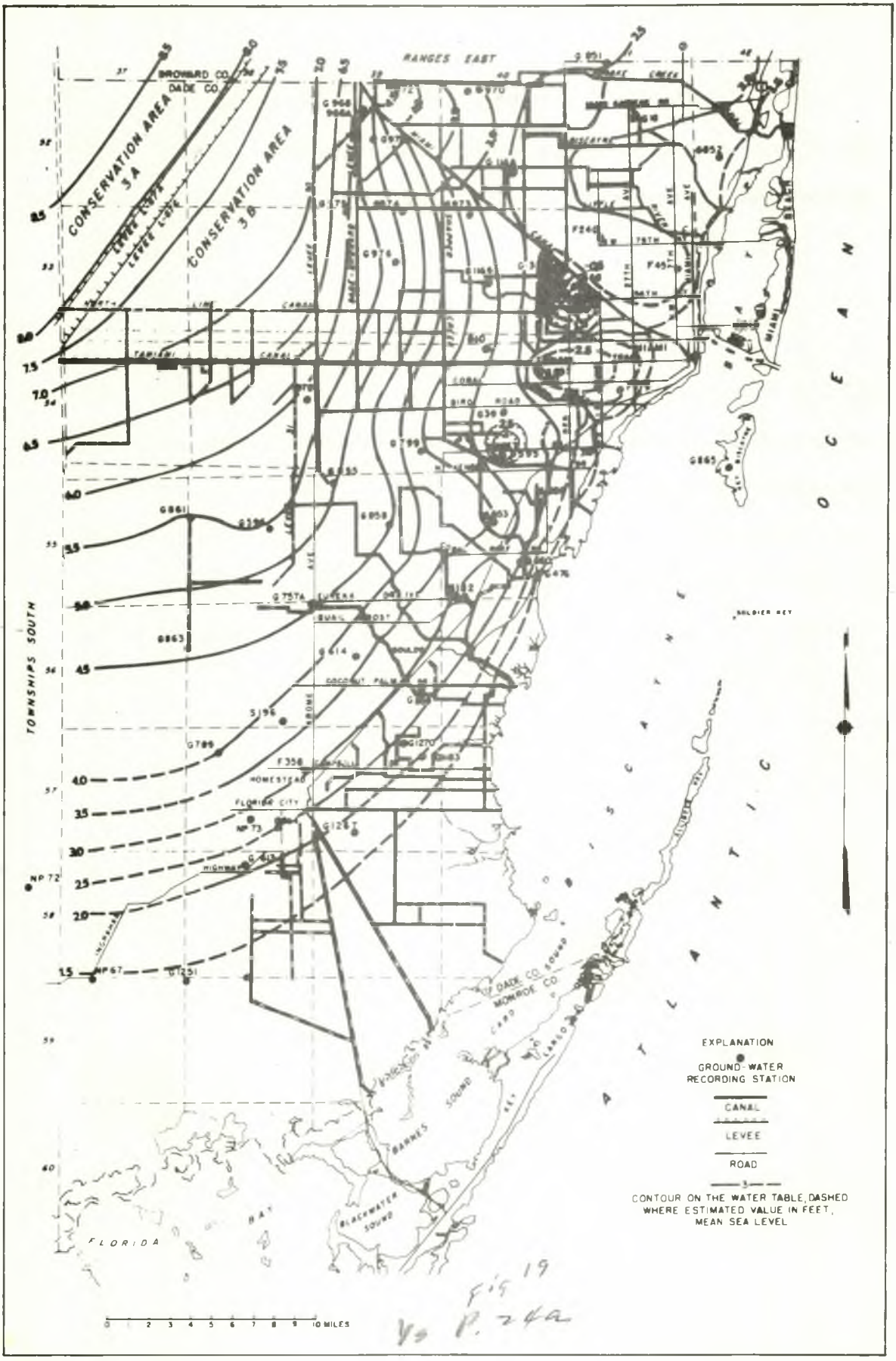

Figure 6.--Map of Eastern Dade County showing contours on the average ground-water level, 1959-67.

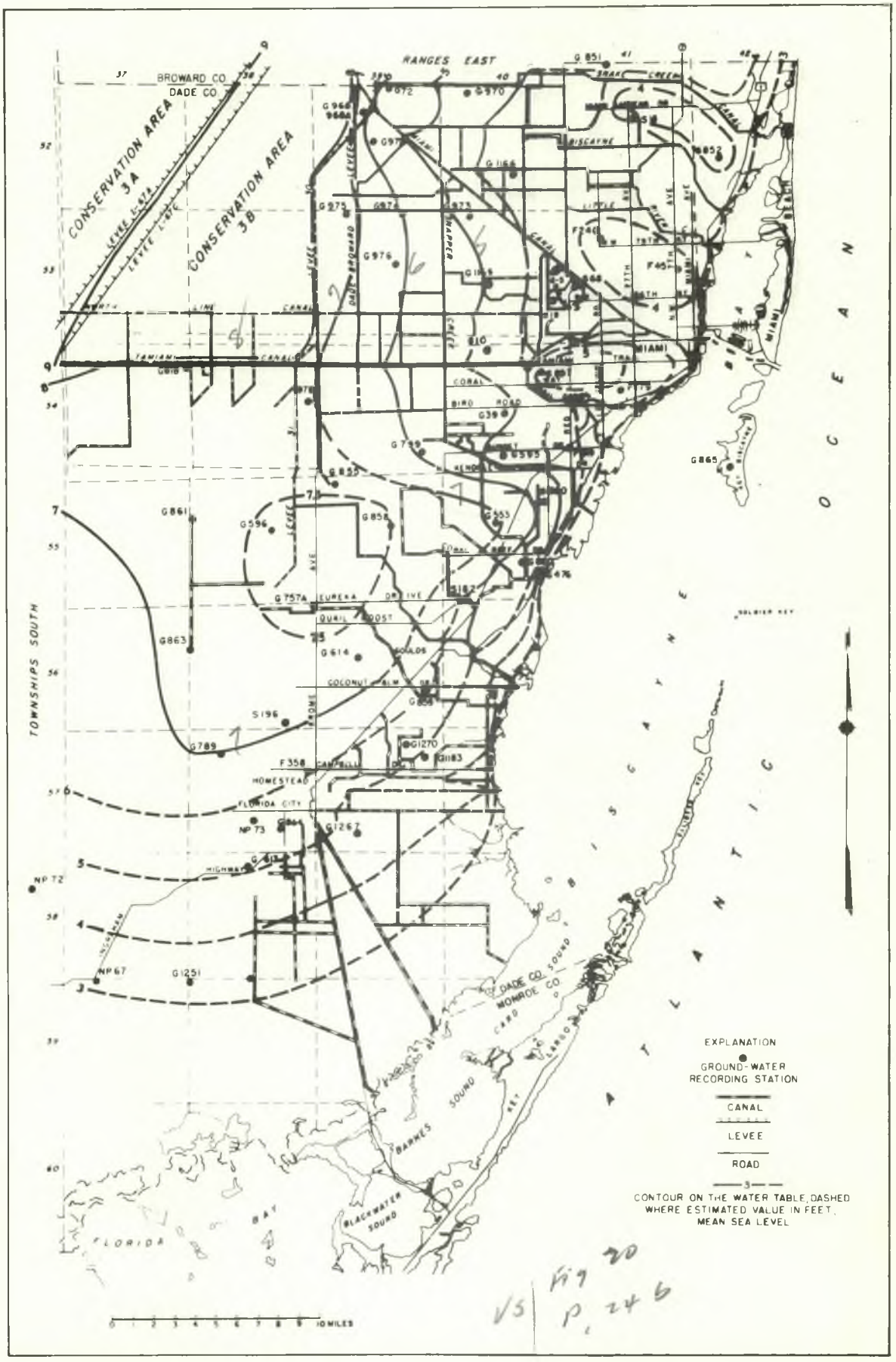

Figure 7.--Map of Eastern Dade County showing contours on the average yearly highest ground-water level, 1959-67.

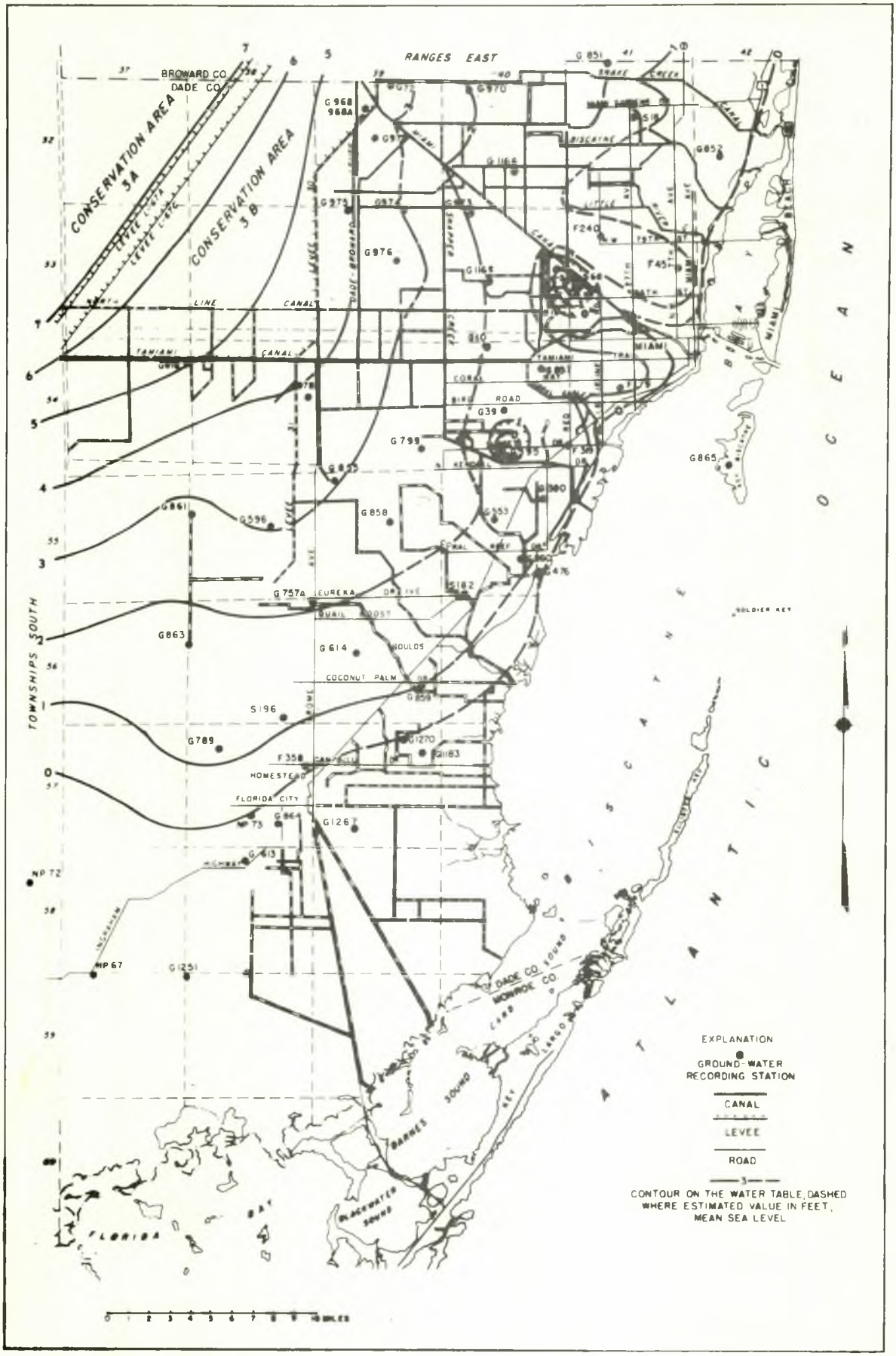

Figure 8.--Map of Eastern Dade County showing contours on the average yearly lowest ground-water level, 1959-67

Water levels during 1967 reflected the uneven distribution of rainfall on the county -- rainfall and water levels were near or above average in the northeastern part and below average in the southern part. Figures 9 through 18 are graphs of water-level fluctuations in wells representative of areas of different land-use and drainage. Water-level fluctuations during the 1967 water year are shown with seasonal fluctuations during the period 1959-67 for comparison of yearly extremes and for definition of long-term trends. A summary of the selected water-level data is presented in table 2.

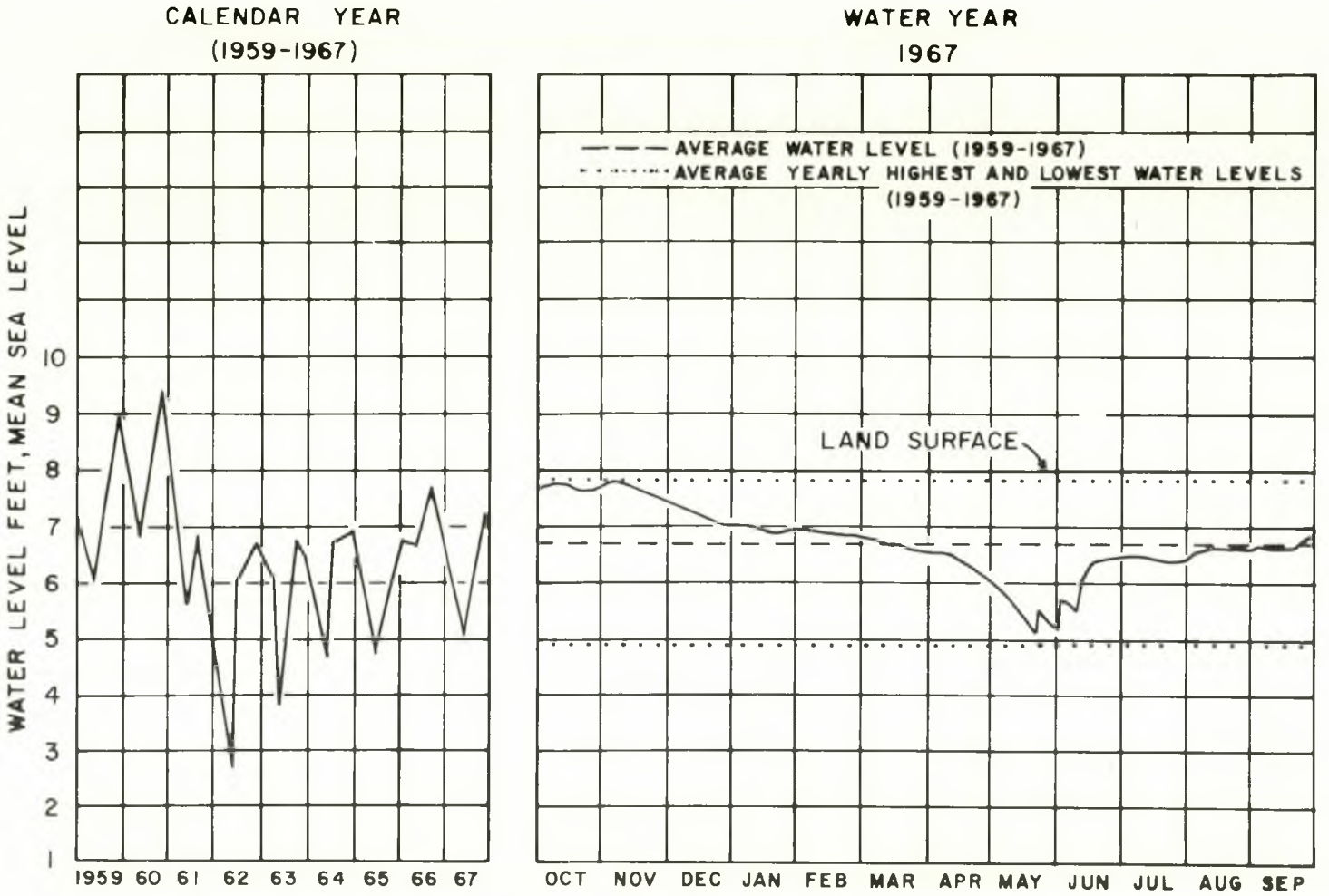

Figure 9. Hydrograph of well G-618 in northwestern Dade County, for the 1967 water year and 1959-67 calendar years.

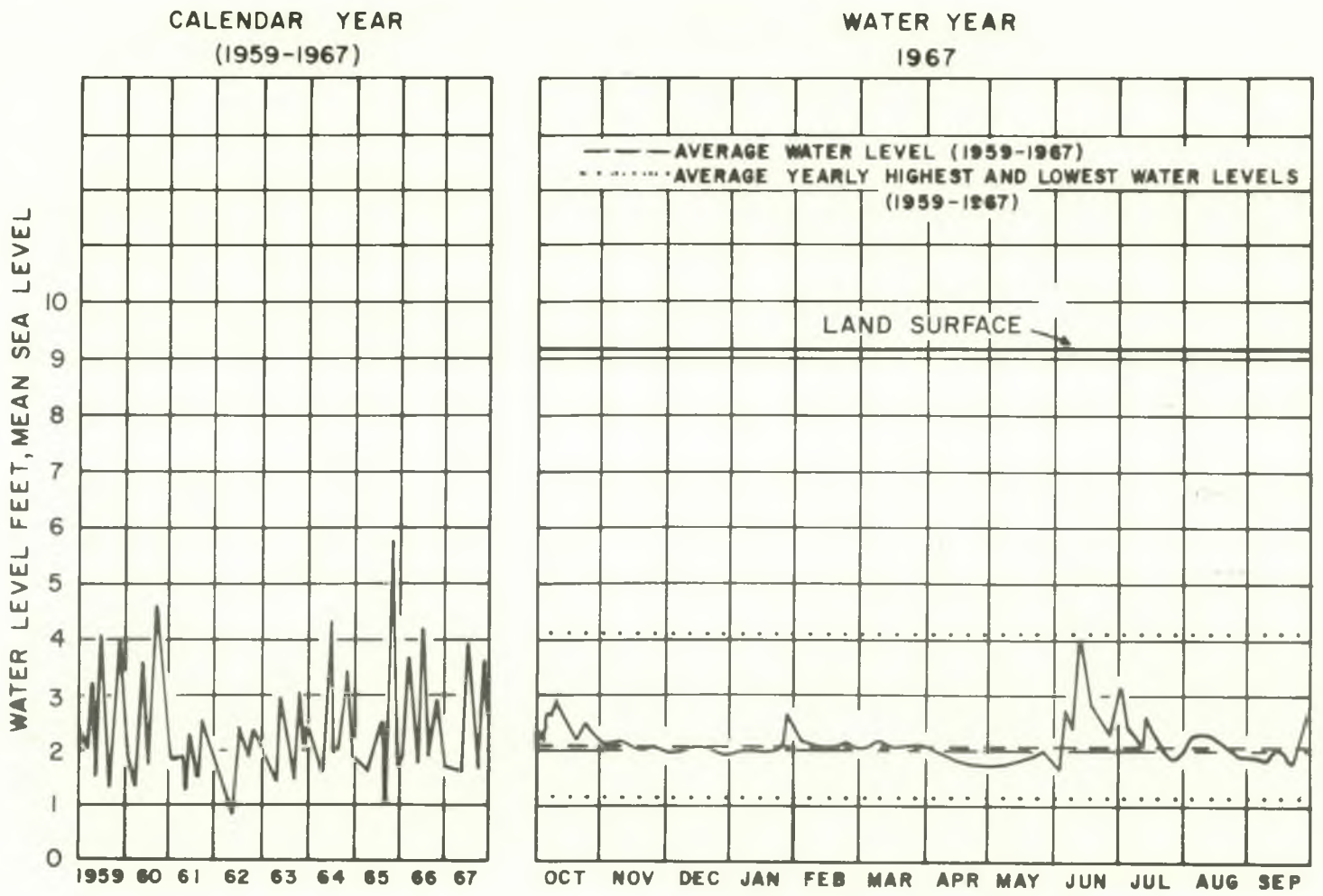

Figure 10. Hydrograph of well S-18 in northeastern Dade County, for the 1967 water year and 1959-67 calendar years

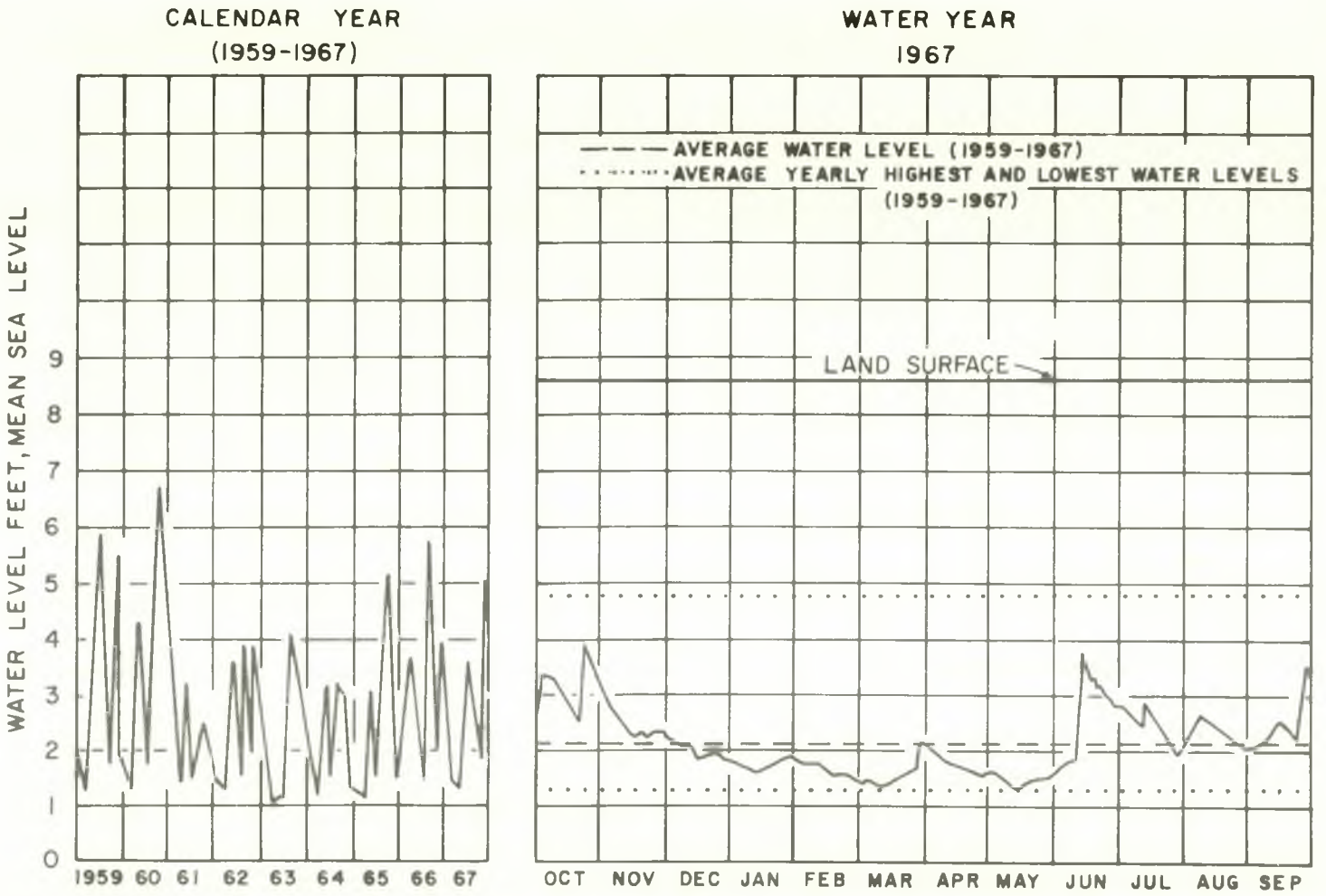

Figure 11. Hydrograph of well F-179 in northeastern Dade County, for the 1967 water year and 1959-67 calendar years.

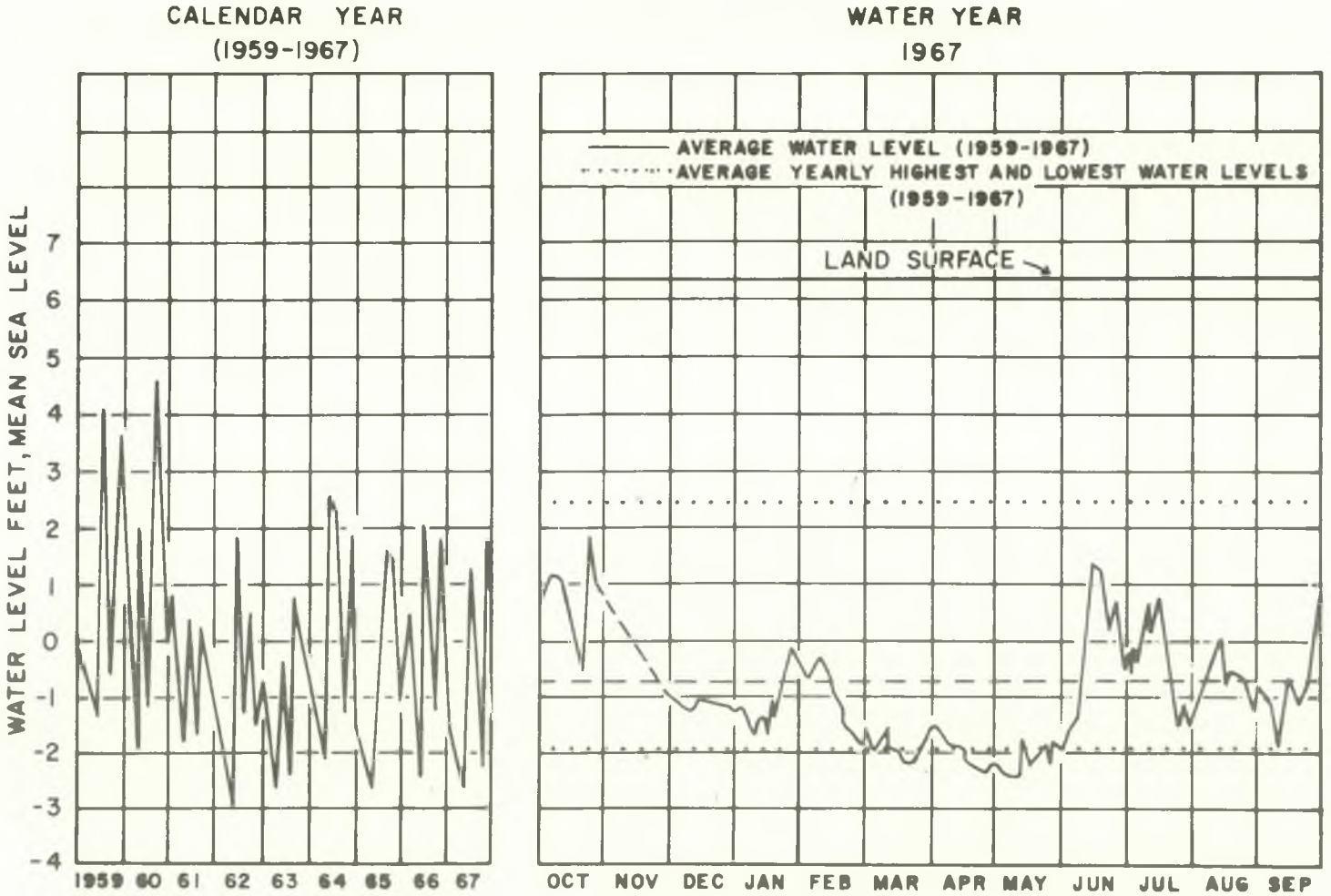

Figure 12. Hydrograph of well S-68 in northeastern Dade County, for the 1967 water year and 1959-67 calendar years.

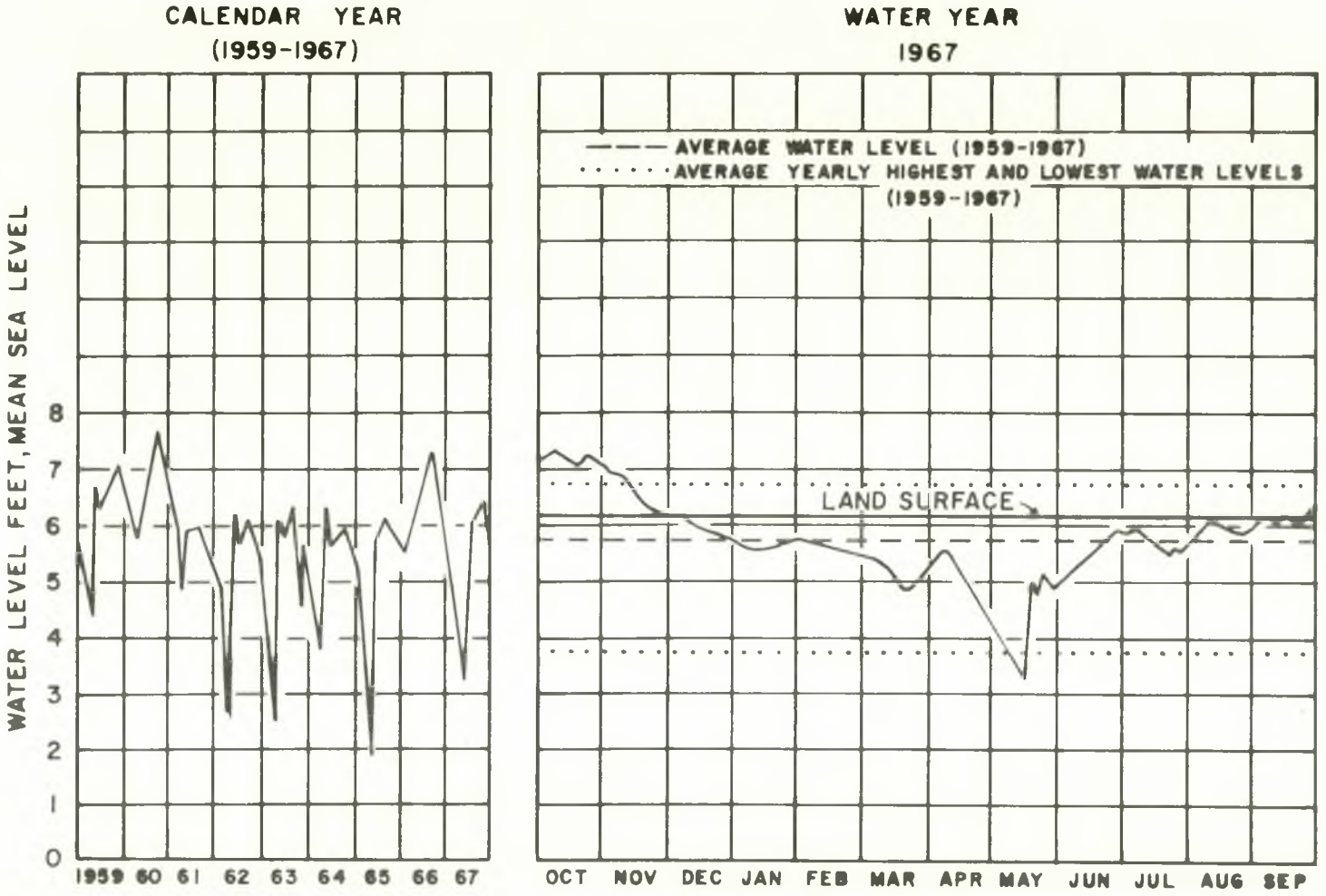

Figure 13. Hydrograph of well G-620 in west-central Dade County, for the 1967 water year and 1959-67 calendar years.

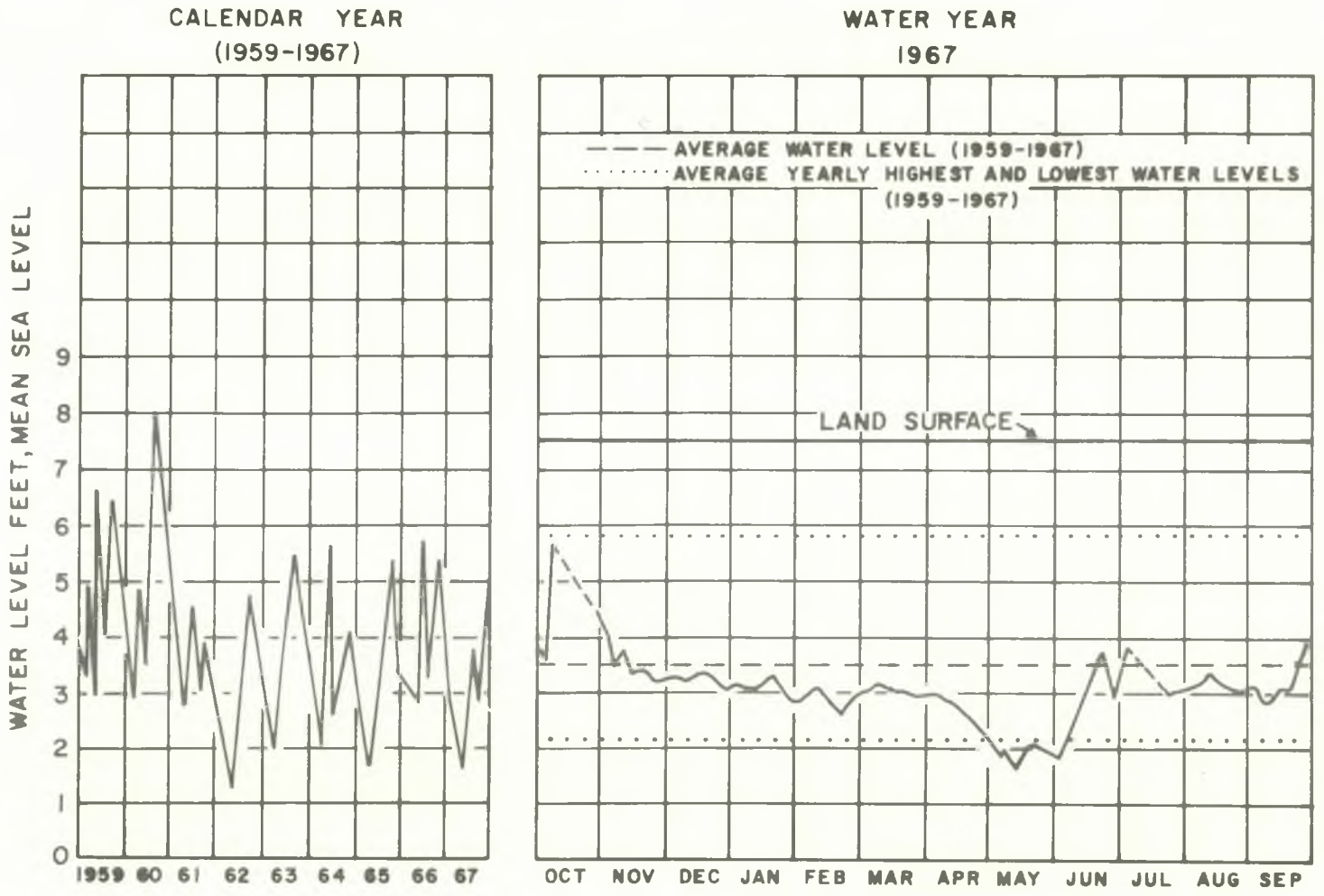

Figure 14. Hydrograph of well G-799 in central Dade County, for the 1967 water year and 1959-67 calendar years.

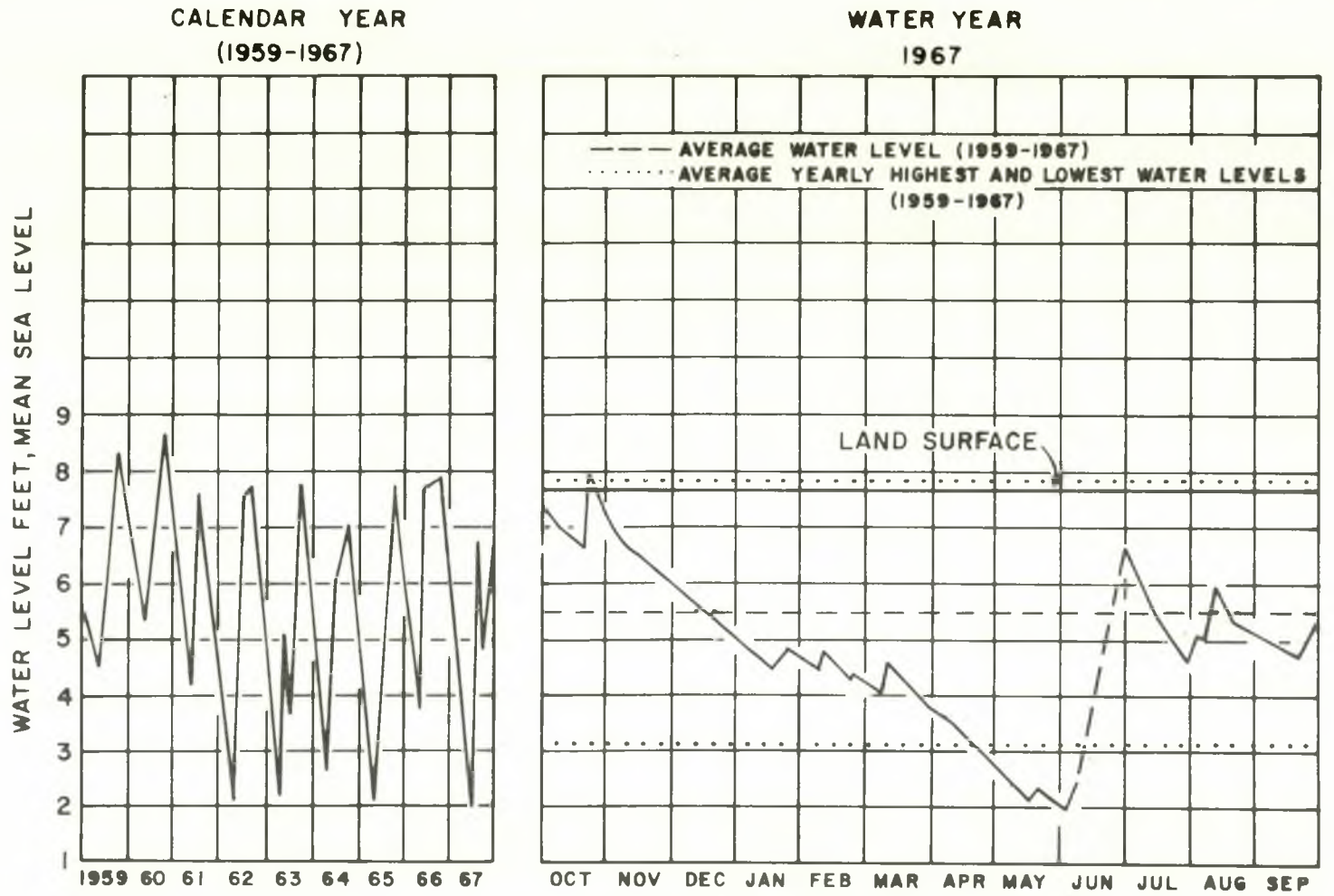

Figure 15. Hydrograph of well G-596 in central Dade County, for the 1967 water year and 1959-67 calendar years.

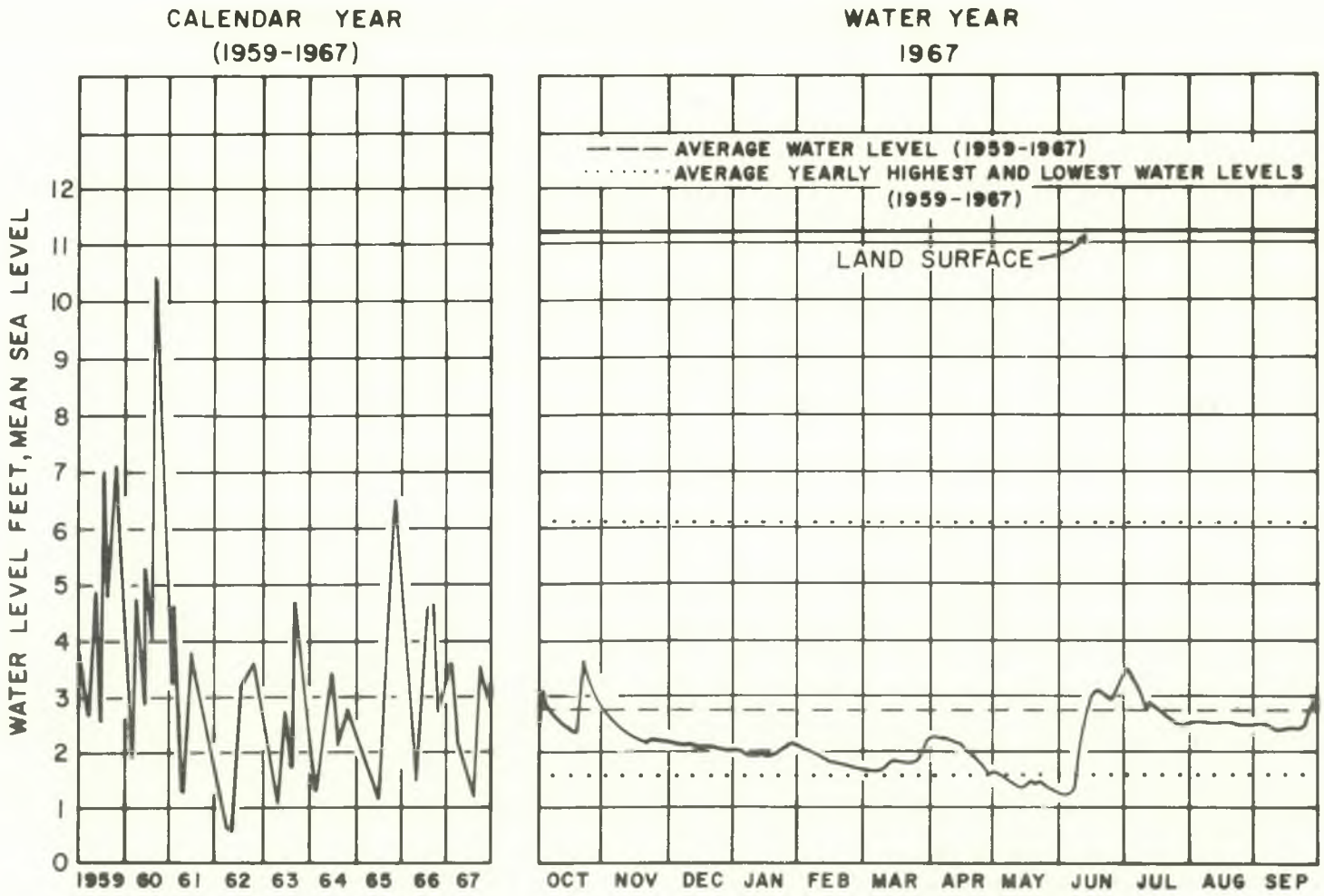

Figure 16. Hydrograph of well S-182 in east-central Dade County, for the 1967 water year and 1959-67 calendar years.

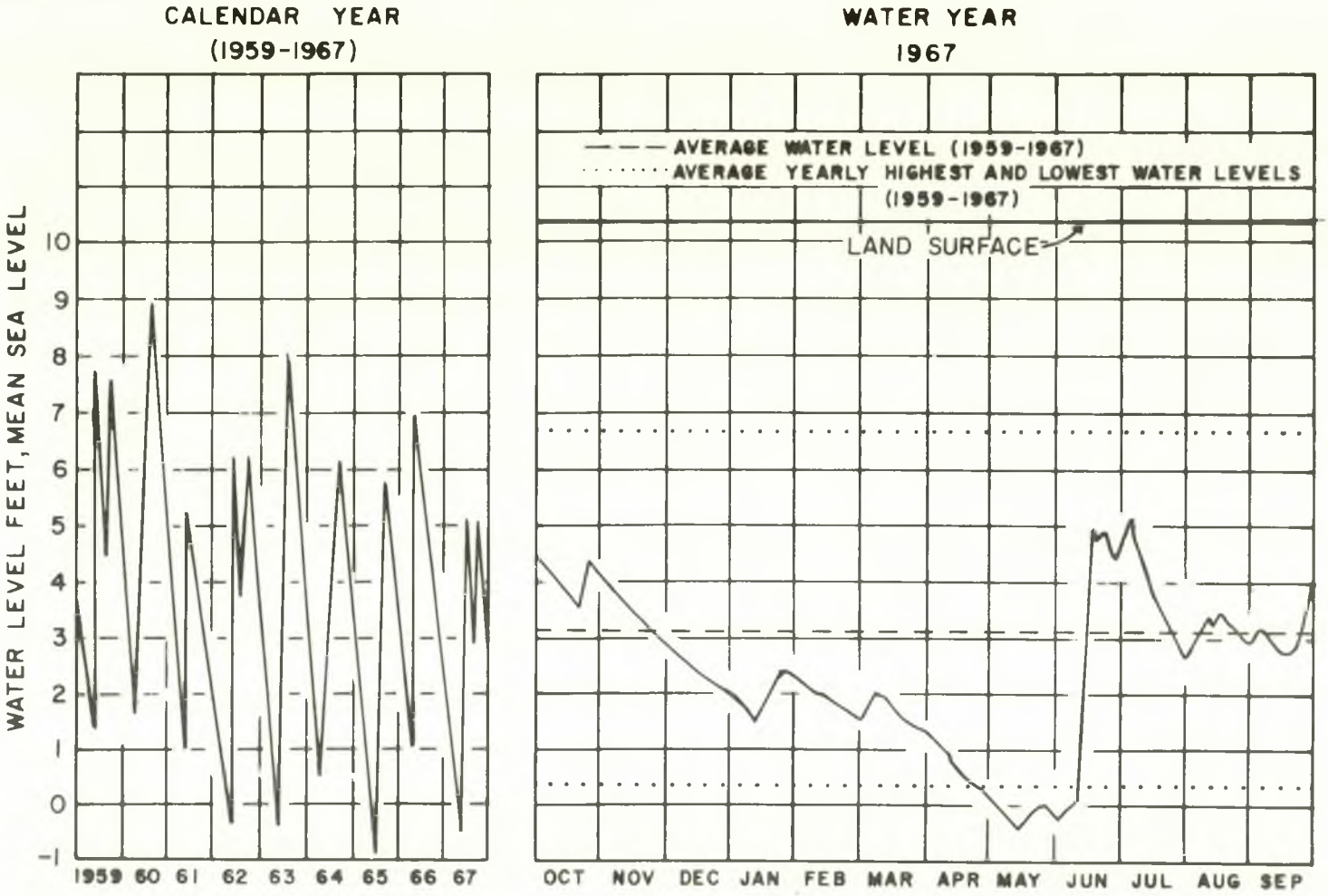

Figure 17. Hydrograph of well S-196 in south-central Dade County, for the 1967 water year and 1959-67 calendar years.

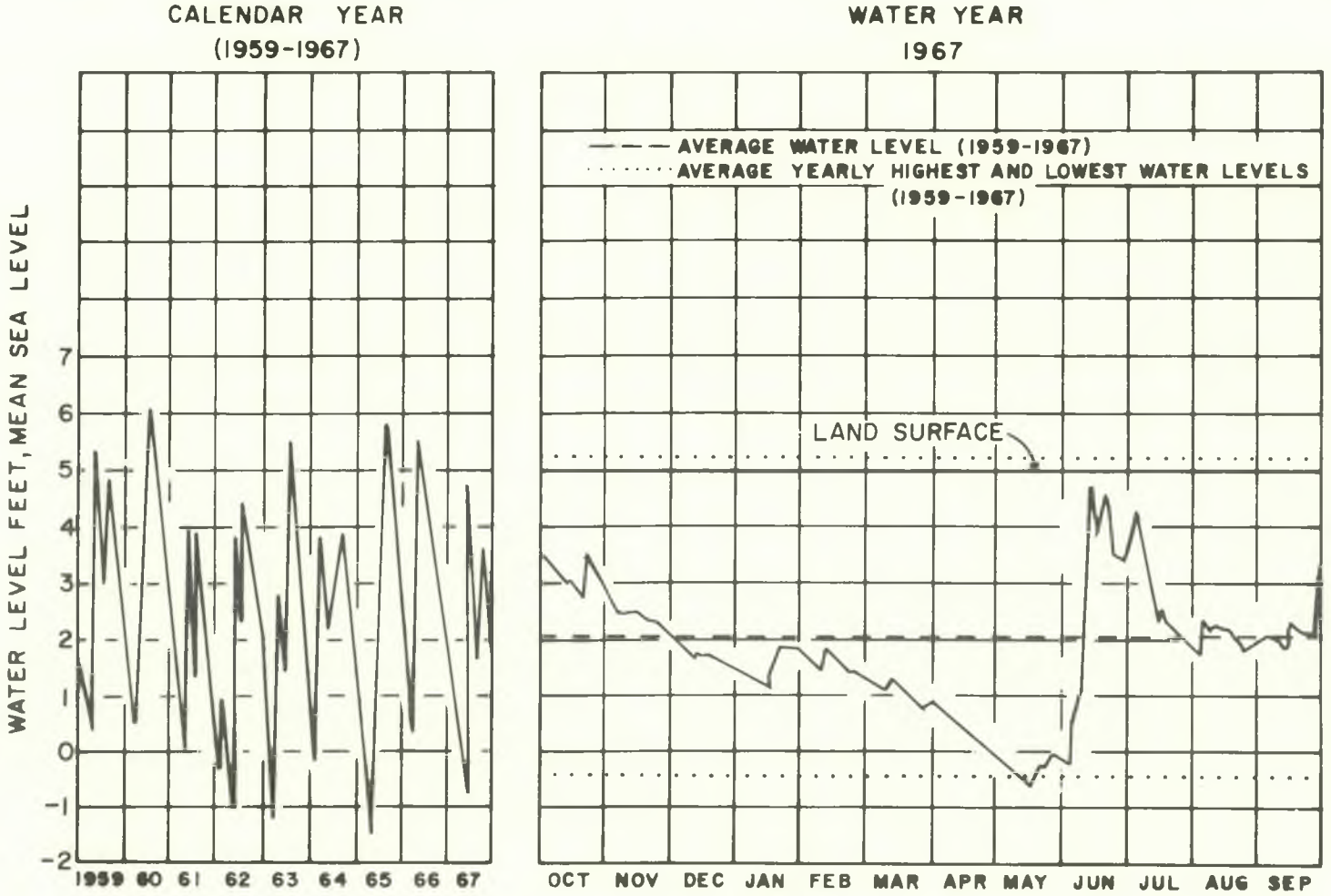

Figure 18. Hydrograph of well G-613 in southern Dade County, for the 1967 water year and 1959-67 calendar years.

Table 2.--Summary of water-level data from selected wells during 1967 water year, Dade County.

Well No.: Well number; G, government-owned; S, private ownership; F, fire well.
Location: General location in county; see fig. 1 for locations.
Land Use: A, agriculture; E, everglades; U, urban; S, suburban.
Drainage: N, natural; C, canal; c, controlled; p, poor.
Range: Range of fluctuation during 1967 water year,; feet, msl (mean sea level).
Average: Average stage 1967 water year, feet, msl.
Deviation: Deviation from average stage for period 1959-67, feet.
Remarks: p, affected by pumping.

Well No.	Location	Land Use	Drainage	Range	Average	Deviation	Remarks
G-618	Northwest	E	C, c	7.7 to 5.1	6.6	-0.1	See fig. 9
S-18	Northeast	U	C, c	3.9 to 1.7	2.1	0	See fig. 10,p
F-179	Northeast	U	C, c	3.9 to 1.3	2.3	+0.2	See fig. 11
S-68	Northeast	U	C, c	1.8 to -2.4	-1.0	-0.2	See fig. 12,p
G-620	West-central	E	N, p	7.3 to 3.2	5.6	-0.2	See fig. 13
G-799	Central	S	C, c	5.5 to 1.7	3.0	-0.5	See fig. 14,p
G-596	Central	A	C, c	7.9 to 2.0	4.6	-0.9	See fig. 15
S-182	East-central	S	C, c	3.7 to 1.2	2.3	-0.5	See fig. 16
S-196	South-central	A	C, c	5.2 to -0.4	2.1	-1.0	See fig. 17
G-613	South	A	C, c	4.8 to -0.7	1.6	-0.5	See fig. 18

Water-table contour maps were drawn to show the extreme seasonal variation in water levels experienced during the 1967 water year. Figures 19 and 20 are maps of eastern Dade showing water levels during the dry period (May 20, 1967) and the wet period (June 15, 1967) respectively.

Figure 19 shows that the yearly lowest water levels ranged from 7 feet above msl in Conservation Area 3A to more than a foot below msl in the southern part of the county, except in the well fields where water levels were lowered more than a foot below msl by pumping. A comparison of figure 19 with figure 8 suggests that the yearly lowest water levels during the 1967 water year were about normal in the northern part of the county and about a foot below normal in the southern part.

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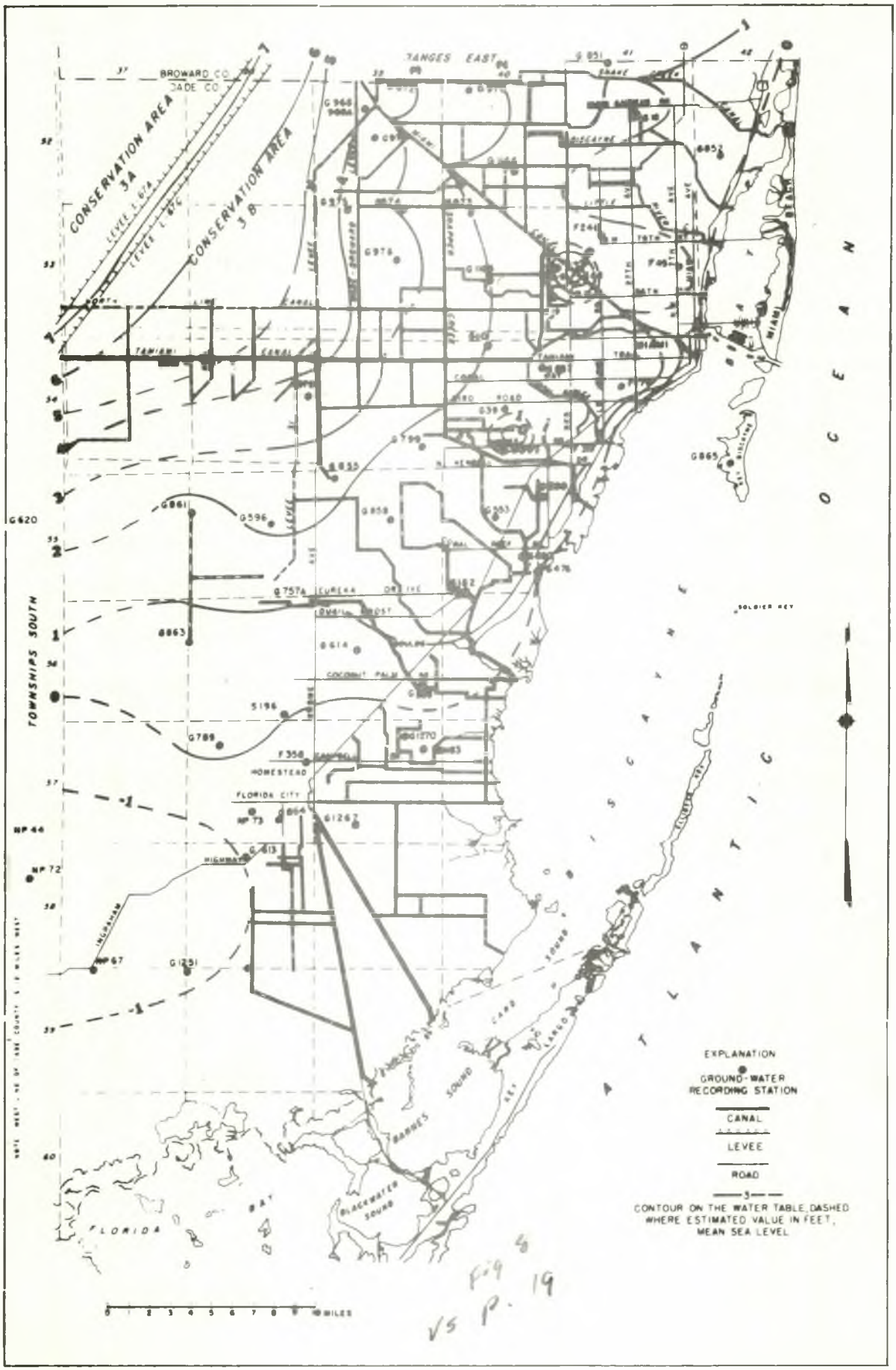


Figure 19.--Map of Eastern Dade County showing contours on the water table during the dry period, May 20, 1967.

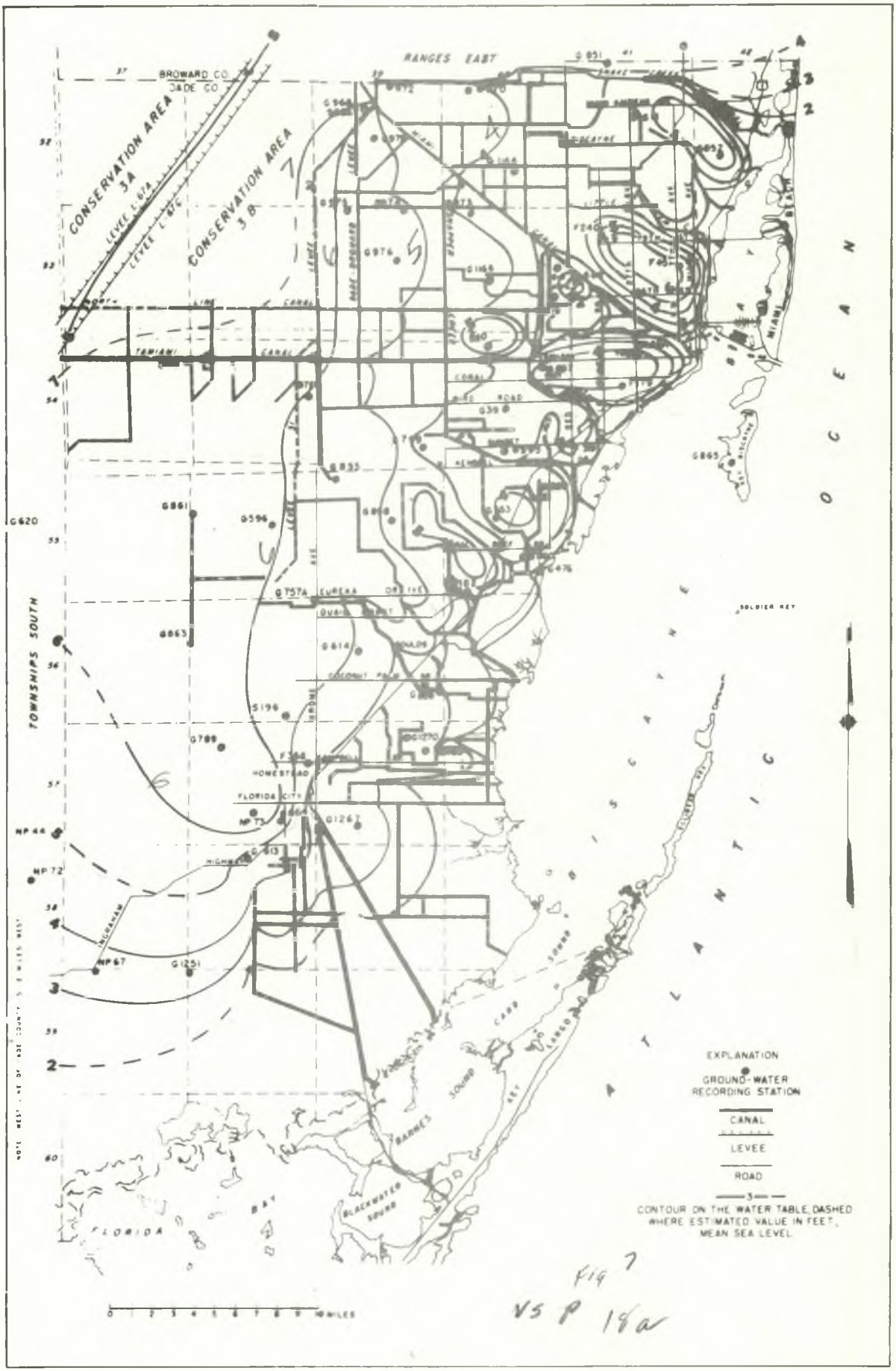


Figure 20.--Map of Eastern Dade County showing contours on the water table during the wet period, June 15, 1967.

Figure 20 shows the water levels in the wet period during June 1967 ranged from 8 feet above msl in Conservation Area 3A to about 2 feet above msl along the coast. A comparison of figure 20 with figure 7 suggests that the yearly highest water levels during the 1967 water year were below normal. High water levels on June 15 were caused by unusually heavy rains in June. Ground-water mounds were formed in the intercanal areas and excess water was discharged through salinity-control structures to the ocean.

During seasonal dry periods, ground-water levels in well-field areas are highly dependent upon recharge from nearby canals. Figure 21 is a water-table map of the City of Miami's well fields in the Hialeah-Miami Springs area showing the drawdown caused by an average pumpage of 80 mgd. Water levels near the centers of heaviest pumpage were 3.6 feet below msl while water levels in the nearby canals were about 2.6 feet above msl; the 36th Street salinity control on the Miami Canal was closed at the time and releases to the Miami Canal had been recently made from the conservation areas to insure recharge to the well fields.

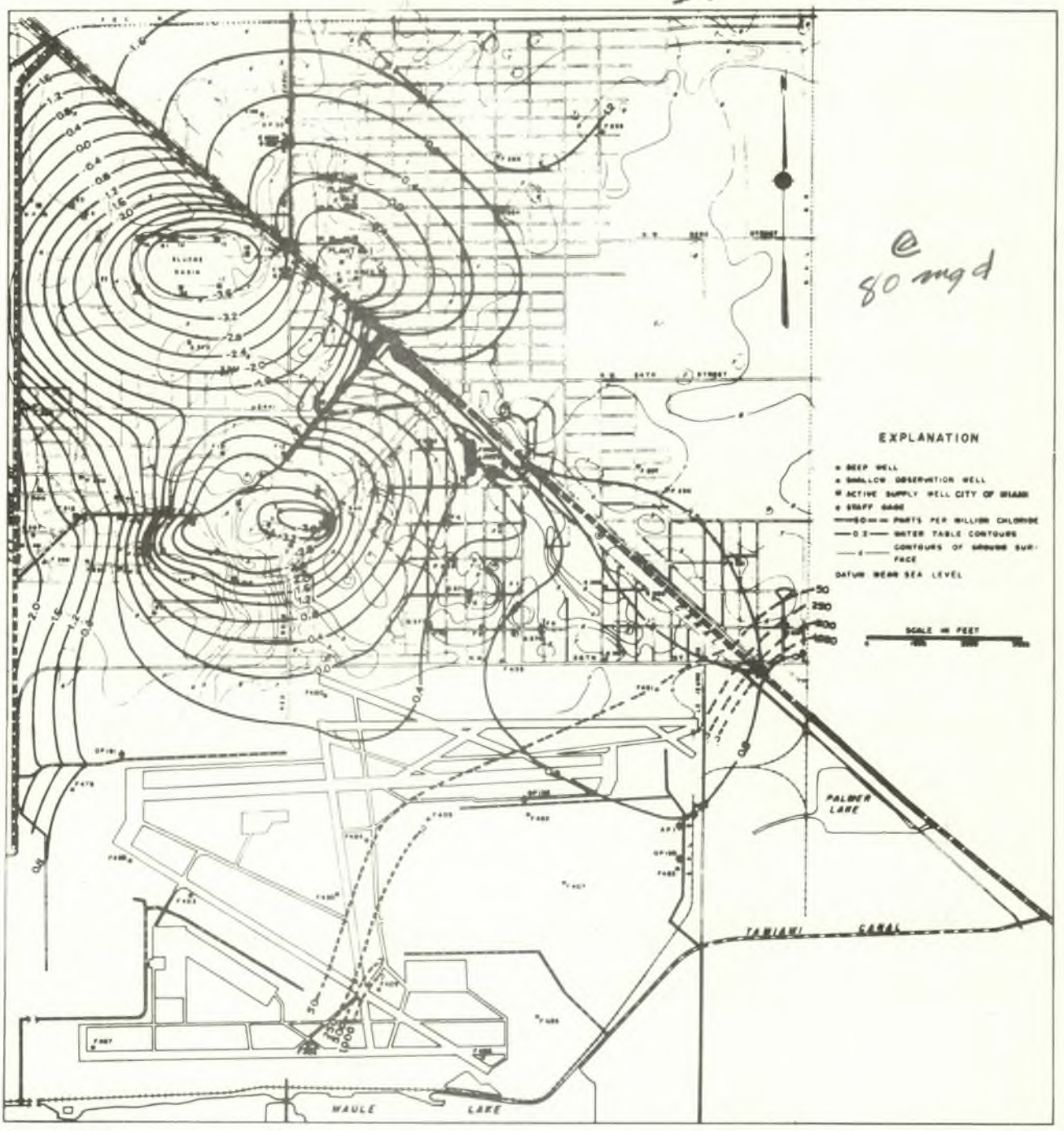


Figure 21.--Map of Miami well field area showing contours on the water table, April 13, 1967.

Water Use

Ground water in Dade County is used county-wide for municipal, industrial, domestic, and agricultural purposes. The total yearly pumpage at the Miami well fields increased from approximately 8.5 billion gallons in 1940 to 51 billion gallons in 1965 and dropped to 48.6 billion gallons in 1967 (fig. 22). The average daily pumpage at these well fields as shown in figure 23 indicates a nearly constant increase in pumpage from 1930 through 1953. The dropoff in the rate of year-to-year increase in pumping since 1953 probably reflects a population shift to the suburban areas which are served by local water systems.

A comparison of monthly pumpage of the Miami well fields for 1967 with monthly rainfall (fig. 24) shows the demand for water was greatest during May, a month of sparse rainfall. Conversely, water demands were least during June, a month of surplus rainfall.

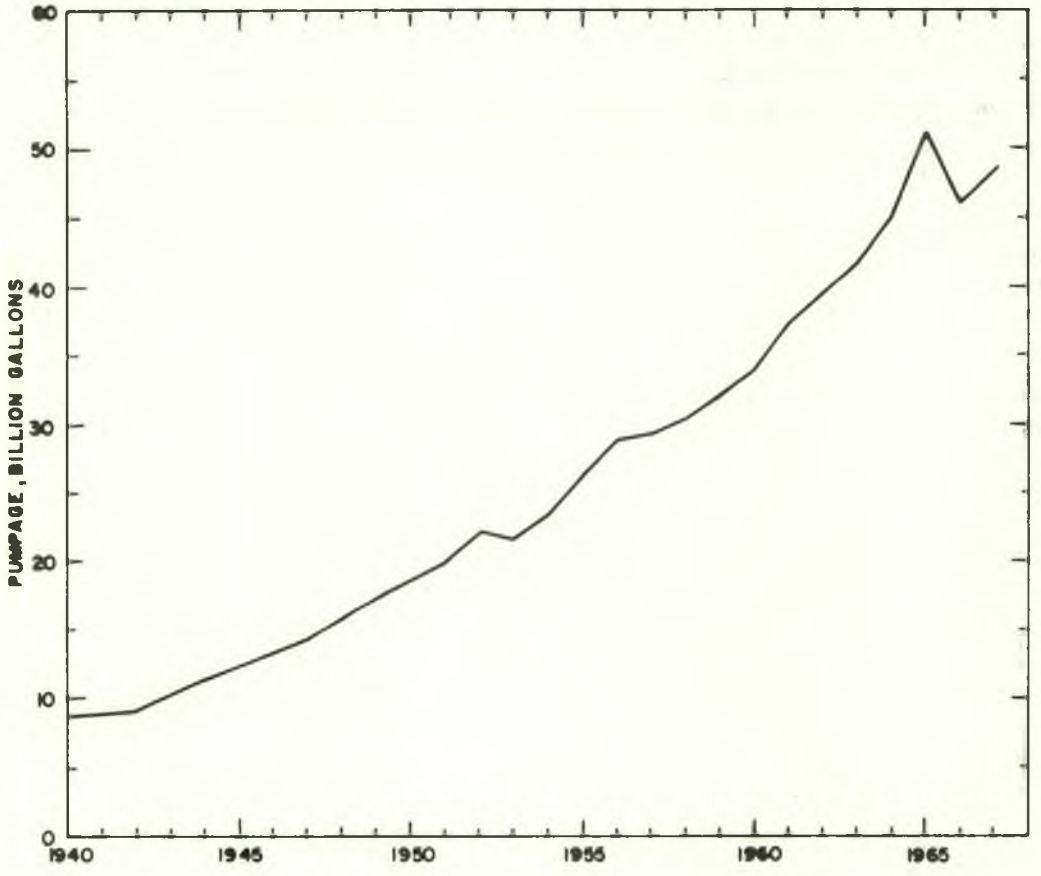


Figure 22.--Graph showing total yearly pumpage at the City of Miami well fields, 1940-67.

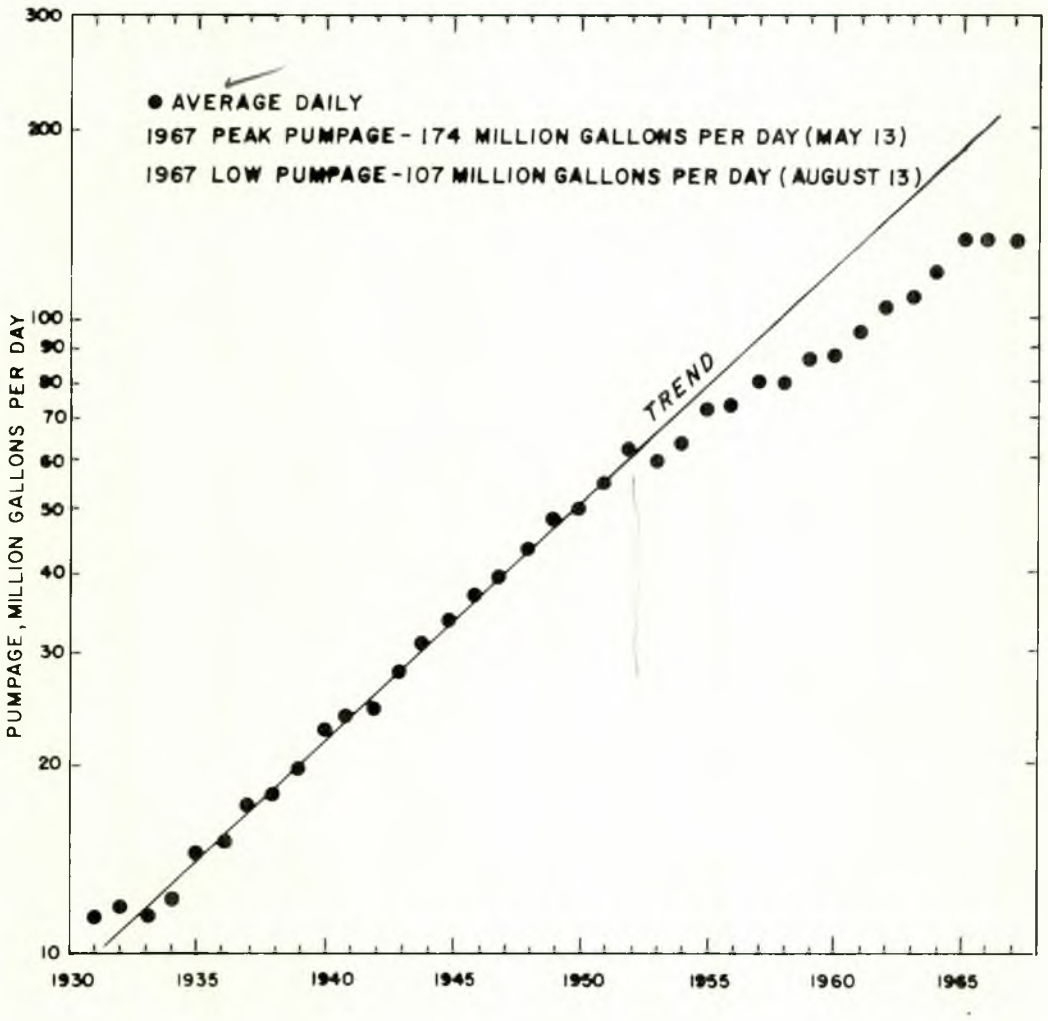


Figure 23.--Graphs showing average daily pumpage from the City of Miami well fields, 1930-67.

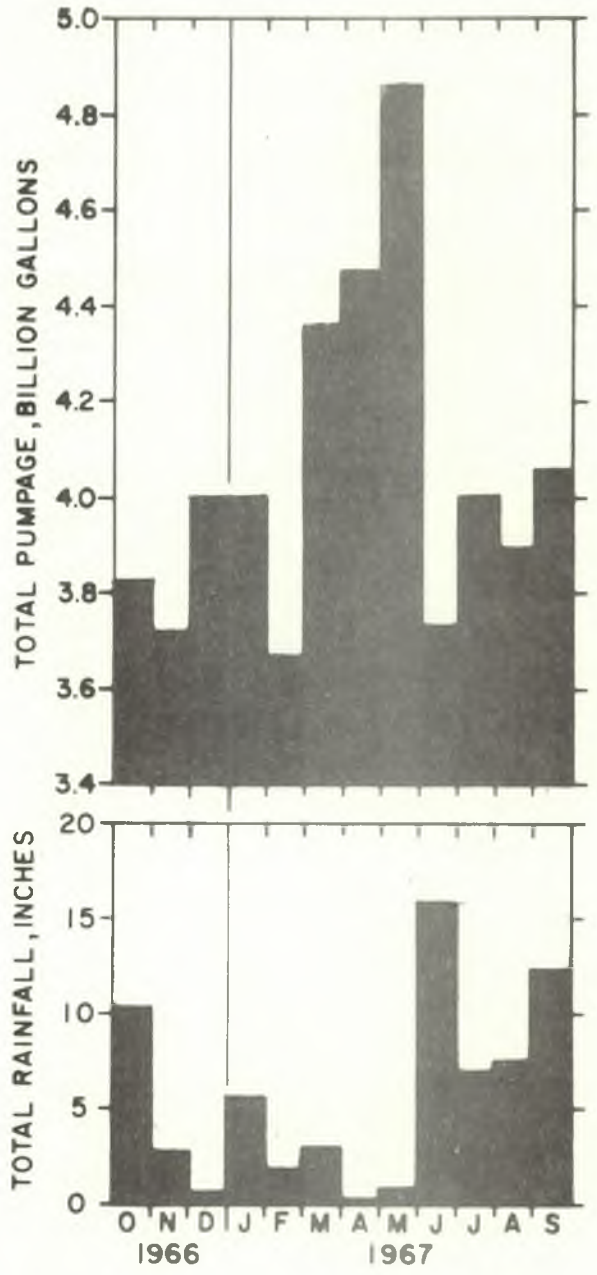


Figure 24.--Graphs comparing total monthly pumpage at Miami well fields and total monthly rainfall at Hialeah, 1967 water year.

SURFACE WATER

During 1967 the U.S. Geological Survey maintained 46 surface-water gaging stations within the county to determine water levels and runoff. Thirteen of these stations were located at coastal control structures, three were in Biscayne Bay, and thirty were at inland locations. Records of daily flow were obtained at all major canals except the Black Creek Canal while periodic measurements of flow were made and daily water levels were recorded at canals of lesser importance. Discharge hydrographs for 12 of the stations are shown in figures 25 through 30.

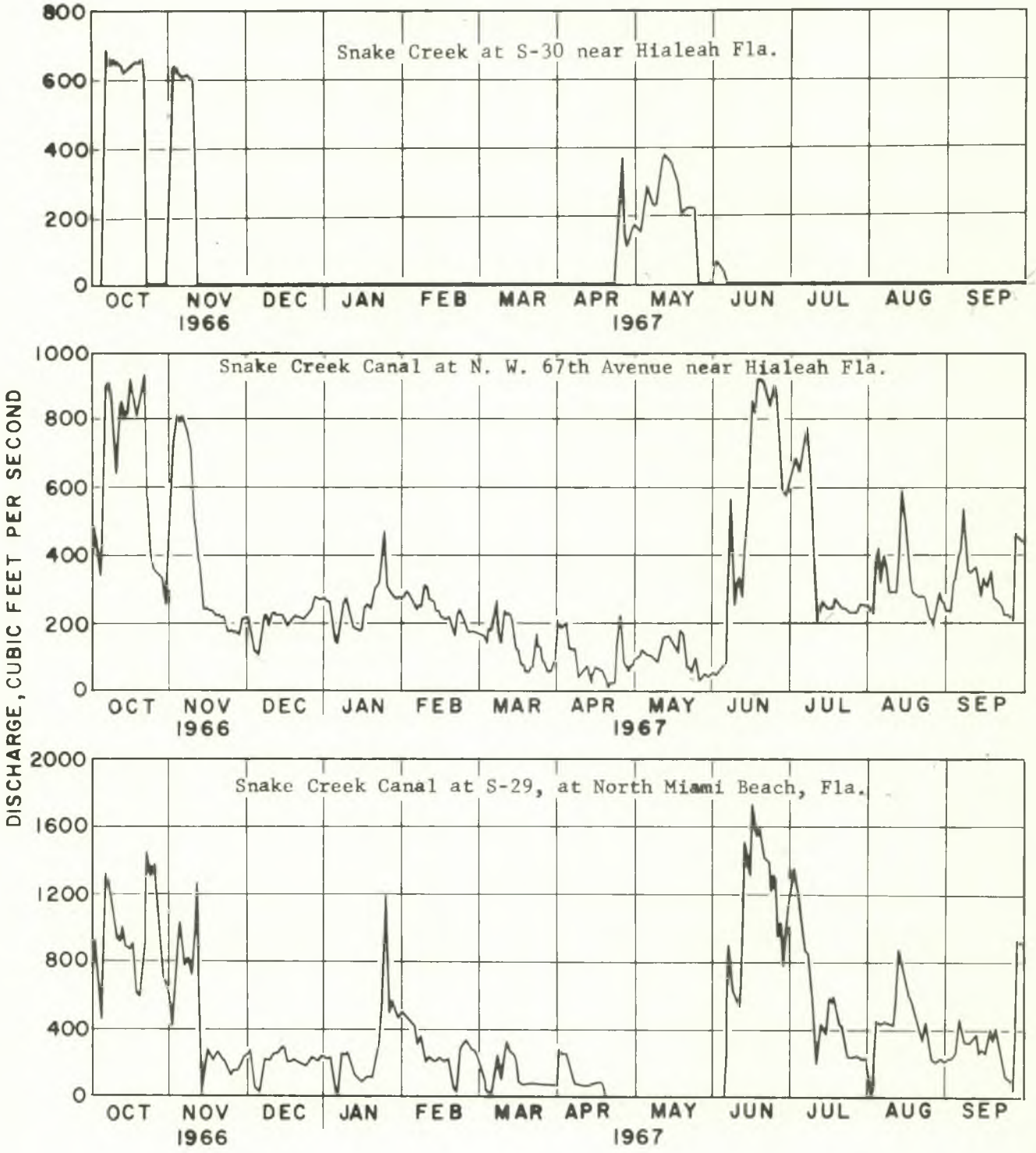


Figure 25.--Discharge hydrographs for Snake Creek Canal.

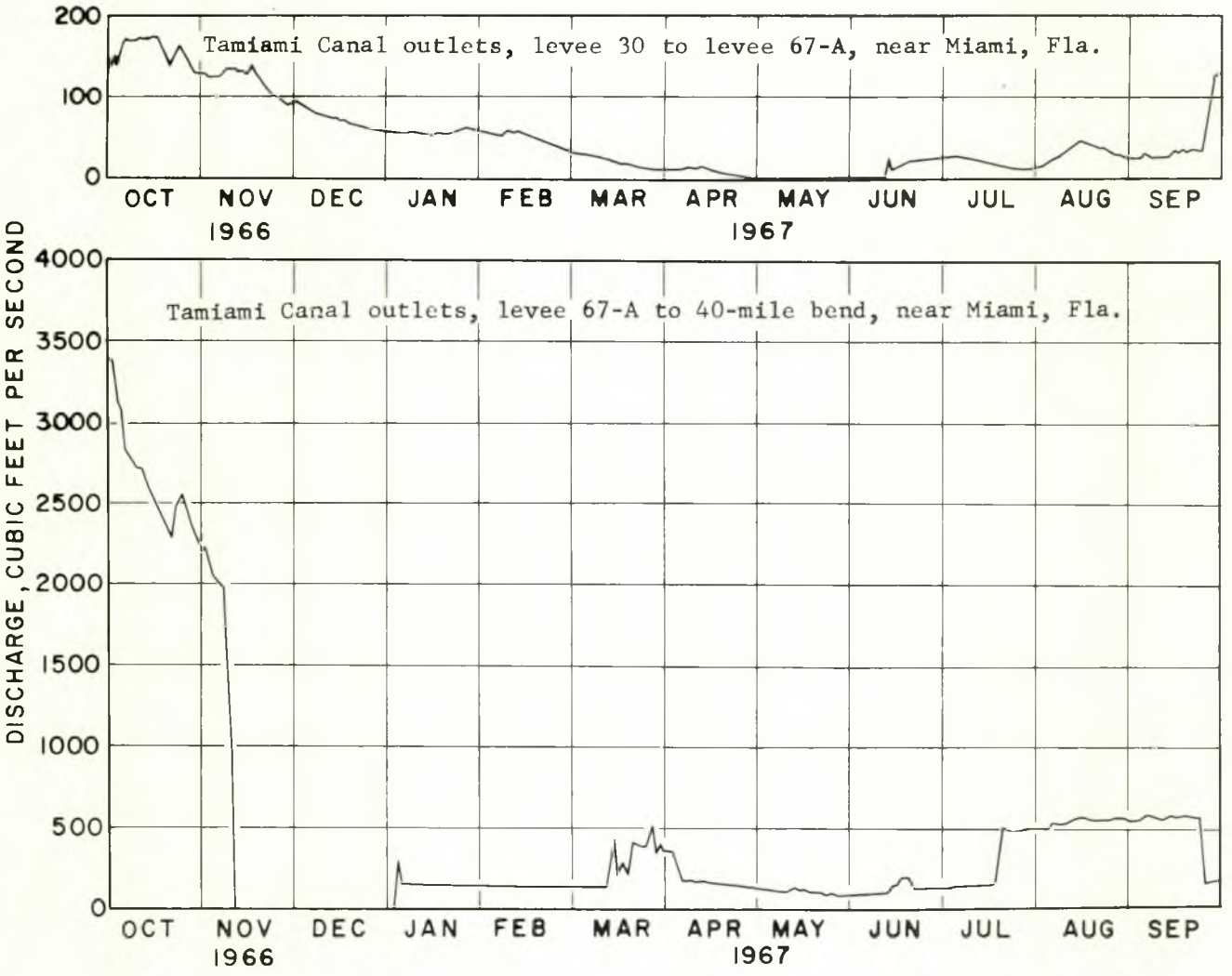


Figure 26.--Discharge hydrographs for Tamiami Canal outlets.

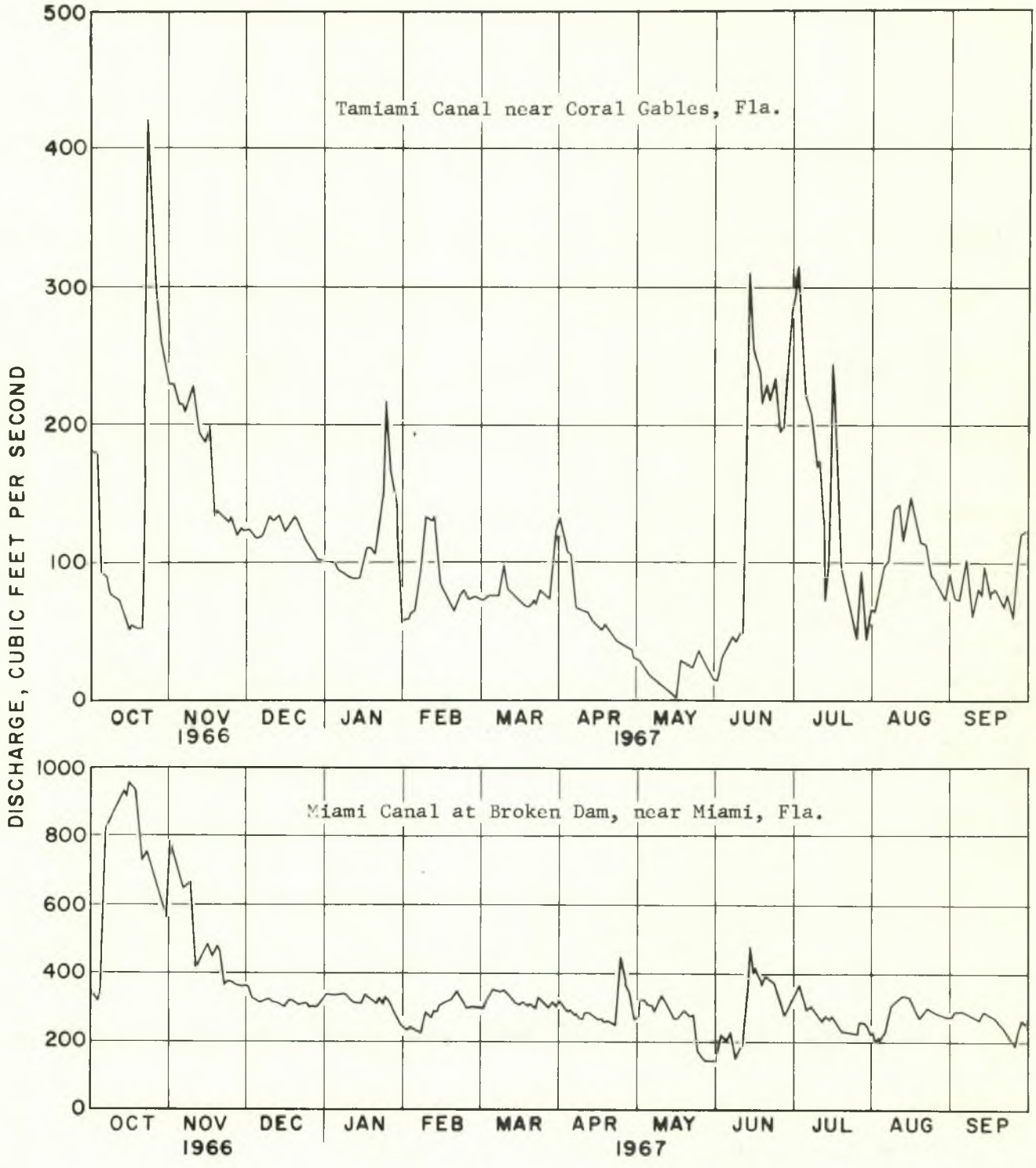


Figure 27.--Discharge hydrographs for Tamiami and Miami Canals.

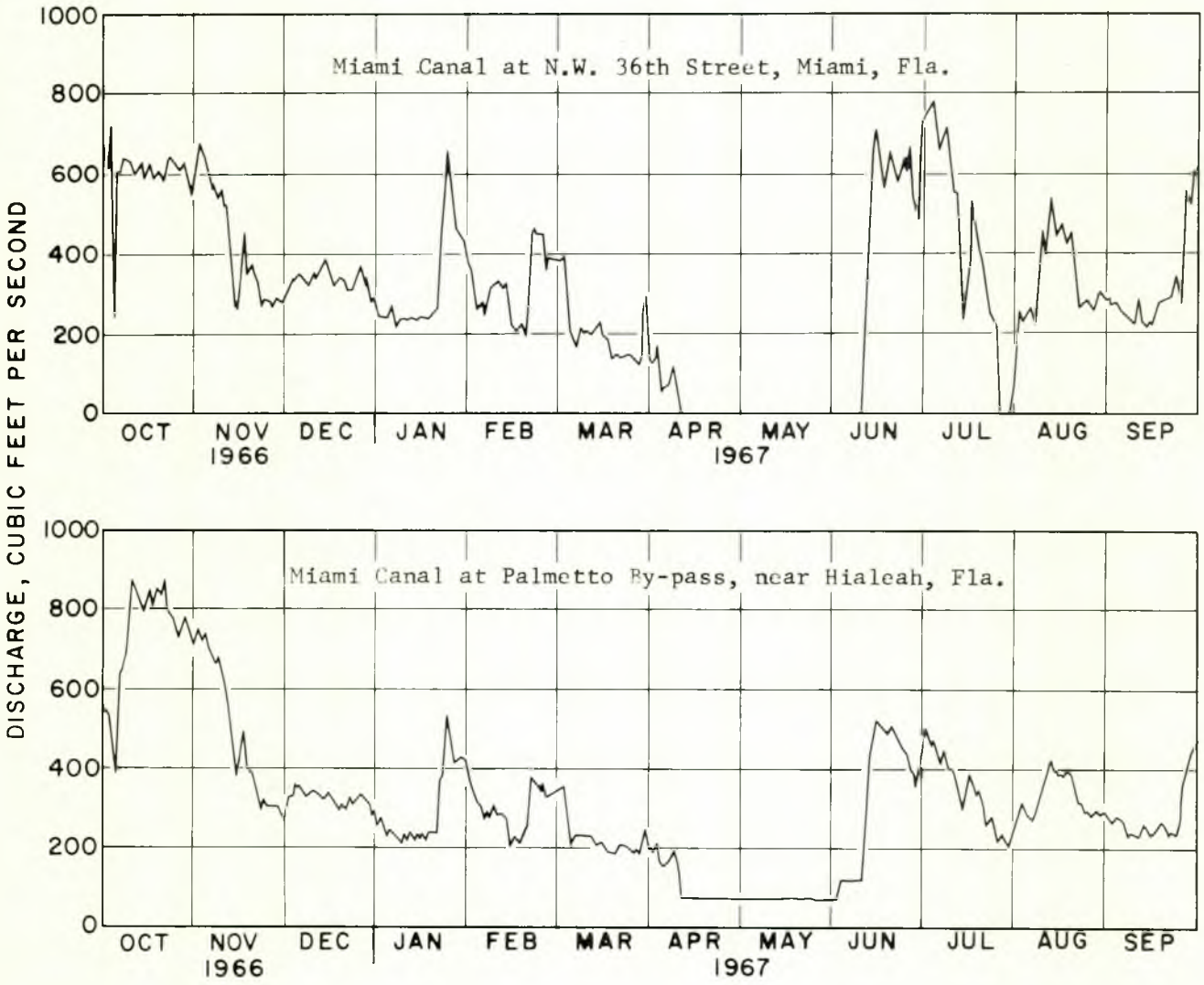
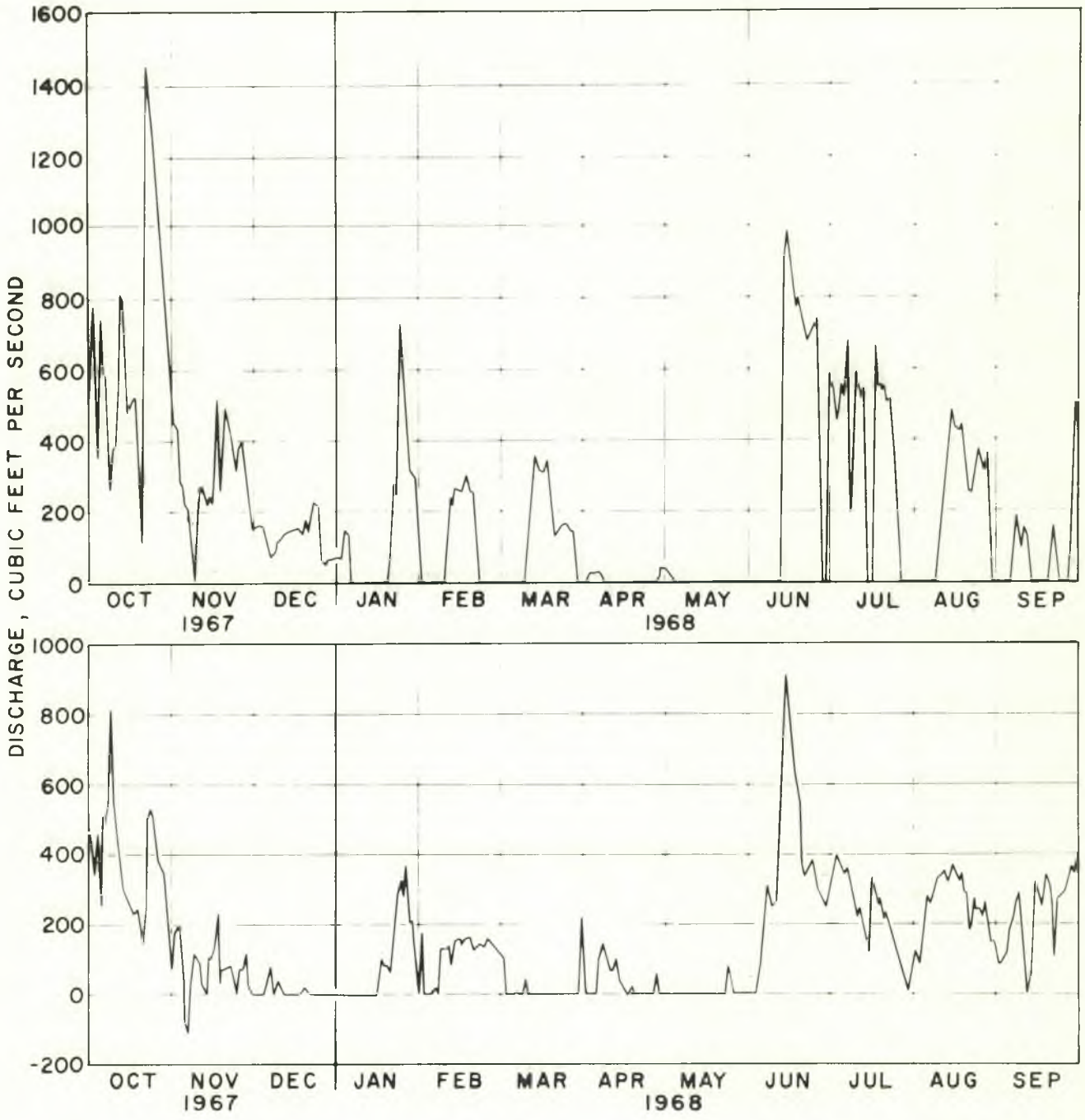


Figure 28.--Discharge hydrographs for Miami Canal.

Snapper Creek Canal at S-22, near South Miami, Fla.



Little River Canal at S-27, at Miami, Fla.

Figure 29.--Discharge hydrographs for Snapper Creek and Little River Canals.

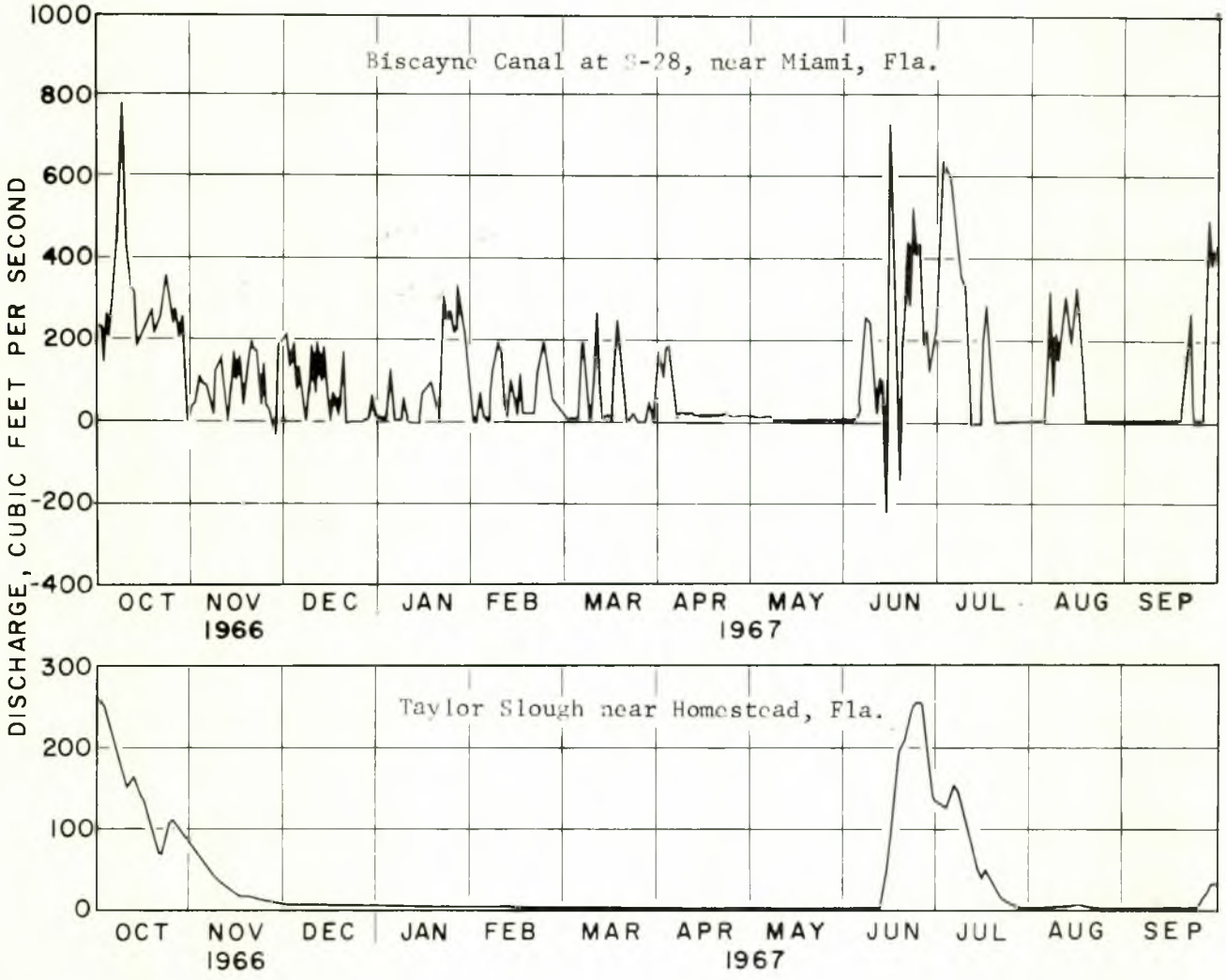


Figure 30.--Discharge hydrographs for Taylor Slough and Biscayne Canal.

Determination of discharge

During the 1967 water year, the U.S. Geological Survey made 156 discharge measurements at 15 different locations within the county. The purpose of these measurements was to check existing discharge relationships or when necessary establish new ones. Many of the measurements were made difficult by the extremely low velocities and were further complicated at times by floating aquatic vegetation, and control structure regulations.

Flat gradients in canals and complications resulting from control structure operations made deflection meters the most effective means of obtaining continuous records of flow. They were used at all but four locations where daily discharge was determined. The exceptions were Taylor Slough and the three Tamiami Canal outlet stations, where discharge is related to stage and adjusted for periodic shifts in control conditions.

Records of discharge

During the water year records of daily discharge were maintained at fifteen different locations on seven streams and canals within the county, a summary of which is given in table 3. Snake Creek, Biscayne, Little River, Miami, Tamiami and Snapper Creek Canals flow into the Atlantic Ocean. Their combined annual discharge represents an estimated seventy-five percent of the total eastward runoff from all Dade County canals.

During the 1967 water year these canals had a combined average daily discharge of 1,260 cfs (cubic feet per second) or 814 million gpd. This compares with an 8-year average of 1,400 cfs or 905 million gpd. The total discharge of 912 thousand acre-feet was 608 thousand less than that of the previous water year and was 90 percent of the 8-year average.

Snake Creek Canal had the greatest discharge (278,000 acre-feet), and Biscayne Canal had the least discharge (76,000 acre-feet) of the six canals. All showed declines from 1966 and only Snake Creek and Little River discharged more than the average for the period of record. The maximum daily discharge of 1,740 cfs was recorded at Snake Creek Canal, while zero flow was recorded at all except Tamiami Canal where the minimum flow was 1.6 cfs. Maximum daily reverse flow of 222 cfs was recorded at Biscayne Canal. Other stations recording net daily reverse flows were Little River (112 cfs) and Snapper Creek (2.3 cfs).

Table 3.--Summary of discharge data for gaging stations for the 1967 water year.

Gaging station	Maximum daily (cfs)	Minimum daily (cfs)	Number of days of zero flow	Mean (cfs)	Average for period of record (cfs)
Snake Creek Canal at S-30	698	0	299	67.1	48.8
Snake Creek Canal at N.W. 67th Ave.	940	11	---	306	310
Snake Creek Canal at S-29	1,740	0	48	384	381.
Tamiami Canal outlets, 40-mile bend to Monroe	1,330	0	53	180	264
Tamiami Canal outlets, levee 67A to 40-mile bend	3,380	0	53	462	410
Tamiami Canal outlets, levee 30 to levee 67A	172	0	43	48.6	71.4
Tamiami Canal near Coral Gables	420	1.6	---	109	145
Miami Canal at broken dam	956	140	---	343	262
Miami Canal at Palmetto Bypass	870	68	---	318	330
Miami Canal at N.W. 36th St.	771	0	67	303	340
Snapper Creek Canal near Coral Gables	186	-2.3	---	44.1	44.8
Snapper Creek Canal at S-22	1,450	0	138	212	254
Little River Canal at S-27	908	-443	123	146	136
Taylor Slough near Homestead	269	0	173	27.6	46.5
Biscayne Canal at S-28	792	-222	97	105	145

Snake Creek Canal

Snake Creek Canal discharges more water than any other of Dade County's coastal canals. Flow in the canal is regulated by two gated-control structures -- one located at the eastern edge of Conservation Area 3B and the other near the mouth.

During the 1967 water year the U.S. Geological Survey obtained daily stage and discharge records at three locations on the canal -- above each control and at the confluence of the north and west forks of the canal at N. W. 67th Avenue.

The upstream structure S-30 was kept closed 299 days during the year. During the 66 days it was open it discharged a total of 48,560 acre feet for a daily average for the year of 67.1 cfs. Maximum daily discharge of 698 cfs occurred October 6.

Miami Canal

Miami Canal is Dade County's second largest coastal canal. Records of daily flow in the canal were obtained by the U.S. Geological Survey at Broken Dam, Palmetto By-pass and N. W. 36 Street. In addition, daily records of stage were obtained from the station at Pennsuco. The discharge station at Brickell Avenue was discontinued at the end of the 1966 water year.

During the year the Miami Canal discharged an average of 303 cubic feet per second at the N.W. 36 Street salinity-control dam. This compares with an eight-year average of 340 cfs. The highest daily discharge was 771 cfs and occurred July 3, 1967 and there were 67 days of zero flow.

On October 4, 1966 flow in the Miami Canal was significantly affected by the winds accompanying hurricane "INEZ". As the center of the storm moved southwestward along the Florida Keys, (see fig. 4) strong easterly winds caused tidal waters along Dade's lower east coast to rise from 2 to 4 feet higher than normal. This resulted in flow moving inland and in some locations overflowing the coastal controls. Highest inland movement recorded was in the Miami Canal at N. W. 36 Street. Here reverse (inland) flow through the partially open control began at 10 A.M. on October 4 and continued moving inland for some 5 3/4 hours. The maximum reverse flow was 1,230 cfs, occurring at 12:30 P.M. when the tide reached a peak of 3.95 feet above mean sea level. This flow was the second highest reverse flow recorded at the N. W. 36 Street gaging station. The highest, estimated at 1,400 cfs occurred September 8, 1965, when the wind-driven tides accompanying hurricane "BETSY" rose to 5.14 feet msl, at the station.

Although the effect of "INEZ" on the flow in the Miami Canal was noteworthy it was short-lived. As the winds diminished and tides receded a return to normalcy occurred within hours. (See fig. 31). Net flow October 4 was 254 cfs in a downstream direction, a drop from 734 cfs, the flow on the previous day.

Other canals where tidal waters rose above the crest of the dams are listed in table 3 with their maximum gage heights occurring during the storm.

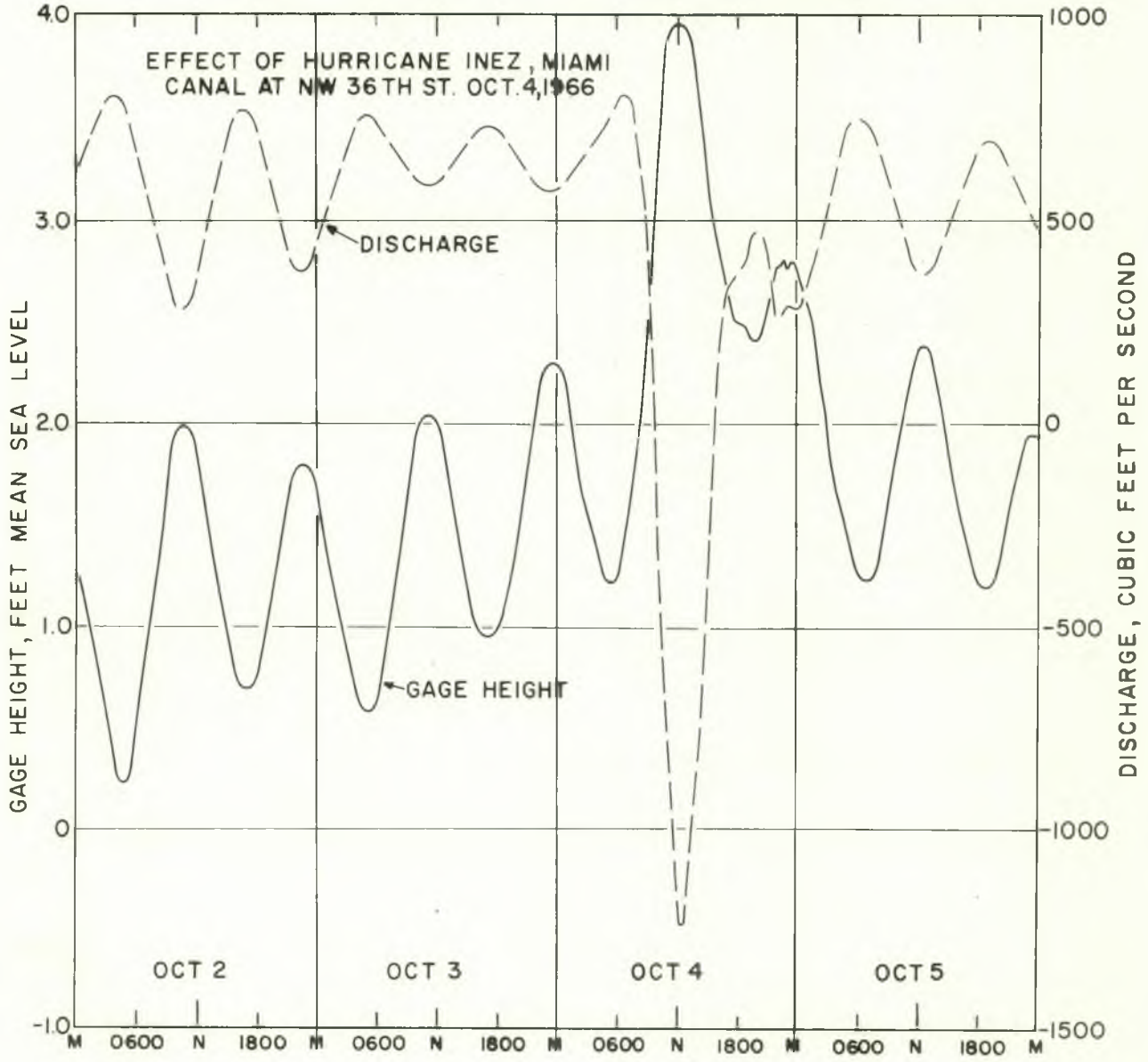


Figure 31. Effect of hurricane "INEZ" on the stage and discharge at the Miami Canal at N. W. 36th Street.

Table 4.--Summary of data for canals where tide water levels overtopped dams as a result of hurricane "INEZ".

10/4/67

	Maximum Gage Height	Dam Crest Feet above mean sea level 1/
Coral Gables Canal at Red Road	4.30	2.89
Military Canal nr. Homestead	6.38	4.99
Florida City Canal nr. Homestead	5.41	5.00
Model Land Canal above control	4.00	2.60 est

1/ Based on U.S. Geological Survey levels.

Snapper Creek Canal

Snapper Creek Canal has the third largest total annual runoff of Dade County's coastal canals. The canal is about 19 miles long and extends from just south of Pennsuco Canal due south six miles to a juncture with Tamiami Canal, and then south and east to Biscayne Bay. From north to south the canal is joined by numerous other canals, which, depending on head differentials, contribute to the flow or divert it into other channels. Flow in the canal, for the most part is to the south but because of the affect of the laterals, and regulation of salinity controls on both Tamiami Canal and Snapper Creek Canal, it occasionally reverses.

The U. S. Geological Survey maintains two daily discharge stations and one daily stage station along the canal. One of the former is located just south of the juncture with the Tamiami Canal and the other just upstream of salinity control Structure-22. The stage station is located opposite Miller Drive and is used as an auxiliary gage for determining daily discharge at the upper station. Structure-22 is a salinity control dam located 1.4 miles upstream from the mouth of the canal. It comprises two mechanically operated sluice gates each 17 feet wide. When the gates are open flow is affected by tide and occasionally reverses.

During the water year discharge at S-22 totaled 153,600 acre-feet for a daily average of 212 cfs, below the 8-year average of 183,900 acre-feet and 254 cfs respectively. Maximum daily discharge of 1,450 cfs occurred October 23 and there were 138 days of zero flow. Flow on October 4, was affected by the high tides which accompanied Hurricane INEZ but the affect was temporary and net flow for the day was 358 cfs in a downstream direction.

Biscayne Canal

Fourth largest of Dade County's coastal canals in total annual run-off is Biscayne Canal. The canal, 13 miles long, extends in a meandering line from upper Biscayne Bay westward to N. W. 77 Avenue where it joins the 77th Avenue Canal. The U.S. Geological Survey maintains gaging stations at two locations on the canal. The upper station, recording stage only, is located 120 feet west of Red Road, and the lower station which records both stage and deflection is located above control structure 28.

Flow in Biscayne Canal is greatly affected by inflow from many laterals and is regulated by gated control structure 28 near its mouth. S-28 consists of two electrically powered sluice gates which can be operated manually or automatically. When the gates are open flow is affected by tide and occasionally reverses. During the water year total discharge at S-28 was 76,310 acre-feet and the average daily flow was 105 cubic feet per second. Maximum daily discharge was 792 cfs on October 8, and maximum daily reverse flow was 222 cfs on June 14. There were 97 days when there was no flow.

Tamiami Canal Outlets Levee 67A to Forty-Mile Bend

During the 1967 water year the S-12 structures along the southern perimeter of Conservation Area 3A remained partly or fully open during all but 53 days out of the year. Combined total flow to the south through the four control structures, 12-A, 12-B, 12-C, and 12-D, of 334,100 acre feet was the second highest of record. Although this was a drop from the previous water year, the maximum daily and the total discharge was still greater than at any other station in the county. Daily records of stage and discharge were obtained by the U.S. Geological Survey from eight gaging stations (fig. 2), one above and below each control. Maximum gage height north of S-12-C, the index station, for the 1967 water year was 9.81 feet above msl on September 30 and the minimum was 5.34 feet msl on May 21.

The Tamiami Canal outlet discharges from Levee 67A to Forty-Mile Bend consist of runoff from Conservation Area 3A as represented by the sum of the flows through all the outlets between Levee 67A and Forty-Mile Bend.

Water Levels

During the water year the U.S. Geological Survey obtained water-level records from 40 gaging stations and two twice - monthly staff-gage observation points within the county. Except for the short period when coastal canals were feeling the effects of hurricane "INEZ", water levels stayed within the normal ranges and there was no major flooding. Water levels declined substantially when rainfall in April and May was below normal, however, the drought was broken by the above average rainfall which occurred in June.

Most highs occurred in October as a result of the hurricane and most lows occurred in May. There were no new high or lows established during the year. Table 5 contains a listing of the maximum and minimum water level at each station for the 1967 water year and for the period of record.

Table 5.--Summary of Dade County surface-water levels for the 1967 water year.

Station	Water level, feet, mean sea level			
	1967 water year		Period of record	
	Maximum (feet)	Minimum (feet)	Maximum (feet)	Minimum (feet)
Snake Creek Canal at S-30	6.53	3.15	7.20	3.15
Snake Creek Canal at N. W. 67 Avenue	3.38	1.48	4.27	1.18
Snake Creek Canal at S-29	2.93	-.35	3.88	-.69
Biscayne Canal at Red Rd.	3.05	1.60	8.12	.57
Biscayne Canal at S-28	2.64	.21	4.24	-.34
Biscayne Bay at North Miami	4.14	-1.48	5.52	-1.77
Little River at Palm Ave.	3.17	1.68	4.15	.69
Little River at S-27	2.98	0.48	4.49	-.18
Miami Canal at Broken Dam	5.35	2.42	6.21	1.40
Miami Canal at Pennsuco	4.42	2.16	9.07	.05
Miami Canal at Palmetto Bypass	3.80	1.98	4.74	.99
Miami Canal at N. W. 36 St.	3.95	.20	5.14	-.44
Tamiami Canal at Forty-Mile Bend	9.00	6.10	10.3 est	1.46
Tamiami Canal above S-12-C	9.81	7.26	10.26	5.34
Tamiami Canal below S-12-C	9.78	6.99	10.12	5.37

Table 5.--Summary of Dade County surface-water levels for the 1967 water year - continued.

Station	Water level, feet, mean sea level			
	1967 water year		Period of record	
	Maximum (feet)	Minimum (feet)	Maximum (feet)	Minimum (feet)
Tamiami Canal above S-12-B	9.87	7.25	10.26	5.31
Tamiami Canal below S-12-B	9.86	7.20	10.18	5.35
Tamiami Canal at Bridge 45	7.93	5.16	9.76	1.96
Tamiami Canal east of Levee 30	7.40	4.40	9.37	2.57
Tamiami Canal west of Levee 30	7.85	5.72	10.02	2.72
Tamiami Canal near Coral Gables	4.98	1.87	8.49	1.08
Tamiami Canal at Red Rd.	3.82	-.19	6.00	-.52
Miami Canal at N. W. 27th Ave.	4.11	-1.16	5.38	-1.54
S. Fork Miami River at N. W. 29 Ave.	3.81	0.02	5.01	-.92
Biscayne Bay at Coconut Grove	5.32	-1.59	9.9	-1.94
Coral Gables Canal at Red Rd.	4.30	1.50	6.58	-.82
Snapper Creek near Coral Gables	5.64	2.30	6.74	1.30

Table 5.--Summary of Dade County surface-water levels for the 1967 water year - continued.

Station	Water level, feet, mean sea level			
	1967 water year		Period of record	
	Maximum (feet)	Minimum (feet)	Maximum (feet)	Minimum (feet)
Snapper Creek near Miller Drive	4.95	2.08	6.93	1.32
Snapper Creek at S-22	4.05	.04	6.02	-.59
Black Creek above S-21	4.07	.28	6.41	-.57
Goulds Canal above control	3.73	-.11	8.90	-1.40
Military Canal above control	6.38	-.12	9.17	-.76
Mowry Canal above control	3.75	-.19	9.25	-.83
North Canal above control	4.55	-.46	9.12	-.58
Biscayne Bay near Homestead	4.63	-.95	9.82	-1.56
Florida City Canal above control	5.41	-.44	9.56	-.77
Model Land 5.2 mile upstream from control	2.48	-.81	8.0 est	-1.41
Model Land below control	4.00	-.34	10.0 est	-.68
Taylor Slough	4.52	-.86	5.28	-1.30 est
Everglades P-37	1.87	-1.37	3.05	-1.85
Everglades P-33	7.14	3.95	7.69	2.20
Everglades P-38	2.37	-1.34	2.92	-1.43

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