UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

# SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA 1974

OPEN-FILE REPORT 75-007

Prepared in cooperation with
COLLIER COUNTY and the CITY OF NAPLES

Tallahassee, Florida
1975

United States Department of the Interior

Geological Survey

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By

H. Jack McCoy

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ILLUSTRATIONS

(continued)

SUMMARY OF HYDROLOGIC CONDITIONS

IN COLLIER COUNTY, FLORIDA, 1974

By H. Jack McCoy

## INTRODUCTION

This report is a product of the continuing study of the water resources of Collier County, started in 1968, by the U.S. Geological Survey in cooperation with Collier County and the city of Naples. The report is designed to provide water managers with data on the annual variations of the hydrologic parameters to assist them in planning.

Streamflow and water-level fluctuations are graphed for the 1974 water year (October, 1973 to September, 1974). Water-quality data are presented in table, graph, and diagram forms for their periods of record.

For use of those readers who may prefer to use metric units rather than English units, the conversion factors for the terms used in this report are listed below:

| Multiply English unit | By | To Obtain metric unit |
|---|---|---|
| inches (in.) | 25.4 | millimetres (mm) |
| feet (ft) | .3048 | metres (m) |
| miles (mi) | 1.609 | kilometres (km) |

| Multiply English unit | By | To Obtain metric unit |
|---|---|---|
| million gallons (Mgal) | $3.785 \times 10^{-3}$ | cubic hectometres ($hm^3$) |
| cubic feet per second ($ft^3/s$) | .02832 | cubic metres per second ($m^3/s$) |
| gallons per minute (gal/min) | .06309 | litres per second (l/s) |
| million gallons per day (Mgal/d) | .04381 | cubic metres per second ($m^3/s$) |

## DATA COLLECTION

Changes in hydrologic conditions are monitored by a data-collection network mainly in the western half of the county but in greater detail in the urbanized Naples area. The county-wide network (fig. 1) consists of 4 streamflow gaging stations (plus 1 station not in network), 16 wells equipped with continuous water-level recorders, 32 wells sampled semi-annually for chloride analyses, and 15 surface-water sites sampled semi-annually for nutrient analyses. The Naples network (fig. 2) consists of 1 streamflow gaging station, 3 wells (C-391, C-392, and C-489) equipped with continuous water-level recorders, 91 wells sampled or measured semi-annually for chloride analyses or water-level fluctuations, and 4 surface-water sites sampled quarterly for analysis of chemical, physical, and bacteriological parameters.

Data from the Naples network are used to prepare water-table contour maps of the municipal well field area (fig. 1) near the end of the dry season (May) and the wet season (October).

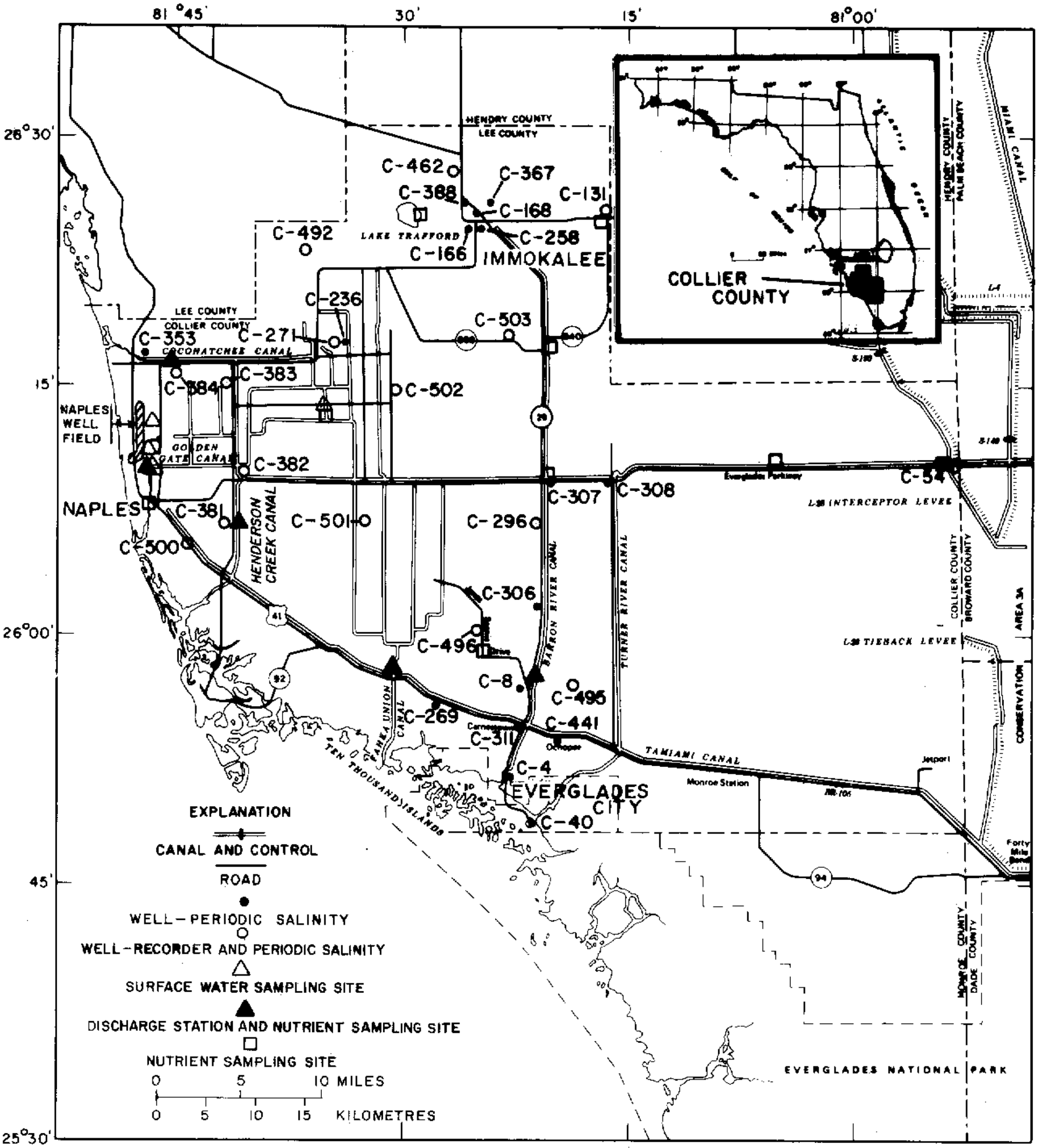



Figure 1.-Location of data-collection stations in Collier County network.

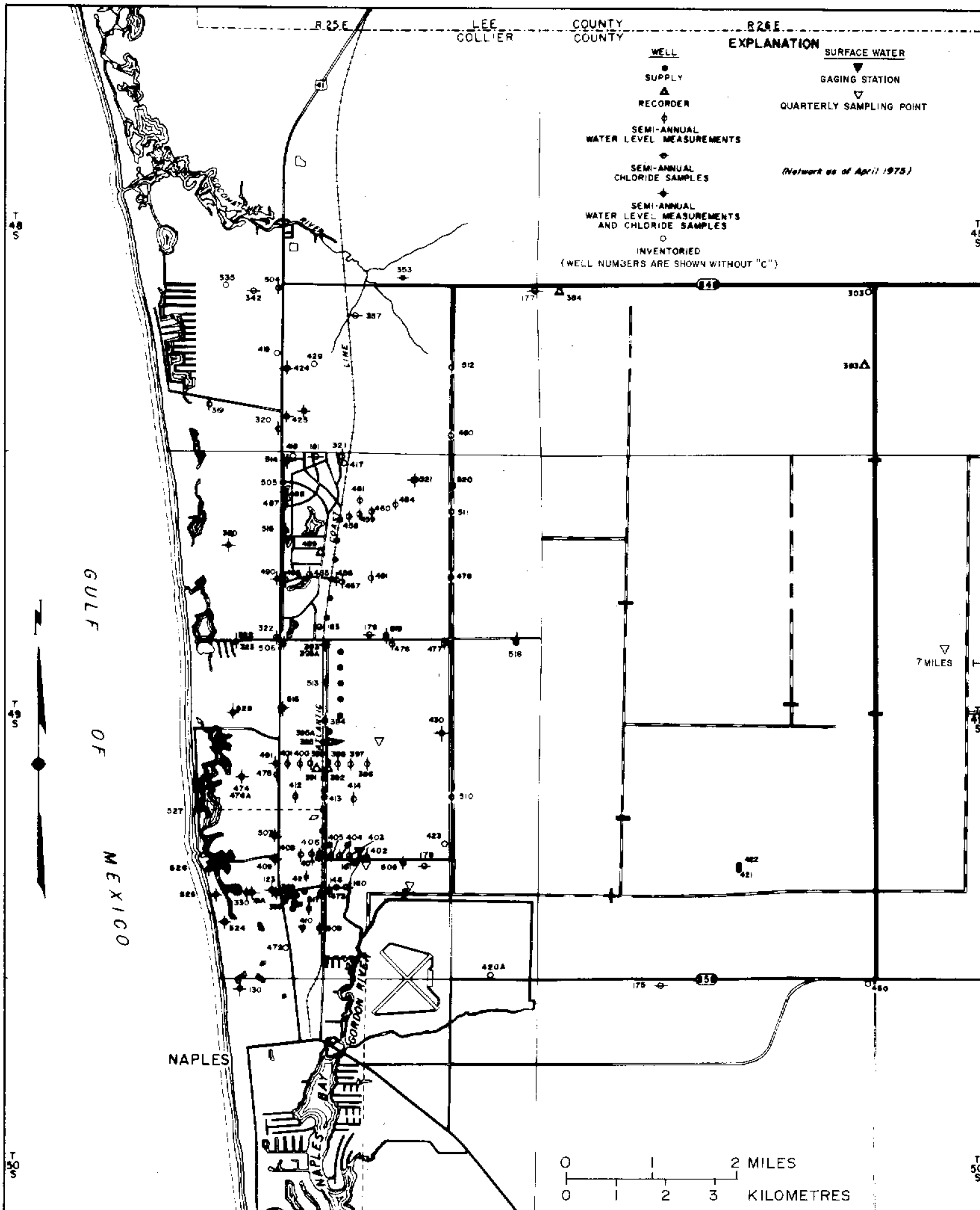



Figure 2. Location of data-collection stations in Naples area.

## HYDROLOGIC SETTING

Most of Collier County is underlain by a shallow aquifer (McCoy, 1962, p. 61-82, and Klein, 1972). The aquifer, which has a maximum thickness of about 130 feet in west Collier County (McCoy, 1962, p. 24-25), consists of sand, limestone, and some marl. The aquifer thins eastward and wedges out near Dade and Broward Counties. In the western part, shallow limestone beds of low permeability retard infiltration of rainfall to the deeper and more permeable zones of the aquifer (fig. 3). The aquifer underlying these dense limestone beds has not been adequately flushed of mineralized water originally in the aquifer. The shallow limestone beds in the remainder of the area are of higher permeability and the ground water contained therein is of low mineral content because adequate flushing has taken place.

In the Naples well field area (fig. 1) the shallow aquifer is composed of three parts: 1) a shallow, permeable, unconfined zone, 2) a lower, more permeable, semi-artesian pumping zone, and 3) a confining zone separating the shallow and pumping zones.

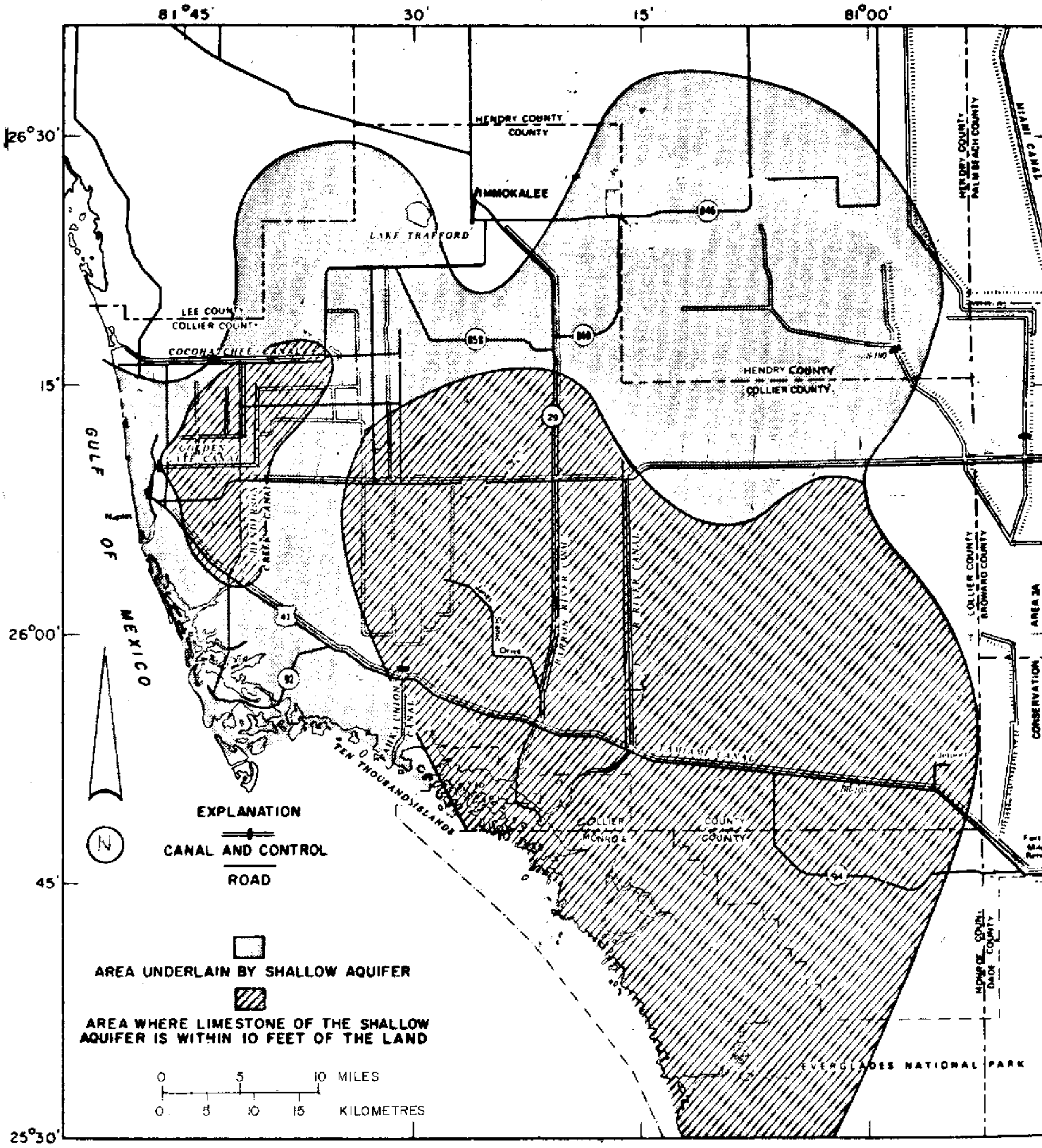



**Figure 3.-Approximate areal extent of the shallow aquifer and the area where limestone is within 10 feet of the land surface** (from Klein, 1972, fig. 1).

The shallow zone is composed of some limestone and sand. In the southern part of the Naples well field, the zone extends from land surface to a depth of about 32 feet and contains mostly limestone; the northern part increases in thickness to about 60 feet but is composed mainly of less permeable sand. The confining zone is composed of fine sand and marl and immediately underlies the shallow zone. The confining zone is about 8 feet thick in the southern part of the well field and about 15 feet thick in the northern part. The pumping zone, composed of limestone and some sand, immediately underlies the confining zone. Data indicate the permeability increases to the north in the well field area. The pumping zone is the source of water for the Naples municipal supply system and about 90 percent of all domestic, industrial, and irrigation uses in the Naples area.

Under static conditions, the three units act as a single hydrologic unit. When the pumping zone is under little or no stress, the confining zone allows percolation of sufficient water from the shallow zone down to the pumping zone such that only a small differential in water levels of the two zones occur. But as stress is applied to the pumping zone, water levels in the pumping zone decline faster and to greater depths than do water levels in the shallow zone.

Water levels were measured in deep observation wells (55 to 75 feet deep) in 1974 throughout the well field area so that water-level contour maps could be drawn for the pumping zone. Water levels were measured on existing shallow observation wells (15 to 50 feet deep) for contouring water levels in the shallow zone.

## WATER-LEVEL CONTOURS OF NAPLES WELL FIELD

Ground-water levels in the Naples area respond rather quickly to recharge to and discharge from the aquifer. Recharge is mainly from rainfall, and is greatest, naturally, during the wet season. Discharge is by evapotranspiration, by ground-water flow to the Gulf and to canals, and by pumping from wells. Discharge by flow to the Gulf and to canals and losses by evapotranspiration are greatest during and shortly after heavy rainfall when water levels are high; discharge by pumping from wells is greatest during the dry period, at the peak of the tourist season, and during the irrigation season. Discharge by wells constitutes only a small part of the total discharge from the area.

Because water levels respond quickly to recharge and discharge, a moderate rain during the dry season may cause water levels to rise several feet in the center of the well field area. This is caused not only by the recharge from the rain but also by the decrease in pumping as a result of sharp reduction in irrigation demand. Two to three weeks of deficient rainfall during the wet season, however, may cause water levels to decline sharply in areas where numerous wells are pumping simultaneously as a result of no recharge and an increase in demand. Therefore, daily rainfall and pumping data are recorded for at least a week before water-level measurements are made to determine if the measured levels reflect the effects of seasonal or short-term hydrologic conditions.

As the rainy season begins, ground-water levels rise correspondingly. In the western part of the county where urbanization is spreading, a canal network conveys potential flood waters to the Gulf of Mexico. After the rainy season, water levels start to decline, but controls in the canals prevent overdrainage. In the eastern and central parts of the county where drainage is somewhat sluggish, water levels rise in response to rain until the water rises above the land surface and slowly flows overland to the south.

The average annual rainfall for western Collier County is 54 inches - 54.40 inches at Everglades City, 54.62 inches at Immokalee, and 53.00 inches at Naples. During 1974 the rainfalls. at these stations were 43.95, 52.59, and 42.38 inches respectively

The combination of deficient rainfall for three of the last five years and a continued sharp increase in annual municipal pumpage through 1974 (fig. 4) increased the already severe stress on the coastal aquifer in the Naples area. During the 1972-73 dry season the stress was so severe that the differential between water levels in the shallow zone and the pumping zone became large enough to necessitate the contouring of both zones.

The altitude of the water level in the shallow zone on May 7, 1974 (fig. 5) was about one foot lower than on May 14, 1973 (McCoy, 1974). However, figure 6 shows that the water level in the pumping zone was 6 feet below mean sea level in the middle of the Naples well field. A comparison of the two maps reveals that the differences in the water levels between the two zones is as much as 13 feet near the middle of the well field. The area enclosed by the zero contour line is the largest ever recorded.

Sometime prior to May 7, 1974, farming was reactivated in the area southeast of the intersection of U.S. Highway 41 and S.R. 846. Large withdrawals of ground water from farm wells similar in depth to municipal wells resulted in a marked depression of the pumping zone water level north of the well field area. This pumpage, in effect, removed large quantities of water which usually replenished the pumping zone in the Naples well field.

Although less than the long-term average, rainfall during

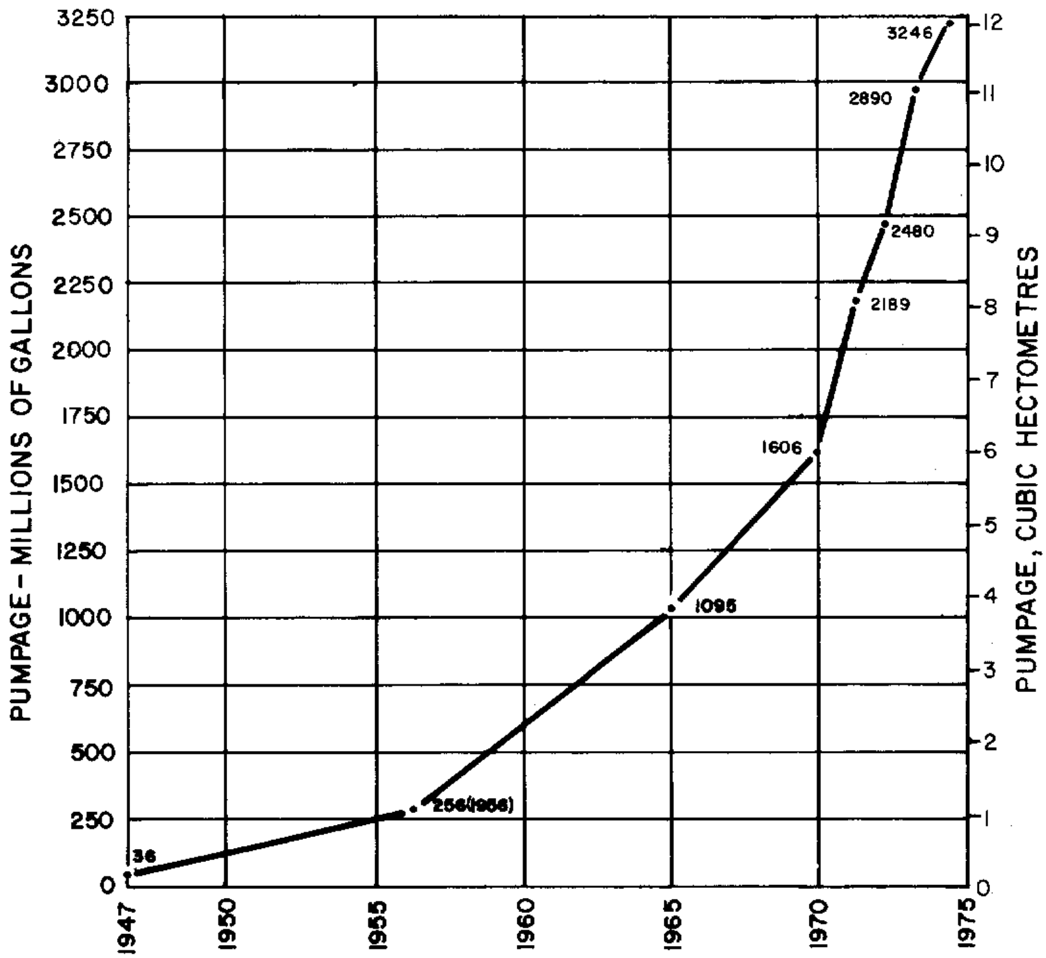



Figure 4. Annual pumpage from Naples municipal wells, 1947-74.

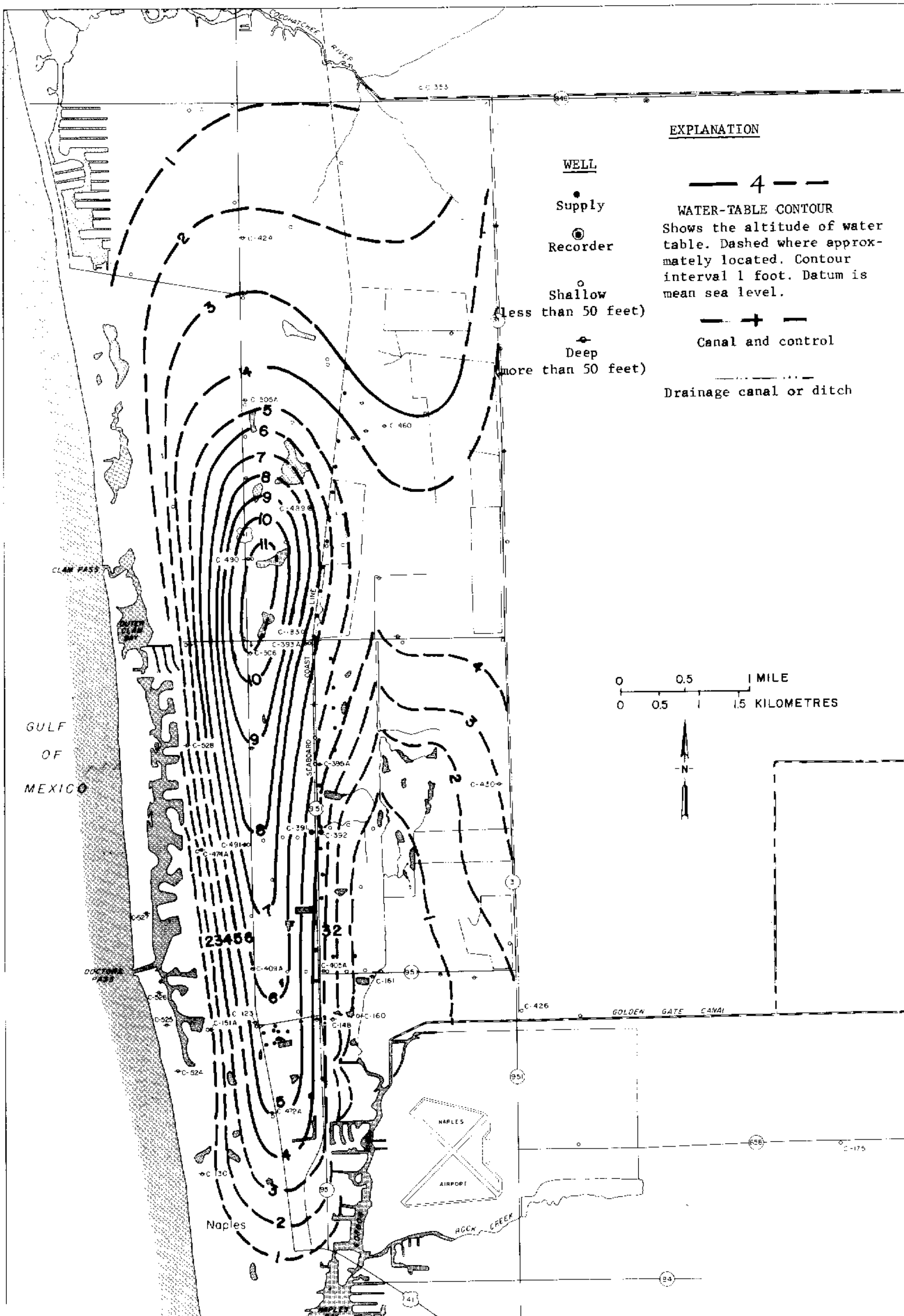



Figure 5. Water-table contour map of Naples well-field area, May 7, 1974, shallow zone.

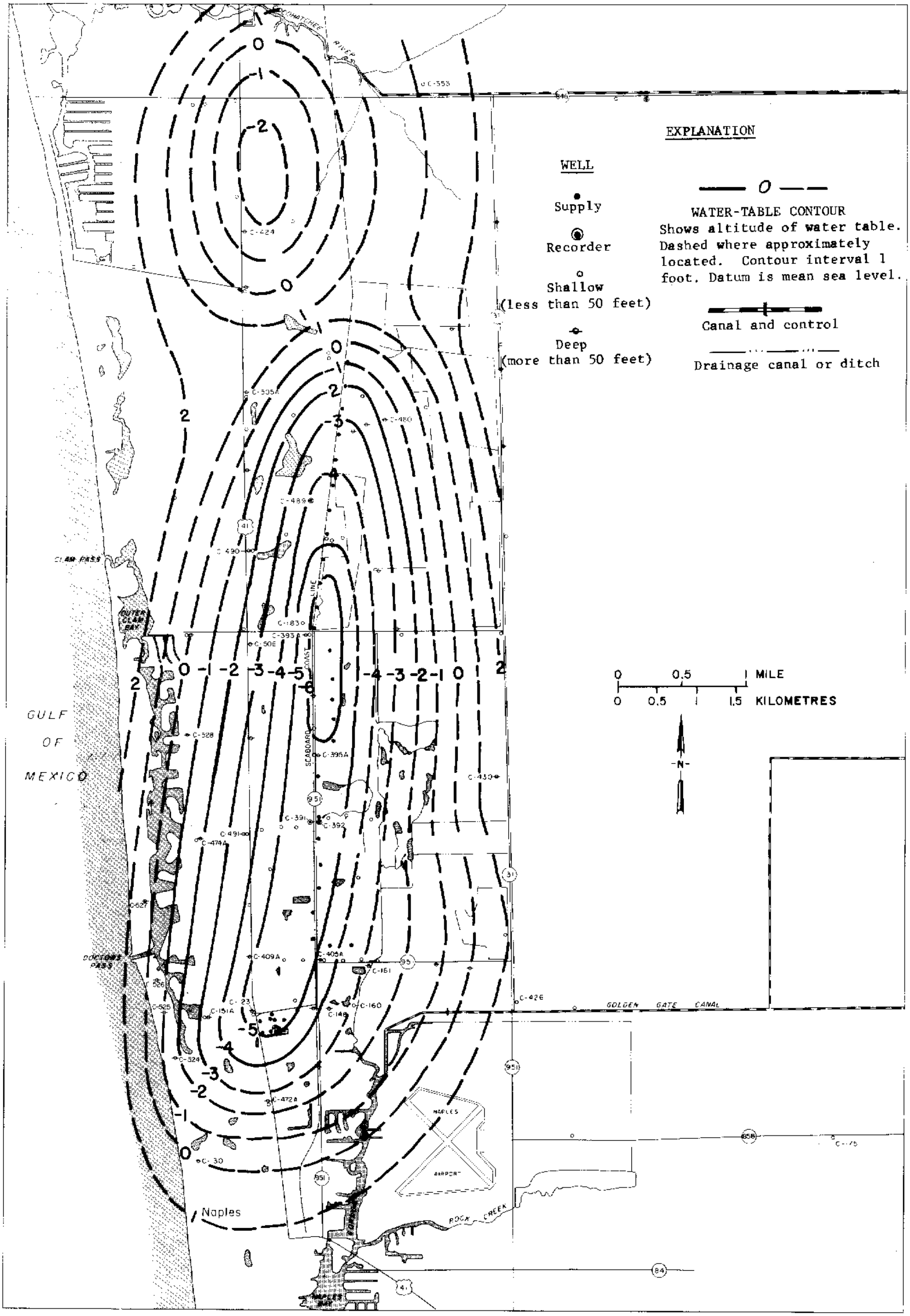



Figure 6. Water-table contour map of Naples well-field area, May 7, 1974, pumping zone.

the early part of the wet season of 1974 was sufficient for the water level in the shallow zone to return to average elevations by October 1974 (fig. 7 and Basic Data). However, the combination of below average rainfall for September and early October resulted in abnormally low water levels in the pumping zone (fig. 8 and Basic Data). The water level in the pumping zone was as much as 4 feet lower than in October 1973. Again, the effects of agricultural use is shown by the depression near the Cocohatchee River. The pumpage for farm use had removed large quantities of water that usually would replenish the north part of the well field.

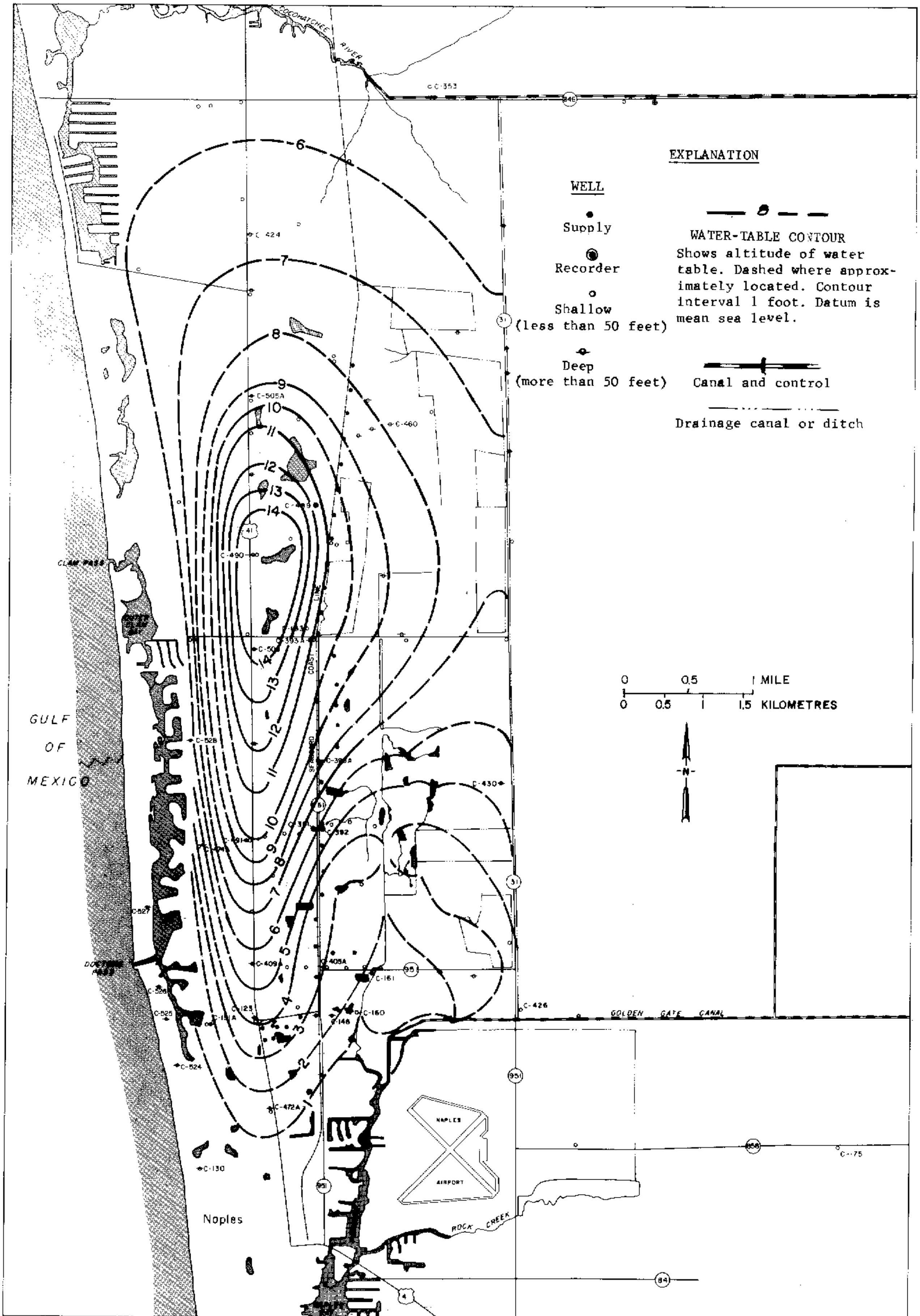



Figure 7. Water-table contour map of Naples well-field area, October 18, 1974, shallow zone.

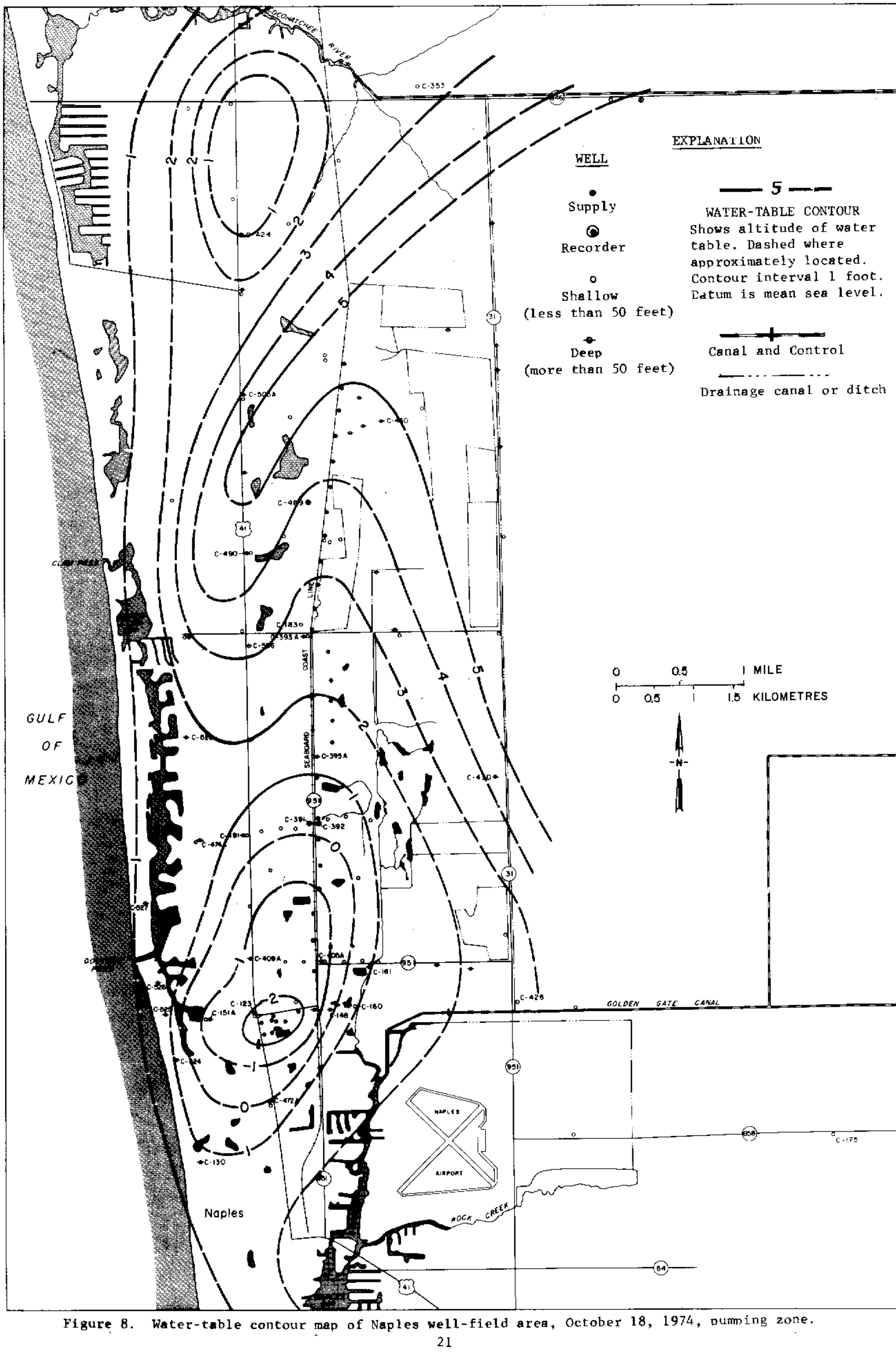



Figure 8. Water-table contour map of Naples well-field area, October 18, 1974, pumping zone.

## WATER-LEVEL HYDROGRAPHS

Water-table contour maps may reflect water levels for only an instant in time, but data from continuous water-level recorders on selected wells together with rainfall and pumpage records indicate whether the conditions reflected by the contour maps have resulted from seasonal or from recent changes in the hydrologic system. The wells in Collier County on which water-stage recorders are in operation are shown in figure 1.

Hydrographs of water level in wells equipped with recorders for the 1974 water year are in the Basic Data section. Hydrographs for the period of record, through 1973, are included for wells with more than 5 years of record. Generally, water levels throughout the county were almost 1 foot lower near the end of the 1974 dry season than they were near the end of the 1973 dry season. Although rainfall during the fall of 1974 was sufficient to raise the shallow water table to the 1973 wet-season levels, storage in the coastal aquifer was still below average as reflected by the low water levels in the Naples well field near the end of the 1974 wet season (figs. 7 and 8).

## CANAL FLOW

Although short-period overland flow occurs locally during the wet season, most surface-water flow in western Collier County is through the Fahka Union and Golden Gate Canals. The Barron River and Turner River canals plus several large sloughs and strands are the chief routes of surface-water flow in the central part of the county. Surface-water flow is slower there than in the western part of the county and as a result much of the central area is inundated for several months during the wet season.

Drainage in east Collier County is entirely natural except for that through the L-28 Interceptor Canal in the northeast corner and perhaps for some small, short canals near private hunting camps. At the height of the rainy season as much as 90 percent of the area is covered by water to a depth ranging from a few inches to more than 3 feet (Klein and other, 1970, p. 27).

Canal discharge hydrographs for 5 gaging stations in Collier County are shown in the Basic Data section. Although the station on the Barron River Canal is not in the Collier County network, it is shown for comparative purposes. The Gordon River station is affected by tides and only water-level data are collected.

The discharge hydrographs (Basic Data section) exhibit graphically the effects of rainfall throughout the county. Barron River Canal was the only canal in which the flow was substantial during January-March of 1974. The flow was probably the result of normal rainfall in the Immokalee area -- the headwaters of the Barron River Canal. In the Golden Gate Canal flow for this period was average or slightly less than average indicating that the canal received some of the rainfall in the Immokalee area. All canal discharges showed the effects of the heavy rains of late June 1974.

For the 1974 water year (October 1973-September 1974) the Barron River Canal discharge was 1 $ft^3/s$ higher than the 22-year average; the Golden Gate Canal was about 100 $ft^3/s$ higher than the 10-year average; the Henderson Creek Canal was about 3 $ft^3/s$ less than the 6-year average; and the Cocohatchee River Canal was about 12 $ft^3/s$ higher than the 6-year average. Average discharge has not been determined for the Fahka Union Canal but inspection of published records reveals the 1974 water year discharge was about 65 $ft^3/s$ higher than the 1973 (water year) discharge.

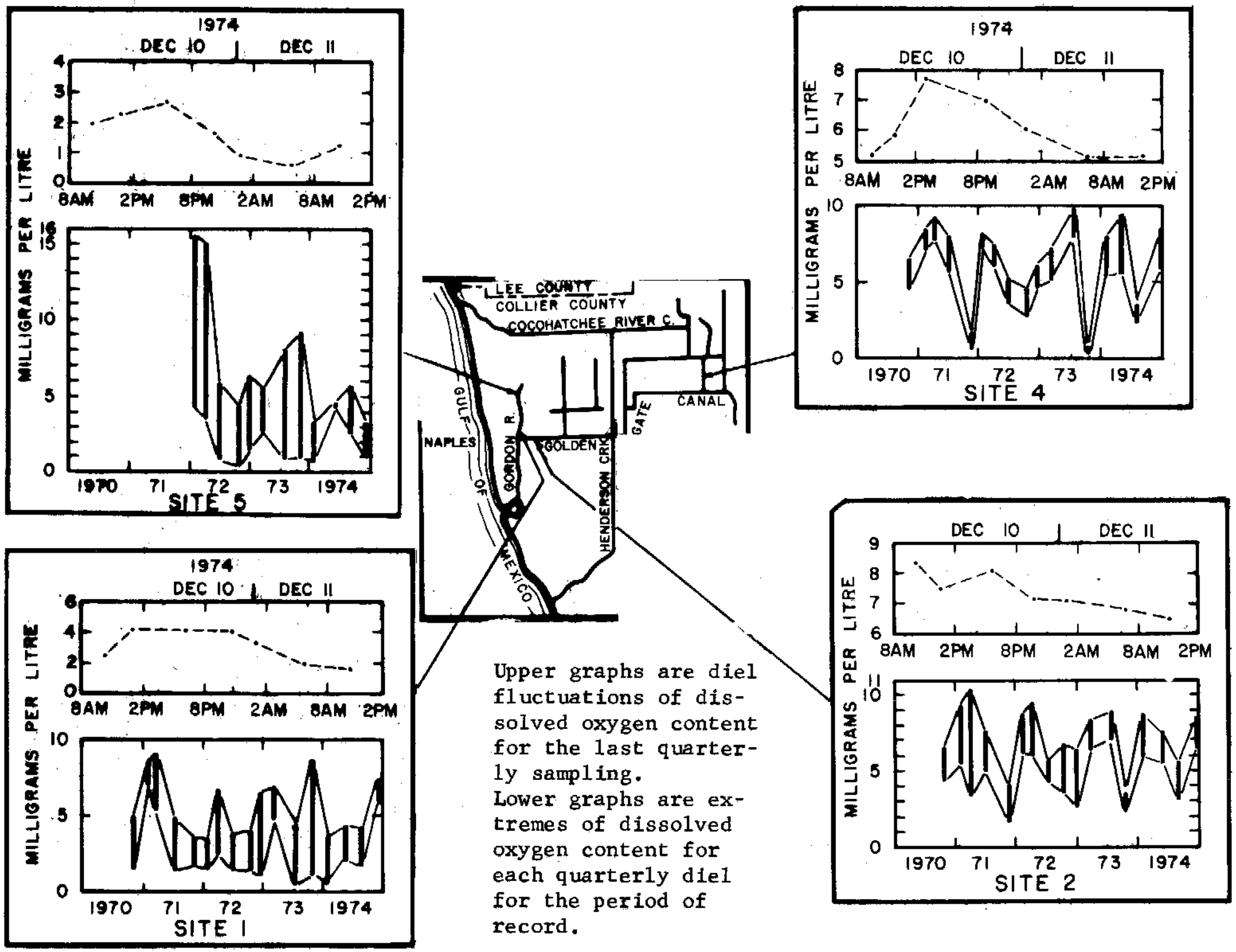
## WATER QUALITY

Graphs of chloride concentration of water from selected wells and surface water sites throughout the county indicate that at most sites the chloride concentration fluctuated within the existing concentration range. (See Basic Data.) The notable exceptions were the increases in chloride concentration of water from well C-123 and C-151A along a line running west from the south end of the well field. (See fig. 2). These wells are used to monitor the inland extent of the salt-water front at depth (100-145 feet) in the aquifer and a substantial increase in chloride concentration in water from them would indicate an inland migration of the front. The chloride concentration of water in well G-151A has increased steadily except for a decline in part of 1972 and a sharp decline in 1974. Near the end of the 1973-74 dry season, the chloride concentrations was almost 400 mg/1 (milligrams per litre), well above the recommended limit of 250 mg/1 (National Academy of Science and National Academy of Engineering, 1973). However, the chloride concentration had decreased to 126 mg/1 by October 1974 (See Basic Data.) Wells C-123 and C-151(A) are sampled weekly by city of Naples during the dry season. If the chloride concentration in water from either increases, municipal pumping schedules are changed to reduce pumping of wells in the south part of the well field.

Water samples have been collected 4 times a year from 4 canal sites in the Naples area since October 1970 as part of a monitoring program to determine changes in water quality resulting from urbanization. Sites 1 and 5 are in the urbanized area, site 2 is in the suburban-agricultural area, and site 4 is in an area virtually uninhabited and is used as a control station (fig. 9). Site 3 was designed to collect adequate data to indicate the general character of water in the Naples Bay estuary and then was replaced by site 5.

Water samples were analyzed for common chemical constituents, trace metals, nutrients, pesticides, coliform bacteria, BOD (biochemical oxygen demand), and carbon. In addition, water temperature, pH, specific conductance, alkalinity, and DO (dissolved oxygen) are determined several times during a 24-hour period at each site for each quarterly sampling. All analyses are given in the Basic Data section.

Many factors affect the DO concentration of canal waters but the most important are the liberation of oxygen by aquatic plant growth (photosynthesis) and the utilization of oxygen in the decomposition of man-made wastes and natural organic matter. Therefore, the DO concentration is usually a reliable indicator of not only the general health of the canal water, but also an indicator of contamination.




Upper graphs are diel fluctuations of dissolved oxygen content for the last quarterly sampling.
Lower graphs are extremes of dissolved oxygen content for each quarterly diel for the period of record.

Figure 9. Dissolved oxygen content of water in selected canals, west Collier County.

Aquatic plant growth is most active during that part of the day when sunlight is most intense and least active just before sunrise. Thus, DO concentration plotted for a 24-hour period will generally define a sinusoidal curve with a high point in mid-afternoon and a low point early in the morning. Variations in activities affecting DO concentration can shift these points several hours in either direction and can also reduce or expand the amplitude of the curve.

The utilization of oxygen by man-made wastes and natural organic matter varies chiefly with the type and amount of organic materials in surface runoff and with the amount of sewage effluent or other man-made wastes introduced into the canals. Oxygen-demanding wastes reduce the DO concentration but nutrients associated with the wastes may trigger rapid plant growth causing an algae bloom in the canal. When this happens, the DO is unusually high during the day and unusually low at night.

In 1974 the DO concentration at all four sites fluctuated within the ranges of antecedent data. At the two sites on the Gordon River DO concentration continued to fluctuate more during a 24-hour period than at the two sites on the Golden Gate Canal.

Fecal and total coliform bacteria in a water sample, both individually and together, are regarded as indicators of contamination. Coliforms are bacterial organisms of many different origins such as soils, plants, and feces of warm-blooded animals. In this report coliforms of all origins are labelled "total coliforms"; coliforms originating in warm-blooded animal feces have been separated from the "total" and labelled "fecal coliforms."

High concentrations of coliforms can occur in surface waters at any time depending on local conditions - both natural and man made - but they are most likely to occur during periods of high flow and in effluent-laden canals. High flows in the canals are generally the result of surface runoff after heavy rains. During high runoff urban wastes and road runoff as well as animal wastes from the undeveloped areas are picked up by the canals.

The concentrations of coliforms allowed by Florida Department of Pollution Control 1971 and U.S. Environmental Protection Agency 1973 depend on the classification and use of the waters. In surface waters to be used as sources for public supplies the Environmental Protection Agency lists 10,000 col/100 ml (colonies per 100 millilitres of water) of total and 2,000 col/100 ml of fecal coliforms as permissible limits and 100 total and less than 20 fecal col/100 ml as desirable limits. The Florida Department of Pollution Control requires that in waters used for body contact activities, total coliforms not exceed 1,000 col/100 ml on a monthly average, nor exceed this number in more than 20 percent of the samples examined during the month. Canals in Collier County are not used for public water supplies and are not generally used for body contact activities.

The total coliform concentrations were within antecedent ranges at all sites (fig. 10). The fecal coliform concentrations recorded a new high at site 5 (fig. 11) and rose sharply at site 1 but were still below early 1971 concentrations.

Flow in the Gordon River was extremely low throughout 1974 and the resulting small amount of water in the channel at site 5 probably accounted for the increase in concentrations.

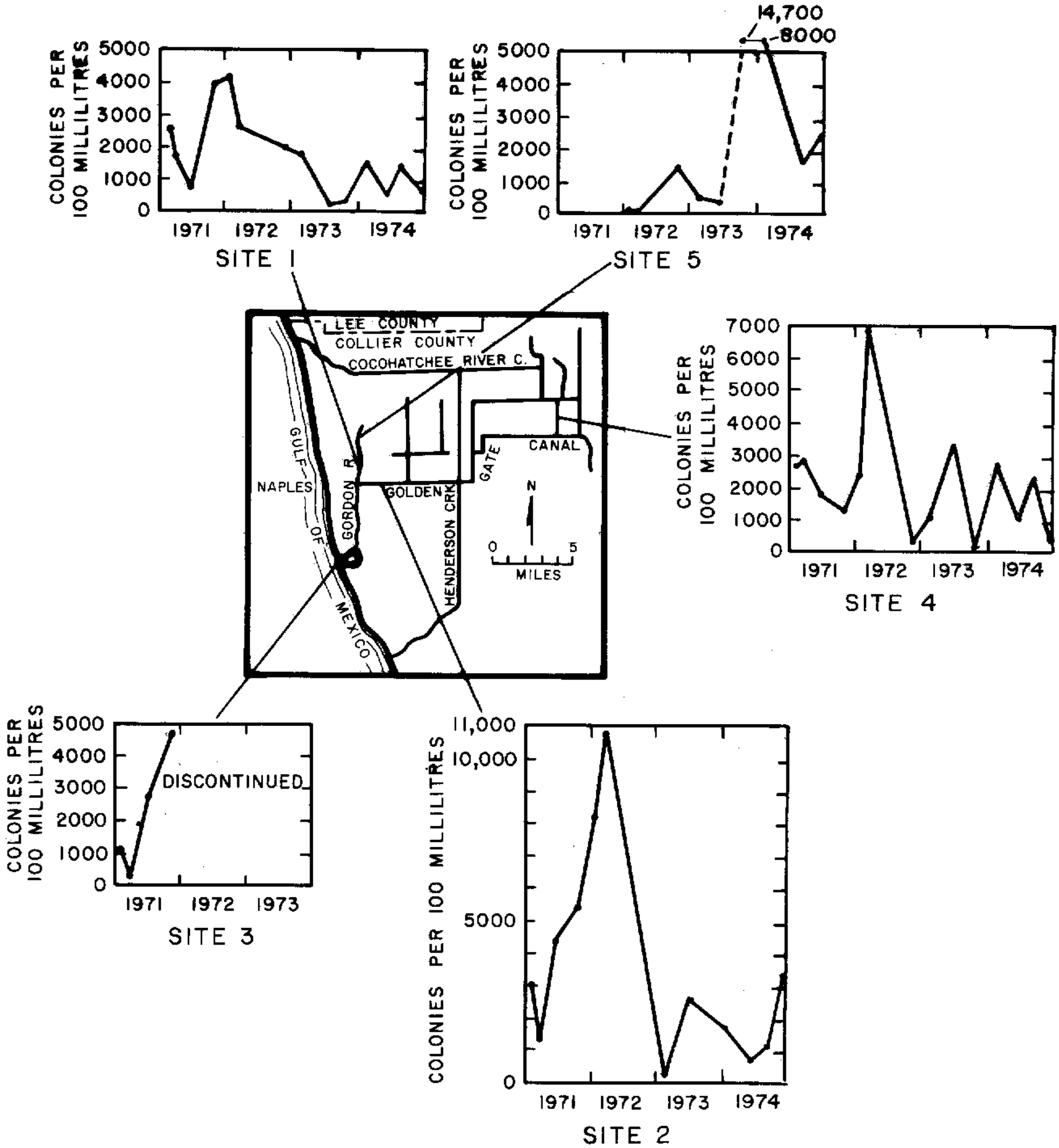



Figure 10.--Levels of total coliform bacteria in selected canals, west Collier County.

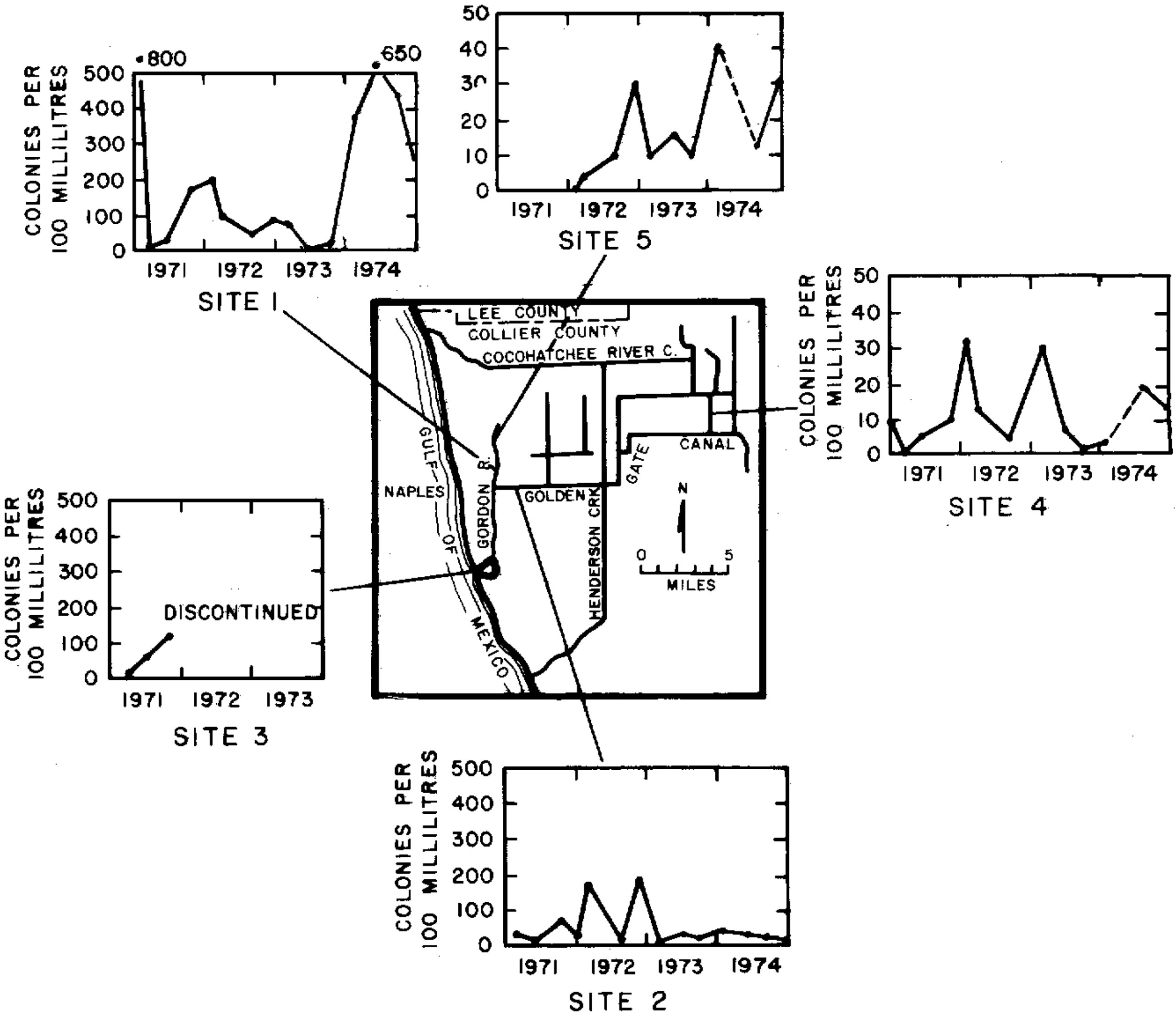



Figure 11.--Levels of fecal coliform bacteria in selected canals, west Collier County.

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BASIC DATA

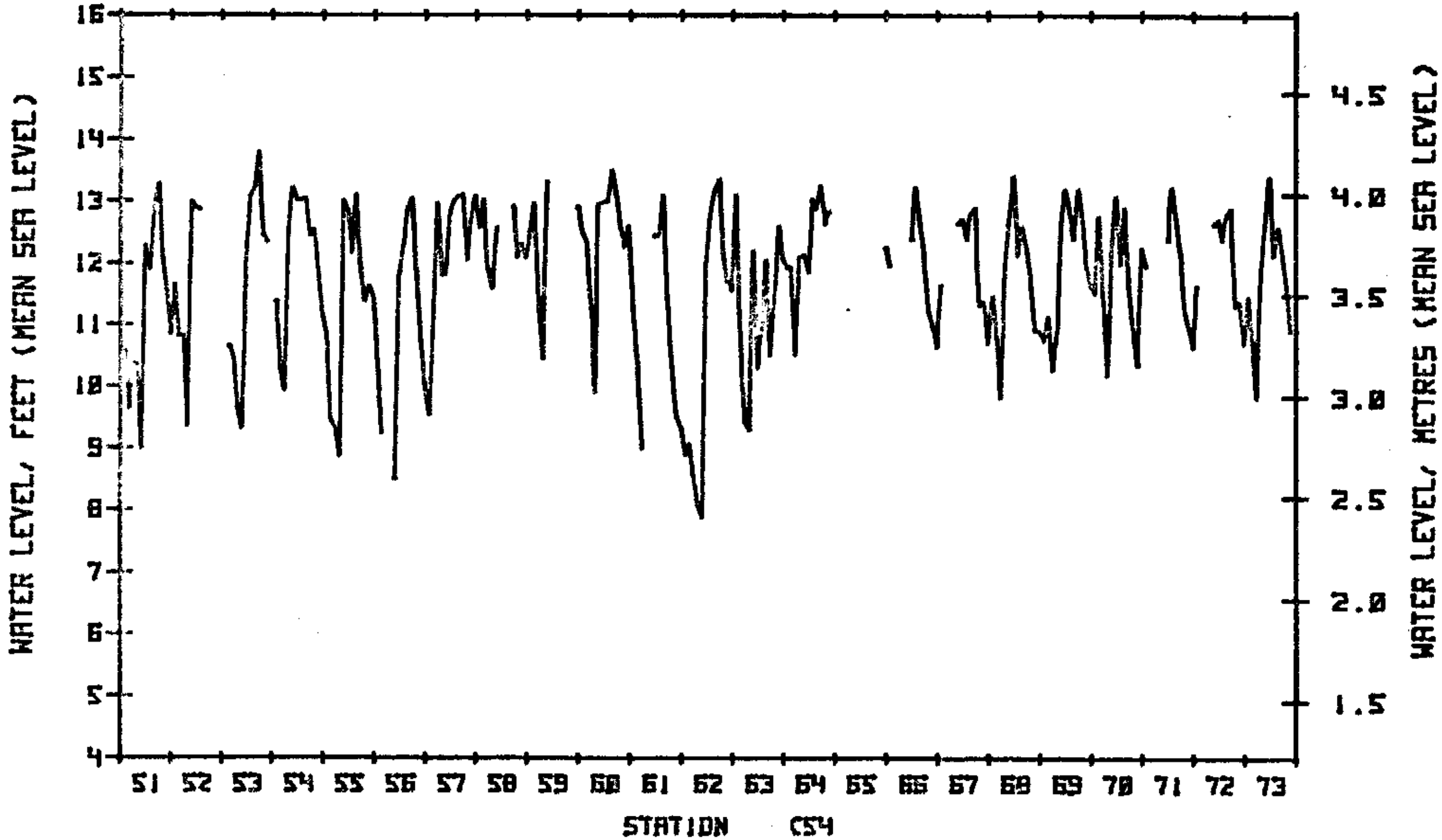
## BASIC DATA - Section A

### Water-level hydrographs

Nineteen wells in the Naples and the Collier County data-collection networks are equipped with continuous recording water-level gages. Hydrographs of water levels in these wells for the 1974 water year follows. Also included are water-level hydrographs for the period of record of wells with more than 5 years of record.

| Well Number | Depth (ft) | Page | Well Number | Depth (ft) | Page |
|---|---|---|---|---|---|
| C-54 | 8.5 | 38-39 | C-462 | 110 | 58 |
| C-131 | 54 | 40-41 | C-489 | 83 | 59 |
| C-271 | 38 | 42-43 | C-492 | 60 | 60 |
| C-296 | 45 | 44-45 | C-495 | 70 | 61 |
| C-381 | 58 | 46-47 | C-496 | 60 | 62 |
| C-382 | 58 | 48-49 | C-500 | 50 | 63 |
| C-383 | 22 | 50-51 | C-501 | 50 | 64 |
| C-384 | 58 | 52-53 | C-502 | 50 | 65 |
| C-391 | 80 | 54-55 | C-503 | 50 | 66 |
| C-392 | 30 | 56-57 | | | |

The hydrographs for the period of record were constructed by plotting the end of momth water levels with the inclusion of the annual extremes; the annual hydrographs were constructed by plotting the daily high water levels.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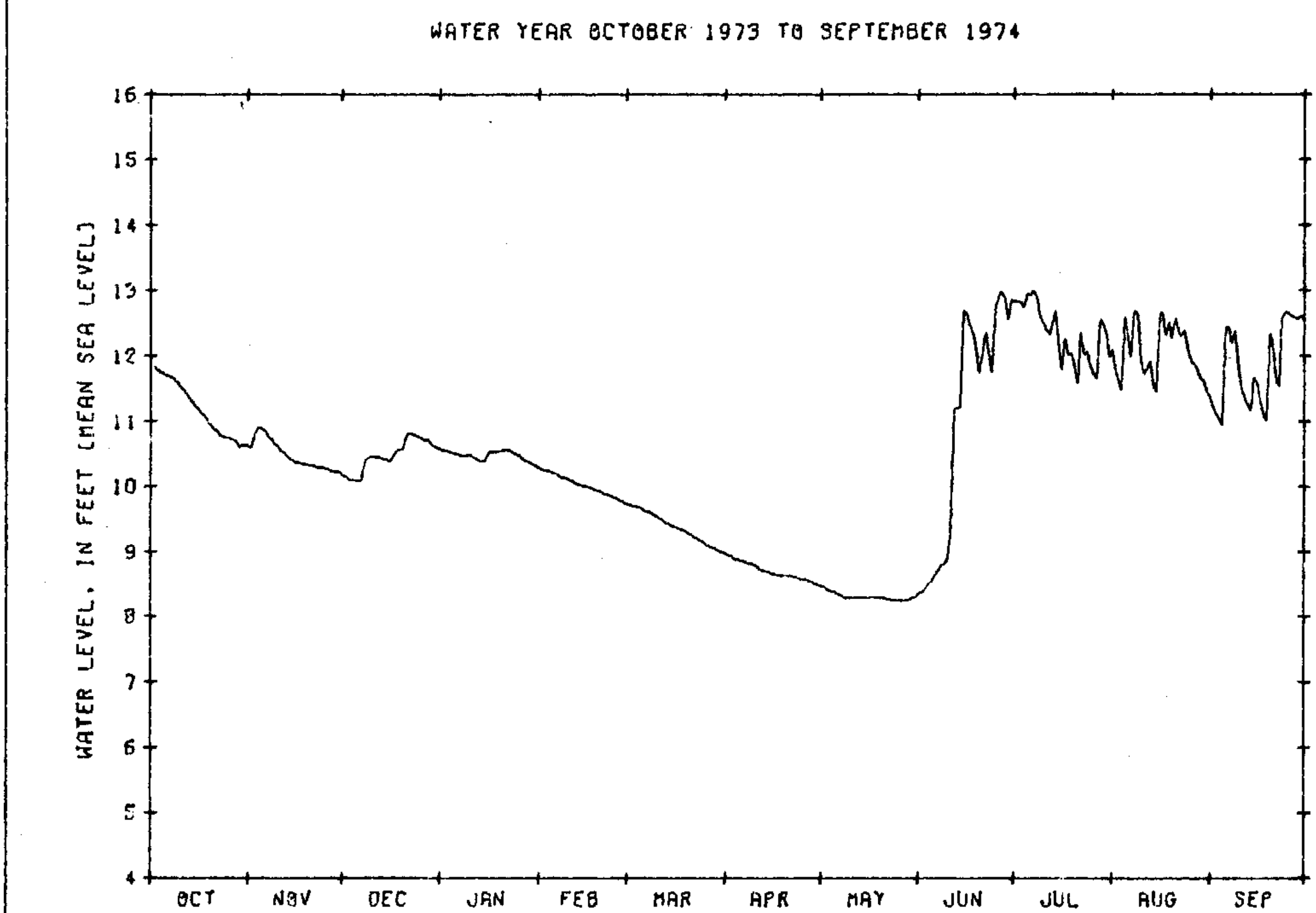
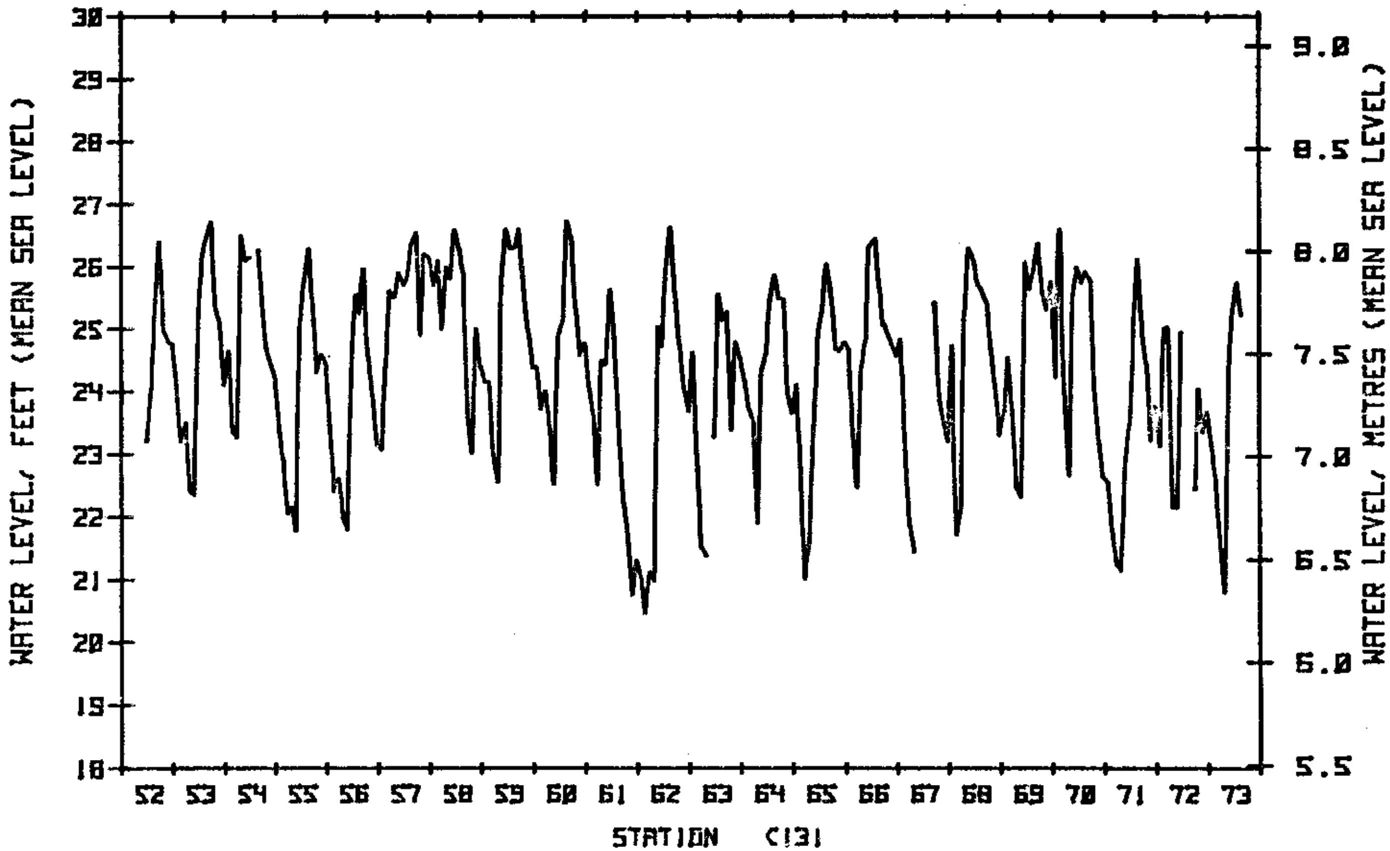



DAILY HIGH HYDROGRAPH OF WELL C-54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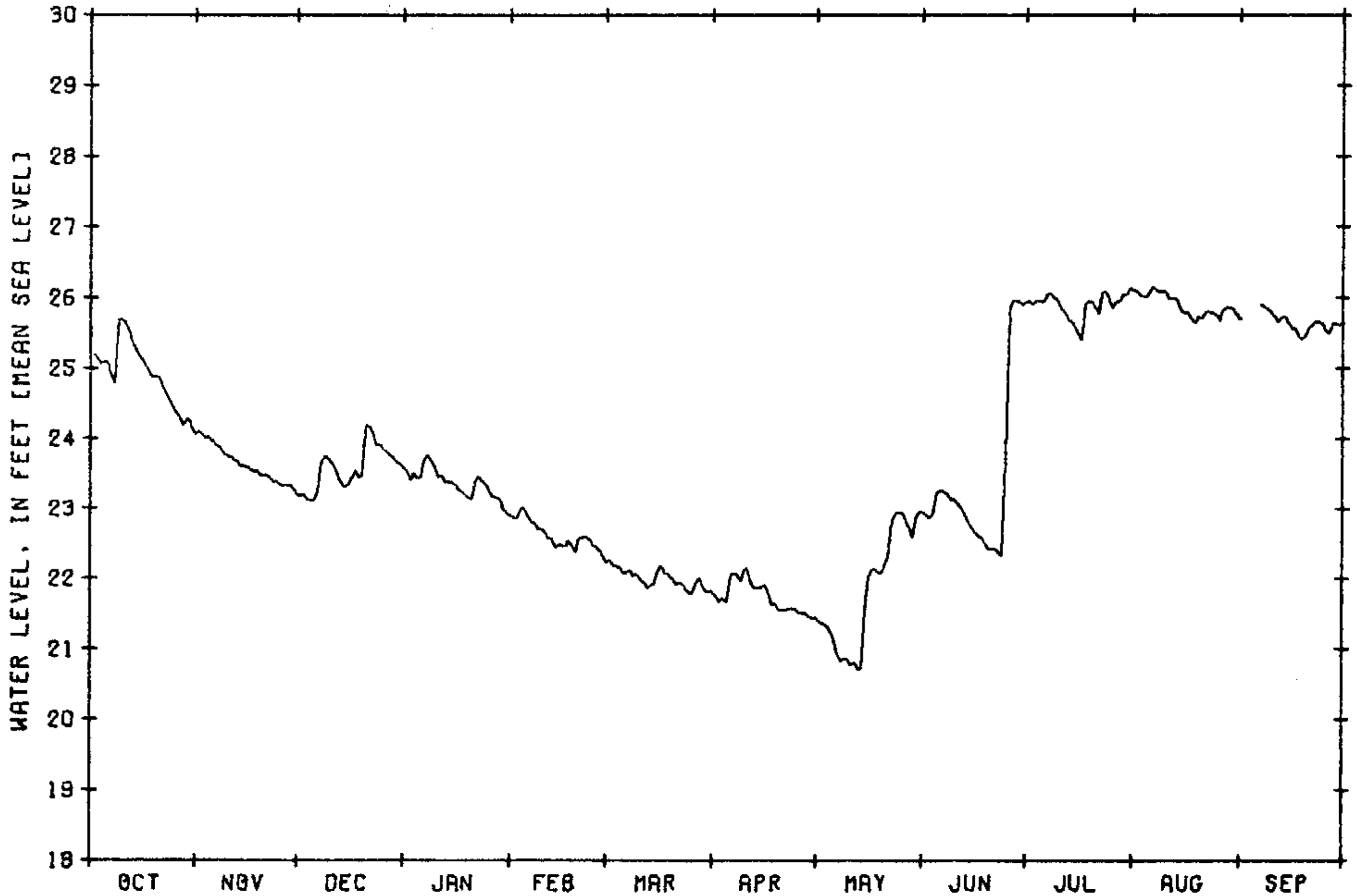
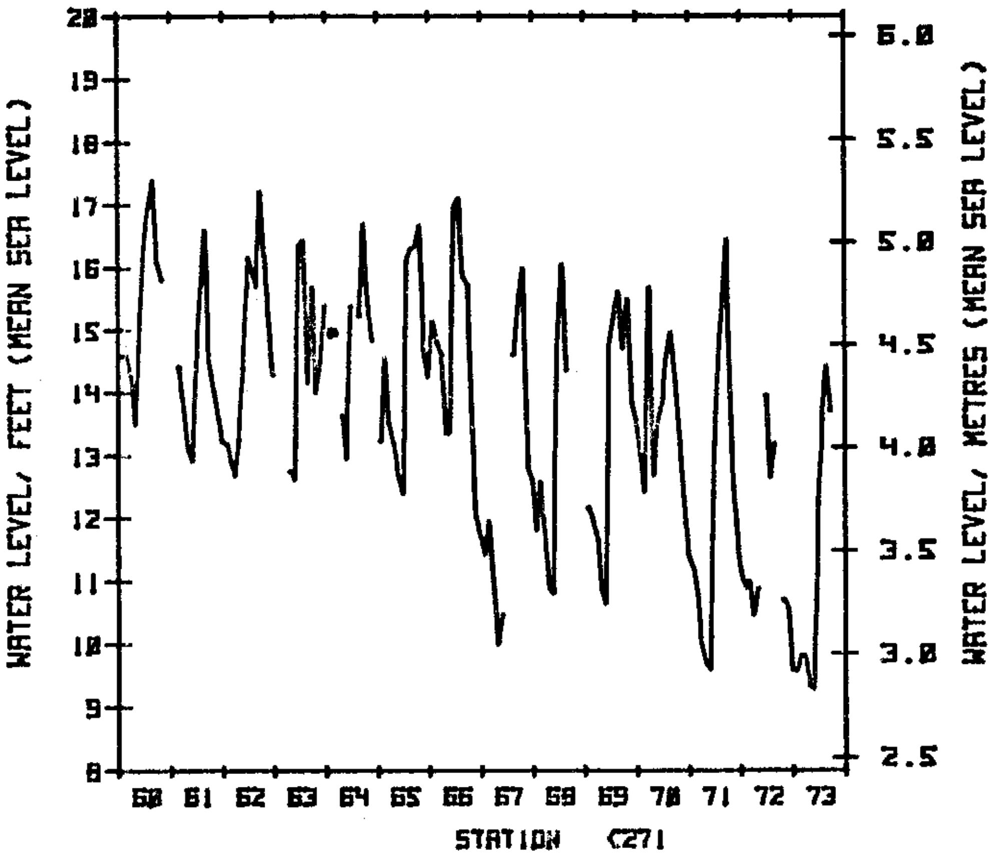
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974




DAILY HIGH HYROGRAPH OF WELL C-131.


WATER LEVEL, FEET (MEAN SEA LEVEL)
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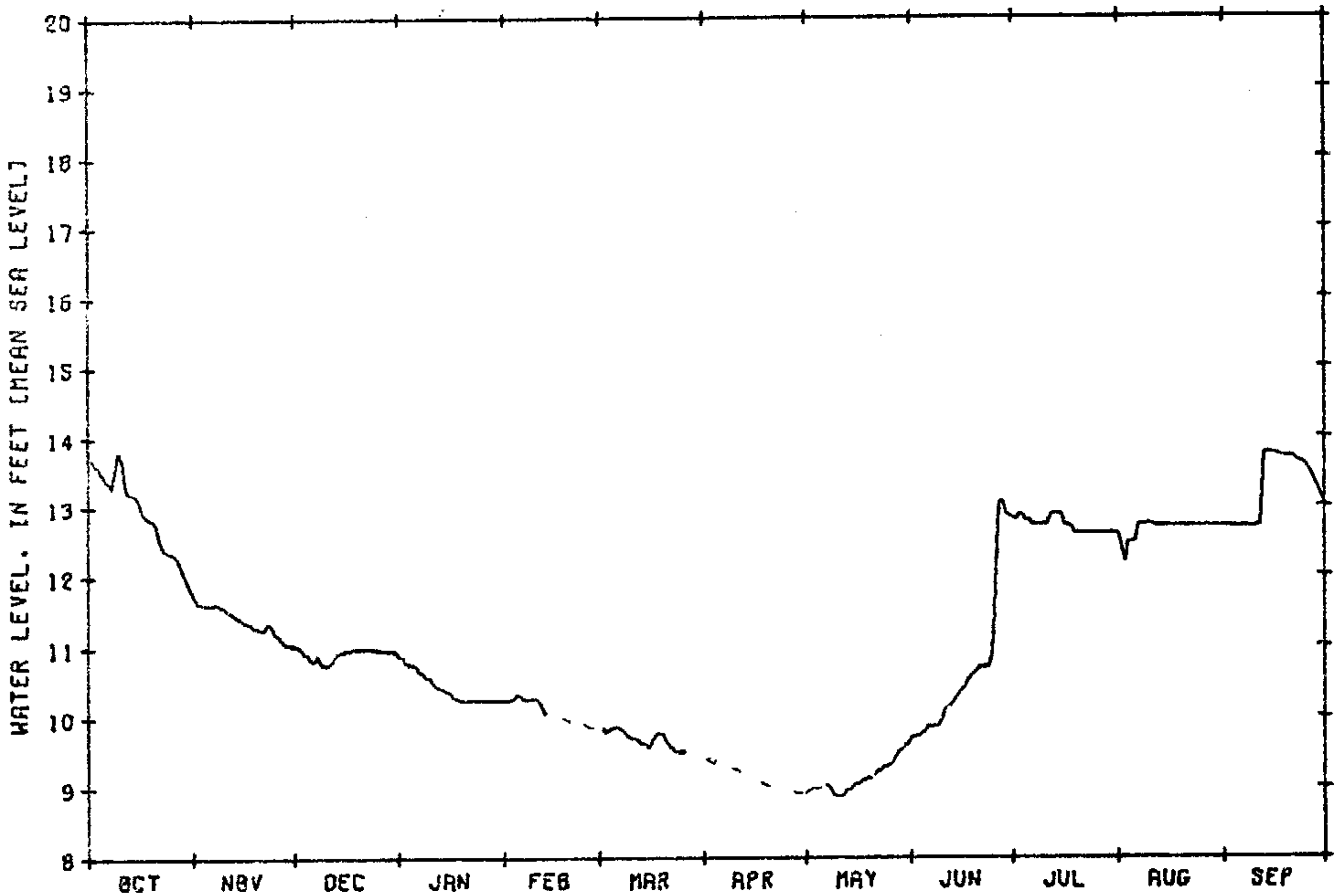
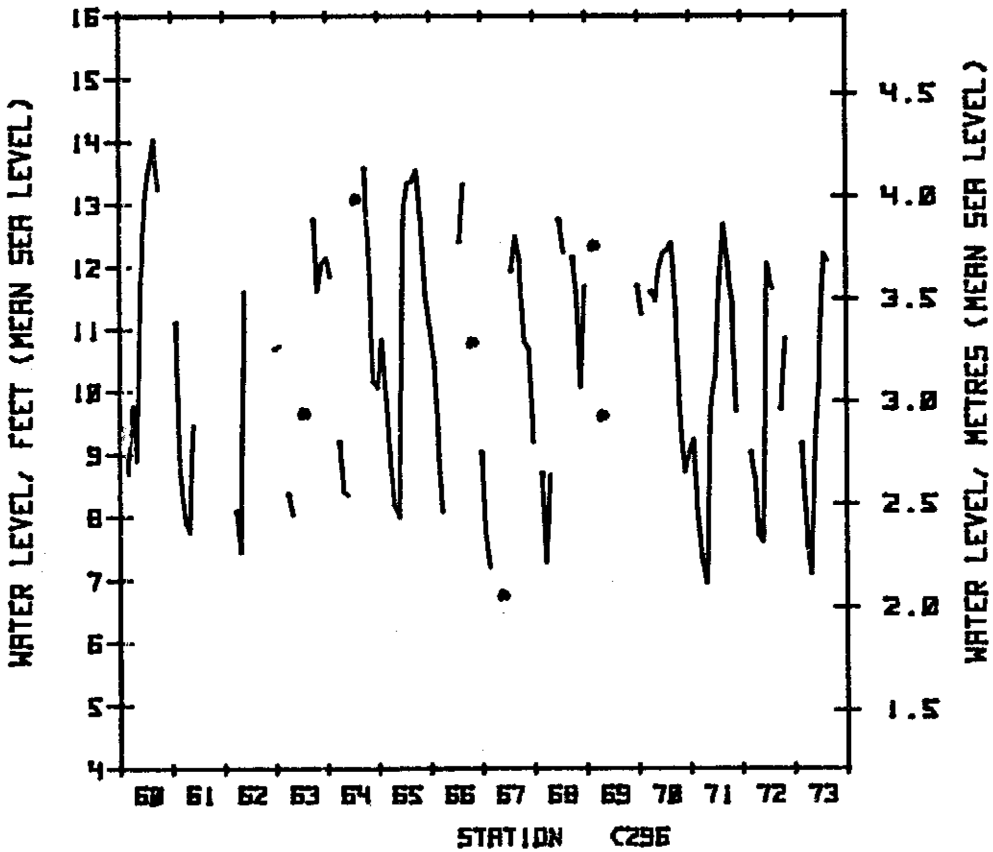
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974




DAILY HIGH HYROGRAPH OF WELL C-271.


WATER LEVEL, FEET (MEAN SEA LEVEL)
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WATER LEVEL, METRES (MEAN SEA LEVEL)
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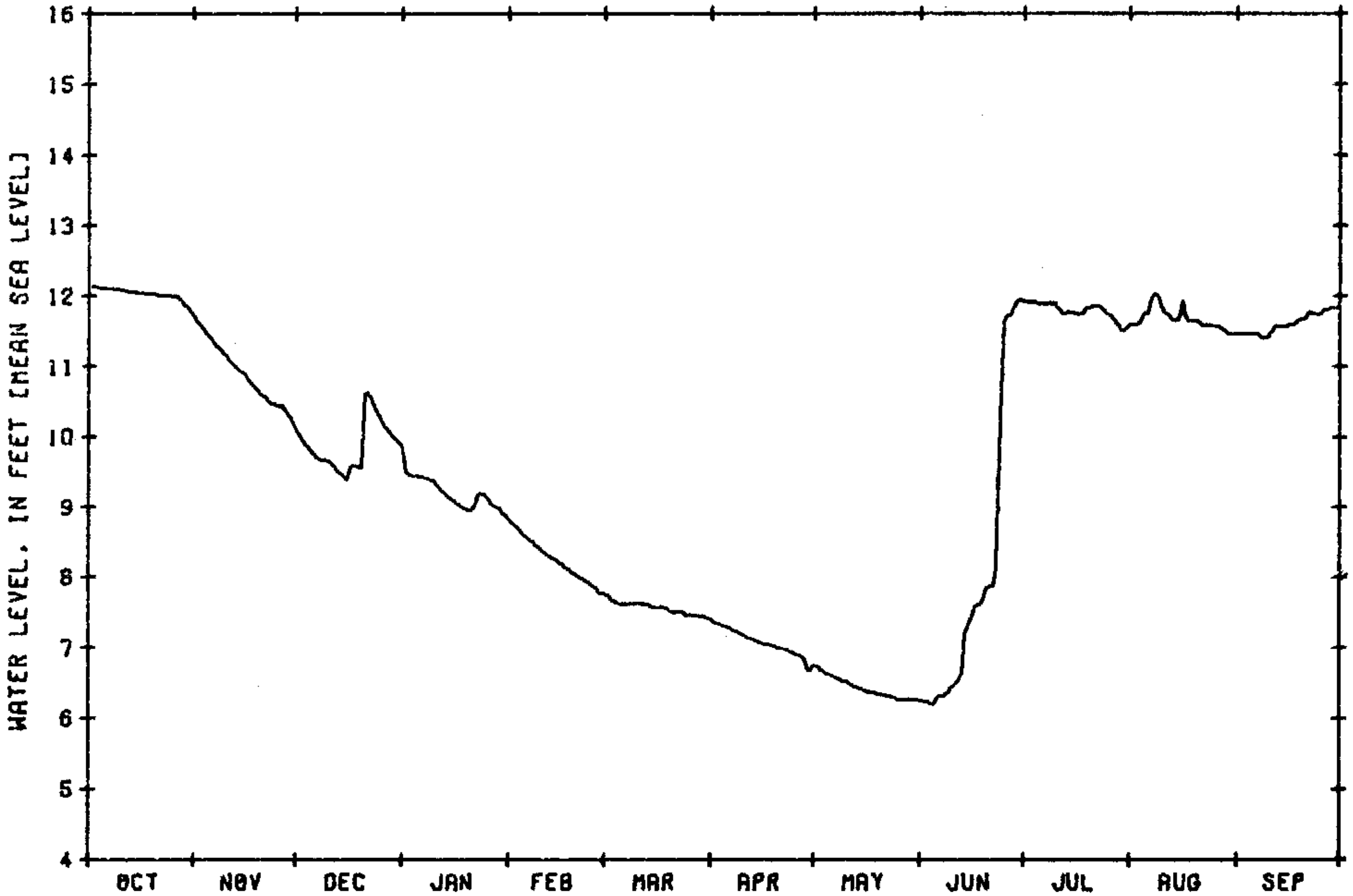
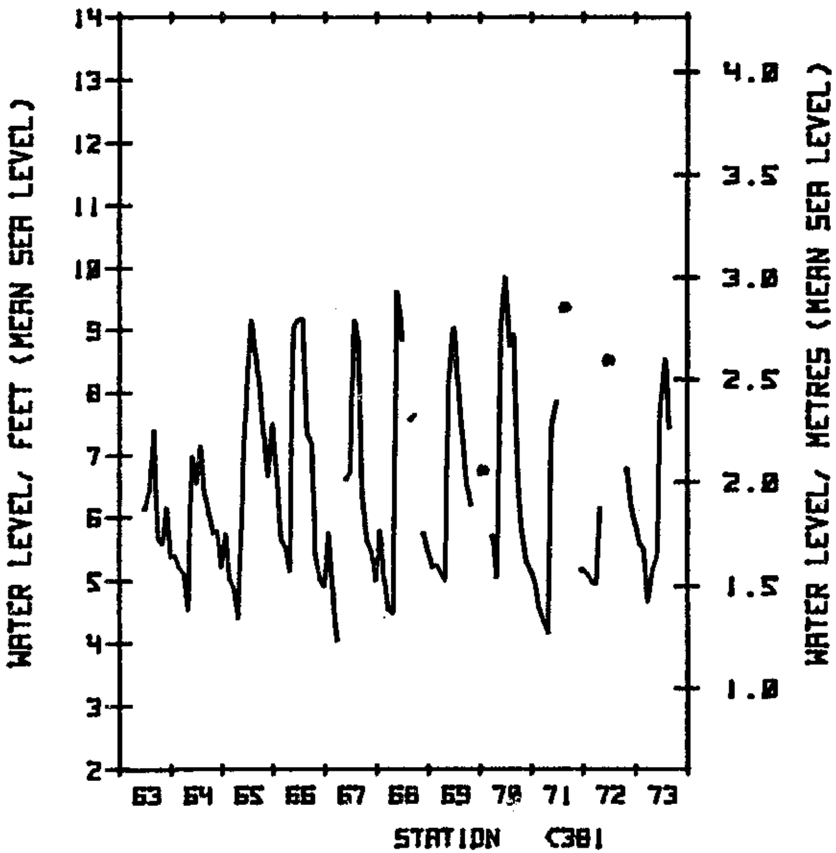
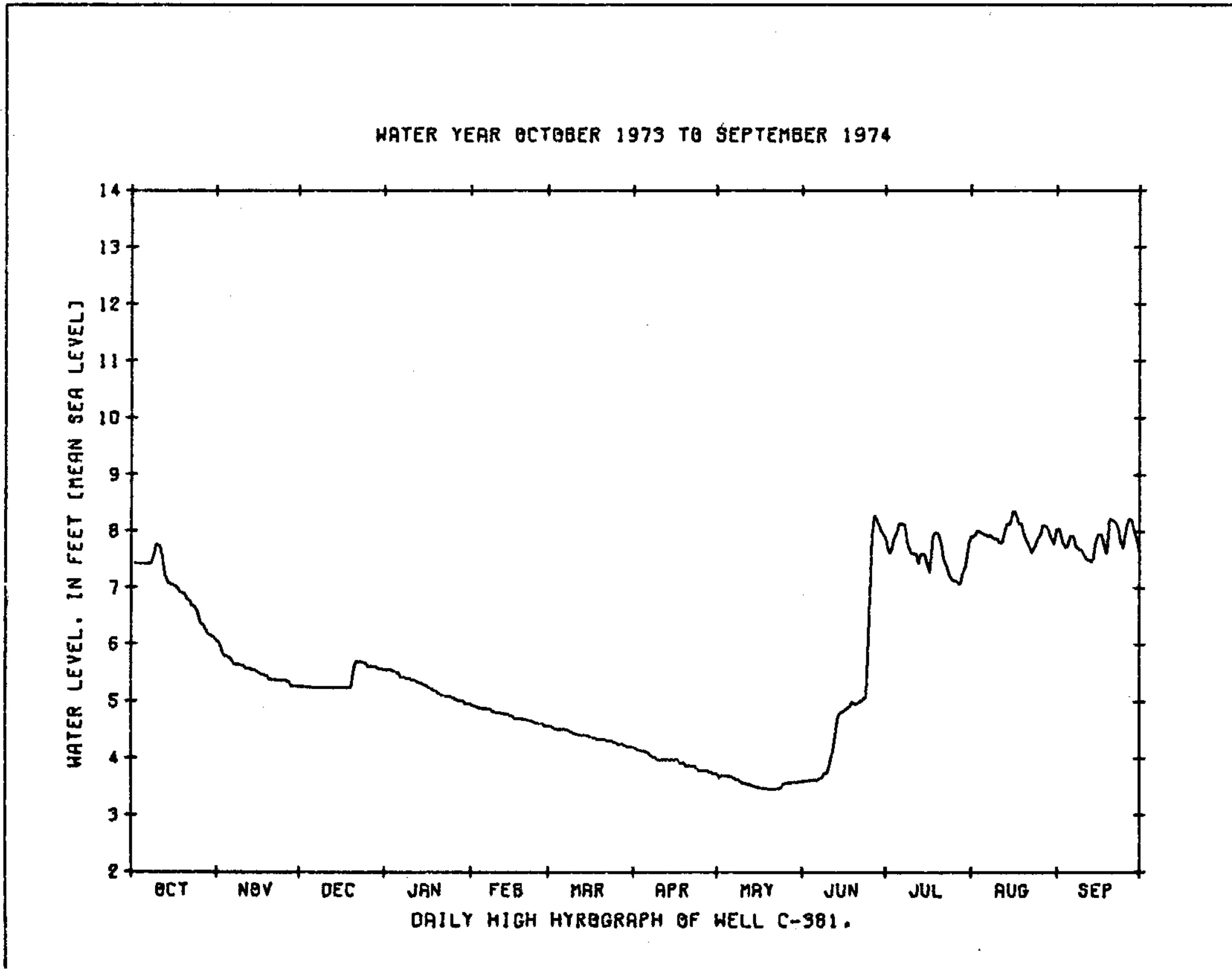
STATION C296

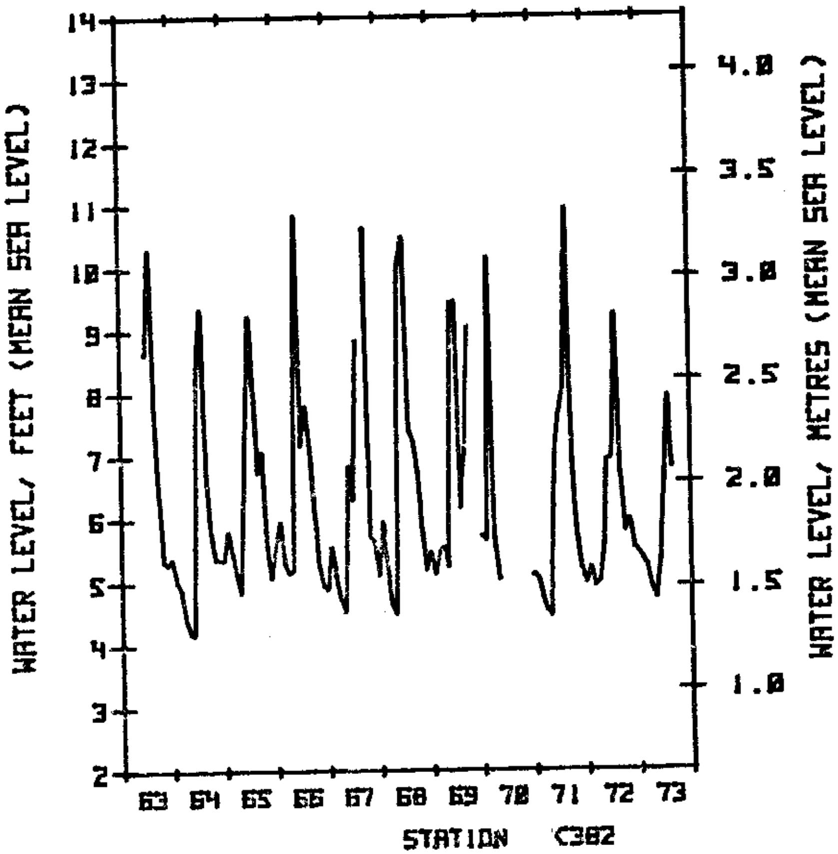
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



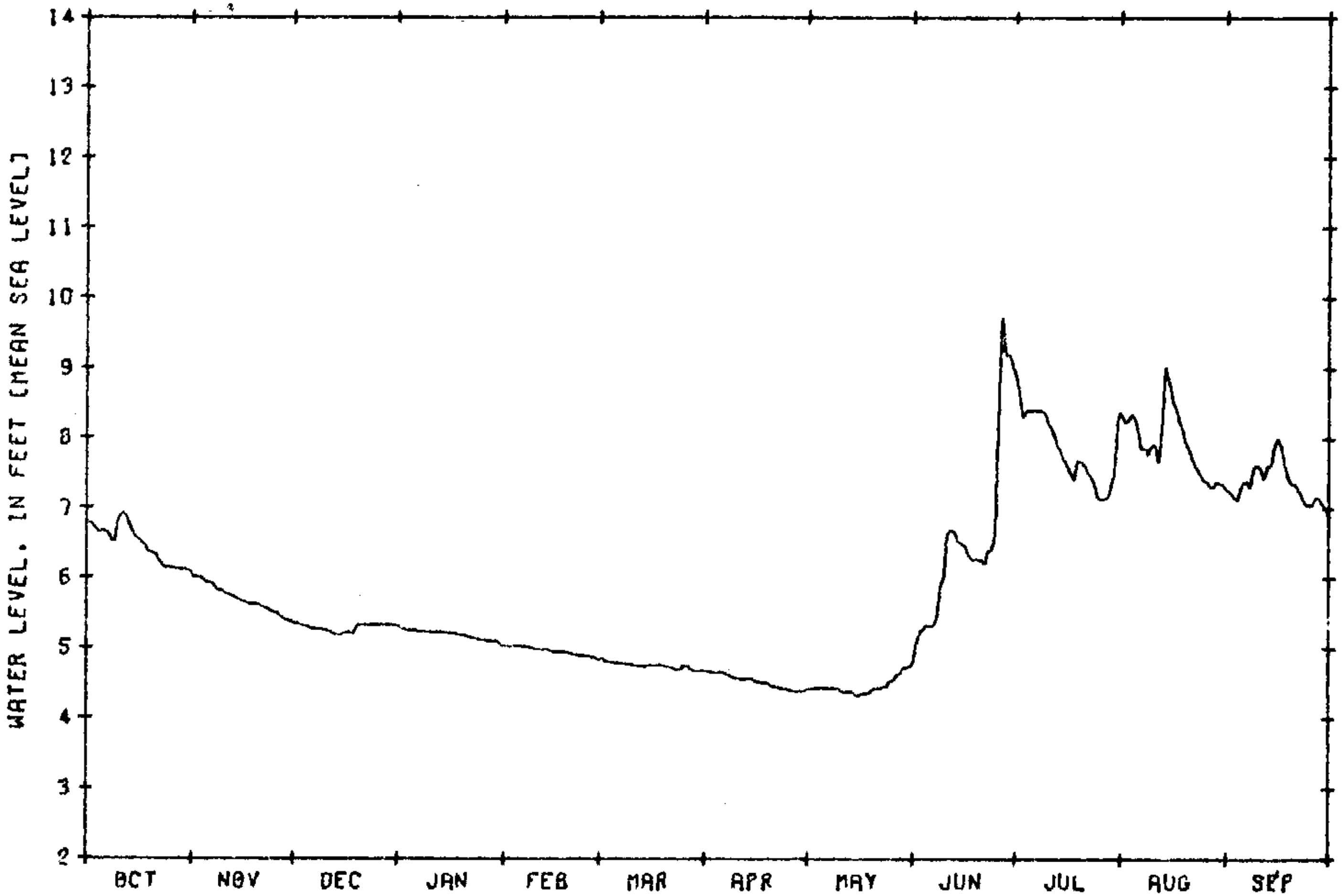

DAILY HIGH HYROGRAPH OF WELL C-296.


WATER LEVEL, FEET (MEAN SEA LEVEL)
WATER LEVEL, METRES (MEAN SEA LEVEL)
14
13
12
11
10
9
8
7
6
5
4
3
2
4.0
3.5
3.0
2.5
2.0
1.5
1.0
63 64 65 66 67 68 69 70 71 72 73
STATION C381

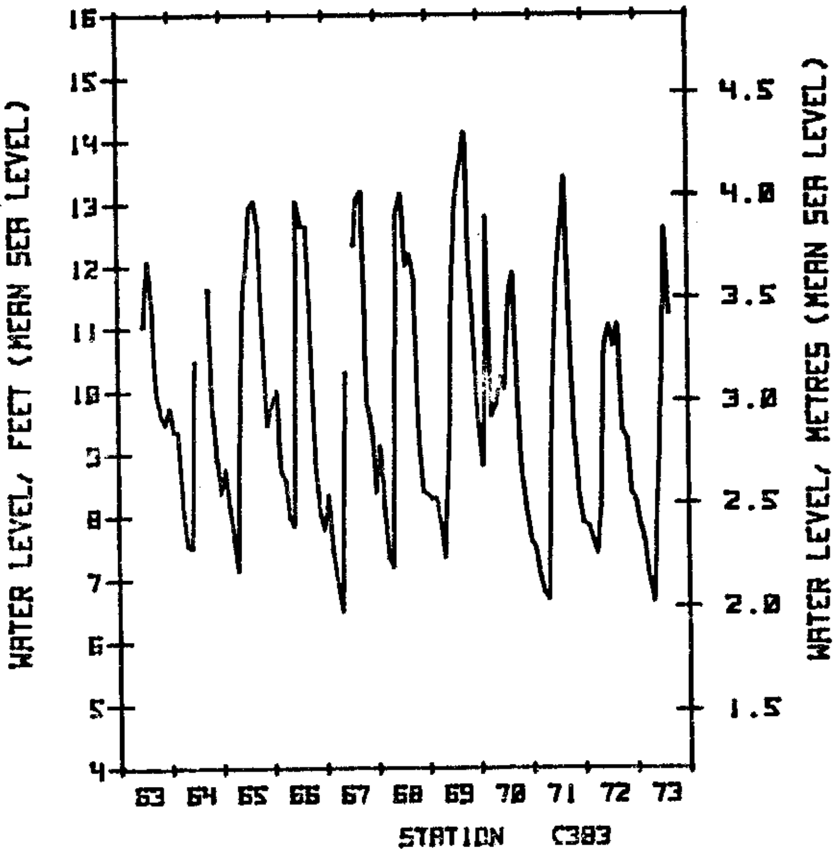

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974
WATER LEVEL, IN FEET (MEAN SEA LEVEL)
14
13
12
11
10
9
8
7
6
5
4
3
2
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
DAILY HIGH HYROGRAPH OF WELL C-381.


WATER LEVEL, FEET (MEAN SEA LEVEL)
WATER LEVEL, METRES (MEAN SEA LEVEL)
14
13
12
11
10
9
8
7
6
5
4
3
2
4.0
3.5
3.0
2.5
2.0
1.5
1.0
63 64 65 66 67 68 69 70 71 72 73
STATION C382

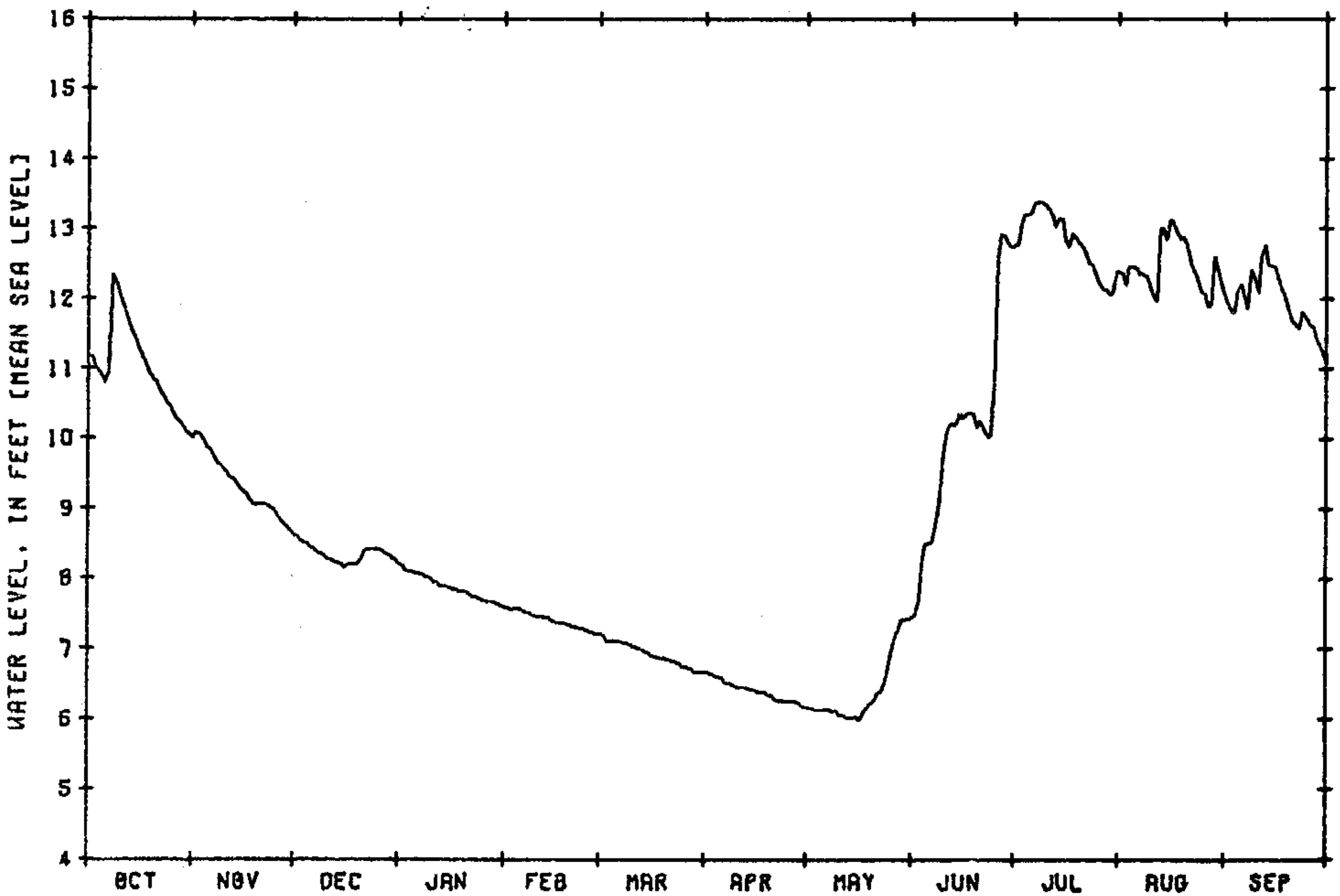
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



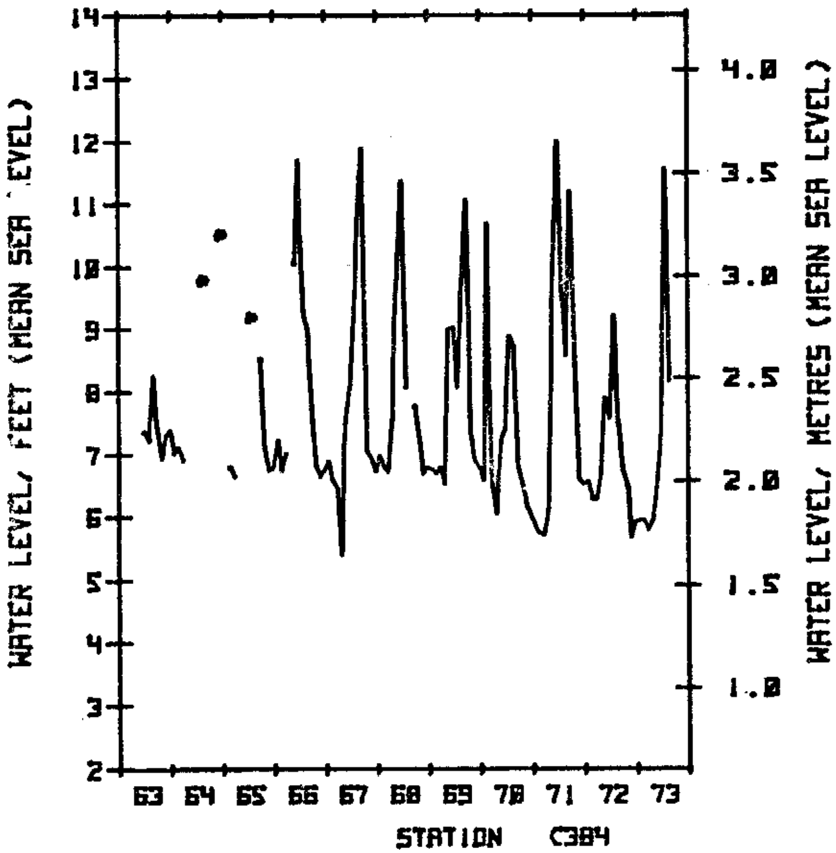

DAILY HIGH HYROGRAPH OF WELL C-382.


WATER LEVEL, FEET (MEAN SEA LEVEL)
WATER LEVEL, METRES (MEAN SEA LEVEL)
16
15
14
13
12
11
10
9
8
7
6
5
4
4.5
4.0
3.5
3.0
2.5
2.0
1.5
63 64 65 66 67 68 69 70 71 72 73
STATION C383

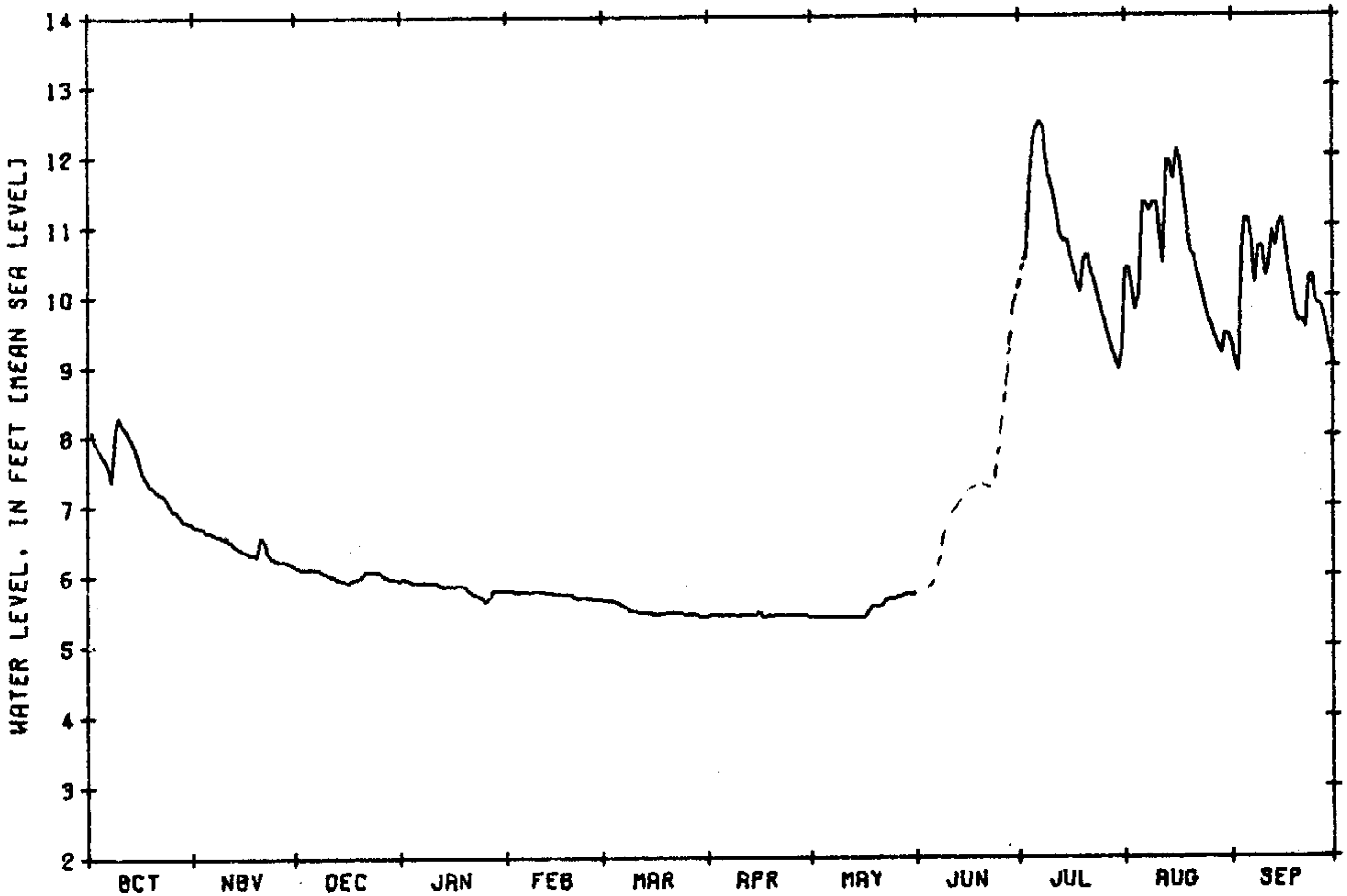
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



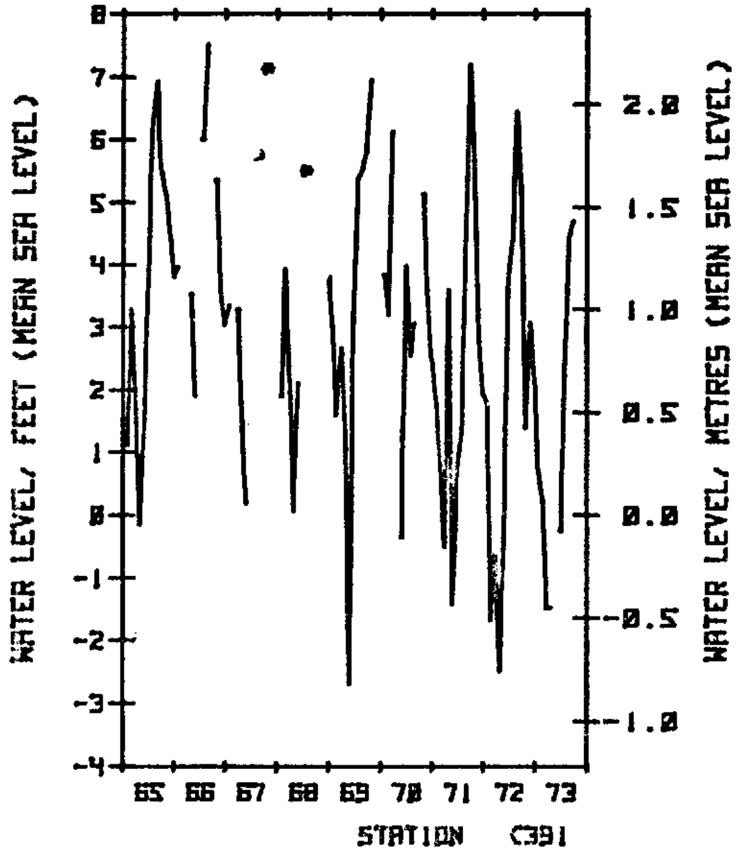

DAILY HIGH HYROGRAPH OF WELL C-389.


WATER LEVEL, FEET (MEAN SEA LEVEL)
WATER LEVEL, METRES (MEAN SEA LEVEL)
14
13
12
11
10
9
8
7
6
5
4
3
2
4.0
3.5
3.0
2.5
2.0
1.5
1.0
63
64
65
66
67
68
69
70
71
72
73
STATION C384

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

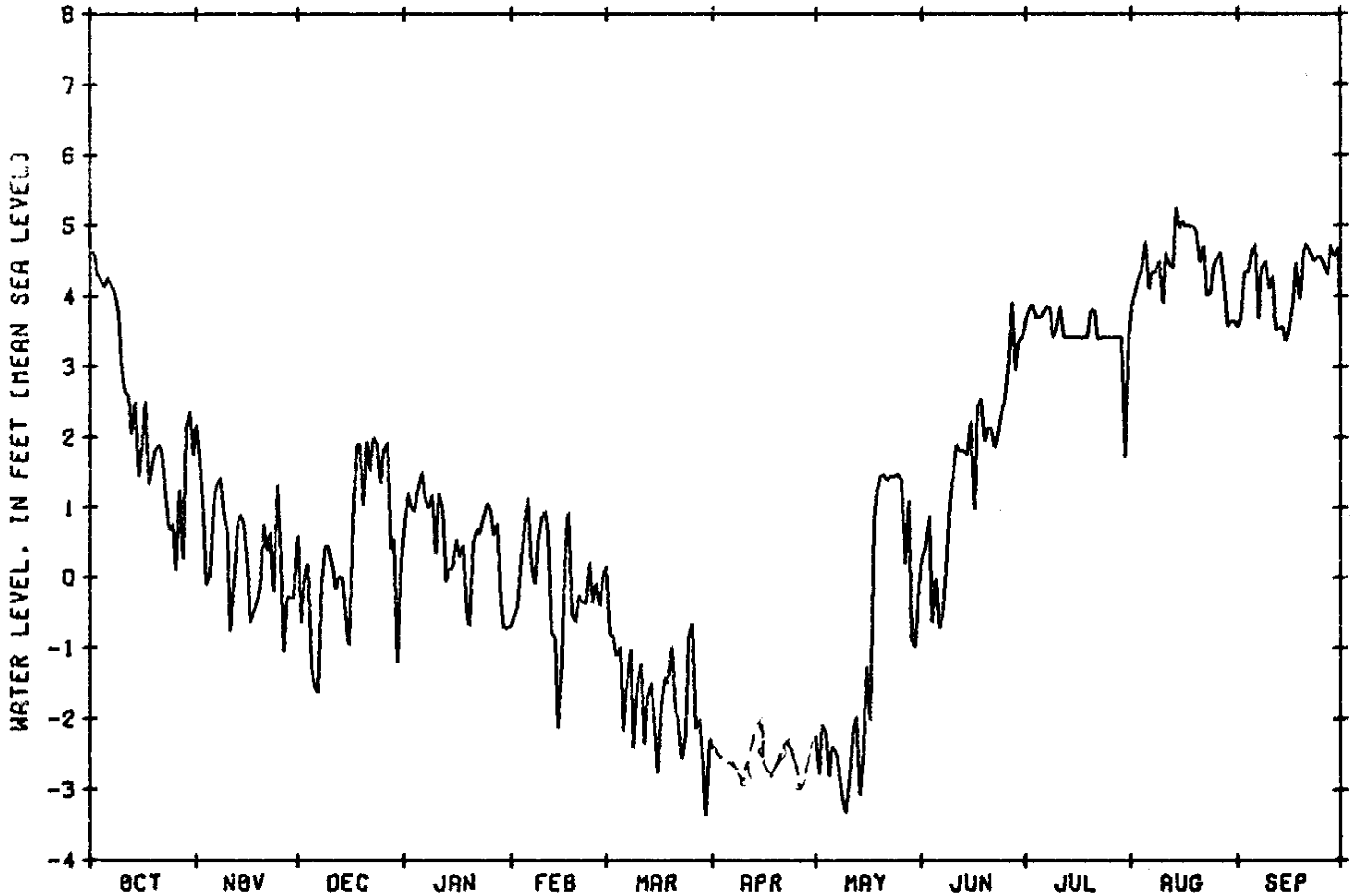



DAILY HIGH HYROGRAPH OF WELL C-384.

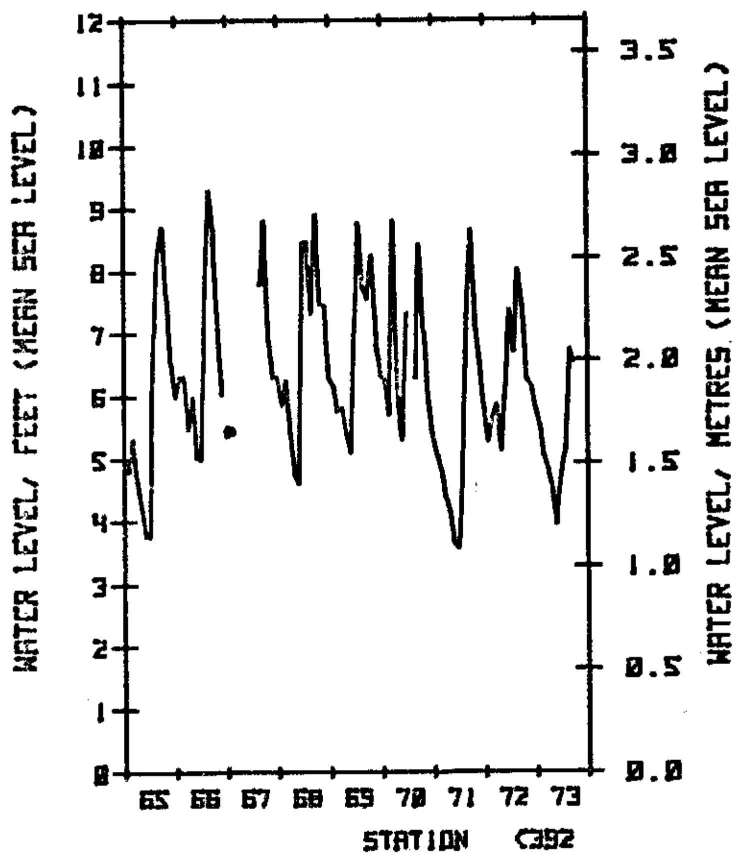


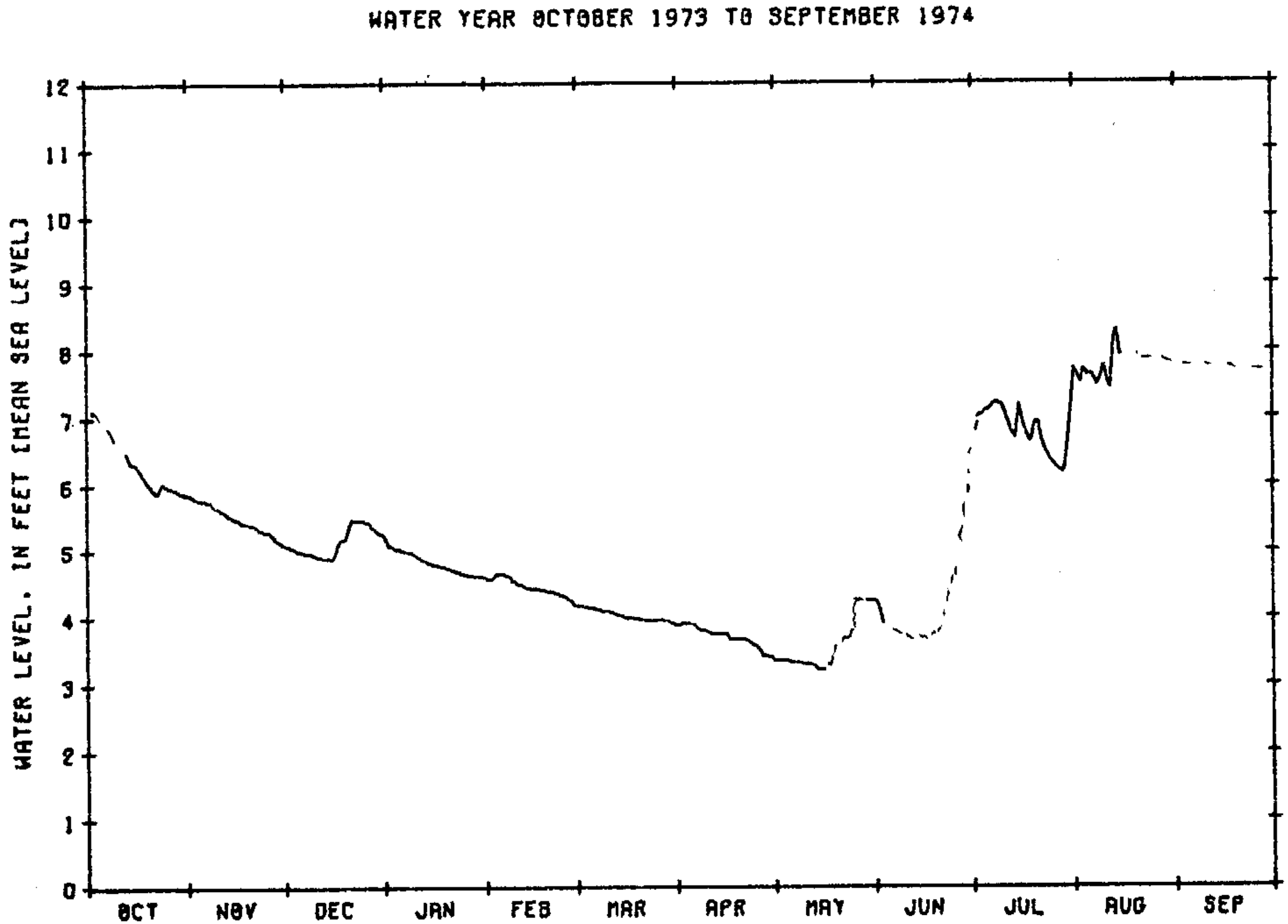
WATER LEVEL, FEET (MEAN SEA LEVEL)
WATER LEVEL, METRES (MEAN SEA LEVEL)
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
65 66 67 68 69 70 71 72 73
STATION C391

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



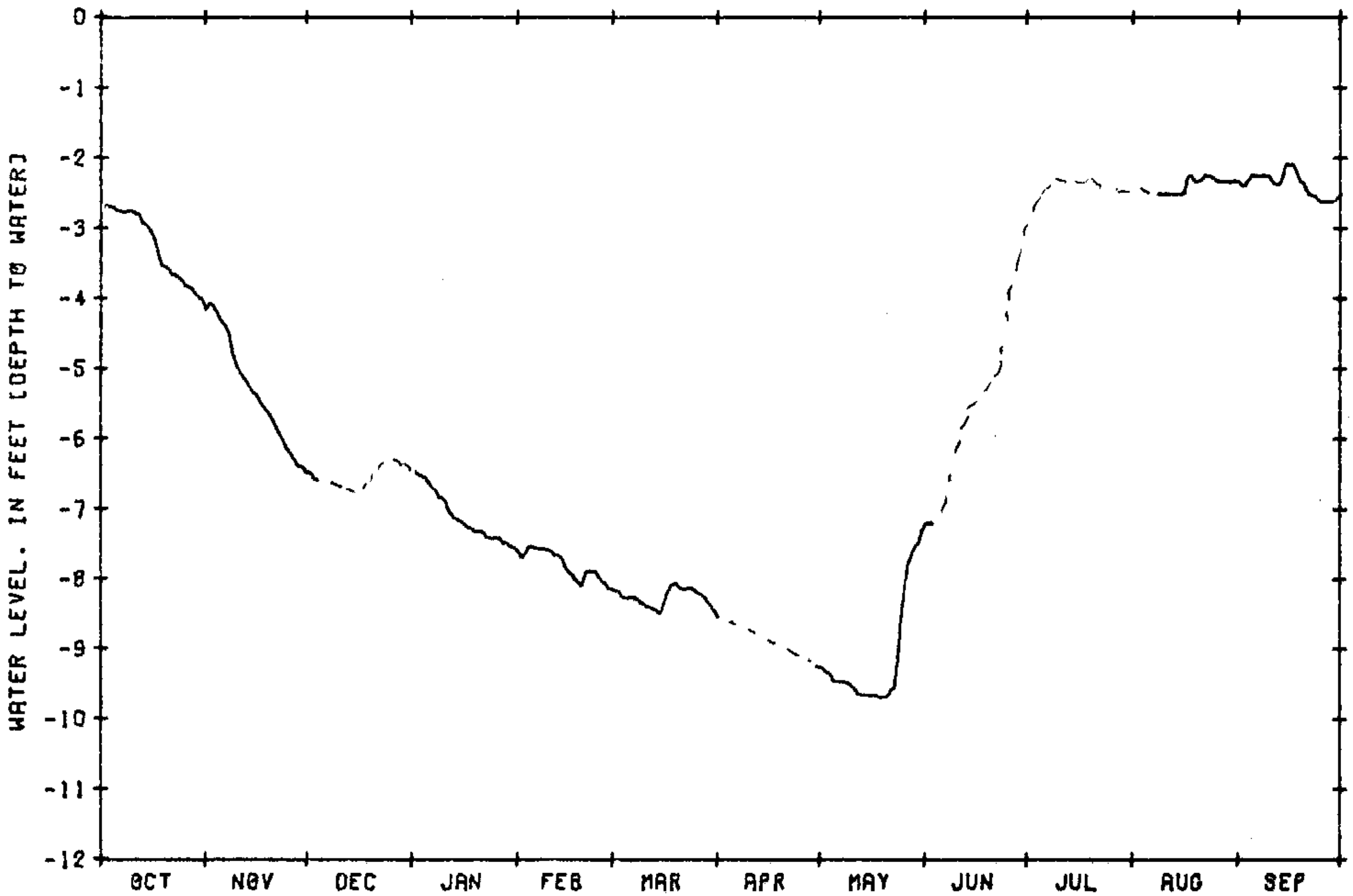

DAILY HIGH HYROGRAPH OF WELL C-391.


WATER LEVEL, FEET (MEAN SEA LEVEL)
0 1 2 3 4 5 6 7 8 9 10 11 12
WATER LEVEL, METRES (MEAN SEA LEVEL)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5
65 66 67 68 69 70 71 72 73
STATION C392



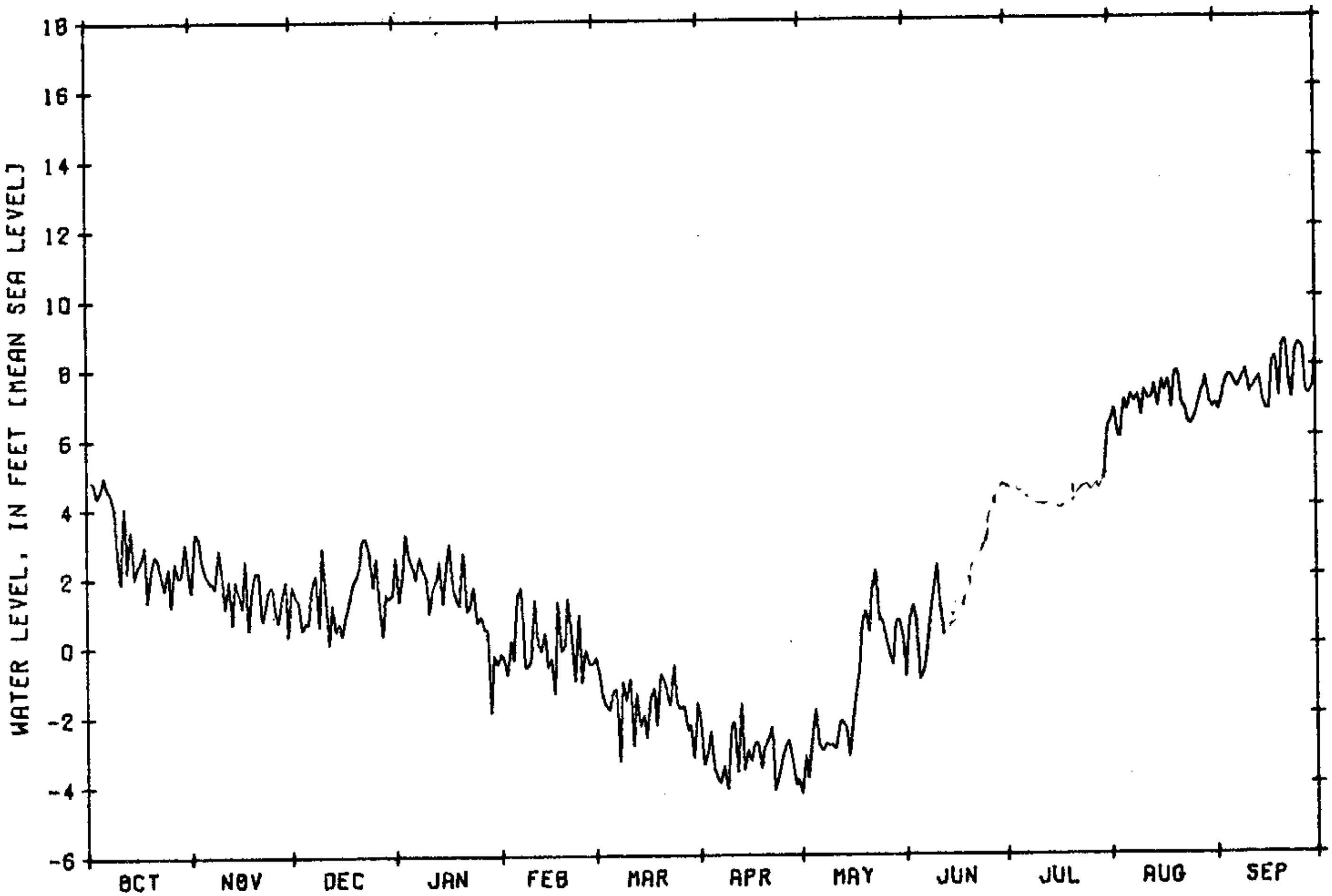

DAILY HIGH HYROGRAPH OF WELL C-392.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



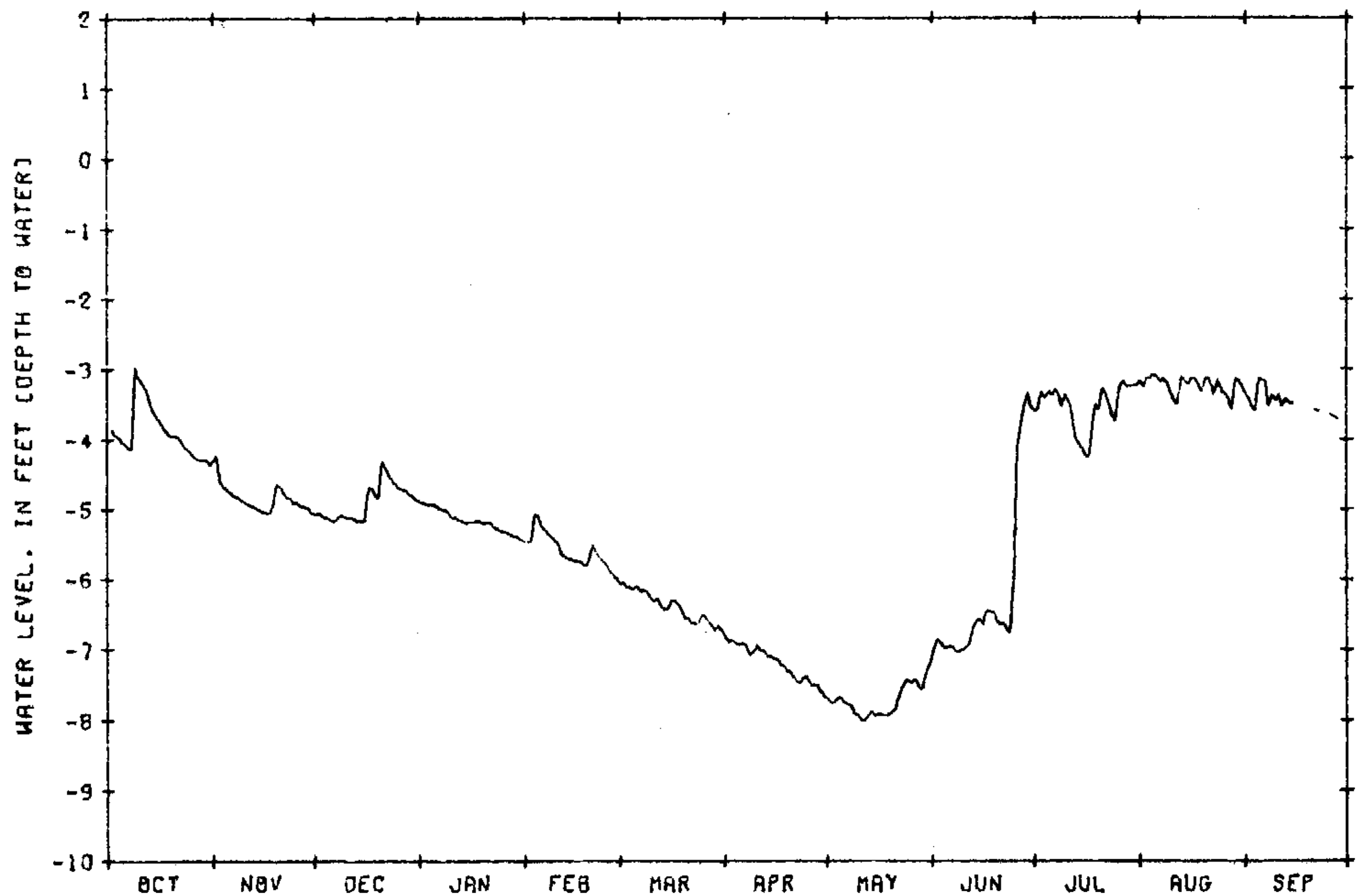

DAILY HIGH HYROGRAPH OF WELL C-462.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



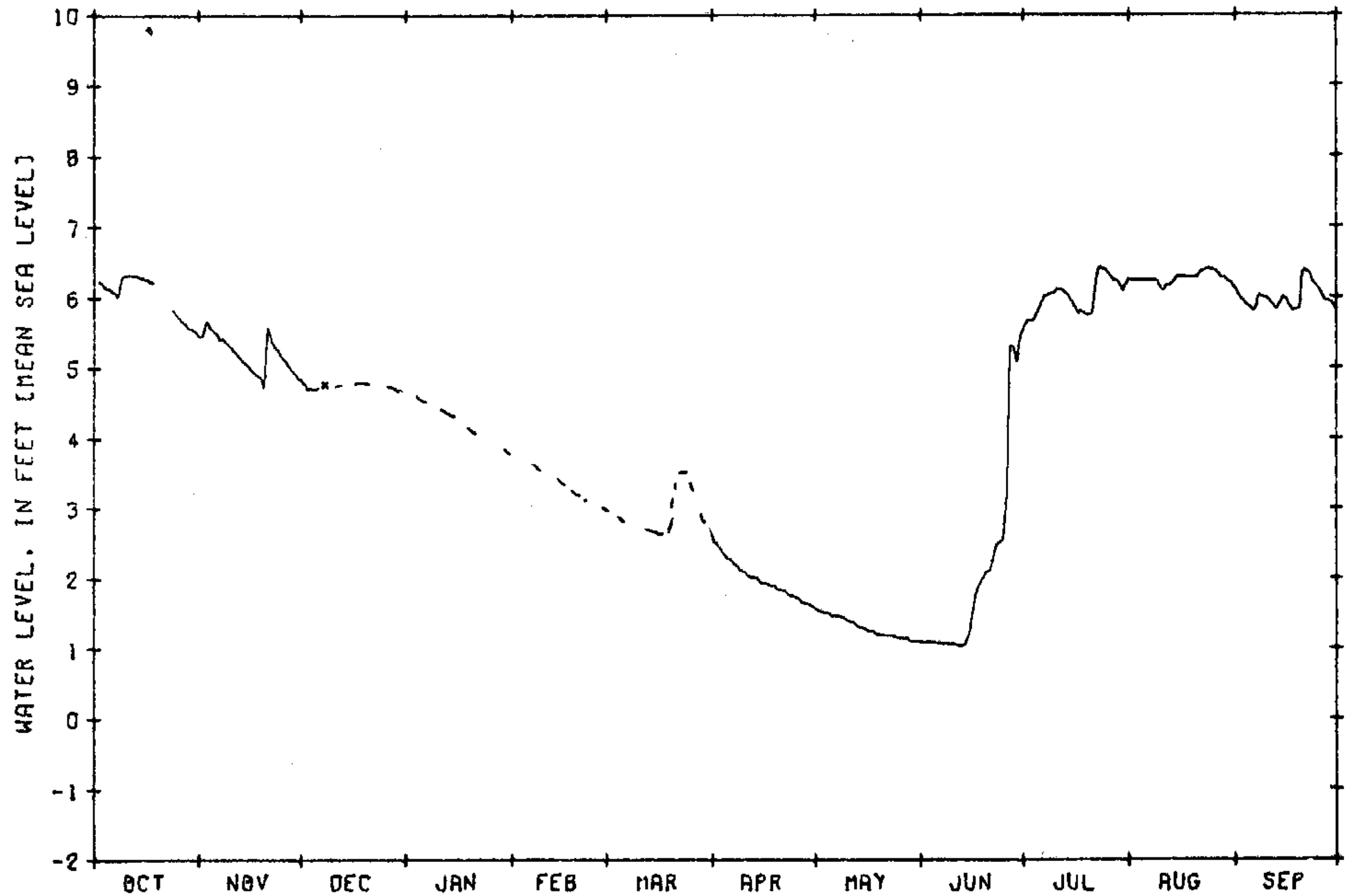

DAILY HIGH HYROGRAPH OF WELL C-489.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



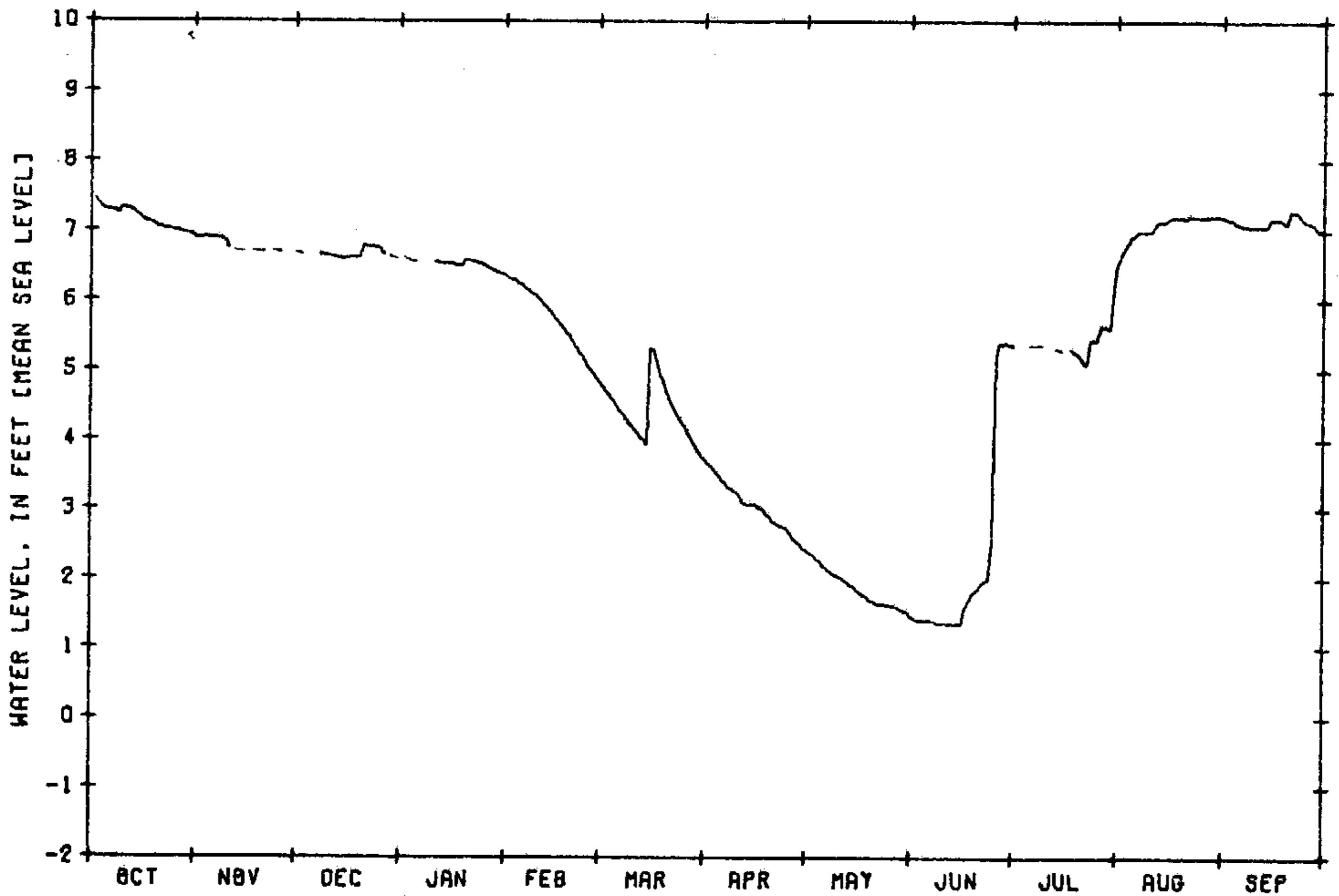

DAILY HIGH HYROGRAPH OF WELL C-492.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

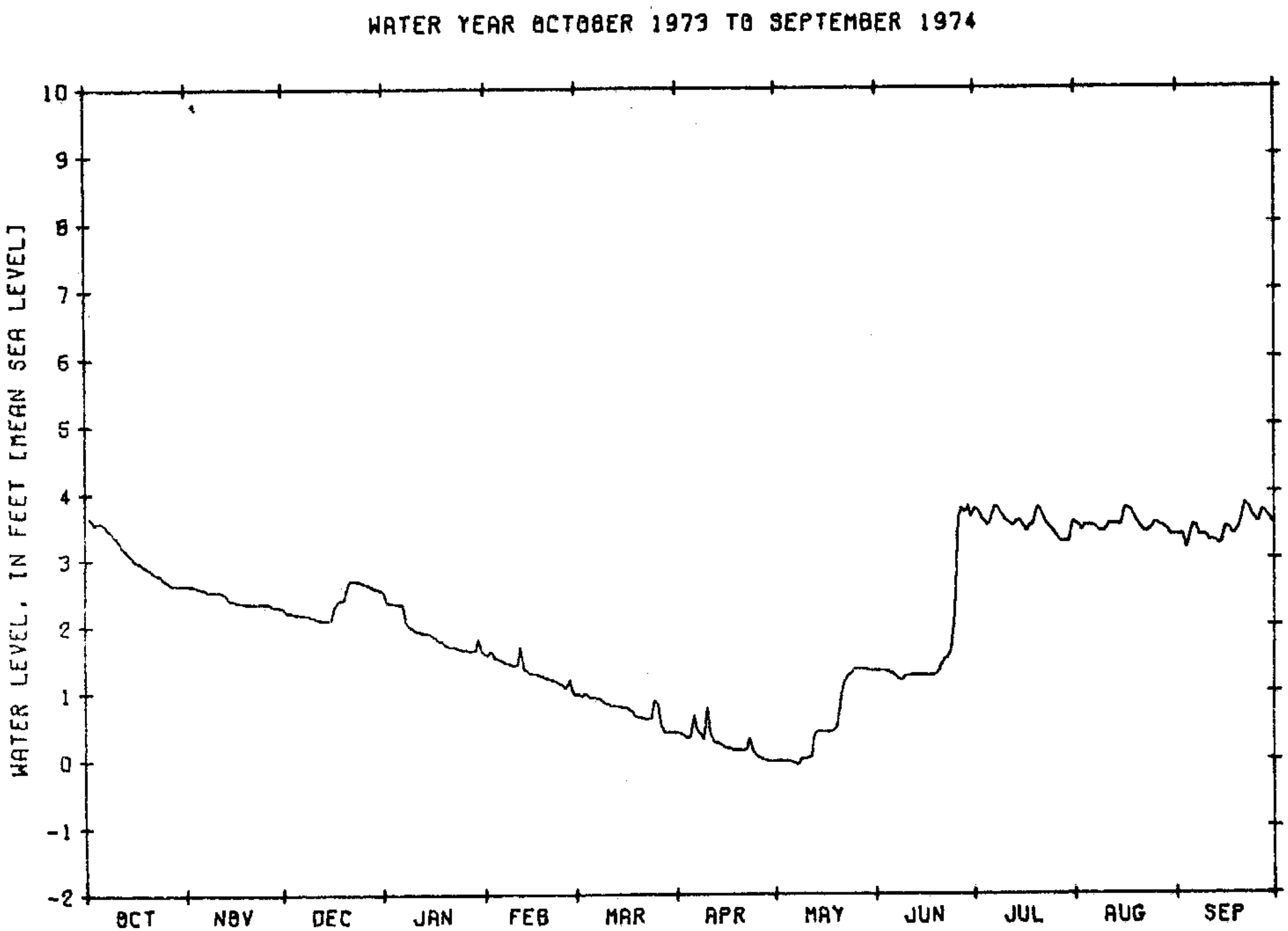



DAILY HIGH HYROGRAPH OF WELL C-495.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

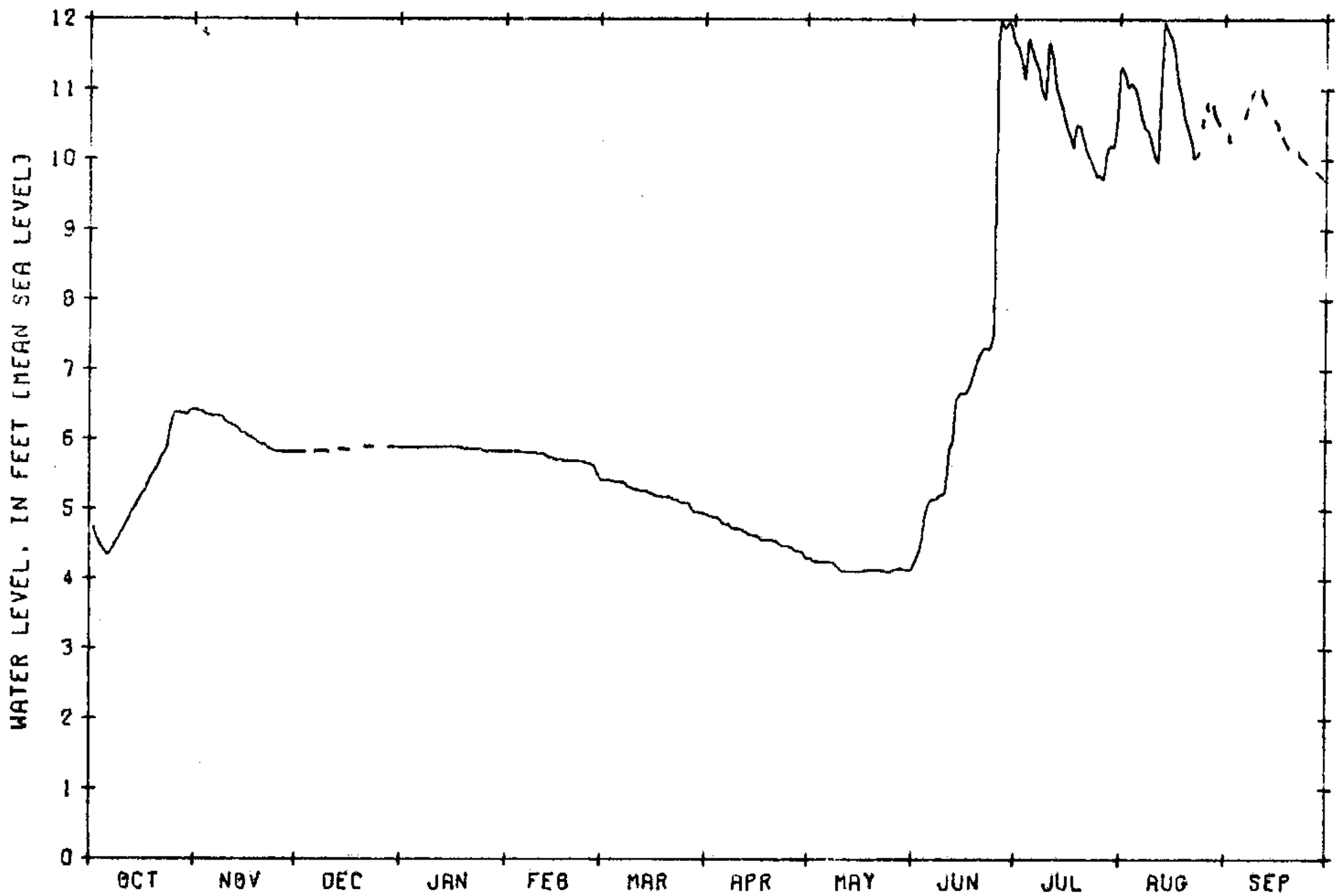



DAILY HIGH HYROGRAPH OF WELL C-496.



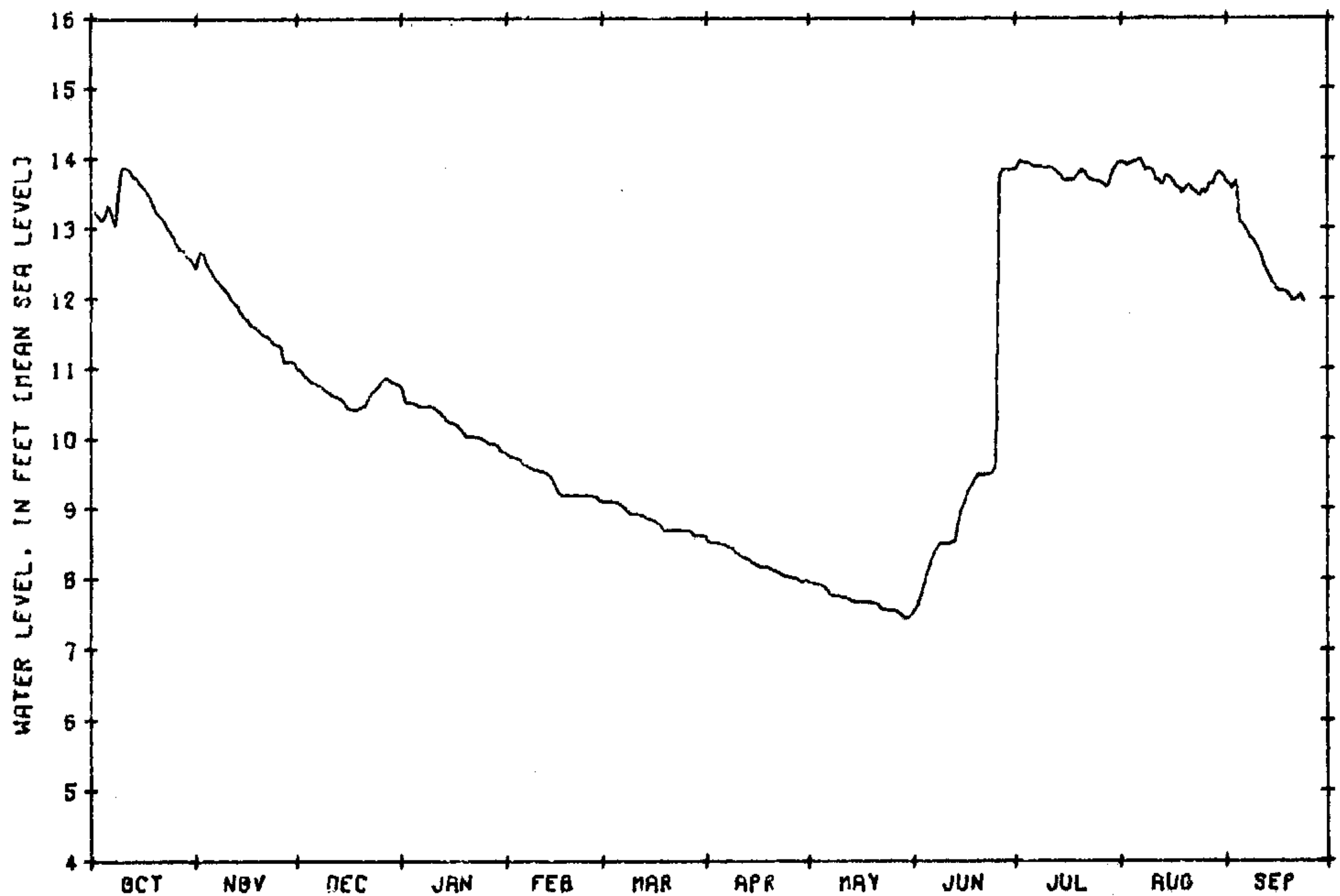

DAILY HIGH HYROGRAPH OF WELL C-500.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



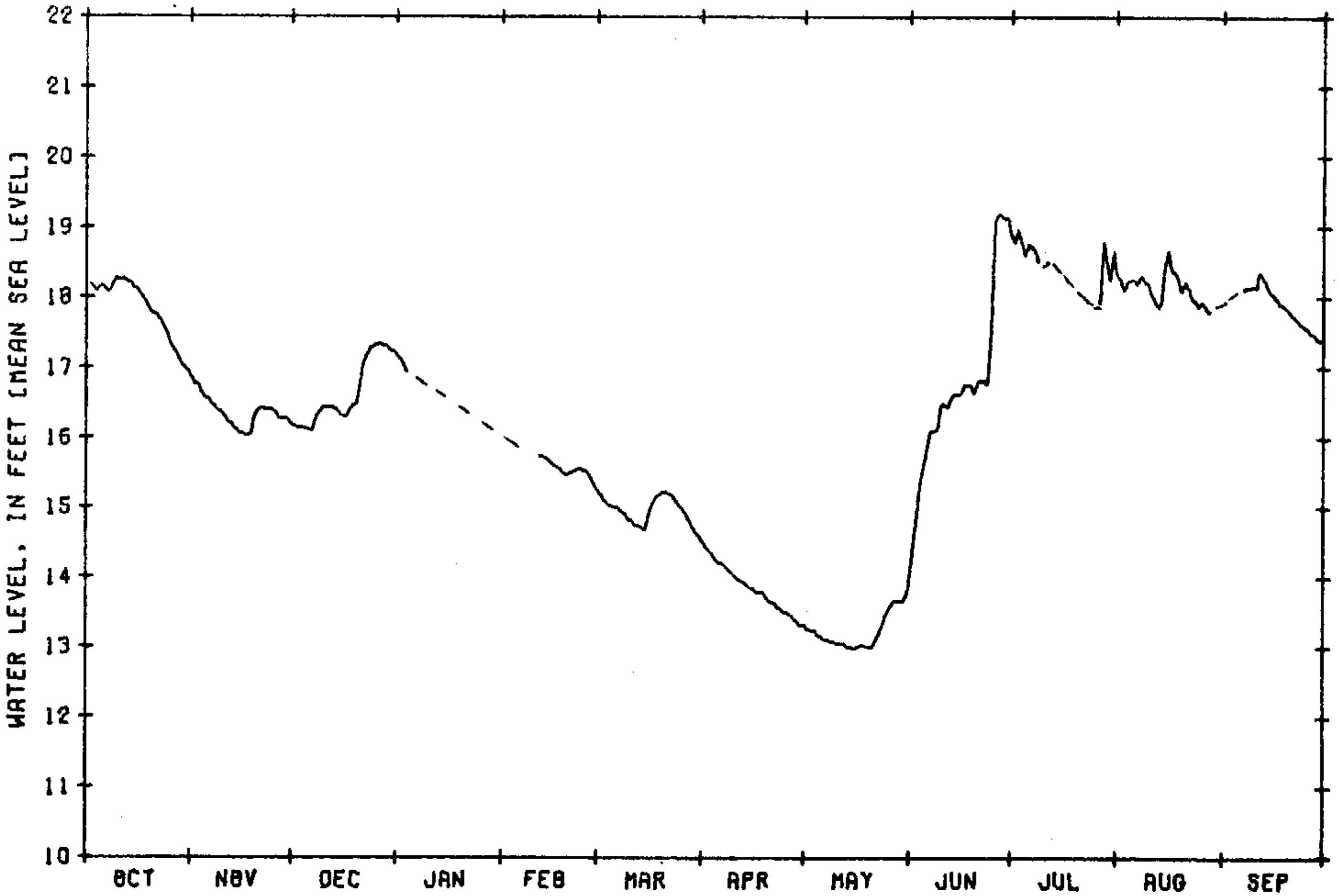

DAILY HIGH HYROGRAPH OF WELL C-501.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974




DAILY HIGH HYROGRAPH OF WELL C-502.

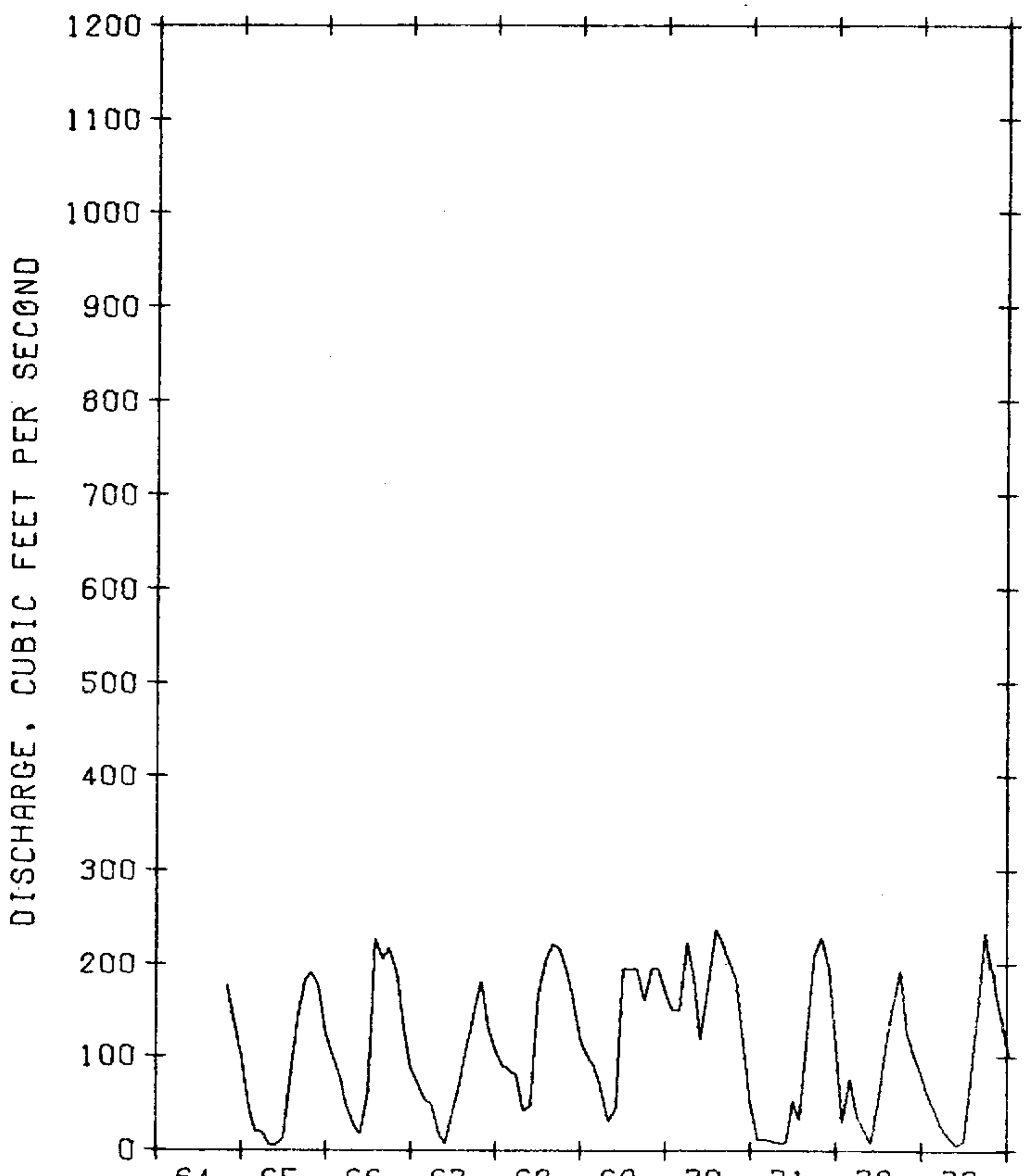
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



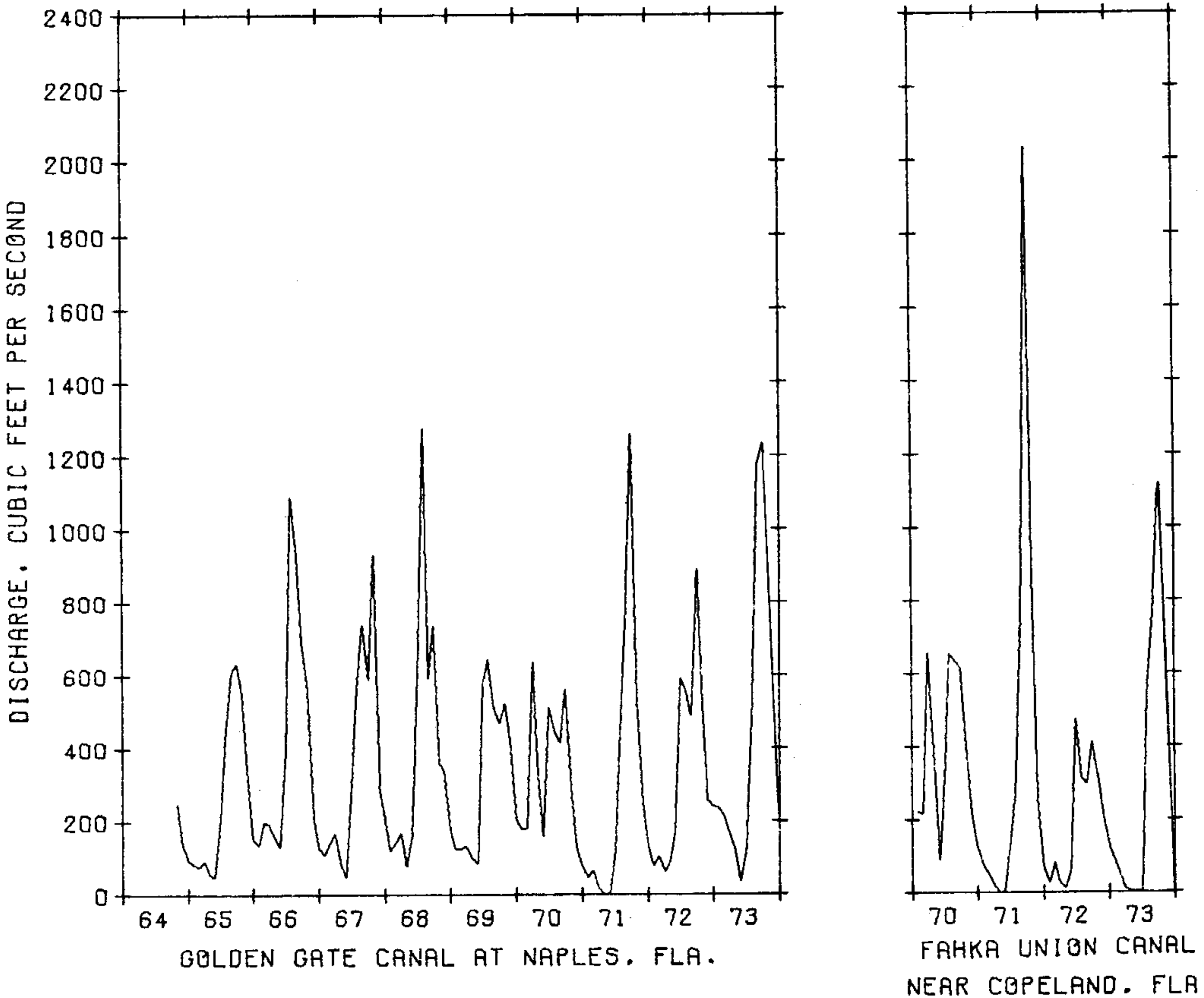

DAILY HIGH HYROGRAPH OF WELL C-503.

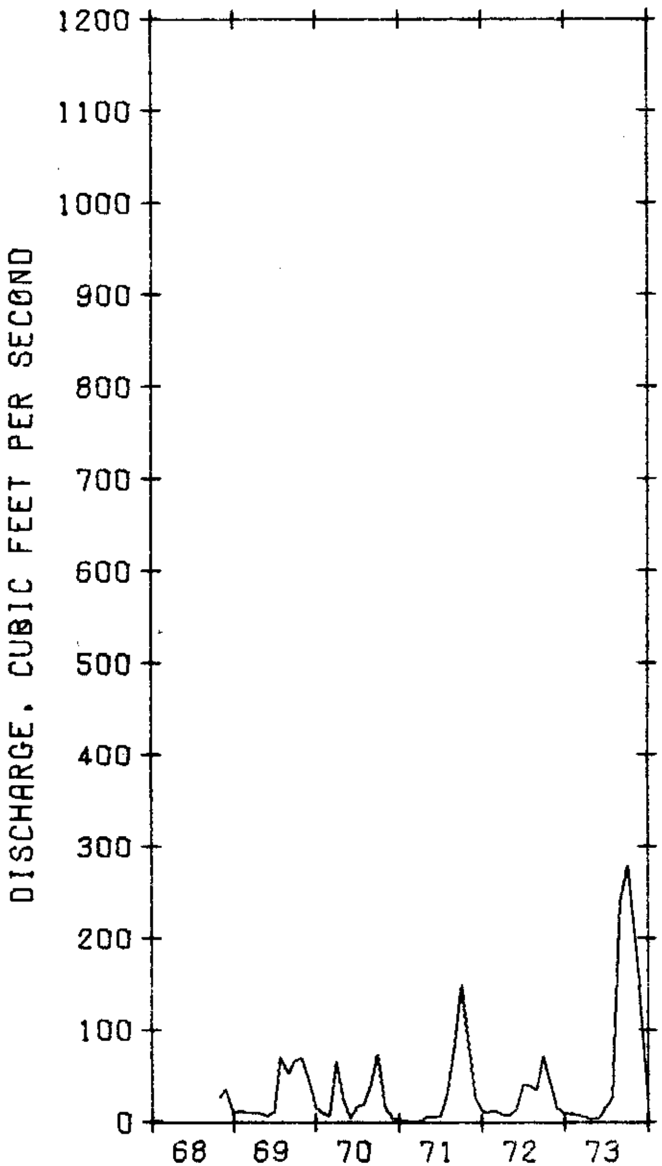
## BASIC DATA - Section B

## Canal Discharge Hydrographs

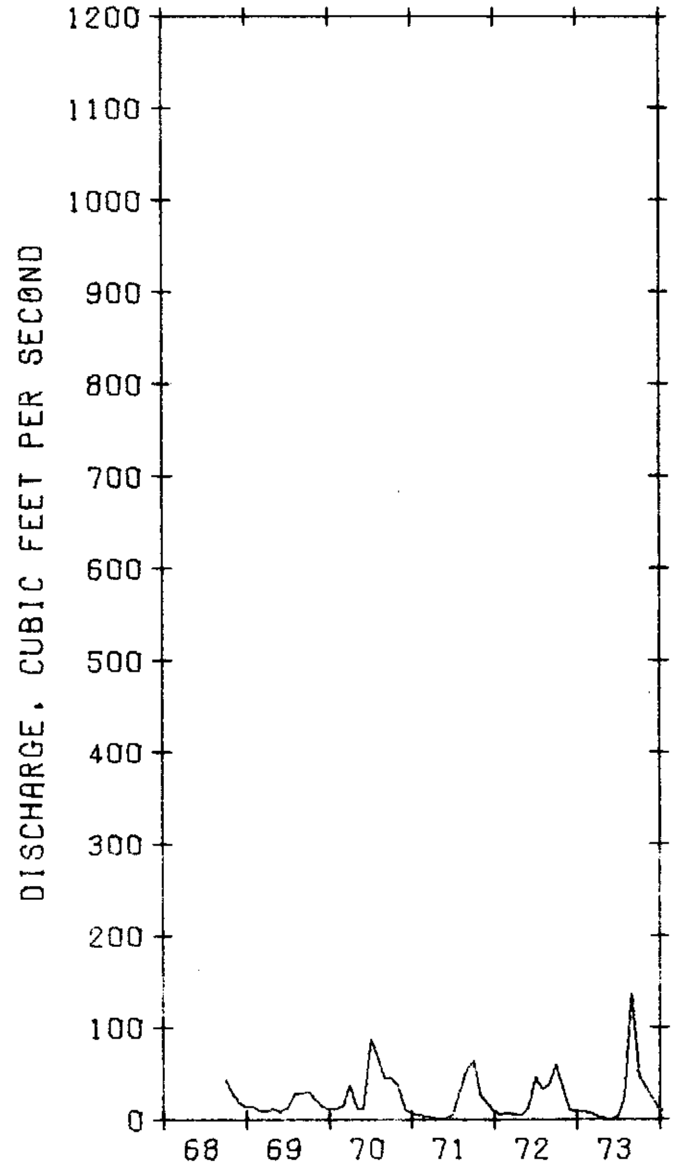


BARRON RIVER CANAL NEAR EVERGLADES, FLA.

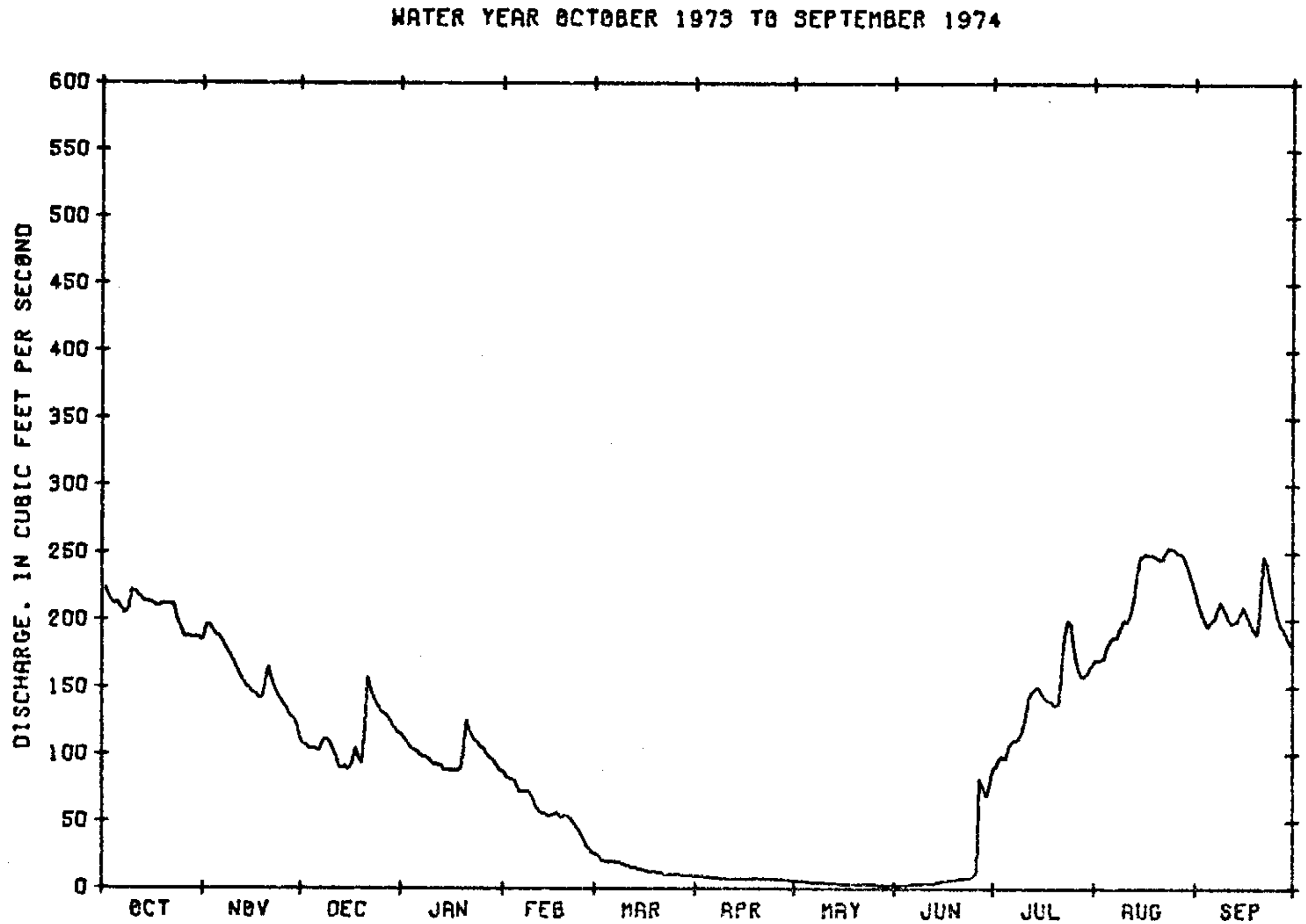

DISCHARGE, CUBIC FEET PER SECOND
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
64
65
66
67
68
69
70
71
72
73
GOLDEN GATE CANAL AT NAPLES, FLA.
70
71
72
73
FAHKA UNION CANAL
NEAR COPELAND, FLA.



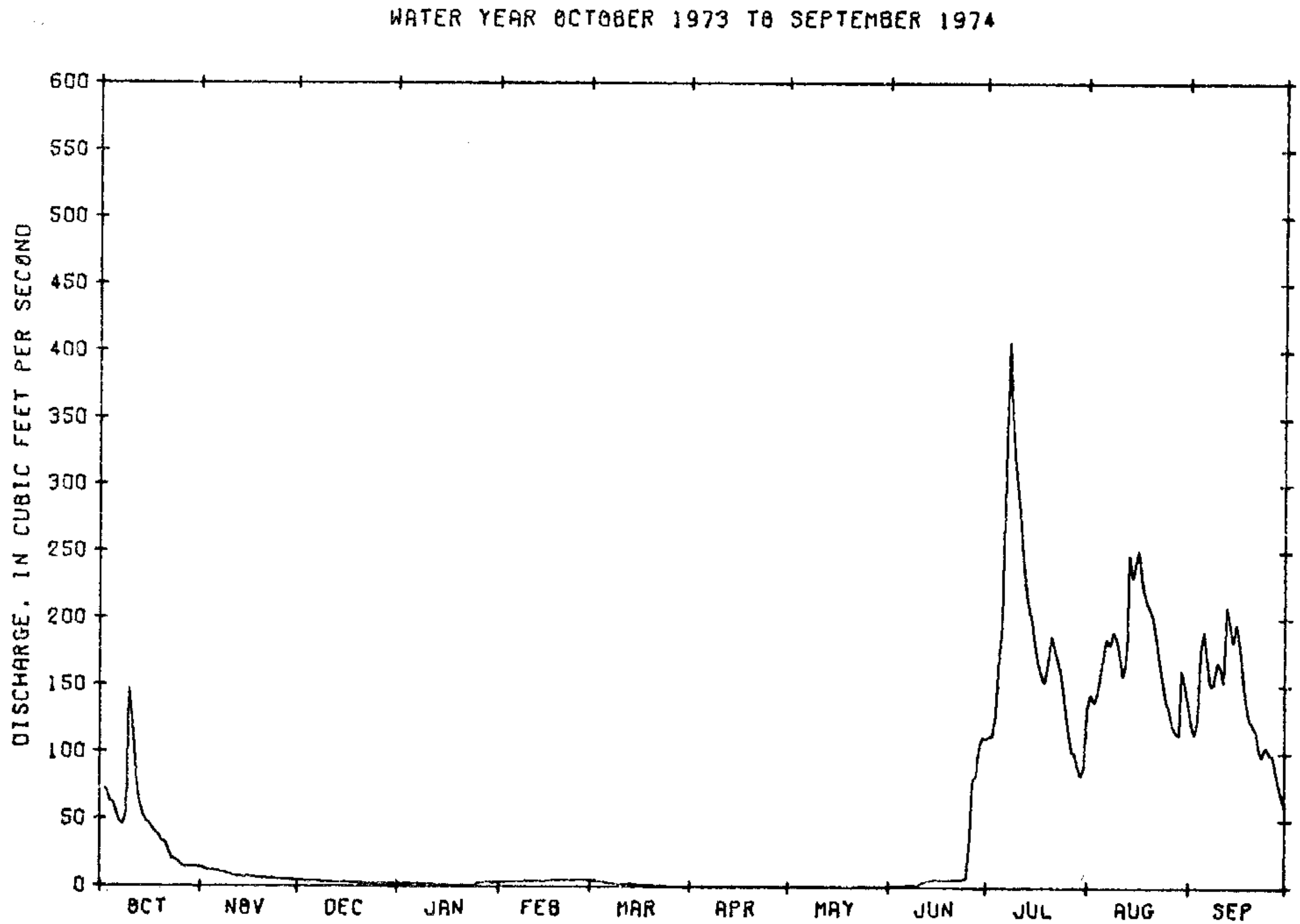

COCOHATCHEE RIVER CANAL
NEAR NAPLES PARK, FLA.



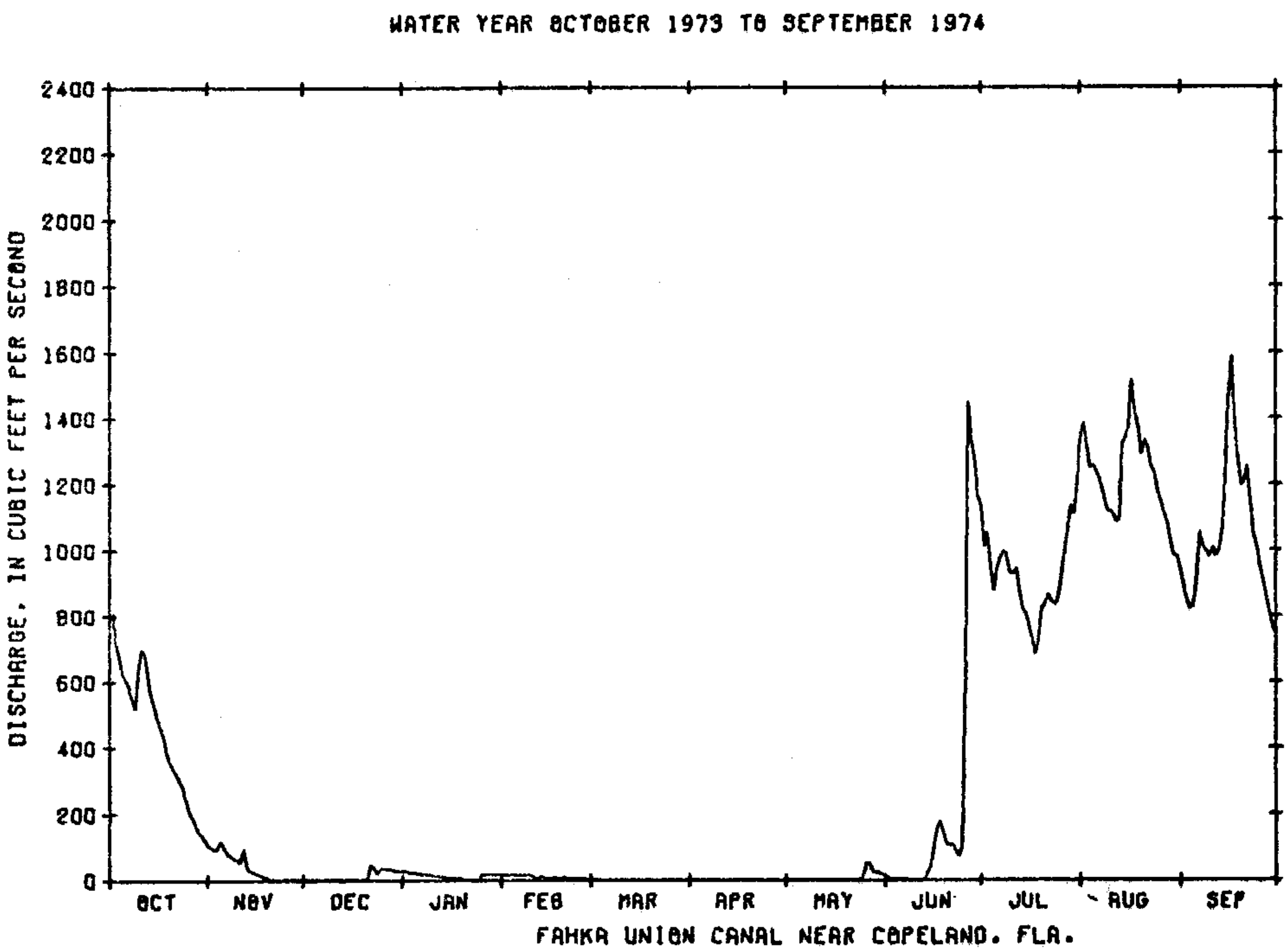

HENDERSON CREEK CANAL
NEAR NAPLES, FLA.



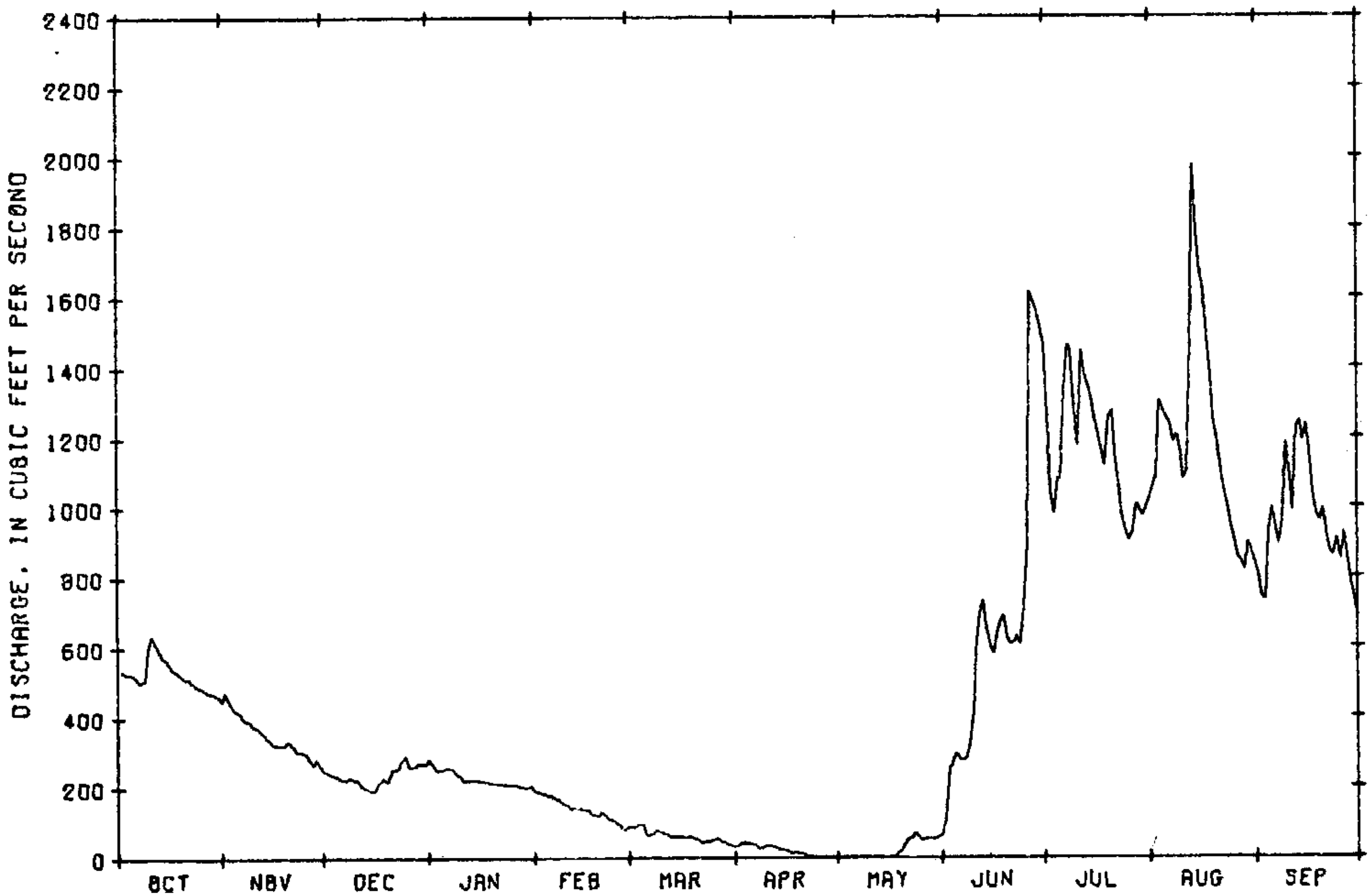

Barron River Canal near Everglades




Cocohatchee River Canal near Naples Park

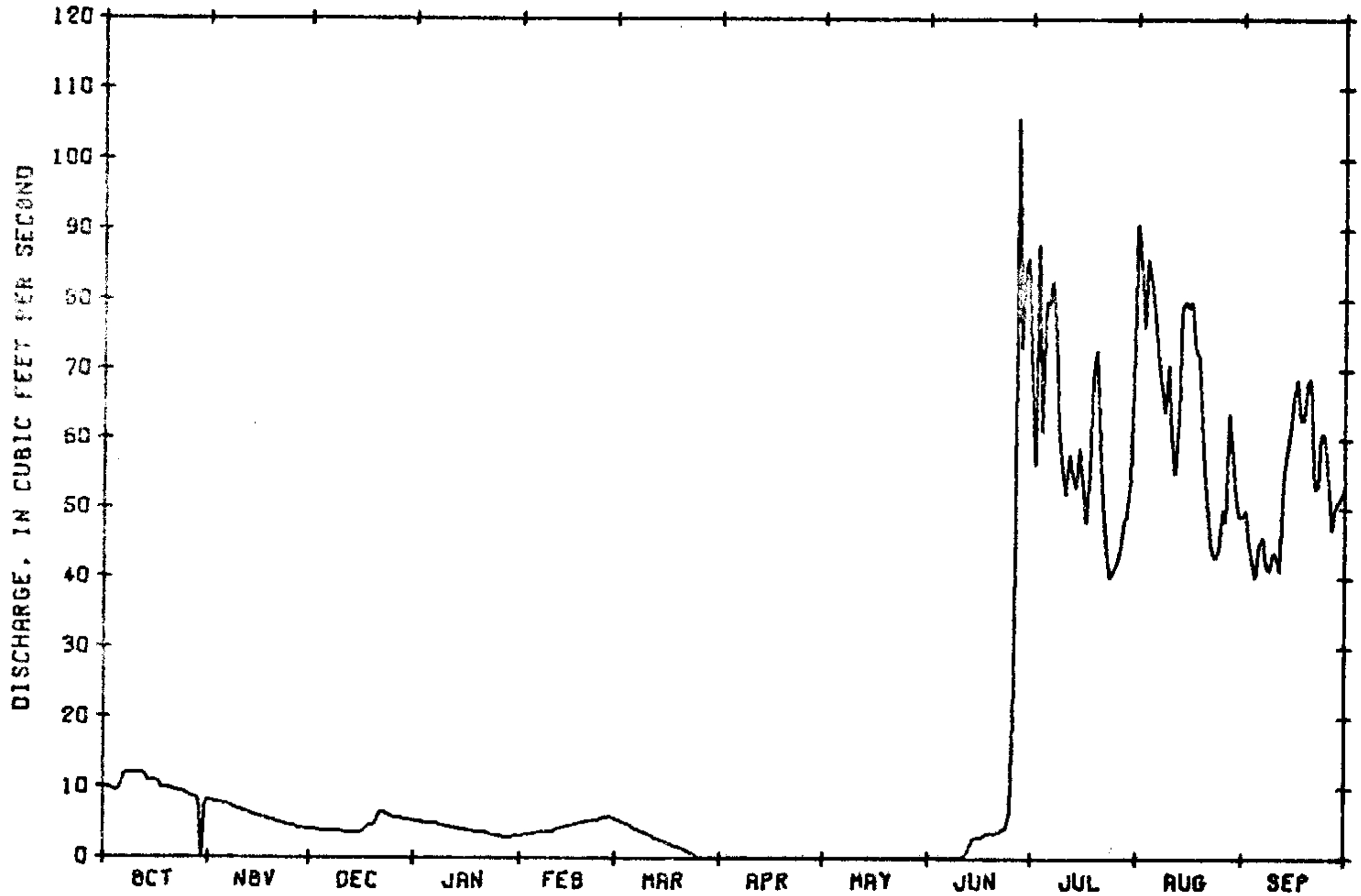

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974
DISCHARGE, IN CUBIC FEET PER SECOND
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
FAHKA UNION CANAL NEAR COPELAND, FLA.

WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974




GOLDEN GATE CANAL AT NAPLES, FLA.

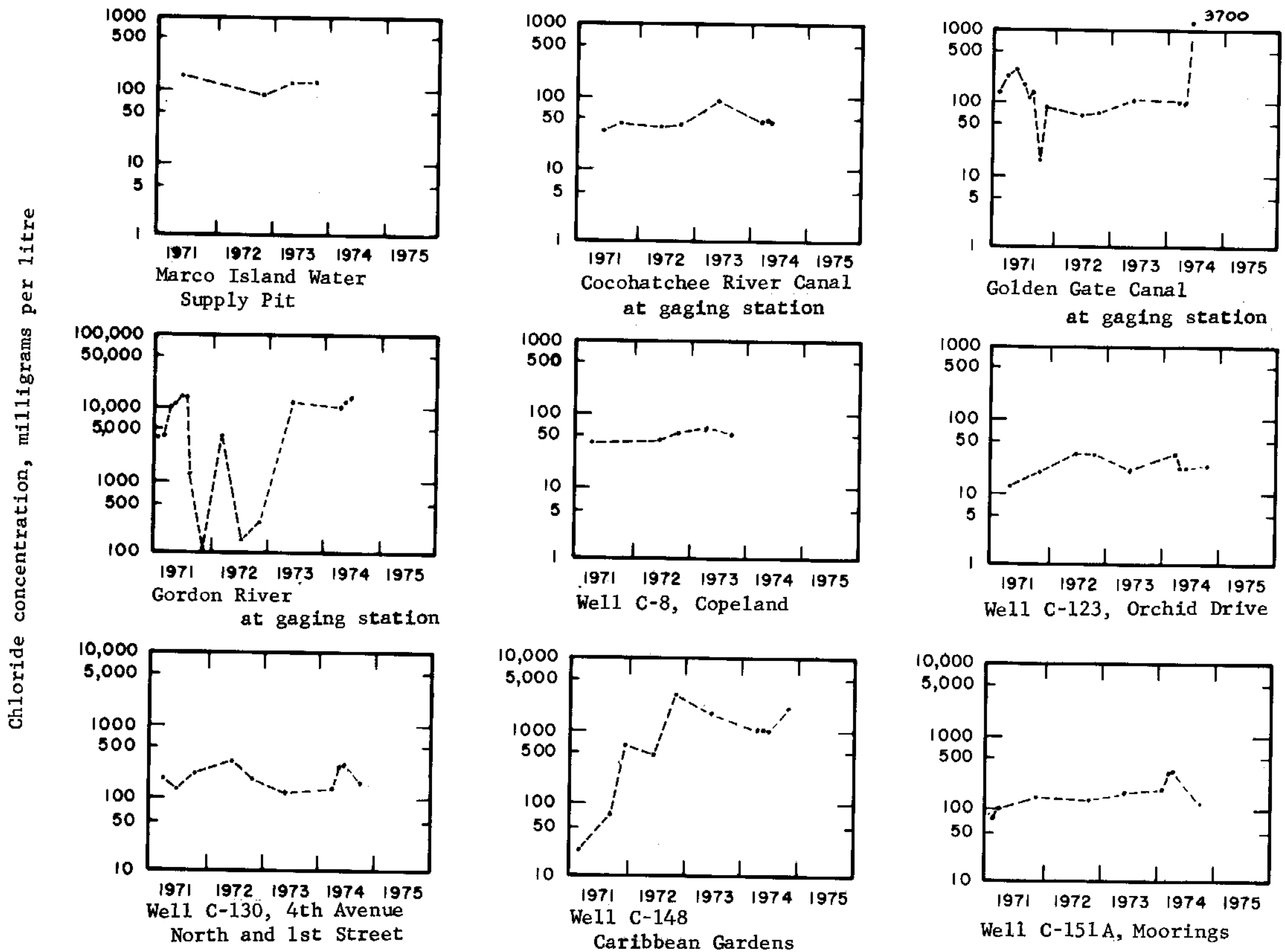
WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974



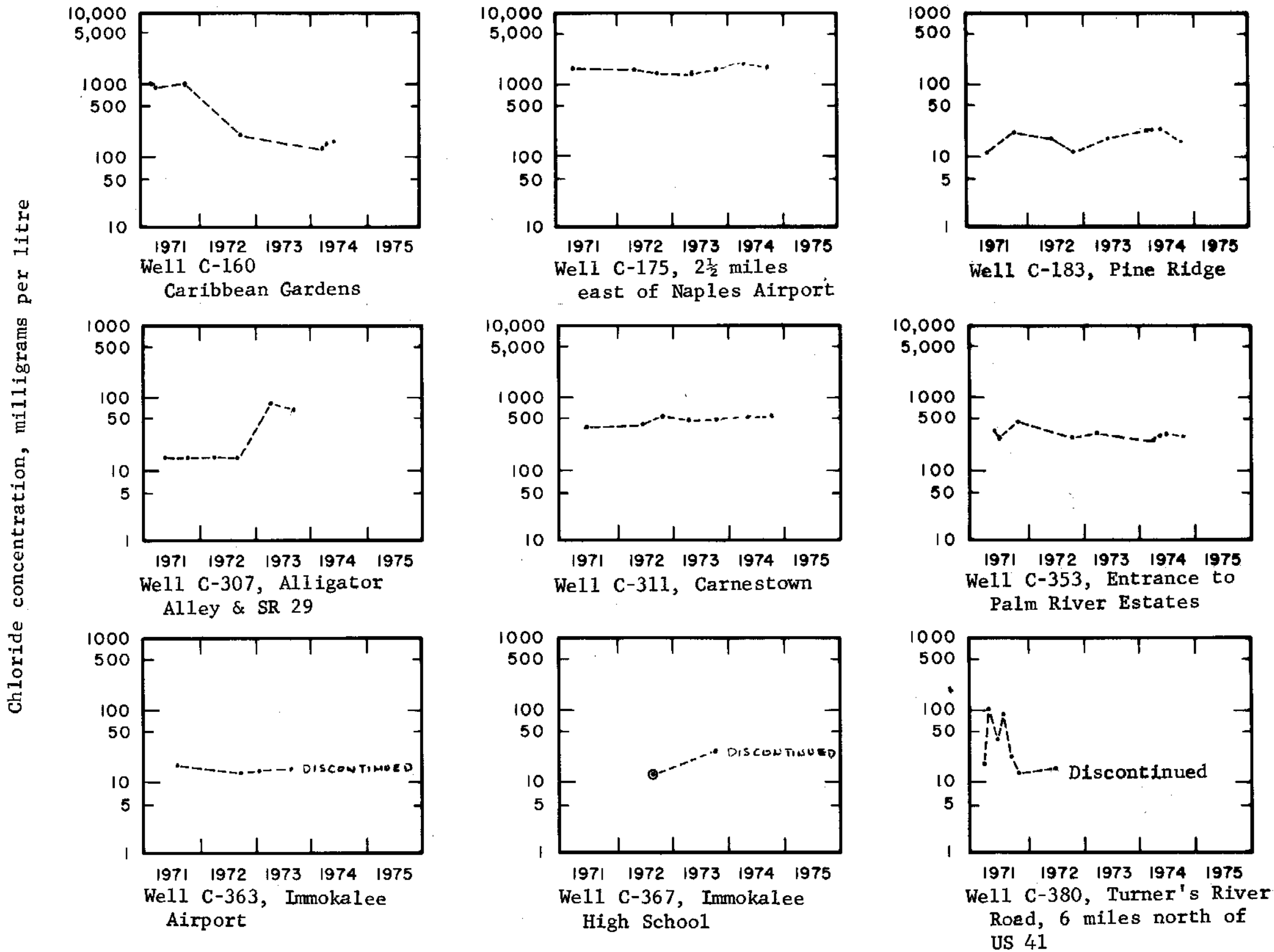

HENDERSON CREEK CANAL NEAR NAPLES, FLA.

BASIC DATA - Section C

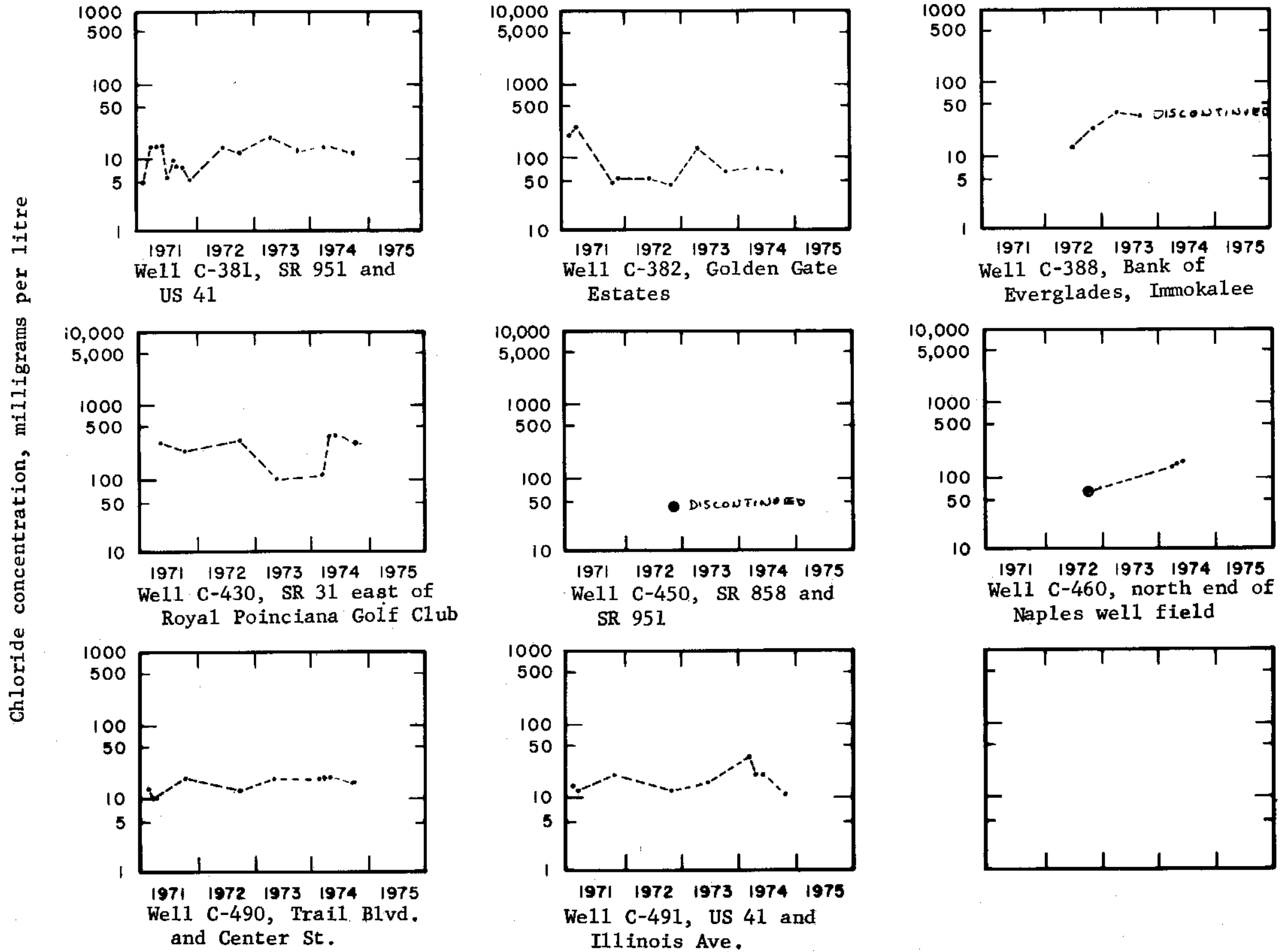
Chloride Concentration Graphs




Chloride content of water from ground- and surface-water sites, Collier County, Fla.




Chloride content of water from ground- and surface-water sites, Collier County, Florida




Chloride content of water from ground- and surface-water sites, Collier County, Florida

BASIC DATA - Section D

Extended Chemical Analyses at

Canal Study Sites



Note: Site 3, GORDON RIVER, at US Hwy 41 was replaced by Site 5.

SELECTED WATER-QUALITY PARAMETERS AT CANAL SITES IN NAPLES VICINITY, 1974, WITH AVERAGES AND EXTREMES.

Canal Site: GORDON RIVER, upstream of control at SR 951 (#1)

| PARAMETER (Milligrams per litre except where noted) | 1974 | | | | Values Prior to 1974 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maximum | | Minimum | | Average |
| | Jan 30 | May 7 | July 31 | Dec 11 | Value | Date | Value | Date | |
| Specific conductance (micromhos) | 12,700 | 41,500 | 770 | 1,200 | 34,000 | 6/71 | 745 | 6/72 | 9,760 |
| pH | 7.6 | 7.6 | 7.5 | 7.5 | 8.3 | 12/72 | 7.2 | 10/71 | |
| Color (Cobalt-platinum units) | | 40 | 50 | 30 | 120 | 6/72 | 20 | 2/71 | 48 |
| Iron 1/ | | 0.43 | 0.18 | 0.38 | 0.34 | 9/73 | 0.02 | 2/71 | 0.13 |
| Calcium | | 190 | 100 | 130 | 370 | 6/71 | 80 | 6/72 | 177 |
| Magnesium | | 1,200 | 10 | 20 | 820 | 9/73 | 9 | 9/72 | 230 |
| Strontium | | 7.2 | 0.63 | 0.78 | 4 | 9/73 | 0.5 | 6/72 | 1.6 |
| Sodium | | 9,500 | 56 | 110 | 7,000 | 6/73 | 48 | 2x | 2,070 |
| Potassium | | 400 | 3.2 | 6.5 | 270 | 6/73 | 1.4 | 9/72 | 74 |
| Bicarbonate | 284 | 192 | 216 | 276 | 276 | 12/73 | 188 | 6/72 | 240 |
| Sulfate | | 2,500 | 77 | 100 | 1,700 | 2x | 56 | 10/70 | 530 |
| Chloride | | 17,000 | 110 | 200 | 12,000 | 3x | 95 | 6/72 | 3,645 |
| Fluoride | | 1.0 | 0.1 | 0.2 | 2.0 | 9/72 | 0.1 | 9/73 | 0.6 |
| Phosphorus (ortho) | 0.06 | 0.20 | 0.04 | 0.01 | 0.30 | 6/71 | 0.01 | 6x | 0.06 |
| Do (total) | 0.08 | 0.23 | 0.06 | 0.02 | 0.33 | 6/71 | 0.01 | 9/72 | 0.08 |
| Alkalinity (as $CaCO_3$) | | 157 | 177 | 226 | 227 | 12/72 | 154 | 6/72 | 196 |
| Hardness (as CaMg) | | 5,400 | 290 | 410 | 4,200 | 2x | 240 | 6/72 | 1,397 |
| Do (as noncarbonate) | | 5,300 | 110 | 180 | 4,000 | 2x | 83 | 6/72 | 1,195 |
| Dissolved solids (residue @ 180°C) | | 32,500 | 506 | 830 | | | 480 | 6/72 | |
| Do (calculated sum) | | 30,900 | 471 | 731 | 22,100 | 6/73 | 401 | 6/72 | 6,876 |
| Zinc | | 0.11 | 0.03 | 0.5 | 0.09 | 6/71 | 0 | 2x | 0.03 |
| Lead | | 0.015 | | 0.012 | 0.01 | 2/71 | 0 | 5x | 0.002 |
| Copper | | 0.005 | 0.006 | 0.011 | 0.050 | 3/71 | 0 | 4x | 0.012 |
| Chromium | | 0 | 0.001 | 0 | 0 | | 0 | | 0 |
| Arsenic | | 0.002 | 0 | 0.002 | 0.04 | 6/71 | 0.01 | 6x | 0.02 |
| MBAS (detergents) | | 0.62 | 0.06 | 0.10 | 0.36 | 3/71 | 0 | 2x | 0.09 |
| Ammonium nitrogen | 0.08 | 0.24 | 0.04 | 0.02 | 0.30 | 6/72 | 0 | 10/70 | 0.08 |
| Nitrate nitrogen | 0.08 | 0.02 | 0.09 | 0 | 0 | | 0 | | 0 |
| Nitrite nitrogen | 0.01 | 0.01 | 0.02 | 0 | 0.03 | 10/70 | 0 | 6x | 0.01 |
| Total organic nitrogen | 0.73 | 0.51 | 0.75 | 0.70 | 1.10 | 3/73 | 0.36 | 2/71 | 0.70 |

1/ values for all metals are reported in the dissolved state

SELECTED WATER-QUALITY PARAMETERS AT CANAL SITES IN NAPLES VICINITY, 1974, WITH AVERAGES AND EXTREMES.

Canal Site: GOLDEN GATE CANAL, at SR 858 Bridge (#2)

| PARAMETER (Milligrams per litre except where noted) | 1974 | | | | Values Prior to 1974: Maximum | | Minimum | | Average |
|---|---|---|---|---|---|---|---|---|---|
| | Jan 30 | May 7 | July 31 | Dec 11 | Value | Date | Value | Date | |
| Specific conductance (micromhos) | 810 | 2,840 | 655 | 700 | 990 | 1/72 | 670 | 10/71 | 805 |
| pH | 7.5 | 7.7 | 7.4 | 6.4 | 8.4 | 12/72 | 7.2 | 10/71 | |
| Color (Cobalt-platinum units) | 80 | 50 | 80 | 90 | 160 | 6/12 | 35 | 6/71 | 66 |
| Iron 1/ | 0.78 | 0.58 | 1.2 | 1.5 | 1.36 | 6/72 | 0.04 | 2/71 | 0.55 |
| Calcium | 130 | 75 | 130 | 140 | 140 | 1/72 | 98 | 6/73 | 121 |
| Magnesium | 7.1 | 51 | 6.8 | 4.8 | 11 | 6/71 | 4.8 | 10/71 | 7.6 |
| Strontium | 1.0 | 0.83 | 0.5 | 0.40 | 1.3 | 3/73 | 0.44 | 10/71 | 0.65 |
| Sodium | 36 | 430 | 22 | 20 | 66 | 6/73 | 21 | 10/71 | 39 |
| Potassium | 1.3 | 18 | 1.1 | 0.7 | 1.8 | 6/72 | 0.8 | 10/70 | 1.3 |
| Bicarbonate | 328 | 324 | 280 | 334 | 348 | 2/71 | 288 | 6/73 | 312 |
| Sulfate | 68 | 140 | 75 | 68 | 89 | 1/71 | 60 | 6/72 | 69 |
| Chloride | 61 | 700 | 38 | 32 | 120 | 6/71 | 34 | 10/71 | 70 |
| Fluoride | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 7x | 0.2 | 6x | 0.25 |
| Phosphorus (ortho) | 0.02 | 0.01 | 0.03 | 0.01 | 0.02 | 6/73 | 0.0 | 10/70 9/73 | 0.01 |
| Do (total) | 0.04 | 0.03 | 0.06 | 0.01 | 0.06 | 2/71 | 0.1 | 4x | 0.03 |
| Alkalinity (as $CaCO_3$) | 268 | 266 | 230 | 274 | 285 | 2/71 | 236 | 6/73 | 257 |
| Hardness (as CaMg) | 350 | 400 | 350 | 370 | 391 | 1/72 | 280 | 6/73 | 333 |
| Do (as noncarbonate) | 86 | 130 | 120 | 96 | 108 | 1/72 | 44 | 6/73 | 76 |
| Dissolved solids (residue @ 180°C) | 553 | 1,800 | 352 | 532 | 650 | 1/72 | 412 | 10/71 | 530 |
| Do (calculated sum) | 473 | 1,580 | 419 | 438 | 555 | 1/72 | 397 | 10/71 | 471 |
| Zinc | 0 | 0.04 | 0.15 | 0.37 | 0.07 | 6/71 | 0.0 | 3x | 0.02 |
| Lead | | 0.015 | 0.023 | 0.016 | 0.030 | 3/71 | 0.00 | 3x | 0.01 |
| Copper | 0 | 0.005 | 0.006 | 0.01 | 0.01 | 3x | 0.00 | 8x | 0.00 |
| Chromium | 0 | 0 | 0 | 0 | 0.010 | 2/71 | 0.000 | 10x | 0.000 |
| Arsenic | 0 | 0 | 0.005 | 0.002 | 0.02 | 3&6/71 | 0.00 | 4x | 0.01 |
| MBAS (detergents) | | 0.18 | 0.0 | 0.1 | 0.09 | 3/71 3/72 | 0.00 | 10/70 12/72 | 0.04 |
| Ammonium nitrogen | 0.05 | 0.06 | 0.33 | 0.05 | 7.8 | 3/71 | 0.01 | 10/70 | 0.70 |
| Nitrate nitrogen | 0.08 | 0 | 0.36 | 0.07 | 0.1 | 3x | 0.0 | 6x | 0.04 |
| Nitrite nitrogen | 0.01 | 0 | 0.02 | 0.01 | 0.03 | 3/73 | 0.0 | 4x | 0.01 |
| Total organic nitrogen | 0.69 | 0.81 | 0.66 | 0.66 | 1.20 | 1/72 | 0.31 | 2/71 | 0.75 |

1/ values for all metals are reported in the dissolved state

SELECTED WATER-QUALITY PARAMETERS AT CANAL SITES IN NAPLES VICINITY, 1974, WITH AVERAGES AND EXTREMES.

Canal Site: GOLDEN GATE CANAL TRIBUTARY, at Golden Gate Blvd. Bridge, 12 miles NE of Naples (#4)

| PARAMETER (Milligrams per litre except where noted) | 1974 | | | | Values Prior to 1974: Maximum | | Minimum | | Average |
|---|---|---|---|---|---|---|---|---|---|
| | Jan 30 | May 7 | July 31 | Dec 11 | Value | Date | Value | Date | |
| Specific conductance (micromhos) | 620 | 735 | 525 | 640 | 694 | 1/72 | 500 | 6/73 | 632 |
| pH | 7.3 | 7.3 | 7.3 | 7.4 | 8.4 | 12/72 | 7.0 | 10/71 | |
| Color (Cobalt-platinum units) | 100 | 60 | 100 | 100 | 160 | 6/72 | 60 | 3/71 6/73 | 91 |
| Iron 1/ | 4.8 | 2.6 | 1.2 | 1.9 | 1.9 | 9/73 | 0.12 | 2/71 | 0.86 |
| Calcium | 120 | 78 | 120 | 140 | 130 | 2/71 | 92 | 6/75 | 112 |
| Magnesium | 4.2 | 5.3 | 4.0 | 5.2 | 5.2 | 2/71 | 3.1 | 9/72 | 4.0 |
| Strontium | -- | 0.67 | 0.50 | 0.43 | 0.74 | 9/72 | 0.02 | 3/72 | 0.45 |
| Sodium | 15 | 19 | 8 | 13 | 30 | 9/72 | 12 | 9/73 | 16 |
| Potassium | 0.6 | 0.4 | 0.6 | 0.6 | 1.2 | 9/73 | 0.2 | 6/73 | 0.6 |
| Bicarbonate | 324 | 376 | 308 | 324 | 348 | 2/71 | 244 | 6/73 | 305 |
| Sulfate | 47 | 88 | 59 | 60 | 84 | 10/71 | 34 | 9/73 | 50 |
| Chloride | 19 | 22 | 16 | 18 | 28 | 10/70 | 15 | 6/73 | 21 |
| Fluoride | 0.3 | 0.3 | 0.2 | 0.3 | 0.4 | 2&6/73 | 0.2 | 6x | 0.3 |
| Phosphorus (ortho) | 0.02 | 0.01 | 0.03 | 0.01 | 0.1 | 8x | 0.0 | 5x | 0.01 |
| Do (total) | 0.06 | 0.04 | 0.06 | 0.01 | 0.5 | 2/71 | 0.0 | 10/70 3/73 | 0.02 |
| Alkalinity (as $CaCO_3$) | 263 | 308 | 253 | 266 | 285 | 2/71 | 200 | 6/73 | 252 |
| Hardness (as CaMg) | 320 | 220 | 320 | 370 | 350 | 2/71 | 250 | 6/73 | 297 |
| Do (as noncarbonate) | 54 | 0 | 63 | 100 | 91 | 10/71 | 8 | 7/72 | 46 |
| Dissolved solids (residue @ 180°C) | 424 | 490 | 366 | 502 | 468 | 10/70 | 313 | 6/73 | 406 |
| Do (calculated sum) | 370 | 480 | 372 | 404 | 420 | 2/71 | 300 | 6/73 | 367 |
| Zinc | 0 | 0.03 | 0.05 | 1.7 | 0.11 | 3/71 | 0.00 | 3x | 0.03 |
| Lead | -- | 0.012 | 0.004 | 0.009 | 0.011 | 1/72 | 0.000 | 5x | 0.003 |
| Copper | 0 | 0.005 | 0.006 | 0.011 | 0.01 | 3x | 0.00 | 10x | 0.00 |
| Chromium | 0 | 0 | 0 | 0 | 0.05 | 2/71 | 0.00 | 11x | 0.00 |
| Arsenic | 0.00 | 0 | 0.002 | 0.001 | 0.01 | 8x | 0.00 | 4x | 0.00 |
| MBAS (detergents) | -- | 0.11 | 0.07 | 0.1 | 0.11 | 3/72 | 0.00 | 10/71 12/72 | 0.06 |
| Ammonium nitrogen | 0.05 | 0.03 | 0.04 | 0.05 | 7.5 | 3/71 | 0.00 | 10/70 | 0.62 |
| Nitrate nitrogen | 0.03 | 0 | 0.06 | 0.07 | 0.1 | 6/72 | 0.00 | 10x | 0.02 |
| Nitrite nitrogen | 0.01 | 0 | 0.02 | 0.01 | 0.3 | 12/72 | 0.00 | 6x | 0.01 |
| Total organic nitrogen | 0.84 | 1.1 | 0.9 | 0.85 | 2.7 | 3/71 | 0.37 | 2/71 | 0.94 |

1/ values for all metals are reported in the dissolved state

SELECTED WATER-QUALITY PARAMETERS AT CANAL SITES IN NAPLES VICINITY, 1974, WITH AVERAGES AND EXTREMES.

Canal Site: GORDON RIVER CANAL, at Solano Rd. Ext. Bridge (Royal Poinciana Golf Course) (#5)

| PARAMETER (Milligrams per litre except where noted) | 1974 | | | | Values Prior to 1974: Maximum | | Minimum | | Average |
|---|---|---|---|---|---|---|---|---|---|
| | Jan 30 | May 7 | July 31 | Dec 11 | Value | Date | Value | Date | |
| Specific conductance (micromhos) | 990 | -- | 535 | 920 | 920 | 3/73 | 405 | 6/72 | 699 |
| pH | 7.2 | -- | 7.6 | 7.4 | 8.3 | 12/72 | 7.7 | 6/72 3/73 | |
| Color (Cobalt-platinum units) | 10 | -- | 40 | 8 | 160 | 6/72 | 10 | 3/72 12/72 | 42 |
| Iron 1/ | 0 | -- | 0.15 | 0.250 | 0.43 | 6/72 | 0.02 | 3/73 | 0.18 |
| Calcium | 110 | -- | 85 | 120 | 100 | 6/73 | 53 | 6/72 | 79 |
| Magnesium | 26 | -- | 5 | 12 | 18 | 6/73 | 3.4 | 6/72 | 9.0 |
| Strontium | 1.0 | -- | 0.53 | 0.70 | 1.0 | 6/73 | 0.3 | 6/72 9/72 | 0.6 |
| Sodium | 170 | -- | 24 | 58 | 78 | 6/73 | 17 | 6/72 | 48 |
| Potassium | 6.3 | -- | 2 | 2.5 | 6.0 | 3/72 | 16 | 9/73 | 2.8 |
| Bicarbonate | 244 | -- | 208 | 208 | 256 | 12/72 | 140 | 6/72 | 199 |
| Sulfate | 25 | -- | 57 | 38 | 39 | 9/73 | 23 | 6/72 | 30 |
| Chloride | 190 | -- | 45 | 140 | 190 | 6/73 | 35 | 6/72 | 103 |
| Fluoride | 0.2 | -- | 0.2 | 0.2 | 0.6 | 3/73 | 0.2 | 9/73 | 0.3 |
| Phosphorus (ortho) | 0.01 | -- | 0.02 | 0 | 0.07 | 6/72 | 0.0 | 6x | 0.01 |
| Do (total) | 0.04 | -- | 0.06 | 0.01 | 0.10 | 6/72 | 0.0 | 3/73 | 0.03 |
| Alkalinity (as $CaCO_3$) | 198 | -- | 171 | 230 | 210 | 12/72 | 115 | 6/72 | 163 |
| Hardness (as CaMg) | 380 | -- | 230 | 350 | 320 | 6/73 | 150 | 6/72 | 234 |
| Do (as noncarbonate) | 180 | -- | 63 | 120 | 120 | 6/73 | 32 | 6/72 | 70 |
| Dissolved solids (residue @ 180°C) | 614 | -- | 392 | 526 | 668 | 6/73 | 267 | 6/72 | 454 |
| Do (calculated sum) | -- | -- | 328 | 522 | 570 | 6/73 | 210 | 6/72 | 381 |
| Zinc | 0 | -- | 0.040 | 0.44 | 0.03 | 9/72 | 0.0 | 6/72 12/72 | 0.02 |
| Lead | -- | -- | -- | 0.008 | 0.008 | 9/73 | 0.000 | 3x | 0.002 |
| Copper | 0 | -- | 0.006 | 0.007 | 0.01 | 9/73 | 0.00 | 7x | 0.00 |
| Chromium | 0 | -- | 0 | 0 | 0.002 | 3/73 | 0.000 | 6x | 0.000 |
| Arsenic | 0 | -- | 16 | 0.005 | 0.02 | 6/72 | 0.00 | 3x | 0.01 |
| MBAS (detergents) | -- | -- | 0.07 | 0 | 0.09 | 6/73 | 0.00 | 1/72 12/72 | 0.04 |
| Ammonium nitrogen | 0.01 | -- | 0.02 | 0.04 | 0.09 | 6/72 | 0.01 | 3/72 | 0.04 |
| Nitrate nitrogen | 0 | -- | 0.06 | 0 | 0 | | 0 | | 0 |
| Nitrite nitrogen | 0.01 | -- | 0.01 | 0 | 0.02 | 6/72 | 0 | 6x | 0.00 |
| Total organic nitrogen | 0.47 | -- | 0.78 | 0.41 | 1.50 | 3/73 | 0.29 | 1/72 | 0.93 |

1/ values for all metals are reported in the dissolved state

BASIC DATA - Section E

Pesticide Analyses at

Canal Study Sites

(See section D for

site locations)

## WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

### PESTICIDE ANALYSES
Water samples in micrograms per litre (ug/l)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 1 Gordon River | 2- 4-71 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | - | 0.0 | 0.0 | 0.0 | - | - | - | - | - | 0.0 | 0.0 | 0.0 | - | - | - |
| @ SR 951 Bridge | 6-22-71 | .0 | .0 | .0 | .0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | .0 | .0 | .0 | - | - | - |
| | 1-20-72 | .0 | .0 | .0 | .0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | - | - | - | - | .0 | .0 |
| | 6-26-72 | .0 | .0 | .0 | .0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | - | - | - | - | .0 | |
| | 12- 7-72 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | - | - | - | .0 | .0 | .0 |
| | 6- 7-73 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| | 1-30-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .08 | .0 | .0 | .0 | .0 | .0 |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | .01 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | <.1 | .0 |

WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

PESTICIDE ANALYSES
Bottom sediments in micrograms per kilogram (ug/kg)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 1 Gordon River @ SR 951 Bridge | 2- 4-71 | 0.00 | 0.00 | 0.6 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | | | | | | 0.0 | 0.0 | | | | |
| | 6-22-71 | .0 | 9.0 | 2.9 | 1.2 | .0 | | .0 | .0 | .0 | | | | | | .0 | .0 | | | | |
| | 1-20-72 | .0 | .4 | Trace | .0 | .1 | | .0 | .0 | .0 | | | | | | | | | | 12.0 | 0 |
| | 6-26-72 | .0 | .5 | .6 | 0 | .1 | | .0 | .0 | .0 | | | | | | | | | | 13 | |
| | 6- 7-73 | 0 | 3.0 | 3.3 | .9 | .2 | | 0 | 0 | 0 | | | | | | | | | | 24 | trace |
| | 1-30-74 | .0 | .6 | 1.4 | .0 | .6 | | .0 | .0 | .0 | | | | | | | | | | 3 | 0 |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | | .0 | .0 | .0 | | | | | | | | | | 330 | |

WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

PESTICIDE ANALYSES
Water samples in micrograms per litre (ug/l)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 2 Golden Gate Canal @ SR 858 Bridge | 2- 4-71 | .0 | 0.0 | 0.0 | 0.0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | .0 | .0 | .0 | - | - | - |
| | 6-22-71 | .0 | .0 | .0 | .0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | - | - | - | - | - | - |
| | 1-20-72 | .0 | .0 | .0 | .0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | - | - | - | - | - | - |
| | 6-26-72 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 12- 7-72 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | - | - | - | .0 | .0 | .0 |
| | 6- 7-73 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .06 | .0 | .0 | .01 | .0 | .0 | .0 | .0 | .0 |
| | 1-30-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | - | - | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | | | .0 | .0 | .0 | .0 | .0 | .0 | .0 |

WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

PESTICIDE ANALYSES
Bottom sediments in micrograms per kilogram (ug/kg)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 2 Golden Gate Canal @ SR 858 Bridge | 2- 4-71 | 0.0 | 16.0 | 6.3 | 8.1 | 0.0 | - | 0.0 | 0.0 | 0.0 | | | | | | 0.0 | 0.0 | 0.0 | - | - | - |
| | 6-22-71 | .0 | 1.0 | .4 | .0 | .0 | - | .0 | .0 | .0 | | | | | | - | - | - | - | - | - |
| | 1-20-72 | .0 | 2.1 | 4.7 | .2 | 1.1 | - | .0 | .0 | .0 | | | | | | - | - | - | - | - | - |
| | 6- 7- 73 | 0 | 20 | 17 | 7.4 | 0.2 | - | .0 | .0 | .0 | | | | | | - | - | - | -- | 15 | trace |
| | 1-30-74 | .0 | 1.5 | 3 | .0 | .0 | - | .0 | .0 | .0 | | | | | | | | | | 8 | o |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | 0.0 | .0 | .0 | .0 | | | | | | | | | | .0 | |

## WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

### PESTICIDE ANALYSES

Water samples in micrograms per litre (ug/l)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 4 Golden Gate Tributary Canal | 2- 4-71 | .0 | .0 | 0 | 0 | .0 | .0 | - | .0 | .0 | - | - | - | - | - | .0 | .0 | .0 | - | - | - |
| | 6-22-71 | .0 | .0 | 0 | 0 | | .0 | - | .0 | .0 | - | - | - | - | - | - | - | - | - | - | - |
| | 1-20-72 | .0 | .0 | 0 | .0 | .0 | .0 | - | .0 | .0 | - | - | - | - | - | - | - | - | - | - | - |
| | 6-26-72 | .0 | .0 | 0 | .0 | .0 | - | .0 | .0 | .0 | - | - | - | - | - | - | - | - | - | 0 | - |
| | 12- 7-72 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | | | | | | .55 | .0 | .01 | .0 | .0 | .0 |
| | 6- 7-73 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .02 | .0 | .0 | .0 | .0 | .0 |
| | 1-30-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | | .02 | .0 | .0 | .0 | .0 | .0 |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | | | .0 | .0 | .0 | .0 | .0 | .0 |

WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

PESTICIDE ANALYSES
Bottom sediments in micrograms per kilogram (ug/kg)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 4 Golden Gate Tributary Canal | 2- 4-71 | 0.0 | 0.0 | 0.0 | 0.0 | .0 | 0.0 | - | 0.0 | 0.0 | | | | | | 0.0 | 0.0 | 0.0 | - | - | - |
| | 6-22-71 | .0 | 280 | 240 | 200 | 1.5 | .0 | - | .0 | .0 | | | | | | - | - | - | - | - | - |
| | 1-20-72 | .0 | 2.1 | 3.0 | .3 | .0 | .0 | - | .0 | .0 | | | | | | - | - | - | - | - | - |
| | 6-26-72 | .0 | 5.2 | .4 | .0 | .3 | - | 0.0 | .0 | .0 | | | | | | - | - | - | - | 150.0 | - |
| | 6- 7-73 | .0 | .0 | .0 | .0 | - | .0 | .0 | .0 | .0 | | | | | | .0 | .0 | .0 | - | .0 | .0 |
| | 1-30-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | | | | | | .0 | .0 | .0 | | 150 | .0 |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | | | | | | | | | .0 | .0 | .0 |

## WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

### PESTICIDE ANALYSES
Water samples in micrograms per litre (ug/l)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 5 Gordon River Canal @ Solarno Rd Ext. | 1-20-72 | 0.0 | 0.0 | 0.0 | .0 | 0.0 | .0 | - | .0 | .0 | - | - | - | - | - | - | - | - | - | - | - |
| | 6-26-72 | .0 | .0 | 0.0 | .0 | .0 | .0 | - | .0 | .0 | - | - | - | - | - | - | - | - | - | 0.0 | - |
| | 12- 7-72 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | - | - | - | .0 | .0 | .0 |
| | 6- 7-73 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | - | - | - | .0 | .0 | .0 |
| | 1-30-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .1 | .1 | .0 |
| | 7-31-74 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .0 |

WATER QUALITY CHARACTERISTICS OF SELECTED CANALS IN COLLIER COUNTY, FLA.

PESTICIDE ANALYSES
Bottom sediments in micrograms per kilogram (ug/kg)

| SITE | DATE | Aldrin | DDD | DDE | DDT | Dieldrin | Diazinon | Endrin | Heptachlor | Lindane | Malathion | Parathion | Methyl-parathion | Ethion | Trithion | 2,4-D | 2,4,5-T | Silvex | Methyl-trithion | Chlordane Estimate | PCB Estimate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # 5 Gordon River | 1-20-72 | 0.0 | 7.0 | 0.5 | 0.0 | 0.5 | 0.0 | - | 0.0 | - | - | - | - | - | - | - | - | - | - | - | - |
| Canal @ Solarno | 6-26-72 | .0 | 2.0 | .9 | .0 | .0 | .0 | - | .0 | - | - | - | - | - | - | - | - | - | - | 150.0 | - |
| Rd Ext. | 6-7-73 | .0 | .5 | 1.7 | .0 | .2 | - | - | .0 | .0 | - | - | - | - | - | - | - | - | - | 160 | trace |
| | 1-30-74 | .0 | .0 | .0 | .0 | .0 | | .0 | .0 | .0 | | | | | | | | | | 41 | .0 |

BASIC DATA - Section F

Coliform, BOD, and Carbon

Analyses at Canal Study Sites

(See section D for site locations)

| STATION GORDON RIVER at S.R.951 bridge | | | BACTERIA in Colonies per 100 millilitres | | | | | BIOCHEMICAL OXYGEN DEMAND (BOD) in Milligrams per litre | | CARBON in Milligrams per litre | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I.D. NUMBER | SITE NUMBER | DATE | Total Coliform | Fecal Coliform | Fecal Strep-tococci | FC/FS Ratio | DATE | | DATE | Total | Organic | Inorganic |
| 022912.80 | #1 | 2- 5-71 | 2,600 | 800 | | | 2- 4-71 | 0.9 | 2- 4-71 | 61 | 11 | 50 |
| | | 3-30-71 | 1,750 | 10 | | | | | 3-30-71 | 73 | 36 | 37 |
| | | 6-22-71 | 750 | 30 | | | 6-22-71 | 7.3 | 6-22-71 | 60 | 21 | 39 |
| | | 10-14-71 | 4,000 | 170 | | | 10-14-71 | 1.5 | | | | |
| | | 1-20-72 | 4,200 | 200 | | | 1-20-72 | 2.9 | 1-20-72 | 67 | 12 | 55 |
| | | 3-30-72 | 2,640 | 100 | | | | | 3-30-72 | 77 | 19 | 58 |
| | | 9- 6-72 | | 50 | | | | | | | | |
| | | 12- 7-72 | 2,000 | 80 | 330 | 0.2 | 12- 7-72 | ..3 | 12- 7-72 | 75 | 8 | 67 |
| | | 3- 5-73 | 1,700 | 90 | 80 | 1.1 | 3- 5-73 | 3.6 | | | | |
| | | 3- 6-73 | 2,800 | 50 | 40 | 1.2 | | | | | | |
| | | 6- 7-73 | 120 | 0 | 12 | | 6- 7-73 | 3.9 | 6- 7-73 | 59 | 18 | 41 |
| | | 9 20-73 | 180 | 10 | 240 | | 9 20-73 | 2.5 | 9 20-73 | 54 | 6 | 48 |
| | | 1 30-74 | 1,700 | 370 | 134 | | 1-30-74 | 1.4 | 1-30-74 | 76 | 14 | 62 |
| | | 5- 7-74 | 650 | 88 | 4 | | 5-7-74 | 2.1 | 5-7-74 | 47 | 10 | 37 |
| | | 7-31-74 | 1,600 | 432 | 432 | | 7-31-74 | 1.6 | 7-31-74 | 57 | 4 | 53 |
| | | 12-11-74 | 800 | 260 | 62 | | 12-11-74 | 1.8 | 12-11-74 | 68 | 33 | 35 |

| STATION GOLDEN GATE CANAL at S.R.858 bridge | | | BACTERIA in Colonies per 100 millilitres | | | | | BIOCHEMICAL OXYGEN DEMAND (BOD) in Milligrams per litre | | CARBON in Milligrams per litre | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I.D. NUMBER | SITE NUMBER | DATE | Total Coliform | Fecal Coliform | Fecal Strep-tococci | FC/FS Ratio | DATE | | DATE | Total | Organic | Inorganic |
| 022913.00 | #2 | 2- 5-71 | 3,000 | 10 | | | 2- 4-71 | 1.1 | 2- 4-71 | 53 | 16 | 37 |
| | | 3-30-71 | 1,300 | 40 | | | | | 3-30-71 | 70 | 20 | 50 |
| | | 6-22-71 | 4,450 | 20 | | | 6-22-71 | 1.2 | 6-22-71 | 66 | 15 | 51 |
| | | 10-14-71 | 5,400 | 75 | | | 10-14-71 | .8 | | | | |
| | | 1-20-72 | 8,200 | 32 | | | 1-20-72 | .8 | 1-20-72 | 120 | 50 | 70 |
| | | 3-30-72 | 10,800 | 179 | | | | | 3-30-72 | 84 | 14 | 70 |
| | | 9- 6-72 | | 15 | | | | | | | | |
| | | 12- 7-72 | 3,000 | 190 | 320 | 0.5 | 12- 7-72 | .4 | 12- 7-72 | 74 | 1 | 73 |
| | | 3- 5-73 | 220 | 0 | 10 | | 3- 5-73 | 1.3 | | | | |
| | | 3- 6-73 | 720 | 10 | 40 | .2 | | | | | | |
| | | 6- 7-73 | 2,600 | 32 | 232 | .13 | 6- 7-73 | 1.4 | 6- 7-73 | 68 | 14 | 54 |
| | | 9-20-73 | - | 20 | 60 | .33 | 9-20-73 | 1.3 | 9-20-73 | 72 | 5 | 67 |
| | | 1-30-74 | 1,900 | 36 | 18 | 2.0 | 1-30-74 | .7 | 1-30-74 | 88 | 18 | 70 |
| | | 5- 7-74 | 850 | 30 | 20 | 1.5 | 5-7-74 | 1.4 | 5-7-74 | 80 | 18 | 62 |
| | | 7-31-74 | 1,100 | 28 | 100 | | 7-31-74 | .9 | 7-31-74 | 74 | 12 | 62 |
| | | 12-11-74 | 3,300 | 10 | 8 | | 12-11-74 | 1.2 | 12-11-74 | 83 | 14 | 69 |

| STATION<br>GOLDEN GATE TRIBUTARY CANAL at Golden Gate Blvd. bridge.<br>I.D. NUMBER | SITE NUMBER | DATE | BACTERIA in Colonies per 100 millilitres<br>Total Coliform | Fecal Coliform | Fecal Streptococci | FC/FS Ratio | DATE | BIOCHEMICAL OXYGEN DEMAND (BOD) in Milligrams per litre | DATE | CARBON in Milligrams per litre<br>Total | Organic | Inorganic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2613350811352.00 | #4 | 2- 5-71 | 2,600 | 10 | | | 2- 4-71 | 0.4 | 2- 4-71 | 80 | 18 | 62 |
| | | 3-30-71 | 2,800 | 0 | | | | | 3-30-71 | 74 | 21 | 53 |
| | | 6-22-71 | 1,800 | 6 | | | 6-22-71 | .6 | 6-22-71 | 69 | 22 | 47 |
| | | 10-14-71 | 1,250 | 10 | | | 10-14-71 | 1.3 | | | | |
| | | 1-20-72 | 2,450 | 32 | | | 1-20-72 | .9 | 1-20-72 | 200 | 144 | 56 |
| | | 3-30-72 | 6,900 | 13 | | | | | | | | |
| | | 9- 6-72 | | 5 | | | | | | | | |
| | | 12- 7-72 | 380 | 0 | 0 | | 12- 7-72 | 1.1 | 12- 7-72 | 74 | 6 | 68 |
| | | 3- 5-73 | 1,080 | 30 | 10 | 3.0 | 3- 5-73 | .9 | | | | |
| | | 3- 6-73 | 740 | 0 | 0 | | | | | | | |
| | | 6- 7-73 | 3,500 | 8 | 20 | .4 | 6- 7-73 | 1.9 | 6- 7-73 | 62 | 21 | 41 |
| | | 9-20-73 | 90 | 0 | 10 | | 9-20-73 | 1.2 | 9-20-73 | 78 | 13 | 65 |
| | | 1-30-74 | 2,700 | 2 | 4 | .5 | 1-30-74 | .7 | 1-30-74 | 92 | 22 | 70 |
| | | 5- 7-74 | 1,100 | - | 4 | | 5-7-74 | 2.7 | 5-7-74 | 130 | 54 | 76 |
| | | 7-31-74 | 2,300 | 20 | 310 | | 7-31-74 | 1.1 | 7-3174 | 88 | 22 | 66 |
| | | 12-11-74 | 300 | 16 | 10 | | 12-11-74 | 1.2 | 12-11-74 | 90 | 21 | 69 |

| STATION<br>GORDON RIVER CANAL<br>atSolano Rd. Ext. bridge | | | BACTERIA in Colonies per 100 millilitres | | | | | BIOCHEMICAL OXYGEN DEMAND (BOD) in Milligrams per litre | | CARBON in Milligrams per litre | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I.D. NUMBER | SITE NUMBER | DATE | Total Coliform | Fecal Coliform | Fecal Strep-tococci | FC/FS Ratio | DATE | | DATE | Total | Organic | Inorganic |
| 2611470814704.00 | #5 | 1-20-72 | 100 | 0 | | | 1-20-72 | 6.9 | 1-20-72 | 80 | 16 | 64 |
| | | 3-30-72 | 32 | 4 | | | | | 3-30-72 | 48 | 22 | 26 |
| | | 9- 6-72 | | 10 | | | | | | | | |
| | | 12- 7-72 | 1,500 | 30 | 190 | 0.16 | 12- 7-72 | .9 | 12- 7-72 | 63 | 10 | 53 |
| | | 3- 5-73 | 540 | 10 | 500 | .02 | 3- 5-73 | .5 | | | | |
| | | 3- 6-73 | 4,600 | 70 | 3,750 | .02 | | | | | | |
| | | 6- 7-73 | 380 | 16 | 360 | .04 | 6- 7-73 | 1.9 | 6- 7-73 | 64 | 14 | 50 |
| | | 9-20-73 | 14,700 | 10 | 220 | .04 | 9-20-73 | 2.2 | 9-20-73 | 47 | 6 | 41 |
| | | 1-30-74 | 8,000 | 40 | 4 | 10 | 1-30-74 | .5 | 1-30-74 | 64 | 10 | 54 |
| | | 5- 7-74 | NOT ENOUGH WATER TO COLLECT SAMPLE | | | | 5-7-74 | | | | | |
| | | 7-31-74 | 1,800 | 12 | 370 | | 7-31-74 | 1.6 | 7-31-74 | 52 | 10 | 42 |
| | | 12-11-74 | 2,500 | 30 | 114 | | 12-11-74 | 1.6 | 12-11-74 | 68 | 10 | 58 |

BASIC DATA - Section G

COLLIER COUNTY NUTRIENT SAMPLING SITES

| SITE | LOCATION | PAGE |
|---|---|---|
| 1 | Fahka Union Canal @ U.S. Hwy 41 | 101 |
| 2 | Barron River Canal @ Copeland | 101 |
| 3 | Barron River Canal @ SR 840 | 101 |
| 4 | Barron River Canal @ Alligator Alley | 101 |
| 5 | Alligator Alley Canal east of SR 29 | 101 |
| 6 | Cocohatchee River Canal near Naples | 102 |
| 7 | Golden Gate Tributary Canal 8 miles east of SR 858 | 102 |
| 8 | Henderson Creek Canal @ Amity Road | 102 |
| 9 | Naples Bay @ U.S. Hwy 41 | 102 |
| 10 | Golden Gate Canal @ SR 858 | 103 |
| 11 | Gordon River @ SR 951 | 103 |
| 12 | Canal about 8 miles east of Immokalee on SR 846 near ground-water gage C-131 | 103 |
| 13 | Lake Trafford | 103 |
| 14 | Fahkahatchee Strand @ Janes Scenic Drive | 103 |
| 15 | L-28 Interceptor Canal @ Alligator Alley | 103 |

NUTRIENT CONTENT IN SURFACE WATERS OF COLLIER COUNTY, FLORIDA
(milligram per litre)

| STATION DESCRIPTION | DATE & TIME | PHOSPHORUS AS P | | AMMONIA NITROGEN | | NITRITE | | NITRATE | |
|---|---|---|---|---|---|---|---|---|---|
| | | Dissolved inorganic | Total | As N | As $NH_4^+$ | As N | As $NO_2^-$ | As N | As $NO_3^-$ |
| 1 | 9-17-70 | | 0.00 | 0.09 | 0.12 | 0.00 | 0.00 | 0.01 | 0.04 |
| | 3-13-72 | | .00 | .13 | .17 | .00 | .00 | .00 | .00 |
| | 1-16-73 | | .00 | .01 | .01 | .00 | .00 | .09 | .40 |
| | 9-13-73 | | .00 | .10 | .13 | ≅ .005 | | .04 | .18 |
| | 1-15-74 | | .00 | .07 | .09 | .00 | .00 | .00 | |
| 2 | 9-17-70 | | .00 | .09 | .12 | .00 | .00 | .03 | .13 |
| | 9-23-71 | | .00 | .01 | .01 | .00 | .00 | .00 | .00 |
| | 3-13-72 | | .00 | .06 | .08 | .00 | .00 | .02 | .09 |
| | 1-16-73 | | .00 | .03 | .04 | .00 | .00 | .13 | .58 |
| | 9-13-73 | | .03 | .21 | .27 | ≅ .005 | | .01 | .04 |
| | 1-15-74 | | .02 | .27 | .35 | .00 | | .00 | |
| 3 | 9-17-70 | | .06 | .17 | .22 | .00 | .00 | .00 | .00 |
| | 9-23-71 | | .12 | .07 | .10 | .00 | .00 | .00 | .00 |
| | 3-13-72 | | .00 | .12 | .15 | .00 | .00 | .04 | .18 |
| | 1-16-73 | | .06 | .08 | .10 | .00 | .00 | .03 | .13 |
| | 9-13-73 | | .35 | .70 | .90 | ≅ .005 | | .01 | .04 |
| | 1-15-74 | | .02 | .18 | .23 | .00 | | .12 | .53 |
| 4 | 9-17-70 | | .01 | .08 | .10 | .00 | .00 | .00 | .00 |
| | 9-23-71 | | .06 | .01 | .01 | .00 | .00 | .00 | .00 |
| | 3-13-72 | | .03 | .12 | .15 | .00 | .00 | .03 | .13 |
| | 1-16-73 | | .05 | .05 | .06 | .00 | .00 | .10 | .44 |
| | 9-13-73 | | .06 | .32 | .41 | ≅ .005 | | .01 | .04 |
| | 1-15-74 | | .01 | .26 | .33 | .00 | | .00 | |
| 5 | 9-17-70 | | .02 | .11 | .14 | .00 | .00 | .00 | .00 |
| | 9-23-71 | | .00 | .02 | .02 | .00 | .00 | .00 | .00 |
| | 3-13-72 | | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 1-16-73 | | .01 | .02 | .02 | .00 | .00 | .00 | .00 |
| | 9-13-73 | | .01 | .19 | .24 | ≅ .005 | | .00 | .00 |
| | 1-15-74 | | .01 | .19 | .24 | .00 | | .00 | |

NUTRIENT CONTENT IN SURFACE WATERS OF COLLIER COUNTY, FLORIDA
(milligram per litre)

| STATION DESCRIPTION | DATE & TIME | PHOSPHORUS AS P | | AMMONIA NITROGEN | | NITRITE | | NITRATE | |
|---|---|---|---|---|---|---|---|---|---|
| | | Dissolved inorganic | Total | As N | As $NH_4^+$ | As N | As $NO_2^-$ | As N | As $NO_3^-$ |
| 6 | 9-17-70 | | .18 | .12 | .15 | .00 | .00 | .02 | .09 |
| | 9-23-71 | | .35 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 3-13-72 | | .01 | .08 | .10 | .00 | .00 | .01 | .04 |
| | 1-16-73 | | .04 | .02 | .02 | .00 | .00 | .16 | .71 |
| | 9-13-73 | | .10 | .30 | .39 | ≤ .005 | | .04 | .18 |
| | 1-15-74 | | .01 | .18 | .23 | .00 | | .00 | |
| 7 | 9-17-70 | | 0.01 | 0.11 | 0.14 | 0.00 | 0.00 | 0.07 | 0.31 |
| | 9-23-71 | | .15 | .12 | .15 | .00 | .00 | .01 | .04 |
| | 3-13-72 | | .00 | .12 | .15 | .00 | .00 | .01 | .04 |
| | 1-16-73 | | .02 | .22 | .28 | .00 | .00 | .00 | .00 |
| | 9-13-73 | | .00 | .17 | .22 | ≤ .005 | | .00 | .00 |
| | 1-15-74 | | .00 | .13 | .17 | .00 | | .09 | .40 |
| 8 | 9-17-70 | | .00 | .12 | .15 | .00 | .00 | .03 | .13 |
| | 9-23-71 | | .03 | .03 | .04 | .00 | .00 | .04 | .17 |
| | 3-13-72 | | .00 | .06 | .08 | .00 | .00 | .01 | .04 |
| | 1-16-73 | | .00 | .06 | .08 | .00 | .00 | .03 | .13 |
| | 9-13-73 | | .01 | .17 | .22 | ≤ .005 | | .05 | .22 |
| | 1-15-74 | | .01 | .16 | .21 | .00 | | .02 | .09 |
| 9 | 9-17-70 | | .09 | .15 | .19 | .00 | .00 | .07 | .31 |
| | 9-23-71 | | .15 | .08 | .09 | .00 | .00 | .06 | .26 |
| | 3-13-72 | | .10 | .25 | .32 | .00 | .00 | .02 | .09 |
| | 9-13-73 | | .01 | .22 | .28 | ≤ .005 | | .00 | .00 |

NUTRIENT CONTENT IN SURFACE WATERS OF COLLIER COUNTY, FLORIDA
(milligram per litre)

| STATION DESCRIPTION | DATE & TIME | PHOSPHORUS AS P Dissolved inorganic | PHOSPHORUS AS P Total | AMMONIA NITROGEN As N | AMMONIA NITROGEN As $NH_4^+$ | NITRITE As N | NITRITE As $NO_2^-$ | NITRATE As N | NITRATE As $NO_3^-$ |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 9-17-70 | | .00 | .08 | .10 | .00 | .00 | .08 | .35 |
| | 9-23-71 | | .10 | .12 | .15 | .00 | .00 | .05 | .22 |
| | 3-13-72 | | .00 | .00 | .00 | .00 | .00 | .04 | .17 |
| | 1-16-72 | | .00 | .10 | .13 | .00 | .00 | .10 | .44 |
| | 9-13-73 | | .02 | .15 | .20 | ≤ .005 | | .05 | .22 |
| | 1-15-74 | | .01 | .09 | .12 | .00 | | .08 | .35 |
| 11 | 9-17-70 | | .09 | .16 | .21 | .00 | .00 | .01 | .04 |
| | 9-23-71 | | .30 | .03 | .04 | .00 | .00 | .14 | .62 |
| | 3-13-72 | | .04 | .10 | .13 | .00 | .00 | .00 | .00 |
| | 1-16-73 | | .00 | .05 | .06 | .00 | .00 | .13 | .58 |
| | 9-13-73 | | .04 | .17 | .22 | ≤ .005 | | .04 | .18 |
| | 1-15-74 | | .05 | .22 | .28 | .00 | | .01 | .04 |
| 12 | 9-23-71 | | 1.7 | .01 | .01 | .00 | .00 | .00 | .00 |
| | 3-13-72 | | 1.8 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 1-16-73 | | .25 | .03 | .04 | .00 | .00 | .00 | .00 |
| | 9-13-73 | | .03 | .26 | .33 | ≤ .005 | | .01 | .04 |
| 13 | 1-16-73 | | 0.10 | 0.09 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3-13-72 | | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 1-16-73 | | .00 | .02 | .02 | .00 | .00 | .00 | .00 |
| | 9-13-73 | | .03 | .35 | .45 | ≤ .005 | | .00 | .00 |
| | 1-15-74 | | .03 | .44 | .57 | .00 | | .00 | |
| 14 | 1-16-73 | | .00 | .02 | .02 | .02 | .00 | .00 | .00 |
| | 9-13-73 | | .00 | .19 | .24 | ≤ .005 | | .00 | .00 |
| | 1-15-74 | | .03 | .40 | .52 | .00 | | .00 | |
| 15 | 1-16-73 | | .00 | .01 | .01 | .00 | .00 | .00 | .00 |
| | 9-13-73 | | .02 | .14 | .18 | ≤ .005 | | .01 | .04 |
| | 1-15-74 | | .01 | .11 | .14 | .00 | | .00 | |