DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with the
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

WATER-RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 81-494

INTRODUCTION

Lake Jackson is in central Florida at the town of Sebring in northwest Highlands County (fig. 1). The lake is part of the headwaters of Josephine Creek, which empties into Lake Istokpoga in the Kissimmee River basin. Lake Jackson, with a surface area of 3,244 acres, is the fourth largest lake in Highlands County and is used extensively for recreation by local residents and tourists.

In 1979, the U.S. Geological Survey began a study of the hydrologic conditions of Lake Jackson. The lake is the 11th in a series of lakes selected for study as part of a continuing cooperative project with the Southwest Florida Water Management District. The objective of the project is to document hydrologic conditions in the selected lake basins. To accomplish this objective, available data were evaluated to describe the hydrology of Lake Jackson and its environment. A map of the lake bottom was prepared from bathymetric data collected as part of the study. Existing climatological and hydrologic data were used in a water-budget analysis to evaluate the response of the lake during periods of deficient rainfall and to identify the probable causes of the 1970–73 stage decline. Available water-quality data were analyzed to identify long-term or seasonal trends and to document water-quality conditions.

The hydrology and geology of the Lake Jackson area have been discussed in two previous publications by the U.S. Geological Survey. A description of the geology and ground-water resources of Highlands County is provided by Bishop (1956). Kohout and Meyer (1959) discuss the relation between ground water and lake levels in their report on the Lake Istokpoga and Lake Placid areas.

In a report published by the Florida Board of Conservation, Bishop (1967) described the high-water lines of Lake Jackson. Milleson (1978) included water-quality data for Lake Jackson in a report published by the South Florida Water Management District.

Hydrologic data reports are published on a regular basis by the U.S. Geological Survey. Maps showing the potentiometric surface of the Floridan aquifer are published twice a year through a cooperative program with the Southwest Florida Water Management District. Water levels for Lake Jackson and Lake Josephine, discharges for Jackson Creek and Josephine Creek, and water-quality data are published in U.S. Geological Survey Water-Supply Papers and in the series "Water Resources Data for Florida."

All elevations in this report are referenced to NGVD of 1929 (National Geodetic Vertical Datum of 1929), a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "mean sea level." NGVD of 1929 is referred to as sea level in this report.

AREA DESCRIPTION

Highlands County is at the southern end of a highland area that trends along the longitudinal axis of peninsular Florida (fig. 1). A ridge, extending from north to south across the county, is part of the surface drainage divide between the Peace and Kissimmee Rivers. Relatively flat, lowland areas to the east of the ridge are in the Kissimmee River basin. Lowland areas to the west are part of the Peace River basin. Lake Jackson is in the northwest part of the county near the center of the ridge. The lake lies east of the drainage divide in the Kissimmee River basin.

Lake Jackson is within the town limits of Sebring. U.S. Highway 27 extends along the west and south sides of the lake (fig. 2). The western shore previously served as a municipal beach, but the beach was destroyed when Highway 27 was expanded to four lanes. Much of the remaining shoreline has been developed into lakefront homesites. A public boat ramp on the west shore, a municipal pier on the east, and a public beach on the north make the lake easily accessible to local residents and tourists. The lake is used extensively for fishing, boating, and swimming.

Almost all surface inflow to Lake Jackson results from storm-drain discharge. The lake does not receive any inflow from rivers or streams. A channel from Lake Sebring (fig. 2) discharges into the northwest bay of Lake Jackson. The volume of flow through this channel is estimated to be less than 100 acre-feet per year.

Lake Jackson outflows under U.S. Highway 27 through Little Lake Jackson into Jackson Creek. A fixed-crest weir, structure 1 (fig. 2), is located at the outlet of Little Lake Jackson. The weir is one of three control structures on Jackson Creek built by the U.S. Soil Conservation Service under Public Law 566 as part of the Upper Josephine-Jackson Creek Watershed project. Structure 2, about 4,000 feet downstream from structure 1 and about 1,200 feet east of Sparta Road, has two 12-foot radial gates that control flow over a concrete spillway. Structure 3 (fig. 1) is about 2.5 miles downstream from structure 2 and has three 16-foot radial gates for controlling flow.

Construction of the Upper Josephine-Jackson Creek Watershed project began downstream from Lake Josephine (fig. 1) and progressed upstream to structure 1 at the outlet of Little Lake Jackson. A new control structure at the outlet of Lake Josephine was completed in April 1965. Channelization then proceeded upstream. Structure 1 was completed in August 1971 and replaced a concrete and timber weir that had removable stop logs. The top of the concrete section of the old structure had an elevation of 101.9 feet above sea level and the top of the stop logs had an elevation of 104.7 feet above sea level.

Structure 1 has a crest elevation of 102.7 feet above sea level. When the level of Lake Jackson is below the weir's crest, operation of structures 2 and 3 does not affect lake stage. When the level of Lake Jackson exceeds the crest elevation of structure 1, structure 2 can be opened to discharge overflow from structure 1 and relieve potential flooding. Structures 2 and 3 are both designed for the 50-year flood event.

Four major lithologic units underlying the Lake Jackson area are shown in the generalized geologic section (fig. 3). The section is based on well logs obtained from the Florida Bureau of Geology and from Bishop (1956). The uppermost unit, the surficial aquifer, is composed of fine to coarse sand ranging in thickness from about 130 to 225 feet. The surficial aquifer is underlain by a unit of undifferentiated sand and clay that increases in thickness from about 50 feet in the north to 200 feet in the south. The sand and clay unit is underlain by 50 to 60 feet of a relatively impermeable clay that, with the sand and clay unit, forms a confining layer for the underlying Floridan aquifer. Although most of the water movement in the unconfined surficial aquifer is horizontal, some water moves downward through the confining beds to the Floridan aquifer (Bishop, 1956). The Floridan aquifer is composed of limestone and dolomite of the Suwannee Limestone of Oligocene age, and the Ocala Limestone, Avon Park Limestone, and Lake City Limestone of Eocene age.

Wells in the surficial aquifer supply much of the water for domestic, stock, and small irrigation requirements in Highlands County. Many lakefront property owners, including those around Lake Jackson, use lake water for home irrigation systems. Water for large irrigation systems and for municipal supply is primarily from the Floridan aquifer. Water supply for the town of Sebring comes from wells that are about 1,200 feet deep and tap the Lake City Limestone.

LAKE CHARACTERISTICS

The bottom of Lake Jackson was mapped in February 1979 using a fathometer. Little Lake Jackson was mapped in April 1979. The stage of Lake Jackson was 100.62 feet above sea level during mapping, and the stage of Little Lake Jackson was 100.02 feet above sea level. All depth contours shown on the photo base map (fig. 2) and depths noted elsewhere in the text are referenced to Lake Jackson's average stage of 101.44 feet above sea level, based on records for 1958 to 1975.

The passage under U.S. Highway 27 that connects Lake Jackson and Little Lake Jackson was partly filled in when the highway was expanded to four lanes in the late 1960s. Prior to that time, boats could travel under Highway 27 and the lakes were considered a single body of water. In April 1979, the passage was surveyed to determine the elevation at which there would be flow between the lakes. Based on the current configuration, lake elevation would have to be about 100.8 feet above sea level for flow to occur. Because of shifting sand in the channel, however, the configuration of the channel and the overflow elevation may change frequently.

The photo base map (fig. 2) shows the general configuration of the lake bottom. The scale of the map does not permit identification of numerous dredged holes that were found during bottom mapping. It is probable that most of the dredging was done to obtain fill material. Because of the thickness of the underlying sands, it is unlikely that the confining layer for the Floridan aquifer (fig. 3) was breached during dredging operations or that dredging has altered the relation of the lake to the aquifer. The dredged holes can, however, be hazardous to swimmers.

Dredged holes occur around almost the entire perimeter of the northwest bay of Lake Jackson. The holes occur at distances of 50 to 150 feet from shore and range from 8 to 16 feet in depth. A large number of dredged holes also occur along the southwest shore adjacent to U.S. Highway 27. Many of these holes are surrounded by beds of sawgrass. Some are within 30 feet of the shoreline. The deepest hole found along the southwest shore is adjacent to the former boat passage between Lake Jackson and Little Lake Jackson (fig. 2). Its depth is about 16 feet. On the eastern side of Lake Jackson, a dredged hole near the end of the municipal pier (fig. 2) has a maximum depth of about 20 feet.

Little Lake Jackson has two major dredged areas. The largest is in the northeast part of the lake, about 100 feet from shore, where the depth exceeds 28 feet. Another dredged area, with a maximum depth of 30 feet, extends from near the former boat passage to about 400 feet from shore. Steep sides of the large holes on the west side of Little Lake Jackson (fig. 2) indicate that they may be dredged rather than natural features.

There are several large natural depressions in the bottom of Lake Jackson, as shown on the photo base map. Two depressions occur near the northeast shore of the lake, two are in the north-central part, and one is in the southwest part.

Except for areas where dredging has occurred, or where natural depressions exist, a firm sand bottom slopes gradually from the shore toward the center of the lake. The depth near the center is about 22 feet. In the northwest bay, the bottom slopes gradually to a depth of about 16 feet. In Little Lake Jackson, maximum depth near the center is about 22 feet.

The volume of water in Lake Jackson varies with stage, as shown by the stage-volume relation (fig. 4). The relation shows the volume of water in Lake Jackson (including Little Lake Jackson) for lake levels from 80 to 103 feet above sea level. At average daily stage (101.44 feet above sea level), the lake contains about 50,000 acre-feet of water.

Stage records for Lake Jackson were collected by the U.S. Geological Survey from 1945 to 1975. Records from May 1945 through August 1958 were primarily once-weekly stage readings. Daily readings were recorded from September 1958 through August 1975. The maximum stage of record, 103.76 feet above sea level, occurred on September 19, 1947. The minimum stage of record, 98.58 feet above sea level, occurred on December 21, 1972. Lake level declined more than 3 feet between September 1970 and December 1972. The stage hydrograph (fig. 5) shows some seasonal fluctuation since September 1970, but levels have remained below average.

Monthly maximum, minimum, and mean stages for Lake Jackson are shown in figure 6. The lowest monthly mean stage occurs in May; the highest monthly mean stage occurs in September. All monthly minimum stages occurred in 1972 or 1973. All monthly maximum stages occurred prior to 1971.

A stage-frequency relation for Lake Jackson is shown in figure 7. The relation is based on a Pearson Type III frequency distribution of annual maximum stages for 1945–70. The relation indicates, for example, that over a long period of time, a stage of 102.8 feet above sea level will be exceeded about once every 2 years. The distribution is based on historical records and may not accurately represent the stage-frequency relation after 1970.

Lake Jackson stage-duration curves for 1945–70, 1945–75, and 1971–75 are shown in figure 8. During 1945–70, stage exceeded 101.50 feet above sea level about 84 percent of the time. From 1971 to 1975, lake stage exceeded 101.50 feet above sea level only about 4 percent of the time.

WATER BUDGET

A water-budget analysis of Lake Jackson was completed to evaluate the decline in Lake Jackson's stage from 1970 to 1973 and the continuation of below-average stages, to evaluate the response of the lake to climatological factors, and to estimate the possible impact on the lake resulting from known changes in the surrounding ground-water and surface-water systems. By comparing water-budget estimates for October 1970 to June 1973 with estimates for another 33-month period, October 1954 to June 1957, the possible causes of the lake-stage decline were identified. Both periods were unusually dry; however, the comparison indicates that deficient precipitation was not the sole cause of the lake-stage decline. The data indicate that changes affecting the ground-water system contributed significantly to the decline.

The volume of water in Lake Jackson fluctuates primarily in response to precipitation, evaporation, surface inflow, outflow through the surface stream system, inflow from the water-table aquifer, lateral outflow through the surficial aquifer, and downward leakage. This relationship can be expressed by the water-budget equation:

Change in volume = Precipitation − Evaporation + Surface-water inflow − Surface-water outflow + Ground-water inflow − Ground-water outflow − Downward leakage

Lake levels decline when losses through evaporation, outflow, and leakage are greater than gains from precipitation and inflow. Conversely, lake levels increase when precipitation and inflow exceed losses to evaporation, outflow, and leakage. Diversion of lake water for irrigation has a slight effect on lake levels, but is relatively insignificant when compared to other water-budget components.

The relation between the measured components of the water budget is illustrated in figure 5. The two 33-month periods used for water-budget comparisons are identified as are several other events of hydrologic significance. Results of water-budget calculations for the two 33-month periods are provided below, followed by a discussion and comparison of results for each component. Values are in acre-feet. Values in parentheses are in inches over the surface area of the lake, 3,244 acres.

Period	Change in volume	= Precipitation	− Evaporation	+ Surface-water inflow	− Surface-water outflow	+ Ground-water inflow	− Ground-water outflow	− Downward leakage
10/54–6/57	−1,350 (−5.0)	29,550 (109.3)	38,550 (142.6)	6,450 (23.9)	6,300 (23.3)	12,000 (44.4)	1,000 (3.7)	3,500 (13.0)
10/70–6/73	−10,500 (−38.9)	29,450 (108.9)	34,600 (128.0)	5,700 (21.1)	50 (0.2)	−400 (−1.5)		10,600 (39.2)

Changes in volume were determined from lake-stage data (fig. 5) and the stage-volume relation (fig. 4). Lake levels for 2 years prior to October 1970 were similar to those preceding October 1954. Volume loss during 1970–73 was, however, about eight times greater than the volume loss during 1954–57.

Precipitation and Evaporation

Precipitation data (fig. 5) were based on records from a private rain gage at Sebring (fig. 2). Records for the gage begin in August 1951 and continue to the present. Data for January 1950 through July 1951 were generated by correlation with National Weather Service records for Avon Park and Lake Placid (fig. 1). Departures from average annual precipitation for 1950 to 1975 are shown in figure 9. During both 33-month periods, precipitation was below average. Precipitation during 1970–73 was, however, only 0.4 inch less than precipitation during 1954–57. This indicates that the lake level decline after 1970 did not result solely from deficient precipitation.

Lake evaporation was estimated from National Weather Service pan evaporation data for four central Florida stations, Okeechobee Hurricane Gate 6, Vero Beach, Lake Placid, and Lake Alfred Experiment Station. Pan data were multiplied by a coefficient of 0.7 to obtain an estimate of lake evaporation. Evaporation data (fig. 5) show a seasonal cycle, with slight variations from year to year. The data indicate that evaporation losses were greater during 1954–57 than during 1970–73.

Surface-Water Inflow and Outflow

Surface-water inflow for Lake Jackson was estimated on the basis of drainage area ratio from gaging station records for Josephine Creek near De Soto City (fig. 1). Surface-water inflow was slightly less in 1970–73 than in 1954–57.

Surface-water outflow was based on about 90 miscellaneous discharge measurements of Jackson Creek correlated with daily discharge records for the Josephine Creek gage (fig. 1). Discharge measurements of Jackson Creek were made between 1945 and 1959, just downstream from the old control at the outlet of Little Lake Jackson. Since completion of structure 1 in August 1971 there has been no surface-water outflow from Lake Jackson. Surface-water outflow was significantly greater during 1954–57 than during 1970–73.

Ground-Water Inflow and Outflow

Ground-water inflow to Lake Jackson comes from the surficial aquifer. The water table is above the potentiometric surface of the Floridan aquifer in the Lake Jackson area, and, consequently, there is no upward discharge into the lake from the Floridan aquifer. A generalized water-table map (fig. 10) shows general flow patterns and gradients. The map was prepared from 1952 topographic maps and water-level data; altitudes are approximate.

Most inflow from the surficial aquifer occurs through the west side of the lake. Kohout and Meyer (1959) outlined a procedure for estimating ground-water flow through the surficial aquifer at Lake Placid. Using the permeability determined by Kohout and Meyer at Lake Placid (700 gallons per day per square foot) and applying their procedure over gradients shown in figure 10, it was estimated that during 1954–57 about 12,000 acre-feet of water entered Lake Jackson as ground-water inflow.

Ground-water outflow from Lake Jackson moves laterally through the surficial aquifer. Figure 10 indicates that ground-water outflow from the lake occurs at the northeast side toward Dinner Lake, along the east side toward Arbuckle Creek (fig. 1), and on the south side toward Jackson Creek. The steepest gradient is on the south side, and the greatest volume of ground-water outflow is southward along Jackson Creek. Using the gradients shown in figure 10, it was estimated that ground-water outflow through the surficial aquifer was about 1,000 acre-feet during 1954–57.

A generalized water-table map for the 1970–73 budget period could not be produced because of data limitations. Instead, ground-water inflow minus ground-water outflow was combined into a single term and an estimate was determined by solving the water-budget equation for the combined term. Ground-water inflow minus ground-water outflow was estimated to be about −400 acre-feet during 1970–73. During 1954–57 the value of the combined term was +11,000 acre-feet. Comparison of the two budget periods indicates a major change in the ground-water system surrounding Lake Jackson. The possible causes for this change are presented in the "Discussion" section below.

Downward Leakage

Leakage to the Floridan aquifer occurs as vertical outflow through the bottom of Lake Jackson. Downward leakage during 1954–57 was estimated by solving the water-budget equation for downward leakage. Over the period from October 1954 to June 1957, 3,500 acre-feet represents an average of 3.5 acre-feet per day.

A decline in the potentiometric surface of the Floridan aquifer increases the potential for downward leakage. Long-term water-level data for the Floridan aquifer are not available in the Lake Jackson area. Miscellaneous measurements of water levels, however, indicate a possible decline of 10 to 20 feet in the potentiometric surface between 1951 and the mid-1970s. Bishop (1956, p. 49) reported that in June 1951 the potentiometric surface in the Sebring-Avon Park area was about 90 feet above sea level. Measurements of Altmann deep well near Avon Park between 1973 and 1976 show altitudes of between 70 and 80 feet above sea level. Wilson (1977, p. 50) estimated that in northeast Hardee County, about 10 miles west of Lake Jackson, the potentiometric surface of the Floridan aquifer had declined about 20 feet between 1949 and 1973, with most of the decline occurring between 1962 and 1973.

Darcy's equation (discharge = permeability × head differential × area) was used to estimate the probable increase in leakage resulting from a decline in the potentiometric surface. In this analysis, head differential is equal to the difference between the lake elevation and altitude of the potentiometric surface divided by the thickness of materials overlying the Floridan aquifer. Applying the Darcy equation over a head differential of 0.025 (10 feet/400 feet), 3.5 acre-feet per day is equivalent to a downward leakage rate or permeability of 0.05 foot per day over the surface area of the lake. Assuming the potentiometric surface was an average 20 feet lower (head differential = 30 feet/400 feet) during 1970–73 than during 1954–57, and using a downward leakage rate of 0.05 foot per day, 10,600 acre-feet of lake water would be lost to downward leakage from October 1970 to June 1973.

Discussion

The change in net ground-water flow from +11,000 acre-feet during 1954–57 to −400 acre-feet during 1970–73 resulted from either a reduction in ground-water inflow, an increase in ground-water outflow, or both. Inflow from the surficial aquifer would be reduced if the water table on the west side of Lake Jackson declined. Lateral ground-water outflow would increase if gradients to the south or east of Lake Jackson were increased.

Data are not available to determine trends in the water table west of Lake Jackson. There are, however, some possible factors that could have contributed to a decline in the water table and a consequent reduction in ground-water inflow. The estimated decline of 20 feet in the potentiometric surface of the Floridan aquifer would have increased the possibility for downward leakage from the surficial aquifer surrounding Lake Jackson. Assuming that the leakage rate calculated for the lake (0.05 foot per day) is applicable over the entire drainage area (14 square miles), and using an average water-table altitude of 130 feet above sea level, a drop of 20 feet in the potentiometric surface would increase downward leakage from the surficial aquifer by about 14,000 acre-feet during 1970–73. With a porosity of 20 percent, this increased leakage would cause an average water-table drop of about 12 feet throughout the drainage area and would reduce ground-water inflow to about 4,800 acre-feet during 1970–73. A porosity of 30 percent would result in an average water-table decline of about 8 feet and ground-water inflow would be reduced to about 6,600 acre-feet.

Without an increase in ground-water outflow, ground-water inflow would have to be reduced from 12,000 acre-feet during 1954–57 to 600 acre-feet during 1970–73 to account for the entire change indicated by the water-budget comparison. A reduction to 600 acre-feet would require a water-table decline of about 25 feet, 5,000 feet west of the lake. Direct pumpage from the surficial aquifer would contribute to a decline in the water table, but even with a decline of 12 feet as a result of increased downward leakage, about 4.5 million gallons per day would have to be pumped from the surficial aquifer in addition to that pumped daily in 1954–57 in the Lake Jackson basin to cause a decline of 25 feet during 1970–73. Municipal supply for the city of Sebring was 2.85 million gallons per day in 1979 (Duerr and Trommer, 1981).

It is quite probable that ground-water outflow from Lake Jackson has increased. The relation between the level of Lake Jackson and shallow observation well H-10 (fig. 10) has remained about the same since 1949, indicating that water-table gradients on the east side of Lake Jackson have not changed appreciably. There has, however, probably been a change in water-table gradient on the south side of Lake Jackson as a result of channelization along Jackson Creek. In 1952, water-table altitude near the location of structure 2 (fig. 1) was about 95 feet above sea level. Measurements in October 1979 indicate a water-table altitude of about 85 feet above sea level. This change would result in greater ground-water outflow from the lake toward the south.

Assuming that there was no change in the configuration of the water-table contours (fig. 10) following channelization, a decline of 10 feet near structure 2 would increase ground-water outflow from about 1,000 acre-feet during 1954–57 to about 2,000 acre-feet during 1970–73. It is, however, unlikely that the configuration of the water-table contours south of the lake remained the same following channelization. After completion of the project there was a noticeable change in the relation between Lake Jackson (fig. 5) and Lake Josephine (fig. 5) at the downstream end of the channelized reach. Through 1969 there was a close correlation between water levels in Lake Jackson and Lake Josephine. During the 1970–73 budget period, the stage of Lake Josephine remained relatively constant, whereas the stage of Lake Jackson dropped about 3 feet. Surface outflow from Lake Josephine also remained relatively constant during 1970–73. Water-level records for Lake Josephine show almost no response as a result of below average precipitation or the cessation of surface inflow from Lake Jackson. This indicates that a substantial volume of unexpected inflow entered Lake Josephine during 1970–73.

Drainage of the swampy area between Lake Jackson and Lake Josephine would result in substantial inflow to Lake Josephine. It would also cause a major re-orientation of the water-table contours south of Lake Jackson. Sufficient data are not available to determine the extent of change in water-table configuration. It is, therefore, impossible to accurately estimate the potential increase in ground-water outflow from Lake Jackson or to accurately determine the overall impact on the lake as a result of channelization.

In summary, the estimates for the water-budget components are approximate because of data limitations. The estimates do, however, show Lake Jackson's response to climatological factors and the possible impact of man-induced changes. Deficient precipitation substantially affected Lake Jackson during 1970–73, but it was not the sole cause of the decline in lake stage. Several other factors have affected the lake. A drop in the potentiometric surface of the Floridan aquifer has increased the possibility for downward leakage from the lake. The possibility for increased downward leakage from the surficial aquifer surrounding Lake Jackson also exists and may have resulted in a drop in the water table and a subsequent decrease in ground-water inflow. Pumpage from the surficial aquifer may also have contributed to a decline in the water table and a decrease in ground-water inflow. Channelization along Jackson Creek may have resulted in increased ground-water outflow. It is not possible to accurately estimate the individual effects of these factors, but some combination of these factors contributed to the 1970–73 stage decline.

WATER QUALITY

The U.S. Geological Survey has collected water samples from Lake Jackson since 1965. Results of water-quality analyses are presented in table 1 and table 2. Milleson (1978) provides additional water-quality data for Lake Jackson and discusses the general quality characteristics of seven other lakes that drain into Lake Istokpoga.

Dissolved solids concentrations ranged from 38 to 58 milligrams per liter. Sodium is the predominant cation and chloride the predominant anion in the chemical analysis of water from Lake Jackson. Specific conductance and dissolved solids reflect relatively low ionic concentrations. All except one of the lakes described by Milleson (1978) have a similar chemical make-up.

There appears to be a slight increase in ionic concentrations, dissolved solids, and specific conductance over the period of record. Increased concentrations in 1976, 1977, and 1978 may be related to lowered lake stages rather than long-term changes. The seasonal variation in phytoplankton is normal. No radical long-term or seasonal trends are indicated.

The profile data in table 2 show a slight stratification in February and May. The data for September indicate no stratification.

All constituents in table 1 are within limits set by the Florida Department of State (1978) for waters that are used for recreation and for propagation and management of fish and wildlife. Alkalinity of 20 milligrams per liter or more as $CaCO_3$ is desirable for freshwater aquatic life. Lake Jackson and many other lakes in the area have naturally low alkalinity.

Available data do not indicate detrimental effects from septic tank drain fields at private residences along the lakeshore. Coliform data collected by the Florida Department of Environmental Regulation in 1974 and 1976 show that coliform levels are well within limits set by the State. Fecal coliform from 14 samples averaged 2 colonies per 100 milliliters of sample. Total coliform averaged 7 colonies per 100 milliliters.

Pesticide and herbicide analyses are not available for Lake Jackson. There is potential for pesticide and herbicide contact from storm-drain inflow and surface runoff from developed lakeshore property.

The clear water and firm sand bottom of Lake Jackson make it esthetically suitable for recreation, and the lake supports an aquatic population attractive to fishermen. Freshwater mussels are common along the sandy bottom, and numerous bass and bluegill were sighted during bottom mapping.

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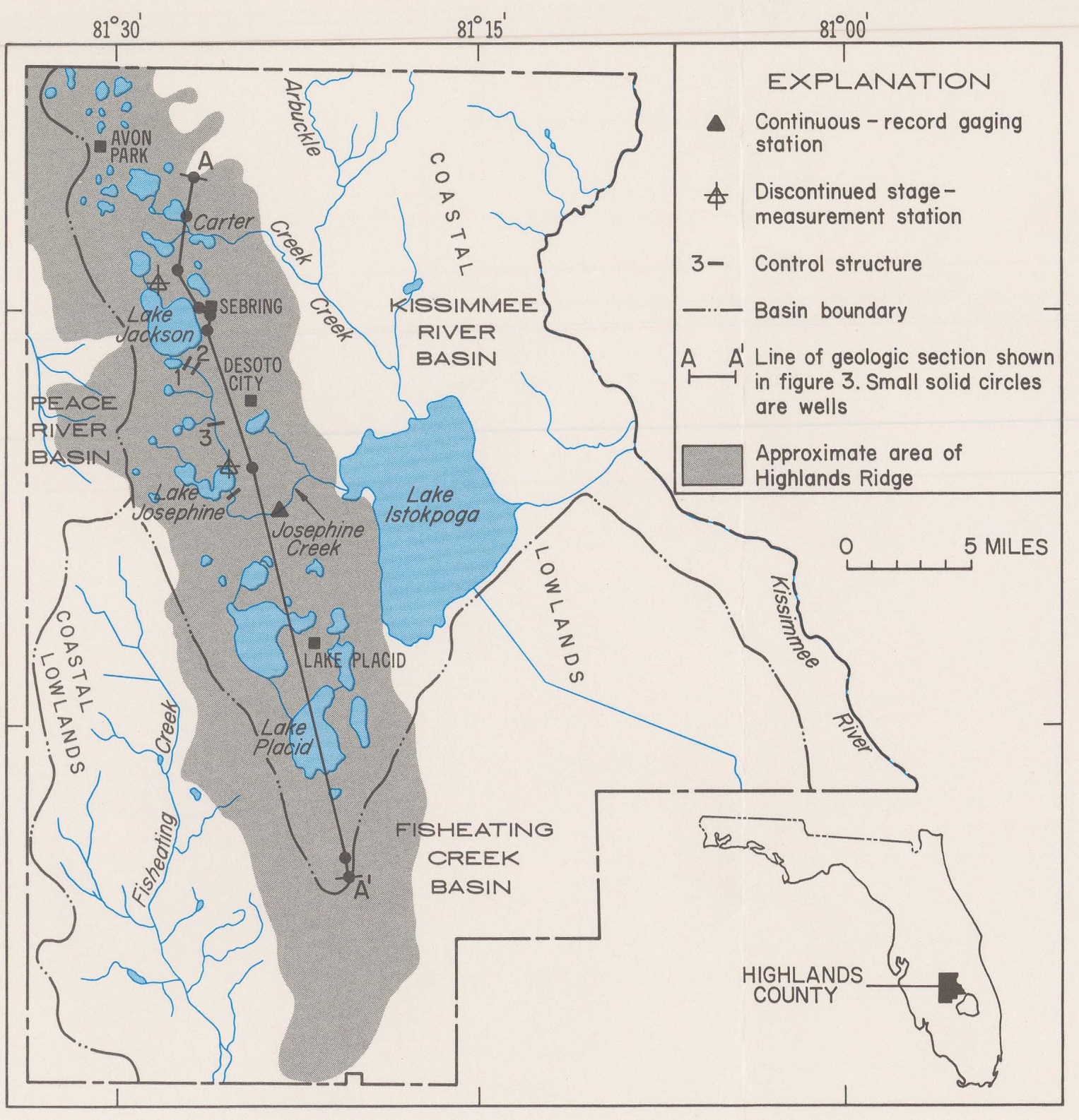


Figure 1.—Location of Lake Jackson and the major physiographic features of Highlands County.

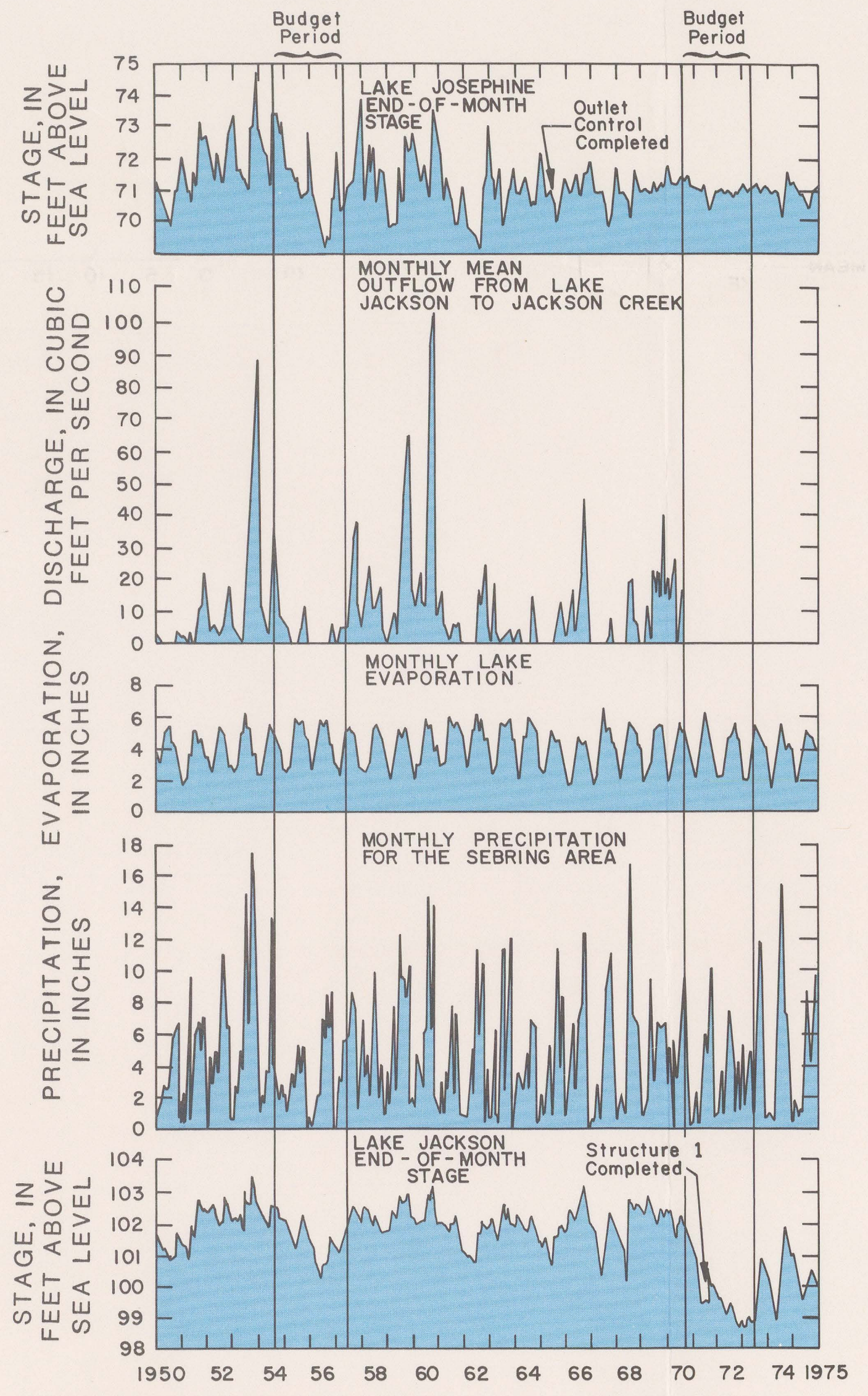


Figure 5.—End-of-month stages of Lake Jackson, monthly precipitation for the Sebring area, estimated lake evaporation, monthly mean outflow to Jackson Creek, and end-of-month stages of Lake Josephine, 1950–75.

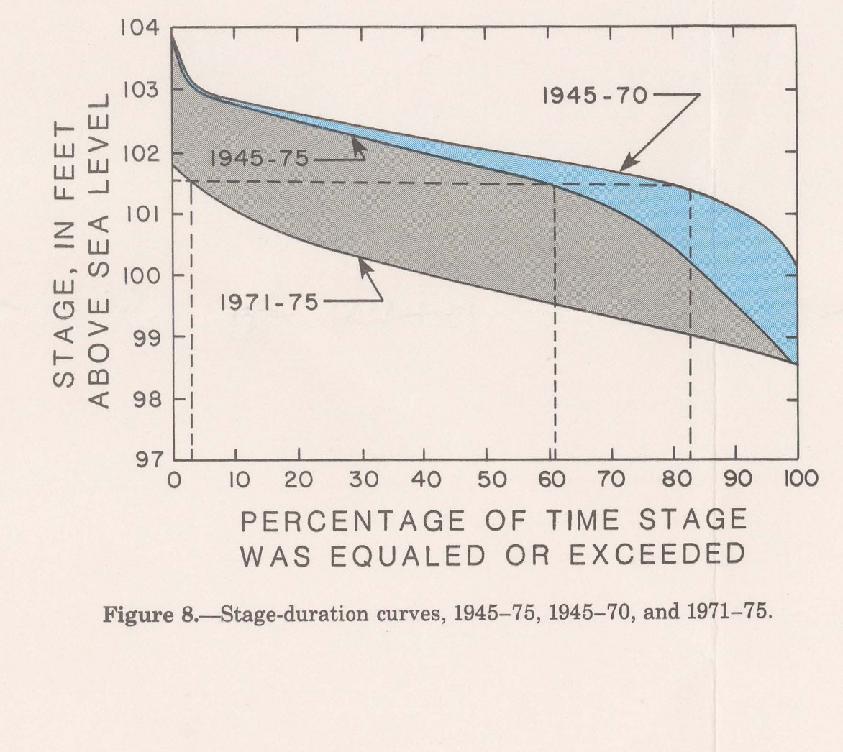


Figure 8.—Stage-duration curves, 1945–75, 1945–70, and 1971–75.

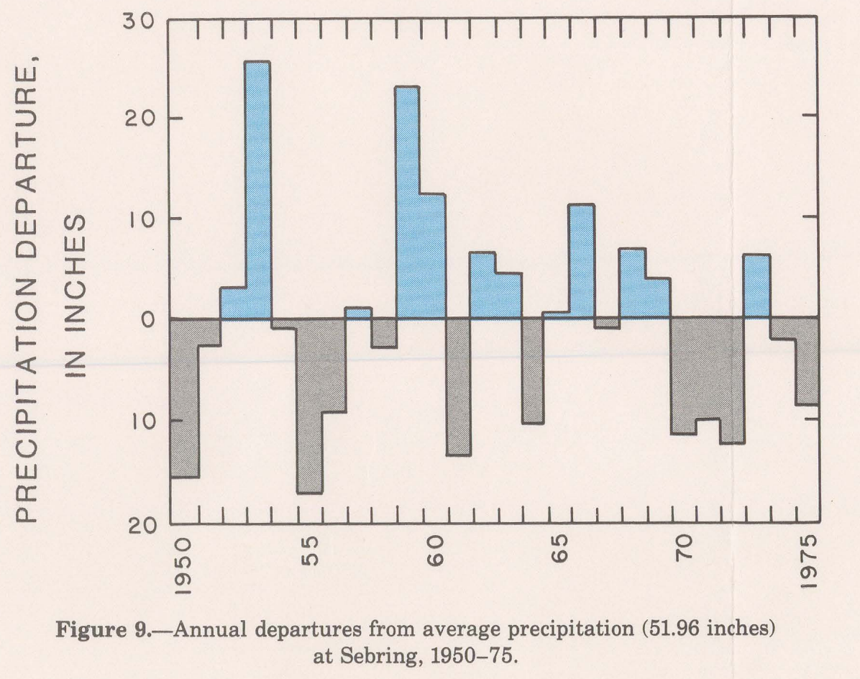


Figure 9.—Annual departures from average precipitation (51.96 inches) at Sebring, 1950–75.

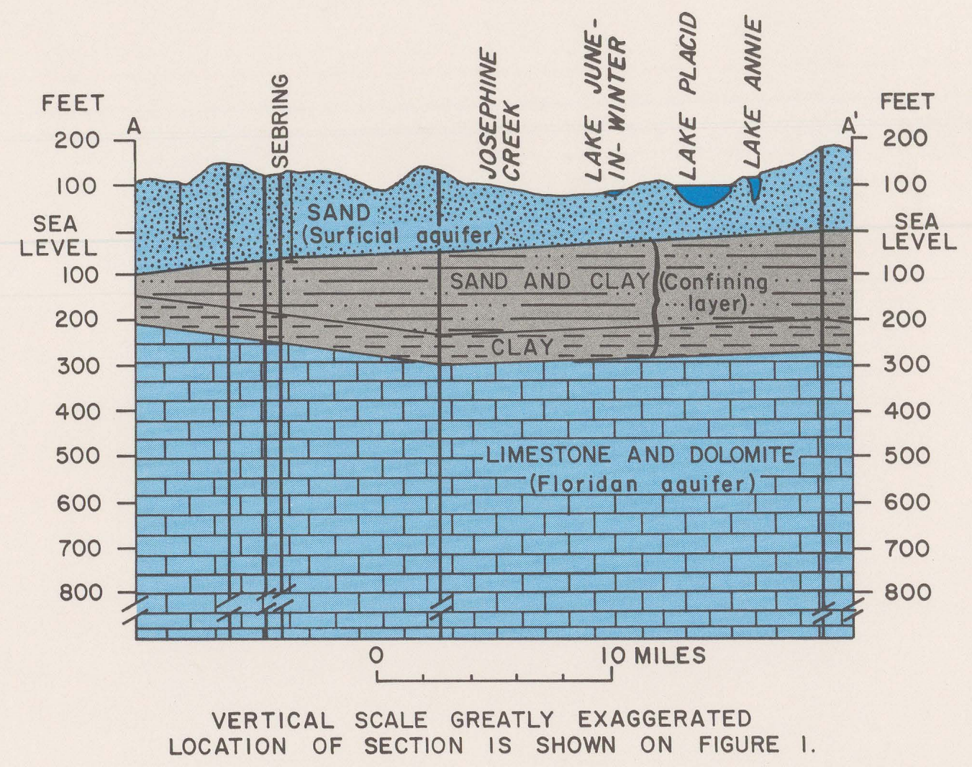


Figure 3.—Generalized geologic section along the Highlands Ridge.

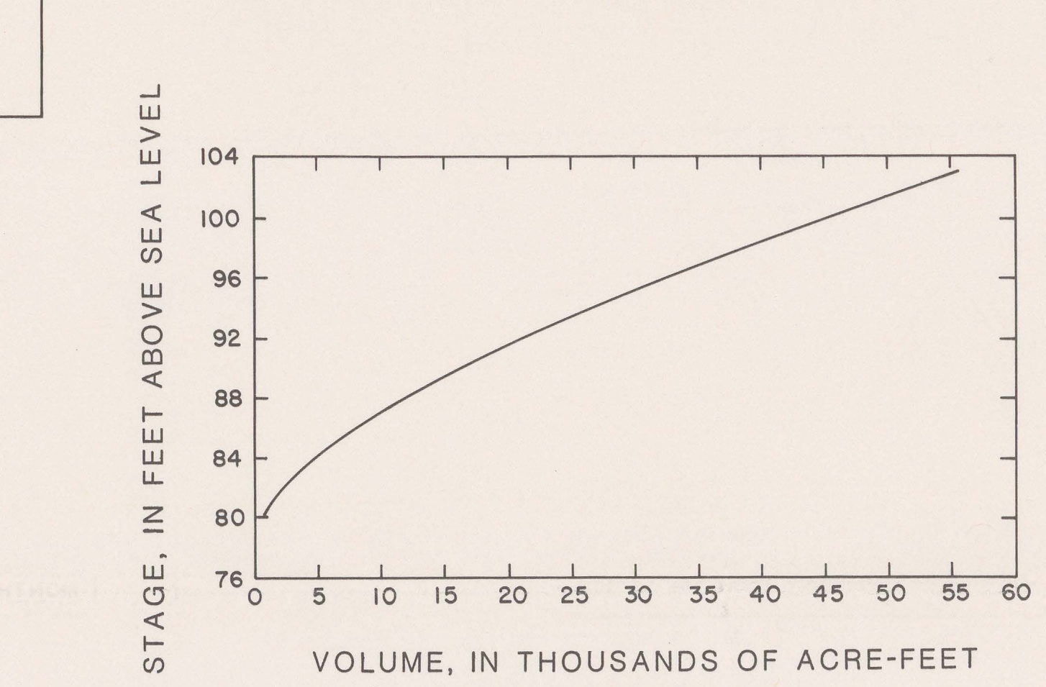


Figure 4.—Stage-volume relation.

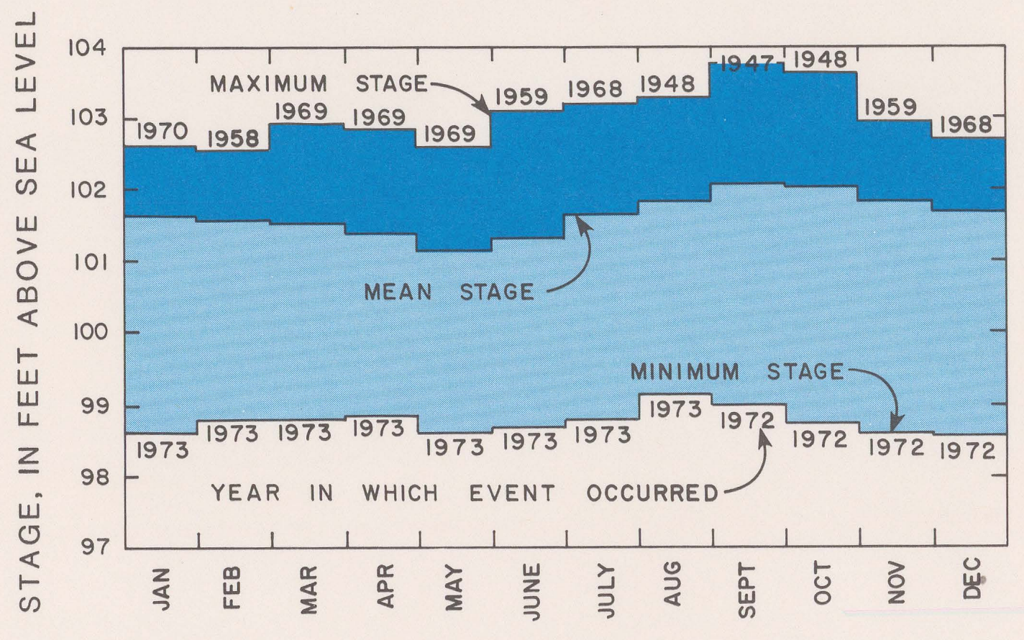


Figure 6.—Monthly maximum, minimum, and mean stages, 1945–75.

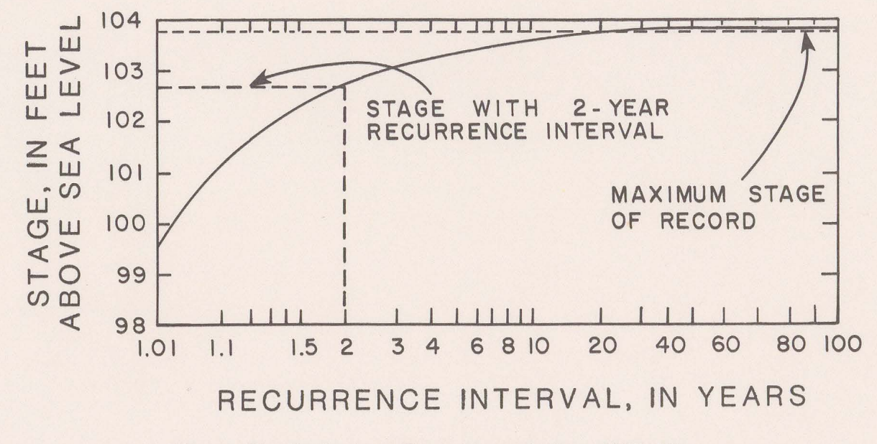


Figure 7.—Peak-stage frequency relation, 1945–70.

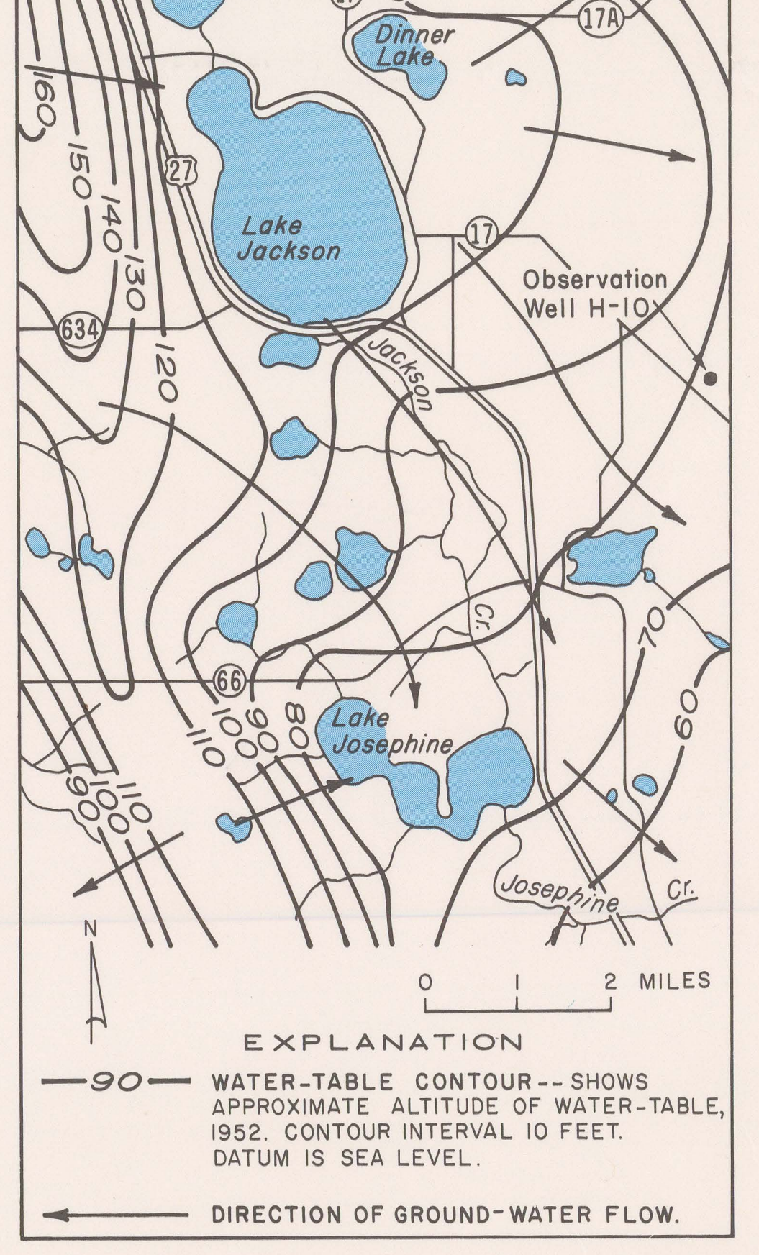
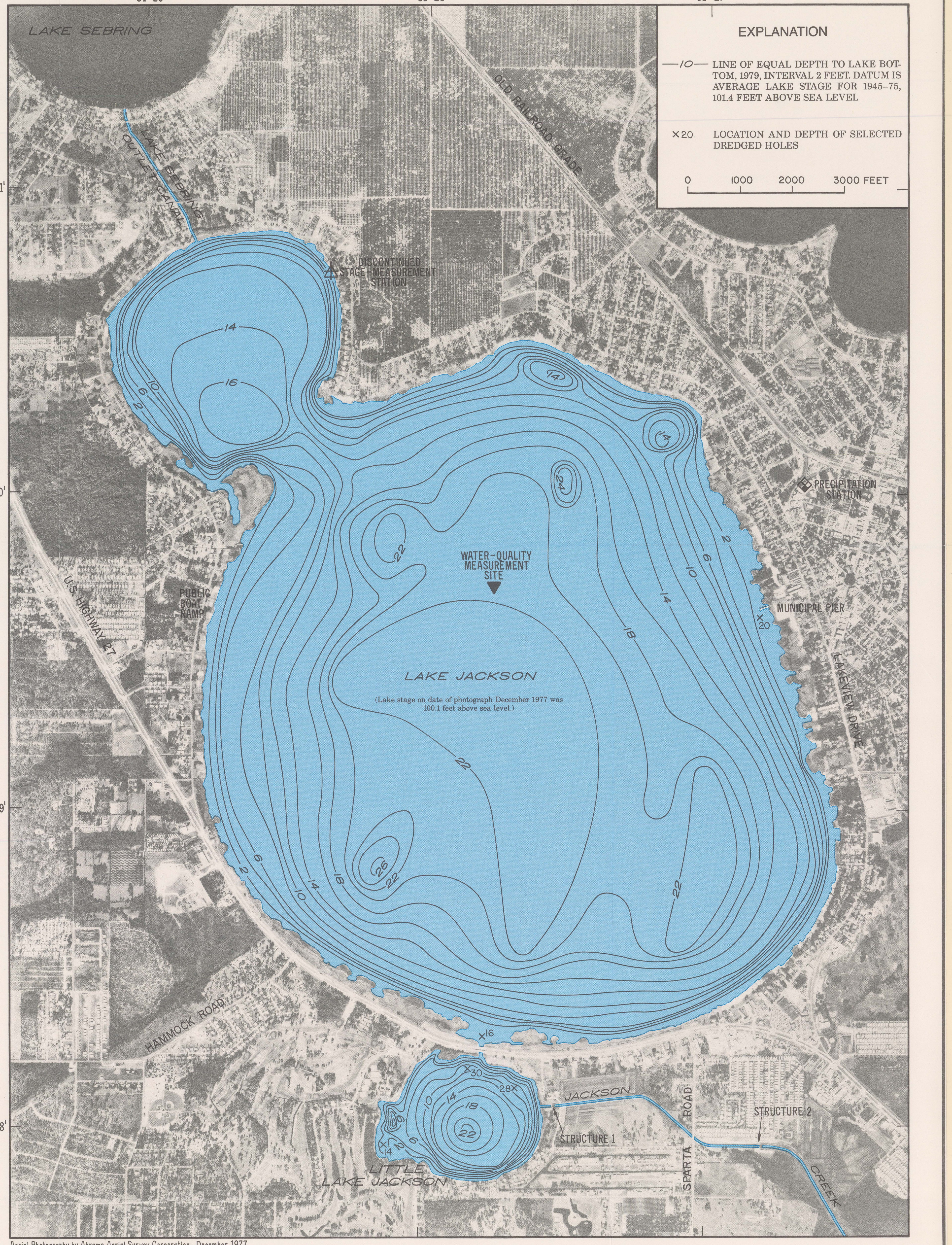


Figure 10.—Generalized water-table map of Lake Jackson area.



Aerial Photography by Abrams Aerial Survey Corporation, December 1977

Figure 2.—Lake Jackson area.

Table 1.—*Water-quality analysis, 1965–78*

[In milligrams per liter except as noted]

Date	Time	Silica (SiO_2)	Iron (µg/L, Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Alkalinity (as $CaCO_3$)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Nitrite (NO_2)	Ammonia (NH_4)	Total organic nitrogen (N)	Total Kjeldhal nitrogen (N)	Total nitrogen (N)	Orthophosphate (PO_4)	Dissolved solids (sum of constituents)	Hardness (Ca, Mg)	Noncarbonate hardness	Specific conductance (µmho/cm at 25° C)	pH (units)	Temperature (° C)	Color (platinum-cobalt units)	Turbidity (JTU)	Secchi disk transparency (in)	Dissolved oxygen (DO)	Carbon dioxide (CO_2)	Total phytoplankton (Cell/mL)	Total organic carbon (C)	Total inorganic carbon (C)
6/29/65		.8	20	3.2	1.5	6.6	1.4	8	7	8.8	11	.4	.10	—	—	—	—	—	—	38	14	8	71	6.5	28.5	5	—	—	—	—	—	—	—
7/28/65		.3	30	3.2	1.5	6.2	1.6	7	6	9.2	11	.1	.10	—	—	—	—	—	.07	37	14	8	72	6.2	—	5	—	—	—	—	—	—	—
2/2/66		.9	—	2.2	2.5	6.9	1.4	7	6	10	12	.2	.30	—	—	—	—	—	.00	40	16	10	76	6.5	—	5	—	—	—	—	—	—	—
4/14/66		.2	0	2.6	2.2	6.6	2.0	6	5	10	11	.2	.70	—	—	—	—	—	.00	39	16	10	75	6.1	—	5	—	—	—	—	—	—	—
4/25/67		.4	0	3.3	2.2	6.6	1.5	9	7	11	11	.2	.80	—	—	—	—	—	.00	41	17	10	83	6.4	25.0	5	—	—	8.8	—	—	—	—
5/2/67		.5	10	3.4	2.3	7.0	1.8	8	7	10	11	.1	.60	—	—	—	—	—	.00	41	18	12	85	6.1	23.3	5	—	—	8.8	—	—	—	—
4/22/68	1500	1.1	30	4.3	2.5	7.2	2.0	9	7	13	12	.1	1.6	—	—	—	—	—	—	48	21	14	95	6.0	20.0	10	—	—	9.2	—	—	—	—
5/15/69	1130	.6	—	3.9	2.2	6.4	1.8	—	—	12	10	.1	.80	.01	—	—	—	—	—	—	19	—	85	—	28.0	10	—	—	7.8	—	—	—	—
5/12/70	0825	1.0	—	3.3	2.3	6.1	1.9	6	5	14	9.8	.2	.20	.01	.05	.09	—	—	.02	42	18	13	85	7.0	25.0	5	2	—	7.0	1.0	—	—	—
5/24/71	1730	2.1	—	—	—	—	—	—	—	—	—	—	1.3	.01	.03	.61	—	—	.02	—	—	—	98	—	29.0	—	2	—	7.3	—	—	—	—
2/13/76	1225	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.36	.39	.40	—	—	—	—	105	6.5	18.0	—	3	180	9.6	—	390	3.0	1.0
5/11/76	1340	1.6	—	3.3	2.4	8.0	2.2	6	5	16	14	.1	—	—	—	.31	.33	.33	—	51	18	13	115	6.8	26.5	0	2	120	9.1	1.5	17,000	2.0	.0
9/21/76	1510	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.36	.36	.36	—	—	—	—	105	6.2	28.5	—	3	144	7.4	—	19,000	3.0	.0
1/27/77	1035	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.29	.32	.36	—	—	—	—	88	7.0	13.0	—	2	96	11.4	—	5,200	22	3.0
5/19/77	1435	1.4	—	4.7	2.6	9.2	2.3	14	11	15	14	.1	—	—	—	.34	.36	.36	—	56	23	11	110	7.5	25.5	0	2	102	10.0	.7	40,000	6.0	5.0
8/31/77	1440	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.27	.28	.28	—	—	—	—	110	8.2	28.0	5	2	98	8.4	—	92,000	11	1.0
2/21/78	1045	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.23	.26	.27	—	—	—	—	120	7.4	16.0	—	2.0	108	—	—	250	3.0	3.0
5/25/78	1700	1.1	—	5.1	2.6	8.4	2.8	21	17	15	13	.0	—	—	—	.30	.31	.31		58	24	6	100	7.0	29.0	10	1.0	140	8.8	3.4	—	4.0	1.0

Table 2.—*Temperature, specific conductance, and dissolved-oxygen profiles, 1976–78*

Sampling depth (feet)	February 13, 1976			May 11, 1976			September 21, 1976		
	Temperature (°C)	Specific conductance (µmho/cm at 25°C)	Dissolved oxygen (mg/L)	Temperature (°C)	Specific conductance (µmho/cm at 25°C)	Dissolved oxygen (mg/L)	Temperature (°C)	Specific conductance (µmho/cm at 25°C)	Dissolved oxygen (mg/L)
0.0	18.0	105	9.6	26.5	115	9.1	28.5	105	7.4
3.0	17.5	109	9.2	26.5	115	8.8	28.5	105	7.4
6.0	17.0	110	9.2	26.5	115	8.3	28.5	105	7.4
9.0	17.0	110	9.2	26.0	115	7.8	28.5	105	7.4
12	16.5	112	9.0	26.0	115	7.8	28.5	105	7.4
15	16.0	115	8.5	25.5	115	7.5	28.5	105	7.1
18	15.5	115	8.5	25.0	115	6.4	28.5	105	7.1
21	15.5	115	8.5	25.0	118	6.1			
22	15.5	115	8.4						

Sampling depth (feet)	February 21, 1978			May 25, 1978		
	Temperature (°C)	Specific conductance (µmho/cm) at 25°C)	Dissolved oxygen (mg/L)	Temperature (°C)	Specific conductance (µmho/cm) at 25°C)	Dissolved oxygen (mg/L)
0.0	16.0	120	—	29.0	100	8.8
2.0	15.5	120	—	29.0	100	8.8
4.0	15.5	120	—	27.5	100	8.5
6.0	15.5	120	—	27.0	100	8.6
8.0	15.5	120	—	27.0	100	8.5
10	15.5	120	—	26.5	100	8.4
12	15.5	120	—	26.5	100	8.2
14	15.5	120	—	26.5	100	8.2
16	15.5	120	—	26.0	100	7.5
18	15.5	120	—	25.5	100	6.7

HYDROLOGIC DESCRIPTION OF LAKE JACKSON, SEBRING, FLORIDA

By

K. M. Hammett

1981