HYDROLOGY OF THE LAKE DEATON AND LAKE OKAHUMPKA AREA, NORTHEAST SUMTER COUNTY, FLORIDA

By
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INTRODUCTION

The landscape of Florida, particularly the central part, is dotted with lakes. These lakes are an important feature of the area because of their esthetic appeal, recreational value, and water-supply potential. An understanding of the hydrology of lakes aids in decisions which may affect the environment of a lake or its watershed, and is of interest to those who utilize lakes for any purpose.

This report describes the hydrology of Lakes Deaton and Okahumpka and their watersheds, west of Leesburg, in Sumter County. It was prepared as part of a continuing cooperative effort between the U.S. Geological Survey and the Southwest Florida Water Management District to investigate and describe the hydrology of selected lakes. Lakes for studies are selected because of: (1) a potential for utilization by a relatively large portion of the population; (2) a water-quality problem or other type of problem; or (3) concern about impact of development on the hydrology of the lakes. Data used to prepare this report were obtained from October 1978 through September 1979, or were compiled from earlier studies in the general area of the lakes.

For those readers who may prefer to use metric units (SI) rather than inch–pound units, the conversion factors for the terms used in this report are listed below:

Multiply	**By**	**To Obtain**
	Length	
inch	25.40	millimeter (mm)
foot	0.3048	meter (m)
mile	1.609	kilometer (km)
	Area	
acre	4047	square meter (m^2)
	Flow	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

Temperature in degrees Celsius can be converted to degrees Fahrenheit as follows:

$$°F = 1.8°C + 32$$

National Geodetic Vertical Datum of 1929 (NGVD of 1929) is a geodetic datum formerly called Sea Level Datum of 1929.

ENVIRONMENTAL SETTING

Lakes Deaton and Okahumpka are located in a rural area of northeast Sumter County, about 7 miles west of Leesburg (fig. 1). The area in proximity to the lakes is mostly open pasture with some forested wetland and evergreen forest bordering the lakes. An orange grove of about 140 acres is located on an area of relatively high ground near the east shore of Lake Deaton, and east of the orange grove is a low area of extensively drained mucklands (about 630 acres) used for farming (fig. 2). The small community of Orange Home lies between the two lakes. Selected morphological and related data for the lakes are listed in table 1.

Lakes Deaton and Okahumpka are in the Florida Central Highlands near the western end of the Lake Harris Cross Valley which connects the Western Valley to the Central Valley (fig. 3). The Lake Harris Cross Valley, which separates the higher altitude of the Sumter Uplands to the north from the Lake Uplands to the south, is characterized by swampy terrain with only small differences in altitudes. The altitude of the valley floor is about 60 to 65 feet throughout this area. North of Lake Deaton in the Sumter Uplands, the land surface rises to altitudes which in some places exceed 100 feet (to as high as 150 feet) within 2 miles of the lake. South of Lake Okahumpka, in the Western Valley, altitudes generally range from 80 to 90 feet.

Soils in the Lake Deaton and Lake Okahumpka area (fig. 4) are of two general types: sandy and organic (U.S. Department of Agriculture, 1976). Lake Deaton lies almost entirely within an area of poorly drained organic soils 16 to 80 inches thick. This area of organic soils extends to the east and north of Lake Deaton where it is extensively drained and cultivated for vegetable production (fig. 2). Elsewhere in the area, soils are predominantly sandy with a loamy or weakly cemented subsoil. These sandy soils are well to excessively drained in the higher altitudes, and poorly drained on the valley floors where the water table is close to the land surface.

The Lake Deaton and Lake Okahumpka area is in NOAA's (National Oceanic and Atmospheric Administration) north–central climatic division of Florida. This is a subtropical area characterized by mild winters and hot, humid summers. Monthly mean temperatures for the division ranged from 60°F in January to 82°F in July and August, based on NOAA's records for the period 1941–70 (U.S. Department of Commerce, 1978). Daily mean temperatures for the same period ranged from 50°F minimum for January to 92°F maximum for August.

HYDROLOGY AND HYDROLOGIC RELATIONS

Daily rainfall data have been collected by NOAA at a station near Bushnell, about 14 miles southwest of Lakes Deaton and Okahumpka, for the periods 1937–40 and 1943–78. The average annual rainfall for the periods was 52.00 inches. Annual rainfall, shown in figure 5, has ranged from 35.60 inches in 1956 to 77.11 inches in 1960. The seasonal distribution of rainfall is not uniform—average monthly totals for the 28-year period 1943–70 show that more than half of the annual rainfall generally occurred from June to September. For that 28-year period November was the driest month, with an average rainfall of 1.51 inches at the Bushnell station.

Evaporation in the north–central climatic division of Florida has been measured by NOAA since 1961, using a 4-foot standard pan located at Lisbon, about 13 miles northeast of the lakes. Lake evaporation is less than that measured in a pan, however; Kohler (1954) determined coefficients relating pan evaporation to lake evaporation at Lake Okeechobee, Fla. These coefficients, which vary seasonably from a low of 0.69 for February to a high of 0.91 for July and August, were assumed to be applicable to the Lisbon pan data to estimate evaporation from Lakes Deaton and Okahumpka. Although rainfall amounts are quite variable from year to year, this is not the case with evaporation. Estimated annual lake evaporation for the 16-year period from 1963–78 ranged only from 46.8 inches in 1976 to 55.5 inches in 1978. Seasonally, evaporation is quite variable, being lowest in cold months and highest in warm months. For the period 1963–78, estimated average monthly lake evaporation ranged from 2.1 inches in January to 5.9 inches in May (fig. 6).

Rainfall on and evaporation from the surfaces of lakes are important parts of the water budget. Average monthly rainfall, lake evaporation, and the cumulative monthly difference between rainfall and evaporation for the Lake Deaton and Lake Okahumpka area are shown in figure 6 for the period 1963–78. Rainfall shown in this figure is the average for the NOAA stations at Bushnell and Lisbon. For this period, the cumulative monthly difference increased, on the average, to a maximum rainfall excess in February, then decreased as evaporation surpassed rainfall until a maximum deficit of water occurred in May. Summer rains replenished the water lost to evaporation by September, but evaporation exceeded rainfall for October and November. For the 16-year period ending 1978, the net result has been an average evaporation excess of 0.4 inch per year over rainfall. This period may not be strictly representative of long-term conditions (especially for rainfall), but the data do indicate that rainfall and lake evaporation are of similar magnitude. Rainfall will probably exceed evaporation for wet years and the opposite will occur for dry years.

Lakes Deaton and Okahumpka are part of a watercourse which at times discharges water toward the west to the Withlacoochee River basin. This watercourse consists of the lakes and broad, swampy areas connected by natural or manmade drainage channels (fig. 2). During dry periods, there is probably little or no exchange of water between the lakes or other low areas. During periods of heavy rainfall, Evans Prairie, about 1 mile northwest of Lake Deaton, probably becomes an extension of Lake Deaton. During such wet periods water moves from Lake Deaton through a drainage canal which crosses State Road 44 near Bamboo to the lowlands south of the highway. Also directed through the Bamboo drainage canal is drainage from the farms east of Lake Deaton. Chitty Chatty Creek passes water westward to the swampy area south of Lake Okahumpka. Westward of the gaging station at State Road 468 the creek channel has been dredged and straightened; this channel at one time was open directly to Lake Okahumpka but is presently blocked with an earthen plug about half a mile west of State Road 468. At the plug, water is directed back into the natural watercourse south of Lake Okahumpka (fig. 2). From this point, the destination of the water is dependent upon the potentiometric surface of the Floridan aquifer. If the potentiometric surface is below land surface, Hogeye Sink can intercept some or all of the water moving toward Lake Okahumpka; however, during wet periods when the potentiometric surface is high, Hogeye Sink may be unable to receive water or even may become a source of water, then the flow of water will be to Lake Okahumpka. At water-surface altitudes of about 61 feet, water will flow northwestward from Lake Okahumpka to a swampy area draining into Lake Panasoffkee.

Long-term records of surface-water levels and discharge for the area are lacking. The gaging station on Chitty Chatty Creek (fig. 2) was operated from October 1963 to July 1966, and was reactivated in October 1978. Flow ceased during dry periods, and maximum daily discharge for the period was 111 ft^3/s as shown in the discharge hydrograph for the October 1963 to July 1966 period (fig. 7). Mean discharge for the two water years 1964–65 averaged 11 ft^3/s, or 3.9 inches of runoff from the 38-square-mile drainage basin.

Weekly observations of water levels in Lakes Deaton and Okahumpka were begun in April 1978, and data obtained through March 1979 are shown in figure 8. These data show that water levels in the lakes fluctuated over a range of about 1½ to 2 feet, and that the lakes exhibited patterns of water-level fluctuation which were very similar in magnitude and seasonal variation to each other and to the rainfall minus lake-evaporation hydrograph. Because lake-stage changes corresponded so closely with rainfall minus evaporation differences, this indicates that lake levels were controlled mainly by rainfall and evaporation. The surface runoff and ground-water components of the water budget, therefore, have been small in relation to rainfall and lake evaporation for the period April 1978 through March 1979.

The Floridan aquifer, a source of large amounts of high-quality water, is a thick sequence of limestones and dolomite limestones which underlie the sandy surficial materials of central Florida. In eastern Sumter County, the uppermost unit of the Floridan aquifer is the Ocala Limestone of Eocene age. Depth to the Floridan aquifer near Lakes Deaton and Okahumpka is variable, ranging from 50 to 130 feet according to driller's logs for two wells in Orange Home and another well about 0.5 mile northwest of the north shore of Lake Okahumpka. These logs show that the Floridan aquifer is separated from the sandy surface materials by a clay layer about 20 to 50 feet thick, or by thicker pockets of clay locally.

The potentiometric surface of the Floridan aquifer in the area is very close to the water level in the lakes. East of the lakes, at Leesburg, an observation well indicates that the potentiometric surface of the Floridan aquifer is generally slightly higher than the water level in Lake Deaton, and several feet higher than the water level in Lake Okahumpka. West of the two lakes, the potentiometric surface in the Floridan aquifer is lower than the water level of both lakes (see record for observation wells near Coleman and Wildwood in fig. 8). The locations of the Floridan aquifer observation wells and a potentiometric surface map of the Floridan aquifer in the vicinity of Lakes Deaton and Okahumpka for May 1979 are shown in figure 1. The potentiometric surface map shows that water movement in the Floridan aquifer is from east to west.

The potentiometric surface of the Floridan aquifer is generally lowest at the end of the late-spring dry period and highest in fall or early winter as a result of summer rains. A long-term record for the Floridan aquifer well near Wildwood (fig. 5) for the period April 1961 to May 1979 gives an indication of the range of fluctuation of the potentiometric surface. At this location, the altitude of the potentiometric surface has ranged from a high of 57.86 feet in 1965 to a low of 46.03 feet in 1976; there has been a general downward trend in the potentiometric surface since 1966, probably in response to less than average rainfall. If this range in potentiometric surface fluctuation is at all characteristic of the Lakes Deaton–Okahumpka area, then the altitude of the potentiometric surface of the Floridan aquifer at times may exceed the altitude of the lake surfaces and also of the land surface in the lowlands around the lakes (especially near Lake Okahumpka). The higher potentiometric surface would change Hogeye Sink from a point of recharge to a point of discharge. However, as previously mentioned, both surface runoff and ground-water components of the lakes water budget during the study period appear to be small in relation to rainfall and evaporation. Thus there seemingly is no appreciable exchange of water between the lakes and the Floridan aquifer directly beneath the lakes.

Some water probably enters the lakes from the sandy surficial material surrounding the lakes but information is lacking as to the hydraulic gradients between the lakes and the surficial aquifer in the area.

WATER QUALITY

Water of the Lake Deaton and Lake Okahumpka area was sampled in February 1979 and again in May 1979 for some sites. The sampling sites, selected to determine water quality in the several parts of the hydrologic system of the area and located as shown in figure 2, are:

- S1 — Floridan aquifer well
- S2 — Drainage canal at Bamboo
- S3 — Chitty Chatty Creek at State Road 468
- S4 — Inflow to Hogeye Sink
- S5 — Lake Deaton
- S6 — Lake Okahumpka

Some aspects of water quality of the lakes are apparent by a visual survey. In February and May of 1979, Lake Deaton had a prolific growth of suspended algae, or phytoplankton. This algal "bloom" gave the water a brown, muddy appearance and severely restricted penetration of light. Rooted aquatic plants were nearly absent. In contrast, Lake Okahumpka was characterized by very clear water and a prolific growth of rooted aquatic plants, which in many places extended to the water surface. These plants occurred in dense patches, and were often heaped into tangled floating mats.

Water type (major chemical constituents which make up the bulk of the dissolved solids) is variable among the six sampling sites (fig. 9). Water from the Floridan well is a calcium–magnesium bicarbonate type. Water from the drainage canal (sampled twice) was a composite of calcium–magnesium bicarbonate–sulfate–chloride water in February and a calcium–magnesium nitrite–sulfate–chloride water in May. Chitty Chatty Creek and the inflow to Hogeye Sink both had a calcium bicarbonate–chloride water. The two lakes have different water types—Lake Deaton a sodium chloride water and Lake Okahumpka a calcium bicarbonate water. Bulk precipitation (a composite of rainfall and dry fallout) at Ocala, Fla. (1965) and at Lake Hope at Maitland, Fla. (1971–79) was generally a calcium bicarbonate water and a calcium–sodium bicarbonate–sulfate–chloride water, respectively, and is shown in figure 9 to illustrate the general chemical type of rainfall in central Florida.

The mixture of dissolved constituents at the drainage ditch is probably the result of rainfall, agricultural practices, soil leaching, and runoff. The application of fertilizers, some containing muriate potash (potassium chloride) and the application of lime (calcium carbonate) to the soil may explain the higher calcium, magnesium, sulfates, chlorides, and nitrates found in the drainage ditch (particularly following the heavy rainstorm event in May 1979).

The water in Lake Okahumpka is a calcium bicarbonate water derived from flow from Chitty Chatty Creek, rainfall, and runoff from a golf course on the eastern side of the lake.

Lake Deaton water is unique because of its low concentration of calcium and bicarbonate. The water is made up mainly from rainfall and overland runoff, with a possibility of some runoff from the muck farm to the east as indicated by the relatively high chloride, nitrogen, and phosphorus concentrations as compared to Lake Okahumpka (figs. 9 and 10). One possible explanation for the low concentration of calcium and bicarbonate is the use of bicarbonate in photosynthesis by the large phytoplankton community. The ability of plants to utilize bicarbonate has been established for many but not all algae (Ruttner, 1952, p. 69). The need for carbon dioxide in photosynthesis ($6H_2O + 6CO_2 \rightleftarrows C_6H_{12}O_6 + 6O_2$) can be satisfied by free CO_2 in solution and, for some algae, the CO_2 that is stored in the bicarbonate ion ($Ca^{++} + 2HCO_3^- \rightleftarrows Ca^{++} + CO_3^{--} + H_2O + CO_2$). For the calcium carbonate to remain in solution, there must be a surplus of CO_2 in solution; without this surplus, $CaCO_3$ will precipitate (Ruttner, 1952). High CO_2 demand of the phytoplankton in Lake Deaton could result in $CaCO_3$ precipitation.

The major plant nutrients, nitrogen and phosphorus, are important to water quality chiefly because excessive amounts of these nutrients may lead to accelerated aging, or eutrophication of lakes. Potential sources of these nutrients are many and may include (1) municipal or domestic wastes, (2) animal wastes and runoff from fertilized fields, and (3) decomposed plant debris. Fixation of atmospheric nitrogen by plants may also be an important source of nitrogen in some lakes (Ruttner, 1952, p. 88).

The highest concentrations of nitrogen found in the Lakes Deaton and Okahumpka area (fig. 10) were in the drainage canal at Bamboo (site S2 on fig. 2). Both in February and in May, 1979, inorganic nitrogen ($NO_3 + NO_2$) was predominant over the organic forms at this site. In May, the nitrogen content, especially the inorganic forms, was extremely high. The sampling in May was preceded by heavy rainfall, and runoff from the farms upstream from the sampling site was probably the source of the nitrogen. Nitrogen concentrations in Chitty Chatty Creek and in the inflow to Hogeye Sink (sites S3 and S4 on fig. 2) were much lower than in the Bamboo drainage canal; also, the relative concentration of inorganic nitrogen to organic nitrogen was much lower. This indicates that the nitrogen discharged from the drainage canal is being diluted by water from other sources or that the nitrogen (especially the inorganic forms) is being retained by the rooted plants in the marshy watercourse of Chitty Chatty Creek. Lake Okahumpka (site S6) had the lowest nitrogen concentrations, and nearly all of the nitrogen was in the organic form. Lake Deaton (site S5) had nitrogen concentrations, also mostly in the organic form, which were 2½ to 3 times higher than in Lake Okahumpka. These relatively high nitrogen concentrations in water samples from Lake Deaton may be the result of (1) runoff from the farms to the east of the lake, (2) nitrogen fixation by the prolific algae population, and (3) nitrogen contained in the suspended biomass of the algae.

The occurrence of phosphorus in the Lake Deaton and Lake Okahumpka area is similar in areal variation to that of nitrogen (fig. 10). The ortho, or inorganic form, of phosphorus predominated at the drainage canal, at Chitty Chatty Creek, and at Lake Deaton; other (including organic) forms of phosphorus were predominant in inflow to Hogeye Sink and at Lake Okahumpka.

As mentioned above, the nutrients nitrogen and phosphorus are of primary importance to water quality of lakes. However, exactly what constitutes an excessive nitrogen or phosphorus loading of lakes is difficult to establish, chiefly because of the many variables associated with plant production. The Florida Department of Environmental Regulation has stated that for Class III waters (recreation–propagation and management of fish and wildlife) that "***in no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora and fauna***" (Florida Department of State, 1978, p. 39).

Previous studies have suggested limiting concentrations of nitrogen and phosphorus. Mackenthun (1973) suggested that total phosphorus concentrations should not exceed 0.025 mg/L (milligrams per liter) in lakes, 0.1 mg/L in flowing streams, or 0.05 mg/L in streams feeding lakes or reservoirs. The U.S. Council on Environmental Quality (1975) suggested a limit of 0.6 mg/L of nitrate–nitrogen for eutrophication control. With respect to these suggested criteria, total phosphorus was present in excessive concentrations in May 1979 at the drainage canal, in February 1979 at Lake Okahumpka, and in both February and May at Lake Deaton. Nitrate–nitrogen was not present at either lake, was present in only small concentrations at Chitty Chatty Creek, but was present in excessive concentrations at the drainage canal.

Both lakes were sampled for selected metals in February. Of the 12 total metals concentrations determined, only 2, cadmium and mercury, were near the limits for Class III waters set by the Florida Department of Environmental Regulation (table 2). Because both cadmium and mercury concentrations were at, or nearly at, the lowest detectable levels for the analytical method used, they may or may not exceed the recommended limits.

Samples were analyzed for pesticides in both the water and bottom sediment at Lakes Deaton and Okahumpka in February. The analyses included determination of aldrin, chlordane, DDD, DDE, DDT, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, lindane, mirex, perthane, and toxapene for the water and the sediment; and additionally diazinon, ethion, ethion parathion, ethion trithion, malathion, methyl parathion, methyl trithion, 2,4-D, 2,4DP, 2,4,5-T, and silvex for the water. Pesticides in the bottom sediment were undetected except for heptachlor in Lake Deaton, which was 7.5 micrograms per kilogram. Heptachlor is used as a contact poison, and as a fumigant in soils, and may be applied by itself or as a component of the chlordane mixture. However, no chlordane residue was found in Lake Deaton.

Dissolved-oxygen concentrations were higher in February than in May in the lakes. The higher dissolved oxygen in February is probably due to both the lower water temperature and a higher rate of biochemical respiration. Lake Deaton had dissolved-oxygen concentrations of 9.2 mg/L (95 percent saturation) on the bottom and 10.4 mg/L (111 percent saturation) near the surface in February; 5.7 mg/L (67 percent saturation) on the bottom and 7.6 mg/L (88 percent saturation) near the surface in May. Lake Okahumpka had dissolved-oxygen concentrations of 9.1 mg/L (93 percent saturation) in February and 7.6 mg/L (88 percent saturation) in May with no change in dissolved oxygen with depth. The major sources of dissolved oxygen in surface water are the atmosphere and plant photosynthesis. Owing to the changing production and consumption rates, dissolved oxygen can be highly variable with regard to both time and location, making the measurement useful only for the point of sampling and for a short period of time. The dissolved-oxygen measurements were made near midday at the center of the two lakes. Neither lake showed any evidence of a lack of dissolved oxygen.

Secchi disk transparency, a measurement of water transparency which is influenced by color, suspended sediment, and phytoplankton showed no change between February and May in the two lakes. At Lake Okahumpka, the Secchi disk transparency was to the lake bottom (about 4 ft). At Lake Deaton, Secchi disk transparency was 20 inches in February and 19 inches in May. The low transparency in Lake Deaton is the result of the large phytoplankton population and not of suspended sediment materials or color. The Secchi disk transparency is useful for estimating depth of the euphotic, or producing zone, which is the zone that receives 1 percent or more of the surface light. The euphotic zone is estimated by multiplying the Secchi disk transparency by 5. Thus the euphotic zone in Lake Okahumpka was to the bottom and at Lake Deaton the euphotic zone was estimated to a depth of about 8.1 feet, which is about the maximum depth of the lake. Based on water column transparency, even in the turbid (but shallow) Lake Deaton, plant production on the sampling dates could have occurred from water surface to lake bottom.

Two phytoplankton samples each were collected at Lakes Okahumpka and Deaton—one in February and another in May. Four phylums were identified: Cyanophyta (blue-green algae), Chlorophyta (green algae), Chrysophyta (yellow-green algae), and Euglenophyta (euglenoids). The blue-green algae were dominant in both samples from Lake Deaton and in the February sample from Lake Okahumpka (fig. 11). Species of the blue-green algae are considered the most nuisance-producing type of phytoplankton. They tend to produce objectionable odor and taste, may be generally inedible by higher aquatic life forms, and may have gas vacuoles allowing them to float on the water surface. Many species of blue-green algae can contribute to enrichment of water because of their ability to fix atmospheric nitrogen.

In Lake Okahumpka, the total concentration of phytoplankton was about the same in May as in February. Lake Deaton had a large increase in cell concentration with almost six times the number in May as in February.

The phytoplankton were identified to the genus level and a summary of this identification is given in table 3. The number of genera identified ranged from 8 in May at Lake Deaton to 18 in February at Lake Okahumpka. At least 50 percent of the total cell count for each sample was accounted for by no more than three genera.

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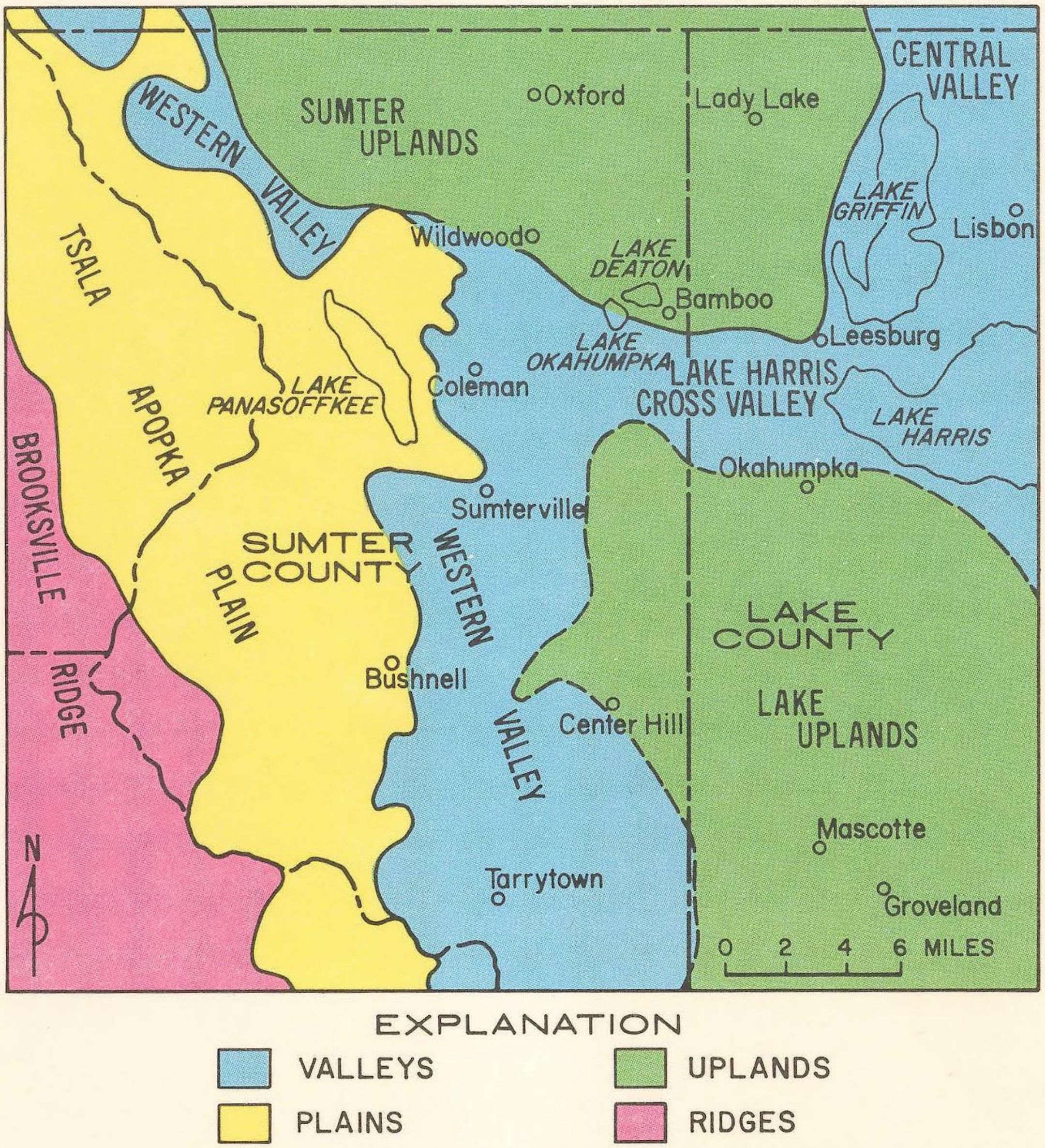

Figure 3.—Physiography of central Florida (modified from White, 1970).

Table 1.—Morphological and related properties of Lakes Deaton and Okahumpka

Property	Lake Deaton	Lake Okahumpka
Surface area in acres[1]	506	513
Mean depth in feet (approximate)	6	4
Volume in acre-feet	3,100	2,100
Shoreline length in miles[1]	3.6	3.8
Drainage area in square miles	12.7	55.2[2]

[1]Open water at a water-surface altitude of 63 feet for Lake Deaton and 57 feet for Lake Okahumpka.
[2]Includes the area drained by Hogeye Sink.

Table 3.—Number of phytoplankton genera and most numerous genera, February and May 1979

(The genera listed comprise at least 50 percent of the total cell count.)

Lake	Date	Number of genera	Dominant genera (and major group) and percentage of total cell count	
Deaton	Feb. 21	10	*Oscillatoria* (blue-green algae)	76
Do.	May 9	8	*Lyngbya* (blue-green algae)	49
			Oscillatoria (blue-green algae)	27
Okahumpka	Feb. 21	18	*Cyclotella* (yellow-green algae)	29
			Dinobryon (yellow-green algae)	14
			Microcystis (blue-green algae)	13
Do.	May 9	14	*Mycrocystis* (blue-green algae)	44
			Chlorella (green algae)	12

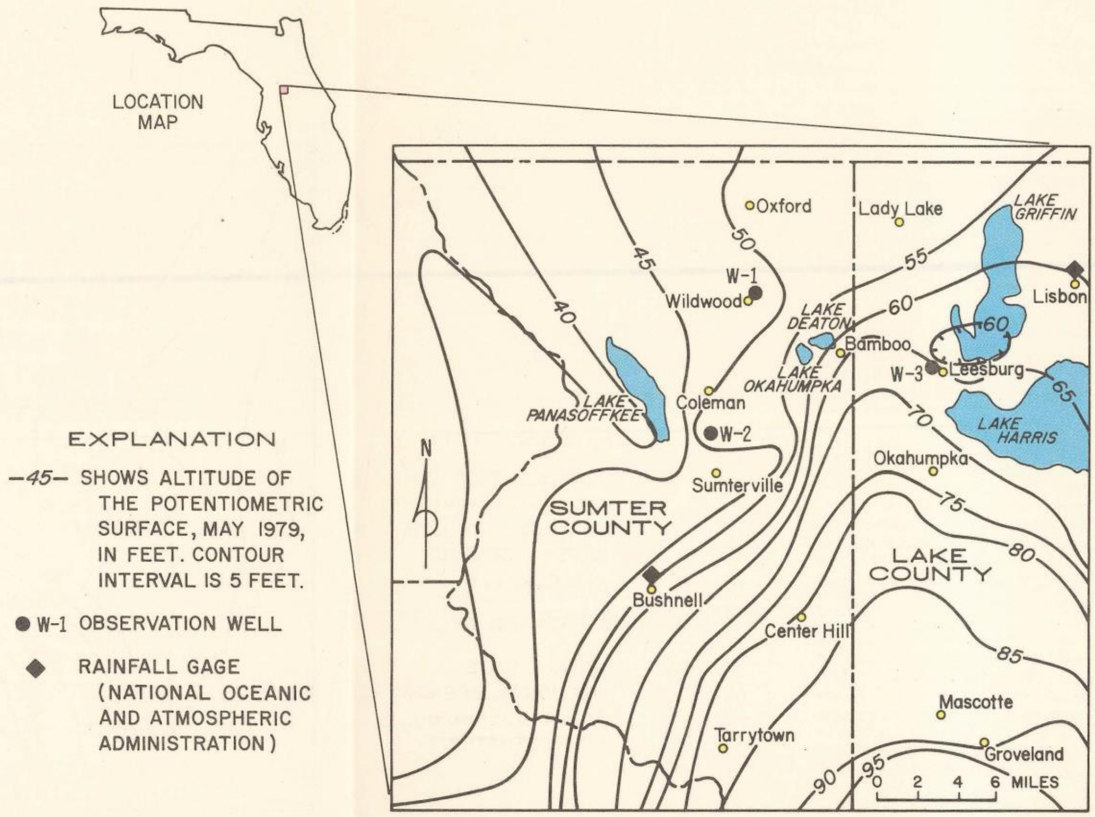

Figure 1.—Sumter-west Lake County area showing locations of selected hydrologic record stations, and the potentiometric surface of the Floridan aquifer for May 1979. (Laughlin, Hayes, and Schiner, 1979)

Table 2.—Concentrations of selected metals and criteria (limits of concentrations) set by Florida Department of Environmental Regulation for Class III (recreational) waters

(All concentrations are in micrograms per liter)

Location	Arsenic	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Zinc
Lake Okahumpka	1	0	2	10	0	280	17	20	< 0.5	7	0	0
Lake Deaton	1	0	1	< 10	0	50	3	30	< .5	6	0	0
Florida Department of Environmental Regulation criteria for Class III waters.	50	11[1]	.8[1]	50	30	1,000	30	—	.2	1,000	25	30

[1]For waters with hardness not exceeding 150 milligrams per liter as calcium carbonate.

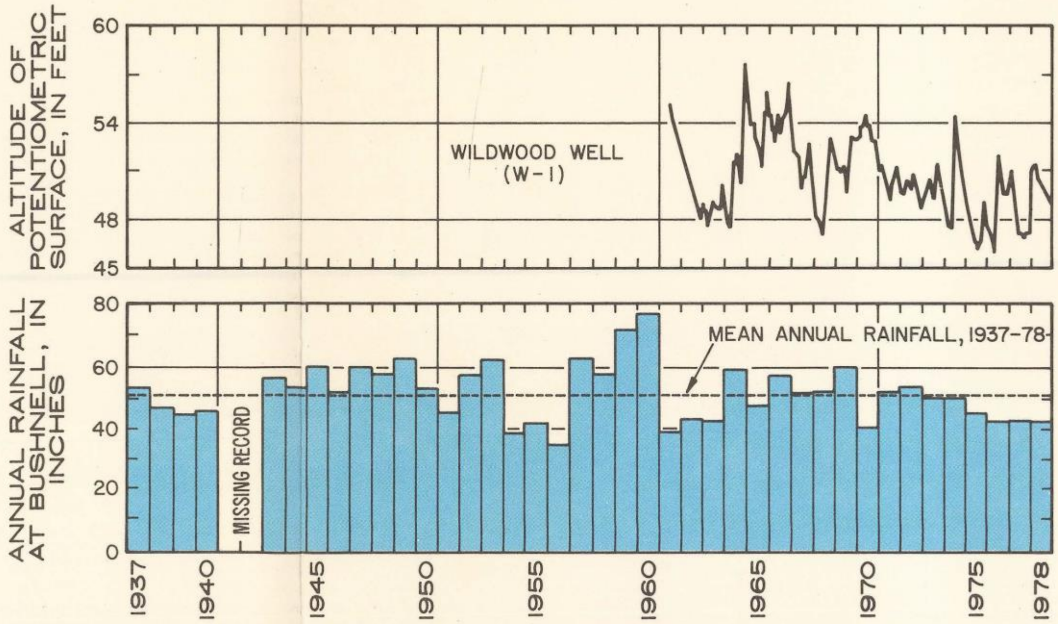

Figure 5.—Long-term rainfall at Bushnell and elevation of potentiometric surface of the Floridan aquifer near Wildwood.

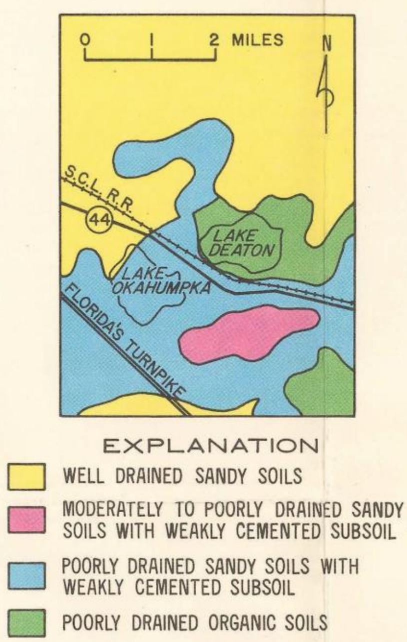

Figure 4.—Soils of the Lake Deaton and Lake Okahumpka area (U.S. Department of Agriculture, 1976).

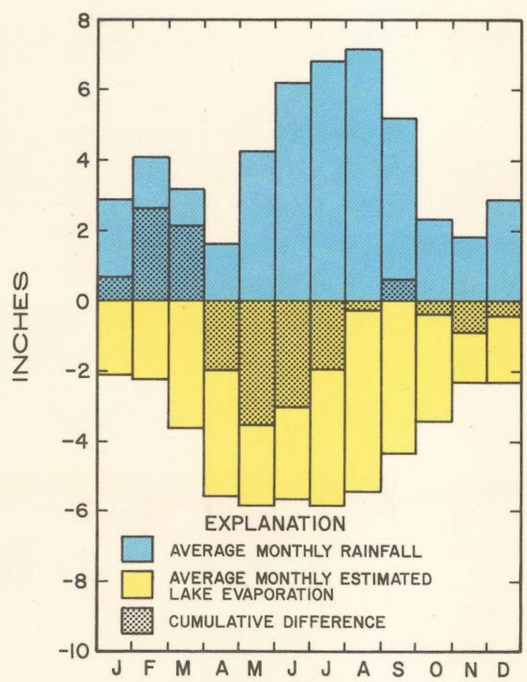

Figure 6.—Monthly rainfall, lake evaporation and cumulative difference between rainfall and lake evaporation, 1963–78.

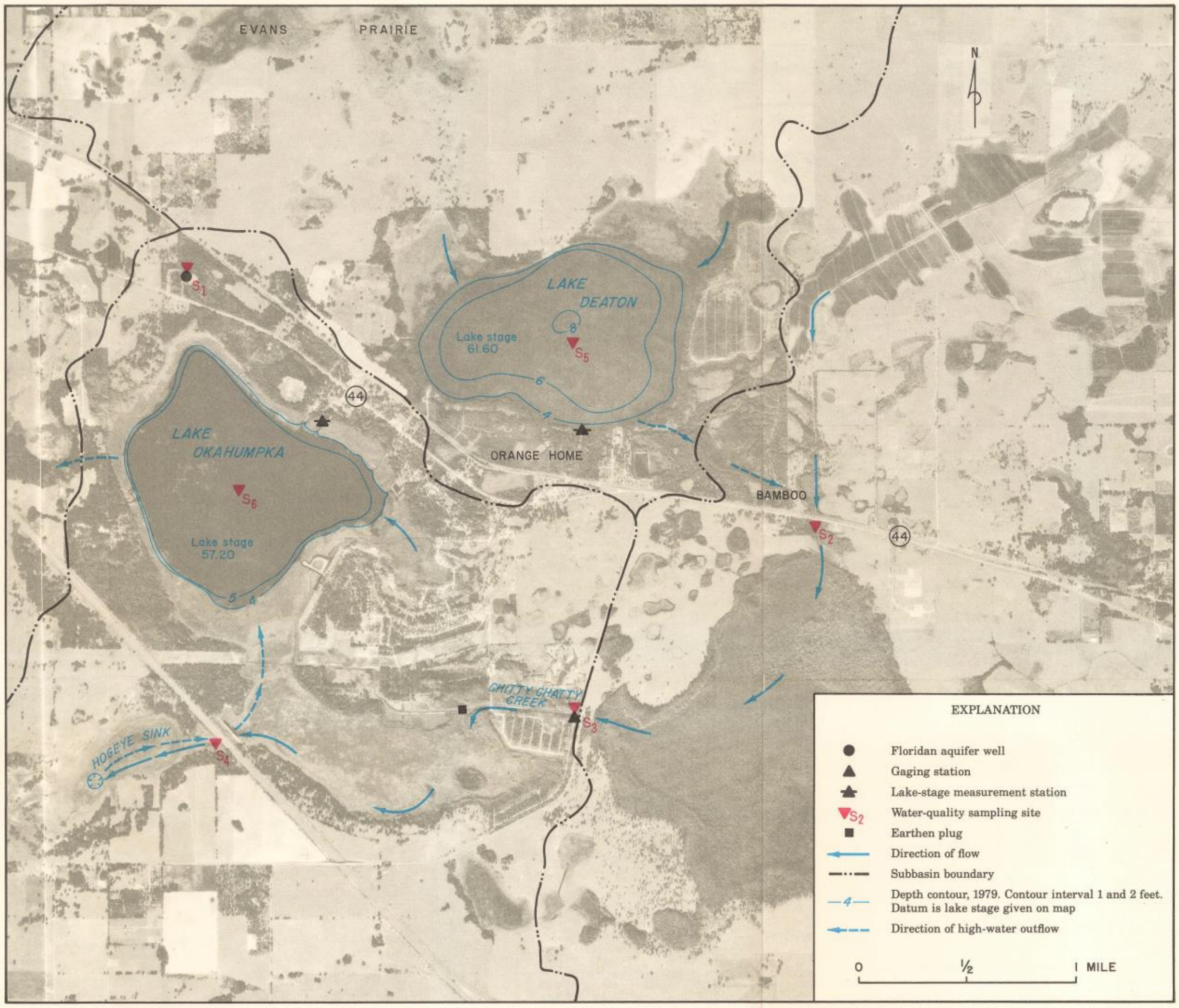

Figure 2.—Lake Deaton, Lake Okahumpka, and surrounding area, with selected hydrologic information and station locations.

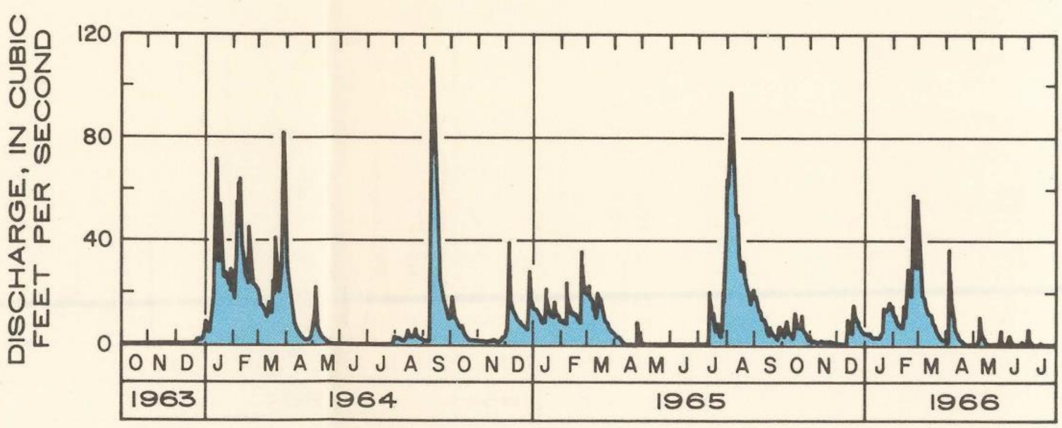

Figure 7.—Discharge of Chitty Chatty Creek for the period October 1963 to July 1966.

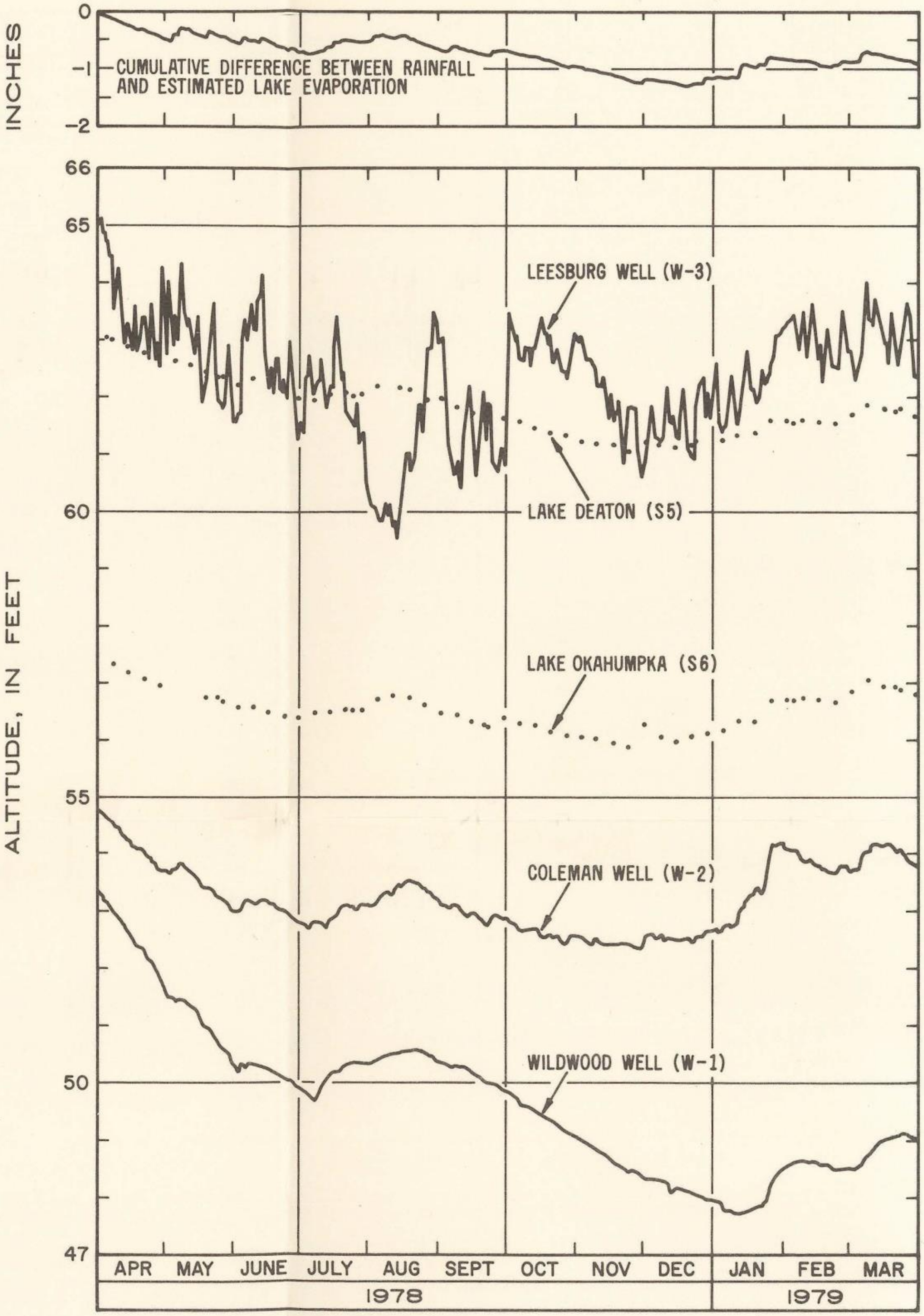

Figure 8.—Cumulative difference between rainfall and lake evaporation, water-surface altitude in Lakes Deaton and Okahumpka, and altitude of potentiometric surface of the Floridan aquifer at three selected locations, April 1978 to March 1979.

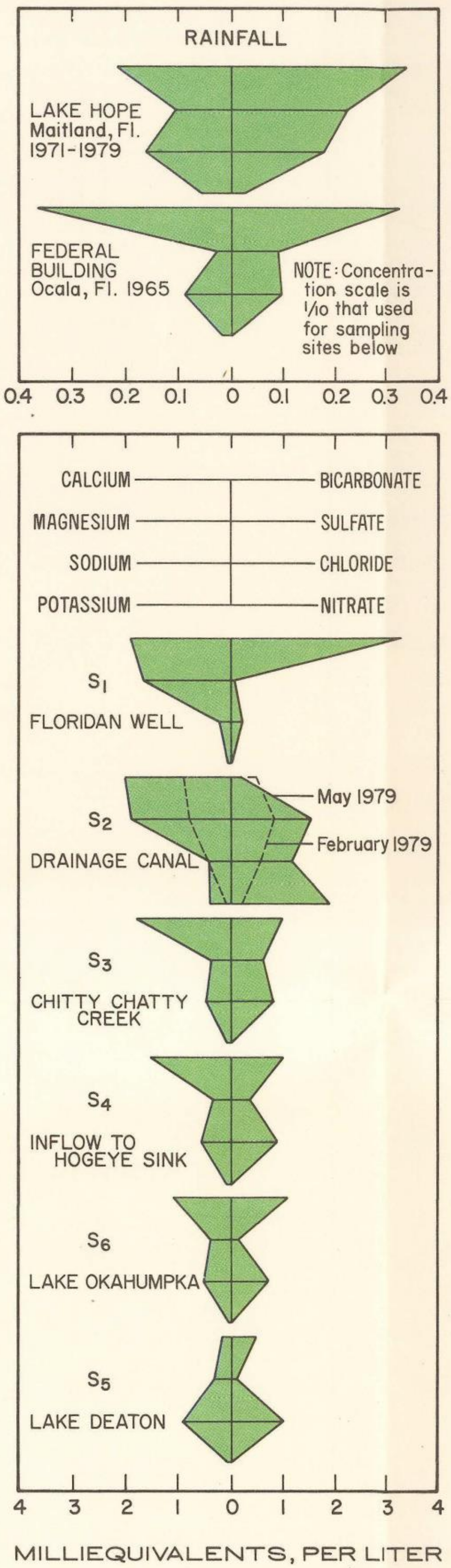

Figure 9.—Major dissolved constituents in water from six sites and in rainfall.

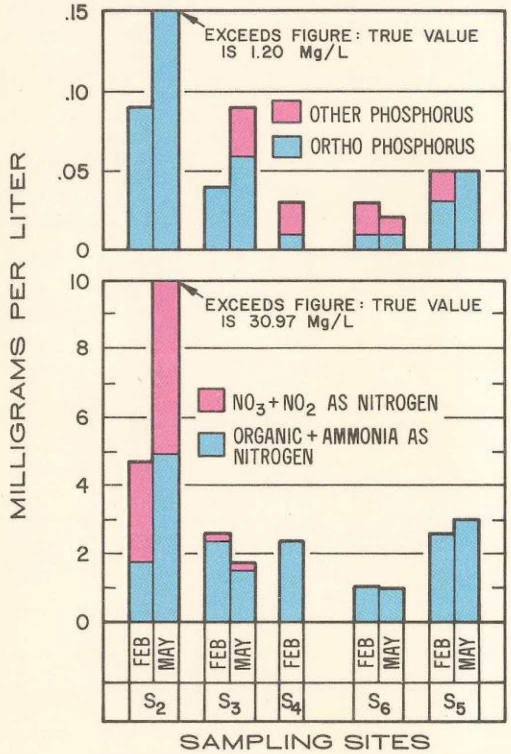

Figure 10.—Concentrations of nitrogen and phosphorus species in February and May 1979.

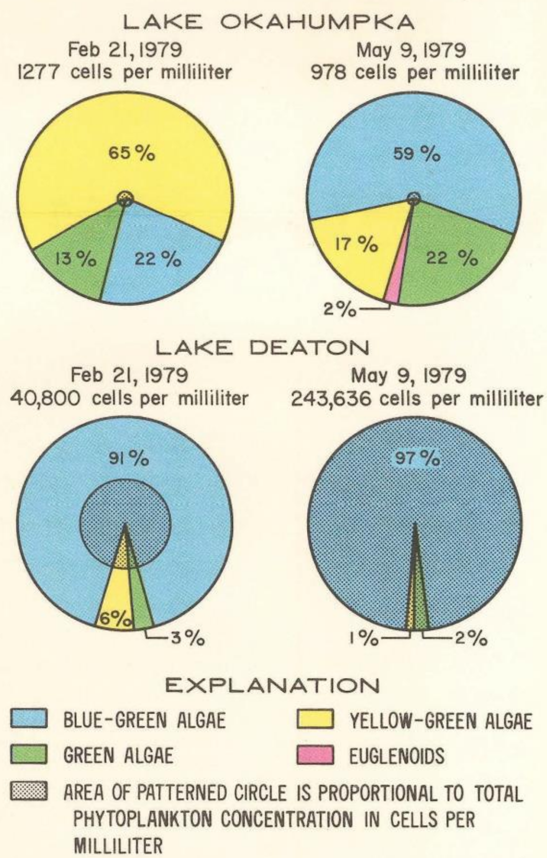

Figure 11.—Distribution of phytoplankton phyla.