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STATE BOARD OF CONSERVATION
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FLORIDA GEOLOGICAL SURVEY

Robert O. Vernon, Director

REPORT OF INVESTIGATIONS NO. 37

**GEOLOGY AND GROUND-WATER RESOURCES
OF GLADES AND HENDRY
COUNTIES, FLORIDA**

By
Howard Klein, M. C. Schroeder, and W. F. Lichtler
U. S. Geological Survey

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in cooperation with the
FLORIDA GEOLOGICAL SURVEY
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Tallahassee
1964

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Florida Geological Survey

Tallahassee

October 10, 1964

Honorable Farris Bryant, *Chairman*
Florida State Board of Conservation
Tallahassee, Florida

Dear Governor Bryant:

The Division of Geology is publishing, as Florida Geological Survey Report of Investigations No. 37, a report on the "Geology and Ground-Water Resources of Glades and Hendry Counties, Florida," which was prepared by Howard Klein, M. C. Schroeder, and W. F. Lichtler, as a part of a cooperative program between the U. S. Geological Survey and the Florida Geological Survey.

Both Glades and Hendry counties obtain water from the Floridan aquifer, generally by artesian flow, and from several shallow aquifers. Recharge of the artesian aquifer occurs over these counties and in Polk County. The report is a continuation of a series, which is designed ultimately to present the geologic and hydrologic facts of all of the State. Only in this way, can the State be guaranteed a conservative and adequate development of its water and associated resources.

Respectfully yours,

Robert O. Vernon
Director and State Geologist

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GEOLOGY AND GROUND-WATER RESOURCES OF GLADES AND HENDRY COUNTIES, FLORIDA

By

Howard Klein, M. C. Schroeder, and W. F. Lichtler

ABSTRACT

Ground water in Glades and Hendry counties is obtained from the Floridan aquifer, which yields water by artesian flow in most areas of the two counties, and from several shallow aquifers.

Highly permeable parts of the Floridan aquifer are limestones of the Tampa Formation¹ (early Miocene) and of the Ocala Group and the Avon Park Limestone (Eocene). The yields of wells penetrating the Floridan aquifer usually exceed 200 gpm (gallons per minute). Except in the central and northwestern parts of Glades County, wells deeper than 800 feet yield highly mineralized water. The upper part of the Floridan aquifer (Tampa and Hawthorn Formations) yields relatively fresh water in the vicinity of LaBelle, Hendry County, and in all of Glades County except in the area adjacent to Lake Okeechobee. In the remainder of Hendry County, the artesian water contains more than 700 ppm (parts per million) of chloride.

The artesian aquifer in Glades and Hendry counties is recharged primarily from the piezometric high in Polk County in central Florida. The piezometric surface of the aquifer is highest in northwestern Glades County and southeastern Hendry County. The high-pressure area in southeastern Hendry County may be a residual mound resulting from a large number of uncontrolled flowing wells to the northwest. This uncontrolled discharge over a long period has resulted in an overall decline in artesian pressure in the counties. Discharge from the aquifer is mainly through flowing wells.

¹The nomenclature of the rock units conform to the usages of the Florida Geological Survey and also, except for the Tampa Formation and the Ocala Group and its subdivisions, with those of the U. S. Geological Survey which regards the Tampa as the Tampa Limestone and the Ocala Group as two formations—the Ocala Limestone and the Inglis Limestone.

The Ocala Group as used by the Florida Geological Survey includes the Crystal River, Williston, and Inglis Formations.

Shallow ground water is obtained from wells ranging in depth from 20 to 300 feet, which penetrate limestone and shell beds in the Tamiami Formation (upper Miocene) and limestone and pebble beds in the upper part of the Hawthorn Formation. The quality of the water from these aquifers generally is superior to that from the Floridan aquifer. Yields of 6-inch wells tapping shallow aquifers range from about 200 to 1,400 gpm. The most prolific shallow aquifer is a highly permeable limestone section of the Tamiami Formation which underlies central and southern Hendry County. Recharge to shallow aquifers is by local rainfall, by downward seepage from overlying sediments, and by southward underflow from Highlands County, where pebble beds and limestone of the Hawthorn Formation occur at shallow depth. Discharge from the shallow aquifers is chiefly by evapotranspiration and by pumping for irrigation of truck crops.

Quantitative tests on wells penetrating the shallow aquifers show that the coefficient of transmissibility ranges from 70,000 gpd/ft (gallons per day per foot) to 1,070,000 gpd/ft, and that the coefficient of storage ranges from 0.00015 to 0.0014. A method for forecasting the results of continued pumping during an extensive drought is illustrated in the report.

INTRODUCTION

PURPOSE AND SCOPE OF INVESTIGATION

The extensive and expanding utilization of ground water for domestic, municipal, and irrigation supplies in Glades and Hendry counties, Florida, has created the problem of locating and preserving satisfactory water supplies. The expansion of agriculture increases the demand for irrigation water, a large part of which must come from ground-water reservoirs. The development and growth of communities are in part dependent upon the availability of adequate supplies of potable water. This report describes the geology and appraises the ground-water resources of Glades and Hendry counties. It contains information on the location, availability, and quality of the ground-water resources in the two counties, and furnishes basic data that can be used in flood control and water conservation.

Fieldwork for the investigation was begun late in 1952 by the U. S. Geological Survey in cooperation with the Florida Geological Survey and the Central and Southern Florida Flood Control District,

but was suspended between 1953 and 1958 because of more urgent commitments. Work was resumed in June 1958 and was completed by September 1958.

The investigation was under the supervision of N. D. Hoy, district geologist, and M. I. Rorabaugh, district engineer, of the U. S. Geological Survey.

ACKNOWLEDGMENTS

The investigation was aided by data contributed by local residents, property owners, farmers, and ranchers. These data included the locations of wells, their total depth, casing depth, and yield, and in a few cases information on the quality of the water. The generosity of local residents in permitting the sampling of wells and measuring of water levels is greatly appreciated. The writers are especially indebted to the following well drillers and concerns: Roy Messer, LaBelle; Chester Beeles and James Drawdy, Arcadia; C. D. Cannon, Palmetto; the B. & D. Drilling Co., and James Whatley of Immokalee; and Miller Bros., Fort Myers. They granted permission to collect rock cuttings and water samples, take flow readings, and measure water levels during the drilling of wells and, in addition, they furnished geologic and hydrologic information. Flow-velocity measurements in flowing artesian wells were made through the cooperation of C. C. Carlton, Arcadia, and M. K. Wheeler, LaBelle.

The Florida Geological Survey furnished logs of a few shallow and deep wells in the area. The Corps of Engineers, U. S. Army, Jacksonville District, furnished charts of water stages of the Caloosahatchee River.

Mollusks listed in the well logs were identified by Julia Gardner and F. S. MacNeil of the Paleontology and Stratigraphy Branch, U. S. Geological Survey, Washington, and by personnel of the Florida Geological Survey, Tallahassee.

PREVIOUS INVESTIGATION

References to the geology and ground-water resources of Glades and Hendry counties have been made in several reports published by the Florida Geological Survey and the U. S. Geological Survey. Brief descriptions of surface and subsurface geology and water-well data in the Glades-Hendry area were presented by Matson and Clapp (1909), Sellards (1912, 1919), Matson and Sanford (1913), and Cooke and Mossom (1929). Stringfield (1936) discussed the

geology and hydrology of the principal artesian aquifer in Florida. Cooke (1945) and Parker and Cooke (1944) discussed the surface and shallow subsurface geology in the Caloosahatchee River and Lake Okeechobee areas. Water-quality and water-level data were given by Stringfield (1936), and the chemical analyses of 17 ground-water samples were published by Black and Brown (1951). Schroeder and Klein (1954) described and interpreted the shallow geology of eastern Hendry County from a series of core borings. Parker and others (1955) gave generalized information on the geology of Glades and Hendry counties and presented a few specific data concerning the quality of the water from the Floridan aquifer and the shallow aquifers. DuBar (1958) described in detail the geology along the Caloosahatchee River and discussed the stratigraphic relationship of the Caloosahatchee Marl and the Fort

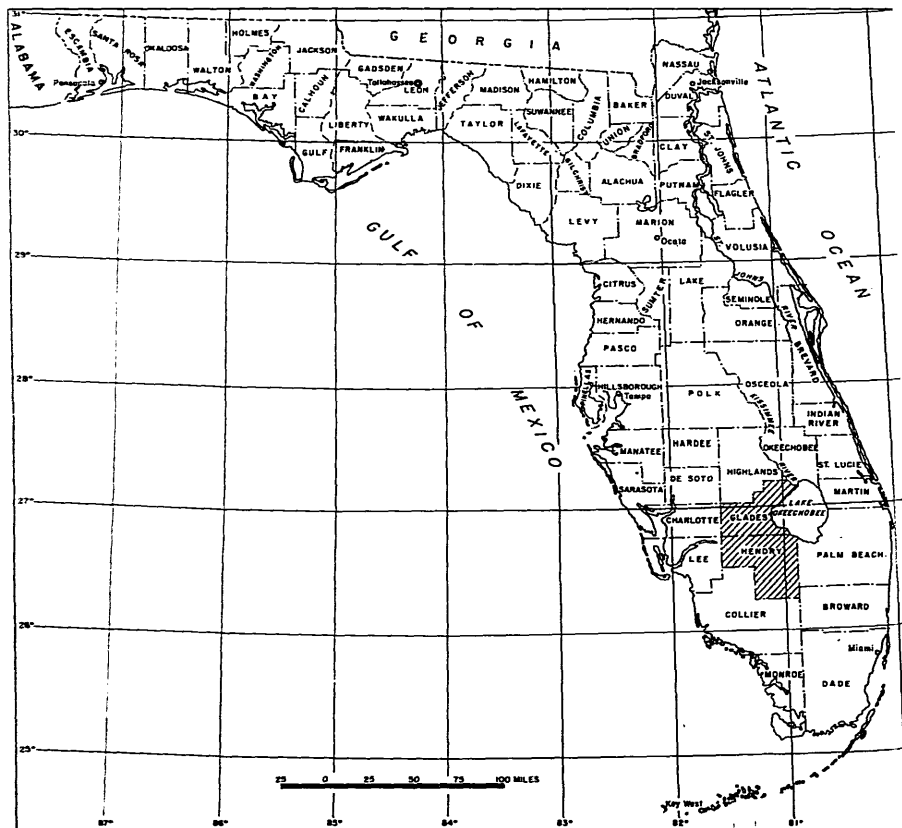


Figure 1. Location of Glades and Hendry counties.

Thompson Formation. The following U. S. Geological Survey Water-Supply Papers contain records of ground-water levels in Hendry County: 987, 1017, 1024, 1072, 1097, 1127, 1157, 1166, 1192, 1222, 1266, 1322, and 1405.

GEOGRAPHY

LOCATION OF AREA

Glades and Hendry counties are in the central part of southern Florida and constitute an area of approximately 2,000 square miles. Glades County, the smaller, lies north of Hendry County and borders the western shore of Lake Okeechobee (fig. 1).

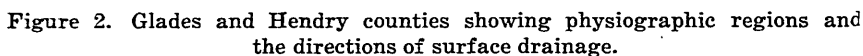
GENERAL LAND FEATURES AND DRAINAGE

Three general physiographic units are included in Glades and Hendry counties and are classified with respect to land-surface altitude, surface-mantling material, and types of vegetation. The general units listed by Parker and Cooke (1944, p. 38-53) are the Everglades, the Sandy Flatlands, and the Big Cypress Swamp (fig. 2). Davis (1943, p. 40-50) subdivided the Sandy Flatlands and used the designation Western Flatlands for the area west of Lake Okeechobee. Also, he specifically designated the area in northeastern Glades County as the Istokpoga-Indian Prairie Basin. This unit extends northwestward into Highlands County.

EVERGLADES

The Everglades covers an area along the eastern boundary of Hendry County and reaches a maximum width of about 6 miles in the northeastern part of the county (fig. 2). In Glades County the Everglades borders part of the southwestern shore of Lake Okeechobee and extends to Lake Hicpochee. The boundary between the Everglades and other physiographic units is indefinite, but may be placed where sedges and sawgrass give way to true grasses, pinelands, and cypress trees. Places of slightly higher altitude support the growth of trees and shrubs because of better aeration of the soil.

The soil of the Everglades is predominantly organic, but it contains some fine sand. The organic soil is composed almost entirely of peat in eastern Hendry County, where the maximum thickness is 8 feet. Farther north, in southeastern Glades County, the



sand content gradually increases until the soil loses its organic character. In eastern Hendry County the Everglades peat and muck overlies marl or an eroded marly limestone surface (Parker and Cooke, 1944, p. 48) at an altitude of about 8 feet above msl (mean sea level). The surface altitude of the Everglades is everywhere less than 25 feet above msl.

SANDY FLATLANDS

The Sandy Flatlands is the largest physiographic unit in Glades and Hendry counties. In Glades County it includes all but the area east of Lake Hicpochee, and in Hendry County all but the eastern and southern edges (fig. 2). The Sandy Flatlands extends northward into Highlands County, westward to the Gulf of Mexico and southward into Collier County. A minor subdivision in northeastern Glades County is the southward extension of the Istokpoga-Indian Prairie Basin.

The sands were deposited as marine terraces during late Pleistocene time, when sea level fluctuated from more than 70 feet to less than 25 feet above sea level.

The surface altitude in the Sandy Flatlands ranges from about 10 feet to more than 70 feet above msl. The highest sandy surfaces, which are in western Glades County and north of Fisheating Creek, were deposited by the Penholoway sea of Pleistocene time, which stood 42 feet to more than 70 feet above present sea level. The wide reentrant in the Penholoway terrace in the northwestern part of Glades County (fig. 3) resulted from erosion by Fisheating Creek after the recession of the Penholoway sea. Figure 3 (from Parker and others, 1955, pl. 10) shows the approximate extent of Pleistocene terrace surfaces in Glades and Hendry counties.

The Talbot terrace slopes gently toward the Caloosahatchee River and Lake Okeechobee and surface altitudes range from about 42 to 30 feet above msl (fig. 3). An area in western Hendry County, where altitudes are comparable to the Talbot terrace, was referred to by Parker (1955, p. 139) as Immokalee Island. The Pamlico terrace, where altitudes do not exceed 30 feet above msl, is the area between the Talbot terrace and the Everglades.

BIG CYPRESS SWAMP

The Big Cypress Swamp includes a large part of southern Hendry County. The land-surface altitude in this area is lower than that of the Sandy Flatlands, but is usually slightly higher than

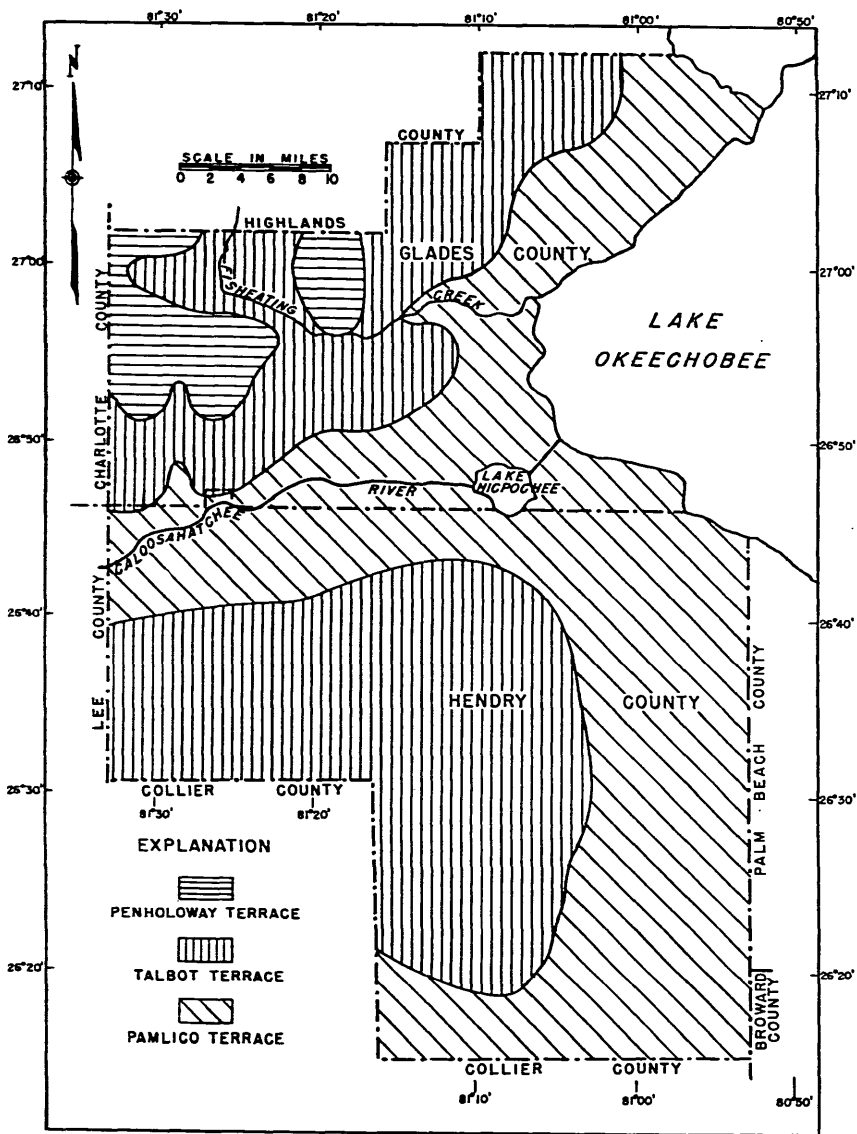


Figure 3. Approximate extent of Pleistocene terraces in Glades and Hendry counties.

the Everglades. Except in small areas of southwestern Hendry County, altitudes are less than 25 feet above msl.

The soil of the Big Cypress Swamp in Hendry County is chiefly sand grading to loam near the northern boundary of Collier County. At the edges of the Big Cypress Swamp the soils merge with the sand of the higher Sandy Flatlands and the peat and muck of the Everglades.

The surface of the Big Cypress Swamp is flat and marked by many small, high hammock areas. The hammocks support bunch grass, palmettos, and pines, and stand out from the swampy region where low cypress, sedges, and marsh plants predominate.

DRAINAGE

Most of Glades and Hendry counties lie within the Fisheating Creek and the Caloosahatchee River watersheds. These and other drainage features are shown in figure 2. Drainage of the northern part of Glades County is by Fisheating Creek, which flows southward from the high sandy ridge areas of Highlands County into Glades County and eastward into Lake Okeechobee. Because of the low gradient in the eastern reaches of Fisheating Creek, drainage is sluggish and much of this area in eastern Glades County is flooded during rainy seasons. The northeastern part of the county is drained chiefly by the Kissimmee River, the Harney Pond Canal, and the Indian Prairie Canal. Drainage in the remainder of Glades County and the western part of Hendry County is by the Caloosahatchee River. The divide that separates the Caloosahatchee River and the Fisheating Creek drainage basins trends east-southeast across south-central Glades County. The Devil's Garden marshy area in central and southern Hendry County drains sluggishly to the west into the Okaloacoochee Slough, which in turn normally drains northward into the lower Sandy Flatlands, and southward into the Big Cypress Swamp. During high-water periods, drainage from Devil's Garden may occur in all directions.

The discharge of the Caloosahatchee River depends upon the water stage of Lake Okeechobee. During low lake stages the spillways and gates at Ortona Lock are closed and flow in the river is greatly reduced. However, during wet periods the gates are opened and the discharge of the river is increased many times. The stage of the Caloosahatchee River is affected by the Gulf of Mexico tides as far upstream as the Ortona Lock.

Before drainage and water control were in effect in the Everglades and Lake Okeechobee areas, the Lake Flirt basin and Lake

Hicpochee were fed by overflow from Lake Okeechobee. Much of the Everglades and the areas adjacent to Lake Okeechobee and the Caloosahatchee River were flooded during rainy seasons and for a considerable period afterward. The construction of the levee along the southern rim of Lake Okeechobee and the improvement of the channel of the Caloosahatchee River after the floods of 1928 resulted in a decrease in the overall area affected by periodic flooding.

The Devil's Garden and the Okaloacoochee Slough in central and western Hendry County are the largest remaining marshy areas (fig. 2). Surface runoff throughout most of the 2-county area is sluggish because of the flatness of the region. Rainfall soaks into the sandy mantle of the flatlands, and when the ground becomes saturated, wide shallow ponds and marshes form in large areas.

CLIMATE

The climate of Glades and Hendry counties is subtropical and the temperature rarely falls below freezing. Table 1 shows the average monthly and yearly temperatures at Moore Haven and La Belle. Table 2 shows the maximum, minimum, and average monthly and yearly rainfall at the same stations. The average annual rainfall for the period 1935-56, from U. S. Weather Bureau records, is 49.83 inches at Moore Haven and 51.81 inches at LaBelle. The maximum monthly rainfall at Moore Haven was 21.55 inches in September 1948. The minimum of record occurred in 1956 when only 30.94 inches of rain fell at Moore Haven. Rainfall is heaviest during June through October and lightest during November through February. The average monthly rainfall at the Moore Haven and LaBelle stations is similar.

TABLE 1. Average Temperature ($^{\circ}$ F) at Moore Haven and LaBelle, 1935-56

	Moore Haven	LaBelle
January	64.00	64.2
February	64.5	64.4
March	67.5	68.0
April	72.0	72.5
May	75.9	76.5
June	79.5	79.9
July	80.9	81.3
August	81.4	81.7
September	80.3	80.6
October	75.9	75.6
November	68.9	68.5
December	67.4	65.1
Year	73.2	73.2

TABLE 2. Rainfall, in Inches, at Moore Haven and LaBelle, 1935-56

	Max.	Moore Haven Min.	Average	Max.	LaBelle Min.	Average
January	5.73	0.05	1.45	4.07	0.00	1.48
February	5.02	.03	1.68	5.46	.03	1.84
March	8.73	.03	2.17	8.84	.01	2.35
April	5.64	.21	3.03	7.71	.65	3.05
May	11.96	1.13	4.39	9.24	.71	3.12
June	15.02	3.61	7.25	19.32	3.33	9.20
July	16.13	2.99	8.27	15.14	5.11	8.46
August	12.51	2.39	6.61	13.90	2.21	7.66
September	21.55	2.23	8.08	18.51	2.92	7.87
October	11.11	.03	4.17	13.46	.31	4.21
November	5.47	.03	1.31	2.21	.18	1.26
December	6.46	.11	1.42	4.63	.08	1.31
Year	71.20	30.94	49.83	73.83	36.83	51.81

DEVELOPMENT AND GROWTH OF AREA

In 1950 the populations of Glades and Hendry counties were 2,199 and 6,051, respectively. Between 1940 and 1950 the population of Glades County declined about 20 percent and that of Hendry County increased more than 10 percent. The estimated populations as of July 1958 were 3,100 for Glades County and 7,200 for Hendry County. Most of the population is concentrated near Lake Okeechobee. In 1950, Moore Haven, the Glades County seat, LaBelle, the Hendry County seat, and Clewiston, had populations of 636, 945, and 2,499, respectively. The population of the area increases in winter when migrant farmworkers move into the area for the growing season. Only a small number of tourists visit these two counties, mainly for fishing in Lake Okeechobee and hunting.

Agriculture is the predominant economic activity in both counties, and the chief products are winter vegetables, sugarcane, beef cattle, and dairy products. Green beans, lettuce, and sugarcane are grown on the Everglades mucklands adjacent to Lake Okeechobee; peppers, tomatoes, cucumbers, and watermelons are the main crops raised on the sandy soils. A crop is grown every year on the mucklands, but on the sandy soils the land is farmed for only one or two seasons, owing to the spread of plant disease and the rapid growth of Bermuda grass on the cultivated soil. The land then usually is converted to improved pasture with a forage cover of pangolia, carib, or other grass. Citrus is grown along the Caloosahatchee River downstream from LaBelle. Dairy farms are located near Clewiston, LaBelle, Moore Haven, and Lakeport. One of the largest single-unit cane factories for producing raw sugar is located south of Clewiston.

GEOLOGIC FORMATIONS AND WATER-BEARING CHARACTERISTICS

The main water-bearing rocks underlying Glades and Hendry counties include consolidated and unconsolidated strata ranging in age from Eocene to Recent. Rocks of middle Miocene age and older yield water by natural flow, but the shallower, younger sediments yield water to wells in which the water levels normally are below the land surface. The sediments form part of the southern flank of the regional Ocala uplift (Vernon, 1951, p. 54-65), the crest of which is in northern and north-central Florida. The beds conform to the regional uplift in a subdued manner and dip gently to the south. The general sequence of geologic formations underlying Glades and Hendry counties is shown in table 3. Rocks deposited before the middle Miocene Epoch are composed almost entirely of limestone, formed by the accumulation and cementation of shell fragments and by chemical precipitation of calcium carbonate in a marine environment. Younger materials are chiefly clastics, deposited as an aggregate of sand, silt, and clay, with shelly material scattered throughout.

The surface sediments in Glades and Hendry counties are of Pleistocene and Recent age. Subsurface beds composed of impermeable clay and marl form a major part of the middle Miocene. A limestone section occurs at the top of the Tampa Formation and continues downward through Oligocene, Eocene, and Paleocene rocks. According to Applin (1951, p. 6-7) the top of the Upper Cretaceous rocks in Glades and Hendry counties occurs at depths ranging from 4,500 to 6,000 feet. Oil is recovered from Lower Cretaceous rocks at the Sunniland field (Collier County), near the southwest corner of Hendry County, from a depth of about 11,500 feet.

The recognition and differentiation of the Tertiary formations are of variable accuracy. In most samples macrofossils are not present in sufficient quantities to make accurate determination of the formation. In many cases no diagnostic fossils were present in the drill cuttings, and lithologic differences were used to identify the formations.

EOCENE SERIES

Rocks of the Eocene Series in Glades and Hendry counties are chiefly limestones of different textures and permeability, and are represented in ascending order by the Oldsmar Limestone, the Lake

TABLE 3. Geologic Formations in Glades and Hendry Counties

Series	Group	Formation ¹	Estimated range of thickness (feet)	Lithology and water-bearing properties
Recent		Organic soils	0- 8	Peat and muck ; water has high color.
		Lake Flirt Marl	0- 8	Fresh-water marl, sandy muck, carbonaceous sand ; of low permeability.
Pleistocene		Terrace deposits	0- 15	Quartz sand ; yields small quantities of water to sandpoint wells ; water is colored and high in iron content.
		Fort Thompson Formation (contemporaneous with Anastasia)	0- 15	Alternating marine shell beds and fresh-water marl ; generally of low permeability except locally where it is solution riddled.
		Anastasia Formation	0- 15	Sand, marl, and shell beds ; yields colored water to sandpoint wells.
Pliocene		Caloosahatchee Marl	0- 60	Shell, sand, and silt ; shell beds yield water that in some areas is highly mineralized.
Miocene		Tamiami Formation	30-110	Sand, marl, shell beds, and limestone ; limestone is fairly widespread and yields large quantities of water for irrigation.
		Hawthorn Formation	300-500	Clay marl, sand, gravel, and limestone ; clay marl forms confining beds for the Floridan aquifer ; limestone at base forms upper part of the Floridan aquifer ; sand and gravel and limestone beds in upper part yield water to wells.
		Tampa Formation	15-190	Sandy limestone ; yields water under artesian pressure ; is part of the Floridan aquifer.
Oligocene		Suwannee Limestone	0-570	
	Ocala		150-390	Limestone and dolomite ; yields water under artesian pressure, in many areas highly mineralized ; is part of the Floridan aquifer.
Eocene		Avon Park Limestone	200-390	Limestone and dolomite ; yields water under artesian pressure, highly mineralized in much of the area ; is part of the Floridan aquifer.
		Lake City Limestone	300+	Crystalline dolomite, dolomitic limestone and chalky limestone ; porous and highly permeable ; yields large quantities of highly mineralized water in much of the area ; is part of the Floridan aquifer.

¹U. S. Geological Survey lists formations as follows: Lake Flirt Marl as Pleistocene and Recent; Ocala Group as Ocala Limestone and Inglis Limestone; Tampa Formation as Tampa Limestone.

City Limestone, the Avon Park Limestone, and limestones of the Ocala Group. The Oldsmar Limestone, the oldest formation of the series, has not been penetrated by water wells in the two counties. Cooke (1945, p. 40) states that the formation unconformably overlies rocks of Paleocene age. In most places in Florida the formations of the Eocene Series can be differentiated only by a study of microfossils. Figure 4 shows the locations of wells for which detailed logs are available and also the locations of the geologic sections shown in figures 5-8.

LAKE CITY LIMESTONE

The Lake City Limestone is the name applied by Applin and Applin (1944, p. 1693) to the dark-brown chalky limestone of early middle Eocene age penetrated between depths of 497 to 1,010 feet in a well at Lake City, Columbia County. They give a thickness of 200 to 250 feet for the formation in peninsular Florida, and Cooke (1945, p. 46) also estimates that the formation in southern Florida ranges in thickness from 200 to 250 feet. The Lake City Limestone beneath southern Florida is composed of brown, hard, crystalline dolomite and dolomitic limestone, and cream-colored permeable limestone. The general absence of appreciable clastic material and the subsurface extent of the limestone indicates that Glades and Hendry counties were located a considerable distance offshore at the time of its deposition.

A large part of the fossil content of the Lake City Limestone is Foraminifera. Applin and Jordan (1945, p. 131) list species that they consider diagnostic of the formation. Vernon (1951, p. 92) indicates that the Lake City Limestone may rest unconformably on the Oldsmar Limestone and is unconformable with the overlying Avon Park Limestone.

Bishop (1956, p. 113) estimates that 80 feet of the Lake City Limestone was penetrated in well 22, in northeastern Glades County (fig. 5). The only other known penetrations of this formation were by deep oil-test wells. The geologic section A-A' shown in figure 5 indicates that the regional dip of the formation is southward.

The Lake City Limestone has good porosity, is highly permeable, and is part of the Floridan aquifer. Bishop (1956, p. 18) states that the Lake City Limestone, because of its high permeability, is a highly productive part of the Floridan aquifer beneath Highlands County. However, it yields highly mineralized water in most of Glades and Hendry counties.

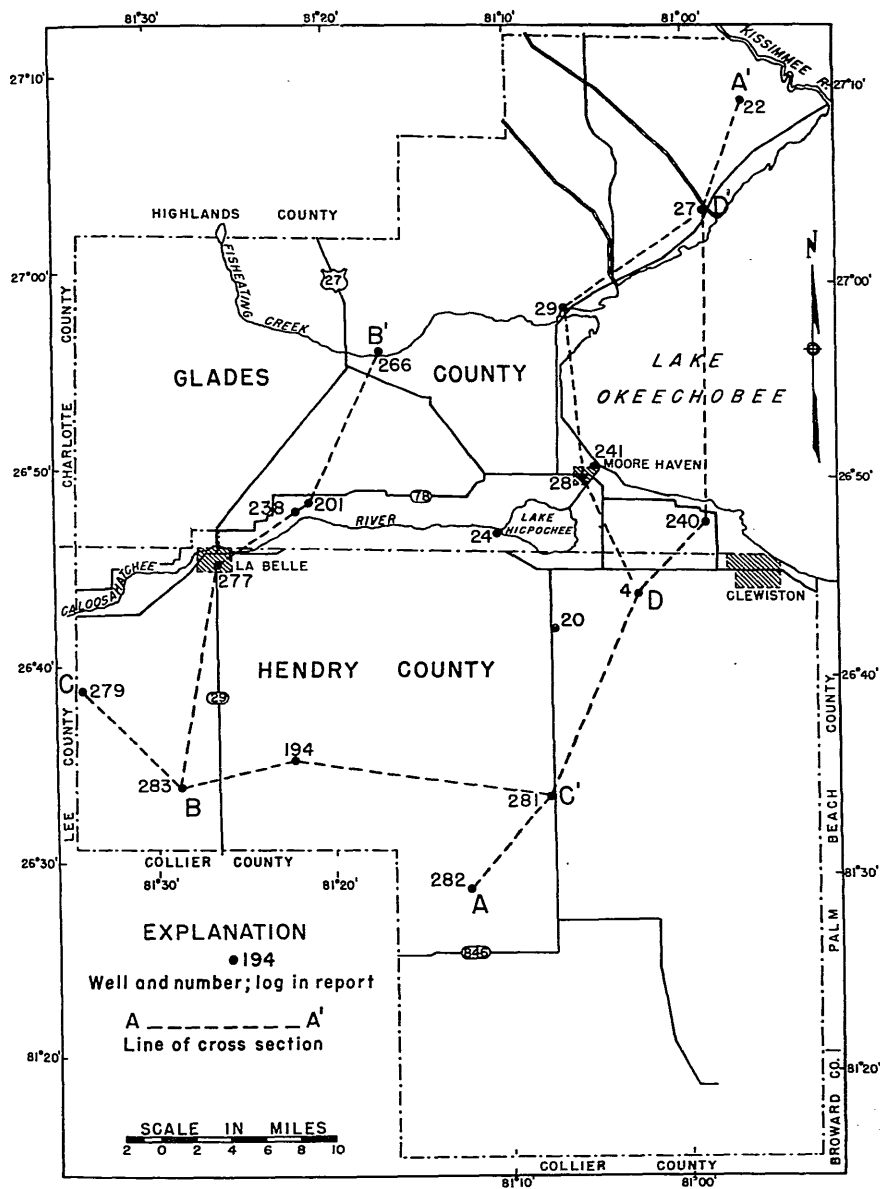


Figure 4. Glades and Hendry counties showing locations of geologic sections and included wells.

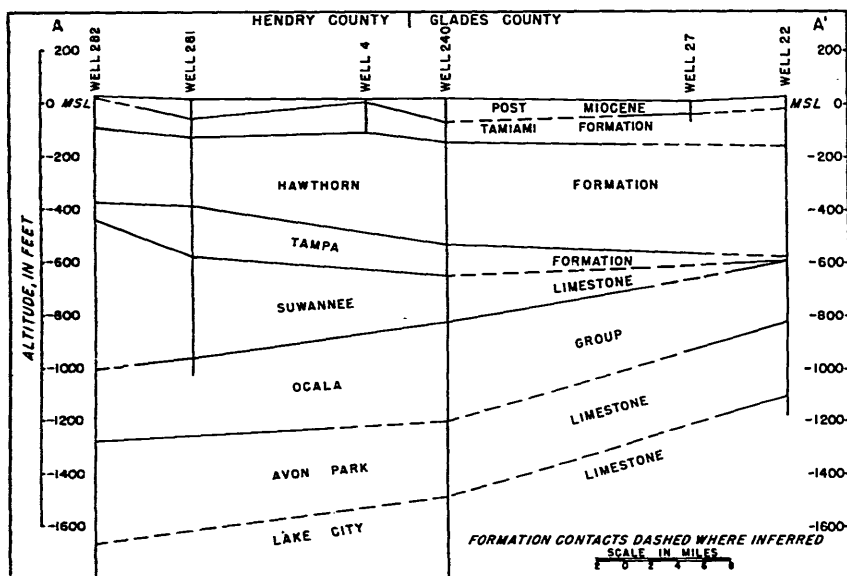


Figure 5. South-north geologic section A-A' through Glades and Hendry counties.

AVON PARK LIMESTONE

Applin and Applin (1944, p. 1686-1687) gave the name Avon Park Limestone to the highly microfossiliferous limestone in the upper part of the late middle Eocene rocks which occur between depths of 600 and 930 feet in a well drilled at Avon Park in Polk County. Vernon (1951, p. 95-96) identified the Avon Park Limestone at the surface in Citrus and Levy counties. The formation underlies all of Glades and Hendry counties, increasing in thickness to the southeast; it ranges from 200 feet in southern Highlands County (Bishop, 1956, p. 14) to 390 feet in southern Hendry County. The Avon Park Limestone is mainly a tan-to-white, slightly porous, chalky limestone containing many microfossils; part of the formation, however, is composed of brown, hard, granular limestone and dolomitic limestone. The microfossils have been described by Applin and Applin (1944), Applin and Jordan (1945), and Cole (1942, 1944). Vernon (1951, p. 99) indicates that the Avon Park Limestone is separated from older and younger formations by erosional unconformities.

Cooke (1945, p. 51-52) states, "The Avon Park limestone was deposited in an open ocean that received little sand or clay. The

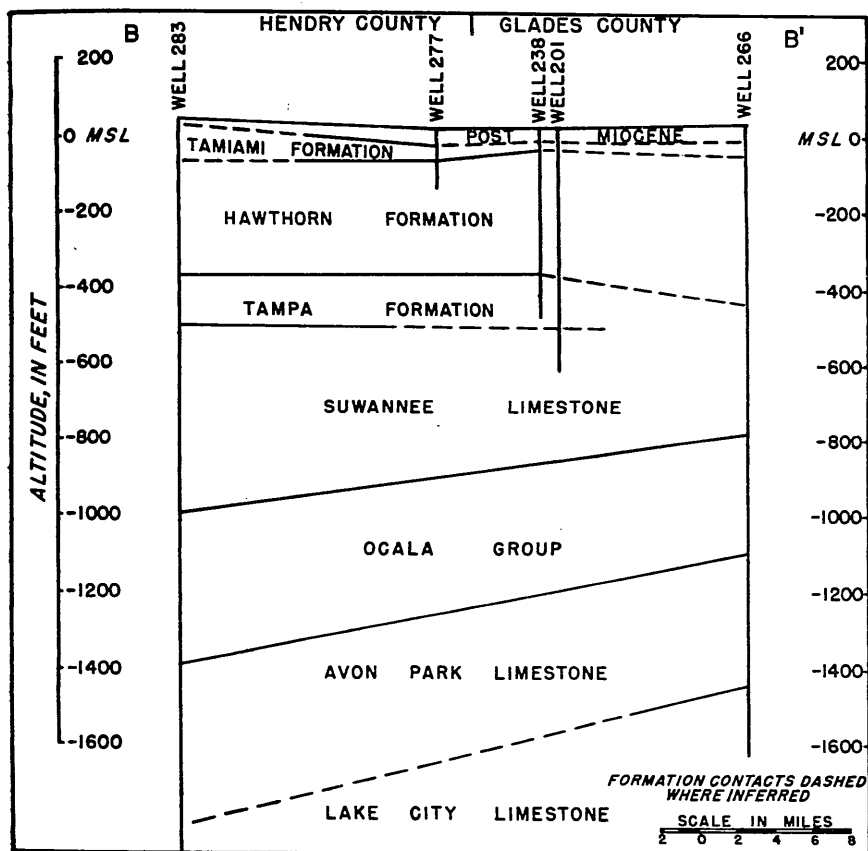


Figure 6. South-north geologic section B-B' through Glades and Hendry counties.

entire Floridan Plateau was probably submerged, but the location of the shore line is unknown." Vernon (1951, p. 97) states, "The fauna of the Avon Park limestone ranges from a shallow-water marine beach to only slightly deeper marine facies. The environments favorable for such deposits are shallow coastal bays, beaches, and marine shelves where almost no clastic material was being deposited." Vernon found in Polk County that the Avon Park Limestone resembled a beach-type deposit, and in the encircling area the limestone is a shallow-water marine deposit. It seems likely that in Glades and Hendry counties the Avon Park Limestone is mainly a shallow-water marine-shelf deposit.

The formation is an important component of the Floridan aquifer and will yield water to flowing wells in most areas. In much of Glades and Hendry counties the water is highly mineralized.

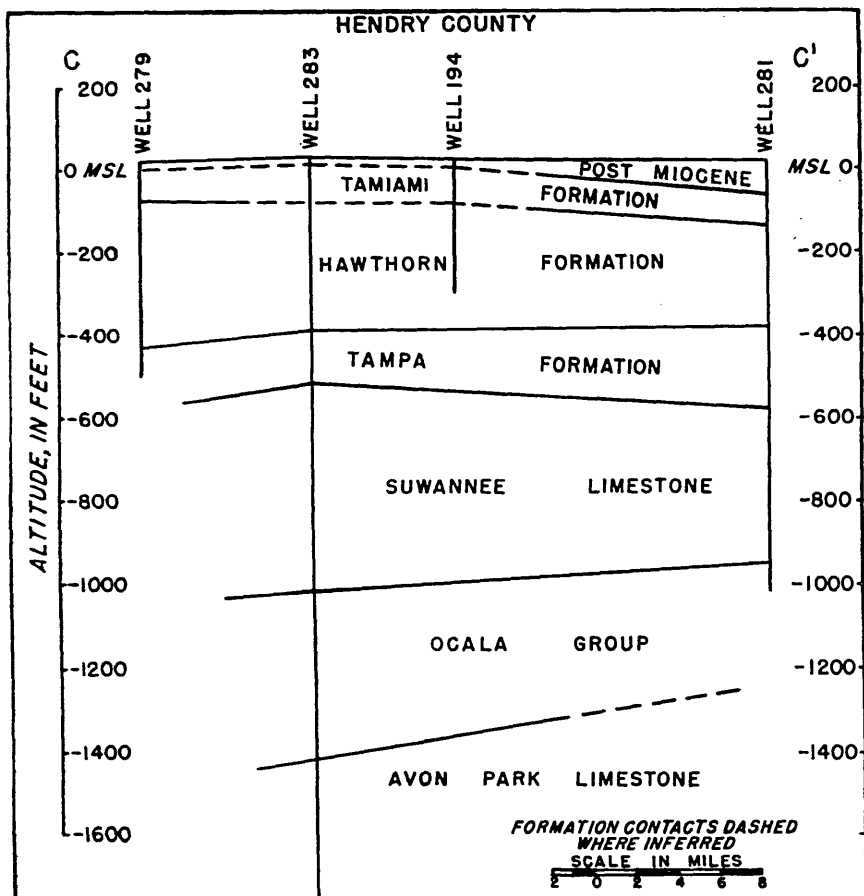


Figure 7. West-east geologic section C-C' through Hendry County.

OCALA GROUP

Cooke (1915, p. 117; 1945, p. 53) defined the Ocala as limestone of Jackson age. Applin and Applin (1944, p. 1683-1685) and Applin and Jordan (1945, p. 130) determined that the Ocala could be differentiated into a lower and an upper unit. Vernon (1951, p. 115) correlated the basal 80 feet of the Ocala Limestone of Cooke (1945, p. 53-73) at the outcrop area in Citrus and Levy counties with the Moodys Branch Formation of early Jackson age in Alabama. By separating this basal part, to which he applied the name Moodys Branch Formation, Vernon (1951, p. 156) restricted the Ocala Limestone to beds of late Jackson age. He described the Moodys Branch Formation in Florida as a marine, fossiliferous limestone

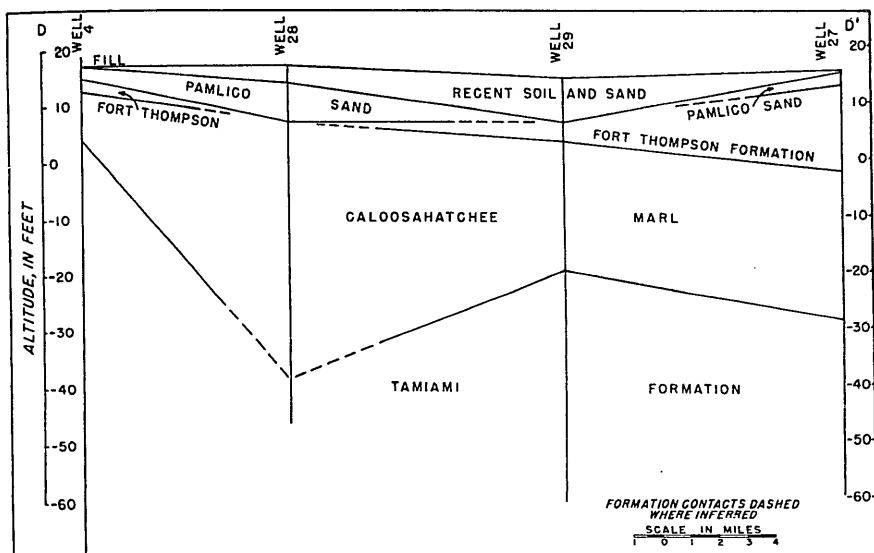


Figure 8. South-north geologic section D-D' along the western shore of Lake Okeechobee.

composed of the camerinid-rich Williston Member at the top, and the echinoid-rich Inglis Member at the base. The Ocala Limestone of Cooke was raised to group rank by Puri (1953, p. 130), who subdivided it into three formations as follows: the Crystal River Formation, equivalent to Vernon's Ocala Limestone (restricted); the Williston Formation, equivalent to the upper part of the Moodys Branch Formation; and the Inglis Formation, equivalent to the lower part of the Moodys Branch Formation.

Limestones of the Ocala Group range in thickness from about 150 feet to 390 feet and appear to thicken in a southwesterly direction within Glades and Hendry counties. In general they are cream-colored, soft and chalky, and in many places are composed of a foraminiferal coquina. The lowermost part of the Ocala Group is unconformable with the Avon Park Limestone. The top of the Ocala is an eroded surface and, according to Cooke (1945, p. 56), the oldest outcropping rocks overlying it are those of the Marianna Limestone of middle Oligocene age in northwestern Florida. Cooke (1945, p. 57) suggests that during the deposition of the Ocala Group the shoreline was in Alabama and Georgia and that the sea was open and fairly shallow. Vernon (1951, p. 57) seems to agree with this concept, as he found some detrital, crossbedded limestone in his Inglis Member.

Bishop (1956, p. 23) states that the limestones of the Ocala Group are not important units in the Floridan aquifer beneath the ridge area of Highlands County. In Glades and Hendry counties, however, they are fairly permeable and yield appreciable amounts of water to wells penetrating the aquifer. These limestones contain relatively salty water in most parts of the two counties.

OLIGOCENE SERIES

Cooke (1945, p. 75) states, "The Oligocene series, as interpreted by the United States Geological Survey, is divided into three parts. The lowest, which includes the Red Bluff clay and the Forest Hill sand of Mississippi, is not known to be represented in Florida. The Marianna limestone and the overlying Byram limestone together comprise the middle part to which the name Vicksburg group is now restricted. The Suwannee limestone and its littoral equivalent, the Flint River formation, are of late Oligocene age." The Suwannee Limestone apparently is the only formation of Oligocene age in Glades and Hendry counties.

SUWANNEE LIMESTONE

The name Suwannee Limestone was proposed by Cooke and Mansfield (1936, p. 71) for the yellowish limestone exposed along the Suwannee River in Hamilton and Suwannee counties, in northern Florida. The formation includes all the beds lying below the Tampa Formation and above the Byram Formation or older beds. The definition is the same as that used by MacNeil (1944, p. 1313-1318).

The Suwannee Limestone underlies all of Glades and Hendry counties except an area in the northeastern part of Glades County. The formation thickens from north to south and apparently from east to west, and reaches a maximum thickness of about 570 feet (fig. 5-7).

The distribution of Oligocene rocks in Florida indicates that erosion prevailed over large areas during the Oligocene Epoch. The sea that transgressed during the middle Oligocene Epoch deposited the Marianna and Byram Formations in western Florida, but Glades and Hendry counties probably were above sea level during early and middle Oligocene time and limestone of the Ocala Group was undergoing considerable erosion. It appears that the only time Glades and Hendry counties were covered by Oligocene seas was during deposition of the Suwannee Limestone.

The Suwannee Limestone is a white, finely porous limestone, somewhat crystalline and partly dolomitized. It is moderately permeable and yields artesian water to deep wells that penetrate the Floridan aquifer; however, the water contained in the Suwannee Limestone is brackish in most of Glades and Hendry counties.

MIOCENE SERIES

Cooke (1945, p. 109-111) recognized three divisions of the Miocene which, in the Florida Peninsula, are represented by the Tampa Formation (lower Miocene), Hawthorn Formation (middle Miocene), and Duplin Marl. Puri (1953, p. 38-41) recognized three divisions of the Miocene in the Florida Panhandle: Tampa Stage (lower Miocene), the Alum Bluff Stage (middle Miocene), and the Choctawhatchee Stage (upper Miocene). In southern Florida the Miocene Series is represented by the Tampa Formation, the Hawthorn Formation, and the Tamiami Formation in ascending order.

TAMPA FORMATION

The Tampa Formation of this report refers to the sandy limestone, of Miocene age, that lies above the Suwannee Limestone and beneath the predominantly clastic beds of the Hawthorn Formation. The Tampa Formation, which crops out in the vicinity of Tampa Bay, was originally described by Johnson (1888) and Dall (1892).

The formation probably underlies all of Glades and Hendry counties, but in northeastern Glades County it is very thin. It gradually increases in thickness from 15 feet in northeastern Glades County to about 190 feet in southern Hendry County. It is composed of porous, highly permeable limestone, friable calcareous sandstone, and a few beds of white chalky marl. Because of solution by ground-water movement, fossils are preserved mainly as molds. This solvent action has produced the very porous and permeable zones within the formation.

The Tampa Formation overlies the Suwannee Limestone unconformably. Puri (1953, p. 38) indicates that the Tampa is unconformably overlain by the Hawthorn Formation and its equivalents in western Florida. Some of the field studies of Cooke (1945, p. 115) suggest that it may grade vertically upward into the Hawthorn Formation. This gradational relationship may pertain in Glades and Hendry counties.

The Tampa Formation is very permeable, and together with the limestones of the lower part of the Hawthorn Formation

furnishes most of the artesian water used in Glades and Hendry counties.

HAWTHORN FORMATION

The Hawthorn Formation of this report is defined as beds younger than the Tampa Formation and older than the upper Miocene sediments. This is essentially the definition of Cooke (1945, p. 44) and of Vernon (1951, p. 186-187). The Hawthorn Formation underlies all of Glades and Hendry counties and ranges in thickness from about 300 feet in southern Hendry County to about 500 feet in northern Glades County.

The Hawthorn Formation is composed of light-green to greenish-gray sandy marl, green and white plastic clay, finely crystalline permeable limestone, silty sands, and quartz pebbles. These sediments commonly contain small grains of phosphorite and occasionally contain phosphate pebbles. The coarse sand and pebbles occur in the beds near the top of the formation and the limestone beds usually occur near the base. Sandy and clayey marls are the predominant sediments of the Hawthorn Formation.

Puri (1953, p. 38-39) had indicated that in western Florida the Hawthorn Formation and its equivalents overlie the Tampa Formation unconformably and underlie the upper Miocene sediments unconformably. Cooke (1945, p. 145) also reports that the upper Miocene beds overlie the Hawthorn clastics unconformably. Lithologic and foraminiferal studies of cuttings from wells located west and southeast of Glades and Hendry counties suggest that the Tamiami Formation (upper Miocene) may overlie the Hawthorn Formation conformably. The Hawthorn Formation probably is early and middle Miocene in age.

The Hawthorn Formation, as examined from well cuttings in Glades and Hendry counties, is apparently of marine origin. Bishop (1956, p. 26) has found that the ridge area in Highlands County is underlain by deltaic sediments containing sand, quartz pebbles, phosphorite, mica, and kaolinite, which overlie typical marine marl and clay of the Hawthorn Formation. The upper Miocene beds appear to wedge out against these deltaic deposits on both flanks of the ridge. The deposits probably are of late Hawthorn age and apparently extend southward into Glades County in the vicinity of U. S. Highway 27.

According to reports from well drillers, a gravelly bed occurs in northeastern Glades County and extends southward into Hendry County. It has been recognized in some of the wells for which lithologic logs have been prepared. In well 4, west of Clewiston in

Hendry County, the gravel between 91 and 127 feet below the land surface could be interpreted as the basal part of the Tamiami Formation; however, the authors believe that it is part of the Hawthorn Formation and is a southward extension of the ridge deltaic deposits. Quartz pebbles also have been penetrated within the Hawthorn Formation in a well on Marco Island, Collier County, a well in Dade County near the Collier-Monroe County line, and a well on Cape Sable in the Everglades National Park. Bishop (1956, p. 27) also reports that quartz pebbles have been found in the Hawthorn Formation underlying the Bone Valley Formation (Pliocene) in Polk County. Well drillers report that in Glades and Hendry counties the gravels are usually isolated masses and are of irregular thickness. These occurrences tend to substantiate the fact that a delta tongue extended southward from Highlands County during late Hawthorn time.

Glades and Hendry counties were submerged during early Hawthorn time and the shoreline probably extended as far north as the Ocala uplift, as suggested by Vernon (1951, p. 181-184). Before the end of Hawthorn time a finger of a delta progressed southward across Highlands County and the final frontal slope formed near Venus (Highlands County). It is presumed that only bottomset deltaic beds were deposited in Glades and Hendry counties. The sea withdrew from most of Florida at the end of Hawthorn time, but there is a possibility that all of southern Florida may have been receiving continuous deposition during the middle and late Miocene time, and the contact between the Hawthorn Formation and the Tamiami Formation may be conformable.

Local occurrences of gravel, thin limestone beds, and shell beds in the upper part of the Hawthorn Formation form moderately productive aquifers in an area about 5 miles west of Moore Haven in Glades County, in an area north of the Devil's Garden in Hendry County, and in the vicinity of LaBelle. Wells that penetrate these aquifers range in depth from about 100 to 175 feet.

The limestone beds in the lower part of the Hawthorn Formation are fairly widespread and may form a hydrologic unit with the underlying more permeable limestones of the Floridan aquifer. The beds by themselves do not yield sufficient quantities of water for most irrigation needs, and wells are generally drilled into one or more of the underlying limestones. In most places, the clay and marl of the Hawthorn Formation form the confining unit for the Floridan aquifer; upward leakage through these materials is small.

TAMIAMI FORMATION

The Tamiami Formation, as redefined by Parker (1951, p. 823), includes all upper Miocene deposits in southern Florida. The Tamiami Formation underlies all of Glades and Hendry counties.

The deposition of sediments in Glades and Hendry counties during Tamiami time probably was controlled by the southward extension of the Hawthorn deltaic clastic materials which formed a topographic high. In the western half of Glades and Hendry counties and in Lee and Charlotte counties the Hawthorn deltaics occur at a higher altitude than the Hawthorn clastic sediments to the east (fig. 7). Consequently, the overlying sediments of Tamiami age in the western parts of the counties are thinner than those in the eastern parts of the counties and probably do not exceed 80 feet in thickness (fig. 7). They are composed chiefly of fine and medium sand, silt, marl, and lenses or thin beds of shells. These sediments appear to be reworked Hawthorn deltaic deposits.

In much of the eastern part of Hendry County the Tamiami Formation contains limestone that dips to the east and southeast. Limestone in the Tamiami Formation is continuous and widespread over an area exceeding 400 square miles. At the Collier-Hendry County boundary, directly east of Immokalee, limestone occurs at a depth of 22 feet below the land surface and extends to a depth of at least 55 feet. This limestone layer presumably dips eastward to a depth of about 90 feet in an area 8 miles east of the county boundary, and to a depth of 120 feet in an area about 20 miles east of the county line. The limestone wedges out 3 to 5 miles east of Immokalee, and no shallow limestone beds are reported in the immediate vicinity of Immokalee.

The Tamiami Formation differs in composition from shelly marl to soft, silty, fossiliferous limestone in different localities. The formation crops out locally along the Caloosahatchee River in Glades and Hendry counties where it is a greenish-gray sandy clay. DuBar (1958, p. 34) suggests that the Tamiami Formation along the Caloosahatchee River reaches a maximum thickness of at least 60 feet. Throughout Glades County and northern and western Hendry County the Tamiami Formation is composed chiefly of sand, marl, and shells.

In most of southern and eastern Hendry County the limestone beds of the Tamiami Formation are highly permeable and yield large quantities of water to relatively shallow irrigation wells. In the remainder of Hendry County and in Glades County local shell beds and lenses will yield moderate quantities of water to

domestic wells or small irrigation wells. Some shell beds in the vicinity of LaBelle and the area bordering Lake Okeechobee yield water of relatively high mineral content.

PLIOCENE SERIES

The Caloosahatchee Marl is the only formation of Pliocene age recognized in southern Florida. Although there is some uncertainty about the age of the Caloosahatchee Marl, the authors tentatively are retaining it in the Pliocene. DuBar (1958, p. 35) assigned the Caloosahatchee Marl to the Pleistocene, primarily on the basis of vertebrate fossils, and to a lesser extent on mollusks and stratigraphic relationship.

CALOOSAHATCHEE MARL

The shell beds exposed along the upper reaches of the Caloosahatchee River were classified by Heilprin (1887) as Pliocene in age. Matson and Clapp (1909, p. 123) adopted the name Caloosahatchee Marl for these beds and their definition has been in general use since that time. The formation as used in this report comprises the sediments that contain a molluscan fauna considered as diagnostic of the Caloosahatchee Marl.

The distribution and areal extent of the Caloosahatchee Marl are not well known. It is exposed along the Caloosahatchee River and has been penetrated in wells near the river and along the margin of Lake Okeechobee (fig. 8). Shelly material dredged from drainage canals a few miles southeast of Lake Okeechobee closely resembles the material along the Caloosahatchee River. DuBar (1958, p. 85, fig. 29) indicates that the Caloosahatchee Marl ranges in thickness from 5 to 25 feet in areas adjacent to the river and downstream from LaBelle. Upstream from LaBelle test wells penetrated 45 to 65 feet of the formation, but did not reach the bottom. Generally, the Caloosahatchee Marl ranges in thickness from 15 to 30 feet, although thicknesses of 60 feet have been noted. The formation appears to be a discontinuous deposit, occurring as erosional remnants filling depressions in the older eroded surface of the Tamiami Formation.

The Caloosahatchee Marl consists predominantly of unconsolidated sand and sandy marl that contain abundant marine mollusks. In addition to the profusion of mollusks, one of the outstanding features of the formation along the banks of the Caloosahatchee River is a 2-foot layer of hard, solution-riddled marine limestone

which Dubar (1958, p. 58) calls the Bee Branch Member. About 2½ miles upstream from LaBelle the Bee Branch Member of DuBar dips beneath the waterline. Schroeder and Klein (1954, p. 5) indicate that in eastern Hendry County a greenish silty sand and sandy marl, derived from erosion of green clay marl of the Tamiami Formation, composed a part of the Caloosahatchee Marl. These greenish sediments appear to be restricted to the flanks of the hills of the eroded Tamiami Formation.

In general, the Caloosahatchee Marl has low permeability and is a relatively unimportant source of ground water. Small yields can be obtained from shell beds and lenses, but in areas adjacent to the Caloosahatchee River where the Bee Branch Member of DuBar is best developed in the subsurface, the formation may yield fairly large quantities of water by infiltration from the river. In the area along the west shore of Lake Okeechobee the water is usually highly mineralized.

PLEISTOCENE SERIES

Formations of Pleistocene age in southern Florida are the sands of the marine terraces, the Anastasia and Fort Thompson Formations, the Key Largo Limestone, and the Miami Oolite. The higher terraces of early Pleistocene age, the Miami Oolite, and Key Largo Limestone do not occur in Glades and Hendry counties. The Anastasia Formation and the terrace sands are of marine origin and the Fort Thompson Formation is a succession of marine and fresh-water beds.

The different elevations of the Pleistocene shorelines and the alternation of marine and fresh-water beds in the Fort Thompson Formation give a record of the oscillation of sea level during the ice age. Although the maximum advances of ice sheets were far to the north, their advances and retreats affected Florida by alternately lowering and raising the level of the sea as water was being frozen or melted and consequently was being withdrawn from or added to the ocean.

The Pleistocene deposits in Glades and Hendry counties are chiefly quartz sands, shell beds, limestone, and marl.

ANASTASIA FORMATION

The Anastasia Formation was named by Sellards (1912) for outcrops of coquina on Anastasia Island, near St. Augustine, Florida. Cooke and Mossom (1929, p. 199) expanded this definition to include all the marine deposits of Pleistocene age underlying the

lowest plain bordering the east coast of Florida, excluding the Key Largo Limestone and Miami Oolite in southeastern Florida. Parker and Cooke (1944, p. 66) defined the formation as follows: "The Anastasia formation as here defined includes the coquina, sand, sandy limestone, and shelly marl of pre-Pamlico Pleistocene age that lies along both the Florida east and west coast."

The exact distribution of the Anastasia Formation is not known. It probably is present beneath all of Glades and Hendry counties excluding the Everglades area in eastern Hendry County, a 5-mile strip on either side of the Caloosahatchee River, and a strip 5 to 10 miles wide along the west shore of Lake Okeechobee. The thickness of the formation is commonly about 2 to 3 feet and probably does not exceed 15 feet.

The coquina limestone found at the type locality of the Anastasia Formation does not occur in Glades and Hendry counties. Sand, shell, and marl form most of the formation in Glades and Hendry counties. A thin marine sandstone is the most prominent bed in the formation. The beds in eastern Hendry County that have been assigned tentatively to the Fort Thompson Formation by Schroeder and Klein (1954, p. 5) are apparently transitional between the Fort Thompson and Anastasia Formations. The formation is overlain unconformably by the Pamlico Sand and underlain unconformably by the Caloosahatchee Marl.

A few wells for domestic supplies and numerous wells for watering stock derive water from the Anastasia Formation. The water is generally colored and high in iron content.

FORT THOMPSON FORMATION

The alternating fresh-water and marine limestones exposed along the Caloosahatchee River at Fort Thompson, about 2 miles east of LaBelle, were initially named the Fort Thompson beds by Sellards (1919, p. 71-72). Cooke and Mossom (1929, p. 211-215) later named this sequence the Fort Thompson Formation and indicated that the beds lie unconformably on the Caloosahatchee Marl and are overlain by the Lake Flirt Marl of Recent age.

The Fort Thompson Formation in Glades and Hendry counties has its maximum thickness in the southern part of the Everglades basin. It extends in a strip about 5 miles wide near the eastern border of Hendry County, in a strip about 5 miles on either side of the Caloosahatchee River upstream from LaBelle, and in a strip 5 to 10 miles wide along the west shore of Lake Okeechobee. The formation ranges in thickness from 2 to 15 feet.

The typical development at old Fort Thompson shows alter-

nating beds of marine shells and fresh-water limestones. The limestones apparently are case-hardened marl.

The Fort Thompson Formation lies unconformably upon the Caloosahatchee Marl and is overlain unconformably by the Pamlico Sand or Recent soil and marl. Parker and Cooke (1944, p. 89-96) correlated the beds at old Fort Thompson with the inferred fluctuations of sea level during the Pleistocene Epoch. They considered the Pamlico Sand to be of mid-Wisconsin age, but later, Cooke (1952, p. 51) referred it to the Sangamon Interglaciation.

The beds along the river downstream from the Ortona Lock, in the vicinity of station 343 of Parker and Cooke (1944, p. 93), have been studied in detail by the authors. At that locality the Fort Thompson Formation is 6 to 7 feet thick and is described as follows:

Description	Thickness (feet)
Fort Thompson Formation:	
10. Shell beds, marine (Coffee Mill Hammock Marl Member)	1 -2
Diastem	
9. Marl, sandy, containing marine shells in lower part	0 -2
Diastem	
8. Marl, fresh-water	½
7. Shell marl, marine, silty	¼-1
Diastem	
6. Limestone, fresh-water	0 - ½
5. Shell marl, marine, silty	1 -2
Diastem	
4. Limestone, fresh-water	0 - ½
3. Shell marl, marine, <i>Vermicularia</i> bed	1 -2
Diastem	
2. Limestone, sandy, fresh-water	½-1½
Diastem	

Caloosahatchee Marl:

1. Shell marl, marine

Parker and Cooke included beds 2 and 3 of the section in the Caloosahatchee Marl. However, fresh-water gastropods were abundant in bed 2 for 1,700 and 800 feet, respectively, on the left and right banks of the river. Therefore, the top of the Caloosahatchee Marl is placed tentatively below bed 2. Typical Caloosahatchee shells were not found in bed 3. In this area, as noted, the four fresh-water beds (beds 2, 4, 6, and 8) may indicate glaciations, and the six diastems suggest short periods of lowered sea levels and breaks in sedimentation.

The deposition of the Anastasia and Fort Thompson Formations and the terrace deposits was the result of the oscillation of sea

level during the Pleistocene. During the interglacial stages the high-level seas covered the area, and during the glacial stages, when the sea levels were below present levels, most of the area was being eroded but fresh-water marls were being deposited in shallow depressions. The Lake Okeechobee-Everglades Basin and a subsidiary basin in the Caloosahatchee River valley probably were lakes or swamps during a part of each glacial period. It appears that a drainageway from the Lake Okeechobee area toward the Gulf of Mexico existed during the glacial periods and conditions were somewhat similar to those prior to the dredging of the Caloosahatchee River.

The Fort Thompson Formation generally does not yield large quantities of water in Glades and Hendry counties because the limestones are usually of low permeability and the shell beds contain silt and clay. Small supplies can be obtained from shell beds by jetting and removing the fine materials from the zone surrounding the bottom of well casings.

TERRACE DEPOSITS

The terrace deposits in Glades and Hendry counties are composed of quartz sand referred by Parker and Cooke (1944, p. 74-77) to the Pamlico, Talbot, and Penholoway terraces. The old shorelines of these deposits occur at about 25 feet, 42 feet, and 70 feet above sea level, respectively, and are associated with glacial control of sea level during the Pleistocene Epoch.

Terrace sands mantle all of Glades and Hendry counties, except the areas covered by Recent organic soils and marls in the Everglades, and the Lake Flirt basin along the Caloosahatchee River. Usually the sands are 2 to 3 feet thick, but where they overlie old depressions they may be as much as 15 feet thick. The terrace sands lie unconformably upon the Fort Thompson or Anastasia Formations of Pleistocene age, the Caloosahatchee Marl of Pliocene age, and the Tamiami Formation of late Miocene age, and are overlain unconformably by the Lake Flirt Marl and deposits of Recent age.

Wells developed in the terrace sands are generally driven sandpoints. Well 237 in northwestern Glades County is a dug well and holds its form because it penetrates iron-cemented "hardpan." The water from this well is undesirable for domestic use because it is high in color and has a high iron content.

RECENT SERIES

The deposits of Recent age in Glades and Hendry counties include the organic soils of the Everglades and the Lake Flirt Marl. The marl and the parent material for most of the organic soils accumulated in a fresh-water environment.

LAKE FLIRT MARL

The Lake Flirt Marl was the name applied by Sellards (1919, p. 73-74) to the fresh-water deposits overlying the Fort Thompson Formation and the Pamlico Sand in the now-drained Lake Flirt area east of LaBelle. The approximate extent of these fresh-water deposits is shown in figure 2.

The maximum thickness of the formation along the banks of the Caloosahatchee River is 6 to 8 feet. In addition to gray and brown marl containing fresh-water gastropods, the formation is composed of dark sticky muck, sandy marl, and carbonaceous sand. The low permeability of the Lake Flirt Marl precludes its development as an aquifer.

ORGANIC SOILS

After the close of the Pleistocene Epoch, organic soils began to accumulate in the Lake Okeechobee-Everglades Basin and in shallow ponds, lakes and swamps. The maximum thickness of the organic soils is about 8 feet in eastern Hendry County. They are composed of brown to black peat and muck. Along the western edge of the Everglades, quartz sand from the terrace deposits was reworked and mixed with the organic material.

Several samples of peat, collected from the lowermost 6 inches of organic soil that immediately overlie the rock floor of the Everglades, have been dated by radioactive carbon determinations. The age of the peat was determined as follows: mucky peat at the Everglades Experiment Station near Belle Glade in Palm Beach County, 4900 years $\pm$ 200 years; fibrous peat near the same location, 3,800 years $\pm$ 200 years; and peat from the vicinity of U. S. Highway 27, 10 miles south of Lake Okeechobee in Palm Beach County, 5,050 years $\pm$ 200 years.

Peat is considered to be resistant to the lateral seepage of water. This characteristic and the low permeability of the materials underlying the organic soils make flood control and water control feasible in the Everglades area of Glades and Hendry counties

through the use of canals, pumps, and levees. The high organic content of the soils makes the ground water contained in the soils undesirable for domestic use.

GROUND WATER

OCCURRENCE AND MOVEMENT

The basic principles that govern the occurrence and movement of ground water have been thoroughly described by Meinzer (1923). Following is a summary of these principles as they relate to Glades and Hendry counties and most areas of southern Florida.

The chief source of ground-water recharge in Glades and Hendry counties is rainfall. Part of the rainfall evaporates, a part is absorbed by plants and transpired into the atmosphere, and a part is lost by surface runoff. The remainder infiltrates downward through the surface materials until it reaches the zone of saturation to become part of the body of ground water. The upper surface of the saturated zone where not confined by an impermeable bed is the water table.

Ground water is stored in the openings, solution cavities, and pore spaces within the consolidated and unconsolidated materials of the earth's crust. The amount of water that can be stored in water-bearing materials is determined by the porosity of the materials. Porosity is controlled by such factors as the shape, arrangement and assortment of the components, the amount of cementing material in the interstices, and the degree of compaction of the sediments.

The permeability of a water-bearing stratum is its ability to transmit water under a hydraulic gradient. Clay, marl, and fine sand, although highly porous, are of low permeability, but coarse sand, gravel, and cavernous limestone are highly permeable because the interstices are large and interconnected. A formation, group of formations, or part of a formation that transmits appreciable quantities of water to wells and springs is called an aquifer.

The water table is an undulating surface that conforms in a general way to the topography of the land. It fluctuates seasonally in southern Florida, rising during rainy seasons and declining during dry periods, and responds to such forces as evaporation, transpiration, and pumping from wells. Ground water moves down-gradient from areas of recharge to areas of discharge. The gradient of the water table depends upon the thickness and

permeability of the aquifer and the quantity of water moving through the aquifer. A steeper gradient is required to move a given amount of water through an aquifer of low permeability than through an aquifer of high permeability.

An aquifer where the upper surface of the zone of saturation is not confined by impermeable material contains water under nonartesian (or water-table) conditions. The water level in a well penetrating the saturated zone of an unconfined aquifer is a measure of the altitude of the water table.

Where ground water has moved laterally into permeable material that is overlain by an impermeable layer and it is under sufficient pressure to rise above the top of the material containing it, it is said to occur under artesian (confined) conditions. The water level in a well penetrating an artesian aquifer will rise above the top of the aquifer to a point that is the approximate measurement of the pressure head. The pressure head is due to the weight of the water in upgradient areas of the aquifer.

Glades and Hendry counties are underlain by an artesian system that extends beneath Florida and southeastern Georgia. The system will yield flowing water to deep wells in all Hendry County and all but northwestern Glades County. Glades and Hendry counties are underlain at shallow depth by less extensive aquifers which exhibit both nonartesian and artesian characteristics. Water levels in wells penetrating these aquifers respond to local recharge by rainfall and to evapotranspiration, but also are affected by changes in barometric pressure and by earthquakes. Figures 9-12 show the locations of deep and shallow wells inventoried in Glades and Hendry counties.

FLORIDAN AQUIFER

The principal artesian aquifer beneath Florida was described by Stringfield (1936) and was named the Floridan aquifer by Parker (1951, p. 819). The part of the Floridan aquifer penetrated by deep artesian wells in Glades and Hendry counties consists of water-bearing limestones that range in age from middle Miocene to Eocene. The depth of the base of the Floridan aquifer is not known, but rocks older than Eocene probably contain highly mineralized water in most of Glades and Hendry counties. The aquifer is overlain by clay, sandy clay, and marl of the Hawthorn Formation, which form a relatively impermeable confining layer. The clay and marl in the lower part of the Hawthorn Formation are interbedded with water-bearing limestones. These limestones,

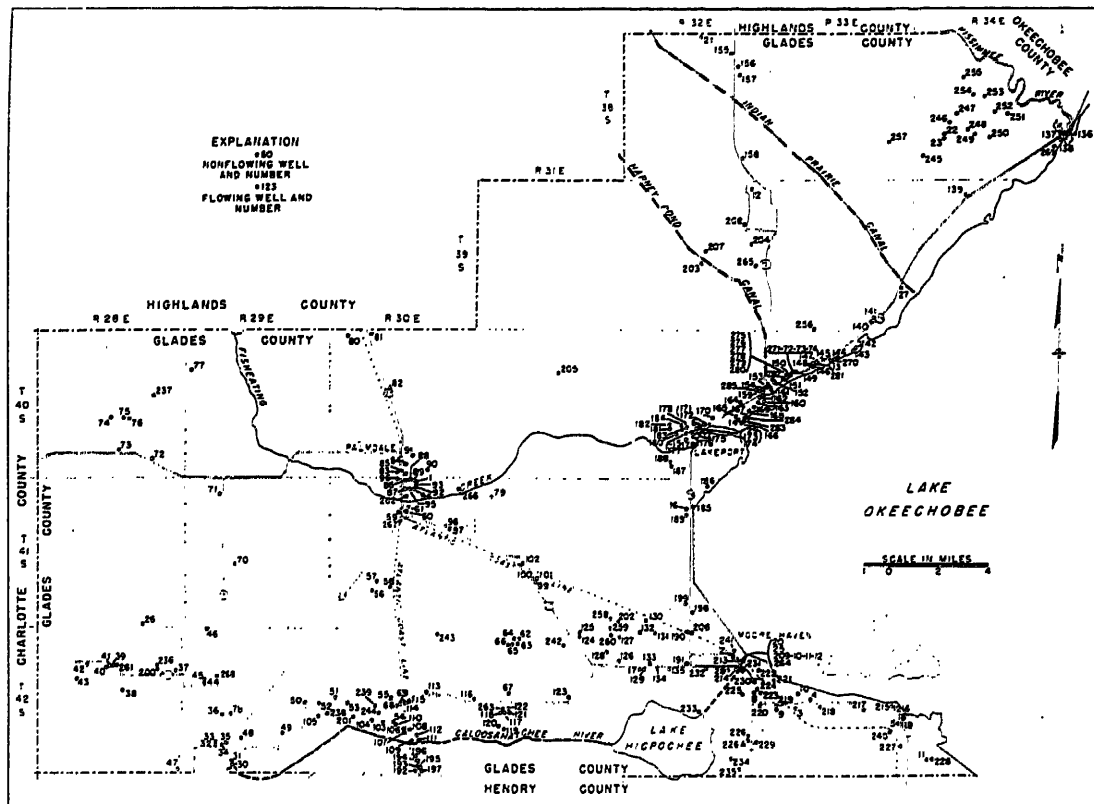


Figure 9. Glades County showing the locations of wells.

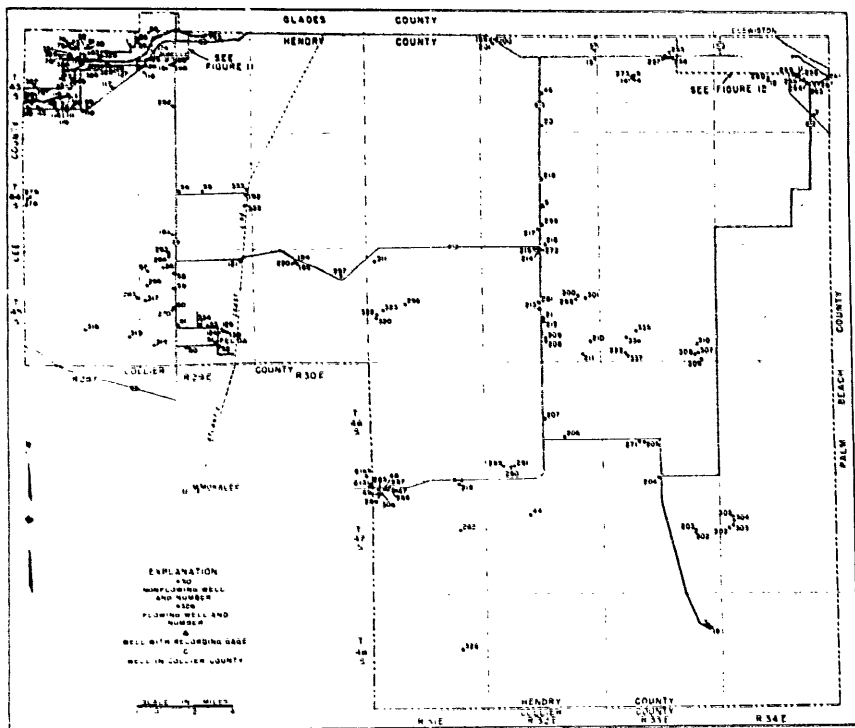


Figure 10. Hendry County showing the locations of wells.

which usually occur at depths ranging from 300 to 400 feet, are not as productive as the deeper limestones; therefore, most of the artesian wells in Glades and Hendry counties are bottomed in the highly permeable Tampa Formation or the Suwannee Limestone.

The limestones of the Floridan aquifer in Glades and Hendry counties are not homogenous, and in many cases, most of the yield of a given well may be contributed by two or three thin, highly permeable zones. One of the highly productive parts of the aquifer is at the top of the Tampa Formation. The limestones in the lower part of the Hawthorn Formation are included as part of the aquifer unit; however, the artesian pressure in these layers is much lower than it is in the Tampa Formation, which suggests that they may constitute a separate aquifer.

In table 4 (Bishop, 1956, p. 113) the artesian pressure and the yield of well 22, Glades County, increased sharply between depths of 573 feet and 610 feet, below the land surface as the well passed from the Hawthorn Formation into the Tampa

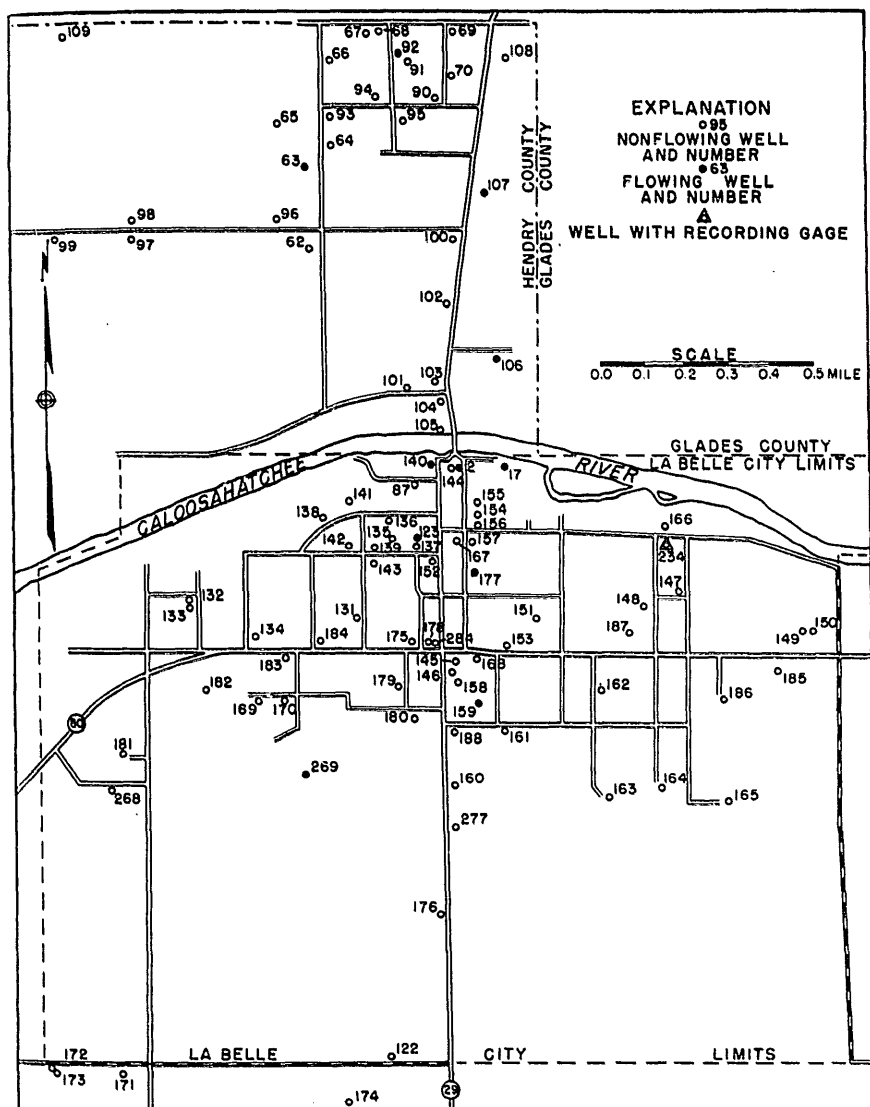


Figure 11. LaBelle and vicinity showing the locations of wells.

Formation. After the first major flow (200 gpm) was obtained at 610 feet, the yield from the remainder of the hole (610 to 1,215 feet) increased at an irregular rate to 585 gpm. The data indicate that the interval between 610 and 616 feet in the upper part of the Tampa Formation is the zone of the highest permeability at this site.

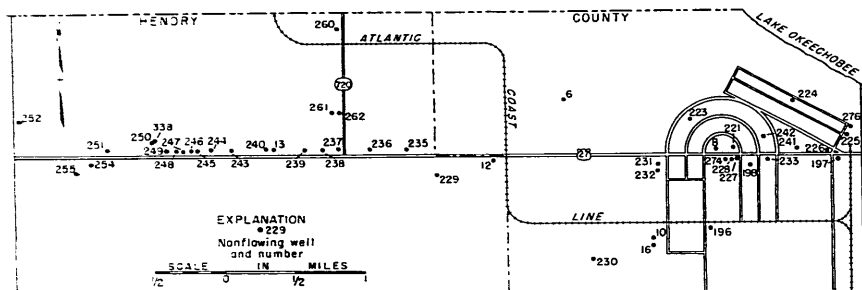


Figure 12. Clewiston and vicinity showing the locations of wells.

Several flowing wells are used to irrigate pastures and farmland north of the Caloosahatchee River, about 6 miles northeast of LaBelle. Fairly good geologic and hydrologic data and accurate well construction information are available on wells 201, 238, and 239 in this area of Glades County.

Wells 201 and 238 were cased to a depth of 203 feet, but the original drilled depths of the wells differed by 142 feet (well 201, 642 feet; well 238, 500 feet). When the wells were completed, well 201 yielded 385 gpm and well 238 yielded 730 gpm. Well 239, 1 mile to the northeast, was cased to a depth of 254 feet, and was completed at a depth of 716 feet; its initial yield was 310 gpm. The

TABLE 4.¹ Water-level and Flow Measurements Made During Drilling of Well 22, Glades County
[Casing seated at 432 feet]

Date	Depth of well below land surface (feet)	Water level above land surface (feet)	Yield by flow (gpm)	Average increase in yield per foot of interval (gpm)	Geologic formation
1951					
Feb. 24	500	----	Trace	---	Hawthorn
Feb. 27	515	6.0	----	---	Do.
Feb. 28	573	6.0	----	---	Do.
Mar. 1	610	30.0	200	---	Tampa
Mar. 1	616	----	290	15.0	Do.
Mar. 1	632	32.0	----	---	Ocala
Mar. 1	667	----	310	0.4	Do.
Mar. 1	677	----	340	3.0	Do.
Mar. 1	670	31.0	----	---	Do.
Mar. 2	854	----	395	0.3	Do.
Mar. 5	1,119	----	420	.1	Avon Park
Mar. 5	1,134	----	445	1.7	Do.
Mar. 5	1,164	----	480	1.2	Lake City
Mar. 6	1,190	30.0	565	3.3	Do.
Mar. 6	1,215	31.0	585	.8	Do.

¹Table condensed from Bishop, 1956 (p. 113).

relatively large differences in the amount of casing in the wells, the amount of aquifer penetration needed to obtain substantial yields, and the differences in the individual well yields indicate that the confining beds of the Hawthorn Formation in this general area are of nonuniform thickness and lithology, and that the water-yielding properties of the limestones composing the aquifer differ both laterally and vertically.

Two months after these wells were drilled additional measurements of depth and flow were made, and traverses with a deep well current meter were made in wells 201 and 238 to measure the velocity of flow through the well bores at different depths. The measurements showed that the depth and yield of well 238 were the same as originally determined, but that the open-hole part of well 201 had filled in 38 feet and the yield had been reduced by 35 gpm. Data obtained from the current-meter traverses in these wells are shown in figure 13. The graphs show the relative velocity of the ground water moving upward at different depths in the wells and presents the percentage of the total flow that enters the well bores from different intervals. About 40 percent of the total yield of well 201 was contributed by the limestone section between 510-520 feet; nearly 40 percent of the total flow of well 238 was contributed by the 5-foot section at the bottom of the well. Flow measurements made in these wells in May 1958 showed that the yield of well 238 had declined from 730 to 650 gpm, and that of well 239 had declined from 310 to 230 gpm.

Similar studies were made on two 8-inch flowing wells in Hendry County (wells 278 and 279), about 9 miles southwest of LaBelle. The yield of well 279 diminished from 500 gpm in August 1953 to 200 gpm in March 1954. The graph of the results of the current-meter traverse of well 279 (fig. 13) shows that 40 percent of the yield was contributed from the interval between 440 and 460 feet. Flow data obtained in May 1958 indicate that the yield of well 279 had not changed from the 200 gpm rate of March 1954.

Well 278, a quarter of a mile south of well 279, yielded 760 gpm when it was completed in July 1953, but by March 1954 the discharge had diminished to 400 gpm, and by May 1958 it was 320 gpm. The well has 8-inch casing from the land surface to a depth of 290 feet and 6-inch casing between 378 and 520 feet, leaving an open hole between 290 and 378 feet and between 520 feet and the bottom of the well, at 790 feet. Some yield was obtained from the zone between 290 and 378 feet, but the source of most of the water apparently was the zone below the bottom

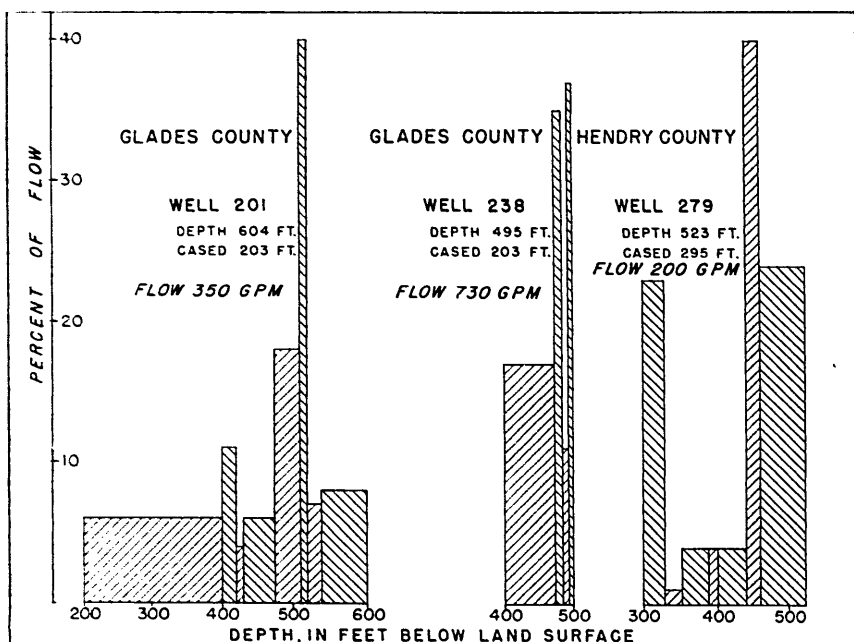


Figure 13. Graphs showing the distribution of flow in selected wells in Glades and Hendry counties.

of the lower casing. Water samples collected at 340 and 377 feet (upper open-hole part) contained 1,000 ppm of chloride, practically the same concentration as in samples obtained from the lower open-hole section and also from the discharge outlet. However, a water sample taken at a depth of 400 feet in well 279, to the north, contained 665 ppm of chloride. This suggests that the 400-foot zone, which had been cased off in well 278, contains relatively fresh water, and that the major part of the yield is from the deeper saline zones.

If the open-hole part of a flowing well is of uniform diameter and the aquifer has uniform pressure, the water velocity should increase from the bottom of the hole upward. The flow distribution in well 279 (fig. 13) indicates that the size of the hole is not uniform. Where the hole is enlarged opposite sections of the aquifer consisting of soft material, the velocity of the water decreases because of the larger cross-sectional area. Possibly some decrease in flow may result from loss of water into sections of the

borehole where the pressure is lower than the pressure in the main yielding zones.

PIEZOMETRIC SURFACE

The piezometric surface is an imaginary surface representing the pressure head of water confined in an artesian aquifer. It is defined by the height to which water will rise in tightly cased wells that penetrate the aquifer. Where the piezometric surface is higher than the land surface, wells tapping the artesian aquifer will flow.

In peninsular Florida the piezometric surface is highest in central Polk County where the aquifer is recharged, and lowest in coastal areas where discharge takes place. Over much of south central Florida the piezometric surface is relatively flat and has a general southeasterly slope.

The configuration of the piezometric surface in Glades and Hendry counties is shown in figure 14, by contours which indicate that artesian water in the Floridan aquifer is flowing generally southeastward from the Highlands Ridge area into Glades County. A mound in the piezometric surface in eastern Hendry County and southwestern Palm Beach County (fig. 14) indicates that ground water is flowing outward in all directions from that generally high area. This suggests that the Floridan aquifer is being recharged in that area; however, the height of the piezometric surface there is 30 feet or more above the land surface, and thus there is no possibility of local downward recharge. This piezometric high probably is a residual mound that has resulted from the discharge of flowing wells in the areas to the northwest.

RECHARGE

At some places in north, central, and northwestern Florida the Floridan aquifer is exposed at the surface, but throughout the remainder of Florida the aquifer dips beneath the surface and is covered by layers of sand and clay of low permeability which form a confining unit. At the outcrop area the aquifer is recharged directly by rainfall. Recharge to the Floridan aquifer occurs also in the high areas of central Florida where the water table is perennially higher than the piezometric surface of the aquifer; replenishment occurs by downward infiltration through semi-permeable layers of the Hawthorn Formation. According to Stringfield (1936, p. 148) the artesian aquifer in parts of central

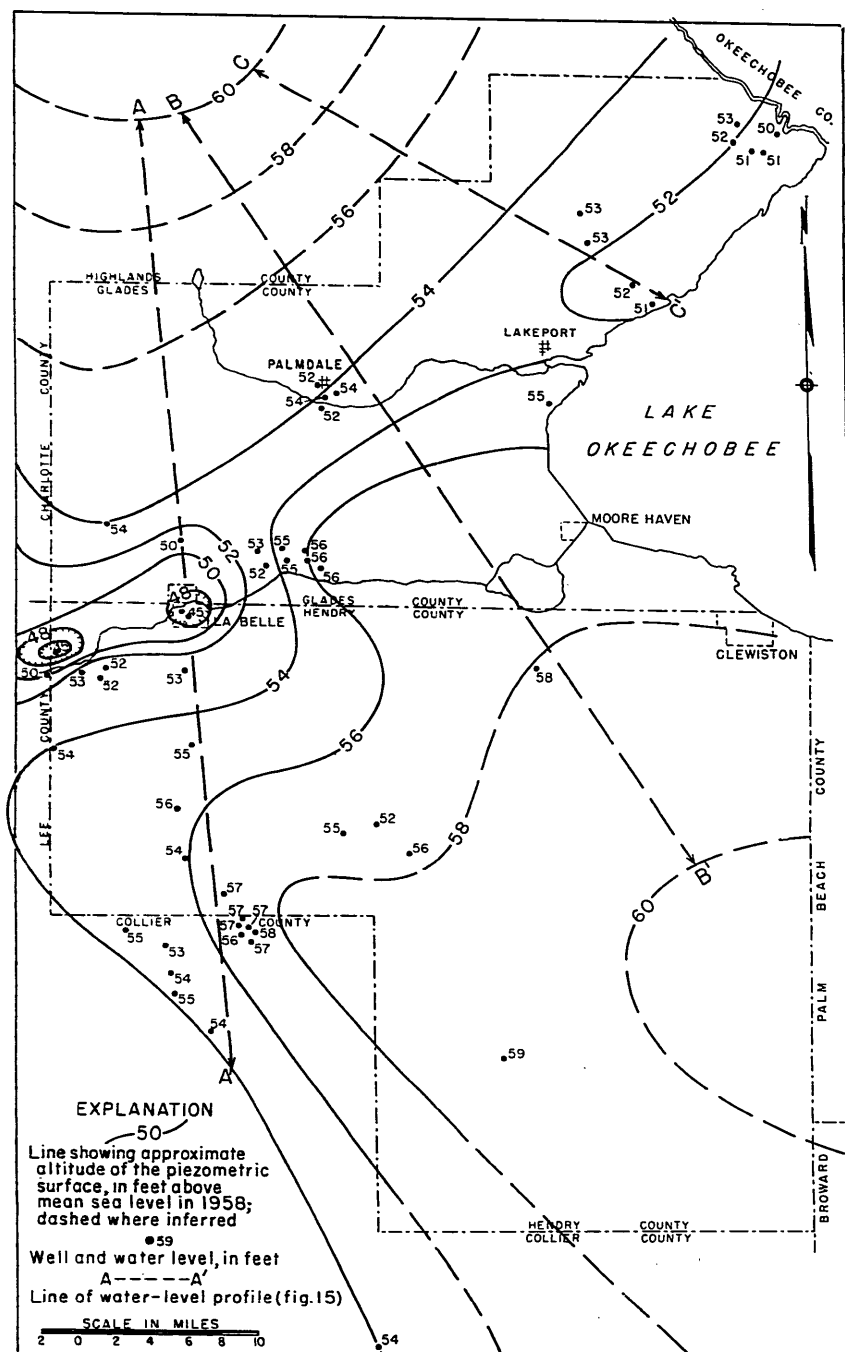


Figure 14. Glades and Hendry counties showing the configuration of the piezometric surface of the Floridan aquifer, 1958.

Florida is blanketed by permeable material, thus permitting ready recharge to the aquifer.

It is probable that replenishment to the Floridan aquifer by downward infiltration occurs in much of the Highlands Ridge area of central Florida. Water-level measurements by Bishop (1956, p. 46-48), during the drilling of a deep well in southern Highlands County, substantiate the theory that recharge to the Floridan aquifer occurs as far south as the town of Venus in southern Highlands County. The water in the Floridan aquifer beneath Glades and Hendry counties moves southward beneath the confining layers of the Hawthorn Formation in a general direction normal to the piezometric contours shown in figure 14.

DISCHARGE

Most of the discharge from the Floridan aquifer in Glades and Hendry counties probably occurs through artesian wells used to irrigate winter vegetable crops and pastureland. The total water discharged during the seasons of heavy irrigation is about 10 mgd (million gallons per day). Hendry (1957, p. 19) estimated that about 50 wild, flowing wells in the two counties discharge water at a total rate of approximately 3 mgd. Many of these wells are west and southwest of LaBelle.

The layers and lenses of clay, sandy clay, and fine sand of low permeability that compose the middle and upper parts of the Hawthorn Formation in the two counties tend to prevent upward leakage from the Floridan aquifer. However, where sand is the chief component of the confining unit or where the Hawthorn Formation is thin (figs. 6, 7), upward leakage may occur because of the high pressure differential (30-40 feet) between the piezometric surface and the water table.

WATER-LEVEL FLUCTUATIONS

The water levels in an artesian aquifer fluctuate in response to recharge by rainfall, discharge, earthquakes, and variations of barometric pressure. Fluctuations due to rainfall are most apparent in the vicinity of the recharge area. However, water levels in deep wells in Glades and Hendry counties are only slightly affected by seasonal rainfall because the wells are a great distance from the recharge area. Large fluctuations of the piezometric surface are due to discharge from wells during periods of irrigation.

Figures 9, 10, and 11 show the locations of inventoried flowing wells in Glades and Hendry counties, though they do not show all the flowing wells in the area. The concentration of wells is greatest along the Caloosahatchee River from Ortona westward to the Lee County boundary. The cones of depression in the piezometric surface (fig. 14) are evidence of the heavy discharge from the Floridan aquifer in this area where many wells have been in use for 50 years or more. It is estimated that 50 percent of them are no longer maintained and are leaking through corroded casings or are flowing wild. Such heavy discharge over a long period of time is responsible for the overall decline in pressure in that area, and this may have caused the quality of the water to deteriorate. Probably the quality of the water derived from the Floridan aquifer in the vicinity of LaBelle during the early days of the development was superior to the quality in 1958.

A second area of heavy water use is in northeastern Glades County and the adjoining part of Okeechobee County, where crops and pastures are frequently irrigated. The lowering of the piezometric surface caused by this discharge is shown in figure 14. The lowered pressure in this area and the lowered pressure caused by discharging wells north of Lakeport and in the vicinity of Palmdale have produced the northeastward-trending trough in the piezometric surface in Glades County.

Few, if any, artesian wells have been drilled to the Floridan aquifer in the Everglades south of Lake Okeechobee, and the piezometric surface in this area has remained at its approximate original level. Artesian water is moving downgradient from this area of high pressure and as the mound is not being recharged, a slow decline of pressure can be expected until a new gradient from the recharge area is established. It may be many years before this gradient adjustment is completed.

Figure 15 is a series of water-level profiles of the Floridan aquifer in Glades and Hendry counties. These profiles show the effect that the discharging wells have on the piezometric surface. Profile A-A' shows that recharging water moves downgradient from the high areas in Highlands County toward the cone of depression in the vicinity of LaBelle. Profile B-B' crosses from the high water level in Highlands County southeastward through the saddle-shaped depression in the vicinity of Palmdale to the residual high-pressure area in eastern Hendry County. Profile C-C' shows a relatively steep gradient from Highlands County southeastward to the area of heavy withdrawals near lake Okeechobee.

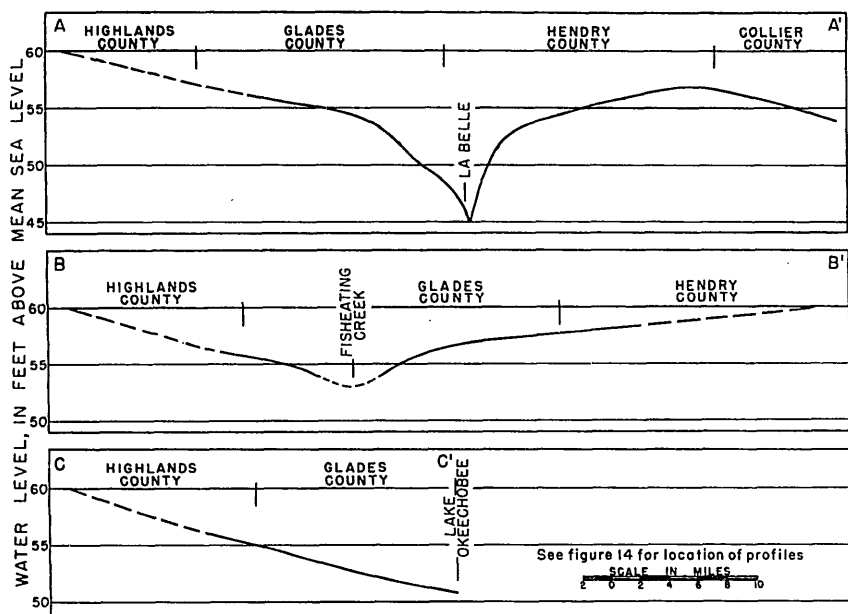


Figure 15. Profiles of the piezometric surface of the Floridan aquifer in Glades and Hendry counties, 1958.

SHALLOW AQUIFERS

The shallow aquifers in Glades and Hendry counties range in age from middle Miocene to Pleistocene. Permeable beds of shell, limestone, or mixtures of sand and gravel in the Tamiami Formation and the upper part of the Hawthorn Formation are the principal sources of ground water for shallow wells. Wells tapping these aquifers range in depth from about 10 feet to more than 300 feet. The shallower wells generally penetrate shell beds or limestone in the Tamiami Formation. They are finished with a few feet of open hole and yield relatively small amounts of water in Glades County and most of northern and western Hendry County. In 1953 few irrigation wells produced water from the shallow aquifers in Glades County because the Floridan aquifer, in most areas yielded usable water in large quantities without the use of pumps. In Hendry County the Floridan aquifer yields water that is generally unsuitable for irrigation, and farmers must depend on the shallow aquifers for fresh-water supplies. Truck-crop farmers

in the Devil's Garden, the Big Cypress Swamp, and the Everglades areas irrigate with wells that range in depth from about 50 feet to more than 300 feet. The deepest of these is well 194, 6 miles northeast of Felda (fig. 10); it was drilled to a depth of 326 feet, and was reported to tap one of the gravel beds within the Hawthorn Formation.

The principal shallow aquifer in the area is in the southern and central parts of Hendry County, and is composed of highly permeable limestone of the Tamiami Formation. Geologic information obtained from well 131 in Collier County, due east of Immokalee at the Hendry County boundary, shows the top of the aquifer to be at a depth of 22 feet, and that permeable limestone extends to a depth of at least 54 feet. In this area the aquifer is overlain by 5 feet of surficial, medium-grained sand and 17 feet of sandy, shelly clay of low permeability. The clay retards the downward infiltration of water to the aquifer.

Further information indicates that the aquifer thins out 3 to 5 miles west of well 131 in Collier County. The increase in the depth of wells eastward from well 131 suggests that the highly permeable limestone in the aquifer dips to the east. The depth to the top of the limestone in the Devil's Garden area (fig. 2) is about 120 feet. Eight miles north of well 131 the aquifer probably is thinner, as indicated by the shallow depth of irrigation wells in that area. The greatest extent of the aquifer is southward, where it probably underlies all of southern Hendry County and most of Collier County. Similar permeable limestone was noted in rockpits as far south as southern Collier County.

Data from well 4, 9 miles west of Clewiston, in Hendry County, indicate that the top of a shallow aquifer in that area occurs at 96 feet below the land surface. This aquifer extends to 127 feet and is reported to be composed of fine to coarse gray sand mixed with well rounded pebbles. The aquifer may be the basal part of the Tamiami Formation or possibly one of the pebble beds of the Hawthorn Formation. The well is finished with 5 feet of slotted casing, is gravel packed, and is reported to yield 180 gpm. The overlying material is composed of sandy, shelly marl of low permeability.

Wells penetrating the shallow permeable layers in LaBelle and vicinity range in depth from about 60 to 175 feet, but most are between 20 and 100 feet deep. A study of rock cuttings taken during the drilling of well 277, in the southern part of Labelle, shows that layers of clay, shelly marl, and fine sand are interbedded with layers of limestone to a depth of 170 feet. The clay and

shelly marl are of low permeability and tend to retard ground-water movement between the thin sections of higher permeability. The sediments in general are poorly sorted and grade laterally as well as vertically into material of different composition.

The shallow sediments in Glades County generally have low to moderate permeability, and most large capacity wells penetrate the Floridan aquifer even though the quality of the water is usually poorer. The shallow aquifers in Glades County are composed of sand and pebble beds or discontinuous limestone beds of the Hawthorn Formation. The yield from shallow aquifers in Glades County generally is lower than that from shallow aquifers in Hendry County.

WATER-LEVEL FLUCTUATIONS

Water levels in wells that tap shallow aquifers in Glades and Hendry counties normally are within a few feet of the land surface. However, during rainy seasons the water levels in wells in many areas rise above the land surface. Well 128, 3 miles west of LaBelle and south of the Caloosahatchee River in Hendry County, flows throughout most of the year. The well was reported to penetrate a permeable shell bed at a depth of 76 feet.

Records of fluctuations of water levels in shallow observation wells in and adjacent to Hendry County have been obtained since 1950. Automatic gages provide a continuous record of the daily changes and the seasonal trends of the water levels. Hydrographs of wells 3 and 5, in Hendry County south of Clewiston, and well 131, in Collier County east of Immokalee, are shown in figure 16. They reveal ground-water levels are usually at low stage during winter and spring and are high during and immediately after the rainy season in summer and early fall. The maximum range of fluctuation is about 5 feet.

The greatest rise in water level accompanies the first heavy rainfall of the wet season. The surface materials become saturated nearly to the land surface and subsequent rainfall causes intermittent flooding. The hydrograph for well 3, 30 miles south of Clewiston, shows that the flooding had occurred in that area many times during each rainy season and that the area was flooded nearly the entire year of 1958.

Evapotranspiration is another cause of water-level fluctuations in shallow observation wells. The decline of water levels caused by evapotranspiration ranges from 0.05 to 0.15 foot per day. When overland runoff stops after the rainy season, the persistent decline

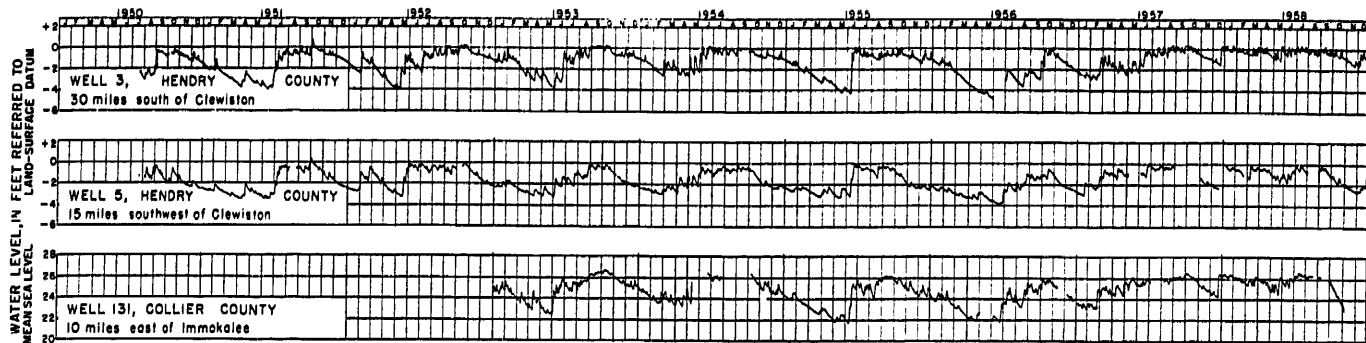


Figure 16. Hydrographs of wells 3 and 5 in Hendry County and well 131 in Collier County.

of water levels throughout the area is the result of the relatively high rate of evapotranspiration.

A water-level recording gage was installed on well 234 in LaBelle to determine the relation between the stage of the Caloosahatchee River and the water table adjacent to the river during 1953-54. This relation is shown in the hydrographs of figure 17. The daily rainfall at LaBelle is included also. The hydrograph shows the daily-average stage of the Caloosahatchee River at LaBelle and is probably indicative of the fluctuations as far upstream as the Ortona Lock, one of the regulatory structures which control the water level of Lake Okeechobee. Fluctuations of river stage at LaBelle are caused by boat-lock operation, by variations of discharge from Lake Okeechobee through the locks at Ortona, and by gulf tides.

The large fluctuations in figure 17 are caused by changes in the rate of discharge through the structure at Ortona. During the period from early February to late May 1953 the locks were open and the average river stage at LaBelle was between 3.0 and 3.5 feet above msl. On May 22, 1953, the locks were closed and the river stage at LaBelle declined to 0.5 foot above msl. Figure 17 shows that the 2.5-foot drop in stage had no influence on the water level in well 234, less than 1,000 feet from the river. Similarly the large changes in river stage that occurred during September and October 1954 produced no corresponding changes in water level in well 234.

Lithologic information obtained from well 234 and from outcrops along the riverbanks at LaBelle shows that sandy and shelly material of moderate permeability extends from the land surface to about 6 feet above sea level. These are underlain by about 6 feet of sandy marl of low permeability. A relatively impermeable layer of silty clay of the Tamiami Formation forms the base of the riverbank at an elevation of about 1 foot above sea level. Apparently, the sediments of predominantly low permeability tend to minimize the effect on ground-water levels produced by rapid stage changes in the Caloosahatchee River, so that the effect extends less than 1,000 feet from the river.

RECHARGE AND DISCHARGE

The water that replenishes the shallow aquifers in Glades and Hendry counties is derived from local rainfall. The terrain is essentially flat and covered by moderately permeable sand, which permits rapid infiltration to the water table. As the water table

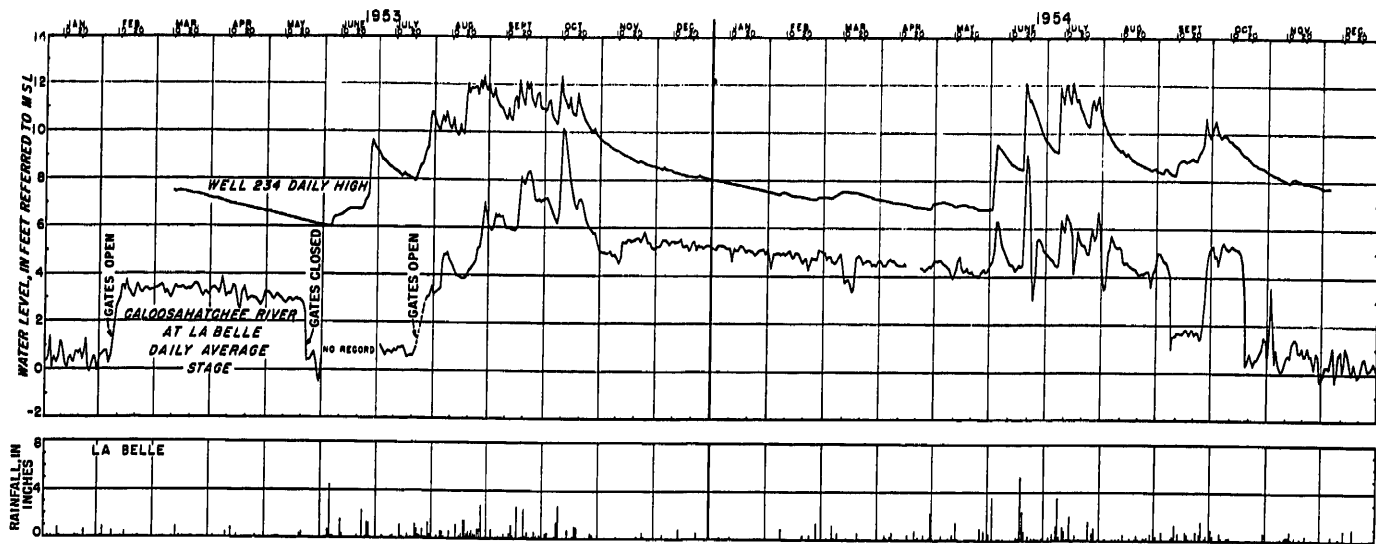


Figure 17. Hydrographs of well 234 and the Caloosahatchee River at LaBelle compared with rainfall for the period 1953-54.

throughout the area is never more than a few feet below the land surface, the shallow sands quickly become saturated early in the rainy season. As a result, ponding is widespread and slow overland flow occurs. Thin layers of fine sand, marl, or clay of low permeability that overlie shallow aquifers tend to impede downward infiltration.

Discharge of ground water occurs by outflow to the Caloosahatchee River, Fisheating Creek, numerous drainage canals, and Lake Okeechobee; by evapotranspiration; and by pumping from wells. Ground-water losses by outflow along the uncontrolled reach of the Caloosahatchee River probably are small because of the general low permeability of the shallow sediments (see discussion of water-level fluctuations). Evapotranspiration is responsible for the largest losses of ground water from storage, because the water table is near the surface throughout the year. The quantity of water discharged by wells is negligible compared to natural discharge.

HYDRAULIC CHARACTERISTICS

The ability of an aquifer to transmit water is expressed by the coefficient of transmissibility. The coefficient of transmissibility is defined as the quantity of water, in gallons per day, that will move through a vertical section of the aquifer 1 foot wide and extending the full height of the aquifer, under a unit hydraulic gradient at the prevailing temperature of the water (Theis, 1938, p. 894). The coefficient of storage is a measure of the capacity of the aquifer to store water, and is defined as the volume of water released from or taken into storage per unit surface of the aquifer per unit change in the component of head normal to that surface. The leakage coefficient (Hantush, 1956, p. 702) characterizes the ability of semiconfining layers above or below an aquifer to transmit water. It is the quantity of water that crosses a unit area of the interface between the permeable section and its confining layer with a unit hydraulic gradient between the head in the permeable section and the section supplying the leakage.

The coefficients of transmissibility, storage, and leakage that pertain to shallow aquifers in Glades and Hendry counties were determined by aquifer tests at seven sites (fig. 18). During each test, the changes in water level were measured in observation wells located at different distances from the pumped well. Figure 19 is a semilogarithmic graph of water-level drawdowns in observation wells versus the distance from the pumping wells at five of the

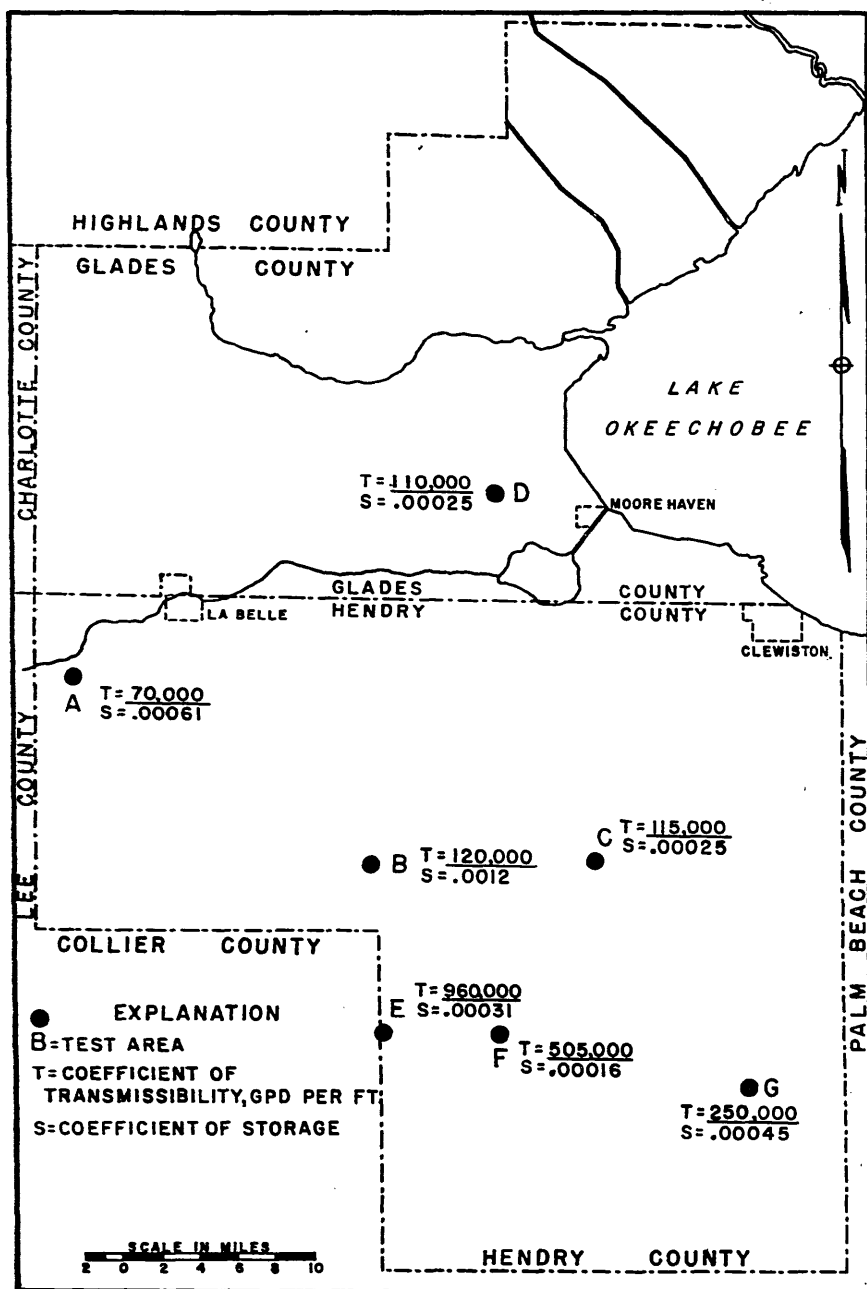


Figure 18. Coefficients of transmissibility and storage determined at test sites in Glades, Hendry, and Collier counties in shallow aquifers.

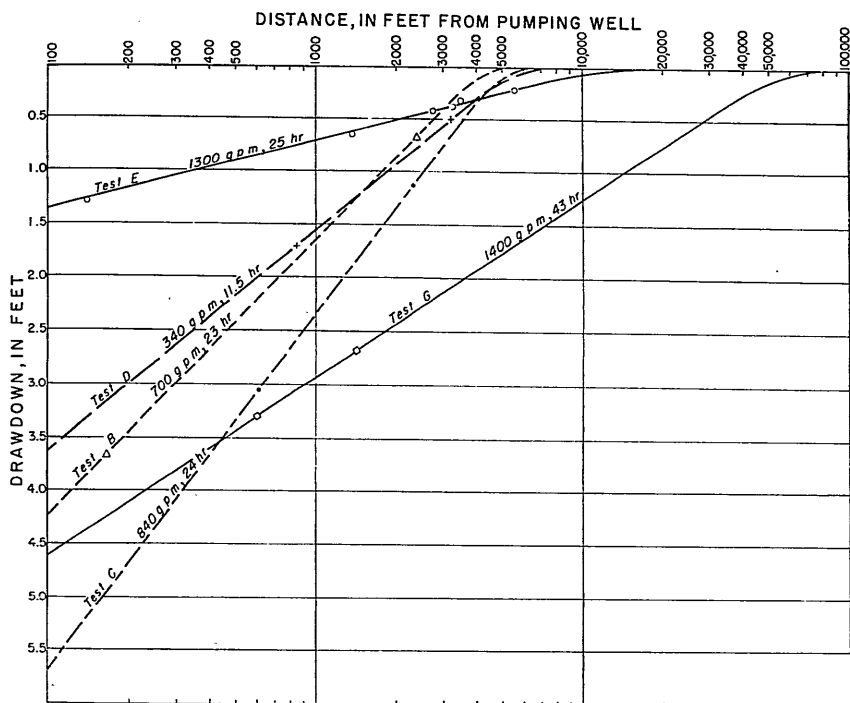
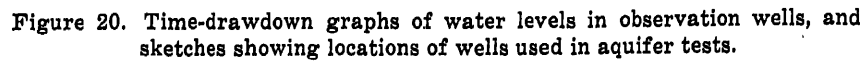


Figure 19. Composite of semilogarithmic distance-drawdown graphs of five aquifer tests.

aquifer test sites. In all but test D the duration of pumping had been sufficient to permit drawdowns in observation wells to reach stabilization. The duration and rate of pumping are shown for each distance-drawdown graph. The projection of each graph indicates the approximate drawdown that would be expected at a given distance from a well pumped at the indicated rate. Therefore the graph can be used to determine the optimum pumping rates and proper spacing for wells.

The field data obtained during the aquifer tests are shown in figure 20. The time-drawdown graphs for each test area are accompanied by a sketch showing the location of the wells used in the tests. The natural fluctuations of the water-level were recorded for periods of 24 hours both before and after each test to determine the fluctuations caused by factors other than pumping, such as changes in atmospheric pressure and evapotranspiration. These



corrections were subtracted, and the corrected drawdowns shown are the result of pumping only. The amount of correction in some cases is very significant, as indicated by the graphs of well 285 in test E (fig. 20).

The corrected water-level drawdowns, in feet, were plotted (on logarithmic paper) against time, in minutes, since pumping started and divided by the square of the distance, in feet, between the pumping well and the observation well (t/r^2). The resulting curve for each observation well was matched to a family of leaky-aquifer type curves developed by H. H. Cooper, Jr., of the U. S. Geological Survey, from the equations developed by Hantush and Jacob (1955). By superposition, match points were established for the best fit of the corrected data to the type curves, and the coefficients of transmissibility, storage, and leakage were calculated from the match points. Table 5 gives the results of these computations for the seven aquifer tests. The coefficients of transmissibility and storage shown on the map of figure 18 represent the average values for each test.

The calculated values indicate that the aquifer composed of limestone of the Tamiami Formation that underlies the area east of Immokalee (test E) has the highest transmissibility. The results of tests F and G show a decrease in the coefficient of transmissibility to the east. This confirms information reported by well drillers that limestone layers become thinner in the vicinity of test G and much of the material is composed of fine and medium sand. A marked decrease in the coefficient of transmissibility is shown also to the north in test sites B and C. In these areas the aquifer is probably thin or the limestone section grades to a marly, partly consolidated shell bed.

A basic assumption of the leaky-aquifer method of analysis is that the water level in the material supplying the leakage does not decline during the period of pumping. Under this condition, when the cone of depression (which forms around the pumped well) has expanded to the extent that the total rate of downward leakage is equal to the rate of withdrawal no further appreciable drawdown will take place in the aquifer as a result of pumping. This condition is closely approximated when an area is flooded or where an area is dissected by a network of canals in which water can be maintained at a constant level.

On the other hand, where there is no source of water to maintain downward leakage at a constant rate, the water table will begin to decline after prolonged pumping. As the water table declines, the rate of downward leakage is reduced because of the reduction

TABLE 5. Coefficients of Transmissibility, Storage, and Leakage in Glades, Hendry and Eastern Collier Counties

Test (see fig. 18)	Date of test	Well no. ¹		Depth of well (feet)		Distance to observation well (feet)	Pumping rate (gpm)	Coefficient of transmissibility (T = gpd/ft)	Coefficient of storage (S)	Leakage coefficient ²	Hours pumped	Maximum draw-down (feet)
		Pumped well	Observation well	Pumped well	Observation well							
A	5-20-58	HE 313	HE 312	125	125	1,850	310	70,000	6.05×10^{-4}	2.77×10^{-6}	8 1/2	.31
B	7-30-58	HE 320	HE 322	84	84	165	700	100,000	1.39×10^{-3}	4.89×10^{-6}	23	3.67
B	7-30-58	HE 320	HE 323	84	23	2,400	700	140,000	9.26×10^{-4}	1.44×10^{-6}	23	.66
C	6-26-58	HE 300	HE 299	97	72	615	840	110,000	2.73×10^{-4}	1.08×10^{-6}	24	3.05
D	6-26-58	HE 300	HE 301	97	98	2,300	840	120,000	2.30×10^{-4}	1.03×10^{-6}	24	1.12
D	8-14-58	GL 260	GL 258	80	73	3,200	340	115,000	2.95×10^{-4}	1.65×10^{-7}	11 1/2	.51
D	8-14-58	GL 260	GL 259	80	82	855	340	105,000	2.06×10^{-4}	1.31×10^{-7}	11 1/2	1.57
E	6-17-58	HE 286	HE 285	40	40	1,380	1,300	985,000	2.98×10^{-4}	2.33×10^{-7}	25	.63
E	6-17-58	HE 286	HE 287	40	51	3,220	1,300	1,070,000	1.98×10^{-4}	5.47×10^{-7}	25	.40
E	6-17-58	HE 286	HE 288	40	40	3,580	1,300	995,000	2.73×10^{-4}	1.08×10^{-6}	25	.32
E	6-17-58	HE 286	HE 306	40	41	140	1,300	935,000	4.16×10^{-4}	2.05×10^{-6}	25	1.28
E	6-17-58	HE 286	C 131	40	54	2,750	1,300	995,000	2.76×10^{-4}	1.10×10^{-6}	25	.41
E	6-17-58	HE 286	C 165	40	51	5,550	1,300	830,000	3.85×10^{-4}	1.60×10^{-6}	25	.21
F	6-18-58	HE 289	HE 290	70	80	1,800	1,570	500,000	1.63×10^{-4}	2.80×10^{-7}	14	1.41
F	6-18-58	HE 289	HE 291	70	92	2,300	1,570	515,000	1.49×10^{-4}	3.60×10^{-7}	14	1.21
G	6- 3-58	HE 303	HE 302	120	121	600	1,400	230,000	6.00×10^{-4}	5.90×10^{-7}	43	3.30
G	6- 3-58	HE 303	HE 304	120	122	1,415	1,400	265,000	2.97×10^{-4}	1.23×10^{-7}	43	2.68

¹C-Collier County, GL-Glades County, HE-Hendry County.²Gpd per square foot per foot of vertical head; Hantush, 1956, p. 706.

of head differential between the water table and the piezometric (pressure) surface of the highly permeable section of the aquifer. The cone of depression then must expand to intercept additional water to supply the pumping well.

After a long period of pumping and no replenishment to the shallow aquifer, the water table will lower gradually and tend to coincide with the piezometric surface. The entire system will then behave as an unconfined unit.

These drawdown conditions are pictured in figure 21, which shows semilogarithmic time-drawdown graphs of four of the observation wells used in test E. In addition to the corrected drawdown information obtained during the test, the graphs show the drawdowns that would have occurred, theoretically, if the aquifer were (1) artesian, curve A, (2) unconfined, curve B, (3) leaky with an unlimited source of downward leakage, curve C, (4) leaky with a limited source of downward leakage, curve D.

Curve A was plotted by using the coefficients of transmissibility and storage of the highly permeable section of the aquifer, as determined by the leaky-aquifer method. For this case it was assumed that the aquifer is infinite, is bounded above and below by impermeable materials, and receives no recharge during the pumping period. Curve B was constructed by using a coefficient of transmissibility 10 per cent higher than the average coefficient of the test area, as determined by the leaky-aquifer method, and assigning a storage coefficient of 0.15 (a typical value for unconfined aquifers). Curve C is a plot of the corrected drawdowns obtained during the test (solid circles) with the plots extended (open circles) to conform with ideal leaky-aquifer conditions, which assume that an unlimited source of supply is available at the surface, and that no further drawdown occurs after equilibrium is reached. Curve D is transitional between ideal leaky-aquifer conditions and leaky-aquifer conditions that prevail in the field, where actual unwatering of the aquifer occurs. This curve predicts the water-level drawdowns caused by constant prolonged pumping and no recharge by rainfall. The graphs in figure 22 show similar drawdown information for test areas B in Hendry County and D in Glades County (fig. 18).

In Glades and Hendry counties ground-water levels fluctuate seasonally, but the average yearly water levels are reasonably constant (fig. 16). Even in agricultural areas where irrigation is heavy, the wide cones of depression developed by pumping do not cause large changes in water levels from year to year. This is due to the fact that under existing rates of pumping complete

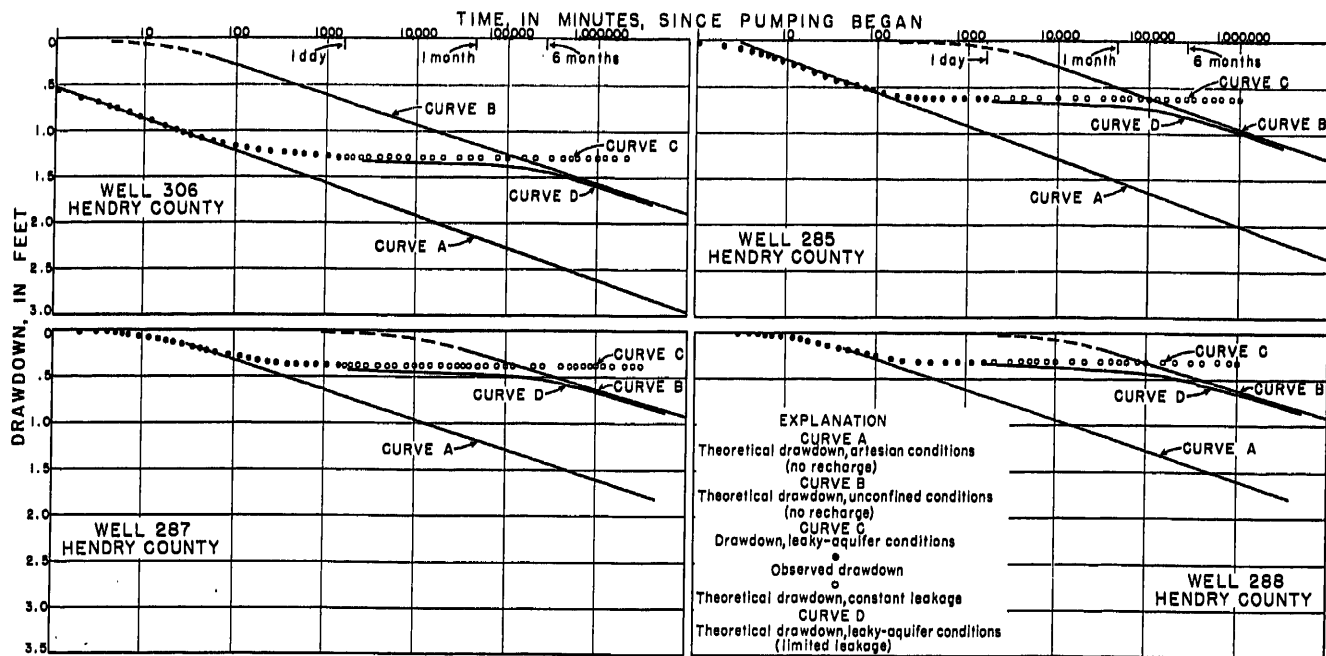


Figure 21. Semilogarithmic time-drawdown graphs of four observation wells in test area E.

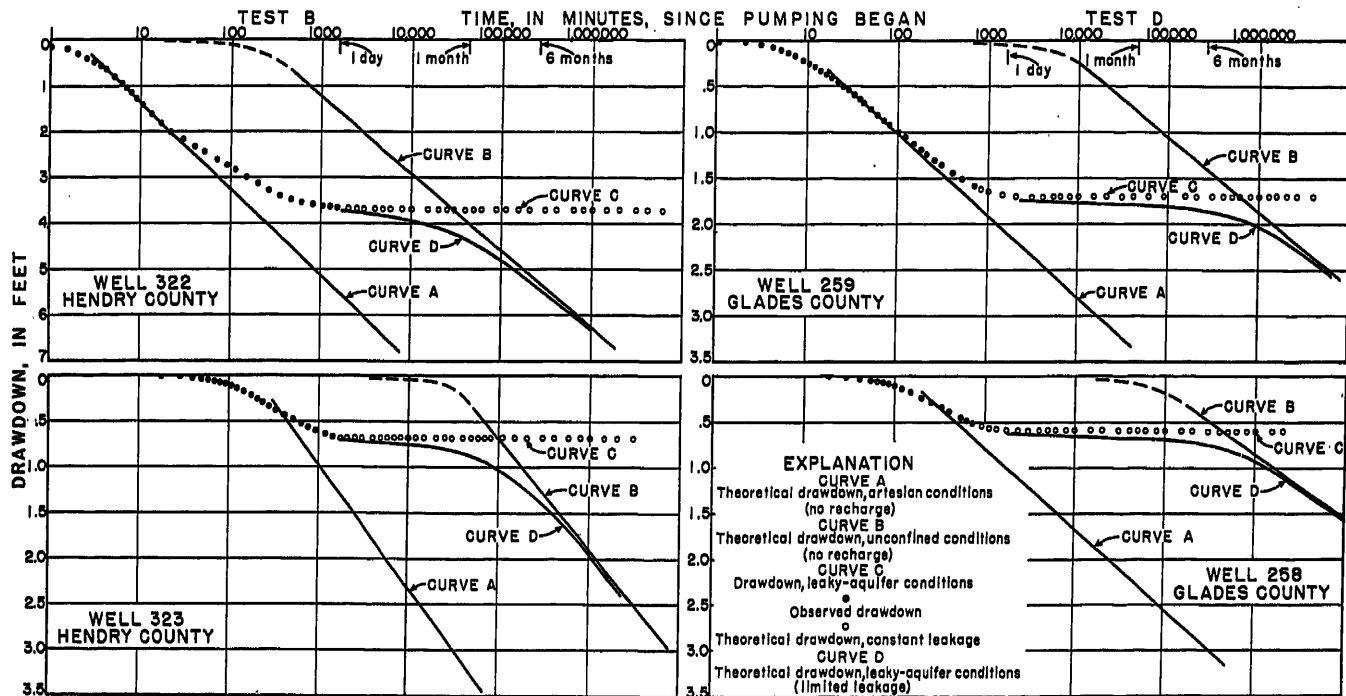


Figure 22. Semilogarithmic time-drawdown graphs of observation wells in test areas B and D.

replenishment of the aquifers occurs during each rainy season. Large local drawdowns do not occur, because a large amount of surface water and shallow ground water is salvaged as a result of reduction in runoff and evapotranspiration in the areas affected by pumping.

During dry seasons, 2 or 3 months may elapse without an appreciable rainfall in Glades and Hendry counties. These rainless periods may be further prolonged during severe droughts. It is important, therefore, to estimate the combined effect that long rainless periods and prolonged, constant pumping would have on the water level in a given area. A 6-month period was selected as the maximum duration of such a rainless interval.

Figure 23 shows the maximum drawdowns that would occur at the end of 6 months, at different distances from a well pumped at selected rates in each of six test areas. It was assumed that nonartesian conditions prevailed in each area after 6 months of pumping; therefore, the graphs were drawn in accordance with the coefficients of transmissibility shown in table 5, but increased by 10 percent to include the transmissibility of the semiconfining beds, and as assumed coefficient of storage of 0.15. If the coefficient of storage in a given area is less than 0.15, the predicted drawdowns will be greater than those indicated in figure 23.

When several wells in a large tract are pumped continuously, the composite drawdown at a particular point can be predicted by summing the effects that each pumping well would have at that time. Because drawdown is approximately proportional to the rate of pumping, the effect of any selected pumping rate can be interpolated from figure 23.

QUALITY OF WATER

All ground water contains dissolved minerals as a result of the solvent action of the water as it moves through the rocks. The character and the quantity of the constituents in the water are determined by the following: (1) the rate of ground-water flow; (2) the composition of the materials through which the water moves; (3) the temperature and pressure of the water; and (4) the presence of other materials in solution or suspension.

Table 6 is a compilation of complete chemical analyses of water samples from 23 wells in Glades and Hendry counties. Five wells penetrate the Floridan aquifer and the rest penetrate shallow aquifers. Also included are analyses of samples collected at

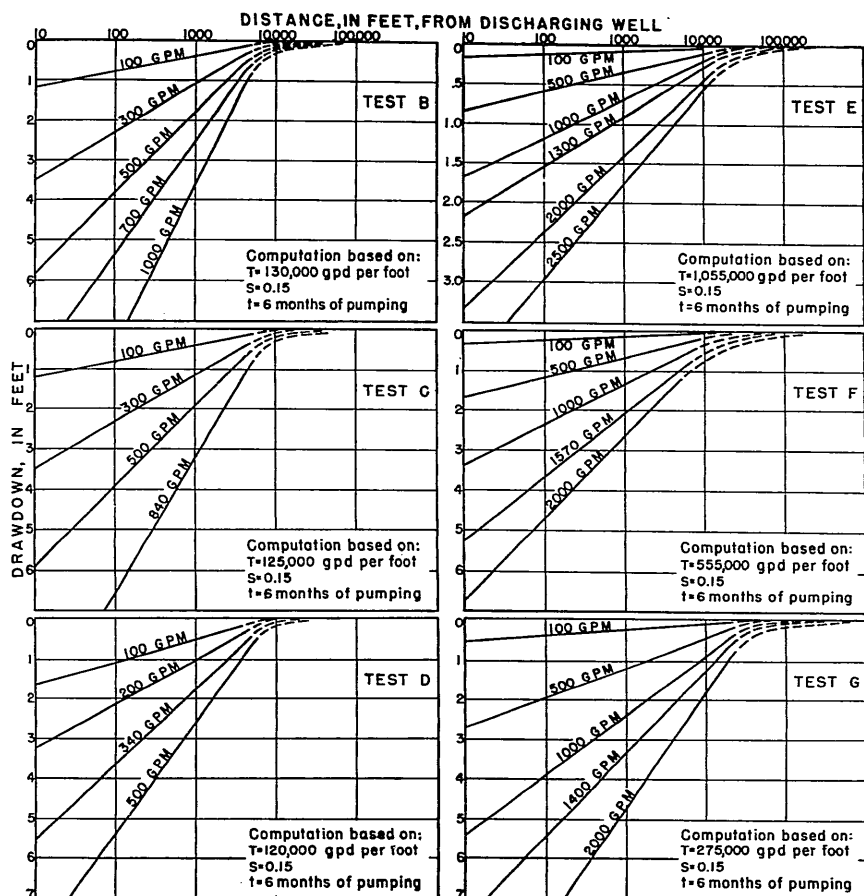


Figure 23. Graphs showing drawdowns expected at different distances from a well pumped at selected rates in each of six test areas.

multiple depths in a few wells, which indicate the change in quality of water at different depths in certain aquifers.

In Glades and Hendry counties the water from the Floridan aquifer generally is highly mineralized, except in northwestern Glades County. Most of the mineralization is due to chloride salts, which suggests seawater contamination. The amount of mineralization differs with the depth of well, the well construction, and the location of the well. Some zones in the Floridan aquifer contain fresher water than others, but in general the deep parts of the aquifer yield water that is more saline than the shallow zones.

TABLE 6. Analyses Of Water From Wells In Glades And Hendry Counties
(Analyses by U. S. Geological Survey. Chemical constituents are expressed in parts per million.)
GLADES COUNTY

Well number	Date of collection	Depth of sample (feet)	Temperature (°F)	Silica (SiO ₂)	Iron (Fe) ¹	Iron (Fe) total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Dissolved solids (residue at 180°C)	Hardness as CaCO ₃		Specific conductance (micromhos at 25°C)	pH	Color
																	Calcium, magnesium	Noncarbonate			
22	8-1-51	667	---	---	-----	---	---	-----	-----	-----	113	168	265	---	---	---	843	250	1,880	7.7	---
	8-2-51	814	---	---	-----	---	---	-----	-----	-----	115	172	258	---	---	---	846	252	1,820	7.8	---
	8-3-51	922	---	---	-----	---	---	-----	-----	-----	109	170	241	---	---	---	838	248	1,280	7.6	---
	8-4-51	1,071	---	---	-----	---	---	-----	-----	-----	113	172	230	---	---	---	826	234	1,250	7.6	---
	8-5-51	1,190	---	13	0.01	---	74	86	148	4.7	111	172	280	0.2	0.2	580	832	241	1,400	7.3	5
23	2-27-51	110	---	24	.40	---	129	13	140	5.5	390	56	218	.6	.9	884	385	66	1,880	7.2	20
27	7-21-48	35	---	---	.02	---	134	33	166	---	534	113	195	---	.2	904	470	32	1,540	7.3	80
	7-22-48	75	---	---	.10	---	103	40	241	---	528	129	268	---	.0	1,041	422	0	1,790	7.7	45
28	8-28-43	17	---	---	.03	---	156	13	66	---	484	79	75	---	3.8	631	443	46	1,090	7.4	65
	8-28-43	47	---	---	.05	---	144	12	175	---	468	10	280	---	---	852	409	28	954	7.0	90
	8-28-43	63	---	---	.02	---	156	17	83	---	470	88	112	---	.02	691	460	70	1,150	7.1	42
29	8-31-43	34	---	---	.06	---	174	31	135	---	464	154	218	---	9.6	950	562	180	1,810	7.3	90
	9-1-43	51	---	---	.07	---	78	86	201	---	384	96	255	---	.1	858	342	28	1,530	7.4	20
	9-1-43	75	---	---	---	---	---	---	---	---	374	---	270	---	---	---	---	---	1,600	7.4	---
93	12-10-53	86	76	28	.20	0.97	49	12	9.2	1.2	218	4.5	11	.1	.1	227	172	0	364	7.0	7
201	11-25-53	642	79	11	.00	.27	50	40	320	12	106	298	388	1.5	.0	1,260	290	154	2,070	7.7	4
212	10-12-53	87	---	12	---	1.5	148	6.2	31	1.8	358	87	50	.4	2.3	661	395	102	812	7.2	90
227	12-10-53	45	73	33	.04	.14	89	120	514	29	302	140	1,040	.1	.3	2,360	716	468	3,890	7.4	3

TABLE 6. (Continued)

HENDRY COUNTY

8	12-10-53	10	77	6.1	0.06	1.3	123	1.2	21	1.2	880	12	38	0.1	0.1	410	312	0	687	7.5	34
4	4-23-43	90	---	---	.03	---	144	10	52	---	512	17	80	.4	---	565	438	18	---	7.1	22
	4-28-43	107	78	---	.94	.94	144	23	49	---	546	2.8	78	.4	---	566	454	6	---	7.1	15
5	12-10-53	9	75	6.4	.92	1.3	45	2.4	28	1.3	162	12	23	.1	.1	297	122	0	336	6.8	450
14	4-24-48	315	---	---	.28	---	65	33	242	---	360	126	232	.3	.0	926	298	3	---	7.5	12
17	3-22-48	601	---	---	.09	---	70	51	352	---	122	351	480	2.4	1.2	1,370	384	284	2,300	7.1	3
20	6-16-42	50	79	---	---	---	122	11	45	---	440	2.9	59	---	.1	457	350	0	338	---	---
21	6-17-42	46	---	---	---	---	126	12	39	---	466	1	47	---	.1	455	364	0	323	---	---
61	11-24-53	80	77	26	.21	.49	84	30	38	1.0	406	4.0	54	.3	.0	468	333	0	761	7.6	23
156	11-24-53	90	77	14	.01	.24	62	49	330	1.3	188	292	472	1.2	.0	1,400	356	243	2,260	7.6	4
163	11-24-53	68	77	52	.34	.44	108	12	40	3.7	424	16	35	.3	.0	710	319	0	747	7.6	18
200	12-10-53	70	75	26	.07	.21	100	15	39	2.2	416	14	40	.1	.1	470	311	0	747	7.5	45
276	11-24-53	44	73	21	.04	.16	174	12	85	1.6	563	35	123	.0	.1	798	484	22	1,250	7.1	30
278	12-10-53	790	83	14	.03	.11	118	95	514	16	150	245	1,030	1.3	.2	2,300	685	562	3,320	7.5	4

solution at time of analysis.

The water in shallow aquifers in Glades and Hendry counties is generally of better quality than water in the Floridan aquifer, except near Lake Okeechobee, in the vicinity of LaBelle, and in the Devil's Garden area about 18 miles southwest of Clewiston. The concentrations of calcium and bicarbonate in the shallow aquifers are usually higher than in the artesian water, but the concentrations of sodium, magnesium, sulfate, and chloride are usually lower.

When the inventory of wells in the counties was made during 1952-53 and 1958-59, samples of water from most of the wells were analyzed for chloride content. Selected wells were resampled for partial chemical analysis, which included color, specific conductance, and total hardness. The results of the partial analyses of water samples from 205 wells are given in table 7; the results of the chloride-content analyses are listed in table 8.

HARDNESS

Hardness of ground water is due chiefly to dissolved calcium and magnesium salts. Water samples from the shallow aquifers in Glades and Hendry counties range from 13 to 755 ppm in total hardness. Samples from the Floridan aquifer range from 68 to 1,620 in hardness. Hardness values of more than 120 ppm denote hard water that usually requires some softening for general use. Most of the samples of extremely hard water also contain large amounts of sulfates and chlorides. Tables 6 and 7 show the total hardness as CaCO_3 in water samples from wells in the two counties.

TOTAL DISSOLVED SOLIDS

The mineral matter that remains after a quantity of water is evaporated is approximately equal to the total dissolved solids in the water. Water from the Floridan aquifer generally contains more dissolved solids than water from shallow aquifers. The total dissolved-solids content in ground water in Glades and Hendry counties ranges from 41 to 4,100 ppm in the shallow aquifers and from 340 to 5,300 ppm in the Floridan aquifer. Total solids should be below 500 ppm to meet U. S. Public Health Service standards (1946). Water containing more than 1,000 ppm probably contains enough objectionable constituents to impart a noticeable taste and make the water unsuitable for many purposes.

TABLE 7. Partial Analyses of Water from Wells in Glades and Hendry Counties

GLADES COUNTY

Well number	Date of collection	Depth (feet)	Temperature (°F)	Dissolved solids (ppm estimated)	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	Color
2	5- 8-53	804	---	2,400	645	4,020	9
12	5- 6-53	120	---	860	430	1,430	60
13	5- 6-53	48	---	1,300	255	2,240	90
26	4-29-53	120	---	380	276	633	19
37	4-29-53	96	77	610	288	1,020	24
40	4-29-53	173	---	320	284	540	25
42	4-29-53	102	75	350	232	579	19
45	4-29-53	112	76	570	330	950	35
47	4-29-53	106	79	200	159	331	25
48	5- 1-53	325	77	380	236	630	22
49	5- 1-53	500	79	1,100	380	1,850	20
50	5- 1-53	85	76	310	186	511	30
52	5- 1-53	491	81	1,100	310	1,780	110
53	5- 1-53	495	80	1,200	330	2,010	55
55	5- 1-53	62	---	430	146	722	11
56	4-30-53	700	79	410	170	688	28
57	4-30-53	22	73	130	86	216	18
58	4-30-53	608	76	340	156	562	30
59	5- 1-53	593	---	400	180	670	45
60	5- 1-53	30	---	40	14	69	50
66	5- 1-53	25	---	200	134	339	65
71	4-29-53	34	75	690	300	1,150	28
73	4-29-53	22	76	450	228	754	20
76	4-29-53	150	76	430	266	722	18
77	4-29-53	21	75	45	14	78	99
79	5-13-53	70	74	80	40	136	75
80	4-29-53	25	---	65	38	111	10
83	7- 8-53	618	---	350	68	580	7
85	5- 1-53	47	---	45	13	77	55
86	5- 1-53	300	76	340	210	568	25
90	5- 1-53	35	---	380	186	625	25
93	5- 1-53	86	---	220	180	368	20
94	5- 1-53	46	75	340	308	569	14
98	5- 1-53	55	---	350	276	575	34
102	5- 1-53	41	---	380	190	636	55
106	5- 1-53	25	77	350	102	585	110
109	5- 1-53	500	---	870	205	1,450	10
110	5- 1-53	508	78	1,100	160	1,800	19
112	5- 1-53	50	74	400	204	662	60
116	5- 1-53	750	---	1,300	545	2,250	22
118	5- 1-53	17	75	240	190	404	220
122	5- 1-53	70	---	380	132	634	110
123	5- 1-53	1,200	---	5,300	725	8,780	25
126	5- 1-53	25	75	320	228	534	180
128	5- 1-53	100	75	540	364	893	90
130	5-13-53	162	74	520	210	873	45
136	5- 6-53	85	74	1,500	240	2,510	45
139	5- 6-53	86	75	810	185	1,350	55

TABLE 7. (Continued)

Well number	Date of collection	Depth (feet)	Temperature (°F)	Dissolved solids (ppm estimated)	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	Color
140	5- 6-53	50	---	920	360	1,540	45
142	5- 6-53	40	---	1,600	245	2,640	35
144	5- 6-53	800	80	2,500	685	4,110	19
149	5- 6-53	32	---	430	144	723	220
152	5- 6-53	56	---	4,100	550	6,770	60
155	5- 6-53	600	79	870	305	1,450	30
159	5- 6-53	48	---	1,100	755	1,760	110
160	5- 6-53	30	---	2,200	570	3,750	45
161	5- 6-53	6	---	620	340	1,030	75
165	5- 6-53	20	---	960	485	1,600	60
168	5- 6-53	102	---	3,400	460	5,650	45
173	5- 6-53	26	---	640	374	1,070	40
174	5- 6-53	52	---	950	345	1,580	60
177	5- 6-53	40	---	970	375	1,610	75
180	5- 6-53	105	---	1,100	260	1,800	50
182	5- 6-53	110	74	790	210	1,310	40
185	5- 6-53	101	---	1,100	310	1,830	55
186	5- 6-53	100	---	3,100	350	5,110	90
188	5- 6-53	73	---	1,500	230	2,500	60
193	4-30-53	186	---	430	338	716	50
194	4-30-53	68	77	440	340	726	40
195	5- 6-53	68	---	660	226	1,100	65
200	4-29-53	850	81	1,400	470	2,390	40
201	5-13-53	642	79	1,200	290	2,000	12
203	5-13-53	65	---	540	476	894	200
204	5-13-53	65	---	1,200	450	1,960	110
205	5- 6-53	---	79	3,800	730	6,400	15
206	5- 6-53	40	---	550	380	928	65
207	5-13-53	1,500	86	4,800	1,620	7,980	20
208	5-13-53	1,250	81	1,100	435	1,760	5
209	5- 8-53	44	---	470	352	776	100
213	5-13-53	20	---	570	426	947	110
215	5- 8-53	26	76	240	158	402	75
217	5- 8-53	100	79	2,600	730	4,300	30
221	5- 8-53	42	75	360	242	598	70
228	5- 8-53	45	---	1,000	475	1,660	45
230	5- 8-53	53	---	1,600	575	2,610	90
236	4-29-53	500	80	1,500	430	2,440	10
237	4-29-53	5	72	65	22	107	60
HENDRY COUNTY							
2	4-30-53	650	80	1,300	330	2,210	7
12	5- 8-53	105	---	670	394	1,120	50
15	5- 8-53	130	---	370	214	624	45
17	4-30-53	601	81	1,300	370	2,230	14
19	5- 7-53	80	---	590	336	979	50

TABLE 7. (Continued)

Well number	Date of collection	Depth (feet)	Temperature (°F)	Dissolved solids (ppm estimated)	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	Color
46	5- 7-53	1,465	83	2,300	760	3,840	7
51	5- 7-53	---	83	2,400	767	3,970	16
52	5- 7-53	68	79	290	200	477	40
54	5- 1-53	1,300	84	2,900	920	4,880	14
55	5- 7-53	100	---	920	395	1,540	27
58	5- 7-53	50	---	660	310	1,070	16
60	5- 7-53	995	82	2,300	795	3,760	5
62	4-29-53	123	79	430	260	716	38
63	4-29-53	580	82	1,000	270	1,720	65
66	4-29-53	115	79	470	202	790	220
71	5- 1-53	300	76	730	338	1,220	32
72	5- 1-53	715	---	1,800	425	2,940	11
74	5- 1-53	820	84	1,900	485	3,090	8
75	5- 1-53	125	---	1,100	455	1,870	28
77	5- 1-53	---	84	2,200	795	3,580	6
79	5- 1-53	85	80	640	290	1,060	19
80	4-29-53	250	76	500	262	829	18
81	4-29-53	750	79	2,400	510	4,010	27
83	4-29-53	---	83	2,400	550	4,060	18
84	5- 1-53	---	79	2,300	720	3,910	10
85	4-29-53	---	78	2,700	455	4,500	8
87	4-30-53	90	---	1,400	370	2,250	10
88	4-29-53	700	80	1,400	390	2,250	15
89	5- 1-53	1,536	87	2,600	995	4,320	20
90	4-29-53	30	78	520	280	871	65
92	4-29-53	390	78	490	142	823	15
97	4-29-53	69	76	340	260	562	20
103	4-29-53	117	78	1,300	235	2,200	26
105	4-29-53	95	78	1,300	365	2,200	6
106	4-29-53	664	82	1,100	255	1,870	7
107	4-29-53	800	81	1,100	245	1,790	17
108	4-29-53	208	78	470	264	789	15
111	5- 1-53	122	---	2,100	740	3,450	40
112	5- 1-53	45	---	1,700	635	2,800	20
114	5- 1-53	60	---	1,600	640	2,590	10
115	5- 1-53	800	84	2,200	890	3,740	7
116	5- 1-53	700	86	2,800	1,030	4,600	8
119	5- 1-53	137	76	810	355	1,350	18
120	5- 1-53	26	---	310	250	509	10
121	5- 7-53	700	80	2,600	715	4,260	19
127	5- 1-53	46	79	500	188	837	15
128	5- 1-53	76	78	1,300	475	2,240	18
131	4-30-53	100	75	600	226	1,000	27
136	4-30-53	100	..	1,200	345	1,960	20
140	4-30-53	---	81	1,400	355	2,310	7
141	4-30-53	68	---	1,300	360	2,160	20
142	4-30-53	74	---	1,100	345	1,860	13
145	4-30-53	80	76	570	232	947	110
149	4-30-53	80	---	570	262	947	21

TABLE 7. (Continued)

Well number	Date of collection	Depth (feet)	Temperature (°F)	Dissolved solids (ppm estimated)	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	Color
150	4-30-53	30	—	310	168	508	19
151	4-30-53	28	—	500	296	846	22
152	4-20-53	22	—	680	220	1,130	15
154	4-30-53	18	—	1,300	445	2,230	16
155	4-30-53	80	—	1,300	370	2,220	15
156	4-30-53	90	—	1,300	365	2,160	6
159	4-30-53	744	—	1,900	330	3,100	22
161	4-30-53	84	—	470	206	790	27
166	4-30-53	80	—	540	242	907	21
167	4-30-53	80	—	1,300	350	2,090	16
170	4-30-53	98	78	790	355	1,320	25
171	4-30-52	40	78	540	132	907	65
172	4-30-53	145	78	830	330	1,390	20
175	4-30-53	140	—	570	236	941	15
176	5- 1-53	135	—	650	180	1,090	35
177	4-30-53	—	—	1,600	345	2,700	45
180	4-30-53	18	—	360	252	596	110
181	4-30-53	20	75	290	218	485	25
182	4-30-53	92	77	740	285	1,230	27
184	4-30-53	60	—	620	244	1,020	50
185	4-30-53	180	76	590	114	977	21
186	4-30-53	99	—	430	290	723	27
187	4-30-53	78	—	370	202	613	40
188	4-30-53	100	—	520	296	873	—
190	5-11-53	48	—	390	88	654	100
194	5- 7-53	326	—	920	165	1,540	45
197	5- 8-53	45	74	590	276	980	45
198	5- 8-53	47	—	570	248	947	55
199	4-30-53	90	76	470	412	787	100
201	4-30-53	180	—	460	224	771	70
203	5- 7-53	15	74	430	212	711	120
204	5- 7-53	112	75	430	152	713	55
205	5- 7-53	90	—	670	292	1,110	120
206	5- 7-53	160	—	310	248	523	60
207	5- 7-53	100	—	820	200	1,360	55
210	5- 7-53	100	—	1,000	420	1,680	65
211	5- 7-53	26	72	1,400	530	2,390	100
212	5- 7-53	42	77	400	208	673	30
214	5-12-53	140	—	1,800	260	3,000	45
215	5- 7-53	45	75	2,900	610	4,850	40
216	5- 7-53	244	—	1,700	250	2,750	50
220	5- 7-53	328	—	1,000	160	1,590	55
221	5-13-53	112	—	1,100	180	1,870	55
223	5- 8-53	12	—	590	316	987	220
224	5- 8-53	40	—	640	172	1,070	50
225	5- 8-53	15	—	470	200	775	80
227	5-13-53	36	—	650	156	1,090	55
236	5- 8-53	115	—	490	156	823	100
241	5-13-53	38	—	610	148	1,020	45

TABLE 7. (Continued)

Well number	Date of collection	Depth (feet)	Temperature (°F)	Dissolved solids (ppm estimated)	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	Color
248	5- 8-53	35	—	610	196	1,010	35
250	5- 8-53	119	—	740	230	1,230	12
252	5- 8-53	80	—	580	410	972	45
258	5-12-53	54	—	550	120	914	45
263	5-12-53	125	—	1,200	180	1,990	50
265	5-12-53	63	—	700	112	1,170	50
268	4-30-53	55	76	430	260	708	40
269	4-30-53	—	80	1,900	380	3,170	40
270	5- 7-53	40	76	520	310	860	25
271	5-12-53	47	—	470	296	774	100
272	5- 7-53	220	75	1,700	210	2,800	45
273	5- 8-53	58	—	1,700	390	2,850	40
274	5-13-53	56	—	580	244	962	35
275	5- 1-53	—	—	1,700	350	2,850	10
278	7- 7-53	790	82	2,200	119	3,700	—

SPECIFIC CONDUCTANCE

Specific conductance is a measure of the ability of water to conduct an electric current. Water containing a low mineral content is resistant to the flow of electricity, whereas highly mineralized water conducts an electric current with relative ease. Therefore, the values for specific conductance can be used to estimate the concentration of dissolved solids in water. Figure 24 shows the relation of total dissolved solids in water samples to specific conductance where both values have been determined in the laboratory. The data show that the dissolved solids can be approximated by multiplying the specific conductance by 0.6. Specific conductance is usually higher in the deep artesian water than in the water from the shallow aquifers; it reaches a maximum of more than 8,700 micromhos in well 123 in Glades County. In table 7 the values for total dissolved solids were estimated from specific conductance by multiplying by the 0.6 factor.

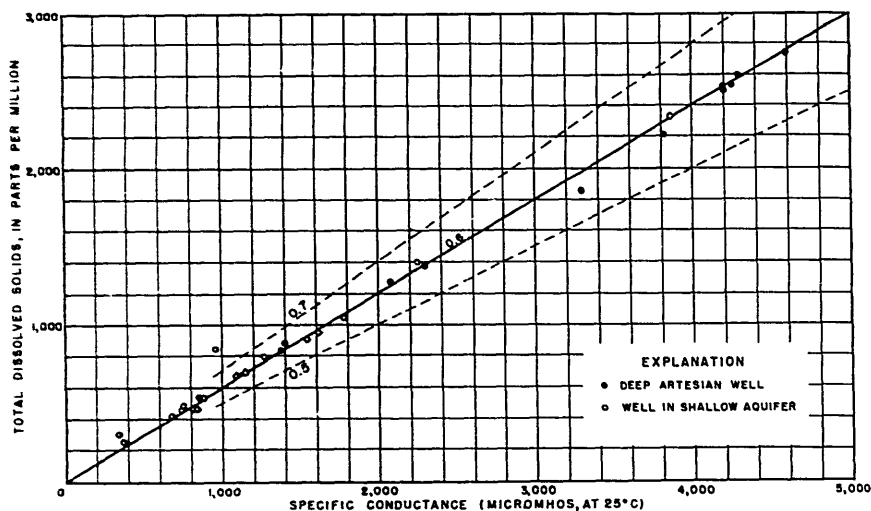


Figure 24. Graph showing the relation between specific conductance and total dissolved solids in water samples from Glades and Hendry counties.

HYDROGEN-ION CONCENTRATION (pH)

The pH is a measure of the hydrogen-ion concentration and indicates whether the water is acid or alkaline. On a scale of 0 to 14, pH values higher than 7.0 indicate alkalinity and values lower than 7.0 indicate acidity. All samples analyzed, except one, had pH values of 7.0 or greater; the sample from well 22 in Glades County had a pH of 6.9. The measured pH values are shown in table 6.

IRON (Fe)

Water containing more than 0.3 ppm of iron will stain plumbing fixtures, clothes, and other objects with which it comes in contact. High concentrations of iron also cause the water to have a disagreeable taste. Iron in a clear ground-water solution is in the ferrous state until the water is exposed to the oxygen in the atmosphere, then the iron is oxidized to the ferric state and precipitates as the insoluble hydroxide or oxide of iron. The iron precipitate may then be removed by filtration. Water samples from the artesian aquifer contained less than 0.3 ppm of iron. The iron content of water from the shallow aquifers differs from place to place and at different depths within the aquifer. It ranged from 0.11 to 1.5 ppm (table 6).

CALCIUM (Ca) AND MAGNESIUM (Mg)

Dissolved calcium and magnesium salts are responsible for most of the hardness of water. Much of the water-bearing material underlying Glades and Hendry counties is composed of limestone and a lesser amount of dolomite. These carbonate rocks are the sources of calcium and magnesium in the ground water in the area. The concentration of calcium ranged from 42 to 136 ppm in water samples from the Floridan aquifer and from 49 to 174 ppm in water samples from the shallow aquifers. The concentration of magnesium ranged from 36 to 105 ppm in the Floridan aquifer and from 1.2 to 120 ppm in the shallow aquifers.

The shallow ground water usually contains less magnesium than the artesian water and the amount of magnesium is usually less than the calcium. An exception is shown in the analyses of water from well 227 in Glades County northwest of Clewiston and from well 276 in Hendry County in Clewiston (table 6). The wells are about 4 miles apart and about 45 feet deep. The chemical analyses of the samples show wide differences in chloride content, total dissolved solids, sodium, calcium, and magnesium. The ratio of magnesium to calcium in well 227 is of interest; the content of magnesium is considerably higher than that of calcium, unlike other samples from the shallow aquifer. As sea water contains more magnesium than calcium, this may indicate the presence of sea water which was trapped in the aquifer during high stands of the sea in Pleistocene time. No dolomitic limestones are known to occur in the shallow materials, thus discounting the solvent action of ground water on the shallow materials as the source of magnesium. The high chloride content of water is further indication of contamination by sea water.

SODIUM (Na) AND POTASSIUM (K)

The quantity of sodium plus potassium in ground water in Glades and Hendry counties ranges from 10.4 to 543 ppm in the shallow aquifers and from 145.5 to 530 ppm in the Floridan aquifer; the concentration of sodium greatly exceeds that of potassium. Moderate amounts of these constituents have no effect on the palatability of drinking water, but large amounts render the water unsuitable for most uses. The ratio of the quantity of sodium to the total quantity of sodium, calcium, and magnesium is important when the water is to be used for irrigation. Large

quantities of sodium tend to decrease the permeability of soils, and water containing more than 50 percent sodium may injure the soil and crops.

Figure 25 shows the suitability of water for irrigation, as determined by Wilcox (1948, p. 25-26) and utilized by Visser (1952, p. 15-17) in an arid area. Most of the water samples from the shallow aquifers are in the range from excellent to permissible, but many of the samples from the Floridan aquifer are in the doubtful or unsuitable range. However, the chart assumes little or no flushing of the soil by rainfall. In an area of plentiful rainfall, such as south Florida, the sodium content of the soil probably would not accumulate in quantities harmful to most crops.

BICARBONATE (HCO_3)

The amount of bicarbonate in the ground water in Glades and Hendry counties ranges from 138 to 563 ppm in the shallow aquifers and from 109 to 166 ppm in the Floridan aquifer. The bicarbonate results from the solvent action of ground water containing carbon dioxide gas on carbonate rocks. Much of the bicarbonate can be readily removed by relatively simple water treatment.

SULFATE (SO_4)

Concentrations of sulfate in ground water in Glades and Hendry counties range from 1 to 292 ppm in the shallow aquifers and from 126 to 351 ppm in the Floridan aquifer. The sulfate radical is not very important in domestic water supplies unless it exceeds 500 ppm, in which case it may have a laxative effect. The U. S. Public Health Service recommends that public water supplies contain not more than 250 ppm of sulfate. Some sulfate compounds in water cause hardness that is difficult to reduce by treatment.

CHLORIDE (Cl)

Water containing chloride in excess of 250 ppm is considered by the U. S. Public Health Service to be unsuitable for public drinking supplies, except in areas where better quality water is not available. Water containing more than 750 ppm of chloride may damage many plants and shrubs. Chloride concentrations in ground water in Glades and Hendry counties range from 7 to 2,280 ppm in the shallow aquifers and from 34 to 4,240 ppm in the Floridan aquifer.

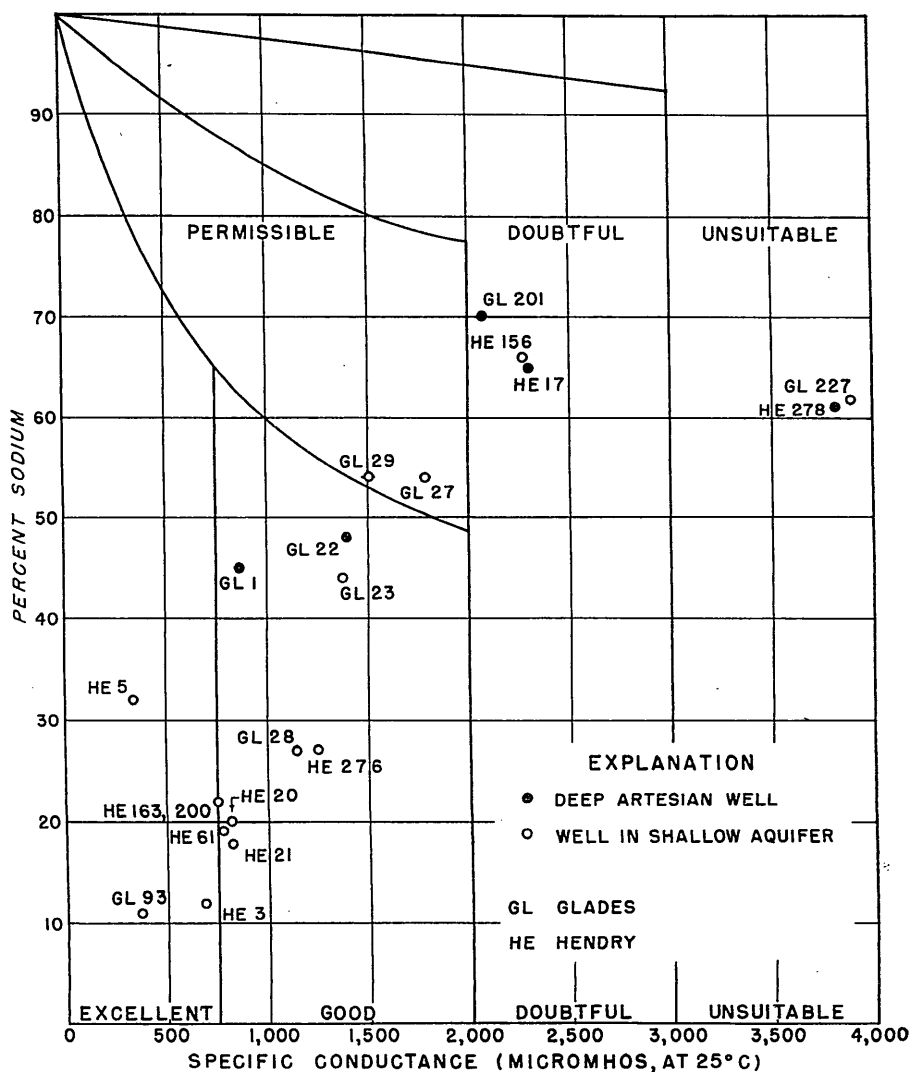


Figure 25. Graph showing the suitability of ground water for irrigation. (after Wilcox 1948, p. 25-23)

High-chloride water is corrosive and may rust holes in the casing through which subsurface leakage from artesian wells can occur. Chloride cannot be removed by ordinary water treatment.

Water samples for chloride-content analysis were obtained from most of the wells inventoried in the two counties, and the analytical results are listed in table 8. Figure 26 shows the chloride content

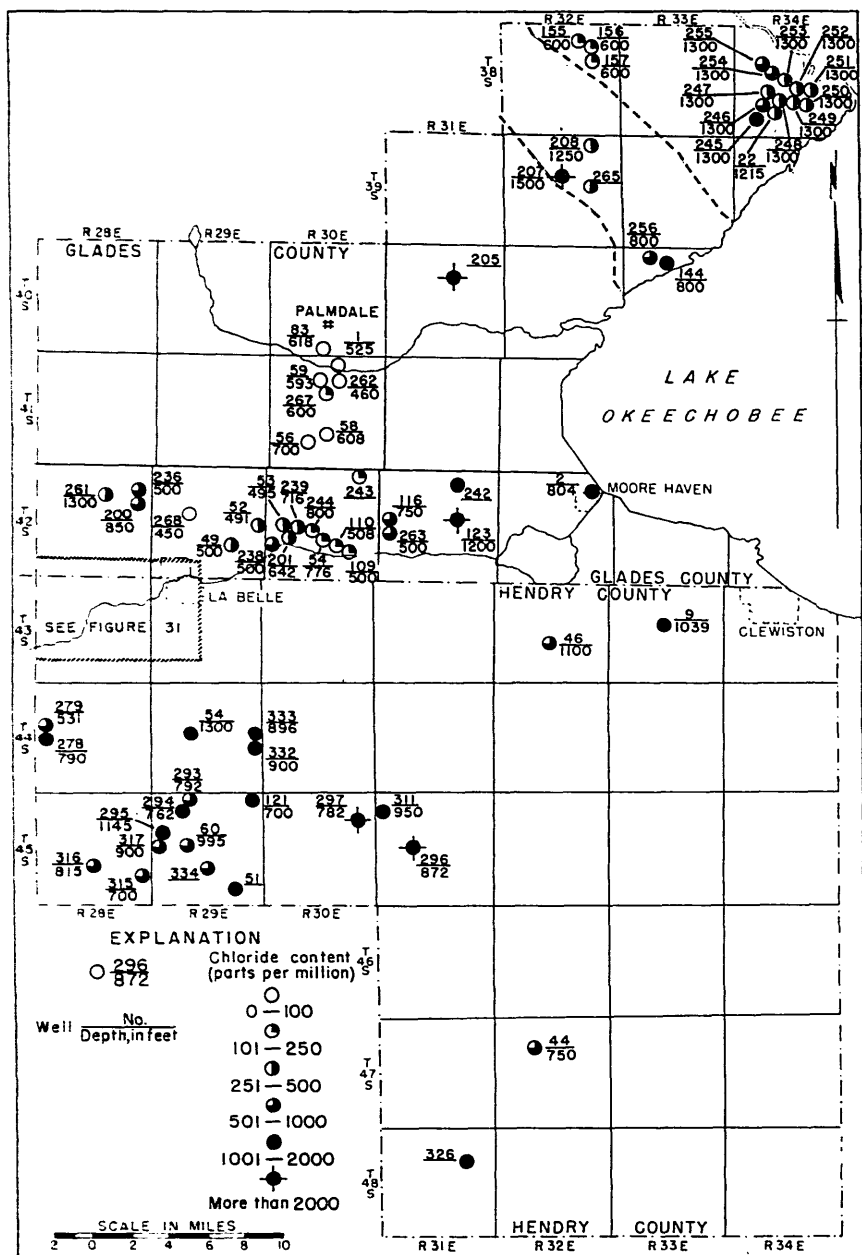


Figure 26. Glades and Hendry counties showing the chloride content of water samples from wells tapping the Floridan aquifer, 1952-53, 1958.

of water samples from wells tapping the Floridan aquifer in these counties. Most of the data shown were obtained during 1952-53; additional information was obtained during 1958 in more recently established agricultural and grazing lands.

The data in figure 26 suggest that the deeper wells generally yield the water of poorest quality. Potable water is available from the Floridan aquifer in central Glades County in the vicinity of Palmdale, and good-quality water can be expected northward and northwestward from central Glades County into Highlands County. Also, wells reportedly ranging in depth from 390 to 450 feet immediately north of LaBelle yield potable water. These wells probably tap the uppermost limestone layers of the Floridan aquifer. A group of artesian wells 8 miles east of LaBelle and three wells near the northern boundary of Glades County yield water that contains less than 250 ppm of chloride. It is possible, however, that increased use of water in those areas may cause a slow deterioration of the quality as a result of upward movement of water of higher chloride content within the aquifer.

The data shown in figure 27 indicate that the shallow aquifers in Glades County yield water of low chloride content except in areas adjacent to Lake Okeechobee. Figure 28 shows chloride data for

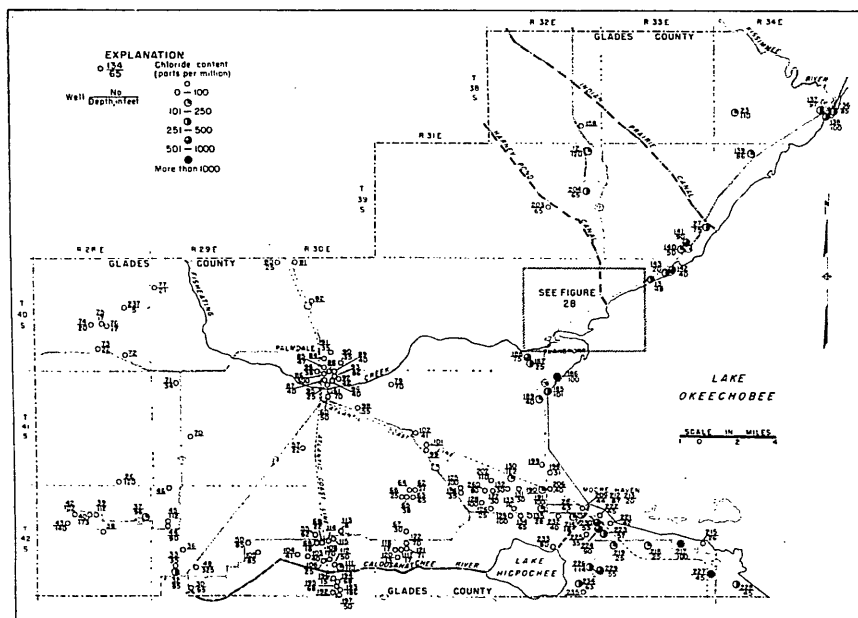


Figure 27. Glades County showing the chloride content of water samples from wells tapping shallow aquifers, 1952-53.

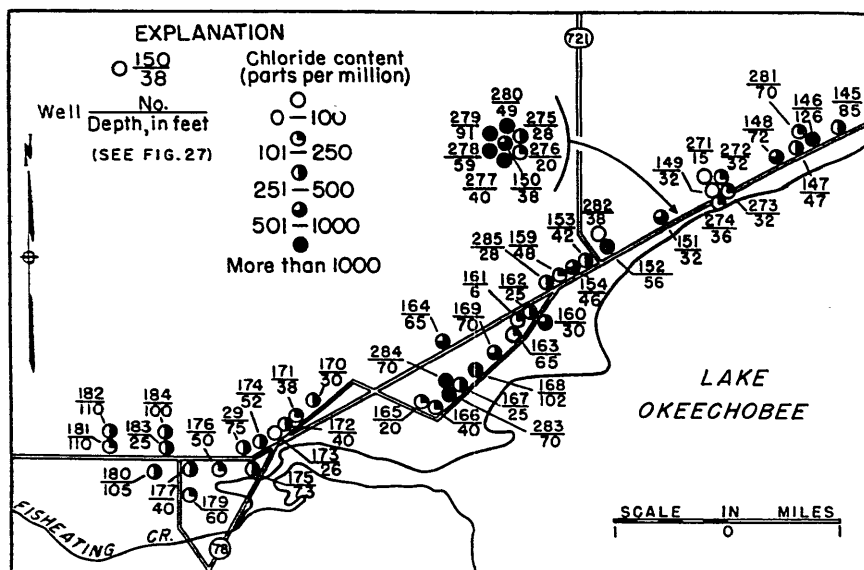


Figure 28. Part of eastern Glades County showing the chloride content of water samples from wells tapping shallow aquifers, 1952-53, 1959.

the area north of Lakeport where there is a large concentration of shallow wells. It is apparent that most of the shallow water in the Lakeport area does not meet the standards for public supplies.

Figure 29 is a map of Hendry County showing the chloride content of water samples from wells tapping shallow aquifers. The distribution of the chlorides suggests isolated sources of contamination by salty water. Figure 30 shows the chloride content of water from selected wells in the Clewiston area.

FLUORIDE (F)

The fluoride concentration in ground water in Glades and Hendry counties ranges from 0 to 1.2 ppm in the shallow aquifers and from 0.2 to 2.4 ppm in the Floridan aquifer. Minor quantities of fluoride in drinking water are beneficial in decreasing tooth decay among children (Black and Brown, 1951, p. 15). However, quantities in excess of 1.5 ppm may result in a condition known as dental fluorosis, a mottling of the tooth enamel in children.

SILICA (SiO_2)

The amount of silica in ground water in Glades and Hendry counties ranges from 6.1 to 56 ppm in the shallow aquifers and from 11 to 14 ppm in the Floridan aquifer. Silica content is of relatively

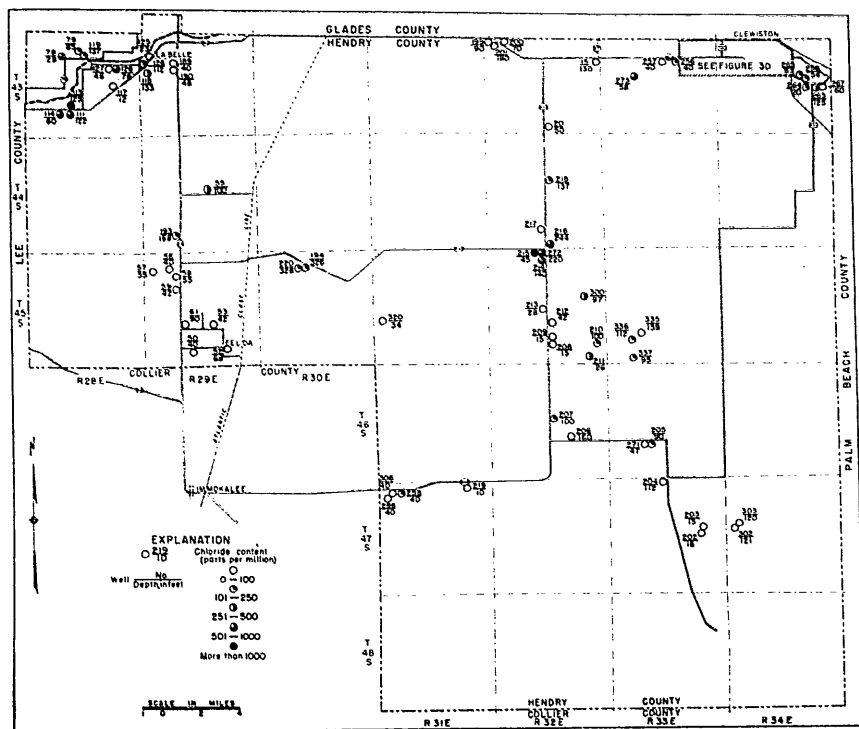


Figure 29. Hendry County showing the chloride content of water samples from wells tapping shallow aquifers, 1952-53, 1958.

little importance except in the formation of boiler scale, and was not determined in most analyses.

NITRATE (NO_3)

Nitrate concentrations range from 0 to 1.2 ppm in the water from the artesian aquifer, and from 0 to 9.6 ppm in the water from the shallow aquifers. A concentration above 50 ppm is very undesirable in drinking water, because it may cause cyanosis in infants.

HYDROGEN SULFIDE (H_2S)

Hydrogen sulfide is found in much of the shallow water and all the deep artesian water of the area. Hydrogen sulfide causes a distinct taste and odor which has given the water the name "sulfur water." Hydrogen sulfide is not generally analyzed because it is a

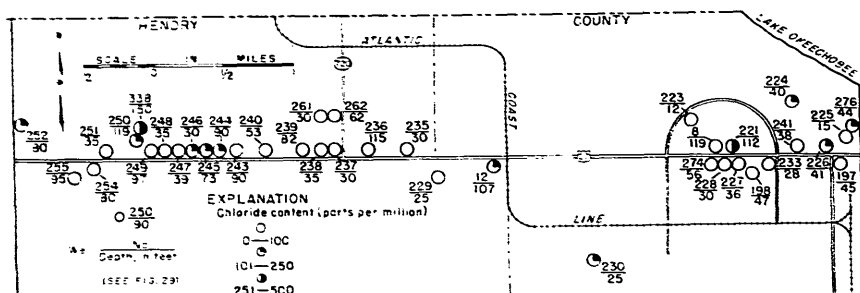


Figure 30. Clewiston area showing the chloride content of water samples from wells tapping the shallow aquifers, 1952-53.

volatile gas held in solution and much of it escapes upon exposure to air. Most of the gas can be removed by aeration.

SALT-WATER CONTAMINATION

In southern Florida the major causes of salt-water contamination of aquifers are as follows: (1) direct encroachment from surface salt-water bodies along coastal areas where the fresh-water head is not sufficient to retard encroachment; (2) upward leakage of relatively salty artesian water, under high pressure, through open well bores or across semiconfining layers; and (3) incomplete flushing of sea water that entered the aquifers during high-sea-level intervals of the Pleistocene Epoch when southern Florida was covered by the ocean.

Direct encroachment: The only possible source of direct sea-water encroachment in Glades and Hendry counties is the Caloosahatchee River. The Ortona Lock is closed during extended dry periods and sea water from the Gulf of Mexico may move inland to the downstream side of the lock. However, the banks and the riverbed along most of the reach downstream from Ortona are composed of relatively impermeable clay and marl, which tend to prevent lateral or downward seepage from the channel. Also, ground-water levels adjacent to the river usually are considerably higher than the river stage (fig. 17), and the normal direction of ground-water flow is toward the river. Therefore, direct sea-water encroachment into aquifers in Glades and Hendry counties is negligible.

Upward leakage: In most of Glades and Hendry counties the deep parts of the Floridan aquifer contain water that is saltier than water in the shallow parts. In some places thin zones

containing fairly fresh water may underlie salty zones, but if the open-hole section of the well is deepened, additional zones containing salty water will be tapped (see table 4).

In most areas of the two counties the pressure in the deep zones of the aquifer is greater than that in shallow zones. If a well is so constructed that its open bore section penetrates upper fresh zones and deeper salty zones, the deep salty water under high pressure can move upward through the well bore and enter the shallow fresh-water zone. The amount of interchange of water will depend upon the permeability of the rock and the pressure differential between the two zones. It appears, therefore, that well construction is an important factor in the quality of the water yielded by a well in the Floridan aquifer.

Contamination by upward leakage within the Floridan aquifer probably is accelerated where the piezometric surface is lowered as a result of heavy discharge by wells. High pressure in deep zones will cause saline water to move upward into zones of fresh water that are tapped by wells. The high mineralization of the water from artesian wells in LaBelle and southwest of LaBelle shown in figure 31 may be due, in part, to the decline of the piezometric surface in this general area, as shown in figure 14. It is possible that the initial flowing wells drilled in this area yielded fresher water than that shown in figure 31.

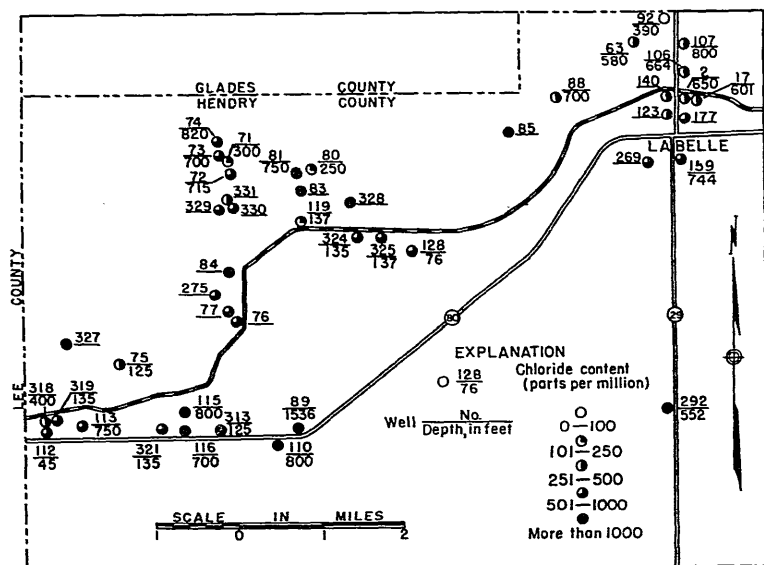


Figure 31. Part of northwestern Hendry County showing the chloride content of water samples from wells tapping deep and shallow aquifers, 1952-53, 1958.

The salt-water contamination in the shallow aquifer in LaBelle was probably caused by upward and lateral leakage in the vicinity of wells penetrating the Floridan aquifer. Figure 32 shows the chloride content of water from shallow wells in and adjacent to LaBelle. Most of the shallow wells in LaBelle range in depth from 60 to 120 feet below the land surface and are developed in shelly limestone layers.

The seven deep artesian wells within the populated area south of the Caloosahatchee River probably were drilled before 1930 (fig. 11). It was reported that casings in most of these wells were seated in a limestone layer at a depth of about 80 feet and that an open bore was drilled to 600-800 feet. The piezometric surface in these wells is at least 25 feet above the land surface, whereas the water level in the shallow wells is below the land surface. Therefore, direct connection probably exists between the open bore of the deep wells and the limestones below 80 feet in the shallow aquifer. Most of the deep wells in LaBelle are not in use or are used sparingly, so that the discharge valves are cut off for long periods. As a result, the pressure differential between the deep well bores and the shallow limestones is consistently high, and upward discharge into the shallow limestone occurs at a constant rate.

Well 17 in LaBelle, immediately south of the Caloosahatchee River, taps the Floridan aquifer, and for many years was used as the central water supply for the town. Distribution lines extend from the well probably as far south as State Highway 80. These distribution lines are known to have developed leaks and the entire system is a probable source of local contamination of the shallow aquifer. The pattern of the chloride contours shown in figure 33 suggests that the five deep artesian wells (within the 400-ppm contour line) between the Caloosahatchee River and State Highway 80 and the subsurface water-distribution system from well 17 may be the principal sources of contamination. Further evidence to support this is shown by a comparison of the analyses of water samples from well 17 (602 feet deep) and well 156 (90 feet deep), 170 feet south of well 17, as shown in table 6. The analyses are nearly identical.

The pattern of the distribution of the chloride contents and isochlor contours in figure 33 negates the possibility that the Caloosahatchee River is the source of contamination. The contour pattern shows that contamination extends beneath and across the river and further substantiates the conclusion that the river does not appreciably affect the drainage of the shallow aquifer.

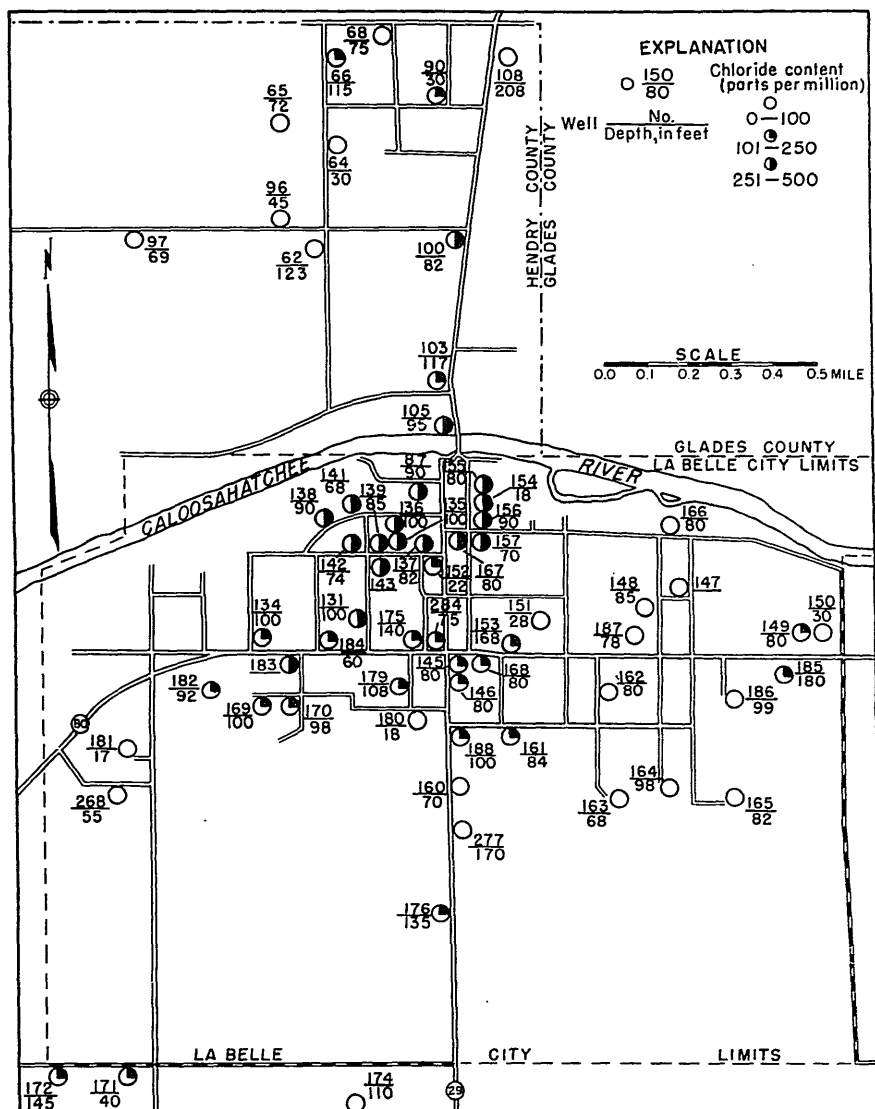


Figure 32. LaBelle showing the chloride content of water samples from wells tapping the shallow aquifer, 1952-53.

Much of the salt-water contamination in the shallow aquifer along the Caloosahatchee River west and southwest of LaBelle may be caused by conditions similar to those causing the contamination in LaBelle. The water level of well 112, a 45-foot well near the Lee County boundary, was 7.5 feet above the land surface in May

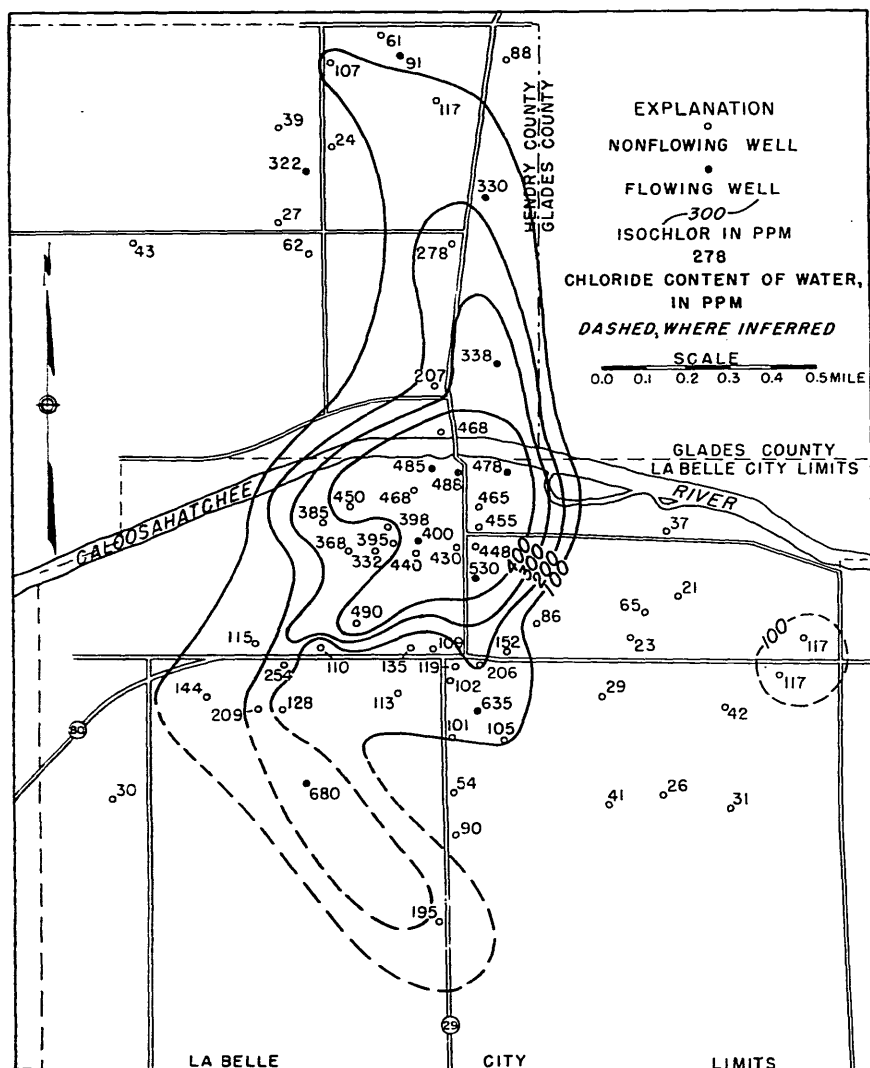


Figure 33. LaBelle showing (by isochlor lines) areas of equal chloride content of water from the shallow aquifer, 1952-53.

1958. This high water level is probably due to upward and lateral leakage from immediately adjacent artesian wells which have been capped at the surface and abandoned.

Incomplete flushing: The high mineralization of the water contained in the Floridan aquifer in southern Florida probably is due to connate sea water which remained in the materials when they were deposited, or to sea water that entered the aquifer when

much of peninsular Florida was covered by the ocean during the Pleistocene Epoch. The shallow aquifers in Glades and Hendry counties also were filled with sea water when the area was last covered by the ocean, but since the seas receded rainfall has been flushing salts from the shallow aquifers. Flushing has been more extensive in the shallow materials than in the Floridan aquifer, but Love (Parker and others, 1955, p. 818) indicated that saline water and the residual salts have never been completely flushed in most of the Everglades, particularly near the borders of Lake Okeechobee. Figures 27 and 28 show the high salinity of the shallow ground water adjacent to Lake Okeechobee.

Flushing of salts would be most rapid where the infiltration of rainfall is rapid and where ground-water movement is not impeded. The rather uniformly low permeability of the shallow sediments may be one of the chief reasons for the saline ground water along the borders of Lake Okeechobee. Also, the low ground-water gradient throughout the area may be an important factor in the slow flushing process. Most of the potential aquifer recharge by rainfall in the area probably is lost by sheet flow and evapotranspiration, and apparently only minor quantities can infiltrate to the permeable sections. Differences in permeability may partly account for the variations of chloride content in areas where upward leakage from the Floridan aquifer is not a factor.

UTILIZATION OF GROUND WATER

Ground water in Glades and Hendry counties is used for irrigation, public and domestic supplies, stock watering, and, to lesser extent, industries and air conditioning.

IRRIGATION

The quantity of ground water used for irrigation in Glades and Hendry counties far exceeds that used for other purposes. In addition to the huge sugar plantations that border Lake Okeechobee near Clewiston, large areas are devoted to the production of truck crops grown during late fall, winter, and spring. In areas near surface-water bodies irrigation is practiced by use of shallow ditches from the surface sources. Other areas, however, depend on ground-water sources.

Water for irrigation is obtained from the Floridan aquifer and the shallow aquifers. The source used depends on the crops to be grown. Tomatoes and cucumbers will tolerate water with a

fairly high concentration of dissolved solids, whereas beans and some other crops will not. Irrigation by use of shallow wells is a fairly recent development in the area and will probably increase. The largest increase in the use of irrigation water has taken place in Hendry County, south of LaBelle, and in the Big Cypress Swamp-Devil's Garden area.

MUNICIPAL SUPPLIES

LaBelle and Moore Haven are the only municipalities in the two counties that used ground water for public supplies in 1959. The supply for LaBelle was obtained from well 17, which penetrates the Floridan aquifer. The water was piped directly from the well through distribution lines to the consumers and received no treatment. The quality of the water is poor and most of the residents have resorted to drilling individual shallow wells. In the central part of LaBelle the shallow aquifer does not produce water of acceptable quality because of salt-water contamination (fig. 33). Chemical analyses of water samples in the LaBelle area indicate that ground water of good quality can be obtained away from the central part of the town, where the shallow water is low in chloride, relatively low in total dissolved solids, but high in hardness. The hardness can be reduced by treatment, and aeration and filtration will remove much of the iron and hydrogen sulfide present in solution. In 1959 the residents of LaBelle authorized a study to develop a public water supply from the shallow aquifer south of town.

Moore Haven obtains its water supply from an 8-inch well drilled to a depth of 87 feet. A 5-horsepower deep-well turbine pump is capable of withdrawing 285 gpm from the well. Approximately 85,000 to 100,000 gallons of water are used daily by the town. This includes water for household use, industrial use, and lawn irrigation. Water treatment consists of aeration, reduction of hardness, and chlorination.

None of the other communities in the area are supplied by public ground-water systems. In agricultural areas and small population centers such as Palmdale, Lakeport, and the outskirts of LaBelle, nearly every home has its individual water supply. A similar situation exists in suburban areas west and southeast of Clewiston. The city of Clewiston obtains its municipal supply from Lake Okeechobee.

OTHER USES

A small quantity of ground water is used for industrial and cooling processes, and a few commercial establishments in Clewiston operate wells for air conditioning. A shallow well is used in running condensers at the ice plant at Moore Haven. Several packing houses in the farming areas use a considerable quantity of ground water in the washing, processing, and packing of truck crops. These wells are operated for only a few weeks during the year. Ground water is used also for stock watering.

SUMMARY

The most productive aquifer in Glades and Hendry counties is the Floridan aquifer, which yields water by natural flow to most parts of the area. Wells penetrating this aquifer range in depth from 400 feet to more than 1,200 feet and generally yield 200 gpm or more.

The chloride concentration in water from wells tapping the artesian aquifer at depths of 400 to 700 feet ranges from 40 ppm to more than 2,000 ppm. The aquifer underlying Glades County in the vicinity of Lake Okeechobee yields water with a chloride content ranging from 700 to more than 1,200 ppm. Artesian water containing less than 100 ppm of chloride, can be obtained in northwestern and northern Glades County. In general, the chloride content of the water increases southward and southeastward.

Permeable zones in the aquifer occur down to more than 1,200 feet. Throughout most of the area the lower limestones yield highly mineralized water, except in northwestern and northern Glades County where relatively fresh water can be obtained in the deep part of the aquifer.

Shallow sources of ground water are being developed in both Glades and Hendry counties, especially in those areas where the artesian water is highly mineralized. Wells penetrating shallow aquifers generally range in depth from 50 feet to more than 300 feet.

The permeable limestone of the Tamiami Formation in southern Hendry County is the most productive shallow aquifer in the area. Wells penetrating this aquifer range in depth from about 40 feet in areas a few miles east of Immokalee to about 120 feet or more south of the Devil's Garden. The lateral extent and the total thickness of this aquifer cannot be determined with present data; however, the aquifer is known to extend as far north as the Felda

area, but has not been noted in wells in the immediate Immokalee area. The aquifer apparently dips to the east and to the south. Six-inch wells penetrating this limestone aquifer yield good quality water at a rate of more than 1,000 gpm with little draw-down. Water levels are within a few feet of the land surface, and pumping costs are relatively low.

In central and northern Hendry County and in Glades County the shallow aquifers are composed of thin local limestones and shell beds in the Tamiami and Hawthorn Formations. These aquifers range in depth from 50 feet to about 175 feet and yield moderate amounts of water. The water usually contains less than 400 ppm of chloride, except in areas adjacent to Lake Okeechobee and along the Caloosahatchee River westward from LaBelle. In and southwest of LaBelle the shallow aquifer is contaminated by artesian water under high pressure leaking upward along open-well bores and laterally into permeable beds of low pressure.

Quantitative tests show that the coefficient of transmissibility of the shallow aquifers ranges from 70,000 gpd/ft to 1,070,000 gpd/ft, and that the coefficient of storage ranges from 0.00015 to 0.0014.

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WELL LOGS

Glades County

WELL 22

NW¼NW¼ sec. 29, T. 38 S., R. 34 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
No samples	0 - 65
Tamiami Formation	
Marl, gray, sandy, phosphatic; fragments of echinoids and <i>Pecten</i>	65 - 110
No samples	110 - 188
Hawthorn Formation	
Clay, dark-green, plastic; mollusk fragments	188
Clay, dark-green, sandy (coarse), phosphatic; pelecypods numerous, mostly <i>Pecten</i> and <i>Arca</i>	188 - 314
Clay, olive-drab, sandy, shelly, phosphatic	314 - 337
No samples	337 - 346
Clay, light-green, shelly, plastic; and olive-drab sandy, phosphatic, shelly clay marl	346 - 418
Clay, dark-green, plastic; phosphorite pebbles and mollusk fragments	418 - 465
Clay, gray, phosphatic; mollusk fragments	465 - 480
Limestone, white, hard, dense, phosphatic; mollusk fragments	480 - 505
Gravel; phosphorite pebbles, brown, up to 8 mm in diameter; some limestone as above	505 - 516
Clay, tan, plastic; many small particles of dark phos- phorite	516 - 537
Clay, tan, plastic; many small particles of phosphorite ..	537 - 575
Clay, dark-green, quartz sand, phosphorite pebbles; some gray sandy, phosphatic limestone	575 - 605
Tampa (?) Formation	
Limestone, cream, hard, porous, granular, slightly phos- phatic, and some sand	605 - 620
Ocala Group	
Limestone, cream, foraminiferal coquina, soft, porous, chalky; <i>Lepidocyclina ocalana</i>	620 - 667
Limestone, cream, foraminiferal coquina, soft, porous, granular; <i>Operculinoides</i>	667 - 814
Limestone as above but fewer foraminifers	814 - 854
Avon Park Limestone	
Limestone, tan, hard, porous; numerous echinoids of <i>Peronella</i> type	854 - 888

Limestone, light-tan, hard, porous, granular; <i>Dictyoconus cookei</i> , <i>Coskinolina floridana</i> , and <i>Peronella</i>	888 - 958
Limestone, tan, hard, granular, porous; some white, soft, chalky limestone; <i>Spirolina coryensis</i>	958 - 1022
Limestone, tan, hard, granular; numerous <i>Coskinolina floridana</i>	1022 - 1134
Lake City Limestone	
Limestone, light-brown, hard, calcitic, granular, porous; some gray dense limestone and brown porous, finely crystalline, dolomitic limestone	1134 - 1215

WELL 27

NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 25, T. 39 S., R. 33 E.

Material	Depth, in feet, below land surface
Pamlico Sand	
Sand, gray, quartz	0 - 3
Fort Thompson Formation	
Shell bed, marine	3 - 7
Sand, light-gray, marly	7 - 18
Caloosahatchee Marl	
Marl, dark-gray, very sandy, somewhat shelly	18 - 30
Shell bed, dark-gray, sandy (shell marl)	30 - 44
Tamiami Formation	
Shell marl, light-gray, sandy	44 - 54
Marl, light-green, clayey, sandy	54 - 75

WELL 28

NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 11, T. 42 S., R. 32 E.

Material	Depth, in feet, below land surface
Recent soils	
Peat	0 - 3
Pamlico Sand	
Sand, gray, quartz	3 - 10
Caloosahatchee Marl	
Shell bed containing quartz sand and the following mollusks:	10 - 14
<i>Pseudomiltha anodonta</i> (Say)	
<i>Transennella caloosana</i> Dall	
<i>Chione cancellata</i> (Linnaeus)	
<i>Anomalocardia caloosana</i> (Dall)	
<i>Turritella</i> sp.	
<i>Nassarius vibex</i> (Say)	

Olivella mutica (Say)*Marginella* sp.

Sand, gray, quartz, and shells containing the following: 14 - 17

Phacoides pensylvanicus (Linnaeus)*Laevicardium serratum* (Linnaeus)*Transenella caloosana* Dall*Chione cancellata* (Linnaeus)*Anomalocardia caloosana* (Dall)*Tellina* (*Merisca*) *dinomera* Dall*Corbula caloosae* Dall*Fissuridea carditella* Dall*Cerithium* sp. cf. *C. glaphyrea litharium* Dall*Turritella perattenuata* Heilprin*Nassarius* sp. ind.*Marginella gravida* Dall?*Olivella mutica* (Say)*Terebra dislocata* Say

Sand, white, quartz 17 - 55

Tamiami Formation

Sand, gray, coarse, quartz, shelly 55 - 63

WELL 29

SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 22, T. 40 S., R. 32 E.

Material	Depth, in feet, below land surface
Recent sand and soils	
Sand, quartz	0 - 4
Muck, peat, black	4 - 8
Fort Thompson Formation	
Sand, gray, quartz, marly	8 - 11
Caloosahatchee Marl	
Marl, gray, sandy, with a few shells	11 - 15
Marl, gray	15 - 20
Marl, gray, sandy, very shelly	20 - 27
Marl, gray, sandy, slightly shelly	27 - 34
Tamiami Formation	
Shell marl, light-gray, very sandy	34 - 38
Shell marl, light-gray, sandy	38 - 42
Sand, light-gray, quartz, slightly shelly	42 - 48
Marl, grayish-green, sandy, shelly	48 - 56
Marl, greenish-gray, silty, plastic	56 - 62
Marl, gray, sandy, very shelly	62 - 75

WELL 201

NW¼SW¼ sec. 20, T. 42 S., R. 30 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
Lake Flirt Marl	
Sand, black, quartz, carbonaceous	0 - 1
Marl, gray, fresh-water, and quartz sand	1 - 5
Fort Thompson Formation	
Marl, tan, sandy, and hard brown fresh-water limestone	5 - 20
Caloosahatchee(?) Marl	
Marl, tan-gray, sandy, shelly	20 - 38
Tamiami(?) Formation	
Marl, green, sandy (medium to granule-size quartz), slightly shelly	38 - 57
Hawthorn(?) Formation	
Marl, green, very sandy	57 - 180
Marl, green, clayey, and some phosphorite granules and small pebbles	180 - 220
Marl, green, sandy, phosphatic	220 - 240
Marl, white, clay, very shelly, phosphatic	240 - 261
Marl, white, phosphatic, interbedded with white crypto- crystalline limestone	261 - 282
Marl, green, clay, phosphatic, shelly	282 - 290
Limestone, white to light-gray, finely crystalline, and light-gray phosphatic shelly marl	290 - 356
Marl, green, clay, shelly	356 - 374
Marl, greenish-gray, and gray, finely crystalline limestone	374 - 384
Limestone, finely crystalline, and some light-green marl ...	384 - 400
Tampa Formation and Suwannee Limestone, undifferentiated	
Limestone, white and light-tan, crystalline, porous, perme- able, fossiliferous	400 - 430
Limestone, white; <i>Robulus americanus</i> ?	430 - 475
Limestone, white and tan, finely crystalline, and light- gray friable fine-grained quartz sandstone	475 - 619
Limestone, tan and white, and dark-green sandy marl	619 - 634
Marl, olive-green, sandy	634 - 642

WELL 238

NE¼SW¼ sec. 19, T. 42 S., R. 30 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
No samples	0 - 20
Caloosahatchee(?) Marl	
Marl, tan-gray, very sandy	20 - 30
Tamiami(?) Formation	
Marl, olive-green, sandy	30 - 60

Hawthorn Formation

Marl, green, micaceous	60 - 110
Marl, green, clay, phosphatic	110 - 126
Marl, dark-green, sandy, micaceous, phosphatic, with <i>Bulimina gracilis</i> and <i>B. gracilis</i> , var <i>spinatus</i>	126 - 185
Marl, greenish-gray, phosphatic	185 - 200
No samples	200 - 226
Marl, greenish-gray, phosphatic, and crystalline lime- stone	226 - 260
Marl, white, phosphatic, and finely crystalline limestone ..	260 - 300
Marl, grayish-green, clayey, shelly, slightly phosphatic ..	300 - 325
Limestone, white, finely crystalline	325 - 390

Tampa Formation

Limestone, white, finely crystalline, and light-gray friable, fine-grained quartz sandstone	390 - 430
Limestone, tan, finely crystalline, and light-gray friable medium-grained quartz sandstone	430 - 500

WELL 240

SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 25, T. 42 S., R. 33 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
No sample	0 - 10
Fort Thompson Formation and Caloosahatchee Marl, undifferentiated	
Sand, cream, quartz, very shelly (<i>Chione cancellata</i>)	10 - 50
Caloosahatchee Marl and Tamiami Formation, undifferentiated	
Sandstone, quartz, friable, shelly, and coarse quartz sand, with a few small phosphate pebbles	50 - 90
Tamiami Formation	
Marl, white, sandy, with quartz and phosphate pebbles, and coarse friable sandstone	90 - 100
Limestone, cream, sandy, silty, and coarse white shelly sandstone	100 - 140
Marl, cream, silty, micaceous	140 - 160
Hawthorn Formation	
Marl, sandy, silty, micaceous, and dark-green clay	160 - 220
Clay, green	220 - 240
Marl, sandy, and green clay	240 - 270
Marl, light-green, silty, and coarse quartz and phosphatic sand; some light-green siltstone	270 - 350
Limestone, green, silty	350 - 370
Marl, dark-green, sandy, phosphatic, shelly	370 - 420
Marl, green, clayey, shelly	420 - 490
Marl, light-green, phosphatic, and white phosphatic lime- stone and green clay	490 - 530

Marl, light-gray, phosphatic	530 - 540
Marl, light-gray, phosphatic, and white limestone	540 - 550
Tampa Formation	
Limestone, cream, shelly, porous, and light-gray phosphatic marl	550 - 630
Marl, green, clayey	630 - 640
Limestone, cream, nodular, chalky, porous	640 - 670
Suwannee (?) Limestone	
Limestone, cream, nodular and chalky, and tan crystalline dolomite; <i>Dictyoconus cookei</i> ?	670 - 700
Limestone, tan, chalky, phosphatic, and tan dolomitic limestone	700 - 740
Dolomite, tan and cream, chalky, and nodular limestone	740 - 800
Limestone, cream, shelly, porous, nodular, and tan dolomite	800 - 840
Limestone, cream, nodular	840 - 850
Ocala Group	
Limestone, cream, chalky, nodular, porous, shelly; <i>Lepidocyclina ocalana</i>	850 - 910
Limestone, white, porous, chalky, and tan crystalline dolomite; <i>Lepidocyclina ocalana</i> in abundance	910 - 1000
Limestone, cream, nodular, chalky, and tan crystalline dolomite; <i>Lepidocyclina</i>	1000 - 1060
Limestone, cream, chalky, porous	1060 - 1190
Limestone, white, chalky, nodular, porous, <i>Lepidocyclina</i>	1190 - 1220
No further samples available	1220 - 13420

WELL 241

SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12, T. 42 S., R. 32 E.

Material	Depth, in feet, below land surface
Recent organic soils	
Peat, fibrous, black	0 - 5
Fort Thompson Formation	
Sand, dark-brown	5 - 10
Sand, brown, shelly (<i>Chione cancellata</i>) and tan fresh-water limestone	10 - 15
Caloosahatchee Marl	
Sand, cream, quartz, shelly (mainly <i>Chione cancellata</i>)	15 - 25
Sand, white, quartz, fine	25 - 35
Sandstone, dark-gray, quartz, coarse-grained, very shelly, friable; in part a coquina	35 - 65
Shell bed, dark-gray, sandy; mainly <i>Ostrea</i> , a few <i>Chione cancellata</i>	65 - 75
Tamiami (?) Formation	
Marl, grayish-green, sandy	75 - 80
Sand, light-gray, quartz, coarse to fine, silty	80 - 90
Sand, white, quartz, fine to coarse	90 - 116

WELL 266

SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 1, T. 41 S., R. 30 E.

Material	Depth, in feet, below land surface
Miocene and Oligocene, undifferentiated	
Sandstone, gray, calcareous; sand grains medium to fine, subangular, some frosted	125 - 140
Clay, olive-green, sandy	140 - 170
Clay, green and gray, sandy	170 - 200
Same as above with calcareous sandstone; some fragments of shells, corals, and phosphorite	200 - 260
Clay, olive-green, and calcareous sandstone; some phosphorite	260 - 290
Siltstone, light-gray, with specks of phosphate; occasional molds of mollusks	290 - 320
As above, with small pebbles of phosphate	320 - 350
As above, with greenish clay	350 - 380
Siltstone, light-gray, and clay containing specks of phosphorite	380 - 410
As above, with casts of mollusks	410 - 440
As above, and phosphatic sandstone	440 - 530
Limestone, cream, with specks of phosphorite and sand	530 - 560
As above and fragmental limestone, fossiliferous, microcoquinoid, phosphatic	560 - 620
Limestone, cream, and pebble phosphate; molds and casts of mollusks	620 - 650
As above, and gray phosphatic sandstone	650 - 740
As above, and olive-green plastic clay	740 - 770
Limestone, cream, fragmental, microcoquinoid in places, fossiliferous	770 - 830
Ocala Group	
Limestone, cream, coquinoid, calcitic; <i>Lepidocyclus</i> sp.	830 - 860
Dolomite, tan, and limestone as above	860 - 889
Dolomite, tan, sugary	889 - 900
Dolomite, tan and cream, and fragmental limestone; <i>Lepidocyclus</i> sp.	900 - 910
Limestone, white, chalky; <i>Lepidocyclus ocalana</i>	910 - 930
Limestone, white, chalky, microcoquinoid; <i>Lepidocyclus ocalana</i> , <i>Operculinoides ocalana</i>	930 - 960
Limestone, white, chalky; <i>Operculinoides moodybranchensis</i>	960 - 980
Dolomite, tan, sugary	980 - 990
As above, with molds of <i>Lituonella</i>	990 - 1000
As above, with foraminifers	1000 - 1070
Dolomite, tan, granular	1070 - 1090
As above, with <i>Operculinoides moodybranchensis</i>	1090 - 1150
Avon Park Limestone	
Limestone, bluish-white, fragmental, with <i>Lituonella floridana</i> , and typical Avon Park fauna	1150 - 1160

Limestone, bluish-white, mostly coquina of Foraminifera	1160 - 1320
Limestone, tan, fragmental, mostly coquina of Foraminifera	1320 - 1350
As above with <i>Dictyoconus americanus</i> ; <i>Lituonella floridana</i> and miliolids	1350 - 1500

Lake City Limestone

As above and brecciated limestone and calcite in clay matrix	1500 - 1530
Limestone, cream; <i>Dictyoconus americanus</i>	1530 - 1710
Dolomite, brownish-gray, dense and abundant crystals of calcite. <i>Dictyoconus americanus</i> common	1710 - 1773
No further samples available	1773 - 10,057

Hendry County

WELL 4

NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 20, T. 43 S., R. 33 E.

Material *Depth, in feet,
below land surface*

Pamlico Sand	
Sand, light-gray, quartz	0 - 4
Fort Thompson (?) Formation	
Limestone, dark-brown, hard	4 - 6
Caloosahatchee Marl	
Sand, light-gray, shelly	6 - 15
Tamiami Formation	
Sand, gray, marly, very shelly	15 - 20
Shell, gray, marl, sandy	20 - 30
Shell, dark-gray, marl, silty, sandy; about 90 percent of shells are <i>Ostrea</i>	30 - 50
Marl, dark-gray, clayey, sandy, shelly; <i>Ostrea</i>	50 - 84
Sand, gray, marly, shelly, and some quartz pebbles	84 - 91
Sand, light-gray, coarse, quartz, with some pebbles	91 - 127
Hawthorn Formation	
Marl, green, clayey	127 - 129

WELL 20

NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 34, T. 43 S., R. 32 E.

Material *Depth, in feet,
below land surface*

Pamlico Sand	
Sand, gray, silty	0 - 4
Fort Thompson Formation	
Sand, light-gray, shelly, and some quartzite pebbles	4 - 6

Sandstone, calcareous, soft, friable	6 - 9
Sand, light-gray, shelly, and some white quartzite pebbles	9 - 14
<i>Chione cancellata</i> (Linné)	
<i>Glycymeris pectinata</i> (Gmelin)	
<i>Venericardia tridentata</i> Say	
<i>Phacoides amiantus</i> Dall	
<i>Cardium muricatum</i> Linné	
<i>Phacoides nassula</i> (Conrad)	
<i>Arca transversa</i> Say	
<i>Corbula cubaniana</i> (?) d'Orbigny	
<i>Transennella stimpsoni</i> (Dall)	
<i>Pecten gibbus</i> (Linné)	
<i>Turritella variegata</i> Linné	

Fort Thompson Formation and Caloosahatchee Marl,
undifferentiated

Sand, tan, quartz	14 - 23
Sand, white, quartz, fine	23 - 50

WELL 194

NW¼SE¼ sec. 4, T. 45 S., R. 30 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
No samples	0 - 20
Tamiami Formation	
Marl, cream, very sandy, shelly (<i>Pecten</i>)	20 - 40
Marl, greenish-tan, sandy, shelly (<i>Pecten</i> and <i>Balanus</i>) ; <i>Bulimina gracilis</i>	40 - 80
Sand, light-green, fine quartz, micaceous	80 - 100
No sample	100 - 110
Hawthorn Formation	
Sand, green, quartz, fine	110 - 140
Marl, olive-green, sandy, slightly micaceous	140 - 214
Sand, light-gray, quartz, very coarse, and small pebbles of quartz and black phosphate	214 - 240
Marl, olive-green, sandy, very shelly	240 - 250
Sand, olive-green, quartz, fine to coarse, very silty, shelly ..	250 - 260
Marl, dark-green, sandy	260 - 270
Limestone, very sandy, silty, soft, shelly, and a few quartz pebbles	270 - 280
Marl, light-gray, and limestone, sandy, shelly	280 - 290
Limestone, cream, soft, fossiliferous, and some coarse quartz sand	290 - 300
Sand, light-gray, quartz, fine to coarse	300 - 310
No sample; reported as quartz pebbles and very coarse cemented quartz sand	310 - 326

WELL 277

SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9, T. 43 S., R. 29 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
Pamlico Sand	
Sand, light-gray, quartz	0 - 4
Fort Thompson Formation	
Sand, brown, quartz, very shelly (<i>Chione cancellata</i>)	4 - 14
Limestone, dark-brown, hard, fresh-water, interbedded with cream silty, shelly, marine sand containing an abundance of <i>Chione cancellata</i>	14 - 26
Caloosahatchee Marl	
Limestone, dark-gray, sandy; <i>Cerithium caloosaense heil-</i> <i>prini</i> Dall?	26 - 27
Sand, cream, quartz, very shelly; mainly <i>Pecten</i> , <i>Ostrea</i> , and <i>Chione cancellata</i>	27 - 41
Tamiami Formation	
Sand, light-gray, quartz, fine, marly, silty, phosphatic, and a few interbeds of greenish marl between 68 and 84 feet	41 - 84
Hawthorn Formation	
Marl, green, and interbeds of gray fine micaceous sand	84 - 94
Limestone, cream, porous, fossiliferous	94 - 104
Marl, cream, sandy, and thin beds of white limestone	104 - 126
Marl, white, sandy, and interbeds of gray fine to very coarse quartz sand	126 - 131
Sand, gray, quartz, fine to coarse, shelly	131 - 139
Limestone, white, shelly	139 - 170

WELL 279

NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T. 44 S., R. 28 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
Pamlico Sand	
Sand, gray, quartz	0 - 3
Fort Thompson Formation	
Sand, brown, quartz, marly	3 - 15
Limestone, brown, fresh-water, dense, hard	15 - 16
Tamiami(?) Formation	
No samples; reported as sand	16 - 75
Sand, light-gray, marly, silty	75 - 84
Marl, cream, sandy, shelly, slightly phosphatic	84 - 88

Hawthorn Formation

Marl, green, sandy, slightly micaceous	88 - 95
Marl, green, very sandy	95 - 105
Sand, dark-green, quartz, coarse, silty, and some phosphate	105 - 134
Limestone, white, slightly fossiliferous, porous, permeable	134 - 155
Sand, light-gray, quartz, very coarse, silty, and some phosphate pebbles	155 - 156
Limestone, cream, fossiliferous, slightly phosphatic	156 - 163
Marl, cream, clayey	163 - 175
Marl, green, clayey, phosphatic	175 - 185
Limestone, white, shelly, porous, permeable	185 - 210
Marl, green, shelly, clayey, phosphatic	210 - 270
Marl, green, clayey, shelly, finely phosphatic	270 - 285
Marl, cream, shelly, finely phosphatic	285 - 320
Marl, cream, clayey, shelly, phosphatic, with beds of white limestone and white plastic clay marl	320 - 400
Marl, clayey, shelly, finely phosphatic	400 - 420
Marl, brown, clayey, plastic, phosphatic (granules)	420 - 425
Marl, tan, clayey	425 - 439
Marl, tan, clayey, and tan fossiliferous crystalline limestone	439 - 448

Tampa Formation

Limestone, white and tan, crystalline, fossiliferous, porous, permeable	448 - 492
Limestone, cream, fossiliferous, permeable; <i>Amphistegina chipolensis</i> , <i>Elphidium chipolensis</i>	492 - 531

WELL 281

SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, T. 45 S., R. 32 E.

Material

Depth, in feet,
below land surface

Post-Miocene

Sand, brown, shelly; some white marl and dark-brown limestone	0 - 20
Marl, white, sandy, shelly, and white limestone	20 - 40
Shell bed, cream	40 - 50
Sand, light-tan, quartz, fine, silty, shelly	50 - 80

Tamiami Formation

Limestone, white, fossiliferous	80 - 150
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Hawthorn Formation

Marl, green, silty, phosphatic, shelly	150 - 170
Marl, dark-green, clayey; <i>Bulmina gracilis</i>	170 - 180
Marl, dark-green, silty, sandy, shelly	180 - 270
Marl, dark-green, clayey, silty	270 - 290
Marl, olive-drab, sandy, with a few quartz pebbles, and some white limestone	290 - 330
Marl, green, silty, shelly	330 - 340

Marl, dark-green, clayey	340 - 380
Marl, green, sandy, clayey	380 - 410
Tampa Formation	
Limestone, white, fossiliferous, and some green clayey marl	410 - 420
Limestone, white, fossiliferous, porous; some white phosphatic marl	420 - 470
Limestone, cream, porous, soft, shelly	470 - 490
Limestone, cream, dense, porous	490 - 530
Marl, gray, sandy, phosphatic, and white dense limestone	530 - 600
Suwannee Limestone	
Limestone, cream, shelly, soft, and tan dense limestone; <i>Dictyoconus cookei</i>	600 - 620
Limestone, white, porous, chalky, fossiliferous	620 - 680
Limestone, tan, porous	680 - 730
Limestone, cream, porous, nodular to chalky, phosphatic, and some brown crystalline dolomite	730 - 780
Dolomite, brown and tan, crystalline	780 - 840
Limestone, tan, porous	840 - 860
Dolomite, brown, crystalline, and tan porous limestone	860 - 910
Limestone, white, porous, and white crystalline limestone	910 - 980
Ocala Group	
Limestone, cream, chalky, nodular; <i>Heterostegina ocalana</i> , <i>Lepidocyclina ocalana</i>	980 - 1045

WELL 282

NW¼SE¼ sec. 14, T. 47 S., R. 31 E.

<i>Material</i>	<i>Depth, in feet, below land surface</i>
No samples	0 - 110
Tamiami Formation	
Limestone, gray, porous, fossiliferous	110 - 120
Hawthorn Formation	
Marl, dark-green, sandy, phosphatic	120 - 140
Marl, dark-green, clayey, and light-gray phosphatic marl	140 - 170
Marl, olive-drab, silty, sandy, shelly, phosphatic, with quartz and black phosphate pebbles	170 - 290
Marl, green, clayey, and white limestone and sandy marl	290 - 350
Marl, white, sandy, shelly, phosphatic	350 - 380
Marl, light-gray, sandy, phosphatic, and cream soft, fossiliferous limestone	380 - 410
Tampa Formation	
Limestone, white, porous, permeable, slightly phosphatic	410 - 440
Limestone, tan, porous, fossiliferous, chalky	440 - 470

Suwannee Limestone

Marl, cream, chalky, phosphatic, and cream chalky limestone; <i>Operculinoides vicksburgensis</i> at 470-500 feet	470 - 560
Limestone, cream, chalky, porous	560 - 650
Limestone, gray, hard, crystalline, porous	650 - 740
Limestone, light-tan, sandy, chalky; some white dense limestone, and cream silty marl	740 - 860
Marl, green, clayey	860 - 980
Limestone, light-tan, sandy, chalky, with some green clayey marl	980 - 1010
No sample	1010 - 1040

Ocala Group

Limestone, cream, silty, porous, nodular, and gray dense limestone: <i>Lepidocyclus</i>	1040 - 1100
Limestone, cream, porous, nodular, chalky; gray limestone; tan, crystalline limestone and dolomite; <i>Heterostegina ocalana</i> , <i>Lepidocyclus ocalana</i>	1100 - 1190
Limestone, tan, chalky; tan nodular crystalline limestone; <i>Lepidocyclus</i> , <i>Operculinoides moodybranchensis</i>	1190 - 1310

Avon Park Limestone

Limestone, tan, chalky; <i>Peronella dalli</i>	1310 - 1340
Limestone, cream, chalky, and tan crystalline dolomite; <i>Dictyoconus cookei</i> , <i>Coskinolina floridana</i>	1340 - 1460

Limestone, cream, nodular, chalky, and tan dense dolomite;

<i>Dictyoconus cookei</i>	1460 - 1670
No sample	1670 - 1700

Lake City Limestone

Limestone, cream, chalky, nodular, dense; <i>Dictyoconus cookei</i> , <i>Coskinolina floridana</i> , and <i>Dictyoconus americanus</i>	1700 - 1916
No further samples available	1916 - 11,794

WELL 283

SE¼SE¼ sec. 13, T. 45 S., R. 28 E.

Material	Depth, in feet, below land surface
No samples	0 - 100
Hawthorn Formation	
Marl, green, sandy	100 - 110
Sand, green, quartz, coarse to fine, silty	110 - 130
Sand, quartz, coarse, and small pebbles, shelly, and some phosphate	130 - 190
Limestone, cream, soft, porous; some gray hard limestone and coarse quartz sand	190 - 250
Limestone, cream, porous, soft, and cream silty marl; some coarse quartz sand	250 - 280

Limestone, white, soft, chalky, porous, and coarse quartz sand	280 - 300
Sand, gray, medium to coarse, shelly, phosphatic, and cream hard limestone	300 - 360
Marl, gray, sandy, phosphatic, shelly, and cream limestone	360 - 420
Tampa Formation	
Limestone, white, porous, fossiliferous, and gray shelly phosphatic marl	420 - 450
Limestone, cream, porous to chalky, fossiliferous	450 - 550
Suwannee Limestone	
Limestone, cream, porous to chalky, fossiliferous; <i>Operculinoides vicksburgensis</i>	550 - 640
Limestone, cream, porous, fossiliferous, phosphatic, chalky, and phosphatic marl	640 - 690
Limestone, cream, porous, fossiliferous, chalky	690 - 740
Limestone, white, porous, crystalline, and tan crystalline dolomite	740 - 880
Limestone, white, porous and chalky	880 - 910
Limestone, cream, porous and chalky	910 - 970
Limestone, gray, sandy, porous	970 - 1020
Limestone, cream, porous, chalky to crystalline	1020 - 1050
Ocala Group	
Limestone, cream, porous, crystalline to chalky, and tan crystalline dolomite	1050 - 1080
Limestone, cream, porous, nodular to crystalline; <i>Lepidocyclina</i>	1080 - 1180
As above; contains <i>Lepidocyclina</i> , <i>Operculinoides</i>	1180 - 1240
Limestone, cream, porous, crystalline; <i>Lepidocyclina</i> , <i>Operculinoides</i>	1240 - 1450
Avon Park Limestone	
Limestone, cream, porous, chalky, and tan crystalline dolomite; <i>Dictyoconus cookei</i> ?, <i>Spirolina coryensis</i>	1450 - 1550
No further samples available	1550 - 6098

TABLE 8. Record of Wells in Glades and Hendry Counties.

Use of water: D, domestic; In, industrial; Ir, irrigation; N, none; O, observation; P, public supply; S, stock; T, test.

Finish: OE, open end; SC, screened; SP, sand point.

Remarks: Ca, complete chemical analysis of water sample; Cp, partial chemical analysis of water sample; L, log of well included in report.

GLADES COUNTY

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
1	NE	NW	3	41	30	R. J. Brewton	525	6	---	OE	125 43	+10.5	5-15-52 12-19-52 6-24-59	---	D	75	Cp.
2	NW	NE	11	42	32	Coburn Chemical Co.	804	6	700	OE	1,160	+37.1	4- 9-53	---	N	75	
3	SW	NW	20	42	33	U. S. Sugar Corp.	92	2	---	OE	---	---	---	---	D	74	
4	SE	SE	12	42	33	--- do ---	80	2	---	OE	---	---	---	---	D	---	
5	SW	SE	24	42	33	--- do ---	135	---	---	---	---	---	---	---	N	---	
6	SW	SW	22	40	32	A. Van Broeck	22	1¼	---	OE	---	---	---	---	S	---	
7	NW	NW	27	40	32	A. Devaert	18	1¼	---	OE	---	---	---	---	D	76	
8	SW	NE	13	42	32	E. S. Daughtry	104	2	---	OE	---	---	---	---	N	76	
9	NW	NE	19	42	33	G. Sanders	52	1½	---	OE	---	---	---	---	D	76	
10	SE	NW	17	42	33	U. S. Sugar Corp.	85	2	---	OE	---	---	---	---	D	---	
11	SE	NE	31	42	34	Shawnee Farms	102	2½	---	OE	---	---	---	---	P	---	Cp.
12	SE	NW	1	39	32	U. S. Indian Service	120	2	---	OE	208	---	1-29-53	---	In	---	
13	NE	NE	9	40	33	C. Close	48	1¼	---	SP	455	---	1-23-53	---	S	77	

14	SE	NE	23	40	32	L. L. Booker	35	1¼	---	OE	---	---	---	---	D	---	
15	NW	NE	28	40	32	J. L. Beck	25	1¼	---	OE	---	---	---	---	D	---	
16	NE	NE	9	41	32	H. C. Otto	25	1¼	---	OE	---	---	---	---	D	---	
17	NE	SE	7	42	32	W. H. Goering	18	1¼	---	SP	---	---	---	---	D	---	
18	SW	SE	24	42	33	U. S. Sugar Corp.	30	2	---	OE	---	---	---	---	D	76	
19	SW	SE	24	42	33	----- do -----	30	2	---	OE	---	---	---	---	D	---	
20	SW	NW	12	42	32	Town of Moore Haven	28	2	28	---	---	---	---	---	N	---	
21	NW	NW	8	38	32	U. S. Sugar Corp.	13	1¼	---	SP	---	3.04	8-28-50	---	O	---	
22	NW	NW	29	38	34	A. Pearre	1,215	6	432	OE	270	+31.0	3- 6-51	565	Ir	82	Ca.: L.
23	NW	NW	29	38	34	----- do -----	110	6	65	OE	218	2.34	3- 7-51	---	Ir	76	Ca.
25	SW	SW	12	42	32	Glades Electric Corp.	97	2	---	---	---	---	---	---	T	---	
26	SE	SW	35	41	28	Lykes Bros.	120	2	---	OE	19	---	12- 5-52	---	D	---	Cp.
27	NE	NW	25	39	33	Soil Conservation Service	75	4	---	---	268	---	7-22-43	---	T	---	Ca.: L.
28	NW	SE	11	42	32	----- do -----	63	6	---	---	112	---	8-28-43	---	T	---	Ca.: L.
29	SW	SW	22	40	32	----- do -----	75	4	---	---	270	---	9- 1-43	---	T	---	Ca.: L.
30	SW	SW	33	42	29	J. F. Danna	95	---	---	OE	19	---	12- 4-53	---	D	72	
31	NW	SW	33	42	29	B. Cross	320	---	---	OE	---	---	---	---	S	---	
32	SE	SW	29	42	29	A. C. Bailey	85	1¼	---	OE	255	---	12- 3-52	---	D	---	
33	SE	SW	29	42	29	----- do -----	35	1¼	---	OE	21	---	12- 4-52	---	D	---	
34	SW	SE	29	42	29	Unknown	30	1¼	---	OE	---	---	---	---	D	---	
35	SE	SE	29	42	29	----- do -----	---	1¼	---	---	---	---	---	---	D	---	
36	NW	SE	20	42	29	Lykes Bros.	---	1¼	---	---	29	---	12- 3-52	---	S	76	
37	SW	SE	12	42	28	B. Branch Cattle Co.	96	1½	---	OE	114	---	12- 4-52	---	D	77	Cp.
38	NE	SW	15	42	28	Fritchie	---	1¼	---	---	60	---	12- 4-52	---	D	74	
39	NW	SW	10	42	28	B. Branch Cattle Co.	112	1¼	---	OE	18	---	12- 4-52	---	S	76	
40	NE	SE	9	42	28	----- do -----	173	2	130	OE	44	---	12- 4-52	---	D	---	Cp.

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
41	NE	SE	9	42	28	B. Branch Cattle Co.	180	2	----	OE	----	----	-----	----	S	—	Cp.
42	NW	SW	9	42	28	----- do -----	102	2	----	OE	14	----	4-29-53	----	S	75	
43	NW	NE	17	42	28	B. Austin	140	2	----	OE	36	----	12- 4-52	----	D, S	75	
44	SE	NE	18	42	29	W. Greer	90	2	----	OE	72	----	12- 4-52	----	D	76	
45	SE	NE	18	42	29	----- do -----	112	2	----	OE	84	----	12- 4-52	----	S	76	
46	NW	NW	5	42	29	Lykes Bros.	----	1½	----	----	55	----	12- 5-52	----	S	77	Cp.
47	SW	SE	36	42	28	C. B. Hoyle	106	1½	----	OE	13	----	12- 5-52	----	D	78	
48	NE	SW	28	42	29	B. Ballard	325	1½	----	OE	66	----	12-15-52	----	D	77	
49	SW	NW	26	42	29	Lykes Bros.	500	4	----	OE	352	----	12-15-52	----	S	79	
50	NW	NW	24	42	29	C. C. Carlton	85	4	----	OE	33	----	1-26-53	----	S	75	
51	SE	SW	18	42	30	Brown	15	1½	----	SP	----	3.35	12-15-52	----	N	—	Cp.
52	NW	NE	24	42	29	C. C. Carlton	491	6	351	OE	336	----	12-15-52	225	Ir	81	
											395	+14.5	3-12-53	----		80	
												----	5- 7-58	400			
53	NE	NE	19	42	30	----- do -----	495	4	460	OE	358	----	12- 2-52	30	D, S	80	Cp.
											475	+29.7	5- 6-58	----		79	
54	SE	SE	21	42	30	----- do -----	776	6	257	OE	262	+28.0	2-25-53	----	Ir	80	Cp.
											212	+41.0	5- 6-58	80		80	
55	SW	SE	16	42	30	J. H. Van Cleve	62	1½	61	OE	50	----	12-16-52	----	D, S	—	Cp.
56	NW	SE	29	41	30	Lykes Bros.	700	4	----	OE	59	----	4-30-53	10	S	79	
												+5.5	1- 6-58	----		78	

57	NE	NE	29	41	30	J. J. Hess	22	1 1/4	---	SP	19	---	12-16-52	---	D	75	Cp.
58	SW	NE	28	41	30	Atlantic Coast Line RR.	608	6	---	OE	36 81	+11.6 +12.4	12-16-52 5-7-58	1	S	76	
59	SE	NE	9	41	30	----- do -----	593	3	200	OE	100	---	12-16-52	---	D	---	Cp.
60	SW	NW	10	41	30	T. Gaskins	30	2	---	SP	10	---	12-16-52	---	D	---	Cp.
61	SE	NW	10	41	30	T. Gaskins	70	2	---	SP	12	---	12-16-52	---	D	75	
62	SW	NW	4	42	31	E. W. Partridge	22	2 1/2	---	SP	68	---	12-16-52	---	D	---	
63	NE	SE	5	42	31	H. Heflin	65	1 1/4	---	SP	43	---	12-16-52	---	D	---	
64	SE	NE	5	42	31	J. B. Arnold	---	1 1/4	---	---	55	---	12-16-52	---	D	75	
65	NW	SE	5	42	31	S. Wayman	30	1 1/4	---	SP	22	---	12-16-52	---	D	---	
66	NW	SE	5	42	31	----- do -----	25	1 1/4	---	SP	32	---	12-16-52	---	D	---	Cp.
67	NW	SE	17	42	31	F. Schauer	30	1 1/4	---	SP	35	---	12-16-52	---	D	---	
68	NW	NW	22	42	31	F. Coyner	180	1 1/4	176	OE	29	---	12-16-52	---	D	75	
69	NW	NW	22	42	31	----- do -----	22	1 1/4	---	SP	24	---	12-16-52	---	D	75	
70	SW	NW	21	41	29	Lykes Bros.	---	1 1/4	---	---	28	---	12-17-52	---	S	76	
71	NE	SW	5	41	29	----- do -----	34	2 1/2	---	OE	65	3.06	12-17-52 4-29-53	---	N	75	Cp.
72	SW	NE	35	40	28	----- do -----	---	1 1/4	---	---	97	---	12-16-52	---	S	75	
73	SE	SW	27	40	28	----- do -----	22	1 1/4	---	SP	66	---	12-16-52	---	D	76	Cp.
74	NE	SE	21	40	28	S. L. Farabee	20	1 1/4	---	SP	34	---	12-17-52	---	D	76	
75	NE	SW	22	40	28	Unknown	17	1 1/4	---	SP	15	---	12-17-52	---	N	77	
76	NW	SE	22	40	28	H. A. Fenno	150	1 1/2	---	OE	35	---	4-29-53	---	S	76	Cp.
77	NE	SW	7	40	29	O. Ingraham	21	1 1/4	---	SP	26	---	12-17-52	---	D	74	Cp.
78	NW	SW	21	42	29	W. B. Whidden	---	1 1/4	---	---	---	---	---	---	D	---	
79	NE	SE	6	41	31	S. B. Snell	70	1 1/4	---	OE	19	---	12-18-52	---	D	74	Cp.
80	NW	NE	6	40	30	V. T. Oxer	25	1 1/4	---	SP	11	---	12-18-52	---	D	---	Cp.
81	NW	NE	5	40	30	Peeples	---	1 1/4	---	---	10	---	12-18-52	---	Ir	---	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
82	SW	SW	16	40	30	Peoples	---	1¼	---	---	11	---	12-18-52	---	S	76	
83	SE	SE	33	40	30	Atlantic Coast Line R.R.	618	6	340	OE	41 116	+ 8.6 +10.0	12-18-52 6-24-59	---	D	74	Cp.
84	SW	NW	34	40	30	V. F. Thirsk	---	1¼	---	---	9	---	12-18-52	---	D	---	
85	SW	SW	34	40	30	Palmdale General Store	47	1¼	---	SP	11	---	12-18-52	---	D	---	Cp.
86	NW	NW	3	41	30	S. B. Snell	300	---	294	---	18	---	12-18-52	---	D	76	Cp.
87	SW	NW	3	41	30	G. E. Fleming	40	2	---	SP	17	---	12-18-52	---	D	---	
88	NE	NW	3	41	30	L. Kunze	---	1¼	---	---	50	---	12-19-52	---	D	75	
89	NE	NW	3	41	30	C. C. Arnold	40	1¼	---	SP	36	---	12-19-52	---	D	75	
90	NE	SE	34	40	30	S. B. Snell	35	1¼	---	OE	29	---	12-19-52	---	D	---	Cp.
91	NE	NW	34	40	30	J. H. Hogan	35	1¼	---	SP	20	---	12-19-52	---	D	74	
92	SE	NW	3	41	30	R. Hendry	40	1¼	---	SP	29	---	12-19-52	---	D	---	
93	SE	NW	3	41	30	J. R. Harris	86	1¼	75	OE	13	---	12-19-52	---	D	---	Ca.; Cp.
94	SE	NW	3	41	30	J. Crews	46	1¼	---	OE	15	---	12-19-52	---	D	75	Cp.
95	SW	NW	3	41	30	R. F. Haskew	25	1¼	---	SP	12	---	12-19-52	---	D	75	
96	NE	NE	4	41	30	G. E. Fleming	38	1¼	---	SP	38	---	12-19-52	---	D	---	
97	NE	NE	14	41	30	C. V. Wadlow	25	1¼	---	SP	---	---	---	---	D	---	
98	NE	NE	14	41	30	--- do ---	55	1¼	---	SP	28	---	12-19-52	---	D	---	Cp.

99	NW	NE	28	41	30	Lyken Bros.	—	1¼	—	—	19	—	1-26-53	—	S	74	Cp.
100	SW	SE	21	41	30	— do —	300	2	—	—	—	—	—	—	S	—	
101	SW	SE	21	41	31	— do —	—	1¼	—	—	23	—	1-26-53	—	D	77	
102	SW	NW	21	41	31	J. H. Dilley	41	1¼	—	SP	29	—	1-26-53	—	D	—	
103	SE	SW	21	42	30	C. C. Carlton	40	1¼	—	OE	24	—	1-26-53	—	S	75	Cp.
104	NE	SE	20	42	30	Unknown	41	1¼	—	OE	17	—	1-26-53	—	S	76	
105	NW	SE	24	42	29	C. C. Carlton	300	1½	—	—	73	—	1-26-53	—	S	76	
106	NE	NW	27	42	30	L. Williams	25	1¼	22	OE	22	—	1-26-53	—	D	75	
107	NE	NW	27	42	30	— do —	100	2	—	SP	—	—	—	—	N	—	Cp.
108	NW	NE	27	42	30	— do —	70	1¼	65	OE	48	—	1-26-53	—	D	—	
109	NW	SE	27	42	30	Atlantic Coast Line RR.	500	4	314	OE	212	—	1-26-53	—	D	—	
110	SE	SE	21	42	30	W. A. Stevens	508	2	—	OE	171	—	1-26-53	1	D	78	
111	NE	SE	27	42	30	U.S. Corps of Engineers	110	4	—	OE	205	—	1-26-53	—	D	—	Cp.
112	SE	NE	27	42	30	J. C. Hicks	50	1¼	45	OE	29	—	1-26-53	—	D	74	
113	NE	SW	14	42	30	Glades County Cemetery	—	2	—	—	7	—	1-27-53	—	Ir	—	
114	NW	NW	22	42	30	J. C. Darby	—	1¼	—	—	28	—	1-27-53	—	D	74	
115	NW	NW	22	42	30	— do —	—	2	—	—	24	—	1-27-53	—	D	—	Cp.
116	SW	SW	18	42	31	State Road Department	750	4	—	OE	510	—	1-27-53	—	D	—	
117	SE	NW	20	42	31	J. H. Peeples	17	1¼	—	SP	14	—	1-27-53	—	D	—	
118	SE	NW	20	42	31	— do —	17	1¼	—	SP	13	—	1-27-53	—	D	75	
119	SE	SW	20	42	31	Bailey	—	2	—	—	—	—	—	—	N	—	Cp.
120	SW	SW	20	42	31	— do —	13	1¼	—	SP	23	—	1-27-53	—	S	—	
121	SW	NE	20	42	31	J. H. Peeples	71	1¼	—	OE	26	—	1-27-53	—	D	—	
122	SW	NE	20	42	31	— do —	70	1¼	—	OE	33	—	1-27-53	—	Ir	—	
123	SW	SW	14	42	31	J. H. Peeples	1,200	8	400	OE	2,350	+5.1 +4.8	1-27-53 10-10-56	—	S	76	Cp.

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
124	NE	NW	2	42	31	B. Peeples	35	1¼	—	OE	57	—	1-27-53	—	S	76	Cp.
125	NE	NW	2	42	31	J. H. Peeples	100	1¼	—	OE	43	—	1-27-53	—	D	—	
126	SW	NW	7	42	31	— do —	25	1¼	—	OE	27	—	1-27-53	—	S	73	
127	SW	NW	6	42	31	W. H. Peeples	30	1¼	—	OE	67	—	1-27-53	—	S	76	Cp.
128	SW	SE	1	42	31	— do —	100	1¼	—	SP	68	—	1-27-53	—	S	75	
129	NW	SW	8	42	31	Swift & Co.	100	1¼	—	SP	87	—	1-27-53	—	D	—	
130	NE	SW	32	41	31	J. J. Wiggins	162	1½	—	SP	133	—	1-27-53	—	D	74	Cp.
131	NW	NE	5	42	32	— do —	30	1¼	—	OE	68	—	1-27-53	—	S	75	
132	NW	NW	5	42	32	— do —	30	1¼	—	OE	66	—	1-27-53	—	S	76	
133	SE	NW	8	42	32	— do —	16	1½	—	SP	40	—	1-27-53	—	S	72	Cp.
134	NW	SE	8	42	32	Swift & Co.	65	1¼	—	OE	60	—	1-27-53	—	D	—	
135	NW	SW	9	42	32	J. J. Wiggins	28	1¼	—	OE	43	—	1-29-53	—	S	75	
136	NW	NW	30	38	35	G. H. Wynn	85	1¼	—	OE	468	—	1-28-53	—	D	74	Cp.
137	NE	NE	25	38	34	C. H. Shirling	97	1¼	62	OE	375 378	—	1-28-53 9- 2-59	—	D	—	
138	SE	NE	25	38	34	— do —	100	1¼	—	SP	390 398	—	1-27-53 9- 2-59	—	D	75	
139	NE	SW	4	39	34	A. Pierce	86	1¼	—	SP	200 207	—	1-28-53 9- 2-59	—	D	75	Cp.

140	NE	SW	35	39	33	E. P. Scarborough	50	1¼	—	OE	104 80	—	1-28-53 9- 2-59	—	D	—	Cp.
141	NE	SW	35	39	33	— do —	90	1½	—	OE	568	—	1-28-53	—	S	76	
142	SW	SE	3	40	33	C. O. Godwin	40	1¼	—	OE	565 605	—	1-28-53 9- 2-59	—	D	—	Cp.
143	SW	SE	3	40	33	R. Roberson	20	1½	—	SP	490 400	—	1-28-53 9- 2-59	—	D	—	
144	NE	NE	9	40	33	Hat Ranch	800	4	—	OE	1,050 1,190	+30.3	1-28-53 9- 1-59	125	S	80	Cp.
145	SE	NW	9	40	33	— do —	90	1¼	—	OE	492 508	—	1-28-53 9- 2-59	—	D	—	
146	NE	SE	8	40	33	C. E. Webb	126	2	—	OE	1,830	—	1-28-53	—	D	75	
147	NW	SW	9	40	33	T. Cook	47	1½	—	SP	482 245	—	1-28-53 9- 2-59	—	D	—	
148	NE	SE	8	40	33	R. F. McDuffie	72	1½	54	OE	528 250	—	1-28-53 9- 2-59	—	D	—	
149	SE	SW	8	40	33	O. Whidden	32	1¼	—	SP	39	—	1-28-53	—	D	75	Cp.
150	SE	SE	7	40	33	C. L. Thompson	52	2	—	OE	875 730	—	1-28-53 9- 3-59	—	D	75	
151	NW	NE	18	40	33	C. Q. Bustle	32	1½	—	SP	895	—	1-28-53	—	N	—	
152	NW	NW	18	40	33	J. Vander Velde	56	2	—	SP	1,700	—	1-28-53	—	D	—	Cp.
153	NW	NW	18	40	33	R. Roberson	42	1¼	30	OE	338	—	1-28-53	—	D	—	
154	NE	NE	13	40	32	W. G. Selby	46	1¼	—	SP	625	—	1-28-53	—	D	75	
155	SE	SW	2	38	32	C. Lykes	600	6	—	OE	224 240	+20.5 +19.0	1-29-53 5- 9-58	—	D	79	Cp.
156	SW	NE	11	38	32	Lykes Bros.	600	6	—	OE	227	—	1-29-53	—	D	79	
157	NW	SE	11	38	32	— do —	600	6	—	OE	250	—	1-29-53	—	D	79	
158	NE	NE	35	38	32	— do —	—	1¼	—	—	16	—	1-29-53	—	S	75	
159	SW	NE	13	40	32	W. H. McDuffie	48	1½	—	SP	178 171	—	1-29-53 9- 3-59	—	D	—	Cp.
160	NW	SE	13	40	32	J. T. Reese	30	1½	—	SP	775	—	1-29-53	—	D	—	Cp.

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F.)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
161	NW	SE	18	40	32	Unknown	6	2	---	OE	208	---	1-29-53	---	D	---	Cp.
162	NW	SE	18	40	32	Calusa Lodge	25	1½	---	SP	302	---	1-29-53	---	Ir	---	
163	NE	SW	14	40	32	Stem-Etheredge Camp	65	1½	---	OE	242 145	---	1-29-53 9- 3-59	---	D	---	
164	SE	SE	14	40	32	D. S. Click	65	1¼	---	OE	572 950	---	1-29-53 9- 3-59	---	S	---	Cp.
165	SW	NE	23	40	32	M. G. Atchley	20	1¼	---	SP	170 116	---	1-29-53 9- 3-59	---	D	---	
166	SE	NE	23	40	32	P. Smith	40	1½	---	OE	230	---	1-29-53	---	D	---	
167	NW	NW	24	40	32	J. S. Click	25	1¼	---	OE	388	---	1-29-53	---	D	---	Cp.
168	NW	NW	24	40	32	D. S. Click	102	1½	100	SP	1,420 1,480	---	1-29-53 9- 3-59	---	D	---	
169	SE	SW	18	40	32	C. B. Swanson	70	2	65	SP	805 835	---	1-29-53 9- 3-59	---	D	---	
170	SW	NE	22	40	32	W. Click	30	1¼	---	OE	256 145	---	2-24-53 9- 3-59	---	D	---	Cp.
171	NE	SW	22	40	32	_____do_____	38	2	---	OE	208	---	2-24-53	---	S	---	
172	NE	SW	22	40	32	H. Click	40	1¼	---	SP	268	---	2-24-53	---	S	---	
173	NE	SW	22	40	32	J. N. Click	26	1¼	---	OE	72	---	2-24-53	---	D	76	Cp.
174	SW	SW	22	40	32	L. Compton	52	1¼	---	SP	282 272	---	2-24-53 9- 4-59	---	D	---	Cp.

175	NW	NW	27	40	32	N. Platt	73	1 1/4	---	SP	282 248	---	2-24-53 9- 4-59	---	D	74	
176	NE	NE	28	40	32	M. Whidden	---	---	---	---	182	---	2-25-53	---	D	---	
177	NW	NE	28	40	32	A. Beck	40	1 1/4	---	SP	260	---	2-25-53	---	D	---	Cp.
178	SW	SE	21	40	32	M. Whidden	140	---	---	SP	---	---	---	---	D	---	
179	SW	NE	28	40	32	T. Beck	60	1 1/4	---	SP	130	---	2-25-53	---	D	---	
180	NE	NW	28	40	32	L. N. Journigan	105	1 1/4	---	OE	418	---	2-25-53	---	D	---	Cp.
181	SE	SE	20	40	32	C. Clemons	110	1 1/4	---	OE	208 206	---	2-25-53 9- 4-59	---	D	---	
182	SE	SE	20	40	32	C. Pollard	110	1 1/4	---	OE	260	---	2-25-53	---	D, S	74	Cp.
183	SW	SE	21	40	32	L. Skipper	25	1 1/4	---	SP	348 345	---	2-25-53 9- 4-59	---	S	73	Deepened to 115 ft.
184	SW	SE	21	40	32	J. Whidden	115	1 1/4	---	OE	340 342	---	2-25-53 9- 4-59	---	D	75	
185	NW	NW	10	41	32	A. A. Beck	101	1 1/4	---	OE	360 515	---	2-25-53 9- 4-59	---	D	---	Cp.
186	SW	NE	3	41	32	Lykes Bros.	100	1 1/4	---	OE	1,450 1,470	---	2-25-53 9- 4-59	---	D	---	Cp.
187	SE	NE	32	40	32	L. Pratt	25	1 1/4	---	SP	330	---	2-25-53	---	D	74	
188	SE	NE	32	40	32	----- do -----	73	1 1/4	---	OE	570 595	---	2-25-53 9- 4-59	---	D	75	Cp.
189	SE	NE	9	41	32	A. T. Uzzel	40	1 1/4	39	OE	238 234	---	2-25-53 9- 4-59	---	D	---	
190	NE	NE	4	42	32	Lykes Bros.	---	1 1/4	---	---	135	---	2-25-53	---	D	---	
191	SE	NE	9	42	32	Summerall Station	100	1 1/4	---	OE	160	---	2-25-53	---	D	---	
192	SE	SE	34	42	30	S. Scott	---	1 1/4	---	---	28	---	2-25-53	---	D	76	
193	NE	SE	34	42	30	J. B. Cattle Co.	186	2	---	OE	32	---	2-25-53	---	D	---	Cp.
194	NE	SE	34	42	30	Atlantic Coast Line RR.	68	4	---	OE	33	---	2-25-53	---	D	77	Cp.
195	NE	SE	34	42	30	----- do -----	68	3	---	OE	30	---	2-25-53	---	D	74	Cp.

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
196	SW	NE	34	42	30	J. B. Hendry Cattle Co.	15	1¼	—	SP	27	—	2-25-53	—	D	—	
197	SE	SE	34	42	30	G. Davidson	50	1¼	—	OE	58	—	2-25-53	—	D	—	
198	NW	NW	34	41	32	R. D. Lyons	31	1½	—	OE	62	—	2-26-53	—	D	—	
199	SE	SE	28	41	32	Unknown	—	1¼	—	—	43	—	2-26-53	—	D	—	
200	NE	SE	11	42	28	I. E. Scott	850	4	—	OE	585	—	3-12-53	—	S	81	Cp.
201	NW	SW	20	42	30	C. C. Carlton	642	6	203	OE	326	+38.0	4- 7-53 5- 6-53	—	Ir	79	Cs. : Cp. ; L.
202	NW	SW	31	41	32	J. C. Wiggins	110	8	—	OE	86	—	3-13-53	—	Ir	—	
203	NE	NW	22	39	32	Brighton Indian Reservation	65	1¼	—	OE	24	—	3-13-53	—	S	—	Cp.
204	NW	SW	13	39	32	— do —	65	1¼	—	OE	314	—	3-13-53	—	S	—	Cp.
205	NE	SW	10	40	31	Lykes Bros	—	4	—	—	1,980 2,300	+11.2 +10.5	3-13-53 5- 7-53	6 5	S	79 78	Cp.
206	NW	NW	3	42	32	R. D. Lyons	40	1¼	—	OE	71 123	—	3-13-53 9- 4-59	—	S	—	Cp.
207	SW	SE	15	39	32	Brighton Indian Reservation	1,500	4	—	OE	2,600 1,220	+ 6.3 +14.5	4- 6-53 5- 9-53	30 5	S	86	Cp.
208	NW	SW	12	39	32	— do —	1,250	6	—	OE	279 332	+29.0	4- 6-53 5- 9-53	50 100	S	81 80	Cp.
209	SW	NW	12	42	32	Glades Electric Corp.	44	10	—	OE	47	—	4- 7-53	—	In	82	Cp.
210	SW	NW	12	42	32	— do —	44	10	—	OE	—	—	—	—	In	—	

211	SW	NW	12	42	32	Glades Electric Corp.	44	10	—	OE	—	—	—	—	In	—	
212	SW	NW	12	42	32	Town of Moore Haven	87	8	—	SC	40	—	4- 7-53	—	P	76	Ca.
213	NE	NE	11	42	32	Moore Haven Ice Co.	20	5	—	SP	69	—	4- 7-52	—	In	—	Cp.
214	NE	SE	11	42	32	P. E. Lundy Plumbing Co.	18	1¼	—	SC	40	—	4- 7-53	—	Ir	73	
215	NE	NW	24	42	32	J. Griffin	26	1½	—	SP	34	—	4- 8-53	—	D	76	Cp.
216	NE	NW	24	42	32	— do —	70	2	—	OE	—	+ 1.83	4- 8-53	—	N	—	
217	SW	NW	23	42	33	J. E. Frierson	100	2	40	OE	1,050 1,070	—	4- 8-53 9- 4-59	—	S	79	Cp.
218	NE	NW	21	42	33	R. D. Chamberlin	25	1½	—	SP	112	—	4- 8-53 9- 4-59	—	D, S	80	
219	NW	NE	19	42	33	Ola Sanders	25	1½	—	SP	155 378	—	4- 8-53 9- 4-59	—	D	77	
220	NE	NE	24	42	32	E. D. Yaun	22	1½	—	SP	—	—	—	—	S	—	
221	NE	NW	18	42	33	— do —	42	4	—	OE	46	—	4- 8-53	—	S	75	Cp.
222	NE	SE	12	42	32	S. T. Smoak	45	1¼	—	OE	52 60	—	4- 8-53 9- 4-59	—	D	79	
223	NE	SE	13	42	32	J. R. Langdale	57	2	—	OE	288	—	4- 8-53	—	D	76	
224	SW	NE	13	42	32	T. Dazey	90	2	—	OE	795	—	4- 8-53	—	D, S	74	
225	NW	SW	13	42	32	F. Ange	35	1¼	—	SP	33	—	4- 8-53	—	D	70	
226	SE	NW	25	42	32	Strayer Packing Co.	114	2	—	OE	488	—	4- 8-53	—	In	75	
226A	SE	NW	25	42	32	— do —	49	2	—	OE	—	—	—	—	In	—	In manifold with well 226.
227	SW	SE	25	42	33	Shawnee Farms	45	6	—	OE	1,010	—	4- 9-53	—	In	74	Ca.
228	SE	NE	31	42	34	— do —	45	2	—	OE	300 415	—	4- 9-53 9- 4-49	—	P	—	Cp.
229	NW	SE	25	42	32	G. Maxey	50	1½	—	OE	645 670	—	4- 9-53 9- 4-59	—	D, S	78	
230	NW	NE	13	42	32	George Lenart	53	2½	—	OE	565	—	4- 9-53	—	D, S	—	Cp.
231	SW	NW	12	42	32	Land of Sun Dairy	30	2	—	SP	—	—	—	—	N	—	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
232	NW	SE	10	42	32	B. Minerlich	40	1½	—	OE	91	—	4-9-53	—	D	—	
233	SE	NW	22	42	32	C. C. Stewart	80	1½	—	OE	35	—	4-9-53	—	D	—	
234	SE	NE	35	42	32	B. Beardsley	63	1½	—	OE	395	—	4-10-53	—	S	—	
235	NW	SW	36	42	32	— do —	—	1½	—	—	49	—	4-10-53	—	S	—	
236	NE	SE	11	42	28	E. Scott	500	4	—	OE	598	—	4-29-53	1	S	80	Cp.
237	NW	SE	14	40	28	M. T. Farabee	5	—	—	SP	14	—	4-29-53	—	D	72	Cp.
238	NE	SW	19	42	30	C. C. Carlton	500	6	207	OE	530 590	— +37.0	3-18-54 5-6-58	800 650	S	82 82	L.
239	SW	NW	21	42	30	— do —	716	6	254	OE	265 340	— +41.0	7-14-53 5-7-58	310 230	Ir	— 80	
240	SE	NW	25	42	33	Coastal Petroleum Co.	13,420	20	383	—	—	—	—	—	T	—	Oil test.
241	SW	NW	12	42	32	Town of Moore Haven	116	12	59	OE	—	—	—	—	P	—	L.
242	NE	SE	3	42	31	W. H. Peebles	—	3	—	OE	1,620	+10.1	5-6-58	1	S	78	
243	NE	NE	2	42	30	Lykes Bros.	—	3	—	OE	218	+12.0	5-6-58	2	Ir	76	
244	SW	NW	21	42	30	C. C. Carlton	800	6	—	OE	238	+39.9	5-7-58	165	—	80	
245	SE	SW	30	38	34	A. Pearce	1,300	6	—	OE	1,050	—	5-8-58	100	—	84	
246	NE	SW	20	38	34	— do —	1,300	5	—	OE	830	+31.0	5-8-58	200	S, Ir	82	
247	NW	NE	20	38	34	— do —	1,300	6	—	OE	275	+32.0	5-8-58	410	S, Ir	80	
248	SW	SW	21	38	34	— do —	1,300	5	—	OE	352	+32.0	5-8-58	150	S, Ir	81	

249	NE	NW	28	38	34	A. Pearce	1,300	6	---	OE	298	+31.5	5- 8-58	220	S, Ir	82
250	SE	NE	28	38	34	do	1,300	6	---	OE	262	+34.0	5- 8-58	350	S, Ir	80
251	SW	NE	22	38	34	do	1,300	6	---	OE	280	+33.0	5- 8-58	150	S, Ir	80
252	NW	NW	22	38	34	do	1,300	6	---	OE	322	+32.5	5- 8-58	210	S, Ir	80
253	NW	SE	16	38	34	do	1,300	6	---	OE	460	+26.5	5- 8-58	95	S, Ir	81
254	SE	NW	16	38	34	do	1,300	6	---	OE	555	+28.0	5- 8-58	185	S, Ir	82
255	SE	SE	8	38	34	do	1,300	6	---	OE	585	+19.5	5- 8-58	150	S, Ir	80
256	SE	SE	32	39	33	Hat Ranch	800	5	---	OE	670	+35.5	5- 9-58	36	S, Ir	80
257	SE	NE	26	38	33	101 Ranch	70	---	---	OE	---	+ 1.87	5- 9-58	---	Ir	---
258	NE	SE	36	41	31	J. J. Wiggins	73	8	---	OE	---	+ 0.48	8-12-58	---	Ir	---
259	SE	SE	36	41	31	do	82	8	---	OE	---	+ 0.51	8-12-58	---	Ir	---
260	NE	NE	1	42	31	do	80	8	---	OE	260	---	8-14-58	---	Ir	77
261	NW	SW	10	42	28	Bee Ranch Cattle Co.	1,300	6	175	OE	480	+ 4.1	1- 8-58	7	Ir	80
262	NW	SW	3	41	30	G. E. Fleming	460	4	---	OE	---	+ 7.1 + 9.0	1-10-58 6-24-59	---	D	75
263	SE	NW	20	42	31	D. Peeples	500	---	328	OE	640	+23.8	1-10-58	1	D	74
264	SW	NW	12	42	32	Town of Moore Haven	87	12	---	OE	48	---	1-11-58	---	P	75
265	SE	NW	24	39	32	Brighton Indian Reservation	---	4	---	---	428	+29.5	1-14-58	14	S, Ir	82
266	SW	NW	1	41	30	Amarada Oil Co.	10,057	6	---	---	---	---	---	---	T	---
267	SW	NW	10	41	30	Florida Forest Service	600	5	450	OE	110	+10.0	6-25-59	---	D	---
268	SE	NW	17	42	28	Florida Forest Service	450	4	238	OE	34	+ 7.2	6-16-59	15	D	---
269	SW	SE	25	38	34	R. Sims	116	2	108	OE	295	---	9- 2-59	---	D	77
270	NE	NE	9	40	33	G. Padgett	21	2	---	SP	1,140	---	9- 2-59	---	D	---
271	SE	SW	8	40	33	O. Whidden	15	1 1/4	---	SP	65	---	9- 2-59	---	D	---
272	SW	SW	8	40	33	J. Wynn	32	2	---	SP	115	---	9- 2-59	---	D	---
273	SW	SW	8	40	33	do	32	2	---	SP	110	---	9- 2-59	---	Ir	---

Oil test; L.

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
274	SW	SW	8	40	33	Vanwright	—	2	—	—	232	—	9- 2-59	—	Ir	—	
275	SE	SE	7	40	33	A. Roehr	20	—	—	SC	355	+ 2.38	9- 2-59	—	D	—	
276	SE	SE	7	40	33	— do ———	20	2	—	OE	235	—	9- 2-59	—	D	—	
277	SE	SE	7	40	33	— do ———	35	1¼	—	OE	1,330	+ 2.40	9- 3-59	—	N	—	
278	SE	SE	7	40	33	— do ———	59	1¼	55	OE	2,150	+ 2.34	9- 3-59	—	N	—	
279	SE	SE	7	40	33	C. L. Thompson	91	2	—	OE	2,280	+ 3.20	9- 3-59	—	N	76	
280	SE	SE	7	40	33	Blackwelder	49	2	42	OE	1,760	+ 2.41	9- 3-59	—	N	—	
281	NE	SE	8	40	33	C. E. Webb	70	2	—	OE	248	—	9- 2-59	—	D	—	
282	NW	NW	18	40	33	J. Vanderveide	38	2	—	OE	30	—	9- 3-59	—	D	—	
283	SE	NE	23	40	32	P. Smith	70	2	—	OE	1,020	—	9- 3-59	—	Ir	—	
284	NW	NW	24	40	32	J. S. Click	70	2	—	OE	1,140	—	9- 3-59	—	D	—	
285	SW	NE	13	40	32	W. H. McDuffie	28	1½	—	SP	392	—	9- 3-59	—	D	—	

HENDRY COUNTY

1	NE	SW	1	43	28	Collier Corp.	600	3	—	OE	—	+22.0	2-21-34	—	Ir	77	
2	NW	SW	4	43	29	Lowery Hotel	650	6	—	OE	486	+34.0	2- 2-34 4-30-53	—	D	81	Cp.
3	SE	SW	12	43	33	U. S. Geological Survey	10	6	—	SP	—	—	—	—	O	—	Ca.

4	NE	NE	20	43	33	Defense Plant Corp.	129	12	83	OE	80	—	4-23-43	—	In	—	Ca.; L.
5	SW	SW	22	44	32	U. S. Geological Survey	13	6	—	OE	84	—	4- 7-53	—	O	—	Ca.
6	NE	SE	8	43	34	Soil Conservation Service	110	4	—	OE	—	—	—	—	N	75	
7	NW	NW	36	43	34	— do —	70	2	70	OE	—	—	—	—	D	74	
8	SE	SE	9	43	34	U. S. Sugar Corp.	119	6	115	OE	84	—	4- 7-53	—	D	—	
9	NE	NE	20	43	33	Defense Plant Corp	1,039	6	949	OE	1,480	—	3-26-52	—	D	—	
10	NW	SE	16	43	34	U. S. Sugar Corp.	88	2	83	OE	—	—	—	—	D	77	
11	NW	NW	23	43	34	Nall	55	1½	—	OE	64	—	4-10-53	—	D	—	
12	NE	NW	17	43	34	U. S. Sugar Corp	107	3	100	OE	112	—	4- 8-53	—	S	75	Cp.
13	SE	SE	12	43	33	G. H. Cox	34	2	—	OE	—	—	—	—	D	76	
14	NE	NE	20	43	33	Defense Plant Corp.	315	10	305	OE	282	—	4-24-43	90	P	—	Ca.
15	NE	NE	13	43	32	E. Hendry	130	2	—	OE	28	—	5- 8-53	—	D	77	Cp.
16	NW	SE	16	43	34	U. S. Sugar Corp.	114	6	105	OE	—	—	—	—	D	75	
17	NW	SW	4	43	29	A. E. Hall	601	6	—	OE	488	—	4-30-53	—	P	81	Ca.; Cp.
18	SE	NE	21	43	34	U. S. Sugar Corp.	110	6	110	OE	—	—	—	—	In	—	
19	SE	SW	12	48	33	U. S. Indian Service	80	2	—	OE	101	—	1-30-53	—	D	—	Cp.; L.
20	NW	SW	34	43	32	Soil Conservation Service	50	4	48	OE	59	—	6-16-42	—	T	79	Ca.
21	NW	SW	22	45	32	— do —	46	4	26	OE	59	—	6-17-42	—	T	76	Ca.
44	SE	SW	9	47	32	B. Roberts	750	6	356	OE	910	+36.5	5-13-58	485	S	82	Records of wells 22-43 are in U.S. Geol. Survey Circ. 314.
45	NE	SE	3	43	29	J. B. Hendry	50	—	—	OE	—	—	—	—	T	—	
46	SW	SW	22	43	32	Earl Hendry Cattle Co.	1,465	6	—	OE	930 925	+34.6	3-26-51 10-15-52	—	S	—	Cp.; plugged at 1,100 ft.
47	NW	SW	5	47	31	W. H. Willis	60	6	50	OE	95	+ 3.31	8-13-52	—	Ir	—	
48	SW	NE	6	47	31	R. Miller	72	6	65	OE	—	—	—	—	Ir	—	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
49	NE	SW	6	47	31	W. H. Willis	41	6	—	OE	62	+ 3.10	8-13-52	—	Ir	—	
50	NW	NE	33	45	29	H. Taylor	40	2	40	OE	50	—	8-13-52	—	D	—	
51	SE	SE	27	45	29	N. Weathersbee	—	6	—		1,050	+22.7	8-13-52 8-12-56	—	N	83	Cp.
52	NW	NW	35	45	29	R. Townsend	68	1½	—	OE	24	—	8-13-52	—	D	79	Cp.
53	SE	SW	22	45	29	W. S. Shoulty	42	1½	—	OE	19	—	8-13-52	—	D	—	
54	SW	SW	16	44	29	R. Dana	1,300	6	—	OE	1,390 1,430	+26.8 +27.0	8-14-52 5-21-58	—	S	84	Cp.
55	SE	SW	15	44	29	— do —	100	2	—	OE	298	—	8-14-52	—	D	—	Cp.
56	SE	SW	5	45	29	H. B. Townsend	40	1½	—	OE	27	—	8-14-52	—	D	—	
57	SE	SW	6	45	29	— do —	35	1¼	—	SP	51	—	8-14-52	—	D	—	
58	NE	NE	8	45	29	W. A. Townsend	55	1¼	—	OE	98	—	8-14-52	—	D	—	Cp.
59	SE	SE	8	45	29	H. B. Townsend	42	1¼	—	OE	31	—	8-14-52	—	D	—	
60	SE	SE	17	45	29	M. N. Taylor	995	—	—	OE	1,010 1,000	+19.1 +19.7	8-14-52 5-26-58	—	D	—	Cp.
61	SW	SW	21	45	29	L. A. Willis	90	1½	—	OE	55	—	8-14-52	—	D	—	Ca.
62	NE	SW	32	42	29	N. Collins	123	1¼	95	OE	62	—	12- 2-52	—	D	—	Cp.
63	SE	NW	32	42	29	N. Townsend	580	—	—	OE	322	—	12- 2-52	—	D	82	Cp.
64	SW	NE	32	42	29	A. Womble	30	1¼	—	SP	24	—	12- 2-52	—	D	—	

65	NE	NW	32	42	29	C. A. Green	72	2	62	OE	39	—	12- 2-52	—	D	—	
66	NW	NE	32	42	29	L. B. Tillet	115	2	—	OE	107	—	12- 3-52	—	D	—	Cp.
											132	—	9- 1-59	—			
67	NW	NE	32	42	29	W. A. Gerstman	90	3 $\frac{1}{2}$	—	OE	30	—	12- 3-52	—	D	—	
68	NW	NE	32	42	29	W. Hampton	75	1 $\frac{1}{4}$	—	OE	61	—	12- 3-52	—	D	75	
											26	—	9- 1-59	—			
69	NE	NE	32	42	29	J. Deese	25	1 $\frac{1}{4}$	—	SP	—	—	—	—	D	—	
70	NE	NE	32	42	29	J. Sumroerall	—	1 $\frac{1}{2}$	—	—	—	—	—	—	D	—	
71	SE	SW	4	43	28	C. Lickton	300	6	—	OE	224	—	12- 3-52	—	D	76	Cp.
											228	+ 6.3	5-28-58	30		76	
72	SE	SW	4	43	28	— do —	715	6	—	OE	730	—	12- 3-52	—	S	77	Cp.
											745	+15.5	5-28-58	20			
73	NW	SW	4	43	28	— do —	700	6	—	OE	600	+ 2.7	5-28-58	—	S	80	
74	NW	SW	4	43	28	— do —	820	6	—	OE	535	+ 2.5	5-28-58	—	N	84	Cp.
75	NW	NW	20	43	28	A. Dyess	125	1 $\frac{1}{2}$	—	OE	442	—	12- 3-52	—	D	—	Cp.
76	NW	SE	16	43	28	B. Wolf	—	5	—	—	538	—	12- 3-52	—	N	76	
											620	+ 5.0	5-28-58	—			
77	NE	SW	16	43	28	— do —	—	10	—	—	905	+ 6.1	12- 3-52	—	N	84	Cp.
78	SE	NE	8	43	28	T. Watson	26	1 $\frac{1}{2}$	—	SP	247	—	12- 3-52	—	D	70	
											570	—	5-28-58	—			
79	SW	NE	9	43	28	LaBelle Dairy	85	1 $\frac{1}{2}$	—	OE	133	—	12- 3-52	—	D	80	Cp.
80	SE	SW	3	43	28	Denaud Cemetery	250	2	—	OE	96	—	12- 3-52	2	Lr	76	Cp.; flows
											133	+ 0.5	5-27-58	—		77	
81	NW	NW	10	43	28	— do —	750	6	540	OE	1,050	—	12- 3-52	1	N	79	Cp.
											1,160	+ 3.1	3- 9-56	—			
82	SE	SW	3	43	28	— do —	16	2	—	SP	—	+ 7.5	12- 3-52	—	Lr	—	
83	NE	NW	10	43	28	E. C. Mills	—	6	—	—	1,050	—	12- 3-52	150	Lr	85	Cp.
											1,100	+24.0	5-27-58	150		83	
84	NW	NE	16	43	28	Davis Grove	—	6	—	—	1,020	—	12- 2-52	100	Lr	79	Cp.
85	NE	NE	1	43	28	H. Parkerson	—	4	—	—	1,060	—	12- 3-52	—	N	78	Cp.

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing		Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks	
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)								Finish
86	NE	NE	1	43	28	D. C. Townsend	---	1½	---	42	---	12- 3-52	---	D	79		
87	NE	SE	5	43	29	E. A. Brungard	90	2	---	OE	468	---	12-15-52	---	D	---	Cp.
88	NW	NW	6	43	29	J. Matuciak	700	6	---	OE	485	---	12- 3-52	---	D	80	Cp.
89	SE	NW	27	43	28	H. H. Ranch	1,536	6	---	OE	1,270 1,390	+ 34.9 + 35.1	12- 4-52 5-27-58	250 225	S	85 86	Cp.
90	NE	NE	32	42	29	R. Deese	30	1½	---	SP	117 105	---	12- 3-52 9-1-59	---	D	78	Cp.
91	NW	NE	32	42	20	P. Rennolds	---	2	---	---	---	---	---	D	---		
92	NW	NE	32	42	29	G. M. Watson	390	3	310	OE	91	+ 18.6	12- 3-52	---	D, S	78	Cp.
93	NW	NE	32	42	29	B. D. Curry	65	1¾	---	OE	200	---	9- 1-59	---	D	---	
94	NW	NE	32	42	29	S. L. Farabee	65	1¾	---	OE	66	---	9- 1-59	---	D	---	
95	NW	NE	32	42	29	J. Orr	22	1¾	---	SP	58	---	9- 1-59	---	D	---	
96	SE	NW	32	42	29	C. Barnes	45	1¾	45	OE	27	---	12- 3-52	---	D	---	
97	NW	SW	32	42	29	G. R. Cason	69	1¾	55	OE	43	---	12- 3-52	---	D	75	Cp.
98	SW	NW	32	42	29	G. Hampton	---	1¾	---	---	---	---	---	D	---		
99	NE	SE	31	42	29	C. Langford	---	1¾	---	---	---	---	---	D	---		
100	NE	SE	32	42	29	L. J. Nobles	82	2	---	OE	278 254	---	12- 3-52 9- 3-59	---	D	---	
101	SW	SE	32	49	29	G. S. Curry	---	1¾	---	---	---	---	---	D	---		

102	NE	SE	32	42	29	E. Curry	—	1½	—	—	—	—	—	—	D	—	
103	SE	SE	32	42	29	T. M. Pollard	117	2	70	OE	207	—	12- 3-52	—	D, S	78	Cp.
104	SE	SE	32	42	29	G. Mims	80	2	—	OE	—	—	—	—	D	—	
105	SE	SE	32	42	29	B. Cross	95	1½	—	OE	468	—	12- 3-52	—	D	78	Cp.
106	SE	SE	32	42	29	J. D. McLeod	664	6	—	OE	338	+31.5	12- 3-52	—	D	82	Cp.
107	SE	NE	32	42	29	W. Hampton	800	4	—	OE	330 340	+32.1	12- 4-52 9- 1-59	—	S	81	Cp.
108	NE	NE	32	42	29	S. J. Ridgill	208	2	—	OE	38	—	12- 4-52	—	D	78	Cp.
109	NE	NE	31	42	29	F. Lucky	—	—	—	—	—	—	—	—	—	—	
110	NW	SW	27	43	28	H. H. Ranch	800	6	—	OE	1,260 1,330	+29.2 +33.0	12- 4-52 5-24-58	—	Ir	83	
111	NW	SW	28	43	28	— do —	122	1½	—	OE	905	—	12- 4-52	—	D	—	Cp.
112	SE	NW	30	43	28	C. A. Murphy	45	1½	—	OE	665 685	+ 7.5	12- 4-52 5-27-58	—	D, S	78	Cp.
113	SW	NE	30	43	28	— do —	750	10	—	OE	710	+37.5	5-27-58	560	Ir	84	
114	NW	SE	29	43	28	R. Royer	60	1½	—	OE	625	—	12- 4-52	—	D	—	Cp.
115	NW	NW	28	43	28	H. Glaser	800	6	—	OE	960 1,120	+38.8	12- 4-52 5-27-58	400	Ir	84	Cp.
116	SE	NE	29	43	28	— do —	700	6	—	OE	1,316 1,350	+29.8	12- 4-52 5-27-58	300	N	86	Cp.
117	SW	NE	23	43	28	H. E. Murray	12	6	10	OE	66	—	12- 4-52	500	Ir	79	
118	NE	SW	18	43	29	R. Messer	133	1½	—	OE	284	—	12- 4-52	—	S	76	
119	SE	NW	10	43	29	C. Summerall	137	1½	—	OE	245	—	12- 4-52	—	D	76	Cp.
120	NE	NE	15	43	28	B. Poor	26	1½	—	SP	19	—	12- 4-52	—	D	—	Cp.
121	NE	SW	1	45	29	Atlantic Coast Line RR.	700	6	—	OE	1,090 1,230	+26.5	12- 4-52 5-14-58	75	N	80 81	Cp.
122	SE	SE	8	43	29	J. Maddox	28	8	—	OE	—	—	—	—	Ir	—	
123	NE	SE	5	43	29	LaBelle School	900	6	—	OE	—	—	—	400	P	—	
124	NE	NW	26	45	29	C. Polk	50	3	—	OE	210	—	8-14-52	—	Ir	—	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
125	SE	SW	7	43	29	T. Crawford	23	1½	—	SP	97	—	12- 5-52	—	D	66	
126	SW	NW	18	43	29	J. C. McBeath	112	1½	—	OE	216	—	12- 5-52	—	D	74	
127	SW	NE	14	43	29	C. Murray	46	1½	—	OE	87	—	12- 5-52	—	D	79	Cp.
128	SW	NE	14	43	29	— do —	76	1½	—	OE	515	—	12- 5-52	—	S	78	Cp.; flows.
129	NE	NW	26	45	29	C. Polk	—	3	—	—	—	—	—	—	Ir	—	
130	NW	NE	26	45	29	— do —	—	3	—	—	—	—	—	—	Ir	—	
131	SE	SE	5	43	29	A. L. Taylor	100	1½	—	OE	490	—	12-15-52	—	D	75	Cp.
132	SE	SW	5	43	29	LaBelle Sugar Co.	—	2	—	—	—	—	—	—	In	77	
133	SE	SW	5	43	29	— do —	—	2	—	—	—	—	—	—	In	77	
134	SW	SE	5	43	29	P. Porterfield	100	1½	—	OE	115	—	12-15-52	—	D	77	
135	NE	SE	5	43	29	LaBelle School	100	1½	—	OE	395	—	12-16-52	—	In	74	
136	NE	SE	5	43	29	LaBelle High School	100	2	—	OE	398	—	12-16-52	—	In	67	Cp.
137	NE	SE	5	43	29	LaBelle School	82	1½	—	OE	440	—	12-16-52	—	In	69	
138	NW	SE	5	43	29	Felton	90	1½	—	OE	385	—	12-16-52	—	D	—	
139	NE	SE	5	43	29	W. P. Andrews	85	1½	—	OE	332	—	12-16-52	—	D	—	
140	NE	SE	5	43	29	K. Thompson	—	—	—	—	485	—	12-16-52	40	Ir	81	Cp.
141	NE	SE	5	43	29	J. R. Spratt	68	1½	—	OE	450	—	12-16-52	—	D	—	Cp.
142	NE	SE	5	43	29	R. N. Miller	74	2	—	OE	368	—	12-16-52	—	D	—	Cp.

143	SE	SE	5	43	29	P. O'Bannon	—	1¼	—	—	250	—	12-16-52	—	D	—	
144	NW	SW	4	43	29	Everett Hotel	90	—	—	OE	—	—	—	—	N	—	
145	NW	NW	9	43	29	Hendry County	80	2	—	OE	119	—	12-16-52	—	P	76	Cp.
146	NW	NW	9	43	29	— do —	80	2	—	OE	102	—	12-16-52	—	D	—	
147	SW	SE	4	43	29	L. E. O'Neil	—	2	—	—	21	—	12-16-52	—	D	—	
148	SW	SE	4	43	29	C. J. Easterly	75	1¼	—	OE	65	—	12-16-52	—	D	—	
149	SE	SE	4	43	29	J. B. Hendry	80	1¼	—	OE	117	—	12-16-52	—	Ir	—	Cp.
150	SE	SE	4	43	29	— do —	30	1	—	SP	24	—	12-16-52	—	D	—	Cp.
151	SW	SW	4	43	29	O. L. Langford	28	1¼	—	SP	86	—	12-16-52	—	D	—	Cp.
152	SE	SE	5	43	29	W. P. Andrews	22	2	—	SP	112	—	12-16-52	—	Ir	—	Cp.
153	SW	SW	4	43	29	B. Curtis	168	2	—	OE	152	—	12-17-52	—	D	69	
154	NW	SW	4	43	29	J. O. Davidson	18	1¼	—	SP	465	—	4-30-53	—	D	—	Cp.
155	NW	SW	4	43	29	Powell Furniture Co.	80	2	—	OE	465	—	12-17-52	—	D	—	Cp.
156	NW	SW	4	43	29	L. M. Jennings	90	1¼	—	OE	455	—	12-17-52	—	D	—	Ca.; Cp.
157	NW	SW	4	43	29	Hill Chevrolet Co.	67	2	—	OE	448	—	12-17-52	—	In	—	
158	NW	NW	9	43	29	L. Storter	31	1¼	—	SP	—	+ 3.18	12-17-52	—	N	—	
159	NW	NW	9	43	29	D. G. McCormack	744	3	—	OE	635	—	12-17-52	—	D	79	Cp.
160	SW	NW	9	43	29	J. M. Davis	65	1¼	—	OE	54	—	12-17-52	—	D	70	
161	NW	NW	9	43	29	C. W. Wooten	84	1¼	—	OE	105	—	12-17-52	—	D	—	Cp.
162	NE	NW	9	43	29	I. Magill	80	1¼	—	OE	29	—	12-17-52	—	D	—	
163	SE	NW	9	43	29	S. O. Luckey	68	1¼	65	OE	41	—	12-17-52	—	D	—	Ca.
164	SW	NE	9	43	29	W. H. Crawford	98	1¼	—	OE	26	—	12-17-52	—	D	—	
165	SW	NE	9	43	29	R. L. Bailey	82	2	—	OE	31	—	12-17-52	—	D	—	
166	NW	SE	4	43	29	E. M. O'Bannon	80	1¼	—	OE	37	—	12-17-52	—	D	—	Cp.
167	NW	SW	4	43	39	F. & F. Burchard	80	—	—	OE	430	—	12-17-52	—	P	—	Cp.
168	NW	NW	9	43	39	Orange State Oil Co.	80	2	—	OE	206	—	12-17-52	—	In	—	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
169	NW	NE	8	43	39	W. T. Maddox	100	2	—	OE	209	—	12-17-52	—	D	—	
170	NW	NE	8	43	39	Jack Lewis	98	2	—	OE	128	—	12-17-52	—	D	—	Cp.
171	NW	NW	17	43	29	I. V. Burke	40	1½	—	OE	102	—	12-18-52	—	D	—	Cp.
172	NW	NW	17	43	29	J. A. Cockrane	145	1½	—	OE	239	—	12-18-52	—	D	76	Cp.
173	NW	NW	17	43	29	— do —	28	1½	—	SP	—	+ 3.28	12-18-52	—	N	—	
174	NW	NE	17	43	29	M. B. Rasmussen	110	1½	—	OE	76	—	12-18-52	—	D	—	
175	SE	SE	5	43	29	Waldron Hotel	140	2	—	OE	109 114 135	—	12-18-52 3-12-53 4-30-53	—	Ir	—	Cp.
176	NE	SE	8	43	29	Atlantic Land & Improvement Co.	135	3	—	OE	188 195	—	12-18-52 5- 1-53	—	D	—	Cp.
177	SW	SW	4	43	29	Waldron Hotel	—	3	—	—	530	+ 30.4	12-18-52	—	D	77	Cp.
178	SE	SE	5	43	29	Davis Trading Post	22	1½	—	SP	—	+ 3.32	12-18-52	—	N	—	
179	NE	NE	8	43	29	— do —	108	1½	—	OE	113	—	12-18-52	—	D	—	
180	NE	NE	8	43	29	P. O'Bannon	18	1½	—	SP	24	—	12-18-52	—	In	—	Cp.
181	SW	NW	8	43	29	L. Thomas	20	1½	—	SP	13	—	12-18-52	—	D	75	Cp.
182	NE	NW	8	43	29	Maddox Bros. Dairy	92	1½	—	OE	144	—	12-18-52	—	S	—	Cp.
183	NW	NE	8	43	29	G. R. Risley	—	1½	—	—	254	—	12-18-52	—	D	—	
184	SW	SE	5	43	29	C. Moore	60	1½	—	OE	110	—	12-18-52	—	D	—	Cp.

185	NE	NE	9	43	29	H. L. Johnson	180	1¼	—	OE	117	—	12-18-52	—	D	76	Cp.
186	NW	NE	9	43	29	W. A. Horn	99	1¼	—	OE	42	—	12-18-52	—	D	—	Cp.
187	SE	SW	4	43	29	F. Dougherty	78	2	—	OE	23	—	12-18-52	—	D	—	Cp.
188	NW	NW	9	43	29	R. F. Lewis	100	1¼	—	OE	101	—	12-19-52	—	D	—	Cp.
189	NE	NE	17	43	29	E. Yoemans	40	1¼	—	OE	28	—	12-19-52	—	D	—	
190	NE	NE	17	43	29	R. L. Yoemans	48	1¼	—	OE	29	—	12-19-52	—	D	—	Cp.
191	NE	NE	17	43	29	_____ do _____	110	1¼	—	OE	—	+ 2.43	12-19-52	—	N	—	
192	NW	NE	24	44	29	M. Flipsa	29	6	—	SP	—	+ 2.69	12-19-52	—	Ir	—	
193	NE	NE	32	44	29	M. White	168	6	—	OE	179	—	12-18-52	500	Ir	77	
194	NW	SE	4	45	30	Atlantic Land & Improve- ment Co.	325	6	318	OE	238	—	5- 7-53	500	Ir	—	Cp.; L.
195	NW	SE	4	45	30	_____ do _____	300	4	—	OE	—	—	—	—	N	—	
196	NE	SE	16	43	34	J. W. Lolley	80	1¼	78	OE	—	+ 3.26	1-26-52	—	Ir	—	
197	NE	NE	15	43	34	J. M. Fountain	45	1½	—	OE	97	—	1-26-53	—	Ir	74	Cp.
198	NW	NW	15	43	34	C. J. Anderson	47	1¼	—	OE	76	—	1-26-53	—	Ir	75	Cp.
199	NW	NE	7	43	34	J. B. Hendry	90	1¼	—	OE	43	—	2-26-53	—	P	75	Cp.
200	NW	NE	7	43	32	_____ do _____	70	1¼	—	OE	43	—	2-26-53	—	D	—	Ca.
201	NW	NE	7	43	32	_____ do _____	180	1½	—	OE	52 50	—	2-26-53 9- 1-59	—	S	—	Cp.
202	SW	SE	14	47	33	J. W. McDaniels	18	1¼	—	SP	42	—	2-26-53	—	D	74	
203	SW	SE	14	47	33	_____ do _____	15	1¼	—	SP	46	—	2-26-53	—	D	74	Cp.
204	NE	NE	4	47	33	_____ do _____	112	1¼	90	OE	46	—	2-26-53	—	D	75	Cp.
205	NW	NW	28	46	33	Wilson Ward	90	2½	50	OE	149	—	2-26-53	—	S	—	Cp.
206	SW	SW	23	46	32	V. Babrock	160	2	—	OE	30	—	2-26-53	—	D	—	Cp.
207	SW	SW	15	46	32	_____ do _____	100	2	—	OE	186	—	3-11-53	—	S	—	Cp.
208	SW	SW	27	45	32	Hull Bros.	15	1¼	—	SP	45	—	2-26-53	—	D	74	
209	SW	SW	27	45	32	_____ do _____	15	1¼	—	SP	59	—	2-26-53	—	D	74	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
210	SW	SE	25	45	32	Atlantic Land & Improvement Co.	100	2	—	OE	212	—	2-27-53	—	Ir	—	Cp.
211	NW	SW	36	45	32	— do —	26	1½	—	SP	445	—	2-27-53	—	Ir	72	Cp.
212	SW	SW	22	45	32	— do —	42	2	—	OE	40	—	2-27-53	—	Ir	77	Cp.
213	NE	NE	21	45	32	— do —	28	2	—	SP	43	—	2-27-53	—	Ir	76	
214	SE	NE	4	45	32	— do —	140	6	90	OE	690 665	—	5-12-53 9-4-59	—	Ir	—	Cp.
215	NE	NE	4	45	32	Florida Forest Service	45	2	—	OE	1,070 1,030	—	2-27-53 9-4-59	—	Ir	75	Cp.
216	SW	SW	34	44	32	F. M. Reeder	244	2	174	OE	565 600	—	2-27-53 9-4-59	—	Ir	—	Cp.
217	NE	NE	33	44	32	J. Healey	—	1½	—	—	67	—	2-27-53	—	S	—	
218	SW	NW	15	44	32	F. Braddock	137	2	—	OE	165 165	—	2-27-53 9-4-59	—	D	—	
219	NW	NE	2	47	31	Collier Corp.	10	—	—	SP	47	—	3-11-53	500	Ir	77	
220	NW	SW	4	45	30	Florida Forest Service	328	3	—	OE	232	—	3-11-53	—	D	—	Cp.
221	SW	SW	10	43	34	U. S. Sugar Co.	112	6	105	OE	305	—	4-7-53	—	In	—	Cp.
222	NE	SW	32	45	33	Atlantic Land & Improvement Co.	97	8	84	OE	—	—	—	—	Ir	—	Flows
223	SE	SE	9	43	34	R. Christian	12	1½	—	SP	32	—	4-7-53	—	Ir	—	Cp.
224	NW	SE	10	43	34	R. M. Bishop	40	2	—	OE	101	—	4-7-53	—	Ir	—	Cp.

225	SE	SE	10	43	34	L. V. Bybee	15	1½	—	OE	26	—	4- 7-53	—	Ir	—	Cp.
226	SE	SE	10	43	34	First Bank of Clewiston	41	1¼	—	OE	105	—	4- 7-53	—	In	—	
227	NW	NW	15	43	34	Martins Department Store	36	2	—	OE	86	—	4- 7-53	—	In	—	Cp.
228	NW	NW	15	43	34	Parkers Drug Store	30	2	—	OE	84	—	4- 7-53	—	In	—	
229	NW	NW	17	43	34	U. T. Cook	25	1¼	—	SP	13	—	4- 8-53	—	D	—	
230	SW	SW	16	43	34	City of Clewiston	25	2	—	SP	140	—	4- 8-53	—	D	—	
231	NW	SE	16	43	34	Hendry County	15	2	—	SP	—	—	—	—	Ir	—	
232	NW	NE	16	43	34	— do —	15	2	—	SP	—	—	—	—	Ir	—	
233	NE	NW	15	43	34	Davis & Marguette	28	1¼	—	SP	81	—	4- 8-53	—	In	—	
234	NW	SE	4	43	29	U.S. Geological Survey	12	6	10	SP	—	—	—	—	O	—	
235	SE	SE	7	43	34	G. Nottingham	30	1½	—	SP	53	—	4- 8-53	—	D	—	
236	SW	SE	7	43	34	L. E. Thompson	115	2	—	OE	45	—	4- 8-53	—	D	—	Cp.
237	SE	SW	7	43	34	Shaw Bros.	30	1½	—	SP	30	—	4- 8-53	—	In	—	
238	SW	SW	7	43	34	G. Neil	35	1¼	—	SP	39	—	4- 8-53	—	D	—	
239	SW	SW	7	43	34	R. M. Schell	82	1¼	—	OE	33	—	4- 8-53	—	D	—	
240	SE	SE	12	43	33	N. Cox	53	2	—	OE	66	—	4- 8-53	—	D	—	
241	SW	SE	10	43	34	E. M. Cornett	38	2	—	OE	93	—	4- 8-53	—	In	—	Cp.
242	SE	SW	10	43	34	B. Bolton	16	2	—	SP	—	—	—	—	Ir	—	
243	SW	SE	12	43	33	R. Pape	90	2	—	OE	90	—	4- 9-53	—	D	—	
244	SE	SW	12	43	33	B. Lawrence	90	—	—	OE	176	—	4- 9-53	—	D	—	
245	SE	SW	12	43	33	J. Lowe	73	1¼	—	OE	119 121	—	4- 9-53 9- 4-59	—	D	—	
246	SE	SW	12	43	33	S. Stanley	30	1¼	—	SP	102 65	—	4- 9-53 9- 4-59	—	D	—	
247	SW	SW	12	43	33	H. Story	39	1¼	—	OE	78	—	4- 9-53	—	D	—	
248	SW	SW	12	43	33	Kirt Golden	35	1¼	—	OE	91	—	4- 9-53	—	D	—	Cp.
249	SW	SW	12	43	33	L. Doby	97	1½	—	OE	73	—	4- 9-53	—	D	—	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
250	SE	SE	11	43	33	J. M. Dickson	119	1½	---	OE	232	---	4-9-53	---	S	---	Cp.
251	SW	SE	11	43	33	Dickson Bros. Dairy	35	---	---	SP	57	---	4-9-53	---	D	---	Cp.
252	SW	SW	11	43	33	W. K. Rixby	80	2	---	OE	102	---	4-9-53	---	D	---	
253	SE	SE	10	43	33	— do —	80	2	---	OE	---	---	---	---	S	---	
254	NW	NE	14	43	33	W. T. Stitt	80	1½	---	OE	76	---	4-10-53	---	D	---	Cp.
255	NE	NW	14	43	33	— do —	95	2	.94	OE	78	+ 2.30	4-10-53	---	D	---	
256	NE	NE	15	43	33	R. Christian	40	1½	---	OE	146	---	4-10-53	---	D	---	
257	NE	NW	15	43	33	J. C. Drake	40	1½	---	OE	88	---	4-10-53	---	D	---	Cp.
258	NE	NW	23	43	34	B. E. Nall	54	2	---	OE	73	---	4-10-53	---	D	---	
259	SW	SW	14	43	34	H. R. Strickland	49	1½	---	OE	76	---	4-10-53	---	D	---	
260	NE	NW	7	43	34	Williams & Stewart	30	1½	---	SP	---	---	---	---	S	---	Cp.
261	NE	SW	7	43	34	J. C. Jackman	30	2	---	SP	30	---	4-9-53	---	D	74	
262	NE	SW	7	43	34	— do —	62	2	---	OE	34	---	4-9-53	---	D	75	
263	SE	NW	24	43	34	A. U. Tokieda	125	8	---	OE	398 365	---	4-10-53 9-4-59	---	D	---	Cp.
264	SE	NE	23	43	34	G. B. McDuffie	20	1½	---	SP	135 120	---	4-10-53 9-4-59	---	Ir	---	Cp.
265	SW	NE	23	43	34	W. W. Ricks	63	1½	---	OE	134	---	4-10-53	---	D	---	
266	NE	NE	24	43	34	N. J. Archer	---	1½	---	---	---	---	---	---	D	---	

267	SE	NE	24	43	34	J. J. Herring	60	1 1/4	—	OE	76	—	4-10-53	—	D	—	
268	SW	NW	8	43	29	W. F. Anderson	55	1 1/4	—	OE	30	—	4-30-53	—	D	76	Cy.
269	SW	NE	8	43	29	B. Maddox	—	6	—	—	680	—	4-30-53	—	S	80	Cy.
270	SE	SE	17	45	29	M. N. Taylor	40	1 1/4	—	OE	70	—	5- 7-53	—	D	76	Cy.
271	NE	NE	29	46	33	W. Ward	47	—	—	SP	40	—	5-12-53	—	D	—	Cy.
272	NE	NE	4	45	32	Florida Forest Service	220	2	—	OE	605	—	5- 7-53	—	N	75	Cy.
273	NE	NE	20	43	33	Florida Conservation School	58	2	55	OE	870	—	5- 8-53	—	Ir	—	Cy.
274	NW	NW	15	43	34	Variety Corp.	56	3	53	OE	82	—	5-13-53	—	Ir	—	Cy.
275	NE	SW	16	43	28	Ben Wolf	—	6	—	—	530	—	5- 1-53	—	N	—	Cy.
276	SE	SE	10	43	34	Lakeside Manor Motel	44	4	43	OE	125	—	6-18-53	—	Ir	—	Ca.
277	SW	NW	9	43	29	T. L. Hudkins	170	1 1/4	90	OE	90	—	7-10-53	—	D	—	L.
278	NW	NW	19	44	28	M. K. Wheeler	790	8	—	OE	1,030 1,030	+25.8	8-10-53 5-26-58	760 320	Ir	82	Ca.; Cy.
279	NE	NW	19	44	28	— do —	531	8	295	OE	620 825	+29.0	8-24-53 5-26-58	500	Ir	83 82	L.
280	NE	NE	21	43	34	U. S. Sugar Corp.	135	6	111	OE	—	—	—	50	—	—	
281	SE	SE	16	45	32	Humble Oil & Refining Co.	1,045	5	1045	—	—	—	—	—	—	—	Oil test; L.
282	NW	SE	14	47	31	— do —	11,794	20	—	—	—	—	—	—	—	—	— do —
283	SE	SE	13	45	28	Red Cattle Co.	6,098	—	—	—	—	—	—	—	—	—	— do —
284	SE	SE	5	43	29	Waldron Hotel	75	2	—	SP	109	—	6-23-54	—	Ir	—	
285	SE	NW	6	47	31	Collier Corp.	40	6	—	OE	—	1.92	4-21-58	—	Ir	—	
286	NE	SW	6	47	31	— do —	40	6	—	OE	45	1.03	7-30-58	1,300	Ir	76	
287	SE	NE	6	47	31	— do —	51	6	—	OE	—	2.78	4-21-58	—	Ir	—	
288	NW	SW	5	47	31	— do —	40	6	—	OE	140	—	4-30-58	900	Ir	76	
289	SE	NE	31	46	32	— do —	70	6	—	OE	—	—	—	1,570	Ir	—	
290	SE	NW	32	46	32	— do —	80	6	—	OE	—	1.26	6-18-58	—	Ir	—	
291	SE	NW	32	46	32	— do —	92	6	—	OE	—	1.48	6-18-58	—	Ir	—	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
292	SE	NE	29	43	29	T. Wells	552	—	266	OE	1,190	+27.5	5-21-58	—	S	82	
293	NW	NE	5	45	29	A. Townsend	792	6	277	OE	940	+26.0	5-21-58	215	Ir	82	
294	NW	NE	5	45	29	— do —	762	6	285	OE	1,140	+24.7	5-21-58	375	Ir	82	
295	NE	SW	7	45	29	— do —	1,145	—	—	OE	1,230	—	5-21-58	150	Ir	84	
296	SE	SE	17	45	31	Atlantic Land & Improvement Co.	872	6	346	OE	2,250	+25.5	5-14-58	340	Ir	82	
297	SE	NW	11	45	30	— do —	782	6	319	OE	2,170	+25.0	5-14-58	140	Ir	81	
298	SW	SW	27	44	32	Joe Hilliard	—	—	—	—	—	—	—	—	—	—	
299	NW	SE	14	45	32	Atlantic Land & Improvement Co.	72	6	—	OE	—	.93	4-23-58	—	Ir	—	
300	NE	SE	14	45	32	— do —	97	6	—	OE	336	— 1.18	6-26-58 4-23-58	—	Ir	77	
301	NE	SW	13	45	32	— do —	98	6	—	OE	—	.99	6-26-58	—	Ir	—	
302	NW	SE	18	47	34	S. & M. Farms	121	6	—	OE	66	1.48	4-24-58	—	Ir	78	
303	NW	SE	18	47	34	— do —	120	6	—	OE	45	—	5-1-58	1,300	Ir	—	
304	SW	NE	18	47	34	— do —	122	6	—	OE	—	1.95	4-24-58	—	Ir	—	
305	NW	NE	18	47	34	— do —	120	6	—	OE	—	1.10	6-3-58	—	Ir	—	
306	NE	SW	6	47	31	Collier Corp.	40	6	—	OE	75	— 1.93	4-30-58 6-17-58	800	Ir	75	
307	NW	SW	36	33	45	Atlantic Land & Improvement Co.	83	3	—	OE	—	.81	5-2-58	—	Ir	—	

308	NE	SE	35	45	33	Atlantic Land & Improve- ment Co.	87	6	—	OE	—	—	—	—	Ir	—	Caved in.
309	SW	SW	36	45	33	— do —	97	6	—	OE	—	—	—	—	Ir	—	
310	NW	NW	36	45	33	— do —	125	8	—	OE	—	—	—	—	Ir	—	
311	SE	SW	6	45	31	— do —	950	6	—	OE	1,240	+ 22.0	5-14-58	160	Ir	81	
312	SW	NE	28	43	28	R. Dainails	125	4	125	OE	—	1.18	5-19-58	—	Ir	—	
313	SE	NE	28	43	28	A. Quermia	125	6	124	OE	1,100	—	5-20-58	310	Ir	79	
314	NW	NE	31	45	29	R. Roberts	940	6	—	OE	180	—	5-22-58	—	S	79	
315	SE	NE	25	45	28	— do —	700	6	—	OE	805	+ 20.3	5-22-58	40	S	82	
316	NW	NW	27	45	28	— do —	815	6	—	OE	770	+ 19.5	5-22-58	20	S	84	
317	NE	SW	18	45	29	— do —	800	6	—	OE	855	—	5-22-58	60	S	84	
318	SE	NW	30	43	28	C. A. Murphy	400	3	—	OE	358	+ 39.9	5-27-58	100	Ir	80	Flows. — do — Casing leaks in sub- surface.
319	SE	NW	30	43	28	— do —	135	2½	—	OE	795	+ 8.4	5-27-58	30	Ir	80	
320	NE	SW	19	45	31	Atlantic Land & Improve- ment Co.	34	6	—	OE	74	.52	7-30-58	700	Ir	76	
321	SW	NE	29	43	28	Unknown	135	6	—	OE	695	—	5-27-58	30	Ir	76	
322	SE	NW	19	45	31	Atlantic Land & Improve- ment Co.	34	6	—	OE	—	.93	7-29-58	—	Ir	—	
323	NE	NE	19	45	31	— do —	23	3	—	SP	—	.58	7-29-58	—	Ir	—	
324	NW	NW	14	43	28	Kirkland	135	—	—	OE	620	+ 3.6	5-27-58	1	Ir	77	
325	NE	NW	14	43	28	B. Stuart	137	2	—	OE	565	+ 5.6	5-27-58	30	S	77	
326	SW	SE	14	43	31	W. Burdine	—	6	—	OE	1,630	—	5-28-58	15	—	80	
327	SE	SW	18	43	28	John Lamb	—	4	—	—	1,490	+ 27.7	5-28-58	200	S	86	
328	SE	NE	10	43	28	H. Parkenson	—	6	—	—	1,020	—	5-28-58	250	Ir	82	
329	SE	NW	9	43	28	Whitton	—	2	—	—	895	+ 3.33	5-28-58	20	—	76	
330	SE	NW	9	43	28	— do —	—	2	—	—	550	+ 3.66	5-28-58	20	—	76	
331	SE	NW	9	43	28	— do —	—	2	—	—	325	+ 3.82	5-28-58	20	—	76	

TABLE 8. (Continued)

Well No.	Location					Owner	Depth of well below land surface (feet)	Casing			Chloride content of water (parts per million)	Water level above (+) or below land surface (feet)	Date water sample collected or water level measured	Estimated yield (gallons per minute)	Use of water	Temperature (°F)	Remarks
	¼ Section	¼ Section	Section	Township, South	Range, East			Diameter (inches)	Depth (feet)	Finish							
882	NE	SW	24	44	29	R. Dana	900	---	----	OE	1,200	+ 17.5	5-26-58	60	Ir	81	Flows in wet periods during rainy season.
883	NW	SW	13	44	29	----- do -----	898	6	----	OE	4,240	-----	5-28-58	200	Ir	82	
884	SW	SW	22	45	29	Hendry County	-----	6	----	---	980	-----	5-26-58	80	---	82	
885	SE	NE	29	45	38	Atlantic Land & Improvement Co.	139	6	----	OE	84	0.21	6-24-58	2	---	---	
886	NE	SW	29	45	38	----- do -----	112	6	----	OE	136	+ .76	6-25-58	---	Ir	77	----- do -----
887	NE	SW	32	45	38	----- do -----	95	6	----	OE	194	+ .63	6-28-58	---	Ir	77	----- do -----
888	SE	SE	11	43	38	J. M. Dickson	150	2	----	OE	448	-----	9- 4-58	---	S	---	