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WATER LEVELS AND ARTESIAN PRESSURE IN OBSERVATION WELLS IN THE UNITED STATES IN 1940

PART 2. SOUTHEASTERN STATES

BY

O. E. MEINZER, L. K. WENZEL
and others

Prepared in cooperation with the States of
ALABAMA, FLORIDA, GEORGIA, MARYLAND, MISSISSIPPI
NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE
and VIRGINIA, the DISTRICT OF COLUMBIA
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INTRODUCTION

By O. E. Meinzer and L. K. Wenzel

The rock formations of the earth are great natural underground reservoirs in which a part of the water derived from rain and snow is stored to supply wells and springs and to maintain the flow of streams during periods of fair weather. Water levels in wells register the stages of these natural reservoirs; they show the extent to which water supplies are depleted by drought or by heavy pumping for public waterworks, for irrigation, or for industrial uses and the extent to which they are replenished in seasons of abundant rainfall or melting snow. The changes in pressure recorded on flowing wells may indicate depletion or replenishment of the artesian reservoirs.

The regular publication of records of water levels and artesian pressure in the United States was begun by the Geological Survey in 1935, and from that year through 1939 one volume containing these data was published each year. The volumes were issued as Water-Supply Papers 777, 817, 840, 845, and 886. This series of reports is in a sense an inventory, year by year, of the ground-water supplies of those parts of the country that it covers. The number of observation wells and the quantity of records on water levels and artesian pressure obtained from them have increased gradually from year to year. As a result it has been deemed advisable to publish the records for 1940 in six volumes, each volume containing records for one of the sections into which the United States has been divided. (See fig. 1.) The present volume covers the southeastern section and gives records of water level or artesian pressure in about 300 observation wells in Alabama, District of Columbia, Florida, Georgia, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia, that were obtained by the Geological Survey and cooperating agencies. About 46 of these wells are equipped with automatic water-stage recorders. For some wells for which records had not heretofore been published complete records of water levels are given in this report, including those for years before 1940. For wells whose previous records have been published, however, this volume gives only current records. If complete descriptions of the wells were given in one of the previous reports, only the well numbers or the well numbers and brief identifying descriptions are given in this report. The report includes about 6,400 individual measurements of water level or artesian pressure.

The water levels in this report are given with reference to datum planes of different kinds. Some are given in depth below the measuring point--that is, below the recognized reference mark, at or near the top of the well, from which the depth to water level is usually measured; and some are given in height above an assumed datum plane. As the measuring points on some of the wells were changed in 1940, the records may not be directly comparable with those in previous annual volumes, but changes in measuring points are recorded in this report. Water levels given in height above sea level or above assumed datum planes are generally comparable with those given in the previous volumes. Unless otherwise stated, the depth of wells is usually the measured depth below the measuring point.

Acknowledgments for effective services in the preparation of this report are due Mrs. Charlotte P. Berger and Misses Dorothy M. Ireland and Ermelinda Mattera, who typed the offset copy; and to Rodney Hart, who prepared many of the illustrations and gave other assistance in preparing the copy.

GENERAL SUMMARY OF CHANGES IN GROUND-WATER LEVEL IN 1940 IN THE SOUTHEASTERN PART OF THE UNITED STATES

The precipitation in Maryland, Mississippi, North Carolina, and Virginia was above normal in 1940, whereas in Alabama, District of Columbia, Florida, Georgia, South Carolina, and Tennessee it was below normal. The fluctuations of water levels and artesian pressure in all wells, however, did not reflect these moisture conditions. The fluctuations of water levels and artesian pressure in wells depend upon many complex factors, such as the distribution and amount of the precipitation, location of the outcrop areas of the formations, permeability and specific yield of the water-bearing materials, depth of the water table below the land surface, and the proximity of the wells to areas of heavy withdrawals. Consequently, it is usually not possible to find a simple relation between the changes in water level or artesian pressure and the departures from normal precipitation. The fluctuations that occur in each well, or group or similar wells, must be studied separately in order to evaluate the effects of the many influencing factors. It is not ordinarily possible to make general statements regarding changes in ground-water levels that apply over large areas. The following paragraphs are taken chiefly from

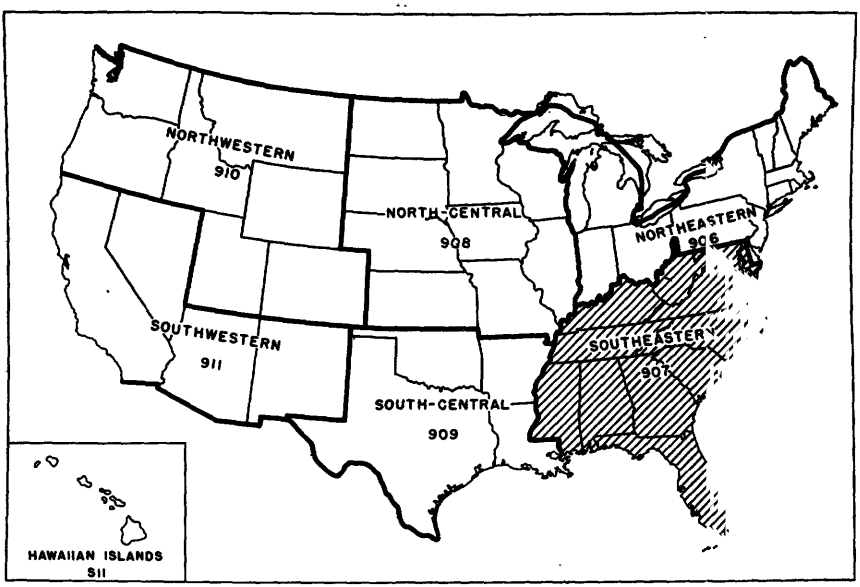

Figure 1.--Outline map of the United States, showing sections of the country covered by the six water-supply papers on water levels and artesian pressure in observation wells in 1940. The shaded section represents the part of the country covered by this volume.

the interpretive texts of the several State sections in this volume. They summarize very briefly the changes in ground-water levels or artesian pressure that occurred in 1940 in the parts of the underground reservoirs in the southeastern States that the wells tap.

Florida.--Observations on two wells in central Florida, in Marion and Seminole Counties, show that the artesian pressure in the wells declined slightly in 1940.

In southeastern Florida, in Dade and Broward Counties, water levels in wells were generally normal during 1940. The lowest stages of the year were reached in May, just prior to heavy rains in May and June. Heavy rains in September produced the highest water levels in four years. Water levels were about 0.2 foot to 0.5 foot higher on December 31, 1940, than on December 31, 1939.

Georgia.--Artesian water levels in wells ending in the Ocala limestone, the principal aquifer in the coastal area, declined generally during 1940. The decline was greatest in Savannah and in the neighboring industrial area, where from November 1939 to November 1940, the water levels in wells declined from 9 to 13 feet. The declines were caused mainly by an increase in the pumpage in the industrial areas of Savannah.

Throughout Bryan, Liberty, McIntosh, Glynn, Camden, and Wayne Counties, the decline in artesian water levels in wells ending in the Ocala limestone ranged from 0.5 foot to 1.5 feet. This decline may have been caused by an increase in the discharge of artesian water or by subnormal precipitation in some parts of the areas of recharge.

Maryland.--The water level in a well in Montgomery County that has been observed periodically since 1932, fluctuated about normally in 1940 and no new high or low stage was reached. The water level in the well at the end of the year was about 1.5 feet higher than at the end of 1939.

Mississippi.--In the Mississippi alluvial plain in northwestern Mississippi the water levels in wells in 1940 were the highest of the three years of record. Water levels in wells tapping water in the "1200-foot sand" at Gulfport averaged 0.8 foot lower in 1940 than in 1939.

North Carolina.--In 1940 net declines in water level occurred in five key observation wells distributed over the State and net rises in water level occurred in three other key wells.

The average of the water levels in about 20 wells in the Deep River area, near High Point, was about 1 foot higher on January 1, 1941, than on January 1, 1940.

Virginia.--The water levels in key wells in northern Virginia fluctuated through about a normal range in 1940 and at the end of the year were not much changed from the stages at the end of 1939. The Bacon and Ross wells had an average net rise of 0.2 foot in the year whereas the water level in the Halls Hill School well declined 0.15 foot. The water level in the Glendale Farm well had a net rise of about 1.8 feet in 1940.

The water level in a well near Petersburg declined about 0.2 foot in 1940.

ALABAMA

By C. W. Carlston

The Federal Geological Survey in cooperation with the Alabama Geological Survey began a study in June 1940 of the ground-water resources of the outcrop area of the Cretaceous formations of Alabama. Included in this area are all or parts of Autauga, Barbour, Bullock, Chilton, Crenshaw, Elmore, Greene, Hale, Lamar, Lee, Lowndes, Macon, Marengo, Montgomery, Parry, Pickens, Pike, Russell, and Sumter Counties. Field work has been completed.

The Cretaceous formations crop out in curving bands across Alabama, dipping south toward the Gulf and southwest and west toward the Mississippi embayment. The important aquifers of the area are the basal Tuscaloosa and overlying Eutaw formations, which crop out in hills along the inner margin of the Coastal Plain. The Selma Chalk, overlying the Eutaw formation, forms the peneplaned prairie lands of the Black Belt. The Black Belt, the most prosperous and densely populated section of the Alabama Coastal Plain, depends almost wholly on underground sources for water supply. Artesian wells in the Black Belt penetrate the Eutaw formation except where the waters in it are too saline, and wells tap water in the Tuscaloosa formation. North of the Black Belt, wells penetrate the Tuscaloosa formation and generally obtain water low in mineral content but in many places high in hydrogen sulphide and iron. Other aquifers of the Cretaceous system are the Cusseta and Providence Sands and the Blufftown formation of eastern Alabama and the Ripley formation of central and eastern Alabama.

There have been earlier studies of the ground water in the rocks of the Cretaceous system. In 1856 Winchell[1/] published a paper in which were listed 74 wells with data on depths, temperature, yield and drillers' logs. Later publications on ground-water in Alabama include sections in Water-Supply Papers 57[2/], 102[3/], and 114[4/]. A detailed report by Smith[5/] was published in 1907. In 1933 Johnston[6/], of the Federal Geological Survey, reported on ground water in the Paleozoic rocks of northern Alabama. This report includes a discussion of Cretaceous ground water in counties where both Paleozoic and Cretaceous formations crop out.

1/ Winchell, A. N., Statistics of some artesian wells in Alabama: Am. Assoc. Advancement Sci. 10th meeting, 1856, pp. 94-103, 1857.

2/ Darton, N. H., Preliminary list of deep borings in the United States, Part 1, Alabama-Montana: U. S. Geol. Survey Water-Supply Paper 57, pp. 10, 11, 1902.

3/ Smith, E. A., Alabama: U. S. Geol. Survey Water-Supply Paper 102, pp. 276-331, 1904.

4/ Smith, E. A., Alabama: U. S. Geol. Survey Water-Supply Paper 114, pp. 164-170, 1905.

5/ Smith, E. A., The underground water resources of Alabama: Alabama Geol. Survey, 388 pp., 1907.

6/ Johnston, W. D., Jr., Ground water in the Paleozoic rocks of northern Alabama: Alabama Geol. Survey Special Rept. 16, 414 pp., 1933.

The present study leads to the conclusion that over the Cretaceous area, except in a few areas, there has been a general decline in artesian water levels in the last 40 years. The few exceptions are areas where only a very few wells have been drilled in the period. The greatest decline in water level in the Cretaceous rocks has occurred at Montgomery where artesian head has dropped from a reported altitude of 20 to 40 feet above the land surface prior to 1899, to a present level of more than 100 feet below the land surface in some of the city wells. Measurements of the water levels in observation wells was begun late in 1940, one well being set up in October, two in November, and one in December.

Greene County

16. W. F. Bell. Boligee, old mill house lot, 200 feet northwest of station. Unused cotton mill well, diameter 4 inches, depth 560 feet. Measuring point, top of iron stand-pipe, 8.65 feet above land surface. Water levels, in feet below measuring point, 1940: Oct. 17, 2.85; Nov. 23, 2.42; Nov. 29, 2.6; Dec. 31, 2.42.

Montgomery County

15. Owner's number 15a. City of Montgomery. Corner of Court and Chamber Streets, Montgomery. Drilled public supply well, diameter 8 inches, depth 680 feet. Measuring point, top of well head, 1.0 foot above land surface and 165 feet above mean sea level. Well in an area of artesian flow prior to 1899. Reported water levels in feet below land surface, 1899, 20; 1913, 66. Well in area affected by pumping.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level
Dec. 17	110.95	Dec. 24	111.31	Dec. 30	113.50
20	113.70	26	109.95	31	111.95

Pickens County

11. Town of Reform. Beside ball park, south of high school gymnasium, Reform. Unused swimming pool well, diameter 4 inches, depth 200 feet. Measuring point, inner edge of spout on dismantled pitcher pump, 2.7 feet above land surface. Water level reported to be 3 feet above land surface from 1924 to 1930. In 1930 a pumped well with a capacity of 500 gallons a minute was installed in same strata 1 mile south of well 11, thus causing well 11 to cease flowing. Water levels, in feet below measuring point: Nov. 26, 8.98; Nov. 28, 9.68.

Tuscaloosa County

60. T. D. Stewart. In small white house in lot across from T. D. Stewart General Store, Ralph. Domestic well, diameter 6 inches, depth 550 feet. Measuring point, surface of concrete trough immediately adjacent to stand pipe, 2.8 feet below land surface. In special report 116, of the Alabama Geological Survey, water level given as 6 feet above land surface. Water levels, in feet above measuring point: Nov. 20, 4.72; Nov. 29, 4.69.

DISTRICT OF COLUMBIA

By V. C. Fishel

An observation-well program was begun in the District of Columbia in 1940 in connection with an investigation by the Geological Survey of the ground-water resources in the District of Columbia and vicinity. Measurements of water level were made in 7 wells in 1940. Observations on two of the wells (4,550 and 4,552) during the year were discontinued. A total of 138 individual measurements were made in 1940.

Reports on ground-water conditions in the District of Columbia have been made by Darton[1/] and by Clark, Mathews, and Berry[2/]. These reports contain records and logs of many wells in the District and vicinity.

A few measurements of water level were made in well 3513 in 1938. The well is used for air-conditioning during the summer months and hence the water-level in the well during these months probably does not represent regional conditions. The water level was about 70 feet below mean sea level on May 23, 1938. It fluctuated through a wide range during the summer of 1938, but on August 1 the water level returned to the same stage as on May 23. From August 1 to August 8 the water level rose 18 feet but this rise was followed by a decline of 3 feet by August 15, when the last measurement of the year was made. On March 27, 1940, the water level was 30 feet below sea level. It then declined 10 feet by April 24 but recovered 22 feet by December 23. The water level on December 23, 1940, was 52 feet higher than on May 23, 1938.

The water level in well 4,518 probably reflects normal conditions in the downtown area. In 1940 the water level ranged from about 18 feet to 43 feet below mean sea level. It was 18.01 feet below mean sea level on February 12. The water level in the well fluctuated within a range of about 4 feet during March, April, and the first half of May, but starting about May 15 the water level began a severe decline. On September 23 the water level reached a stage about 25 feet lower than the stage on February 12.

1/ Darton, N. H., Artesian well prospects in the Atlantic Coastal Plain region: U. S. Geol. Survey Bull. 138, 1896; Preliminary list of deep borings in the United States: U. S. Geol. Survey Water-Supply Paper 57, 1902; U. S. Geol. Survey Geol. Atlas, Washington Folio, (No. 70), 1901.

2/ Clark, W. B., Mathews, E. B., and Berry, E. W., The surface and underground water resources of Maryland, including Delaware, and District of Columbia: Maryland Geol. Survey, vol. 10, 1918.

The water level in well 4,542B is affected by the pumping of a nearby well. The water level in the well ranged from 50.56 feet above mean sea level on February 13 to 34.93 feet above mean sea level on August 5. It had a net decline of 0.78 foot during the year.

The water level in well 4,549 ranged from 61.01 feet above mean sea level on April 23 to 43.28 feet above mean sea level on September 3. It was 0.84 foot lower on September 3 than on February 8.

The fluctuations of water level in well 4,550 were small in 1940 in comparison to those in other wells in the area. The water level ranged from 73.86 feet above mean sea level on May 1 to 73.01 feet above mean sea level on February 13.

Well 4,552, which was drilled in 1940, was abandoned because the yield obtained from it was small and the lower casing was removed. The part of the hole below the water level caved and measurements had to be discontinued.

Well 465 was used prior to November 1939 to furnish part of the water supply for St. Elizabeth's Hospital. At the time measurements were started on February 29 the water level was still recovering from the previous pumping. The water level continued to rise until August 5 at which time it was 19.73 feet higher than when measurements were started. It then declined 2.20 feet by September 23, but rose 1.95 feet by December 30. On December 30 the water level was 19.48 feet higher than on February 29.

3,513. Sears, Roebuck and Company. At 911 Bladensburg Rd., N. E. Used air-conditioning well, depth 304 feet. Measuring point, top of concrete pump base, 56.21 feet above mean sea level. Measurements made by submerged air line method. Water level Mar. 27, 1940, 86 feet below measuring point. Measurements made by Albert Williams.

Water level, in feet below mean sea level, 1938, 1940

Date	Water level	Date	Water level	Date	Water level
May 23, 1938	70	July 18, 1938	55	Apr. 3, 1940	31
June 6	43	25	50	17	39
13	40	Aug. 1	70	24	40
20	40	8	52	May 29	40
27	50	15	55	Dec. 16	20
July 5	45	Mar. 27, 1940	30	23	18
11	35				

4,518. Potomac Electric Power Company. Tenth and E Streets, N. W., in northwest corner of basement garage. Unused drilled well, diameter 8 inches, depth about 100 feet. Measuring point, floor of basement, which is 10.01 feet above mean sea level. Water level Feb. 12, 1940, 28.02 feet below measuring point. Some of the measurements were supplied by E. E. Kennard, superintendent of buildings.

Water level, in feet below sea level, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 12	18.01	Mar. 27	21.17	May 1	20.32	June 5	28.75
28	19.22	Apr. 3	20.19	8	22.26	July 22	34.53
Mar. 6	20.35	10	18.76	15	21.02	Aug. 5	33.94
13	21.07	17	20.04	29	26.24	Sept. 23	43.41
20	20.69	23	20.51				

4,542B. Security Storage Company. At 1140 Fifteenth St., N. W., in basement. Unused drilled well, diameter 4 inches. Measuring point, top of casing, which is 57.76 feet above mean sea level. Water level affected by pumping of nearby well. Water level Feb. 13, 1940, 7.20 feet below measuring point.

Water level, in feet above sea level, 1940

Feb. 13	50.56	Mar. 27	50.31	May 1	40.92	June 5	36.83
28	48.24	Apr. 3	50.09	8	44.01	25	37.51
Mar. 6	41.32	10	47.02	15	44.91	Aug. 5	34.93
13	50.48	17	46.96	22	38.94	Sept. 3	37.37
20	40.47	23	50.00	29	37.03	Dec. 2	49.78

4,549. New Medical Building. At 1726 Eye St., N. W., in southeast corner of basement garage. Unused drilled well, diameter 12 inches at top, reported depth 375 feet. Measuring point, top of casing, 0.5 foot below floor and 62.02 feet above mean sea level. Water level Feb. 8, 1940, 17.90 feet below measuring point.

Water level, in feet above sea level, 1940

Feb. 8	44.12	Mar. 27	45.57	May 1	60.61	June 5	48.75
28	43.95	Apr. 3	44.08	8	54.77	25	44.46
Mar. 6	43.92	10	51.10	15	48.29	July 22	44.47
13	43.88	17	60.12	22	52.12	Aug. 5	44.39
20	50.55	23	61.01	29	54.83	Sept. 3	43.28

4,550. Chesapeake and Potomac Telephone Company. Fourteenth and R Streets, N. W., in southwest corner of basement. Drilled well, diameter 12 inches, depth 110 feet. Measuring point, top of casing, which is 1.2 feet above floor and 92.94 feet above mean sea level. Water level Feb. 13, 1940, 19.93 feet below measuring point.

Water level, in feet above mean sea level, 1940

Feb. 13	73.01	Apr. 10	73.44	May 29	73.66	Aug. 30	73.13
28	73.32	17	73.59	June 5	73.62	Sept. 23	73.12
Mar. 6	73.38	23	73.77	27	73.37	Oct. 21	73.08
13	73.31	May 1	73.86	July 8	73.36	Nov. 4	73.07
20	73.47	8	73.74	22	73.26	25	73.29
27	73.45	15	73.71	Aug. 5	73.24	Dec. 9	73.31
Apr. 3	73.43	22	73.69	19	73.21	30	a 73.35

4,552. Colonial Ice Cream Company. At 416 Canal Street, S. E., at rear of building. Drilled well, diameter 10 inches, original depth 273 feet. Measuring point, top of casing, which is 27.87 feet above mean sea level. Water level May 11, 1940, 46.64 feet below measuring point.

Water level, in feet below sea level, 1940

May 11	18.77	May 22	17.90	June 5	17.75	July 22	(b)
15	18.31	29	17.86	27	18.60		

a Measurements discontinued; well put in use.
b Obstruction at 16 feet; measurements discontinued.

465. St. Elizabeth's Hospital well 1. Near pumping station. Used for hospital water supply to Nov. 1939; unused since Nov. 1939; drilled well, diameter 12 inches, depth 397 feet. Measuring point, bottom inside edge of the upper end of a sloping 4-inch pipe, which is 0.77 foot above floor and 7.92 feet above mean sea level. A correction of -0.70 foot is applied to the measurements of depth to water level in order to correct for the slope of the pipe. Water level Feb. 9, 1940, 60.49 feet below measuring point.

Water level, in feet below sea level, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 29	51.14	Apr. 17	41.09	June 5	34.60	Aug. 30	32.48
Mar. 6	49.34	23	39.91	27	32.66	Sept. 23	33.61
13	48.82	May 1	38.78	July 8	32.20	Oct. 21	33.33
20	46.15	8	37.95	22	31.74	Nov. 4	33.28
27	45.04	15	37.03	Aug. 5	31.41	25	32.80
Apr. 3	43.62	22	36.00	19	32.08	Dec. 30	31.66
10	42.21	29	35.20				

NORTHEASTERN FLORIDA

By H. H. Cooper, Jr.

An investigation of the artesian water in Clay, Duval, Nassau, and St. Johns Counties, in northeastern Florida, was begun in the fall of 1938 by the Federal Geological Survey in cooperation with the Florida Geological Survey, Herman Gunter, State Geologist. The purpose of this investigation is to supplement with more detailed information the results of previous ground-water investigations. The principal fresh water-bearing formation consists of at least 850 feet of permeable limestones of upper Eocene age. The depth below sea level to the top of the formation is less than 200 feet between St. Augustine and Green Cove Springs, more than 500 feet between Jacksonville and Fernandina, about 400 feet at Mayport, and about 400 feet at Hilliard. The water level in an area about 25 miles wide bordering the coast will rise above the surface in wells that penetrate this formation.

Ground-water conditions in northeastern Florida have been discussed in several reports, one of the first of which was prepared by Sellards and Gunter[1]. In 1913 a report by Matson and Sanford[2] on ground water of the entire State was published. Three reports containing general information applicable to northeastern Florida were published by the Florida Geological Survey[3] in 1931 and 1933. A report by Collins and Howard[4] includes northeastern Florida in a discussion and analyses of artesian water in the Florida peninsula. An unpublished report prepared by Pirnie[5] for the water-supply commission of Jacksonville contains a map with contours described as representing the depression cone in the ground-water table at Jacksonville. A report by Stringfield[6] includes much useful information on artesian water in northeastern Florida.

1/ Sellards, E. H., and Gunter, Herman, The artesian water supply of eastern Florida: Florida Geol. Survey 3rd Ann. Rept., pp. 86-195, 1910.

2/ Matson, G. C., and Sanford, Samuel, Geology and ground waters of Florida: U. S. Geol. Survey Water-Supply Paper 319, 1913.

3/ Gunter, Herman, and Ponton, G. M., Need for conservation and protection of our water supply with special reference to waters from the Ocala limestone: Florida Geol. Survey 22d Ann. Rept., pp. 43-55, 1931. Thompson, D. G., and Stringfield, V. T., Ground-water resources of Florida: Florida Geol. Survey Press Bull. 13, 1931. Stringfield, V. T., Ground-water investigations in Florida: Florida Geol. Survey Bull. 11, 1933.

4/ Collins, W. D., and Howard, C. S., Chemical character of the water of Florida: U. S. Geol. Survey Water-Supply Paper 596-G, pp. 177-233, 1928.

5/ Pirnie, Malcolm, Investigations to determine the source and sufficiency of the supply of water in the Ocala limestone as a municipal supply for Jacksonville, New York, Hazen & Whipple, 1927.

6/ Stringfield, V. T., Artesian water in the Florida peninsula: U. S. Geol. Survey Water-Supply Paper 773-C, 1936.

Before the artesian water supply was developed the piezometric surface sloped to the southeast and east from more than 70 feet above mean sea level in the western parts of the area to about 60 feet at Fernandina and about 40 feet at St. Augustine. In the last few decades consumption of artesian water has increased steadily and near the end of 1939 the total consumption in the area was about 40 to 50 million gallons a day, of which about 35 million gallons was being withdrawn in the immediate vicinity of Jacksonville. By the end of 1939 the piezometric surface had changed very little from its original shape, except that a cone of depression had formed around Jacksonville. The water level at the apex of the cone was about 30 feet below its original level.

In December 1939 an industrial plant at Fernandina began pumping about 26 million gallons a day from the artesian formation and by the end of 1940 the pumpage from this plant had increased to about 30 million gallons a day. This heavy withdrawal has created a large cone of depression around Fernandina. The water level in Nassau County well 34, which is about 1,500 feet from the nearest heavily pumped well, has declined about 65 feet since pumping began; the water level in Nassau County well 52, which is about 25 miles west from the pumping area, has declined about 2 feet. No water-level measurement was made on Nassau County well 52 between August 24, 1938, and the time pumping began, and there is a possibility that the water level in this well declined as a result of causes other than the pumping at Fernandina. It is probable, however, that the water level would have been slightly higher in 1940 than it was in 1938 if there had been no heavy pumping at Fernandina since precipitation in northern Florida was only 44.86 inches in 1938 as compared to 54.85 inches in 1939 and 51.94 inches in 1940. The water-level in Nassau County well 44, which is about 8.5 miles from the pumping area, declined about 5 feet between 1938 and 1940.

In Duval County water levels in wells which are less than 8 miles from the center of withdrawal in Jacksonville have declined, in general, about 4 to 6 feet in the last 10 years. Probably this decline is due to an increase in consumption. It is believed that there is a balance between recharge and discharge of ground water in the formation and that the water levels in wells will remain the same, except for seasonal changes due to variations in rainfall, if there is no further increase in the withdrawals.

In Clay and St. Johns Counties water levels have declined only very little, if at all, since measurements were first made in 1934. Changes in water levels, other than those caused by tides and barometric fluctuations, are probably due mostly to variations in rainfall. During the period of record there have been too few observations to permit a correlation to be made between water levels and rainfall.

Charts from recording pressure gages show that water levels in wells a few hundred feet from the Atlantic Ocean fluctuate from about 0.5 foot to about 1 foot with ocean tides. Individual water-level measurements on such wells are not reliable indexes to small seasonal or permanent changes unless corrections are made for the tidal effect.

During 1940 the water levels in about 150 wells were measured one or more times; altogether about 375 individual measurements of water level were made in the year. Four recording pressure gages were in operation at the end of the year. In Jacksonville records were obtained from three recording pressure gages and at Neptune Beach records were obtained from a recording gage that was installed in February 1939, discontinued in July 1939, and reinstalled November 19, 1940. Included in this report are a total of 168 measurements of water level on 36 representative wells distributed over the area. A few of the water levels were published in a previous report [7]. Water-level measurements on wells not included in this report, including data from recorder charts, will be included later in a more comprehensive report.

Clay County

1. Well 12 in Water-Supply Paper 773-C. Girl Scouts of America. About 1,000 feet south of SE cor. sec. 20, T. 5 S., R. 26 E., about 2,200 feet west of south end of bridge across Black Creek, on U. S. Highway 17, Camp Chowenaw, 3.5 miles northwest from Green Cove Springs. Used drilled domestic well, diameter 6 inches, depth 400 feet, cased to 72 feet. Measuring point to Nov. 1, 1934, top of 6-inch valve on horizontal pipe, 1.4 feet above land surface and 13.1 feet above mean sea level. Measuring point on and since July 30, 1940, top of 6-inch tee, 1.1 feet above land surface and 12.84 feet above mean sea level. Average daily flow of well, about 800,000 gallons. Water levels, in feet above measuring point: June 6, 1934, 41.5; Nov. 1, 1934, 42.0; July 30, 1940, 41.1; Oct. 10, 1940, 41.4.

2. Well 7 in Water-Supply Paper 773-C. Mrs. M. A. Chaulker. NW¼NW¼ sec. 13, T. 5 S., R. 24 E., at residence of owner, about 500 feet north of South Fork of Black Creek, Middleburg. Used drilled domestic well, diameter 3 inches, depth 498 feet, cased to 300 feet. Measuring point, lip of 3/4-inch faucet 4 feet east of well, 2.0 feet above land surface and 29.72 feet above mean sea level. Water levels, in feet above measuring point: June 4, 1934, 45; Aug. 7, 1940, 41.1; Aug. 13, 1940, 41.1; Nov. 16, 1940, 39.0.

7/ Stringfield, V. T., Artesian water in the Florida peninsula: U. S. Geol. Survey Water-Supply Paper 773-C, 1936.

Clay County--Continued.

4. T. J. Jennings. Near north line SW¼SW¼ sec. 32, T. 4 S., R. 25 E., southeast side of new highway, 3.2 miles northeast from Middleburg. Used drilled stock well, diameter 4 inches, depth 481 feet, cased to 80 (?) feet. Measuring point, top of 4-inch valve, 3.3 feet above land surface and 29.37 feet above mean sea level. Average daily flow of well, about 40,000 gallons. Water levels, in feet above measuring point, 1940: Aug. 7, 35.1; Nov. 16, 33.1.

5. John Huntley. NE¼NE¼ sec. 32, T. 4 S., R. 25 E., about 500 feet northwest of new highway, in rear of residence of owner, 4.2 miles northeast from Middleburg. Used drilled domestic and stock well, diameter 4 inches, depth 530 feet, cased to 157 feet. Measuring point, top of 4-inch valve, 2.5 feet above land surface and 26.52 feet above mean sea level. Average daily flow of well, about 40,000 gallons. Water levels, in feet above measuring point, 1940: Aug. 13, 32.5; Nov. 16, 30.5.

7. U. S. Navy. Auxiliary air base, about 2.5 miles southeast from Green Cove Springs. Used drilled public supply well, diameter 6 inches, depth 650 feet, cased to 276 feet. Measuring point, top of 6-inch valve, 1.0 foot above land surface and 13.14 feet above mean sea level. Water level, in feet above measuring point, 1940: Oct. 10, 26.2.

8. Well 13 in Water-Supply Paper 773-C. St. Elmo Hotel. North of St. Elmo Hotel, Green Cove Springs. Used drilled domestic well, diameter 4 inches, depth 600 feet, cased to 150 (?) feet. Measuring point, top of 1¼-inch valve in east side of casing, 1.0 foot above land surface and 16.89 feet above mean sea level.

Water level, in feet above measuring point, 1934-35, 1940

Date	Water level	Date	Water level	Date	Water level
June 7, 1934	18.0	Dec. 18, 1934	18.5	Oct. 10, 1940	17.5
Aug. 31	20.0	Mar. 22, 1935	18.0	Nov. 15	16.6
Nov. 2	18.75				

Duval County

12. Jacksonville Motor Transit Company. About 200 feet east of Riverside Avenue, about 75 feet south of McCoy Street, Jacksonville. Used drilled industrial well, diameter 6 inches, depth 785 feet. Measuring point, top of 6-inch valve, 1.8 feet above land surface and 10.14 feet above mean sea level. Water levels, in feet above measuring point: Nov. 25, 1938, 30.3; July 6, 1940, 29.3; Nov. 28, 1940, 29.1.

102. Well 4 in Water-Supply Paper 773-C. V. A. Stevens. SW¼NW¼ sec. 24, T. 2 S., R. 27 E., about 240 feet north of Atlantic Boulevard, in rear of residence of owner. Used drilled domestic well, diameter 6 inches, depth 875 feet, cased to 400 feet. Measuring point to June 15, 1934, top of 1-inch pipe, 3 feet above land surface and 56 feet above mean sea level. Measuring point on and since June 10, 1939, top of 6-inch valve, 0.5 foot above land surface and 53.54 feet above mean sea level. Equipped with centrifugal pump.

Water level, in feet with reference to measuring point, 1930-31, 1934, 1939-40

Aug. 13, 1930	+3.68	June 15, 1934	+1.3	Aug. 22, 1940	+0.48
Oct. 8	+2.8	June 10, 1939	+1.3	Nov. 19	- .19
May 8, 1931	+3.4				

109. J. P. Young. North side of residence of owner, west side of Dones Street, about 400 feet north of Floral Bluff Avenue, about 1,000 feet east of St. Johns River, Floral Bluff, 3 miles northeast from Jacksonville. Used drilled public supply well, diameter 6 inches to 4 inches, depth 735 feet. Measuring point, top of 6-inch cross, 2.5 feet above land surface and 43.55 feet above mean sea level. Water levels, in feet above measuring point: June 15, 1939, 12.4; Aug. 23, 1940, 11.6; Nov. 18, 1940, 11.1.

Duval County--Continued.

115. Well 12 in Water-Supply Paper 773-C. City of Jacksonville. East side of pumphouse, east corner of intersection of Baltic Street and Oxford Avenue, Ortega, 5 miles southwest from Jacksonville. Unused drilled public supply well, diameter 8 inches, depth 729 feet, cased to 476 feet. Measuring point to May 11, 1931, 3/4-inch pipe 0.5 foot above land surface and 16.8 feet above mean sea level. Measuring point on and since June 13, 1938, center of recording pressure gage, 4.7 feet above land surface and 20.82 feet above mean sea level.

Water level, in feet above measuring point, 1930-31, 1938, 1940

Date	Water level	Date	Water level	Date	Water level
Aug. 22, 1930	39.5	May 11, 1931	35.5	Aug. 19, 1938	31.6
Oct. 9	38	June 13, 1938	31.5	Nov. 28, 1940	29.4

118. City of Jacksonville. Southwest side of pumphouse, west corner of intersection of Post and Dancy Streets, Jacksonville. Unused drilled public supply well, diameter 6 inches, depth 900 feet. Measuring point, center of recording pressure gage, 4 feet above land surface and 27.79 feet above mean sea level. Water level, in feet above measuring point, 1940: Nov. 28, 27.5.

122. Well 8 in Water-Supply Paper 773-C. City of Jacksonville. About 20 feet north of 63d Street between Russell and Eastlard Streets, Jacksonville. Unused drilled public supply well, diameter 8 inches, depth 905 feet, cased to 570.9 feet. Measuring point to June 23, 1938, ½-inch outlet, 2 feet above land surface and 16.87 feet above mean sea level. Measuring point Nov. 27, 1940, center of recording gage, 2.5 feet above land surface and 17.37 feet above mean sea level. Water levels, in feet above measuring point: Aug. 21, 1930, 45; June 13, 1938, 41.2; June 23, 1938, 41.7; Nov. 27, 1940, 38.8.

123. Well 6 in Water-Supply Paper 773-C. City of Jacksonville. West of pumphouse, west side of Huron Street, about 150 feet north of Beaver Street, Woodstock Park, Jacksonville. Unused drilled public supply well, diameter 10 inches, depth 1,075 feet. Measuring point, top of 6-inch horizontal pipe at ½-inch hole for petcock, in pumphouse, 2.5 feet above land surface and 25.28 feet above mean sea level.

Water level, in feet above measuring point, 1930-31, 1938-40

Aug. 13, 1930	37.2	June 13, 1938	32.5	July 5, 1940	30.7
May 8, 1931	36.5	June 20, 1939	33.0	Nov. 28	30.4

129. Jim Merril. East side of Ortega Boulevard, between First and Palmetto Streets, Ortega, 5.2 miles southwest from Jacksonville. Unused drilled domestic well, diameter 4 inches, depth 600 feet, cased to 470 feet. Measuring point, 1/8-inch hole for petcock in west side of casing, 1.0 foot above land surface and 9.63 feet above mean sea level.

Water level, in feet above measuring point, 1940

July 5	39.4	July 9	41.3	Nov. 15	39.4
6	39.4	29	41.1	28	40.1

131. Well 19 in Water-Supply Paper 773-C. G. C. Cole. SW¼ sec. 10, T. 1 S., R. 26 E., south side of residence of owner, east side of Lem Turner Road, 0.7 mile north of Trout River, 7.0 miles north from Jacksonville. Used drilled domestic well, diameter 6 inches to 4 inches, depth 725 feet, cased to 500 feet. Measuring point, top of 4-inch cross, flush with land surface and 17.86 feet above mean sea level. Water levels, in feet above measuring point: Apr. 10, 1934, 43.0; July 12, 1940, 38.6; Nov. 14, 1940, 37.8.

138. Well 24 in Water-Supply Paper 773-C. Joe Quattlebaum. Near west line of NW¼NE¼ sec. 15, T. 2 S., R. 25 E., at residence of owner, 0.8 mile northwest from Marietta. Used drilled domestic well, diameter 6 inches, depth 1,060 feet, cased to 583 feet. Measuring point, top of 6-inch valve, 2.5 feet above land surface and 62.84 feet above mean sea level. Water levels, in feet below measuring point: Nov. 5, 1934, 0.5; July 16, 1940, 3.72; Nov. 15, 1940, 4.32.

Duval County--Continued.

145. Duval County School Board. In rear of Oceanway School, 0.5 mile north from Broward, 10 miles north from Jacksonville. Used drilled domestic well, diameter 2 inches. Measuring point, top of 2-inch tee, 1.5 feet above land surface and 36.29 feet above mean sea level. Water levels, in feet above measuring point, 1940: July 24, 20.1; Nov. 14, 19.6.

147. V. C. Johnson. SW¼SW¼ sec. 32, T. 1 N., R. 26 E. Used drilled stock well, diameter 4 inches, depth 610 feet, cased to 446 feet. Measuring point, top of 4-inch cross, 3.8 feet above land surface and 25.65 feet above mean sea level. Water levels, in feet above measuring point, 1940: July 24, 30.7; Nov. 14, 30.5.

149. W. M. Bostwick. North side of mouth of Drummond Creek, 1.2 miles southwest from Eastport, 6 miles northeast from Jacksonville. Used drilled domestic well, diameter 6 inches, depth about 800 feet. Measuring point, top of 6-inch tee, 4.0 feet above land surface and 33.22 feet above mean sea level. Water levels, in feet above measuring point, 1940: July 25, 23.4; Sept. 11, 23.6; Sept. 12, 23.2; Nov. 21, 22.5.

154. J. M. Shield. SW¼ sec. 22, T. 3 S., R. 27 E., between Florida East Coast Railroad and U. S. Highway 1, 1.2 miles north from Sunbeam. Used drilled domestic well, diameter 4 inches, depth 625 feet, cased to 461 feet. Measuring point, top of 4-inch cross, 3.1 feet above land surface and 28.3 feet above mean sea level. Water levels, in feet above measuring point, 1940: July 30, 24.9; Sept. 23, 25.4; Sept. 30, 25.6; Nov. 21, 24.4.

160. Well 3 in Water-Supply Paper 773-C. City of Nepture Beach. About 400 feet from Atlantic Ocean, southeast corner of intersection of First Street and Florida Avenue, Neptune Beach. Unused drilled public supply well, diameter 8 inches, depth 585 feet, cased to 357 feet. Measuring point June 15, 1934, ¼-inch pipe in south side of 8-inch tee, 1.5 feet below land surface and 10.58 feet above mean sea level. Measuring point on and since Oct. 14, 1939, top of blind flange on top of 8-inch tee, 0.5 foot below land surface and 11.55 feet above mean sea level. Recording pressure gage maintained on well from Feb. 4 to July 1, 1939, and since Nov. 19, 1940. Charts from recording gage show fluctuations ranging from about 0.5 foot to about 1.0 foot which are caused by ocean tides.

Water level, in feet above measuring point, 1934, 1939-40

Date	Water level	Date	Water level	Date	Water level
June 15, 1934	42.2	Sept. 3, 1940	38.1	Nov. 21, 1940	38.8
Oct. 14, 1939	41.9	Nov. 19	37.5		

164. Well 11 in Water-Supply Paper 773-C. Ribault Club. In pumphouse, Ribault Club, Fort George Island. Used drilled domestic well, diameter 8 inches, depth 840 feet, cased to 450 feet. Measuring point, top of ½-inch valve, 15 feet east of northeast corner of pumphouse, 1.3 feet above land surface and 17.01 feet above mean sea level.

Water level, in feet above measuring point, 1930-31, 1940

Aug. 19, 1930	43.7	May 9, 1931	42.5	Nov. 21, 1940	37.0
Oct. 9	43	Sept. 12, 1940	38.9		

Nassau County

2. G. G. Gerbing. Southeast corner of pumphouse at residence of owner, Amelia City, 5.5 miles south from Fernandina. Used drilled irrigation well, diameter 3 inches to 2 inches, depth about 580 feet, cased to 350 (?) feet. Measuring point, top of 2-inch horizontal pipe, 1.0 foot above land surface and 10.98 feet above mean sea level. Equipped with centrifugal pump, capacity 80 gallons per minute. Average daily pumpage from well about 30,000 gallons.

Water level, in feet above measuring point, 1939-40

Date	Water level	Date	Water level	Date	Water level
Mar. 23, 1939	40.1	Feb. 29, 1940	36.1	Sept.21, 1940	33.8
Jan. 18, 1940	35.4	Mar. 20	36.5	Nov. 23	33.4
Feb. 1	35.7	May 29	35.2		

8. Charles Pelot. Near SE cor. of NE¼ sec. 1, T. 1 N., R. 28 E., about 400 feet from Atlantic Ocean, in rear of beach cottages, 1.1 miles south from Franklintown, 8.9 miles south from Fernandina. Used drilled domestic well, diameter 4 inches, depth about 680 feet. Measuring point, top of 4-inch cross, 1.8 feet above land surface and 15.50 feet above mean sea level. Average daily flow of well about 40,000 gallons.

Water level, in feet above measuring point, 1939-40

Mar. 24, 1939	40.0	Feb. 29, 1940	36.8	Sept.21, 1940	36.0
Jan. 18, 1940	36.7	Mar. 20	37.8	Nov. 23	35.9
Feb. 1	36.5	May 29	37.0		

23. Owner's number 3. National Park Service. About 1,000 feet northwest from end of south jetty to St. Marys Entrance, 2.6 miles northeast from Fernandina. Used drilled domestic well, diameter 4 inches, depth 800 feet, cased to 550 feet. Measuring point, 1/8-inch hole for petcock in northwest side of casing, 2.8 feet above land surface and 10.62 feet above mean sea level.

Water level, in feet above measuring point, 1939-40

Mar. 27, 1939	40.3	Feb. 29, 1940	26.8	Sept.21, 1940	24.1
Jan. 17, 1940	26.3	Mar. 20	26.7	Nov. 23	23.4
Feb. 1	26.2	May 29	25.2		

28. State of Florida. About 50 feet east of Kingsley Creek, about 50 feet north of State Highway 13, Kingsley Creek drawbridge, 3.2 miles southwest from Fernandina. Used drilled domestic well, diameter 2 inches, depth about 578 (?) feet. Measuring point, top of concrete wall around well, 2.8 feet above land surface and 8.80 feet above mean sea level.

Water level, in feet above measuring point, 1939-40

Mar. 28, 1939	43.5	Feb. 29, 1940	21.6	Sept.10, 1940	18.6
Jan. 16, 1940	19.3	Mar. 20	21.7	Nov. 11	16.9
Feb. 1	21.1	May 29	19.0		

34. W. L. Hardee. About 150 feet east of Amelia River, Hardee dock, 0.3 mile southwest from Fernandina. Unused drilled domestic well, diameter 3 inches. Measuring point, top of 3-inch cross, 2.0 feet above land surface and 5.79 feet above mean sea level.

Water level, in feet with reference to measuring point, 1939-40

June 19, 1939	+45.5	Feb. 29, 1940	-14.92	Sept.21, 1940	-19.71
Jan. 16, 1940	-15.41	Mar. 20	-14.67	Nov. 29	-19.64
Feb. 1	-15.70	May 28	-18.34		

44. Well 9 in Water-Supply Paper 773-C. Seaboard Railway. South of pumphouse near elevated tank, Seaboard Railway station, Yulee. Used drilled industrial well, diameter 4 inches, depth 1,000 feet, cased to 450 feet. Measuring point to Aug. 25, 1938, top of elevated water tank, 26 feet above land surface and 64.69 feet above mean sea level. Measuring point on and since Jan. 16, 1940, top of 6-inch coupling on surface casing, 1.4 feet above land surface and 36.4 feet above mean sea level. Centrifugal pump installed in Dec. 1939 when pressure of the water became insufficient to push water into elevated tank. Measurements temporarily discontinued after Mar. 20, 1940.

Nassau County--Continued.

44.--Continued.

Water level, in feet with reference to measuring point, 1934, 1938, 1940

Date	Water level	Date	Water level	Date	Water level
Mar. 5, 1934	-4.3	Aug. 25, 1938	- 3.5	Mar. 1, 1940	+17.9
Dec. 17	-4.0	Jan. 16, 1940	+17.8	20	+18.6
June 26, 1938	-4.3	Feb. 1	+17.9		

50. Higgenbotham. SW¼SE¼ sec. 4, T. 2 N., R. 26 E., about 100 feet south of Seaboard Railway, in rear of residence of owner, 0.6 mile east from Italia. Used drilled domestic well, diameter 2 inches, depth 569 feet. Measuring point, top of 2-inch tee, 1.2 feet above land surface and 18.99 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 18	39.1	Mar. 1	38.7	May 30	39.3	Nov. 22	37.9
Feb. 2	38.6	20	38.7	Sept.10	38.7		

51. Drew Sauls. Callahan, near SW cor. NW¼ sec. 29, T. 2 N., R. 25 E. Used drilled domestic well, diameter 2 inches. Measuring point, top of 2-inch cross, 1.0 foot above land surface and 19.8 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 18	39.2	Mar. 1	39.2	May 30	39.7	Nov. 22	37.9
Feb. 2	38.8	20	39.2	Sept.10	39.1		

52. CCC. NW¼SW¼ sec. 15, T. 3 N., R. 24 E., in site of former CCC camp, about 500 feet east of U. S. Highway 1, 1.4 miles southeast from Hilliard. Unused drilled domestic well, diameter 4 inches to 2⅛ inches, depth 576 feet, cased to 442 feet. Measuring point on Aug. 24, 1938, top of concrete pump base, about 0.1 foot above land surface and about 60.6 feet above mean sea level. Measuring point on and since Jan. 18, 1940, top of 4 by 2-inch reducing coupling, 0.5 foot above land surface and 61.99 feet above mean sea level.

Water level, in feet with reference to measuring point, 1938, 1940

Date	Water level	Date	Water level	Date	Water level
Aug. 24, 1938	+0.1	Mar. 1, 1940	-0.56	Sept.21, 1940	-1.38
Jan. 18, 1940	-0.75	20	-0.36	Nov. 22	-2.00
Feb. 2	-0.76	May 30	-1.01		

St. Johns County

2. Well 15 in Water-Supply Paper 773-C. P. J. Manucy. East side of North River, about 150 feet north of Vilano Bridge, Vilano Beach, 1.9 miles northeast from St. Augustine. Used drilled domestic well, diameter 6 inches, depth 198 feet, cased to 195 feet. Measuring point June 22, 1934, top of 3/4-inch faucet, 2.2 feet above land surface and 8.3 feet above mean sea level. Measuring point on and since Aug. 2, 1940, top of 6-inch tee, 2.7 feet above land surface and 8.79 feet above mean sea level. Water levels, in feet above measuring point: June 22, 1934, 29.5; Aug. 2, 1940, 25.9; Nov. 20, 1940, 25.7.

3. Well 14 in Water-Supply Paper 773-C. Francis Usina. East side of North River, Usina's Beach, 2.4 miles north from Vilano Bridge, 4.0 miles north from St. Augustine. Used drilled domestic well, diameter 4 inches, depth 216 feet, cased to 104 feet. Measuring point June 22, 1934, top of 3/4-inch pipe at edge of river, 1.0 foot above land surface and 5.0 feet above mean sea level. Measuring point on and since Aug. 13, 1940, top of 4-inch valve, 1.1 feet above land surface and 7.65 feet above mean sea level. Water levels, in feet above measuring point: June 22, 1934, 38.6; Aug. 13, 1940, 33.9; Nov. 20, 1940, 31.7.

St. Johns County--Continued.

4. Well 10 in Water-Supply Paper 773-C. Mill Creek School. In rear of school house, northwest side of Nine Mile Road, about 700 feet northeast of intersection of State Highway 48 with Nine Mile Road, 8.3 miles southeast from Shands Bridge. Used drilled domestic well, diameter 6 inches, depth 400+ feet, cased to 150 feet. Measuring point to Nov. 4, 1934, top of 3/4-inch faucet 6 feet north of well, 2.2 feet above land surface and 28.9 feet above mean sea level. Measuring point on and since Aug. 2, 1940, top of 3-inch tee, 0.5 foot above land surface and 27.24 feet above mean sea level. Water levels may be affected slightly by flowing water. Water levels, in feet above measuring point: Aug. 31, 1934, 20.0; Nov. 4, 1934, 19.5; Aug. 2, 1940, 18.5; Nov. 20, 1940, 18.8.

5. Well 7 in Water-Supply Paper 773-C. G. L. Oesterricker. In rear of residence of owner, east side of Inland Waterways Canal, north side of State Highway 306, 3.2 miles south from Palm Valley. Used drilled domestic well, diameter 6 inches, depth 350 feet, cased to 180 (?) feet. Measuring point, 3/4-inch pipe at northwest corner of residence of owner, 1.2 feet above land surface and 5.73 feet above mean sea level.

Water level, in feet above measuring point, 1934, 1940

Date	Water level	Date	Water level	Date	Water level
Aug. 23, 1934	43	Sept. 20, 1940	43.9	Nov. 20, 1940	43.6
Sept. 6, 1940	44.5	24	44.3		

8. Well 4 in Water-Supply Paper 773-C. Parish Brothers. Near SW cor. of NE¼NE¼ sec. 4, T. 5 S., R. 28 E., 0.5 mile southwest of Florida East Coast Railroad, 2.5 miles southeast from Bayard. Used drilled stock well, diameter 6 inches, depth 336 feet, cased to 240 feet. Measuring point Aug. 28, 1934, top of 6-inch valve, 1 foot above land surface and 19 feet above mean sea level. Measuring point on and since Sept. 23, 1940, top of 6-inch tee, 3.0 feet above land surface and 20.77 feet above mean sea level. Average daily flow of well about 400,000 gallons. Water levels, in feet above measuring point: Aug. 8, 1934, 36; Sept. 23, 1940, 32.1; Sept. 24, 1940, 32.0; Nov. 20, 1940, 30.8.

WEST FLORIDA

By H. H. Cooper, Jr.

Escambia County

An investigation of ground-water conditions in Escambia County was begun in December 1939 by the Federal Geological Survey and the Florida Geological Survey in cooperation with the Municipal Advertising Board of the city of Pensacola. The purpose of the investigation is to determine the adequacy and permanency of the ground-water supply in Escambia County, particularly in the vicinity of Pensacola. A part of the investigation consists of carrying on a program of periodic measurements of water level in wells.

The principal aquifer in the vicinity of Pensacola is the Citronelle formation of Pliocene age, which consists chiefly of sand and fine gravel with lenses of clay and sandy clay. The depth to the top of the Citronelle ranges considerably and at most places it has not been definitely determined. The depth to the bottom of the Citronelle is set tentatively at about 220 feet to about 250 feet below sea level. The Citronelle is underlain by the Choctawhatchee marl of Miocene age and is overlain by a ranging thickness of sands, clays, and marls of Pleistocene age. The Pleistocene formation in many places is similar to the Pliocene, and the demarcation between the two is difficult to determine.

The most abundant supply of water occurs between 50 feet and 240 feet below sea level in a deposit that consists chiefly of coarse sand and fine gravel but which contains also a small amount of clay. Almost all wells that develop a considerable amount of water are screened opposite this deposit. In many places adjacent to bodies of salt water, particularly in the vicinity of Bayou Chico, the water level in the formation has declined to several feet below sea level as a result of heavy pumping, whereas the water level in the overlying formation is still above sea level. Encroachment of salt water into the lower formation has occurred only to a slight extent. Doubtless the overlying beds of marls and clays have acted as a seal and have prevented the salt water from moving downward into the formation, although well logs and samples from test wells fail to show an areal continuity of the beds of marls and clays.

In the central and northern part of Escambia County wells range in depth from a few feet to several hundred feet below the surface. In the valleys of the Escambia and Perdido Rivers flowing wells may be obtained from depths of about 150 feet to about 500 feet. At the present time there are no wells using large quantities of water in the central and northern parts of the county, but an industrial plant has recently completed four 12-inch wells near Cantonment and will soon begin the pumping of several million gallons of water a day.

At the end of 1940, 26 wells were included in the observation program. Water levels in 18 wells are measured once a week; 8 wells are equipped with automatic water-stage recorders. One water-stage recorder was maintained on Bayou Chico in order to obtain a record of tidal fluctuations for comparison with the water levels in wells adjacent to the Bayou. Until the last part of April 1940, water-level observations

were made by representatives of the Federal Geological Survey. After April measurements were made by a local observer. After August the local observer, on his own initiative, discontinued observations on all wells except some of those in the central and northern parts of the county. Water level observations on all 26 wells were resumed after about December 31.

Included in this report are records on three wells in Escambia County. Well 45, near Cantonment, is only a few hundred feet from four large wells from which several million gallons a day will be pumped in the near future. Records of the water level in this well have shown fluctuations of as much as 0.3 foot in 2 days and of more than 0.6 foot in a week due to changes in atmospheric pressure. The water level in well 46, at Ensley, is expected to show whether the pumpage of several million gallons a day at Cantonment will affect water levels measurably in the southern part of the county. Well 42 is about 1,500 feet from a large industrial plant and about 250 feet from Bayou Chico. The water level in well 42 has been lowered to about 12 feet below sea level by the pumpage of about 8 million gallons a day at an industrial plant. Due to the fact that the water level in the well is affected by tide and by changes in the rate of pumpage, accurate comparisons of the water levels in different seasons of the year can not be made with the data so far obtained.

A later report will contain water-level records on wells not included in this report.

An unpublished preliminary report [1] on the ground-water resources of the Pensacola area, based on field work done until about April 10, 1940, was released in typewritten form in August 1940. A map showing the areas of artesian flow in Escambia County and other useful information on ground water in Escambia County are included in a report by Sellards and Gunter [2], published in 1912. Records of typical wells in Escambia County and a brief discussion of the ground water is contained in a report by Matson and Sanford [3], published in 1913.

1/ Jacob, C. E., Cooper, H. H., Jr., and Stubbs, Sidney A., Report on the ground-water resources of the Pensacola area, in Escambia County, Florida, 1940.

2/ Sellards, E. H., and Gunter, Herman, Water supply of west Florida: Florida Geol. Survey 4th Ann. Rept., pp. 87-155, 1912.

3/ Matson, G. C., and Sanford, Samuel, Geology and ground waters of Florida: U. S. Geol. Survey Water-Supply Paper 319, pp. 301-304, 1913.

Escambia County--Continued.

42. Pensacola Shipbuilding Company. West side of storage tank, about 250 feet north of Bayou Chico, about 1,500 feet west of the intersection of Barancas Avenue and Pine Street, Pensacola. Unused drilled industrial well, diameter 10 inches, depth 153 feet. Measuring point, top of 2½-inch tee, 11.2 feet above land surface and 22.95 feet above mean sea level. Water level affected by tide and by pumping from other wells.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 3	34.83	Mar. 5	34.31	Apr. 22	34.90	June 25	35.63
5	33.97	11	33.52	May 4	33.38	July 1	35.58
5	34.09	18	34.34	11	32.95	8	34.45
5	34.57	25	33.96	17	35.28	16	33.45
5	34.49	Apr. 2	34.83	24	33.98	22	34.15
5	34.29	8	33.74	31	34.62	30	33.08
6	34.98	15	33.72	June 7	34.12	Aug. 6	31.25
19	34.58	20	32.10	18	35.75	13	32.15

45. U. S. Geological Survey. About 1,150 feet southwest of Louisville and Nashville Railroad, about 1,600 feet northeast of Gulf, Florida and Alabama Railroad, 0.5 mile south from Cantonment. Used drilled observation well, diameter 4 inches, depth 152.3 feet. Measuring point to Feb. 6, 1940, top of 4-inch coupling on casing, 1.0 foot above land surface and about 136 feet above mean sea level. Measuring point from Feb. 13, to Aug. 10, 1940, top of 1-inch hole in base of recorder shelter, 1.42 feet above the measuring point to Feb. 6, 1940. Measuring point on and since Dec. 7, 1940, top of 1-inch hole in base of recorder shelter, at same altitude as the measuring point to Feb. 6, 1940. Water level affected by changes in barometric pressure. Water-stage recorder maintained on well since Feb. 13, 1940. Water levels, in feet below measuring point, 1940: Jan. 16, 72.03; Jan. 23, 71.69; Jan. 30, 71.82; Feb. 6, 71.64; Feb. 13, 73.30.

Highest and lowest weekly water level, in feet below measuring point, 1940 (from recorder charts)

Week	Highest level	Lowest level	Week	Highest level	Lowest level
Feb. 17-23	72.98	73.70	May 25-31	73.78	(a)
Feb. 24-Mar. 1	73.26	73.60	June 1-7	73.95	74.01
Mar. 2-8	73.11	73.45	8-14	73.95	74.02
9-15	73.42	73.77	15-21	73.66	74.08
16-22	73.37	73.71	22-28	73.83	74.07
23-29	73.46	73.74	June 29-July 5	73.85	74.05
Apr. 13-19	73.40	73.85	July 20-26	73.17	73.42
20-26	73.52	73.75	July 27-Aug. 2	73.01	(a)
Apr. 27-May 3	73.58	73.85	Aug. 3-9	72.91	73.07
May 4-10	73.62	73.99	Dec. 21-27	72.03	72.86
18-24	73.65	73.76	Dec. 28-Jan. 3	(a)	72.87

46. U. S. Geological Survey. Forty-three and one-half feet east of centerline of Louisville and Nashville Railroad, 196 feet north of centerline of a graded crossroad, 0.4 mile east from Ensley. Used drilled observation well, diameter 4 inches, depth 239 feet. Measuring point to June 1, 1940, top of 4-inch coupling on casing, 1.0 foot above land surface and about 130 feet above mean sea level. Measuring point on and since June 8, 1940, top of 1-inch hole in base of recorder shelter, 0.06 foot above the measuring point to June 1, 1940. Water level affected by changes in barometric pressure. Water level recorder maintained on well since June 8, 1940.

a Record for week incomplete.

Escambia County--Continued.

46.--Continued.

Water level, in feet below measuring point, 1939-40

Date	Water level	Date	Water level	Date	Water level
Dec. 14, 1939	69.94	Feb. 13, 1940	71.03	Apr. 16, 1940	72.20
15	69.93	19	71.14	24	72.28
18	69.82	26	71.63	May 2	72.24
Jan. 4, 1940	70.20	Mar. 4	71.50	9	72.68
17	70.48	11	71.76	11	72.68
23	70.50	18	71.84	18	72.71
30	70.79	25	72.13	25	72.70
Feb. 6	70.70	Apr. 9	72.24	June 1	72.85

Highest and lowest weekly water level, in feet below measuring point, 1940 (from recorder charts)

Week	Highest level	Lowest level	Week	Highest level	Lowest level
June 8-14	72.99	73.06	Sept. 7-13	66.91	67.14
15-21	72.82	73.12	21-27	67.07	67.32
22-28	72.80	73.02	Sept. 28-Oct. 4	67.30	67.49
June 29-July 5	72.76	73.02	Oct. 5-11	67.34	67.57
July 6-12	71.17	72.85	12-18	67.43	67.71
13-19	69.68	71.17	19-25	67.52	67.80
20-26	a68.92	a69.68	Oct. 26-Nov. 1	67.77	67.97
July 27-Aug. 2	(a)	68.72	Nov. 2-8	67.97	68.26
Aug. 3-9	a67.70	a68.11	9-15	68.08	68.55
10-16	67.44	67.70	Dec. 14-20	a68.99	a69.25
17-23	67.36	67.47	21-27	68.42	69.09
24-30	67.05	67.36	Dec. 28-Jan. 3	68.45	68.93
Aug. 31-Sept. 6	67.07	67.24			

CENTRAL FLORIDA

By H. H. Cooper, Jr.

Observations of artesian pressure in wells in central Florida (see Water-Supply Paper 845) were continued during 1940 as part of the cooperative ground-water investigations by the Florida Geological Survey, Herman Gunter, State Geologist, and the Federal Geological Survey.

During 1940 two wells were included in the observation program. The district office of the Federal Geological Survey at Ocala made observations on Marion County well 5 (Sharpes Ferry well) about once each week, making a total of 54 measurements on this well. Observations on the Blue Grotto sinkhole at Belleview were discontinued during 1940. The highest and lowest weekly water levels in Seminole County well 35 were obtained from a recording pressure gage installed in November 1938.

a Record for week incomplete.

The fluctuations of water level in Marion County well 5 correlate fairly closely with the precipitation at Ocala, indicating local recharge to the underground reservoir. The water level in the well declined steadily from 5.8 feet above the measuring point at the beginning of the year to about 4.3 feet above the measuring point during June, owing to an average monthly precipitation of only 2.07 inches from January to May. The monthly precipitation averaged 4.96 inches from June to September and as a result the water level rose gradually to 5.35 feet on September 21. From October 1 to December 18 the precipitation totaled only 0.52 inches, and the water level declined steadily to 3.85 feet, the lowest stage of the year, on December 14. The last two measurements of the year indicate that the water level rose slightly due to 6.76 inches of rain in the period December 19 to 29.

The charts from the recording pressure gage on Seminole County well 35 show the effect on the water level of the heavy draft from other wells in the vicinity. Differences between the highest and lowest weekly water levels are caused largely by the discharge of other wells. A conspicuous example is the difference of 11 feet between the highest and lowest pressures recorded during the week January 22 to 27. Because the lowest water levels are generally caused by the draft from nearby wells and are generally of short duration, the highest weekly water levels constitute a better index to seasonal and permanent changes. No steady rise or decline of the water level is detectable during the year, but the water level was slightly higher during the late summer and early fall than it was in other parts of the year. The draft on wells in Seminole County is probably less during the late summer and early fall than at any other time, and heavy rainfall occurred over central Florida during the months June to September. The high water levels probably are a result of one or both of these conditions. Only very little recharge occurs locally but the rains influence the fluctuations of water level indirectly because they furnish some of the water needed for irrigation, and the draft on wells is, therefore, less in periods of high precipitation.

Marion County

Sharpes Ferry well (Marion County 5).

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 4	5.8	Apr. 6	4.8	June 29	4.31	Sept. 28	5.16
13	5.8	12	4.95	July 6	4.28	Oct. 12	4.95
20	5.5	20	4.9	13	4.35	19	4.86
27	5.5	24	4.8	20	4.50	26	4.8
Feb. 3	5.2	May 3	4.82	27	4.60	Nov. 2	4.60
9	5.3	10	4.70	Aug. 3	4.70	9	4.40
17	5.15	18	4.52	10	4.8	16	4.30
24	5.1	25	4.5	17	4.88	23	4.2
Mar. 2	5.2	June 1	4.3	24	5.0	30	4.08
9	5.2	8	4.35	31	5.0	Dec. 7	4.0
16	5.0	15	4.35	Sept. 6	5.15	14	3.85
23	5.0	19	4.36	14	5.12	20	3.90
30	4.9	22	4.34	21	5.35	28	3.95

Seminole County

35. Owner's well 1, farm 3. C. S. Lee. SE¼NW¼ sec. 26, T. 20 S., R. 31 E.

Highest and lowest weekly water level, in feet above measuring point, 1940 (from recorder charts)

Week	Highest level	Lowest level	Week	Highest level	Lowest level
Jan. 1-7	20.4	18.8	June 17-23	20.5	19.9
8-14	20.8	19.9	24-30	20.5	19.9
15-21	20.2	18.6	July 1-7	20.7	20.0
22-28	20.4	9.4	8-14	20.9	20.1
Jan. 29-Feb. 4	19.5	18.0	15-21	20.8	20.2
Feb. 5-11	20.3	19.1	22-28	20.9	20.2
12-18	20.2	19.5	July 29-Aug. 4	21.1	20.5
19-25	20.7	19.1	Aug. 5-11	21.3	20.9
Feb. 26-Mar. 3	19.6	18.9	12-18	21.4	21.0
Mar. 4-10	20.3	18.6	19-25	21.3	20.8
11-17	20.0	19.1	Aug. 26-Sept. 1	21.3	20.6
18-24	20.4	19.1	Sept. 2-8	21.4	20.2
25-31	20.4	19.8	9-15	21.6	21.0
Apr. 1-7	20.6	20.0	16-22	21.4	20.6
8-14	20.9	19.9	23-29	21.3	20.4
15-21	20.4	19.4	Sept. 30-Oct. 6	21.4	19.9
22-28	20.3	19.6	Oct. 7-13	20.9	19.6
Apr. 29-May 5	20.3	19.3	14-20	20.4	19.2
May 6-12	19.9	19.1	Nov. 4-10	20.0	18.8
13-19	20.1	18.5	11-17	19.8	18.4
20-26	19.5	18.1	18-24	19.8	18.2
May 27-June 2	19.9	18.3	Nov. 25-Dec. 1	19.5	18.2
June 3-9	20.3	19.6	Dec. 2-8	19.4	18.4
10-16	20.5	19.9	9-15	19.6	18.6

SOUTHEASTERN FLORIDA

Dade and Broward Counties

By W. P. Cross

Observations of water levels in wells in Dade and Broward Counties were continued during 1940 in connection with the ground-water investigation by the Federal Geological Survey in cooperation with the cities of Miami, Miami Beach, and Coral Gables, and with Dade County.

A brief description of the general geology and water resources of the area under investigation is included in Water-Supply Paper 886. A preliminary report of the investigation is in preparation.

Periodic measurements of water levels were being made by the Federal Geological Survey in 239 observation wells in Dade and Broward Counties at the end of 1940. Twenty of the wells are equipped with automatic water-stage recorders; the rest of the wells are measured once a week. About 13,400 individual measurements of water level were made in 1940.

The rainfall at Miami during 1940 was 71.65 inches, which compares with a 33-year average of 58.82 inches. Precipitation was subnormal in April, July, October, and November, and considerably above normal in May, June, and September.

Water levels in wells were generally above normal during the year. The lowest stages of the year were reached in May, just prior to heavy rains in May and June. Heavy rains in September produced the highest water levels in four years. Water levels were about 0.2 foot to 0.5 foot higher on December 31, 1940, than on December 31, 1939.

Dade County

F25. City of Opa Locka. NE¼SW¼ sec. 21, T. 52 S., R. 41 E. Measuring point, 10.04 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	8.32	Apr. 1	7.85	July 1	8.05	Sept. 24	5.43
8	8.38	8	8.36	8	8.13	Oct. 1	6.03
16	8.46	15	8.67	15	8.38	7	6.40
22	8.32	22	8.84	22	8.57	14	6.69
29	8.32	29	9.01	29	8.19	21	6.90
Feb. 5	8.54	May 6	9.14	Aug. 5	8.26	Nov. 4	6.62
12	8.31	13	9.20	12	8.29	12	7.11
19	8.33	20	9.32	16	6.91	18	7.31
26	8.45	27	9.34	19	6.70	25	7.50
Mar. 4	8.63	June 3	7.07	26	7.51	Dec. 7	7.80
11	8.76	10	7.66	Sept. 2	7.52	23	7.87
18	8.89	17	7.80	9	6.49	30	7.30
25	8.92	24	8.00	17	6.19		

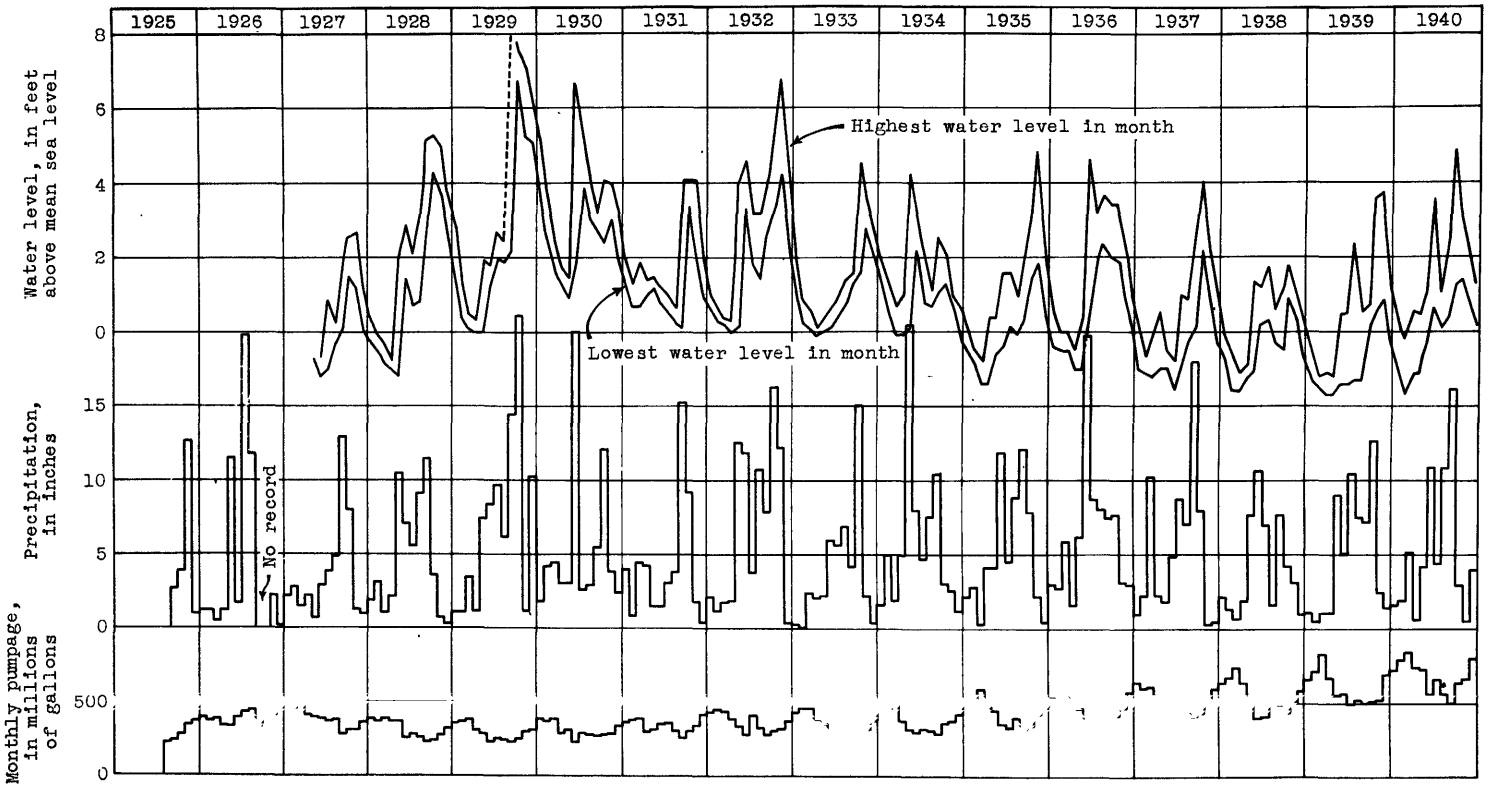

Figure 2.--Graphs showing fluctuations of water level in well S-1A at Miami Springs, Fla., and precipitation and monthly pumpage at Hialeah water plant.

Dade County--Continued.

F284. North Miami. SW¼SE¼ sec. 26, T. 52 S., R. 41 E. Depth 59 feet, erroneously given as 61 feet in Water-Supply Paper 886. Measuring point, 13.28 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	12.17	Apr. 1	11.86	July 1	12.00	Sept. 24	8.68
8	12.19	8	12.12	8	11.97	Oct. 9	10.43
16	12.26	15	12.41	15	12.24	15	10.79
22	12.25	22	12.46	22	12.41	22	11.07
29	12.22	29	12.62	29	12.18	29	11.02
Feb. 5	12.39	May 6	12.68	Aug. 5	12.12	Nov. 5	10.95
13	12.35	13	12.68	12	11.80	12	11.28
19	12.08	20	12.72	19	11.08	19	11.57
26	12.10	27	12.72	26	11.52	26	11.78
Mar. 4	12.35	June 3	10.87	Sept. 2	11.67	Dec. 8	12.02
11	12.40	10	11.29	10	10.09	24	11.92
18	12.53	17	11.47	16	10.36	31	11.57
25	12.49	24	11.81				

S18. Model Dairy. NW¼NW¼ sec. 15, T. 52 S., R. 41 E. Measuring point, 10.12 feet above mean sea level, 1929 adjustment. Depth 52 feet, erroneously given as 53 feet in Water-Supply Paper 886.

Water level, in feet below measuring point, 1940

Jan. 2	8.44	Apr. 1	7.79	July 8	8.38	Oct. 14	6.76
8	8.56	8	8.34	15	8.62	21	7.10
12	8.61	15	8.70	22	8.82	28	7.24
19	8.69	22	8.89	29	8.32	Nov. 4	6.80
22	8.60	29	9.11	Aug. 5	8.40	11	7.19
29	8.49	May 6	9.26	12	8.45	18	7.53
Feb. 5	8.73	13	9.37	19	7.32	25	7.79
12	8.46	20	9.44	26	7.80	Dec. 1	7.95
19	8.45	27	9.52	Sept. 2	7.73	7	8.13
26	8.55	June 3	7.07	9	5.90	14	8.28
Mar. 4	8.77	10	7.67	16	6.09	21	8.42
11	8.87	17	7.82	23	5.09	24	8.24
18	9.03	24	8.14	30	5.94	30	7.57
25	9.06	July 1	8.27	Oct. 7	6.44		

F288. North Miami Beach. SW¼SW¼ sec. 7, T. 52 S., R. 42 E. Measuring point, 10.89 feet above mean sea level, 1929 adjustment. Depth 63 feet, erroneously given as 65 feet in Water-Supply Paper 886.

Water level, in feet below measuring point, 1940

Jan. 2	9.37	Apr. 1	8.63	July 1	9.24	Oct. 1	6.77
8	9.47	8	9.15	8	9.37	9	7.40
16	9.57	15	9.52	15	9.62	15	7.74
22	9.54	22	9.74	22	9.81	22	8.14
29	9.43	29	9.96	29	9.61	30	7.33
Feb. 5	9.64	May 6	10.12	Aug. 5	9.48	Nov. 5	7.75
12	8.98	13	10.25	12	9.31	12	8.19
19	9.23	20	10.33	20	8.48	19	8.57
26	9.39	27	10.34	27	8.75	26	8.84
Mar. 4	8.63	June 3	7.86	Sept. 3	8.78	Dec. 8	9.19
11	9.76	10	8.43	10	6.53	24	9.22
18	9.86	17	8.60	17	6.08	31	8.63
25	9.92	24	9.00	24	6.00		

D151. Peoples Water and Gas Company. Center of sec. 16, T. 52 S., R. 42 E. Measuring point, 0.2 foot above land surface, erroneously given as about 1 foot in Water-Supply Paper 886, and 12.50 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 2	10.89	Feb. 5	11.18	Mar. 18	11.27	Apr. 22	11.20
8	10.82	12	10.89	25	11.09	29	11.39
12	10.96	19	10.82	Apr. 1	10.64	May 6	11.37
19	10.98	26	10.85	8	10.91	13	11.28
22	10.90	Mar. 4	11.12	15	11.27	20	11.24
29	10.99	11	11.06	19	11.14	27	10.80

Dade County--Continued.

D151.--Continued.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
June 3	9.14	Aug. 5	11.04	Sept.27	8.49	Nov. 19	11.78
10	10.05	12	10.58	Oct. 4	8.94	26	11.98
17	10.34	19	10.35	9	9.44	Dec. 1	11.91
24	10.69	26	10.42	16	9.79	8	12.09
July 1	10.94	Sept. 2	10.62	22	10.04	14	12.13
8	10.90	9	8.85	29	9.86	21	12.17
15	11.20	16	8.77	Nov. 5	11.05	24	11.75
22	11.25	21	7.80	12	11.39	31	11.49
29	11.28						

F12. City of Miami Springs. SE¼NE¼ sec. 24, T. 53 S., R. 40 E. Measuring point, 10.57 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 2	10.26	Apr. 1	9.90	July 1	9.63	Sept.30	7.38
8	10.18	8	10.82	8	9.63	Oct. 7	7.93
15	10.37	15	11.03	15	10.02	14	8.25
22	10.53	22	10.85	22	10.31	21	8.58
29	10.63	29	10.62	29	10.27	28	8.81
Feb. 5	10.89	May 6	10.46	Aug. 5	9.59	Nov. 4	8.47
12	10.81	13	10.45	12	9.06	11	8.72
19	10.70	20	10.43	19	8.68	18	9.15
26	10.90	27	10.53	26	9.05	25	9.25
Mar. 4	11.01	June 3	7.46	Sept. 2	9.18	Dec. 7	9.83
11	11.05	10	8.97	9	8.56	23	9.80
18	11.09	17	9.21	16	8.00	30	9.23
25	10.97	24	9.81	23	6.50		

S19. City of Miami. NW¼NE¼ sec. 25, T. 53 S., R. 40 E. Depth 94.8 feet, erroneously given as 77 feet in Water-Supply Paper 886. Measuring point, 8.32 feet above mean sea level, 1929 adjustment. Water levels affected by pumping in nearby city of Miami supply wells.

Water level, in feet below measuring point, 1940

Jan. 2	7.22	Apr. 1	7.49	July 8	7.03	Oct. 14	5.57
8	7.25	8	8.22	15	7.35	21	5.82
12	7.42	15	8.46	22	7.58	28	6.06
19	7.49	22	8.36	29	7.55	Nov. 4	5.67
22	7.59	29	8.07	Aug. 5	6.70	11	5.95
29	7.73	May 6	8.11	12	6.40	18	6.20
Feb. 5	8.01	13	8.03	19	5.76	25	6.48
12	7.75	20	7.85	26	6.40	Dec. 1	6.60
19	7.92	27	7.86	Sept. 2	6.46	7	6.89
26	7.84	June 3	4.55	9	5.84	14	7.16
Mar. 4	8.01	10	6.24	16	5.07	21	7.23
11	8.05	17	6.71	23	3.44	23	7.16
18	8.17	24	7.22	30	4.65	30	6.23
25	8.19	July 1	7.09	Oct. 7	5.16		

F9. City of Miami Springs. SE¼SE¼ sec. 19, T. 53 S., R. 41 E. Measuring point, 7.44 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 2	6.63	Apr. 1	6.65	July 1	6.57	Sept.30	4.45
8	6.66	8	7.04	8	6.50	Oct. 7	4.93
15	6.49	15	7.17	15	6.81	14	5.27
22	6.81	22	7.19	22	6.98	21	5.46
29	6.88	29	6.81	29	6.88	28	5.61
Feb. 5	7.01	May 6	6.95	Aug. 5	6.37	Nov. 4	5.44
12	6.88	13	6.85	12	5.87	11	5.57
19	6.72	20	6.87	19	5.87	18	5.99
26	6.78	27	6.87	26	6.05	25	6.15
Mar. 4	7.00	June 3	4.68	Sept. 2	6.23	Dec. 7	6.37
11	7.05	10	6.15	9	5.71	23	6.40
18	7.12	17	6.25	16	5.35	30	5.97
25	7.05	24	6.59	23	3.52		

Dade County--Continued.

F62. City of Miami. SE¼SE¼ sec. 14, T. 53 S., R. 41 E. Measuring point, 13.26 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	12.10	Apr. 9	12.18	July 8	11.78	Oct. 8	9.52
8	12.22	16	12.43	16	12.04	15	10.40
15	12.20	23	12.51	23	12.31	22	10.92
22	12.14	30	12.57	30	12.42	29	10.93
29	12.24	May 7	12.63	Aug. 6	12.10	Nov. 5	10.75
Feb. 6	12.37	14	12.61	13	11.58	12	11.12
13	12.10	21	12.64	20	10.63	19	11.49
20	12.10	28	12.59	27	11.05	26	11.79
27	12.17	June 4	9.43	Sept. 3	11.37	Dec. 3	12.00
Mar. 5	12.34	11	10.38	10	9.69	10	12.12
12	12.38	18	10.83	17	9.74	17	12.23
19	12.49	25	11.50	24	7.01	24	12.06
26	12.49	July 2	11.59	Oct. 1	8.27	31	11.50
Apr. 2	11.83						

F109. City of Miami. NE¼SE¼ sec. 10, T. 53 S., R. 41 E. Measuring point, 11.20 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 3	10.30	Apr. 9	10.35	July 8	9.94	Oct. 8	8.23
8	10.31	16	10.58	16	10.30	15	8.86
15	10.24	23	10.64	23	10.48	22	9.18
22	10.40	30	10.74	30	10.46	29	9.02
29	10.41	May 7	10.74	Aug. 6	10.22	Nov. 5	9.09
Feb. 6	10.50	14	10.73	13	9.64	12	9.33
13	10.35	21	10.72	20	9.23	19	9.67
20	10.27	28	10.74	27	9.60	26	9.90
27	10.30	June 4	8.41	Sept. 3	9.76	Dec. 3	10.02
Mar. 5	10.48	11	9.24	10	8.82	10	10.13
12	10.54	18	9.48	17	8.48	17	10.24
19	10.61	25	9.94	24	6.36	24	10.02
26	10.66	July 2	9.87	Oct. 1	7.32	31	9.67
Apr. 2	10.01						

F233. City of Miami. SW¼SE¼ sec. 33, T. 53 S., R. 41 E. Measuring point, 12.34 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 3	11.30	Apr. 9	11.74	July 8	11.29	Oct. 8	9.90
8	11.37	16	11.72	16	11.69	15	10.29
16	11.26	23	11.70	23	11.57	22	10.43
22	11.50	30	11.87	30	11.71	30	10.32
29	11.60	May 7	11.76	Aug. 7	11.31	Nov. 5	10.53
Feb. 6	11.49	14	11.74	14	10.60	12	10.56
13	11.57	21	11.61	21	10.75	19	10.95
20	11.36	28	11.72	28	10.79	27	11.20
27	11.37	June 4	10.29	Sept. 4	11.03	Dec. 3	11.22
Mar. 5	11.53	11	10.97	11	10.39	10	11.28
12	11.57	18	11.19	18	10.15	17	11.39
19	11.59	25	11.35	25	9.11	24	11.05
26	11.69	July 2	11.38	Oct. 2	9.41	31	10.96
Apr. 2	11.67						

F240. City of Hialeah. NW¼NE¼ sec. 8, T. 53 S., R. 41 F. Measuring point, 10.55 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 2	9.45	Feb. 12	9.41	Mar. 25	9.88	May 6	9.97
8	9.48	19	9.46	Apr. 1	8.89	13	9.98
15	9.41	26	9.46	8	9.41	20	10.02
22	9.42	Mar. 4	9.62	15	9.72	27	10.02
29	9.41	11	9.73	22	9.88	June 3	7.43
Feb. 5	9.57	18	9.85	29	9.95	10	8.12

Dade County--Continued.

F240.--Continued.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
June 17	8.35	Aug. 5	9.38	Sept.24	5.50	Nov. 11	8.20
24	8.93	12	9.05	30	6.13	18	8.44
July 1	9.01	19	8.07	Oct. 7	6.90	25	8.70
8	8.80	26	8.59	14	7.53	Dec. 7	9.06
15	9.29	Sept. 2	8.80	21	7.93	23	9.25
22	9.63	9	8.12	28	8.21	30	8.67
29	9.56	16	7.63	Nov. 4	7.81		

F268. City of Hialeah. SW¼SE¼ sec. 18, T. 53 S., R. 41 E. Measuring point, 8.48 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	7.56	Apr. 1	7.33	July 1	7.41	Sept.30	4.71
8	7.61	8	7.77	8	7.28	Oct. 7	5.33
15	7.45	15	8.06	15	7.74	14	5.80
22	7.64	22	8.11	22	7.96	21	6.12
29	7.66	29	7.91	29	7.95	28	6.33
Feb. 5	7.81	May 6	8.02	Aug. 5	7.40	Nov. 4	6.02
12	7.67	13	7.98	12	6.94	11	6.25
19	7.62	20	8.01	19	6.61	18	6.60
26	7.66	27	8.03	26	6.93	25	6.85
Mar. 4	7.92	June 3	5.71	Sept. 2	7.06	Dec. 7	7.22
11	7.91	10	6.62	9	6.55	23	7.27
18	8.12	17	6.92	16	5.95	30	6.81
25	8.03	24	7.40	23	4.18		

D8. City of Miami. SW¼NE¼ sec. 36, T. 53 S., R. 41 E. Measuring point, 13.76 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	11.72	Apr. 2	12.07	July 2	11.65	Oct. 2	9.83
8	11.73	9	11.97	8	11.49	8	10.48
16	11.65	16	11.82	16	11.80	15	10.79
22	11.94	23	11.83	23	11.63	22	10.81
29	11.99	30	12.36	30	11.70	Nov. 6	11.00
Feb. 6	11.83	May 7	12.26	Aug. 7	11.47	12	11.06
13	11.91	14	11.73	14	10.60	19	11.34
20	11.64	21	11.60	21	11.19	26	11.56
27	11.67	28	11.72	27	10.01	Dec. 3	13.23
Mar. 5	13.98	June 4	9.55	Sept. 4	12.47	10	13.25
12	11.79	11	10.95	11	11.40	17	13.35
19	11.86	18	12.79	18	10.37	24	11.35
26	11.83	25	11.81	25	9.81	31	11.38

S1A. City of Miami. NW¼SW¼ sec. 19, T. 53 S., R. 41 E. In the Parkway, south of Deer Run, Miami Springs. Driven observation well, diameter 2 inches, depth 11 feet. Measuring point, top of casing, 1.4 feet above land surface and 8.31 feet above mean sea level, 1929 adjustment. Readings furnished by city of Miami are in feet above city of Miami datum; the accompanying hydrograph has been corrected to mean sea level on the basis of levels to the measuring point, by subtracting 0.19 foot.

Water level, in feet with reference to city of Miami datum, 1940

Date		Date		Date		Date	
Jan. 1	+0.2	Apr. 8	-0.1	July 8	+1.2	Oct. 7	+2.6
8	+ .2	15	- .3	15	+ .7	14	+2.5
15	+ .3	22	.0	22	+ .4	21	+1.9
22	- .1	29	.0	29	+ .4	28	+1.7
29	- .3	May 6	+ .4	Aug. 4	+1.2	Nov. 4	+2.2
Feb. 5	- .9	13	+ .3	11	+1.2	11	+1.8
12	- .3	20	+ .4	18	+2.3	18	+1.4
19	- .1	27	+ .3	25	+1.6	25	+1.1
26	- .2	June 3	+3.6	Sept. 2	+1.6	Dec. 2	+1.0
Mar. 4	- .9	10	+1.7	9	+2.5	9	+ .7
11	- .4	17	+1.6	16	+2.9	16	+ .7
18	- .7	24	+1.0	23	+4.6	23	+ .6
25	- .2	July 1	+1.2	30	+3.4	30	+1.5
Apr. 1	+ .7						

Dade County--Continued.

Maximum and minimum water levels by months, in feet with reference to city of Miami datum, 1926-40

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1926-27									-0.5	+1.1	+0.45	+2.00
								-0.5	-1.0	- .8	- .16	+ .3
1927-28	+2.8	+2.9	+1.3	+0.6	+0.1	-0.1	-0.6	+2.1	+3.1	+2.3	+3.4	+5.4
	+1.8	+1.35	+ .2	.0	- .3	- .65	- .8	-1.0	+1.7	+ .9	+1.0	+3.2
1928-29	+5.5	+5.2	+3.9	+3.0	+1.5	+ .7	+ .5	+2.2	+2.0	+2.9	+2.6	.....
	+4.5	+3.9	+2.9	+1.6	+ .6	+ .3	+ .2	+ .2	+1.5	+2.2	+2.1	+2.4
1929-30	+7.8	+7.4	+6.4	+5.3	+3.9	+2.7	+2.0	+1.6	+6.9	+5.7	+4.1	+3.4
	+7.0	+5.4	+5.3	+3.9	+2.7	+2.0	+1.5	+1.1	+2.0	+4.1	+3.3	+3.0
1930-31	+4.3	+4.2	+3.3	+2.1	+1.5	+2.1	+1.6	+1.7	+1.4	+1.2	+0.8	+4.3
	+2.6	+3.3	+2.1	+1.5	+ .9	+ .9	+1.2	+1.4	+1.0	+ .7	+ .5	+ .3
1931-32	+4.3	+4.3	+2.1	+1.2	+ .9	+ .6	+ .5	+4.3	+4.8	+3.4	+3.4	+4.4
	+3.6	+2.1	+1.2	+ .8	+ .5	+ .4	+ .2	+ .4	+3.6	+2.0	+1.6	+2.8
1932-33	+5.8	+7.0	+4.4	+2.4	+1.1	+ .8	+ .3	+ .6	+ .9	+1.3	+1.6	+1.8
	+3.5	+4.4	+2.5	+1.2	+ .5	+ .3	+ .1	+ .2	+ .3	+ .7	+1.0	+1.5
1933-34	+4.8	+3.7	+2.9	+2.1	+1.5	+ .9	+1.2	+4.5	+3.5	+2.3	+1.3	+2.8
	+1.8	+3.0	+2.2	+1.5	+ .7	+ .1	+ .1	+ .3	+2.4	+1.0	+ .9	+1.3
1934-35	+2.3	+1.2	+ .9	+ .3	- .2	- .6	+ .6	+ .6	+1.8	+1.8	+1.1	+2.2
	+1.5	+ .9	+ .1	- .3	- .6	-1.2	-1.2	- .4	- .2	+ .4	+ .1	+ .5
1935-36	+3.1	+5.1	+2.4	+ .8	+ .2	+ .2	- .3	+ .5	+4.9	+3.4	+3.9	+3.6
	+1.6	+2.1	+ .8	- .2	- .3	- .3	- .8	- .8	+ .5	+1.7	+2.6	+2.3
1936-37	+3.6	+2.6	+1.3	+ .5	- .5	+ .2	+ .8	- .3	- .6	+1.2	+1.1	+2.9
	+2.1	+1.3	+ .4	- .8	- .9	-1.0	- .8	- .8	-1.4	- .7	- .1	+ .3
1937-38	+4.2	+2.4	+1.1	+ .1	- .5	- .9	- .7	+1.6	+1.4	+1.9	+ .8	+1.3
	+2.5	+1.0	- .1	- .5	-1.4	-1.4	-1.0	- .9	+ .4	+ .5	- .1	- .3
1938-39	+2.0	+1.2	+ .5	- .4	-1.0	- .9	-1.0	+ .7	+ .7	+2.6	+ .7	+ .9
	+1.1	+ .5	- .4	-1.1	-1.3	-1.5	-1.5	-1.2	-1.2	-1.1	-1.1	+ .2
1939-40	+3.8	+4.0	+1.3	+ .5	.0	+ .8	+ .7	+1.2	+3.8	+1.3	+2.6	+5.1
	+ .7	+1.1	.0	- .8	-1.5	- .9	- .9	- .1	+ .9	+ .3	+ .6	+1.5
1940-41	+3.3	+2.5	+1.5									
	+1.6	+1.0	+0.4									

F186. City of Miami. SE¼SE¼ sec. 1, T. 54 S., R. 40 E. Measuring point, 13.90 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	11.88	Apr. 8	12.39	July 9	11.95	Oct. 8	9.70
8	12.00	15	12.67	16	12.25	14	10.29
15	11.85	22	12.76	23	12.51	22	10.85
22	11.91	29	12.89	30	12.66	29	11.08
29	11.98	May 7	12.99	Aug. 6	12.25	Nov. 5	11.05
Feb. 5	12.18	14	13.05	13	11.35	12	11.23
12	11.97	20	13.10	20	10.29	19	11.46
19	12.04	28	13.11	27	10.94	26	11.66
26	12.10	June 4	9.97	Sept. 3	11.40	Dec. 3	11.80
Mar. 4	12.27	10	10.94	10	10.64	10	11.97
11	12.37	17	11.46	17	10.13	17	12.10
18	12.52	25	11.88	24	7.47	24	11.81
26	12.60	July 2	11.48	Oct. 1	8.75	31	11.36
Apr. 2	12.08						

Dade County--Continued.

D70. City of Miami. Sec. 39, T. 54 S., R. 41 E. Measuring point, 10.90 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	8.68	Apr. 9	9.03	July 8	7.74	Oct. 9	7.85
8	8.81	15	8.90	15	9.00	16	8.08
16	8.54	22	10.97	24	8.89	23	8.27
22	8.93	29	10.96	31	8.91	30	8.12
29	9.01	May 6	10.93	Aug. 7	10.41	Nov. 6	10.34
Feb. 5	9.05	13	10.68	14	7.97	13	10.38
12	8.93	20	10.79	21	8.59	19	10.52
19	8.77	27	10.66	28	8.41	27	10.81
26	8.71	June 3	6.83	Sept. 4	8.52	Dec. 4	11.05
Mar. 5	8.85	10	8.52	11	7.88	11	10.82
12	8.87	17	8.59	18	7.80	18	11.04
19	8.88	24	8.64	25	7.23	24	8.65
26	8.79	July 1	7.86	Oct. 2	7.07	31	8.68
Apr. 2	9.05						

S196. State of Florida. SW¼SE¼ sec. 35, T. 56 S., R. 38 E. University of Florida Sub-Tropical Experiment Station, Waldin Drive, 0.3 mile west of Redland Road, northwest of Homestead. Drilled observation well, diameter 4 inches, depth 20 feet. Float tape-gage readings are taken as depths below approximate land surface, 10.32 feet above mean sea level, 1929 adjustment. Records furnished by Experiment Station.

Water level, in feet below measuring point, 1940

Jan. 1	6.23	Apr. 8	7.42	July 8	6.93	Oct. 7	3.96
8	6.40	15	7.70	15	7.11	14	4.67
15	6.62	22	8.10	22	6.66	21	5.26
23	6.94	29	8.39	29	5.56	28	5.70
29	7.05	May 7	8.72	Aug. 5	5.00	Nov. 4	5.38
Feb. 5	7.27	13	8.96	12	5.47	12	5.90
13	7.09	20	9.25	19	4.43	18	6.25
19	7.12	27	9.44	26	4.35	25	6.57
27	7.24	June 3	7.93	Sept. 2	4.26	Dec. 2	6.77
Mar. 5	7.51	10	7.35	9	1.65	9	7.00
11	7.53	17	7.50	16	2.84	16	7.18
18	7.80	24	7.88	23	2.50	23	7.29
26	8.00	July 1	6.91	30	3.04	30	6.26
Apr. 1	7.47						

Maximum and minimum water levels by months, in feet below measuring point, 1932-41

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1932-33	2.20	2.85	5.14	6.43	7.26	7.55	7.44	6.45	5.88	5.50	3.54	4.43
	5.00	5.25	6.43	7.24	8.25	8.33	8.42	7.96	6.81	7.06	6.09	6.14
1933-34	.74	2.64	5.40	6.80	7.03	7.74	8.0	1.90	3.70	4.53	4.70	....
	3.90	5.40	6.80	7.06	7.92	8.50	8.80	8.12	4.70	5.60	5.45	....
1934-35	4.45	5.73	6.88	7.71	8.43	8.99	8.77	8.78	5.66	5.07	5.09	2.12
	5.67	6.84	7.68	8.40	8.97	9.65	10.33	9.32	9.50	6.06	6.33	5.71
1935-36	3.46	2.95	5.68	6.57	5.67	4.59	5.79	6.95	1.15	2.45	3.26	3.97
	4.90	5.56	6.78	7.38	7.00	6.52	7.36	8.08	6.74	4.80	4.61	5.20
1936-37	4.36	5.41	6.38	7.25	7.90	7.08	....	6.74	7.90	6.45	4.99	1.94
	5.72	6.36	7.23	8.03	8.40	8.05	....	7.92	8.56	8.15	6.48	5.55
1937-38	2.36	4.60	6.47	6.90	7.77	8.55	8.77	9.00	6.53	5.10	4.85	5.40
	4.38	6.43	7.23	7.73	8.52	9.14	9.67	9.98	8.90	6.36	7.12	7.64

Dade County--Continued.

Maximum and minimum water levels by months, in feet below measuring point, 1932-41--Continued.

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1938-39	4.92	6.38	7.22	8.46	9.16	9.77	10.28	9.17	7.50	5.19	5.85	4.94
	6.32	7.28	8.42	9.15	9.75	10.37	10.54	10.71	9.70	7.34	6.92	6.06
1939-40	2.50	2.90	5.80	6.23	7.01	7.36	7.27	8.45	6.96	4.76	3.75	1.65
	5.94	5.74	7.03	7.10	7.31	8.03	8.42	9.54	9.31	7.25	5.54	4.46
1940-41	3.23	5.20	6.26									
	5.70	6.75	7.33									

Broward County

S329. City of Fort Lauderdale. SW¼NE¼ sec. 12, T. 50 S., R. 41 E. North of caretaker's house, Fort Lauderdale Golf Course. Drilled test well, diameter 4 inches, depth 68 feet. Measuring point, top of casing, 1.2 feet above land surface and 10.42 feet above mean sea level, 1929 adjustment. Water-stage recorder maintained on well since Sept. 27, 1940.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Sept. 27	2.48	Oct. 22	4.08	Nov. 19	4.83	Dec. 14	5.57
Oct. 1	2.61	29	3.16	26	5.15	21	5.93
7	3.25	Nov. 5	3.78	Dec. 1	5.29	24	4.98
15	3.67	12	4.41	8	5.74	31	4.47

F294. City of Hollywood. SE¼SE¼ sec. 9, T. 51 S., R. 42 E. NW corner of 24th Avenue and Hayes Street, Hollywood. Drilled fire well, diameter 6 inches, depth 133 feet. Measuring point, lip of hydrant, 1.8 feet above land surface and 16.08 feet above mean sea level, 1929 adjustment.

Water level, in feet below measuring point, 1940

Jan. 2	14.41	Apr. 8	14.15	July 8	14.64	Oct. 9	12.34
8	14.53	15	14.58	15	14.90	15	12.64
16	14.62	22	14.86	22	15.07	22	13.03
22	14.72	29	15.08	29	15.04	30	12.06
29	14.53	May 6	15.31	Aug. 5	14.57	Nov. 5	12.31
Feb. 5	14.75	13	15.46	12	14.30	12	12.90
12	14.52	20	15.58	19	13.64	19	13.36
19	14.38	27	15.54	26	13.04	26	13.70
26	14.43	June 3	12.77	Sept. 2	13.32	Dec. 1	13.90
Mar. 4	14.71	10	13.50	10	11.24	8	14.19
11	14.84	17	13.46	17	11.36	14	14.38
18	14.97	24	14.05	24	11.03	24	14.22
25	15.01	July 1	14.38	Oct. 1	11.83	31	13.38
Apr. 1	13.67						

GEORGIA

By M. A. Warren and A. C. Munyan

Measurements of artesian water levels and pressures in observation wells in the Coastal Plain of Georgia, which were begun in November 1938, were continued through 1940 as a part of cooperative ground-water investigations by the Federal Geological Survey and the Division of Mines, Mining and Geology, of the Georgia Department of Natural Resources. Most of the measurements were made in the part of the State that borders the Atlantic Ocean, within about 40 miles of the coast line, and in Dougherty County, in southwestern Georgia. The work in the coastal area was carried on by M. A. Warren, and that in Dougherty County by A. C. Munyan, Geologist of the State Division of Mines, Mining and Geology.

Within the coastal area 546 individual measurements were made in 103 observation wells during 1940. Forty-eight measurements, made in these wells before 1940, are also given in the following tables of well records. During 1940 water-stage recorders were operated on 4 wells (8, 79, 123, 126) in Chatham County, for all or part of the year, and a recording pressure gage was operated on well 1, Glynn County, at Brunswick, for 28 weeks during the year.

Artesian water levels in wells ending in the Ocala limestone, the principal aquifer in the coastal area, declined generally during 1940. This decline was greatest in Savannah and in the neighboring industrial area, where from November 1939 to November 1940, the water levels in wells 8, 28, 30, 50 and 74, Chatham County, declined about 11, 10½, 11, 9, and 13 feet. The declines were caused mainly by an increase in the pumpage in the industrial areas of Savannah. The pumpage during the last 3 months of 1940 is estimated to be about 4½ million gallons a day more than it was during the comparable period in 1939. The accompanying illustration shows the pumpage for the Savannah and industrial area during 1940, and another illustration shows the piezometric surface of the artesian water in Chatham County for November 1940 and also the location of the observation wells.

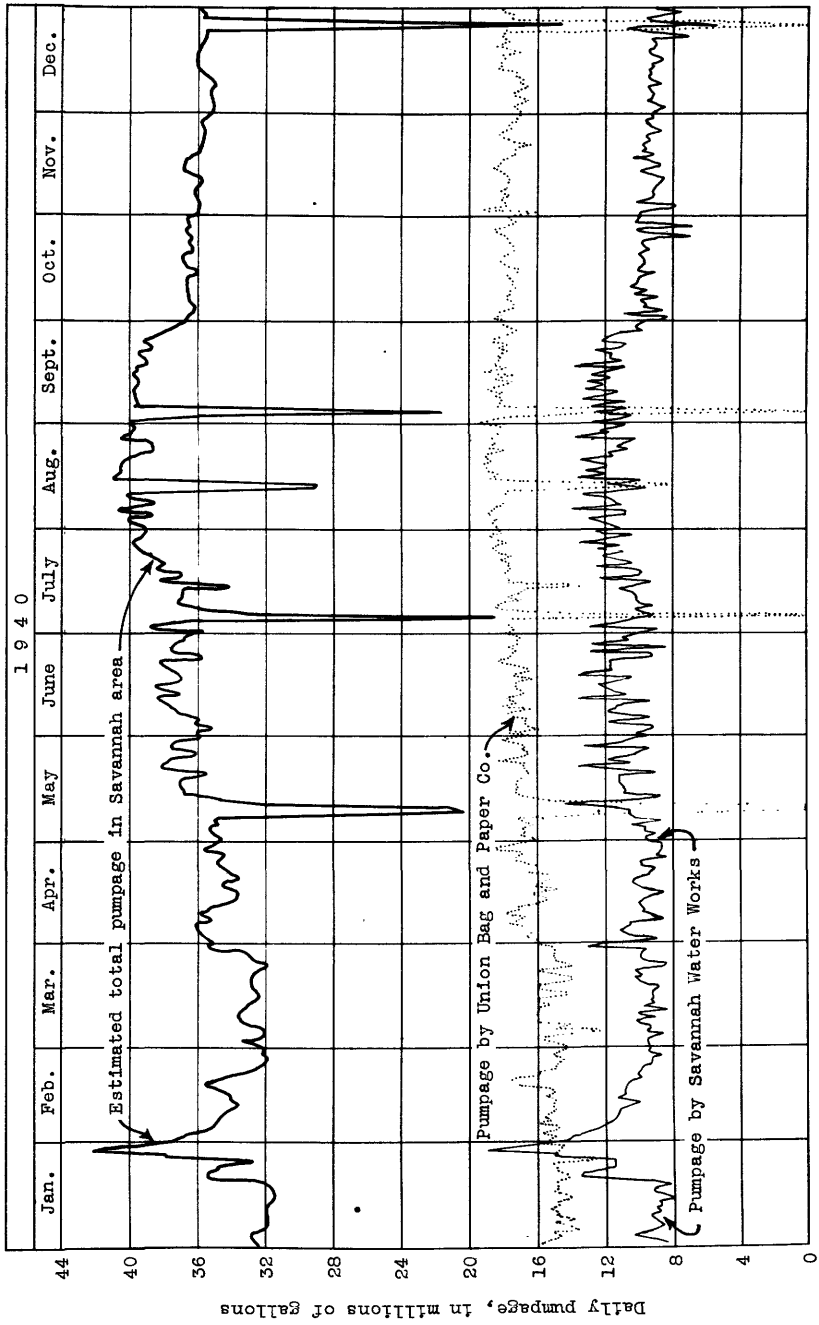

Figure 3.--Graphs showing pumpage from wells in the vicinity of Savannah, Ga., in 1940.

Throughout Bryan, Liberty, McIntosh, Glynn, Camden, and Wayne Counties the decline in artesian water levels in wells ending in the Ocala limestone ranged from 0.5 foot to 1.5 feet. This decline may have been caused by an increase in the discharge of artesian water and also to subnormal precipitation in some parts of the areas of recharge.

Only a few accurate measurements made prior to November 1938 are available for comparison with artesian water levels in 1940, but the levels in 1940 appear to be generally the lowest that have occurred to date and range from 4 feet to more than 70 feet below the estimated original water levels. At Savannah, in areas less than two miles from heavily pumped wells, the decline from the original water levels have exceeded 70 feet.

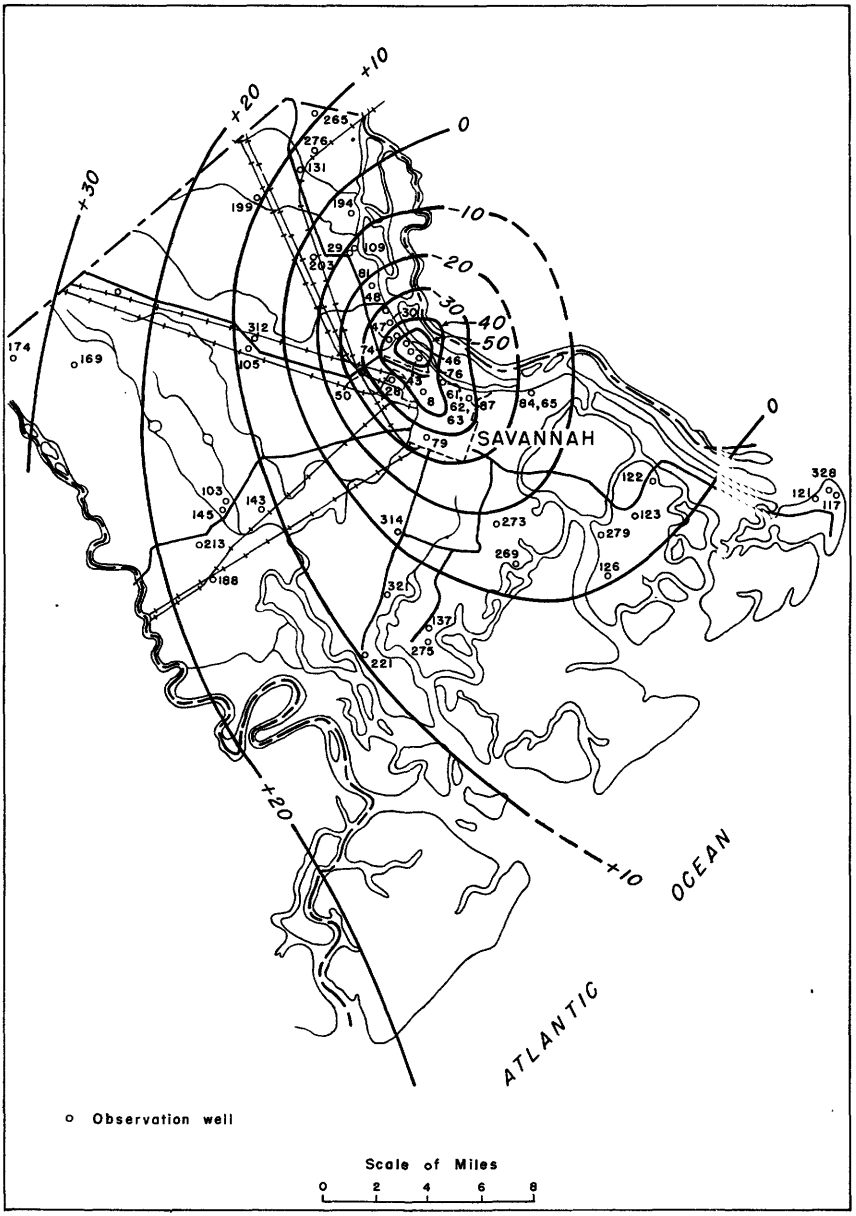

Figure 4.--Map showing piezometric surface of artesian water in November, 1940, and location of observation wells in Chatham County, Georgia. Countour lines represent the height, in feet, to which water will rise with reference to mean sea level in tightly cased wells that penetrate the Ocala limestone.

Bryan County

18. Mrs. S. P. Ratom. At Folley Farms, 5.75 miles southeast of Ways, 1 mile east of Bryan Neck Road, near fountain in garden, in front of large two story white house. Used jetted domestic well, diameter 4 inches, depth about 500 feet. Measuring point, top of 4-inch tee on well casing, 0.9 foot above land surface. Water levels, in feet above measuring point: Dec. 21, 1938, 10.0; Sept. 24, 1940, 8.3.

27. No measurements made in 1940.

41. Mrs. D. B. Gill. About 5 miles northwest of Ways. Altitude of measuring point, 17.52 feet above mean sea level. Water level, in feet above measuring point, 1940: Nov. 28, 13.0.

51. W. H. Davis. Clyde. Water level, in feet above measuring point, 1940: Nov. 8, 11.05.

52. Clyde Consolidated School. Clyde. Water level, in feet above measuring point, 1940: Nov. 8, 7.45.

63. W. C. McCallar. About 200 feet east of road, 4.5 miles north of Fleming. Used jetted domestic well, diameter 3 inches, depth 490 feet. Measuring point, top of 3-inch tee, 0.6 foot above land surface. Water levels, in feet above measuring point: Jan. 30, 1939, 16.8; Nov. 28, 1940, 15.1

71. Green Bay Baptist Church. South side of River Road, 5.5 miles west of State Highway 63, 30 feet southwest of southwest corner of Green Bay Baptist Church. Used jetted well, diameter 3 inches. Measuring point, top of 3-inch tee, 1.0 foot above land surface and about 35 feet above mean sea level. Water levels, in feet above measuring point: Feb. 20, 1939, 3.63; Nov. 8, 1940, 3.58.

87. Henry Ford. Ways. Altitude of measuring point 24.44 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	1.74	Mar. 18	1.62	Oct. 1	0.35	Nov. 27	0.57
30	1.77	Aug. 21	0.77	Nov. 12	0.37	Dec. 17	0.26
Feb. 27	1.67	Sept.24	0.39				

96. J. W. Harden. About 300 feet east Bryan Neck Road, 1.7 miles south of Keller. Used jetted domestic well, diameter 3 inches, depth 320 feet. Cased 60 feet. Measuring point, top of 3-inch tee, 1.7 feet above land surface. Water levels, in feet above measuring point: May 5, 1939, 9.3; Dec. 17, 1940, 8.0.

112. L. W. Smith. South side of River Road. About 12 miles west of State Highway 63. Used jetted domestic well, diameter 3 inches, depth 510 feet. Cased 160 feet. Measuring point, top of 3 by 2-inch bushing, 0.5 foot above land surface and about 38 feet above mean sea level. Water levels, in feet above measuring point: May 5, 1939, 8.55; Dec. 17, 1940, 5.95.

119. Henry Ford. At Kilkenny, 12¼ miles south-southeast of Ways, at north side of club house. Used jetted domestic well, diameter 2 inches. Measuring point, top of 2-inch tee on well, 0.8 foot above land surface and 10.8 feet above mean sea level. Water levels, in feet above measuring point: May 12, 1939, 9.95; Dec. 17, 1940, 8.7.

Camden County

3. Well 20 in Water-Supply Paper 886. Town of St. Marys. About 0.25 mile north of River View Hotel, St. Marys. Used jetted municipal well, diameter 6 inches, depth 539 feet. Cased 345 feet. Measuring point, top of 6-inch tee, 2.3 feet above land surface and 14.35 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	34.1	Feb. 28	34.5	Aug. 23	33.1	Nov. 14	34.0
31	33.7	Mar. 21	34.2	Oct. 2	33.7	Dec. 19	33.5

8. M. L. Hill. Kingsland. Altitude of measuring point, 36.5 feet above mean sea level. Town well 94. Not flowing when measurements were made.

Water level, in feet above measuring point, 1940

Jan. 19	23.5	Feb. 28	23.9	Aug. 23	23.3	Nov. 14	23.2
31	23.45	Mar. 21	23.75	Oct. 2	23.7	Dec. 20	22.7

12. Hopkins and Southwell Co. Kingsland. About 50 feet west of U. S. Highway 17 on north side of town street, one block north of State Highway 40, at Sinclair Filling Station, north side of board fence. Used jetted domestic well, diameter 3 inches. Measuring point, top of 3-inch cross on casing, 1.5 feet above land surface and 36.9 feet above mean sea level.

Water level, in feet above measuring point, 1938-40

Date	Water level	Date	Water level	Date	Water level
Nov. 14, 1938	23.9	Aug. 23	22.7	Nov. 14	22.6
Feb. 28, 1940	23.2	Oct. 2	23.0	Dec. 20	22.0

18. L. O. Harris. East side of State Highway 40, 0.75 mile north of River View Hotel, St. Marys. Altitude of measuring point, 11.35 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	38.3	Feb. 28	38.9	Aug. 23	38.2	Nov. 14	38.3
31	38.5	Mar. 21	38.75	Oct. 2	38.05	Dec. 19	37.80

19. Camden Training School. Behind school building on east side of highway, about 1 mile north of River View Hotel, St. Marys. Altitude of measuring point, 12.7 feet above mean sea level.

Water level, in feet above measuring point, 1940

Jan. 19	37.8	Feb. 28	38.1	Aug. 23	37.0	Nov. 14	37.5
31	37.8	Mar. 21	38.0	Oct. 2	37.3		

32. No measurements made in 1940.

39. Holland and Halter Fishery. West side of North River, 1.5 miles north of River View Hotel, St. Marys.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level
Jan. 19	37.8	Aug. 23	36.85	Dec. 19	37.0
Mar. 21	37.9	Oct. 2	37.3		

Camden County--Continued.

61. Camden properties. At Billysville, about 3.5 miles southeast of Woodbine, 2 miles east of Colesburg, north side of county road at tenant quarters. Used jetted domestic well, diameter 3 inches. Measuring point, top of 3-inch cross on casing, 1.8 feet above land surface and about 24 feet above mean sea level.

Water level, in feet above measuring point, 1939-40

Date	Water level	Date	Water level	Date	Water level
June 22, 1939	36.7	Oct. 2	35.5	Nov. 14	35.1
Aug. 23, 1940	35.4				

66. No measurements made in 1940.

68. Kings Bay Club. At Kings Bay, about 10 miles east of Kingsland and about 4 miles northeast of St. Marys. Used jetted domestic well, diameter 3 inches, depth 525 feet. Cased 320 feet. Measuring point, top of 3-inch cross, 1.5 feet above land surface and about 12 feet above mean sea level. Water level affected by tide.

Water level, in feet above measuring point, 1939-40

June 23, 1939	47.5	Feb. 28	44.2	Oct. 2	44.0
Jan. 19, 1940	44.35	Mar. 21	44.2	Dec. 19	43.8
31	44.2	Aug. 23	44.5		

78. White Oak Public School. White Oak, about 0.1 mile south of county road to Tarboro, about 400 feet west of Seaboard Railroad. Used jetted public well, diameter 2 inches. Measuring point, top of 2-inch cross on casing, 2.5 feet above land surface.

Water level, in feet above measuring point, 1939-40

Sept.14, 1939	42.3	Oct. 2	41.3	Dec. 20	40.2
Aug. 23, 1940	41.25	Nov. 13	40.75		

144. T. C. Heygood. Woodbine, about 100 feet east of U. S. Highway 17, 0.5 mile south of Camden County Courthouse. Used jetted domestic well, diameter 3 inches, depth 410 feet. Cased about 300 feet. Measuring point, top of 3-inch cross on casing, 1 foot above land surface. Water levels, in feet above measuring point: Dec. 8, 1939, 39.1; Aug. 22, 1940, 37.6; Oct. 2, 1940, 39.1; Nov. 13, 1940, 38.2.

Chatham County

8. Owner's number 8. City of Savannah. Stiles Ave., Savannah. Altitude of measuring point, 8.32 feet above mean sea level. Equipped with Stevens automatic water-stage recorder. Daily fluctuations of water levels mostly due to pumping of city wells 2,100 to 5,800 feet distant.

Highest and lowest water level each week, in feet below measuring point, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	35.53	Feb. 16	44.06	Mar. 31	40.78	May 16	49.67
5	42.28	19	38.06	Apr. 4	47.26	19	42.39
7	35.88	21	43.43	7	41.32	21	50.65
11	39.64	25	38.48	11	46.16	27	41.85
14	35.83	28	43.11	14	40.31	27	47.00
20	45.20	Mar. 6	38.53	17	46.38	June 2	43.13
25	39.02	8	42.27	21	40.96	5	46.72
27	49.00	10	38.99	24	47.57	10	43.23
30	50.50	13	43.44	28	42.10	14	46.80
Feb. 3	44.78	17	39.15	May 1	46.94	16	43.59
8	46.28	20	44.77	7	49.62	20	48.76
10	40.01	24	38.78	11	38.82	24	44.53
12	38.70	29	47.97	12	38.96	27	48.58

Chatham County--Continued.

8.--Continued.

Highest and lowest water level each week, in feet below measuring point, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
July 1	48.00	Sept. 4	42.15	Oct. 13	49.26	Nov. 24	48.88
5	41.08	6	52.28	14	53.56	29	52.27
8	42.82	9	46.40	22	53.16	Dec. 1	48.33
9	47.91	11	55.17	26	46.26	4	52.17
15	44.37	15	48.10	27	46.22	8	47.82
16	49.25	17	55.82	Nov. 1	56.24	13	51.83
Aug. 15	45.58	23	47.37	5	50.55	15	48.13
17	52.26	24	54.26	8	57.15	17	51.66
18	46.96	30	46.59	11	49.19	21	51.14
20	53.06	Oct. 3	53.81	13	53.25	28	38.95
26	47.95	6	49.55	17	49.45	29	44.18
26	54.59	10	53.66	18	52.42	31	48.97

28. Reliance Fertilizer Company. About 300 feet south of Louisville Road and about 2 miles west of West Broad Street, Savannah. Altitude of measuring point, 17.87 feet above mean sea level.

Water level, in feet below measuring point, 1940

Jan. 6	45.60	Apr. 13	50.00	July 20	53.70	Oct. 26	56.62
13	45.67	20	49.38	Aug. 3	55.87	Nov. 2	57.02
20	45.69	27	51.32	10	57.20	9	57.61
27	49.82	May 4	51.14	17	55.72	16	56.77
Feb. 3	50.95	11	43.23	24	57.22	30	56.22
10	48.73	18	46.85	31	56.84	Dec. 7	55.44
17	48.73	25	47.43	Sept. 7	59.62	14	55.96
Mar. 2	48.53	June 8	51.98	14	56.66	28	47.94
16	48.70	15	48.64	21	57.26	30	52.48
23	49.30	22	50.16	28	56.50	31	53.82
30	50.18	29	53.50	Oct. 5	56.95		
Apr. 6	51.40	July 6	50.48	12	56.81		

29. Port Wentworth Corp. About 300 feet east of U. S. Highway 17, near elevated steel tank, Port Wentworth. Used drilled municipal well, diameter 12 inches, depth 502 feet. Cased 200 feet. Measuring point, top edge of hole in pump base plate, 1.5 feet above land surface and 17.3 feet above mean sea level. Water levels, in feet below measuring point: Apr. 11, 1939, 18.55; Aug. 16, 1940, 24.15; Oct. 17, 1940, 25.9.

30. Dixie Asphalt Co. About 475 feet southwest of Savarnah River, 3.4 miles northwest of Savannah City Hall. Altitude of measuring point, 11.5 feet above mean sea level.

Water level, in feet below measuring point, 1940

Jan. 6	38.4	Apr. 6	45.00	July 13	47.10	Oct. 12	50.85
13	38.01	20	43.17	20	50.77	19	50.42
20	38.7	27	a49.48	27	50.73	26	51.01
27	40.89	May 4	a49.73	Aug. 3	a53.30	Nov. 2	49.98
Feb. 3	43.32	11	37.16	10	a54.41	9	51.1
10	41.46	18	45.26	17	49.98	16	a54.77
17	42.46	25	39.14	24	a54.89	23	50.25
24	41.97	June 1	43.11	31	51.3	30	49.44
Mar. 2	42.13	8	45.63	Sept. 7	49.33	Dec. 7	49.20
9	42.40	15	48.31	14	50.46	14	49.15
16	42.51	22	49.87	21	a55.1	21	49.25
23	42.64	29	50.37	28	51.4	28	41.29
30	43.18	July 6	43.36	Oct. 5	50.58		

a Pump on well running, drawdown approximately 4 feet.

Chatham County--Continued.

43. Owner's number 215-A. Southern Cotton Oil Co. About 50 feet north of Lathorp Ave. North, about 1,700 feet southeast of intersection of Lathorp Ave. North and Lathorpe Ave. West, Savannah. Used drilled industrial well, diameter 12 inches, depth 1,000 feet. Cased 220 feet. Measuring point, hole in pump base plate, 1 foot above land surface, and 8.8 feet above mean sea level. Water level affected by pumpage in Savannah and industrial vicinity. Water levels, in feet below measuring point, 1940: Sept. 16, 61.6; Oct. 18, 62.20; Nov. 6, 61.87; Nov. 30, 57.92.

46. Owner's number 5. Union Bag and Paper Corp., Savannah. Altitude of measuring point, about 10.5 feet above mean sea level. Measurements made with air line, and supplied through courtesy of Union Bag and Paper Corp. All wells of Union Bag and Paper Corp. were being pumped at the time measurements were made. Water levels, in feet below measuring point, 1940: Aug. 27, 101; Sept. 19, 106.8; Oct. 8, 105.6.

47. No measurements made in 1940.

48. Southeastern Warehouse and Compress Co. About 200 feet west of Savannah River, about 50 feet north of boiler room, 3.9 miles northwest of Savannah City Hall. Used drilled industrial well, diameter 8 inches, depth 539 feet. Cased 239 feet. Measuring point, hole in pump base plate, 15.7 feet above mean sea level. Water levels, in feet below measuring point, 1940: Sept. 12, 46.93; Oct. 17, 46.53; Nov. 16, 46.89.

50. Hercules Powder Co. South side of Louisville Road, 3.2 miles west of West Broad St., Savannah. Altitude of measuring point, 14.83 feet above mean sea level. Measurements made while well about 510 feet west was discharging.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	34.15	Apr. 6	38.80	July 6	38.21	Oct. 5	44.12
13	34.36	13	37.99	13	41.00	12	43.99
20	34.39	20	37.67	20	41.87	19	43.86
27	36.72	27	39.09	27	38.10	26	43.87
Feb. 3	38.48	May 4	39.26	Aug. 3	44.29	Nov. 2	43.96
10	37.36	10	32.79	10	44.25	9	44.49
17	37.12	18	39.19	17	42.94	16	43.72
24	36.93	25	34.13	24	44.06	23	43.67
Mar. 2	36.8	June 1	32.80	31	43.80	30	43.34
9	36.96	8	39.97	Sept. 7	42.68	Dec. 7	42.92
16	37.02	15	35.87	14	43.98	14	43.14
23	37.27	22	35.89	21	44.48	21	42.87
30	37.60	29	41.36	28	43.92	28	36.20

61. Colonial Ice Co. In engine room of plant, north of intersection of Indian and McGuire Sts., Savannah. Altitude of measuring point, 17.2 feet above mean sea level. Water level, in feet below measuring point, 1940: Nov. 2, 56.81.

62. Colonial Ice Co. In east part of building, north of intersection of Indian and McGuire Sts., Savannah. Altitude of measuring point, 26.06 feet above mean sea level. Water levels, in feet below measuring point, 1940: Jan. 24, 58.0; Nov. 2, 65.70.

63. Colonial Ice Co. Five feet northwest of McGuire St. and about 105 feet northeast of Indian St. Unused drilled industrial well, diameter 12 inches, depth 500 feet. Cased 120 feet. Measuring point, hole in pump base plate, 0.7 foot above concrete floor and 20.07 feet above mean sea level. Water levels, in feet below measuring point: Oct. 18, 1939, 47.77; Nov. 2, 1940, 59.64; Dec. 28, 1940, 51.16; Dec. 31, 1940, 57.18.

Chatham County--Continued.

65. Standard Oil Company. Near south bank of Savannah R'ver, 2.9 miles east of Savannah City Hall. Altitude of measuring point, 5.9 feet above mean sea level. Measurements discontinued Aug. 3, 1940.

Oil level, in feet below measuring point, 1940

Date	Oil level	Date	Oil level	Date	Oil level	Date	Oil level
Jan. 6	18.02	Mar. 2	19.15	May 11	19.09	July 6	18.81
20	18.52	16	19.06	June 8	20.44	20	25.13
Feb. 3	21.30	30	19.92	22	20.32	Aug. 3	26.57
17	20.08	Apr. 27	19.32				

74. Certain-teed Products Corporation. In boiler room of plant, about 900 feet southwest of Savannah River, 3 miles northwest from Savannah City Hall. Altitude of measuring point, 13.2 feet above mean sea level.

Oil level, in feet below measuring point, 1940

Jan. 6	47.27	Apr. 13	53.64	July 13	a63.69	Oct. 5	62.44
13	47.42	20	53.47	20	59.73	12	a66.10
20	47.7	27	a61.12	27	a59.89	19	61.74
27	51.56	May 4	56.65	Aug. 3	62.26	26	63.06
Feb. 3	53.90	11	42.33	10	a65.84	Nov. 2	61.76
10	51.40	18	56.72	17	a65.56	9	62.42
17	52.64	25	44.30	24	63.22	16	63.22
Mar. 2	52.92	June 1	54.97	31	63.49	23	61.87
9	53.60	8	56.34	Sept. 7	61.31	30	61.4
16	52.70	15	52.79	14	62.60	Dec. 7	60.17
23	52.89	22	60.08	14	a65.83	14	60.64
30	a58.04	29	59.26	21	62.70	21	60.23
Apr. 6	56.74	July 6	55.20	28	63.05	28	55.74

76. Pierpont Manufacturing Co. About 700 feet northeast of intersection of Lathorp Ave. North, and Lathorp Ave. West, 2.1 miles northwest of Savannah City Hall. Unused drilled industrial well, diameter 3 inches, depth 378 feet. Measuring point, top of 3-inch casing, 1 foot above land surface and 13.1 feet above mean sea level. Water level affected by pumpage in Savannah and industrial vicinity.

Water level, in feet below measuring point, 1939-40

Date	Water level	Date	Water level	Date	Water level
May 8, 1939	54.26	Oct. 22	71.01	Nov. 30	69.49
Oct. 18, 1940	72.30	Nov. 6	71.90		

79. Georgia Ice Co. About 300 feet west of intersection of Bull St. and Atlantic Coast Line Railroad, about 55 feet north of Victory Drive, Savannah. Measuring point, top of 12-inch coupling flush with concrete floor of pump house and 38.8 feet above mean sea level. Water level affected by pumpage in Savannah and vicinity. Automatic water-stage recorder installed on well.

Highest and lowest water level each week,
in feet below measuring point, 1940
(from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	58.73	Feb. 20	58.63	Apr. 1	60.08	May 14	61.51
8	56.54	23	59.80	5	61.84	16	64.62
15	56.59	27	58.54	8	60.36	20	61.32
20	59.55	Mar. 1	59.55	8	62.15	21	64.08
24	58.72	3	59.95	15	60.06	26	62.12
27	63.44	7	58.54	18	61.66	June 1	64.74
29	65.64	11	58.57	21	60.28	5	62.42
Feb. 3	62.24	15	59.67	24	63.55	7	65.02
4	63.33	18	58.72	29	61.28	9	63.08
10	60.15	20	60.15	May 4	64.02	11	65.62
12	60.89	25	59.05	10	66.90	Aug. 16	65.69
16	59.54	30	63.18	11	61.65	17	66.94

a Pump on well running, drawdown approximately 3¼ feet.

Chatham County--Continued.

79.--Continued.

Highest and lowest water level each week, in feet below measuring point, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Aug. 19	66.07	Sept.22	66.42	Oct. 27	63.05	Nov. 25	63.53
21	68.78	23	67.98	Nov. 1	65.03	Dec. 2	63.21
25	66.10	30	66.92	3	67.20	4	64.03
30	68.85	Oct. 1	64.42	8	64.25	9	62.98
Sept. 2	68.06	6	65.77	10	65.5	13	63.99
7	66.18	7	64.42	11	63.55	16	62.96
9	65.90	13	65.30	20	64.68	18	64.01
13	68.36	14	63.99	22	63.79	23	63.72
15	66.55	21	63.00	24	64.60	28	58.65
18	68.23	25	65.16				

81. Gordon Saussy. About 300 feet south of Savannah Sugar Refining Corporation, about 300 feet west of Savannah River, about 1 mile southeast of Port Wentworth, 5.3 miles northwest of Savannah City Hall. Used drilled domestic well, diameter 6 inches, depth 522 feet. Measuring point, top of 6-inch casing which is flush with land surface and 15.1 feet above mean sea level. Water levels, in feet below measuring point, 1940: Oct. 22, 36.35; Oct. 23, 36.91.

84. Standard Oil Company. About 150 feet south of Savannah River, 2.9 miles east of Savannah City Hall. Used drilled industrial well, diameter 10 inches, depth 652 feet. Cased 230 feet. Measuring point, ½-inch hole in pump base plate, 0.5 foot above pump house floor and 6.1 feet above mean sea level.

Water level, in feet below measuring point, 1940

Aug. 31	26.63	Oct. 12	24.71	Nov. 9	23.58	Dec. 7	23.37
Sept.14	26.64	25	23.94	23	23.87	21	22.45
28	25.94						

87. Savannah Gas Company. About 80 feet south of Bay St., east side of Reynolds St., about 55 feet west of Central of Georgia Railroad, Savannah. Used drilled industrial well, diameter 12 inches, depth 695 feet. Cased 241 feet. Measuring point, hole in pump base plate, 1.5 feet above surface and 20.46 feet above mean sea level. Measurements taken while well was discharging 550 gallons a minute, drawdown about 6 feet. Water levels, in feet below measuring point, 1940: Sept. 27, 59.15; Oct. 18, 56.7.

103. Measurements discontinued.

105. Pratt Gay. South side of Louisville Road near intersection with Pine Barren Road, 8 miles west of Savannah. Altitude of measuring point, 11.56 feet above mean sea level.

Water level, in feet below measuring point, 1940

Feb. 3	.50	Mar. 9	.22	Apr. 20	.85	June 1	.90
17	.49	23	.58	May 4	1.30	15	.90
24	.54	30	.40	18	1.00	Aug. 31	3.29
Mar. 2	.45	Apr. 6	.90				

109. State Highway Department of Georgia. South of west abutment of the Coastal Highway Bridge over the Savannah River. Altitude of measuring point, 7.9 feet above mean sea level. Water level affected by tide in river and pumpage in Savannah and vicinity. Water levels, in feet below measuring point, 1940: Jan. 10, 9.68; Feb. 24, 11.33; Aug. 16, 15.28.

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Chatham County--Continued.

112. Mrs. L. O. Givens. About 200 feet north of Central of Georgia Railroad station, about 90 feet west of town street, Bloomingdale. Used drilled domestic well, diameter 2 inches, depth about 360 feet. Measuring poing, top of 2-inch tee, 3.0 feet above land surface and 24.4 feet above mean sea level.

Water level, in feet with reference to measuring point, 1938-40

Date	Water level	Date	Water level	Date	Water level
Nov. 10, 1938	+2.19	Mar. 12, 1940	+1.65	Oct. 23, 1940	-0.22
Mar. 3, 1939	+2.63	Aug. 17	+0.62		

117. War Department. About 300 feet south of old lighthouse, Fort Screven, Tybee Island. Used drilled municipal well, diameter 9 inches, depth 602 feet. Cased 125 feet. Measuring point, top of cap screwed on casing, 0.25 foot above land surface and 6.7 feet above mean sea level. Water level affected by tide.

Water level, in feet below measuring point, 1939-40

Date	Hour	Water level	Date	Hour	Water level
Oct. 5, 1939	5:30 p.m.	4.33	Oct. 31, 1940	1:35 p.m.	6.02
Apr. 3, 1940	11:40 a.m.	4.90	Dec. 12	2:30 p.m.	5.54
Sept.20,	5:50 p.m.	5.50	13	1:00 p.m.	6.25
Oct. 24	1:55 p.m.	3.17	13	1:45 p.m.	6.04
31	1:15 p.m.	5.78			

121. Robert Schneider. Northwest part of Tybee Island. Altitude of measuring point 5.8 feet above mean sea level. Water level affected by tide.

Water level, in feet below measuring point, 1940

Apr. 3	3:30 p.m.	2.40	Oct. 31	1:45 p.m.	5.00
Sept.20	6:00 p.m.	4.53	Dec. 12	4:55 p.m.	3.76
Oct. 24	2:57 p.m.	2.73			

122. State Highway Department of Georgia. Wilmington Island, south bank of Bull River, about 40 feet east of U. S. Highway 80. Used jetted domestic well, diameter 3 inches, depth 245 feet. Measuring point, top of 3-inch tee, 0.5 foot above land surface and 9.07 feet above mean sea level. Water level affected by tide. Water levels, in feet below measuring point: May 19, 1938, 5:30 p.m., 8.01; Oct. 24, 1940, 11:35 a.m., 10.30; Oct. 31, 1940, 2:00 p.m., 10.88; Dec. 12, 1940, 1:50 p.m., 10.65.

123. Henry Walthour. Wilmington Island. Measuring point, top of 3-inch casing, 5.2 feet above mean sea level. Daily fluctuation in water level due mostly to tide. Daily fluctuations about 1.0 foot during greatest spring range of tide, but decreases to about 0.3 foot during some neap tides. Automatic water level recorder installed Jan. 26, 1940.

Highest and lowest water level each week, in feet below measuring point, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 28	4.35	Mar. 3	4.97	Apr. 7	4.49	May 24	4.57
Feb. 3	5.33	8	3.81	13	5.36	25	5.41
7	4.32	10	4.25	18	5.28	26	4.83
9	5.26	15	5.01	19	4.32	31	4.63
15	5.42	17	5.04	29	5.32	June 2	5.13
17	4.69	22	4.05	May 2	4.64	8	6.01
18	4.10	24	4.02	6	5.45	9	5.43
23	5.34	26	5.24	10	4.47	14	6.27
25	4.28	Apr. 6	5.23	11	4.56	19	5.57
26	5.19	6	4.59	15	5.36	22	6.50

Chatham County--Continued.

123.--Continued.

Highest and lowest water levels each week, in feet below measuring point, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
June 23	5.76	Aug. 11	5.45	Oct. 1	5.99	Nov. 19	6.87
29	6.71	17	6.94	5	7.23	23	6.24
July 4	6.77	22	6.12	6	7.18	26	5.54
5	5.84	24	7.01	8	6.31	28	6.78
7	5.72	30	7.12	13	6.94	Dec. 1	5.85
13	6.73	31	6.11	17	6.09	6	6.69
16	5.78	Sept. 1	6.03	21	6.06	12	6.68
19	6.77	4	7.18	26	6.80	14	6.11
21	6.21	11	7.15	29	6.89	18	6.73
27	6.78	12	6.38	30	5.84	20	5.82
30	7.10	15	6.46	Nov. 3	6.86	22	6.43
Aug. 3	5.82	21	7.26	7	6.01	27	5.12
4	5.95	23	7.27	11	5.99	28	5.43
9	7.14	28	6.20	16	6.83	31	6.48

126. Atlantic Mutual Fire Insurance Co. South end of Wilmington Island. Altitude of measuring point, about 15 feet above mean sea level. Daily fluctuation in water levels due mostly to tide. Daily fluctuation is about 1.5 feet during greatest spring range of tide, but decreases to about 0.6 foot during some neap tides. Automatic water-stage recorder in operation on well Sept. 13 to Dec. 13, 1940.

Highest and lowest water levels each week, in feet below measuring point, 1940 (from recorder charts)

Sept.15	14.76	Oct. 6	15.83	Oct. 29	15.60	Nov. 26	13.69
19	15.93	8	14.60	Nov. 2	13.9	28	15.54
22	15.86	14	15.59	11	14.26	Dec. 2	15.36
28	14.42	17	14.34	16	15.44	3	14.13
Oct. 1	14.23	21	14.31	19	15.60	12	15.37
5	15.86	26	15.52	23	14.54	13	14.42

131. C. E. Oliver. East of Augusta Road, 0.75 mile north of grade crossing of Atlantic Coast Line Railroad at Monteith. Altitude of measuring point, 14.31 feet above mean sea level. Water levels, in feet below measuring point, 1940: Aug. 16, 6.09; Oct. 22, 7.19.

137. C. P. Rowland. East side of Ferguson Ave., about 0.3 mile north of intersection at Ferguson Ave. and Ship Yard Road, Montgomery. Used jetted domestic well, diameter 3 inches, reported depth about 400 feet. Measuring point, top of 3-inch casing, 0.2 foot above land surface. Water levels, in feet below measuring point: Nov. 25, 1938, 8.52; Sept. 27, 1940, 10.06; Dec. 12, 1940, 10.56.

143. M. B. Lane. Lebanon Plantation. Altitude of measuring point, 7.07 feet above mean sea level. Water levels, in feet above measuring point, 1940: Aug. 21, 4.96; Sept. 24, 4.27; Nov. 12, 4.29.

145. A. G. Gillespie. About 8.5 miles southwest of Savannah. Measuring point to Aug. 21, 1940, top of 3-inch tee, 1.8 feet above land surface; measuring point since Sept. 24, 1940, top of 3-inch elbow on overflow pipe, 1.1 feet above land surface and about 0.8 foot lower than measuring point used prior to Aug. 21, 1940.

Water level, in feet above measuring point, 1940

Jan. 15	3.30	Mar. 18	2.81	Oct. 10	1.68	Nov. 28	1.41
30	3.08	Aug. 21	1.32	Nov. 12	1.49	Dec. 17	1.53
Feb. 27	2.95	Sept.24	1.59				

Chatham County--Continued.

169. L. J. Carter. Pine Barren Road, north side, 2.75 miles east of Ogeechee River. Used jetted domestic well, diameter 3 inches, depth 365 feet. Cased 115 feet. Measuring point, top of 3-inch tee, 1.5 feet above land surface. Water levels, in feet above measuring point: Dec. 1, 1938, 5.04; Nov. 8, 1940, 3.53.

174. Mrs. Eda W. Sapp. About 750 feet north of Pine Barren Road, about 0.5 mile east of Ogeechee River. Used jetted domestic well, diameter 3 inches, depth about 340 feet. Measuring point, top of 3-inch tee, 2.5 feet above land surface. Water levels, in feet above measuring point: Dec. 1, 1938, 8.8; Nov. 8, 1940, 7.1.

188. A. C. Colbert. Burroughs, between Sea Board Railroad and Atlantic Coast Line Railroad. Used jetted domestic well, diameter 3 inches, depth about 370 feet. Cased 110 feet. Measuring point, top of 3-inch tee, 0.6 foot above land surface. Water levels, in feet above measuring point: Dec. 5, 1938, 4.62; Sept. 24, 1940, 1.51.

194. Mrs. W. W. Keller, Sr. Drakies Bluff, on Savannah River. Altitude of measuring point, 16.1 feet above mean sea level. Water level, in feet below measuring point, 1940: Oct. 23, 19.27.

199. Mrs. H. F. Keller. Meinhard. Altitude of measuring point, 20.27 feet above mean sea level. Water levels, in feet below measuring point, 1940: Aug. 17, 9.27; Oct. 22, 10.76.

203. Atlantic Coast Line Railroad. Cherokee Hill. Altitude of measuring point, 31.10 feet above mean sea level. Water level, in feet below measuring point, 1940: Feb. 24, 29.14.

213. J. L. Budreau. Southwest of intersection of Burroughs Road and Ogeechee Road. Measuring point to Sept. 1, 1940, top of 1-inch coupling, 2.5 feet above land surface and 1.30 feet above bench mark. Measuring point since Sept. 1, 1940, end of 3-inch overflow pipe, 0.5 foot above land surface and 0.73 foot below bench mark. Bench mark, northeast end of concrete base for gasoline pumps at J. F. Zipperer's store on north side of Ogeechee Road opposite well 213.

Water level, in feet above bench mark, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	3.30	Mar. 18	2.90	Oct. 1	1.05	Nov. 27	1.23
30	3.16	Aug. 21	1.52	3	1.01	Dec. 17	0.96
Feb. 27	3.02	Sept.24	1.03	Nov. 12	1.03		

221. J. L. Joyce. Coffee Bluff. Measuring point, top of 3½-inch coupling on casing, about 1 foot above land surface and 16.3 feet above mean sea level. Water level affected by tide. Water levels, in feet below measuring point, 1940: Sept. 27, 5.19; Nov. 7, 6.04; Dec. 11, 6.47.

266. J. H. Chisholm. At Rice Hope plantation 3.5 miles north of Monteith, 1 mile east of the Augusta Road. Used jetted domestic well, diameter 2 inches, depth about 300 feet. Measuring point top of 3-inch tee on well casing, about 0.75 foot above land surface and 13.8 feet above mean sea level. Water levels, in feet with reference to measuring point: May 4, 1939, +0.30; Oct. 22, 1940, -3.54.

269. W. H. Pierpont. East part of Isle of Hope, about 400 feet north of Skidaway River, about 200 feet east of a large two story, white colonial house of W. H. Pierpont. Used drilled domestic well, diameter 8 inches, depth 521 feet. Cased 160 feet. Measuring point, lower, east inside edge of 8-inch tee, where fire hose connects, about 0.9 foot above land surface and 10.8 feet above mean sea level. Water level affected by tide. Water levels, in feet below measuring point: May 8, 1939, 9.75; Aug. 27, 1940, 12.91; Dec. 12, 1940, 12.92.

Chatham County--Continued.

273. C. A. Gross. West side of Isle of Hope Road, about 0.9 mile north from intersection of Isle of Hope Road and Ferguson Ave. Used jetted domestic well, diameter 3 inches, depth about 360 feet. Measuring point, top of 3-inch casing, about 7 feet above mean sea level. Water level affected by tide.

Water level, in feet below measuring point, 1939-40

Date	Hour	Water level	Date	Hour	Water level
May 26, 1939	10:30 a.m.	13.54	Sept.27, 1940	2:25 p.m.	17.50
26	1:05 p.m.	13.30	Dec. 12	10:30 a.m.	16.18
Aug. 3	12:50 p.m.	15.06	12	12:50 p.m.	16.30

275. R. J. Travis. Avalon. Measuring point, end of 4-inch overflow pipe. Measuring point lowered about 0.6 foot, July 1940. Measuring point after July 1940 is 3.14 feet below concrete base for gasoline pump east of garage. Water level affected by tide. Water levels, in feet with reference to measuring point, 1940: Sept. 27, 3:30 p.m., +0.35; Sept. 27, 4:00 p.m., +0.48; Dec. 12, 12:50 p.m., -0.22.

276. Miss Armstrong. About 150 feet west of Atlantic Coast Line Railroad, 2.5 miles northeast of Monteith. Used jetted domestic well, diameter 3 inches. Measuring point, top of 3-inch coupling, 0.85 foot above land surface and 16.13 feet above mean sea level. Water levels, in feet below measuring point: June 7, 1939, 6.45; Oct. 22, 1940, 8.61.

279. Dewitt Hotel Corporation. In southeast part of basement of Savannah-Oglethorpe Hotel, Wilmington Island. Used drilled well, diameter 12 inches. Measuring point, hole in iron plate cap on well, about 6 feet below land surface and 11.1 feet above mean sea level. Water levels, in feet below measuring point: Aug. 1, 1939, 11.94; Oct. 24, 1940, 13.23; Oct. 31, 1940, 13.78.

312. Miss Mamie Taylor. About 50 feet northeast of Louisville Road, about 0.4 mile northwest from intersection with Pine Barren Road. Used jetted domestic well, diameter 3 inches, depth 406 feet. Cased 80 feet. Measuring point top of 3-inch tee, 0.5 foot above land surface and 13.55 feet above mean sea level.

Water level, in feet below measuring point, 1939-40

Date	Water level	Date	Water level	Date	Water level
Sept.30, 1939	1.55	June 15	2.32	Oct. 12	4.80
Feb. 24, 1940	1.69	29	2.56	26	4.78
Mar. 2,	1.61	July 27	2.15	Nov. 8	4.82
9	1.38	Aug. 10	4.25	23	4.87
23	1.72	31	4.24	Dec. 7	4.65
30	1.55	Sept.14	4.38	21	4.52
Apr. 6	2.01	28	4.70	28	3.59

314. J. M. Breckenridge. About 5.6 miles south of Savannah City Hall, 0.1 mile east of White Bluff Road, 0.3 mile north of Montgomery Cross Roads. Used drilled irrigation well, diameter 10 inches, depth 601 feet. Cased 255 feet. Measuring point, hole in pump base plate, 1.0 foot above land surface. Water levels, in feet below measuring point, 1940: Jan. 29, 24.0; Nov. 7, 26.91; Dec. 11, 26.45.

321. R. C. Hinely. About 8.25 miles south of Savannah City Hall, about 100 feet north of Vernonburg Ave., 0.1 mile east of White Bluff Road. Used jetted domestic well, diameter 3 inches, depth 365 feet. Measuring point, ¼-inch tap hole in 3 by 1-inch reducer, 1.7 feet above land surface and about 16.5 feet above mean sea level. Water levels, in feet below measuring point, 1940: Nov. 7, 10.30; Dec. 11, 10.47.

Chatham County--Continued.

328. War Department. Fort Screven, Tybee Island, about 600 feet west of lighthouse, about 70 feet northeast of center line of road, at foot of a sand dune. Unused drilled well, diameter 3 inches, depth 136 feet, measuring point, top of 3-inch nipple screwed on 3-inch casing, 1.3 feet above land surface and 6.9 feet above mean sea level. Automatic water-stage recorder installed on well Dec. 13, 1940. Water level affected by tide.

Water level, in feet below measuring point, 1940

Date	Hour	Water level	Date	Hour	Water level
Dec. 14	1:45 p.m.	6.56	Dec. 18	4:15 p.m.	6.40
14	7:30 a.m.	3.43	18	10:45 a.m.	3.63
15	2:30 p.m.	6.23	19	11:30 a.m.	3.26
15	8:30 a.m.	3.32	19	5:30 p.m.	6.23
16	9:15 a.m.	3.02	20	12:15 p.m.	3.14
16	3:30 p.m.	6.21	20	6:15 p.m.	5.99
17	10:00 a.m.	3.74	21	7:30 a.m.	5.95
17	4:15 p.m.	6.64	21	1:15 p.m.	3.20

Dougherty County

3. Albany recorder well. Albany.

Water level, in feet below measuring point, 1940
(from recorder charts)

Date	Highest Water level	Lowest Water level
Jan. 22 to Jan. 29	36.55	38.62
Jan. 29 to Feb. 5	36.99	39.03
Feb. 5 to Feb. 12	36.92	38.01
Feb. 20 to Feb. 27	32.12	33.33
Feb. 28 to Mar. 6	31.79	33.36
Mar. 6 to Mar. 13	33.21	34.55
Mar. 13 to Mar. 20	32.67	33.95
Mar. 20 to Mar. 27	32.45	33.91
Mar. 27 to Apr. 3	32.81	34.33
Apr. 3 to Apr. 10	33.34	35.81
Apr. 11 to Apr. 18	31.62	33.56
Apr. 19 to Apr. 26	32.71	34.46
Apr. 26 to May 3	32.37	34.26
May 3 to May 11	32.45	34.61
May 11 to May 18	36.07	38.49
May 25 to June 1	35.73	37.9
June 5 to June 12	36.33	38.18
June 12 to June 19	35.07	36.77
June 19 to June 26	35.57	38.02
June 28 to July 5	35.94	38.25
July 6 to July 14	36.41	.....
July 28 to Aug. 4	33.03	34.45
Aug. 18 to Aug. 25	37.9	a100+
Aug. 25 to Sept. 1	37.25	38.87
Sept. 1 to Sept. 8	37.81	39.98
Sept. 9 to Sept.16	38.52	40.39
Sept.25 to Oct. 2	40.1	43.2
Oct. 2 to Oct. 9	38.65	40.83
Oct. 9 to Oct. 15	38.01	40.39
Oct. 15 to Oct. 22	40.16	42.28
Oct. 29 to Nov. 5	39.83	42.21
Nov. 5 to Nov. 12	38.49	41.12
Nov. 22 to Nov. 29	39.87	41.96
Nov. 29 to Dec. 6	38.53	40.63
Dec. 6 to Dec. 13	38.93	41.23
Dec. 16 to Dec. 23	39.42	41.42
Dec. 23 to Dec. 30	38.29	40.70
Dec. 30 to Dec. 31	38.71	40.11

a Pumping.

Effingham County

7. Central of Georgia Railroad. Meldrim. Altitude of measuring point, 33.86 feet above mean sea level. Water levels, in feet above measuring point, 1940: Mar. 12, 2.44; Aug. 17, 1.90; Oct. 23, 1.17.

10. H. M. Edwards. About 100 feet north of U. S. Highway 80, 2.2 miles north from Bloomingdale. Water levels, in feet below measuring point, 1940: Mar. 12, 8.11; Aug. 17, 8.89; Oct. 12, 9.59.

Glynn County

1. Owner's number 1. Atlantic Refining Co. At Arco, northwest of Brunswick, about 1,000 feet west of U. S. Highway 17, about 1,400 feet northwest of office of Atlantic Refining Company. Unused drilled industrial well, diameter 10 inches, depth 1,026 feet. Cased 531 feet. Measuring point, concrete floor of pump house, 0.5 foot above land surface and about 13 feet above mean sea level. Water level affected by pumping nearby industrial wells.

Highest and lowest water levels each week, in feet above measuring point, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	30.4	Mar. 30	30.2	Sept. 30	28.3	Nov. 17	28.4
Feb. 3	28.2	31	31.8	Oct. 2	30.7	18	26.8
5	28.5	Apr. 2	29.3	9	30.5	28	26.7
10	30.8	7	28.8	10	28.6	30	29.0
11	31.3	10	32.1	13	29.0	Dec. 1	29.0
16	28.3	Aug. 22	29.8	16	32.2	5	26.7
19	29.1	24	27.9	21	32.0	8	28.8
20	31.3	26	27.7	24	28.4	12	26.7
26	31.3	Sept. 1	29.9	28	31.4	15	29.3
Mar. 1	28.6	5	28.6	31	28.3	19	27.3
5	32.5	19	32.3	Nov. 8	27.5	22	28.1
7	29.0	21	28.3	9	28.5	28	33.3
21	31.7	22	28.1	13	29.1	29	33.2
22	33.2	23	30.6	16	27.6	31	28.0
28	33.7						

3. Owner's number 3. Atlantic Refining Company. Measuring point, top of 12-inch valve, 3.5 feet above land surface and about 15 feet above mean sea level. Water level affected by pumping nearby industrial wells.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level
Aug. 22	28.15	Dec. 18	26.3	Dec. 24	30.2
Nov. 13	26.2	23	27.85	27	30.5

13. U. S. Department of Commerce. South side of St. Simons Lighthouse, St. Simons Island. Used jetted domestic well, diameter 4 inches, depth 627 feet. Measuring point, top of 4-inch cross on casing, 2.4 feet above land surface and about 13.5 feet above mean sea level. Water level affected by tide. Water levels, in feet above measuring point: Dec. 13, 1938, 10:00 a.m., 34.5; Aug. 22, 1940, 3:25 p.m., 32.9; Nov. 13, 1940, 1:25 p.m., 32.30.

33. Sea Island Yacht Club. South side of the Brunswick to St. Simons Island Causeway, west side of Frederica River. Water level affected by tide. Water levels, in feet above measuring point, 1940: Aug. 22, 2:45 p.m., 38.95; Nov. 13, 1:05 p.m., 38.30.

44. Sea Island Gun Club. St. Simons Island, north side of road, 0.5 mile west of Cloister Hotel. Water level affected by tide. Water levels, in feet above measuring point, 1940: Aug. 22, 3:45 p.m., 37.9; Nov. 13, 1:40 p.m., 37.25.

Glynn County--Continued.

45. City of Brunswick. Brunswick, east part of H. E. Coffin Park. Used drilled public well, diameter 6 inches, depth 630 feet. Cased 514 feet. Measuring point, top of 6-inch cross on 6-inch casing, 1.6 feet above land surface and about 9.5 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level
Oct. 3	34.2	Dec. 18	31.6	Dec. 24	33.0
Nov. 13	32.7	23	32.1	27	34.3

100. New England Tourist Camp. East side of U. S. Highway 17, 6 miles south of Atlamaha River. Altitude of measuring point, 16.9 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	22.05	Feb. 27	22.10	Aug. 21	21.2	Nov. 14	21.35
30	22.25	Mar. 22	21.95	Oct. 3	21.65	Dec. 27	21.4

138. G. F. Cowman. East side of U. S. Highway 17, southwest edge of South Brunswick River marsh, about 5 miles west of Brunswick. Water level affected by tide.

Water level, in feet above measuring point, 1940

Jan. 19	33.15	Mar. 21	33.95	Oct. 2	34.3	Dec. 18	32.4
31	32.7	Aug. 22	32.35	Nov. 13	33.5	27	32.9
Feb. 28	33.75	23	33.3				

143. J. H. McKee. St. Simons Island, 0.5 mile east of Frederica Road, 0.4 mile north of Sea Island Road, at Black Banks. Used jetted domestic well, diameter 3 inches. Measuring point, top of 3-inch cross on 3-inch casing, 1.2 feet above land surface and about 7 feet above mean sea level. Water levels, in feet above measuring point: Aug. 18, 1939, 21.7; Aug. 22, 1940, 21.7; Nov. 13, 1940, 21.3.

192. Edgar Rittenhouse. Brunswick, North Palmetto Cemetery, about 300 feet east of Altamaha Canal. Used jetted domestic well, diameter 3 inches, depth 640 feet. Measuring point, top of 3-inch cross on casing, 1.8 feet above land surface. Water level affected by pumpage of nearby industrial wells.

Water level, in feet above measuring point, 1939-40

Date	Hour	Water level	Date	Hour	Water level
Jan. 31, 1939	11:25 a.m.	23.25	Dec. 23, 1940	3:45 p.m.	26.3
Dec. 18, 1940	4:10 p.m.	21.5	24	8:30 a.m.	27.9
23	9:35 a.m.	24.7	27	11:10 a.m.	28.6
23	10:35 a.m.	25.1	27	3:50 p.m.	28.6

Liberty County

19. Atlantic Coast Line Railroad. McIntosh, about 300 feet southwest of crossing of Atlantic Coast Line Railroad, and State Highway 38, about 10 feet northwest of railroad. Used drilled industrial well, diameter 6 inches. Measuring point, top of 3-inch tee, 1.4 feet above land surface, 1.8 feet below top of rail and about 21 feet above mean sea level. Water levels, in feet above measuring point, 1940: Sept. 26, 1.57; Oct. 3, 1.47; Nov. 12, 1.75; Nov. 28, 1.70.

36. W. M. Woods. About 0.1 mile east of Dorchester Station, on north side of Sunbury Road. Used jetted domestic well, diameter 3 inches. Measuring point, top of 3-inch tee on well, 2.7 feet above land surface. Water levels, in feet above measuring point: Jan. 31, 1939, 15.35; Nov. 22, 1940, 15.05.

38. Dana Stevens. About 0.4 mile southwest of Dorchester Village schoolhouse. Used jetted domestic well, diameter 2½ inches. Measuring point, top of 1½-inch pipe screwed in tee on well, 2.0 feet above land surface. Water levels, in feet below measuring point: Jan. 31, 1939, 7.4; Nov. 22, 1940, 9.52.

Liberty County--Continued.

43. C. H. Ricks. About 2 miles southeast of Dorchester Village school, on north side of road to Colonel's Island. Used jetted domestic well, diameter 3 inches, depth 700 feet. Measuring point, top of 3-inch tee on well casing, 0.5 foot above land surface. Water levels, in feet with reference to measuring point: Jan. 31, 1939, +0.85; Aug. 25, 1939, +0.4, Nov. 22, 1940 -0.75.

45. J. A. Morgan. About 4.5 miles east of Dorchester Village schoolhouse, about 0.3 mile north of Fort Morris, on west bank of Medway River. Used jetted domestic well, diameter 3 inches, depth 580 feet. Cased 250 feet. Measuring point top of 3-inch tee, 1.0 foot above land surface and about 23 feet above mean sea level. Water level affected by tide. Water levels, in feet above measuring point: Jan. 31, 1939, 6.7; Nov. 22, 1940, 4.62.

53. Lionel Tester. About 100 feet west of U. S. Highway 17, 2.5 miles south of Midway.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	26.9	Mar. 22	27.2	Oct. 1	26.8	Dec. 27	26.8
Feb. 27	27.1	Aug. 21	26.8	Nov. 12	26.8		

86. G. M. Brown. Southwest part of Colonel's Island rear Half Moon. Used jetted domestic well, diameter 3 inches. Measuring point, top of 3-inch tee on casing, 1.5 feet above land surface. Water levels, in feet above measuring point: Feb. 14, 1939, 17.4; Nov. 22, 1940, 16.8.

137. H. A. Bacon. Hinesville, 0.5 mile northeast of Liberty County court house, about 100 feet north of State Highway 38, east side of house. Used jetted domestic well, diameter 2 inches, depth 527 feet. Cased 400 feet. Measuring point, top of 2-inch tee on well casing, 0.9 foot above land surface.

Water level, in feet above measuring point, 1939-40

Date	Water level	Date	Water level	Date	Water level
Apr. 26, 1939	2.50	Oct. 1	1.10	Nov. 23	0.74
Mar. 18, 1940	1.97	Nov. 12	.88	25	.79
Sept.26	1.30				

140. Mrs. Amber Kiddy. Allenhurst, about 0.1 mile southeast of the Atlantic Coast Line Railroad, about 0.1 mile northeast of road, at side of old sawmill. Used drilled industrial well, diameter 10 inches, depth 546 feet. Cased 110 feet. Measuring point top of 10-inch tee on casing, 0.5 foot above land surface. Water levels, in feet with reference to measuring point: Apr. 26, 1939, +2.06; Oct. 1, 1940, +0.75; Nov. 27, 1940, +0.40; Dec. 18, 1940, -0.04.

Long County

8. Town of Ludowici. West side of Atlantic Coast Line Railroad, Ludowici. Used drilled municipal well, diameter 8 inches, depth 579 feet. Cased 495 feet. Measuring point, hole in pump base plate, 2.7 feet above land surface and 68.7 feet above mean sea level. Water levels, in feet below measuring point, 1940: Mar. 18, 11.99; Oct. 1, 12.62; Dec. 18, 13.46.

McIntosh County

11. C. A. Stebbins. Darien. Altitude of measuring point, 35.1 feet above mean sea level.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	8.9	Feb. 27	8.9	Aug. 21	7.9	Nov. 13	8.25
30	8.95	Mar. 22	8.8	Oct. 3	8.2	Dec. 20	7.95

McIntosh County--Continued.

27. C. B. Mallard. East side of State Highway 131, about 0.4 mile south of right angle bend in road, on bluff west of southern branch of Sapelo River. Used jetted domestic well, diameter 3 inches, depth 729 feet. Cased 120 feet. Measuring point, top of 3 by 2-inch reducer on 3-inch casing, 1.0 foot above land surface and about 30 feet above mean sea level. Water levels, in feet above measuring point: Mar. 10, 1939, 7.55; Oct. 3, 1940, 6.8.

53. Townsend Band Mill. Townsend, about 200 feet east of Sea Board Railroad, north side of State Highway 99. Used jetted industrial well, diameter 4 inches, depth 485 feet. Cased 400 feet. Measuring point, top of 4-inch tee on well casing, 0.8 foot above land surface. Water levels, in feet above measuring point: Mar. 24, 1939, 26.0; Nov. 14, 1940, 24.8.

85. R. C. Collins. About 0.7 mile west of Crescent post office, about 30 feet south of State Highway 131. Used jetted domestic well, diameter 3 inches, depth 918 feet. Cased about 600 feet. Measuring point, top of 3-inch coupling on casing, 1 foot above land surface. Water levels, in feet below measuring point: Mar. 30, 1939, 1.95; Oct. 3, 1940, 3.29.

103. A. M. Durant. Valona, west side of A. M. Durant's store. Used jetted domestic well, diameter 3 inches, depth about 600 feet. Measuring point top of 3-inch cross on well casing, 0.8 foot above land surface and about 10 feet above mean sea level. Water levels, in feet above measuring point: Apr. 11, 1939, 28.2; Oct. 3, 1940, 26.4.

130. Estate of James O'Brien. Ridgeville, east side of State Highway 131, about 0.5 mile south of road to dock. Used jetted domestic well, diameter 3 inches, depth 996 feet. Measuring point, top of 3-inch cross on 3-inch casing, 1.3 feet above land surface. Water levels, in feet above measuring point: Apr. 14, 1939, 18.5; Oct. 3, 1940, 17.60.

141. Sam Jardney. About 6 miles southeast of Townsend, on east side of Briardam Road. Used jetted domestic well, diameter 3 inches, depth 496 feet. Cased about 400 feet. Measuring point, top of 3 by 2-inch bushing, 0.8 foot above land surface. Water levels, in feet above measuring point: Apr. 27, 1939, 22.5; Nov. 14, 1940, 20.6.

144. Colonel Talbot Smith. About 1.5 miles northeast of Darien, about 0.25 mile east of State Highway 131, near edge of marsh. Used jetted domestic well, diameter 4 inches, depth 716 feet. Cased about 600 feet. Measuring point, top of 4-inch cross on well casing, 1.5 feet above land surface and about 20 feet above mean sea level. Water levels, in feet below measuring point: Apr. 28, 1939, 24.35; Oct. 3, 1940, 23.3.

Pierce County

2. City of Blackshear. Northeast part of city of Blackshear at city water works, about 30 feet west of elevated concrete reservoir. Used drilled municipal well, diameter 8 inches, depth 825 feet. Cased 450 feet. Measuring point, top of 1-inch nipple in cap on well, 0.21 foot above cap, 2.0 feet above land surface and 130.6 feet above mean sea level. Water level reported 55 feet below land surface in Geological Survey Water-Supply Paper 341, page 357. Water levels, in feet below measuring point: June 29, 1939, 59.86; Mar. 1, 1940, 60.28.

Wayne County

1. City of Jesup. West of crossing of Southern Railroad and Atlantic Coast Line Railroad at city water works, Jesup. Used drilled municipal well, diameter 10 inches, depth 654 feet. Cased 502.5 feet. Measuring point, hole in 10-inch bushing over casing, 2.0 feet above land surface and 98.0 feet above mean sea level. Water levels, in feet below measuring point: May 18, 1939, 35.97; Mar. 19, 1940, 35.49; Oct. 1, 1940, 36.15; Dec. 18, 1940, 37.17.

Wayne County--Continued.

3. A. W. Hurn. Gardi, northwest side of residence of A. W. Hurn, about 200 feet southwest of Southern Railroad. Used jetted domestic well, diameter 3 inches, depth 560 feet. Measuring point, top of 3-inch coupling on casing, 1.7 feet above land surface and 63.9 feet above mean sea level. Water levels, in feet below measuring point: May 18, 1939, 3.55; Oct. 1, 1940, 4.57; Dec. 18, 1940, 5.41.

4. State Highway Department. On southwest shoulder of State Highway 27, 0.3 mile southeast of Mt. Pleasant. Used drilled domestic well, diameter 6 inches, depth 560 feet. Cased 345 feet. Measuring point, top of 6-inch tee on casing, 1 foot above land surface. Water levels, in feet above measuring point: May 18, 1939, 5.98; Oct. 1, 1940, 4.93; Dec. 18, 1940, 4.18.

MONTGOMERY COUNTY

By A. H. Horton

Periodic measurements of water level have been made since April 18, 1932 in an observation well in Montgomery County, Maryland by the Federal Geological Survey in cooperation with the Maryland Geological Survey. Records of water level for years prior to 1940 are published in Water-Supply Papers 817, 840, and 845.

The well is an abandoned dug well lined with loose stone, at the rear of the residence owned by Walter M. Brown, 800 feet northeast of the gaging station of the Northwest Branch of the Anacostia River, 1⅛ miles southwest of Colesville. A continuous water-stage recorder was maintained on the well during 1940.

The highest water level observed in the well during the period of record--12.75 feet above datum--occurred April 22, 1933; the lowest water level--6.24 feet above datum--occurred October 6, 1932.

The water level fluctuated about normally in 1940 and no new high or low stage was reached. The highest water level in the year--12.03 feet above datum--occurred April 22 and the lowest water level--6.92 feet above datum--occurred from September 27 to October 1. The water level in the well at the end of the year was 1.49 feet higher than at the end of 1939. Water levels are given in feet above the same datum to which the gage on the Northwest Branch of the Anacostia River is referred.

Mean daily water level, in feet above datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.69	7.90	9.25	9.88	11.48	9.67	8.43	7.57	7.14	6.92	7.08	8.70
2	7.68	7.89	9.24	9.82	11.42	9.63	8.38	7.53	7.21	6.94	7.21	8.69
3	7.67	7.88	9.45	9.79	11.34	9.58	8.35	7.50	7.23	6.96	7.32	8.68
4	7.66	7.87	9.91	9.80	11.23	9.55	8.36	7.48	7.23	6.97	7.35	8.67
5	7.66	7.86	9.93	9.74	11.09	9.52	8.35	7.46	7.24	6.98	7.36	8.68
6	7.65	7.92	9.89	9.66	11.01	9.48	8.32	7.44	7.23	7.00	7.37	8.64
7	7.64	8.10	9.88	9.64	10.95	9.43	8.30	7.41	7.23	7.01	7.36	8.65
8	7.63	8.14	9.87	9.94	10.87	9.39	8.28	7.37	7.23	7.02	7.36	8.64
9	7.62	8.14	9.85	10.76	10.82	9.34	8.25	7.34	7.22	7.03	7.35	8.62
10	7.62	8.17	9.81	10.72	10.73	9.29	8.21	7.31	7.21	7.04	7.34	8.61
11	7.62	8.28	9.77	10.68	10.67	9.25	8.19	7.28	7.20	7.04	7.35	8.57
12	7.62	8.27	9.73	10.71	10.58	9.21	8.14	7.25	7.18	7.05	7.35	8.55
13	7.61	8.27	9.71	10.86	10.54	9.18	8.11	7.23	7.15	7.06	7.37	8.56
14	7.67	8.41	9.79	10.87	10.48	9.13	8.07	7.21	7.14	7.06	7.59	8.53
15	8.01	8.52	10.44	10.86	10.41	9.10	8.04	7.18	7.12	7.06	8.21	8.53
16	8.05	8.51	10.49	10.83	10.36	9.04	8.02	7.15	7.11	7.06	8.26	8.58
17	8.05	8.51	10.44	10.80	10.32	8.98	7.99	7.13	7.09	7.05	8.24	8.70
18	8.03	8.55	10.44	10.80	10.26	8.96	7.95	7.11	7.07	7.05	8.20	8.67
19	8.02	9.04	10.43	10.80	10.22	8.94	7.92	7.09	7.05	7.04	8.19	8.67
20	8.02	9.31	10.39	11.59	10.17	8.88	7.89	7.07	7.03	7.04	8.20	8.68

Montgomery County--Continued.

Mean daily water level, in feet above datum, 1940--Continued
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
21	8.01	9.29	10.33	12.01	10.14	8.83	7.86	7.04	7.01	7.04	8.20	8.69
22	7.99	9.26	10.32	12.03	10.10	8.79	7.83	7.02	7.00	7.04	8.20	8.68
23	7.97	9.25	10.28	11.97	10.06	8.76	7.81	7.00	6.97	7.05	8.18	8.66
24	7.98	9.26	10.22	11.94	10.01	8.74	7.79	6.98	6.95	7.06	8.18	8.64
25	7.97	9.28	10.18	11.86	9.96	8.70	7.75	6.96	6.94	7.07	8.19	8.65
26	7.96	9.27	10.12	11.79	9.90	8.64	7.72	6.95	6.93	7.07	8.22	8.66
27	7.95	9.28	10.10	11.69	9.85	8.60	7.70	6.94	6.92	7.07	8.68	8.65
28	7.94	9.30	10.05	11.60	9.81	8.56	7.67	6.94	6.92	7.07	8.73	8.99
29	7.93	9.27	9.99	11.54	9.76	8.52	7.65	6.93	6.92	7.06	8.70	9.17
30	7.92	....	9.99	11.51	9.72	8.47	7.62	6.93	6.92	7.06	8.69	9.23
31	7.91	....	9.96	.....	9.71	....	7.60	6.96	....	7.07	....	9.18

PRINCE GEORGES COUNTY

By V. C. Fishel

Periodic measurements of the water levels in two wells in Prince Georges County, Maryland were begun in March 1940 in connection with an investigation of the ground-water resources of the District of Columbia and vicinity by the Federal Geological Survey. A total of 40 individual measurements of water level were made in the wells in 1940 by the wetted-tape method.

The water levels in this report are given with reference to mean sea level. The altitude of the measuring point of well 242 was determined with a spirit level and that of well 261 with an altimeter.

Well 242, in Hyattsville, is an artesian well. In March, when observations were begun, the water level stood 5.68 feet above the measuring point. It gradually rose and overflowed a 6-foot extension pipe from April 23 to May 22.

The water level declined about 6 feet by July 22 and about 9 more feet by August 19, at which time the lowest stage of the year was reached. The water level rose 1.28 feet by August 30, declined 0.81 foot by September 23, and then rose 3.15 feet by December 30. On December 30 the water level was 11.44 feet lower than on March 12 when observations were started.

Well 261, in Suitland, is pumped occasionally and hence the measurements of water level, if made soon after the well has been pumped, may not reflect the regional water level. The non-pumping water level in the well during 1940 was approximately 250 feet above mean sea level. The water level declined about 0.4 foot from March 12 to 27, rose 0.89 foot by April 3, and then declined 0.37 foot by April 25. The low water level

on May 1 was probably due to pumping shortly before the measurement was made. The irregular fluctuations of the water level from May to August were probably due also to pumping. The water level rose about 6 feet from August 19 to 30 and then declined about 5 feet by September 23. It declined 2.01 feet by October 21 and then rose 2.50 feet by December 30. On December 30 the water level was 0.83 foot higher than on March 12 when measurements were started.

242. City of Hyattsville. In vacant lot at southeast corner of intersection of St. Marys St. and Wells Ave., 42 feet south of Wells Ave. and 50 feet northeast of railroad. Unused drilled municipal well, diameter 10 inches. Measuring point, top of cap beside 3/4-inch hole, 0.5 foot above land surface and 22.01 feet above mean sea level. Water level Mar. 12, 1940, 5.68 feet above measuring point.

Water level, in feet above mean sea level, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 12	27.69	Apr. 23	(a)	Aug. 19	12.63	Nov. 4	15.73
15	27.61	May 1	(a)	30	13.91	25	15.93
Apr. 3	27.89	8	(a)	Sept.23	13.10	Dec. 9	16.16
10	28.02	22	(a)	Oct. 21	14.81	30	16.25
17	27.55	July 22	21.77				

261. W. H. Harrison. Harrison Nursery at Suitland, about 0.3 mile south of intersection of Suitland Road and road to Silver Hill, Md. Used drilled well, diameter 8 inches, depth 106 feet. Measuring point, top of casing, 1.5 feet above land surface and 280 feet above mean sea level. Altitude of measuring point determined with an altimeter. Equipped with hand pump. Water level Mar. 12, 1940, 27.01 feet below measuring point.

Water level, in feet above mean sea level, 1940

Mar. 12	252.99	Apr. 25	253.13	June 5	253.75	Aug. 30	258.61
20	252.74	May 1	249.67	July 8	253.05	Sept.23	253.33
27	252.61	8	253.02	22	254.20	Oct. 21	251.32
Apr. 3	253.50	15	252.15	Aug. 5	253.15	Nov. 25	253.68
10	253.46	22	253.00	19	252.13	Dec. 30	253.82
17	253.44	29	251.31				

a Flowed very slowly over edge of pipe at altitude of 28.02 feet.

MISSISSIPPI

By V. M. Foster and G. F. Brown

The State-wide investigation of water levels in wells, which was begun in 1938, was continued in 1940 by the Federal Geological Survey in cooperation with the Mississippi Geological Survey. A study was also made of the major aquifers in the Mississippi alluvial plain and the coastal counties. The inventory of wells was expanded to include representative wells in the area of Cretaceous formations in northeastern Mississippi, and in the heavily pumped area near Laurel and Hattiesburg, in southeastern Mississippi. The observation well program was expanded to include 45 wells. Water-stage recorders were in operation on 11 of the wells at the end of 1940.

In the Mississippi alluvial plain in northwestern Mississippi the water levels in wells in 1940 were the highest of the three years of record. At the end of the year the water level in Washington 70, at Hollandale, was 5.78 feet above the highest recorded level in 1939. The annual low stage, which occurs in late fall, was 3.65 feet above the low stage of the previous year. The seasonal fluctuations, characteristically shown by high water levels in early spring and low water levels in late fall or early winter, were obscured during 1940 because of recharge from heavy rainfall. Thus, at Marks, in the northern part of the alluvial plain, the lowest fall stage, which occurred in November, was only 0.3 foot below the stage at the end of June.

The industrial and municipal water supplies of northeastern Mississippi are derived almost entirely from aquifers in the lower parts of the Eutaw and Tuscaloosa formations, although some wells in Tippah, Union, and Pontotoc Counties obtain water from the Ripley formation. Most domestic supplies are obtained from dug or bored wells that tap unconfined water. Where the Selma chalk is at or near the surface, however, most of the domestic wells tap water in the Coffee sand or in the upper part of the Eutaw formation. A comparison between records of water level given in Geological Survey Water-Supply Paper 576 and measurements of water level made in connection with the present investigation shows that a general decline in water level has taken place. This is confirmed by reports of drillers and owners of wells. The declines of water level have apparently

been greatest in areas of heavy withdrawals, averaging 15 to 20 feet in the last 20 years. The greatest decline has occurred at Tupelo, where 700,000 gallons or more are pumped daily from an aquifer near the base of the Eutaw formation. This withdrawal, which is made from an area of about 1 square mile, has lowered the water level at Tupelo approximately 60 feet since 1919.

The decline of the water levels in areas where the withdrawals from wells have been light has apparently been much less than in areas where the withdrawals have been heavy. The water levels in wells at State College, which tap an aquifer near the base of the Eutaw formation from which the withdrawal since 1929 has been small, are now less than 6 feet below the levels reported in Water-Supply Paper 576. During 1940 the water levels in this area declined about 1 foot from June to September, but rose 1.05 feet from September to the end of December.

In the Laurel-Hattiesburg district of southeastern Mississippi, the industrial and municipal water supplies are obtained from two aquifers in the Catahoula sandstone and one aquifer in the Hattiesburg formation. Wells in the deep valleys yield strong flows but wells on the high lands between the major streams and in an area of heavy withdrawal near Laurel must be pumped. Domestic supplies in rural areas are derived chiefly from dug or bored wells that tap unconfined water. A few of the domestic wells are drilled.

At Laurel, approximately 4,500,000 gallons a day are withdrawn from the upper sand in the Catahoula sandstone and 3,500,000 gallons a day are withdrawn from the lower sand. The decline in water level in the upper sand resulting from the heavy draft has been approximately 125 feet since 1911. The head in wells tapping the lower sand at Laurel declined approximately 18 feet from 1926 to 1936, and 52 feet from 1936 to 1940, according to Mr. J. H. Miller, chief engineer at the Laurel pumping plant. Water levels in the lower sand declined 25.8 feet from May to August 1940, but recovered 27.9 feet by the end of the year.

At Hattiesburg, approximately 7,000,000 gallons a day are withdrawn from two aquifers, the "400-foot sand" at the base of the Hattiesburg formation, and the "600-foot sand" near the top of the Catahoula sandstone. The withdrawals from the aquifers and the head of the water in them are about the same. Comparisons with water levels reported in Water-Supply Paper 576 indicate a lowering of artesian pressure of 15 feet or more since 1916.

Water levels in wells to the "1200-foot sand" at Gulfport averaged 0.8 foot lower in 1940 than in 1939, and a comparison of present water levels with those reported in Water-Supply Paper 576 shows a decline of approximately 45 feet since 1911. The highest and lowest levels in 1940 were recorded within a two-weeks period of severely cold weather during which the city wells were alternately pumped to capacity and closed down. The maximum variation in water level was 11.1 feet.

Water levels in wells to the "900-foot sand" near Ocean Springs declined 4.5 feet from March to November and recovered 1.0 foot by the end of the year.

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Bolivar County

13. Town of Shelby. SW¼NE¼ sec. 12, T. 24 N., R. 6 W., 5 feet south of east-west street in front of municipal pumping plant and midway between pumping plant and cotton gin. Used drilled municipal well, diameter at top 4 inches, reported depth about 1,650 feet. Measuring point, top of 4-inch casing tee, 2 feet above land surface and 155.58 feet above mean sea level. Water levels, in feet above datum, 1940: July 27, 8:40 a.m., 173.5; Dec. 30, 5:15 p.m., 171.9.

18. Town of Gunnison. Measuring point, 153.77 feet above mean sea level. Water levels, in feet above datum, 1940: Feb. 23, 3:30 p.m., 180.5; July 27, 9:15 a.m., 180.5; Dec. 30, 6:30 p.m., 179.7.

35. Town of Beulah. Measuring point, 147.53 feet above mean sea level. Water levels, in feet above datum, 1940: Feb. 23, 2:00 p.m., 177.5; July 27, 11:00 a.m., 175.9; Dec. 30, 7:00 p.m., 175.3.

50. Jones Bayou Gin Co. Measuring point, 134.70 feet above mean sea level. Water levels, in feet above datum, 1940: Feb. 23, 10:45 a.m., 152.2; June 25, 5:30 p.m., 153.0; July 27, 12:45 p.m., 153.5; Dec. 31, 3:00 p.m., 153.3.

Coahoma County

11. Norfleet and Wilsford. NW¼SW¼ sec. 7, T. 29 N., R. 2 W., 100 feet east of old U. S. Highway 61 and 1.2 miles south of railroad station at Rich. Used drilled domestic and plantation well, diameter 3 inches reduced to 2 inches, finished with 40 feet of screen, reported depth 1,837 feet. Measuring point, top of 3-inch casing tee, 1 foot above land surface and 181.88 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 7, 10:00 a.m., 221.1; July 26, 12:40 p.m., 221.65; Sept. 11, 10:50 a.m., 221.4; Dec. 30, 1:50 p.m., 220.2.

32. Coahoma County Agricultural High School. SW¼NW¼ sec. 36, T. 28 N., R. 4 W., 50 feet east of administration building in brick walled sump and 4 miles north of Clarksdale. Used drilled school well, diameter at top 4 inches, reported depth 2,000 feet. Measuring point, top of 2-inch casing tee at land surface and 176.74 feet above mean sea level. Reference point, southeast corner of southeast pier of south water tower, 178.78 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 6, 5:00 p.m., 219.7; June 24, 4:40 p.m., 221.6; July 26, 2:45 p.m., 219.94; Dec. 30, 3:15 p.m., 220.5.

Forrest County

City of Hattiesburg. SE¼NW¼ sec. 10, T. 4 N., R. 13 W., 5 feet west of northwest corner of old pumping station. Unused drilled city well, diameter at top 10 inches, reported depth 700 feet. Measuring point, top of 10 by 4 inch bushing, 3.95 feet above land surface and about 160 feet above mean sea level. Flowing prior to measurements. Water levels, in feet above measuring point, 1940: Feb. 20, 0.60; Oct. 29, 0.44.

City of Hattiesburg. SE¼NE¼ sec. 10, T. 4 N., R. 13 W., on the south edge of a private drive opposite southeast corner of old pumping station. Unused drilled city well, diameter at top 10 inches, reported depth 390 feet, finished with 80 feet of screen. Measuring point, top of 4-inch standpipe, 7.7 feet above land surface and about 158 feet above mean sea level. Water level affected by barometric pressure. Water-stage recorder maintained on well since Mar. 1, 1940.

Water level, in feet below measuring point, 1940

Date	Hour	Water level	Date	Hour	Water level
Mar. 20	11:45 a.m.	2.37	Aug. 22	6:00 a.m.	0.73
31	6:00 p.m.	1.53	31	11:30 a.m.	2.06
Apr. 1	12:01 a.m.	1.64	Sept. 21	10:30 a.m.	2.28
13	11:45 a.m.	2.23	30	5:00 a.m.	1.80
May 4	2:00 a.m.	1.11	Oct. 14	6:00 a.m.	1.89
31	10:15 p.m.	2.41	25	2:30 p.m.	2.26
June 6	11:00 a.m.	2.84	Nov. 9	6:00 a.m.	1.88
26	5:00 a.m.	1.75	28	2:00 p.m.	2.33
July 2	11:00 a.m.	1.92	Dec. 3	8:00 p.m.	2.29
11	2:00 a.m.	0.88	27	6:30 p.m.	1.34

Forrest County--Continued.

Dixie Tung Empire Corporation. NE¼NE¼ sec. 28, T. 1 N., R. 12 W., behind manager's residence, 200 yards west of U. S. Highway 49 at Dixie station. Used bored domestic water-table well, diameter at top 6.5 inches, depth 60 feet. Measuring point, top of tile curbing, 5.8 feet above land surface and about 255 feet above mean sea level. Water levels, in feet below measuring point, 1940: Aug. 31, 48.04; Sept. 28, 49.88; Oct. 29, 49.27; Nov. 29, 50.45.

Grenada County

12. Holcomb school. Measuring point, 185.59 feet above mean sea level. Water levels, in feet above datum, 1940: June 10, 3:30 p.m., 211.9; July 30, 10:00 a.m., 212.3.

16. Town of Holcomb. Measuring point, 193.64 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 11, 2:30 p.m., 189.2; June 10, 3:40 p.m., 188.9; July 30, 10:25 a.m., 187.9.

Harrison County

118. City of Gulfport.

Water level, in feet above measuring point, 1940

Date	Hour	Water level	Date	Hour	Water level
Jan. 29	7:45 a.m.	14.3	July 18	10:00 p.m.	18.9
31	8:45 a.m.	25.4	25	3:30 p.m.	21.4
Feb. 9	4:00 a.m.	22.3	Aug. 2	12:15 a.m.	19.0
10	6:20 p.m.	14.9	15	3:45 p.m.	22.3
Mar. 9	9:45 p.m.	16.9	Sept. 7	2:15 p.m.	18.1
30	3:00 p.m.	22.8	30	1:15 p.m.	22.0
Apr. 14	4:15 a.m.	20.0	Oct. 13	5:00 p.m.	22.1
23	3:30 p.m.	23.7	23	5:00 p.m.	19.0
May 1	2:00 p.m.	22.5	Nov. 15	11:00 a.m.	20.1
31	2:00 p.m.	19.2	25	2:30 p.m.	22.0
June 7	3:45 a.m.	19.3	Dec. 10	8:15 a.m.	20.0
11	1:30 p.m.	21.4	27	4:30 p.m.	22.7

Holmes County

38. Town of Tchula. Measuring point, 118.25 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 13, 1:45 p.m., 136.79; June 11, 3:50 p.m., 138.6; July 30, 5:15 p.m., 145.5; Dec. 5, 4:30 p.m., 138.2.

59. M. L. Smith. Measuring point, 111.72 feet above mean sea level. Water levels, in feet above datum, 1940: June 11, 2:30 p.m., 240.5; July 30, 4:45 p.m., 239.4.

Humphreys County

10. Wister Henry. Measuring point, 114.90 feet above mean sea level.

Water level, in feet above datum, 1940

Mar. 14	5:00 a.m.	220.3	July 1	9:00 a.m.	221.4
21	5:00 p.m.	222.9	18	4:15 p.m.	223.0
Apr. 3	7:15 p.m.	222.7	Aug. 20	12:10 a.m.	222.9
9	5:00 a.m.	221.4	25	1:45 p.m.	220.7
May 2	4:00 a.m.	221.5	Sept. 1	11:00 a.m.	222.9
5	3:45 p.m.	122.9	29	6:00 p.m.	220.1
June 1	7:15 a.m.	222.5	Dec. 6	1:30 p.m.	227.4
16	6:00 a.m.	220.9	11	5:00 p.m.	224.0

Humphreys County--Continued.

18. J. C. Holbrook. Measuring point, top of 4-inch elbow, 1.4 feet above land surface and 109.40 feet above mean sea level.

Water level, in feet above datum, 1940

Date	Hour	Water level	Date	Hour	Water level
Jan. 3	12:01 a.m.	115.8	July 18	1:30 p.m.	117.3
13	6:15 p.m.	117.6	Aug. 2	6:30 p.m.	116.5
Mar. 18	10:30 p.m.	117.0	6	10:00 p.m.	117.2
31	11:59 p.m.	116.3	Sept. 1	4:00 p.m.	117.0
Apr. 1	7:00 a.m.	116.1	22	4:30 a.m.	116.0
30	6:00 a.m.	116.9	Oct. 2	10:15 p.m.	116.0
May 2	8:30 a.m.	117.0	8	5:00 a.m.	115.3
23	4:30 a.m.	116.6	Nov. 25	7:15 p.m.	115.5
June 8	2:00 p.m.	116.5	28	6:30 a.m.	114.6
28	11:00 a.m.	116.9	Dec. 18	4:00 a.m.	114.6
July 1	2:00 a.m.	116.6	26	7:45 p.m.	116.1

56. Town of Louise. Measuring point, about 108 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 14, 9:00 a.m., 129.7; June 11, 1:00 p.m., 130.1; Dec. 5, 10:00 a.m., 129.5.

Issaquena County

24. W. W. Gary. Measuring point, 98.13 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 12, 5:00 p.m., 145.8; June 11, 11:00 a.m., 146.5; Aug. 10, 3:15 p.m., 149.3; Dec. 31, 11:40 a.m., 145.45.

Jackson County

Camp McClellan, Civilian Conservation Corps. SE¼NW¼ sec. 35, T. 6 S., R. 9 W., approximately 0.5 mile west of public road and 150 yards south of secondary road, 25 feet southwest of a concrete foundation. Unused drilled camp well, diameter at top 3 inches, measured depth 954 feet. Measuring point, top of casing tee, 2.6 feet above land surface and about 45 feet above mean sea level. Water-stage recorder maintained on well since Feb. 9, 1940.

Water level, in feet above measuring point, 1940

Feb. 9	5:30 p.m.	32.2	July 25	2:00 p.m.	40.1
26	5:30 a.m.	40.6	Aug. 19	2:00 p.m.	41.2
Mar. 4	1:30 p.m.	43.5	30	11:00 p.m.	39.4
14	1:45 a.m.	35.5	Sept. 2	2:00 p.m.	40.0
Apr. 1	4:00 a.m.	37.0	14	6:45 a.m.	39.3
1	11:10 a.m.	43.0	Oct. 3	4:00 p.m.	40.0
May 5	1:00 a.m.	39.2	27	6:00 a.m.	39.1
20	11:45 a.m.	40.7	Nov. 1	12:01 a.m.	39.9
June 1	5:00 a.m.	39.3	13	5:00 a.m.	39.0
23	1:15 p.m.	41.0	Dec. 4	2:30 a.m.	38.9
July 3	4:30 a.m.	40.3	26	3:30 p.m.	40.0

65. Gulf Hills Development Company. NW¼NE¼ sec. 24, T. 7 S., R. 9 W., behind club house. Used drilled club well, diameter at top 4 inches, reported depth 873 feet. Measuring point, top of casing tee, 2.4 feet above land surface and about 19 feet above mean sea level. Water level, in feet above measuring point, 1940: Aug. 29, 20.4.

Jones County

Mr. Ed Howard. SE¼SE¼ sec. 11, T. 9 N., R. 11 W., south of tenant house and 100 yards west of U. S. Highway 11. Used bored domestic well, diameter at top 8 inches, measured depth 21.5 feet. Measuring point, top of wooden curbing, 3.0 feet above land surface and about 304 feet above mean sea level. Water levels, in feet below measuring point, 1940: Aug. 31, 17.68; Sept. 28, 17.70; Oct. 29, 17.94; Nov. 29, 18.05.

Jones County--Continued.

Gilchrist-Fordney Lumber Company. NE¼SW¼ sec. 32, T. 9 N., R. 11 W., on south side of private road which joins First Ave. at 13th St., and 380 feet south-southeast of crossing at G. M. & N. R. R. tracks. Unused drilled industrial well, diameter at top 8 inches, reported depth 400 feet, completely cased and screened. Measuring point, top of well casing, 0.2 foot above land surface and about 268 feet above mean sea level. Water level affected by barometric pressure. Water-stage recorder maintained on well since May 11, 1940.

Water level, in feet below measuring point, 1940

Date	Hour	Water level	Date	Hour	Water level
May 11	4:15 p.m.	102.7	Sept. 8	12:01 a.m.	110.7
29	8:30 a.m.	106.9	30	6:00 a.m.	105.7
June 15	8:30 a.m.	104.6	Oct. 22	10:30 a.m.	106.1
30	4:00 p.m.	109.6	30	11:15 p.m.	110.3
July 20	8:15 a.m.	106.1	Nov. 2	6:30 p.m.	109.6
27	8:10 a.m.	127.3	28	10:30 a.m.	104.4
Aug. 3	8:40 a.m.	128.5	Dec. 1	12:01 a.m.	105.7
24	9:10 a.m.	105.3	29	11:30 p.m.	100.6

(Well 14 in Water-Supply Paper 576, p. 253) Starch plant, U. S. Department of Agriculture. NE¼SE¼ sec. 7, T. 8 N., R. 11 W., on the north edge of entrance drive, 75 feet south of the southwest corner of the plant office at Laurel. Abandoned drilled industrial well, diameter at top 10 inches, reported depth 272.5 feet, completely cased and screened. Measuring point, top of well casing, 2.0 feet above land surface and about 243 feet above mean sea level. Measurements show pumping level in area of heavy and continuous pumping. Weekly water-level measurements have been made since May 11, 1940; water-stage recorder maintained on well since Dec. 2, 1940.

Water level, in feet below measuring point, 1940

May 11	5:20 p.m.	123.6	Sept.21	9:10 a.m.	132.1
18	2:15 p.m.	126.5	28	6:10 a.m.	130.7
25	2:30 p.m.	129.0	Oct. 5	8:45 a.m.	132.6
June 1	8:50 a.m.	124.6	12	6:30 a.m.	140.7
8	9:50 a.m.	130.6	19	8:10 a.m.	138.6
29	12:30 p.m.	140.6	26	8:50 a.m.	139.7
July 6	7:40 a.m.	141.4	Nov. 2	7:30 a.m.	140.6
13	7:45 a.m.	125.5	9	8:45 a.m.	138.4
20	7:45 a.m.	125.5	16	12:15 p.m.	130.1
27	7:15 a.m.	127.3	23	7:45 a.m.	133.1
Aug. 3	8:10 a.m.	130.8	30	4:00 p.m.	128.3
10	7:45 a.m.	132.5	Dec. 3	2:15 p.m.	140.0
17	8:35 a.m.	128.5	7	9:45 a.m.	130.6
24	8:50 a.m.	127.6	14	12:15 p.m.	126.4
31	8:10 a.m.	128.7	21	8:20 a.m.	127.8
Sept. 7	6:30 a.m.	126.4	28	8:40 a.m.	130.6
14	8:15 a.m.	125.3			

Mr. M. Brannon. NE¼SW¼ sec. 25, T. 7 N., R. 13 W., on west side of U. S. Highway 11, 0.7 mile southeast of Tawanta and at rear of the Brannon residence. Used bored domestic water-table well, diameter at top 8 inches, reported depth 90 feet. Measuring point, top of wood curbing at base of hinged cover, 3.2 feet above land surface and about 352 feet above mean sea level. Water levels, in feet below measuring point, 1940: Sept. 29, 74.69; Oct. 29, 71.44; Nov. 29, 70.55.

Town of Ovett. NE¼SW¼ sec. 18, T. 6 N., R. 10 W., along graveled road 150 yards west of crossing at railway station and 200 feet south of highway. Used drilled public well, diameter at top 2 inches, reported depth 190 feet. Measuring point, top of well elbow, 0.8 foot above land surface and about 175 feet above mean sea level. Flowing prior to measurements. Water level, in feet above measuring point, 1940: Mar. 14, 3.58.

LeFlore County

60. Mrs. D. B. Jameson. Measuring point, 133.64 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 12, 5:00 p.m., 148.2; June 26, 8:00 p.m., 149.3; July 27, 3:00 p.m., 147.4; Dec. 28, 4:00 p.m., 146.9.

74. Rudolph Bernander. Measuring point, 132.97 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 12, 3:30 p.m., 143.1; June 27, 9:00 a.m., 142.82; July 27, 3:15 p.m., 142.8.

134. E. D. Simmons. Observations discontinued Feb. 14, 1940. Water levels, in feet above datum, 1940: Jan. 7, 132.85; Jan. 9, 132.67; Feb. 4, 129.71; Feb. 13, 130.61; Feb. 14, 130.51.

136. C. M. Journey. Measuring point, 131.30 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 11, 4:30 p.m., 167.5; June 12, 8:30 a.m., 166.5; July 30, 11:00 a.m., 166.8; Sept. 13, 5:30 p.m., 166.7.

152. City of Greenwood. NE¼NW¼ sec. 15, T. 19 N., R. 1 E., at concrete drinking fountain on west side of city power plant and 40 feet east of center line of Cotton Ave. Unused drilled public well, diameter at top 6 inches, measured depth 660 feet. Measuring point, top of well casing, 2.5 feet above land surface and 148.11 feet above mean sea level. Water level affected by pumping from well that is 100 feet west of well 152. Water-stage recorder maintained on well since Feb. 1940.

Water level, in feet above datum, 1940

Date	Hour	Water level	Date	Hour	Water level
Mar. 14	6:00 p.m.	144.85	Oct. 5	10:30 p.m.	144.87
30	6:00 a.m.	146.38	31	11:59 p.m.	145.98
Apr. 1	9:00 p.m.	145.47	Nov. 2	5:45 p.m.	145.37
23	6:30 a.m.	146.98	30	8:45 a.m.	146.60
May 1	6:00 a.m.	146.94	Dec. 10	4:00 p.m.?	146.29
22	4:00 p.m.	145.59	25	3:00 p.m.	147.09
Sept.30	8:00 p.m.	144.82			

Oktibbeha County

(Well 2 in Water-Supply Paper 576, p. 371) Miss. State College. NE¼SW¼ sec. 1, T. 18 N., R. 14 E., 100 feet east of the northeast corner of the Civil Engineering laboratory. Unused drilled public well, diameter at top 6 inches, reported depth 1,008 feet. Measuring point, top of well casing, 2.33 feet above land surface and 383.28 feet above mean sea level. Water level affected by barometric pressure. Weekly measurements made since June 13, 1940; water-stage recorder maintained on well since Nov. 11, 1940.

Water level, in feet above datum, 1940

June 13	11:10 a.m.	203.89	Sept.23	3:20 p.m.	202.96
15	5:00 p.m.	203.83	30	4:00 p.m.	202.96
23	3:00 p.m.	203.85	Oct. 7	11:15 a.m.	202.03
29	9:20 a.m.	203.68	14	2:00 p.m.	202.08
July 1	10:00 a.m.	203.64	22	1:10 p.m.	202.16
7	3:00 p.m.	203.74	28	5:30 p.m.	203.26
14	7:00 p.m.	203.64	Nov. 4	3:30 p.m.	203.27
21	6:00 p.m.	203.53	11	3:30 p.m.	203.50
28	7:00 p.m.	203.42	18	4:30 p.m.	203.44
Aug. 4	4:00 p.m.	203.38	25	2:00 p.m.	203.71
11	6:00 p.m.	203.37	Dec. 2	2:00 p.m.	203.65
18	2:30 p.m.	203.39	9	8:15 p.m.	203.81
24	12:01 p.m.	203.14	16	4:00 p.m.	203.91
31	12:01 p.m.	203.04	23	3:00 p.m.	203.99
Sept. 7	5:45 p.m.	203.05	30	9:00 a.m.	203.98
16	4:00 p.m.	202.94			

Quitman County

14. Dr. J. E. Furr. Measuring point, 162.63 feet above mean sea level.

Water level, in feet above datum, 1940

Date	Hour	Water level	Date	Hour	Water level
Jan. 9	6:15 p.m.	181.5	Apr. 13	6:45 a.m.	181.4
19	9:00 a.m.	178.1	27	7:00 a.m.	182.4
Feb. 15	5:00 p.m.	180.8	May 1	11:00 p.m.	182.1
28	4:00 a.m.	181.3	6	3:00 p.m.	182.7
Mar. 13	8:00 a.m.	180.7	June 1	7:00 p.m.	182.6
31	6:00 p.m.	181.8	2	9:30 p.m.	182.3

15. Town of Marks. SE¼NW¼ sec. 35, T. 28 N., R. 1 W., at town water works, 25 feet north of stand tank and 15 feet south of south wall of Chevrolet garage. Unused drilled public well, diameter at top 6 inches, measured depth 806 feet. Measuring point, top of well casing which is at the land surface and about 161.5 feet above mean sea level.

Water level, in feet above datum, 1940

Mar. 6	12:30 p.m.	177.7	Sept. 15	1:00 p.m.	177.2
June 19	4:15 p.m.	177.6	Oct. 1	7:00 p.m.	177.2
30	5:00 a.m.	177.0	6	6:00 p.m.	178.0
July 8	4:00 p.m.	177.6	Nov. 5	1:30 p.m.	178.0
28	7:00 a.m.	177.1	16	6:00 a.m.	177.4
Aug. 8	6:00 a.m.	177.1	Dec. 8	9:00 a.m.	177.4
27	2:45 p.m.	178.3	27	4:00 a.m.	178.4
Sept. 3	4:30 p.m.	178.3			

21. W. R. Harrington. NE¼NE¼ sec. 8, T. 27 N., R. 2 W., on gentle slope 15 feet west of plantation road, on east lawn of residence, about 200 feet south of State Highway 6, and 7.4 miles east of U. S. Highway 61 junction at Clarksdale. Used drilled domestic and plantation well, diameter at top 4 inches reduced to 2⅝ inches at screen, finished with 41 feet of screen, reported depth 1,589 feet. Measuring point, top of 4-inch casing tee, 1 foot below land surface and 164.19 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 7, 8:00 a.m., 202.9; Sept. 11, 10:10 a.m., 202.2; Dec. 30, 11:45 a.m., 202.1.

32. City Cafe, Lambert. Measuring point, 161.85 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 6, 7:30 p.m., 165.7; June 24, 3:45 p.m., 164.9; Aug. 4, 2:55 p.m., 167.1; Dec. 28, 1:00 p.m., 164.3.

Sharkey County

43. Cary Water Company. Measuring point, 100.90 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 16, 2:00 p.m., 125.1; June 11, 11:30 a.m., 124.6.

Sunflower County

39. E. L. Coleman et al. NW¼SW¼ sec. 28, T. 21 N., R. 3 W., 25 feet south of gravel road in front lawn of residence and 0.5 mile east of U. S. Highway 49-W at Doddsville. Used drilled community well, diameter at top 3 inches, reported depth 1,180 feet. Measuring point, top of 2-inch casing elbow, 0.5 foot above land surface and about 127 feet above mean sea level. Water levels, in feet above datum, 1940: June 26, 7:00 p.m., 157.0; July 27, 2:00 p.m., 158.0; Dec. 31, 3:35 p.m., 155.3.

Tallahatchie County

24. Town of Tutwiler. Measuring point, 158.07 feet above mean sea level. Reference mark, railroad spike, 1.5 feet above land surface on east side of 18-inch pecan tree, 22 feet northwest of the southeast corner of Harrison apartments lot. Water levels, in feet above datum, 1940: Feb. 23, 6:00 p.m., 165.6; June 24, 4:40 p.m., 167.1; July 26, 167.0; Dec. 28, 2:15 p.m., 166.3.

Tallahatchie County--Continued.

68. Town of Sumner. NW¼NE¼ sec. 11, T. 24 N., R. 2 W., immediately northeast of northeast foundation of elevated tank. Used drilled public-supply well, diameter at top 8 inches, reduced to 4 inches at the screen, reported depth 1,680 feet. Measuring point, top of 8-inch casing, 0.5 foot above land surface and about 153.8 feet above mean sea level. Water levels, in feet above datum, 1940: Feb. 23, 8:30 a.m., 205.1; June 27, 11:05 a.m., 213.1; July 26, 3:45 p.m., 213.6; Dec. 28, 3:10 p.m., 204.4.

171. Phillip Stave Mill Company. Measuring point, 139.26 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 12, 4:00 p.m., 151.3; June 27, 10:10 a.m., 152.3; July 27, 4:00 p.m., 152.4; Dec. 31, 5:10 p.m., 152.1.

Tunica County

17. G. D. Perry, Sr. SW¼SE¼ sec. 7, T. 5 S., R. 11 W., 30 feet east of plantation road, on the rear lawn and 100 feet north of residence of Toby Perry, 2.1 miles south of Tunica and 1.3 miles west of U. S. Highway 61. Used drilled domestic and plantation well, diameter at top 4½ inches, reduced to 2 inches at screen, reported depth 1,806 feet. Measuring point, top of 4½-inch casing tee, 0.5 foot above land surface and about 193 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 7, 1:30 p.m., 223.2; June 25, 8:30 a.m., 222.4; July 26, 11:30 a.m., 221.3; Sept. 11, 11:30 a.m., 221.1; Dec. 30, 1:05 p.m., 225.1.

Washington County

25. Wagner Plantations (formerly E. H. Fisher). Measuring point, 122.87 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 16, 4:30 p.m., 165.3; June 26, 4:30 p.m., 165.4; July 30, 12:15 p.m., 163.0; Dec. 31, 2:15 p.m., 163.5.

65. W. D. Atterbury. Measuring point, 122.07 feet above mean sea level. Water levels, in feet above datum, 1940: Flowing prior to measurements; closed 20 minutes before testing. Mar. 16, 3:40 p.m., 200.87; June 26, 11:00 a.m., 199.4; July 30, 1:15 p.m., 199.3; Dec. 31, 9:15 a.m., 197.6.

70. Town of Hollandale. Measuring point, 119.60 feet above mean sea level.

Water level, in feet above datum, 1940

Date	Hour	Water level	Date	Hour	Water level
Jan. 1	3:30 p.m.	91.50	July 2	4:00 p.m.	94.92
11	3:00 p.m.	92.67	24	8:30 p.m.	97.16
Feb. 2	3:30 p.m.	91.60	Aug. 8	1:00 p.m.	96.75
19	9:45 a.m.	93.81	12	5:30 a.m.	97.60
Mar. 9	9:00 a.m.	92.75	Sept. 1	10:15 a.m.	97.44
31	10:00 a.m.	94.70	24	2:00 p.m.	95.12
Apr. 7	11:00 a.m.	94.93	Oct. 1	8:30 a.m.	96.27
28	10:00 a.m.	96.15	31	11:15 a.m.	94.80
May 12	3:45 p.m.	96.63	Nov. 6	1:15 p.m.	94.48
23	12:01 p.m.	94.94	28	11:00 p.m.	96.76
June 1	11:45 a.m.	96.48	Dec. 6	3:00 p.m.	96.94
30	10:00 p.m.	94.97	31	9:45 a.m.	99.27

Yazoo County

25. Yazoo City. Measuring point, 112.71 feet above mean sea level. Water levels, in feet above datum, 1940: Mar. 14, 10:30 a.m., 138.2; June 11, 1:35 p.m., 138.5; July 30, 3:45 p.m., 138.6; Dec. 5, 9:35 a.m., 138.4.

STATE-WIDE PROJECT

By E. D. Burchard

The program of water-level measurements in observation wells in North Carolina, as described in Water-Supply Papers 777, 840, 845, and 886, was continued in 1940. Water-level recorders were operated on five wells throughout the year; measurements were made daily to about weekly in four other wells.

In 1940 net declines in water level occurred in five wells and net rises in water level occurred in three wells. The declines ranged from 0.2 foot in the Freuler well at Roanoke Rapids, to 1.0 foot in the Terrell well near Copeland, and possibly as much as 3 feet in the McCauley well at Chapel Hill. The McCauley well went dry October 10, a month before the water levels in the other wells began to rise. Net rises in water level during the year ranged from 1.5 feet in the Kurfee well at Mocksville, to nearly 2 feet in the Baldwin well at Blantyre and the Governor Holt well at Haw River.

Records of water level in 1940 in nine wells under observation are given on the following pages. The water level in each well is expressed in feet above an assumed datum.

Freuler well.

Mean daily water level, in feet above datum, 1940
(from recorder charts)

Day	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.69	....	6.23	6.40	5.81	5.11	4.75	7.72	6.04	5.15	5.63
2	5.62	....	6.16	6.38	5.77	5.08	4.72	7.51	6.02	5.37	5.56
3	....	....	6.18	6.34	5.73	5.08	4.69	7.37	5.95	5.25	5.53
4	....	....	6.22	6.24	5.71	5.07	4.66	7.25	5.90	5.20	5.51
5	....	7.05	6.12	6.14	5.70	5.03	4.64	7.18	5.86	5.19	5.52
6	....	....	6.05	6.13	5.67	4.99	4.64	7.12	5.87	5.16	5.43
7	....	....	6.07	6.11	5.65	4.98	4.73	7.05	5.90	5.11	5.49
8	....	....	6.17	6.11	5.64	4.96	4.65	7.02	5.85	5.07	5.44
9	....	....	6.14	6.16	5.66	4.93	4.60	7.00	5.80	5.02	5.37
10	....	....	6.01	6.09	5.60	4.90	4.63	6.93	5.76	4.98	5.35
11	....	....	6.01	6.07	5.57	4.88	4.74	6.83	5.74	4.95	5.30
12	....	....	6.18	6.03	5.54	4.95	4.85	6.77	5.70	4.94	5.29
13	....	6.31	6.75	6.02	5.51	5.58	4.82	6.67	5.68	5.48	5.27
14	....	6.45	6.62	5.97	5.50	5.45	5.20	6.64	5.65	5.97	5.23
15	....	6.71	6.61	5.94	5.47	5.39	8.56	6.63	5.65	6.34	5.23
16	....	6.63	6.54	6.02	5.42	5.35	9.30	6.56	5.57	6.16	5.28
17	....	6.53	6.49	6.13	5.43	5.30	9.47	6.49	5.57	6.09	5.25
18	....	6.58	6.47	6.03	5.50	5.21	9.32	6.46	5.53	5.95	5.18
19	....	6.57	6.48	5.99	5.47	5.17	9.08	6.40	5.53	5.90	5.16

Freuler well.--Continued.

Mean daily water level, in feet above datum, 1940
(from recorder charts)

Day	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
20	....	6.50	6.61	5.98	5.40	5.13	8.71	6.39	5.50	5.91	5.19
21	....	6.43	6.50	6.17	5.35	5.08	8.42	6.35	5.44	5.88	5.18
22	....	6.49	6.39	6.12	5.32	5.00	8.19	6.32	5.39	5.83	5.14
23	....	6.39	6.33	6.08	5.34	4.98	7.99	6.26	5.37	5.78	5.08
24	....	6.32	6.52	6.08	5.32	4.97	7.81	6.25	5.38	5.80	5.07
25	....	6.32	6.44	6.04	5.29	4.93	7.67	6.24	5.34	5.73	5.13
26	....	6.27	6.41	5.95	5.25	4.89	7.87	6.12	5.30	5.74	5.14
27	....	6.29	6.37	5.40	5.21	4.85	7.71	6.10	5.26	5.84	5.08
28	....	6.28	6.33	5.88	5.20	4.82	7.60	6.08	5.24	5.67	5.56
29	....	6.26	6.34	5.85	5.16	4.86	8.20	6.06	5.20	5.67	5.56
30	....	6.35	6.38	5.89	5.11	4.83	7.99	6.06	5.22	5.64	5.48
31	....	6.28	....	5.87	....	4.82	7.84	....	5.17	....	5.44

Kurfee well.

Mean daily water level, in feet above datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.90	4.38	5.46	6.88	7.63	8.30	7.94	7.75	8.66	7.05	5.52	5.48
2	3.90	4.38	5.50	6.89	7.68	8.22	7.89	7.69	8.62	7.01	5.51	5.47
3	3.89	4.38	5.63	6.91	7.71	8.21	7.84	7.63	8.57	6.94	5.44	5.45
4	3.89	4.39	5.72	6.94	7.72	8.24	7.80	7.60	8.52	6.88	5.38	5.43
5	3.88	4.40	5.72	6.96	7.72	8.31	7.73	7.57	8.48	6.80	5.35	5.43
6	3.87	4.42	5.73	6.96	7.72	8.31	7.69	7.54	8.43	6.74	5.32	5.41
7	3.85	4.44	5.77	6.96	7.74	8.33	7.66	7.52	8.39	6.71	5.27	5.37
8	3.84	4.45	5.83	7.05	7.76	8.35	7.62	7.49	8.36	6.64	5.23	5.36
9	3.82	4.45	5.84	7.07	7.78	8.35	7.58	7.42	8.34	6.54	5.19	5.34
10	3.80	4.51	5.85	7.03	7.79	8.35	7.53	7.37	8.30	6.45	5.15	5.31
11	3.79	4.60	5.88	7.03	7.79	8.36	7.51	7.33	8.21	6.40	5.12	5.28
12	3.78	4.59	5.90	7.07	7.78	8.36	7.55	7.31	8.13	6.38	5.09	5.26
13	3.77	4.58	5.92	7.09	7.77	8.36	7.58	7.38	8.06	6.32	5.80	5.24
14	4.61	4.59	6.16	7.11	7.77	8.36	7.46	8.91	8.01	6.27	7.05	5.21
15	4.62	4.60	6.27	7.13	7.77	8.36	7.42	8.68	7.98	6.23	6.86	5.17
16	4.28	4.60	6.19	7.14	7.76	8.35	7.40	8.74	7.92	6.18	6.14	5.32
17	4.15	4.63	6.19	7.14	7.75	8.31	8.30	8.77	7.84	6.12	5.68	5.38
18	4.12	5.17	6.24	7.14	7.72	8.30	8.34	8.77	7.78	6.08	5.49	5.24
19	....	5.19	6.32	7.18	7.71	8.30	8.04	8.78	7.73	6.04	5.41	5.20
20	....	5.07	6.37	7.32	7.72	8.28	7.95	8.79	7.68	6.00	5.40	5.19
21	....	5.03	6.41	7.33	7.70	8.22	7.93	8.79	7.63	5.97	5.40	5.19
22	....	5.02	6.52	7.29	7.66	8.20	7.92	8.79	7.59	5.92	5.41	5.20
23	....	5.04	6.57	7.29	7.64	8.21	7.92	8.79	7.52	5.88	5.42	5.22
24	....	5.11	6.60	7.34	7.63	8.23	7.92	8.79	7.47	5.85	5.44	5.22
25	....	5.18	6.63	7.35	7.61	8.24	7.92	8.79	7.43	5.81	5.46	5.25
26	....	5.24	6.66	7.38	7.56	8.21	7.90	8.79	7.33	5.77	5.46	5.27
27	....	5.32	6.70	7.41	7.52	8.15	7.87	8.78	7.25	5.71	5.48	5.28
28	....	5.38	6.75	7.45	7.51	8.09	7.83	8.76	7.19	5.67	5.48	5.31
29	....	5.42	6.79	7.50	7.52	8.06	7.80	8.72	7.14	5.62	5.48	5.35
30	4.38	....	6.85	7.56	8.82	7.97	7.87	8.70	7.09	5.58	5.48	5.35
31	4.38	....	6.87	....	8.64	....	7.79	8.67	....	5.54	....	5.35

Brick Pit well.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	3.18	Mar. 9	3.64	May 11	3.61	July 13	3.30
13	3.22	16	3.66	18	3.48	20	3.22
20	3.20	23	3.68	25	3.38	27	3.07
27	3.46	30	3.74	June 1	3.28	Aug. 3	2.88
Feb. 3	3.60	Apr. 6	3.78	8	3.64	10	2.74
10	3.62	13	3.86	15	3.68	17	3.30
17	3.64	20	3.88	22	3.64	24	4.00
24	3.68	27	3.84	29	3.48	31	4.38
Mar. 2	3.68	May 4	3.74	July 6	3.45	Sept. 7	4.32

Brick Pit well.--Continued.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Sept. 14	4.14	Oct. 12	3.38	Nov. 9	2.76	Dec. 7	2.58
21	3.96	19	3.20	16	2.78	14	2.52
28	3.70	26	3.06	23	2.70	21	2.44
Oct. 5	3.50	Nov. 2	2.92	30	2.64	28	2.43

Fishdam well.

Water level, in feet above datum, 1940

Jan. 14	4.27	Apr. 26	6.63	July 31	1.58	Oct. 12	0.27
Feb. 11	6.11	May 1	6.45	Aug. 8	1.57	21	.11
21	6.50	20	5.38	13	1.39	28	.03
Mar. 1	5.70	30	6.73	15	1.27	Nov. 7	.00
9	5.78	June 4	5.89	26	2.36	19	.52
17	6.32	14	3.73	Sept. 6	1.45	Dec. 3	2.84
22	6.16	21	3.97	13	1.28	8	2.80
Apr. 1	6.15	July 12	1.75	28	1.17	16	2.89
9	6.22	20	1.59	Oct. 4	.78	28	3.93
18	6.36						

Baldwin well.

Water level, in feet above datum, 1940

Day	Jan.	Feb.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.64	1.25	....	5.06	6.24	6.44	5.76	5.26	5.55	4.65	3.77
2	1.63	1.26	....	5.10	6.26	6.44	5.73	5.27	5.55	4.61	3.73
3	1.52	1.23	....	5.12	6.28	6.41	5.69	5.25	5.54	4.60	3.71
4	1.61	1.23	....	5.18	6.31	6.39	5.68	5.24	5.54	4.53	3.69
5	1.61	1.23	....	5.22	6.32	6.37	5.64	5.24	5.53	4.45	3.68
6	1.60	1.23	....	5.25	6.34	6.35	5.60	5.25	5.51	4.44	3.67
7	1.60	1.23	....	5.31	6.36	6.33	5.58	5.27	5.51	4.40	3.66
8	1.59	1.23	....	5.36	6.39	6.32	5.56	5.27	5.50	4.37	3.64
9	1.59	1.23	....	5.40	6.39	6.29	5.53	5.31	5.47	4.33	3.61
10	1.59	1.23	....	5.44	6.39	6.28	5.49	5.31	5.45	4.30	3.61
11	1.58	1.23	....	5.49	6.43	6.25	5.46	5.33	5.42	4.27	3.58
12	1.58	1.23	....	5.53	6.45	6.23	5.48	5.34	5.38	4.23	3.57
13	1.58	1.24	....	5.57	6.45	6.20	5.60	5.37	5.34	4.21	3.55
14	1.59	1.25	....	5.61	6.45	6.18	5.77	5.36	5.33	4.17	3.55
15	1.58	1.24	....	5.64	6.47	6.16	5.64	5.38	5.31	4.14	3.53
16	1.58	1.29	....	5.67	6.47	6.13	5.56	5.40	5.29	4.12	3.53
17	1.59	1.31	....	5.72	6.47	6.11	5.46	5.42	5.25	4.12	3.51
18	1.58	1.32	....	5.77	6.48	6.08	5.42	5.43	5.20	4.02	3.49
19	1.33	1.41	....	5.81	6.48	6.04	5.37	5.43	5.17	3.98	3.48
20	1.32	1.42	....	5.84	6.49	6.02	5.32	5.46	5.12	3.98	3.48
21	1.31	1.42	....	5.89	6.49	6.01	5.32	5.48	5.09	3.95	3.48
22	1.31	1.43	....	5.92	6.49	5.98	5.28	5.51	5.04	3.93	3.45
23	1.31	1.46	....	5.97	6.50	5.95	5.26	5.52	5.02	3.91	3.46
24	1.30	1.50	....	6.00	6.50	5.93	5.24	5.53	4.98	3.87	3.45
25	1.26	1.52	....	6.03	6.50	5.90	5.22	5.53	4.95	3.87	3.46
26	1.27	1.56	4.81	6.07	6.49	5.88	5.20	5.53	4.89	3.86	3.46
27	1.25	1.60	4.87	6.10	6.49	5.82	5.19	5.54	4.84	3.82	3.46
28	1.26	1.62	4.89	6.13	6.47	5.82	5.18	5.54	4.82	3.79	3.43
29	1.26	1.65	4.96	6.16	6.47	5.82	5.30	5.54	4.77	3.78	3.46
30	1.26	....	4.98	6.19	6.46	5.80	5.29	5.56	4.73	3.76	3.45
31	1.26	....	....	6.22	....	5.78	5.27	....	4.69	....	3.44

Alston well.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	11.58	Mar. 27	13.98	July 17	11.92	Oct. 9	12.08
6	11.64	30	14.09	20	11.56	12	11.91
10	12.72	Apr. 3	13.96	24	11.23	16	13.27
13	13.00	6	13.82	27	12.09	19	13.12
17	12.00	10	13.62	31	12.34	23	13.36
20	12.36	13	13.86	Aug. 3	11.98	26	13.61
24	12.63	17	13.72	7	10.81	30	10.84
27	12.84	20	13.61	10	11.10	Nov. 2	10.61
31	11.68	24	13.45	14	16.54	6	11.22
Feb. 3	11.76	27	13.18	17	17.00	9	11.00
7	13.00	May 1	12.88	21	12.92	13	12.76
10	13.23	4	12.63	24	12.59	16	13.93
14	13.75	8	13.76	28	15.38	20	19.69
17	14.02	11	13.82	31	14.11	23	12.45
21	14.28	15	13.98	Sept. 4	10.65	27	12.36
24	14.00	18	14.03	7	11.10	30	11.99
27	14.03	22	13.88	11	10.32	Dec. 4	12.19
Mar. 2	13.96	25	13.76	14	10.38	7	12.23
6	13.82	29	13.62	18	10.31	11	12.03
9	13.70	June 1	13.45	21	10.09	14	11.86
13	14.18	5	13.00	25	10.53	18	11.69
16	14.63	8	12.92	28	10.42	21	11.54
20	15.30	July 3	11.38	Oct. 2	12.83	25	11.23
23	14.86	6	11.18	5	12.61	28	11.14

Governor Holt well.

Mean daily water level, in feet above datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.85	5.63	9.70	9.09	8.38	8.50	7.36	5.68	7.53	5.61	a4.32	a6.93
2	a5.83	5.69	9.55	9.03	8.38	8.53	7.29	5.61	7.47	5.57	a4.34	a6.85
3	5.78	5.86	9.50	8.99	8.34	8.53	7.22	5.54	7.39	5.51	a4.38	a6.78
4	5.69	5.97	9.58	8.97	8.25	8.51	7.15	5.48	7.30	5.46	a4.43	a6.71
5	5.61	6.23	9.68	8.91	8.16	8.46	7.08	5.43	7.20	5.42	a4.45	a6.65
6	5.58	7.09	9.70	8.80	8.07	8.41	7.02	5.40	7.13	5.37	a4.43	a6.60
7	5.56	8.91	9.68	8.71	8.03	8.38	6.95	5.35	7.05	a5.31	a4.40	a6.55
8	5.50	9.58	9.64	8.74	8.01	8.24	6.91	5.30	6.99	a5.24	a4.36	a6.49
9	5.43	9.86	9.52	8.83	8.01	8.15	6.87	5.24	6.94	a5.18	4.33	a6.43
10	5.42	9.94	9.40	8.84	8.00	8.04	6.83	5.17	6.89	a5.13	4.32	a6.37
11	5.45	10.38	9.27	8.83	8.00	7.94	6.79	5.12	6.82	a5.08	4.32	a6.31
12	5.52	10.53	9.13	8.83	7.98	7.86	6.74	5.09	6.75	a5.05	4.32	a6.26
13	5.55	10.42	9.03	8.82	7.96	7.78	6.67	5.08	6.68	5.03	4.52	a6.22
14	5.64	10.27	9.01	8.81	7.93	7.71	6.63	5.39	a6.60	5.01	6.08	a6.19
15	6.14	a9.96	9.78	8.75	7.88	7.64	6.60	6.50	6.54	4.98	a8.03	a6.18
16	6.37	a9.67	10.18	8.68	7.83	7.54	6.58	8.12	6.49	a4.93	a8.53	a6.19
17	6.50	9.44	10.31	8.61	7.79	7.46	6.55	9.17	6.42	a4.86	a8.64	a6.24
18	a6.55	9.35	10.31	8.57	7.73	7.64	6.50	9.40	6.34	a4.80	a8.60	a6.31
19	a6.55	10.13	10.24	8.57	7.70	7.86	6.44	9.39	6.27	a4.75	a8.47	a6.43
20	a6.52	10.76	10.11	8.57	7.66	7.97	6.40	9.17	6.21	a4.68	a8.28	a6.58
21	6.36	11.02	10.00	8.58	7.61	a8.01	6.37	8.93	6.16	a4.63	a8.06	a6.71
22	6.29	10.97	9.94	8.58	7.58	a8.02	6.31	8.70	6.09	a4.58	a7.85	6.76
23	6.22	10.76	9.83	8.57	7.57	8.01	6.25	8.51	6.01	4.56	a7.70	6.72
24	6.18	10.60	9.67	8.54	7.61	7.98	6.19	8.35	5.97	4.55	7.62	6.65
25	6.11	10.45	9.55	8.50	7.81	7.92	6.13	8.21	5.93	4.52	7.51	6.62
26	a6.03	10.24	9.42	8.46	7.89	7.85	6.04	8.09	a5.85	4.48	a7.39	6.66
27	a5.95	10.11	9.33	8.44	7.91	7.75	5.95	8.00	a5.76	4.43	a7.29	6.81
28	5.88	10.02	9.27	8.43	7.91	7.67	5.85	7.89	a5.70	a4.38	a7.20	6.95
29	5.79	9.86	9.20	8.41	7.88	7.56	5.78	7.77	5.68	a4.35	a7.11	7.26
30	5.69	.....	9.15	8.39	7.93	7.45	5.73	7.66	5.65	a4.33	a7.02	a7.68
31	5.63	.....	9.12	....	8.31	.....	5.70	7.57	....	a4.32	.....	a7.84

a Record estimated from graph based on observer's readings and range lines.

McCauley well,

Mean daily water level, in feet above datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1	5.45	5.11	5.59	6.01	6.33	6.35	5.91	5.15	4.64	4.07
2	5.42	5.13	5.59	6.00	6.35	6.34	5.89	5.11	4.62	4.05
3	5.40	5.11	5.63	6.02	6.36	6.32	5.87	5.08	4.60	4.03
4	5.38	5.12	5.66	6.05	6.36	6.31	5.85	5.06	4.58	4.01
5	5.38	5.15	5.67	6.04	6.32	6.31	5.81	5.04	4.56	3.99
6	5.34	5.19	5.67	6.00	6.32	6.30	5.79	5.02	4.55	3.97
7	5.32	5.26	5.68	6.01	6.36	6.30	5.78	5.00	4.53	3.96
8	5.34	5.26	5.70	6.07	6.38	6.29	5.76	4.98	4.52	3.94
9	5.28	5.26	5.69	6.08	6.39	6.29	5.74	4.95	4.51	3.91
10	5.27	5.30	5.67	6.04	6.39	6.26	5.72	4.93	4.49	3.89
11	....	5.35	5.66	6.06	6.40	6.25	5.70	4.90	4.46	(a)
12	....	5.38	5.65	6.10	6.38	6.23	5.68	4.88	4.44	....
13	....	5.39	5.65	6.10	6.39	6.22	5.64	4.86	4.41	....
14	....	5.42	5.69	6.11	6.41	6.21	5.61	4.86	4.40	....
15	5.27	5.36	5.76	6.13	6.40	6.20	5.59	4.88	4.38	....
16	....	5.35	5.81	6.14	6.40	6.18	5.58	4.92	4.36	....
17	....	5.35	5.83	6.13	6.40	6.14	5.55	4.91	4.34	....
18	....	5.42	5.86	6.13	6.39	6.14	5.52	4.88	4.32	....
19	....	5.50	5.90	6.15	6.40	6.14	5.49	4.86	4.30	....
20	....	5.54	5.90	6.20	6.41	6.13	5.47	4.83	4.28	....
21	....	5.54	5.90	6.22	6.39	6.08	5.45	4.81	4.27	....
22	....	5.53	5.92	6.20	6.40	6.07	5.42	4.79	4.26	....
23	5.21	5.52	5.93	6.21	6.41	6.07	5.39	4.77	4.23	....
24	5.22	5.53	5.92	6.23	6.42	6.08	5.38	4.75	4.22	....
25	5.16	5.56	5.93	6.23	6.42	6.07	5.35	4.74	4.20	....
26	5.16	5.56	5.93	6.24	6.39	6.04	5.31	4.73	4.16	....
27	5.15	5.58	5.95	6.24	6.38	6.01	5.28	4.72	4.15	....
28	5.13	5.63	5.97	6.25	6.37	6.00	5.25	4.70	4.13	....
29	5.13	5.60	5.98	6.26	6.36	5.98	5.22	4.68	4.11	....
30	5.13	....	6.02	6.29	6.36	5.93	5.20	4.67	4.09	....
31	5.12	....	6.01	....	6.37	....	5.18	4.65	....	....

Terrell well.

Mean daily water level, in feet above datum, 194C
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.08	2.73	2.43	2.09	2.15	1.73	1.30	1.41	1.74	1.52	1.73	1.90
2	3.07	2.72	2.43	2.07	2.11	1.70	1.29	1.40	1.73	1.53	1.76	1.90
3	3.05	2.70	2.42	2.06	2.07	1.66	1.31	1.39	1.70	1.53	1.74	1.90
4	3.03	2.69	2.41	2.05	2.04	1.63	1.31	1.37	1.67	1.53	1.74	1.91
5	3.00	2.68	2.35	2.04	....	1.60	1.30	1.35	1.66	1.54	1.75	1.92
6	2.98	2.65	2.34	2.02	....	1.58	1.29	1.33	1.64	1.54	1.76	1.92
7	2.96	2.64	2.34	1.94	....	1.55	1.28	1.32	1.63	1.54	1.76	1.93
8	2.94	2.64	2.34	1.94	....	1.52	1.27	1.31	1.62	1.56	1.77	1.93
9	2.93	2.64	2.33	1.94	....	1.52	1.26	1.30	1.60	1.56	1.78	1.93
10	2.93	2.65	2.32	1.94	....	1.52	1.25	1.30	1.58	1.56	1.78	1.93
11	2.92	2.65	2.27	1.93	....	1.52	1.24	1.29	1.57	1.56	1.78	1.93
12	2.93	2.63	2.24	1.94	1.81	1.52	1.24	1.29	1.57	1.56	1.81	1.94
13	2.93	2.62	2.23	1.94	1.78	1.52	1.23	1.32	1.56	1.57	1.83	1.94
14	3.00	2.60	2.23	1.92	1.75	....	1.23	2.23	1.55	1.57	1.83	1.95
15	3.03	2.59	....	1.91	1.70	1.52	1.23	2.19	1.56	1.58	1.84	1.96
16	2.96	2.57	....	1.88	1.70	1.51	1.23	2.12	1.55	1.59	1.84	1.97
17	2.94	2.55	2.23	1.87	1.70	1.40	1.23	2.07	1.55	1.60	1.85	1.99
18	2.93	2.59	2.20	1.86	1.65	1.39	1.23	2.04	1.54	1.61	1.85	1.99
19	2.92	2.68	2.15	2.52	1.55	1.40	1.24	2.00	1.54	1.60	1.85	1.99
20	2.92	2.58	2.14	2.79	1.54	1.40	1.23	1.96	1.53	1.60	1.85	1.99
21	2.91	2.56	2.14	2.72	1.54	1.40	1.22	1.91	1.52	1.60	1.85	1.99
22	2.89	2.55	2.15	2.62	1.55	1.40	1.21	1.87	1.52	1.61	1.85	1.98
23	2.88	2.55	2.14	2.53	1.55	1.39	1.21	1.84	1.52	1.62	1.85	1.98
24	2.87	2.54	2.13	2.49	1.55	1.38	1.20	1.82	1.52	1.62	1.86	1.99
25	2.85	2.52	2.10	2.42	1.61	1.37	1.20	1.81	1.52	1.63	1.86	2.00
26	2.84	2.50	2.08	2.36	1.76	1.36	1.19	1.80	1.52	1.64	1.87	2.01

a Well dry Oct. 11 through Dec. 31.

Terrell well.--Continued.

Mean daily water level, in feet above datum, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
27	2.80	2.47	2.08	2.30	1.75	1.34	1.18	1.78	1.52	1.64	1.89	2.02
28	2.78	2.45	2.07	2.29	1.75	1.34	1.16	1.75	1.52	1.65	1.89	2.03
29	2.76	2.44	2.07	2.23	1.75	1.32	1.15	1.72	1.52	1.65	1.90	2.04
30	2.75	....	2.10	2.18	1.76	1.31	1.36	1.75	1.52	1.68	1.90	2.04
31	2.73	....	2.11	....	1.75	....	1.42	1.75	....	1.68	....	2.03

FORSYTH, GUILFORD, AND RANDOLPH COUNTIES

DEEP RIVER AREA

By V. C. Fishel

The observation-well program in the Deep River area in Forsyth, Guilford, and Randolph Counties, near High Point, N. C., (see Water-Supply Papers 777, 817, 840, 845, and 886), was continued in 1940 by the Geological Survey. Water-level measurements were made in 20 wells about once a week until August and about once a month for the rest of the year. About 700 individual measurements of water level were made by M. Delk during 1940.

The accompanying illustration gives the average height of the water levels above assumed datum planes from November 1934 to December 1940, and the accumulative departure from normal precipitation at High Point from 1934 to 1940, as determined from the records of the United States Weather Bureau. Normal annual precipitation at High Point is about 44 inches. The precipitation has been above normal each year since 1934 with the exception of 1938, when it was 2.80 inches below normal. The water levels during the period of record presumably have been above normal due to the high precipitation.

The water levels rose an average of about 5 feet from the middle of November 1934 to April 2, 1935, and then declined with only minor interruptions from April 2 until the end of the year, at which time they were about 0.5 foot lower than in November 1934. The water levels rose an average of 7.93 feet from December 22, 1935, to April 10, 1936. These two dates represent respectively the times of the lowest and highest average stages of the water levels during the period of record, which extends from November 1934 through December 1940. The water levels declined

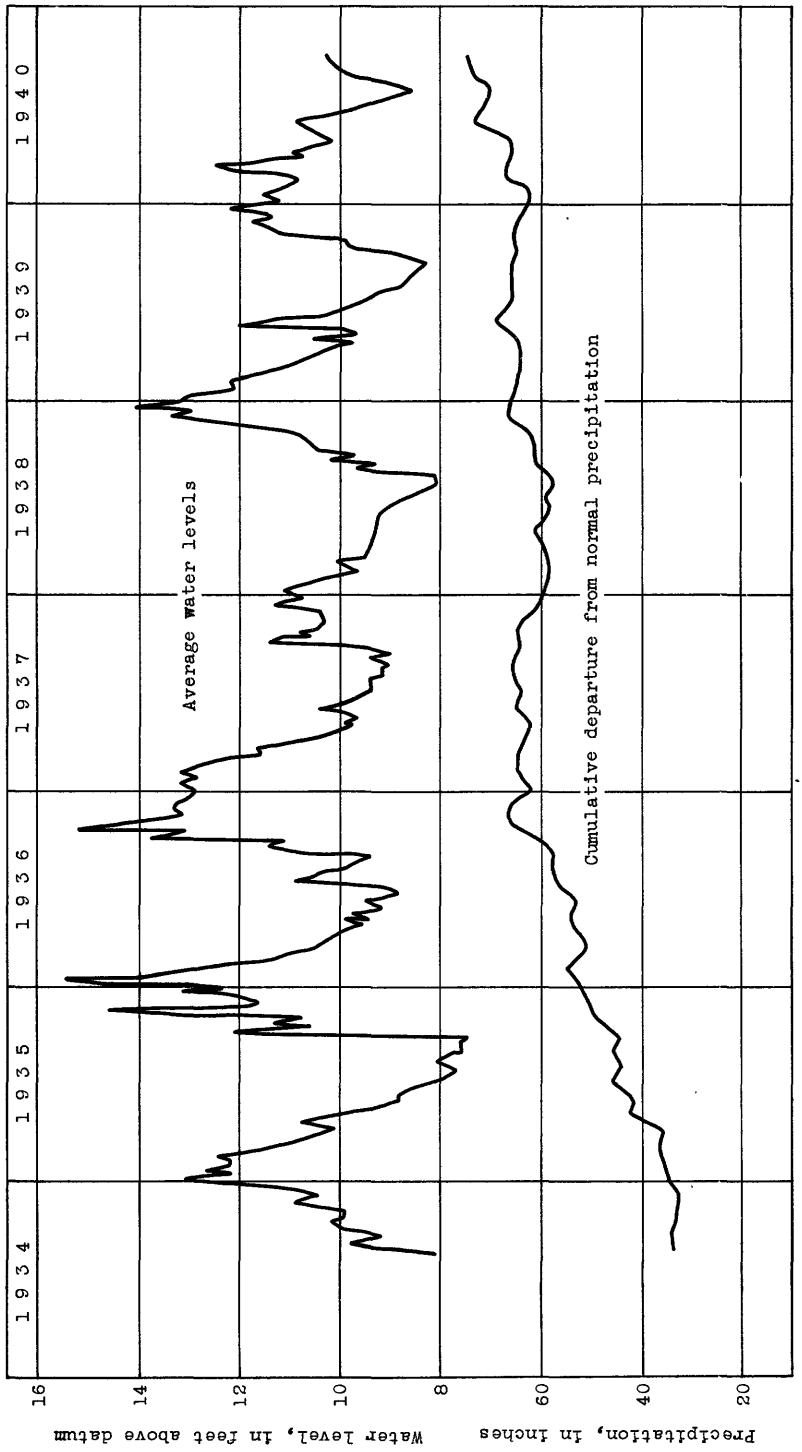

Figure 5.--Average water levels in wells in the Deep River area, N. C., and cumulative departure from normal precipitation from 1934 to 1940 at High Point, N. C.

an average of 6.62 feet from April 10 to September 25, 1936, recovered nearly 2 feet by October 16, and then declined about 1.5 feet by December 11.

From December 11, 1936, to January 22, 1937, the water levels rose an average of 5.83 feet to the highest average stage of 1937. This stage was 0.30 foot lower than the highest average stage of 1936. The water levels declined an average of 6.14 feet from January 22 to December 17, 1937, and then rose 0.74 foot by December 31.

Water levels rose less during the usual spring period of recharge in 1938 than during corresponding periods of the previous 3 years, but the ensuing normal summer decline was likewise less than usual. An average rise of about 1.5 feet occurred in the first week of January, but 1.1 feet of the rise was lost by February 11. The water levels then rose an average of about 0.9 foot by March 18, but declined about 0.6 foot by April 1. They fluctuated irregularly in April, May, and June, and on July 8 were about 0.25 foot below the average at the beginning of the year. They then declined until October 28, when they were at the lowest stage of the year. The water levels recovered about 2.8 feet by December 31.

The water levels rose 3.25 feet from January 1, 1939, to March 10, 1939, and then declined 4.49 feet by August 5. They rose 2.46 feet by August 19, declined 3.75 feet by December 23, and then rose 0.61 foot by December 29.

The water levels rose about 3 feet from January 1, 1940, to March 16. They declined 1.06 feet by April 6, and then rose 0.38 foot by April 3. This rise was followed by a decline of 0.82 foot by May 17 and then by another rise of 1.79 feet by May 31. They declined 2.35 feet by July 26 but rose 0.81 foot by August 31. They declined 2.40 feet by October 30 and at that time were at the lowest stage of the year. The water levels recovered 1.68 feet by December 28.

The water levels on January 1, 1941, were about one foot higher than on January 1, 1940, and about 0.3 foot higher than on January 1, 1935.

Average water levels, in feet above datum planes, in 20 observation wells, 1940

Date	Water level	Date	Water level	Date	Water level
Jan. 19-20	9.91	Apr. 12-13	11.56	June 28	10.80
Feb. 2-3	9.83	19-20	11.47	July 4-5	10.98
9-10	11.20	26-27	11.39	12	10.60
16-17	11.38	May 3-4	11.16	19	10.43
23-24	11.72	10-11	10.93	26	10.18
Mar. 1-2	11.38	17	10.74	Aug. 30-31	10.99
8	11.47	24	11.07	Sept. 27-28	9.69
15-16	12.24	31	12.53	Oct. 28-30	8.59
22-23	11.75	June 7	12.01	Nov. 28-30	9.95
29-30	11.63	14	11.48	Dec. 27-28	10.27
Apr. 5-6	11.18	21	11.24		

Forsyth County

18. Federal Transient Camp.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	10.05	Mar. 8	10.47	May 10	10.82	July 12	11.05
12	10.08	15	10.53	17	10.80	19	11.12
19	10.08	22	10.60	24	10.81	26	11.14
26	10.05	29	10.63	31	11.35	Aug. 30	11.33
Feb. 2	10.01	Apr. 5	10.65	June 7	11.00	Sept. 27	11.18
9	10.20	12	10.69	14	11.00	Oct. 28	11.24
16	10.18	19	10.72	21	11.02	Nov. 28	12.51
23	10.31	26	10.80	28	11.05	Dec. 27	10.51
Mar. 1	10.39	May 3	10.83	July 4	11.05		

19. W. C. Michael.

Water level, in feet above datum, 1940

Date							
Jan. 5	11.47	Mar. 8	11.31	May 10	11.30	July 12	11.47
12	12.35	15	11.22	17	11.33	19	11.48
19	10.21	22	11.24	24	11.28	26	11.49
26	10.77	29	11.23	31	11.55	Aug. 30	12.41
Feb. 2	11.29	Apr. 5	11.26	June 7	11.28	Sept. 27	12.37
9	11.38	12	11.27	14	11.41	Oct. 28	11.87
16	11.25	19	11.30	21	11.35	Nov. 29	11.78
23	11.26	26	11.19	28	11.43	Dec. 27	13.68
Mar. 1	11.25	May 3	11.20	July 4	11.46		

Guilford County

1a. C. H. Mackay.

Water level, in feet above datum, 1940

Jan. 12	11.12	Mar. 1	15.36	June 14	14.76	July 26	12.87
19	14.00	8	15.25	21	15.09	Aug. 18	20.85
26	12.18	15	16.98	28	13.55	29	14.95
Feb. 2	11.63	22	15.00	July 5	16.16	Sept. 4	15.15
9	17.98	29	13.62	12	14.05	13	13.46
16	15.75	Apr. 8	13.69	19	13.96	17	12.99
23	17.50						

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Guilford County--Continued.

2. Lindale Dairy Corporation.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 12	9.01	Mar. 29	9.85	June 14	9.50	Oct. 19	9.90
19	9.07	Apr. 5	9.80	21	9.50	25	9.79
26	9.04	12	9.84	28	9.61	31	9.64
Feb. 2	8.99	19	9.80	July 5	9.60	Nov. 8	9.50
9	9.15	26	9.64	12	9.74	18	9.48
16	9.24	May 3	9.70	19	9.77	25	9.56
23	9.42	10	9.55	26	9.87	Dec. 2	9.45
Mar. 1	9.57	17	9.45	Aug. 30	10.21	9	9.41
8	9.81	24	9.45	Sept.20	10.26	16	9.43
15	9.76	31	9.40	27	10.18	23	9.44
22	9.91	June 7	9.50	Oct. 10	9.99	30	9.57

4. W. O. Atkins.

Water level, in feet above datum, 1940

Jan. 5	11.83	Mar. 8	11.64	May 10	12.46	July 12	12.78
12	11.61	15	11.53	17	12.54	19	12.78
19	11.53	22	11.84	24	12.52	26	12.77
26	11.48	29	11.94	31	12.93	Aug. 30	12.82
Feb. 2	11.41	Apr. 5	12.02	June 7	12.73	Sept.27	12.71
9	11.82	12	12.11	14	12.81	Oct. 25	12.34
16	11.43	19	12.15	21	12.79	Nov. 28	12.73
23	11.44	26	12.33	28	12.78	Dec. 27	11.84
Mar. 1	11.58	May 3	12.34	July 4	12.79		

5. Isaac Tonkins.

Water level, in feet above datum, 1940

Jan. 6	10.35	Mar. 16	10.82	May 17	10.43	July 12	10.43
13	10.38	23	10.39	24	10.45	19	10.41
20	10.42	30	10.31	31	10.94	26	10.45
Feb. 3	10.23	Apr. 6	10.36	June 7	10.51	Aug. 31	10.54
10	10.50	13	10.21	14	10.45	Sept.28	10.48
17	10.25	20	10.49	21	10.42	Oct. 26	10.42
24	10.38	27	10.41	28	10.48	Nov. 30	10.41
Mar. 2	10.20	May 4	10.48	July 4	10.46	Dec. 28	10.52
8	10.44	10	10.42				

7. E. J. Welch.

Water level, in feet above datum, 1940

Jan. 5	8.25	Mar. 8	10.64	May 10	10.72	July 12	10.90
12	8.04	15	11.19	17	10.67	19	10.85
19	8.59	22	11.24	24	10.59	26	10.77
26	8.61	29	11.13	31	10.98	Aug. 30	10.78
Feb. 2	8.54	Apr. 5	10.96	June 7	11.71	Sept.27	10.59
9	9.41	12	10.90	14	11.41	Oct. 28	10.42
16	9.79	19	10.85	21	11.32	Nov. 29	10.99
23	10.35	26	10.81	28	11.19	Dec. 27	10.65
Mar. 1	10.50	May 3	10.77	July 5	11.05		

8. Welch Place.

Water level, in feet above datum, 1940

Jan. 5	9.94	Mar. 8	11.32	May 10	11.64	July 12	11.05
12	9.90	15	11.19	17	11.58	19	10.90
19	9.82	22	11.15	24	11.40	26	10.64
26	9.85	29	11.04	31	12.78	Aug. 30	10.84
Feb. 2	9.82	Apr. 4	11.24	June 7	12.44	Sept.27	10.00
9	11.93	12	11.64	14	12.14	Oct. 28	9.00
16	11.72	19	11.60	21	11.81	Nov. 29	9.81
23	11.80	26	11.98	28	11.59	Dec. 27	9.88
Mar. 1	11.48	May 3	11.96	July 5	11.26		

Guilford County--Continued.

12. John Blair Estate.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	7.63	Mar. 8	9.36	May 11	10.31	July 12	10.23
13	7.64	16	9.61	17	10.27	19	10.16
20	7.91	23	9.62	24	10.22	26	10.05
27	7.95	30	9.90	31	10.39	Aug. 31	10.03
Feb. 2	8.26	Apr. 6	9.94	June 7	10.47	Sept. 28	9.53
10	8.52	12	10.03	14	10.53	Oct. 29	9.57
17	8.72	20	10.18	21	10.49	Nov. 30	12.24
24	8.96	27	10.13	28	10.44	Dec. 28	9.09
Mar. 2	9.14	May 4	10.32	July 5	10.48		

14. Clodfelter Dairy.

Water level, in feet above datum, 1940

Jan. 13	10.71	Mar. 16	12.75	May 17	12.19	July 12	12.55
20	10.80	23	12.42	24	12.13	19	12.37
27	10.70	30	12.41	31	13.60	26	12.20
Feb. 3	10.68	Apr. 6	12.39	June 7	13.08	Aug. 31	12.81
10	11.81	13	12.46	14	13.05	Sept. 28	12.30
17	11.75	20	12.60	21	12.98	Oct. 30	11.57
24	11.98	27	12.40	28	12.87	Nov. 30	8.77
Mar. 2	12.01	May 4	12.36	July 5	12.70	Dec. 28	12.48
8	12.13	11	12.27				

15. C. C. Robbins.

Water level, in feet above datum, 1940

Jan. 6	6.20	Mar. 8	11.17	May 11	8.26	July 12	7.39
13	6.20	16	12.42	17	7.51	19	8.92
20	10.45	23	11.08	24	8.35	26	7.92
27	8.34	30	10.05	31	13.35	Aug. 31	9.40
Feb. 3	9.35	Apr. 6	9.91	June 7	10.90	Sept. 28	5.80
10	12.65	12	10.76	14	9.30	Oct. 29	4.15
17	11.60	20	11.25	21	8.55	Nov. 30	8.68
24	11.81	27	10.45	28	8.02	Dec. 28	10.57
Mar. 2	11.10	May 4	9.26	July 5	7.80		

Randolph County

9. W. C. Warner.

Corrected water level, in feet above datum, 1938-39

Date	Water level	Date	Water level	Date	Water level
Apr. 1, 1938	3.35	July 8, 1938	.97	Mar. 17, 1939	12.03
15	4.50	Aug. 26	3.23	24	10.47
22	3.60	Dec. 2	4.23	31	9.67
29	2.83	9	6.27	Apr. 7	8.57
May 6	2.09	16	5.17	15	6.97
13	1.43	23	4.27	22	5.83
20	1.07	30	8.27	28	5.12
27	3.21	Jan. 6, 1939	6.39	May 6	6.08
June 4	3.86	20	6.95	13	4.68
10	3.02	Feb. 17	14.42	20	3.93
17	1.64	24	10.36	26	3.27
24	3.50	Mar. 10	13.70		

Randolph County--Continued.

9. W. C. Warner.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	4.99	Mar. 8	12.01	May 10	7.83	July 12	6.82
13	5.07	16	13.41	17	7.16	19	6.26
20	7.19	23	12.29	24	10.16	26	3.68
27	7.06	30	12.31	31	7.96	Aug. 31	9.20
Feb. 3	6.26	Apr. 6	9.75	June 7	13.43	Sept. 28	5.51
10	8.64	13	10.56	14	10.77	Oct. 29	- .36
17	11.65	20	9.53	21	10.33	Nov. 30	3.85
24	11.92	27	8.86	28	8.41	Dec. 28	4.72
Mar. 2	11.43	May 4	8.40	July 4	8.69		

9b. W. C. Warner.

Water level, in feet above datum, 1940

Jan. 6	9.07	Mar. 16	14.82	May 17	11.43	July 12	10.93
13	9.69	23	14.77	24	12.56	19	10.08
20	9.63	30	14.72	31	15.63	26	10.93
Feb. 3	10.47	Apr. 6	13.61	June 7	15.42	Aug. 31	12.52
10	11.53	13	13.73	14	14.09	Sept. 28	9.73
17	13.74	20	13.26	21	13.01	Oct. 29	4.93
24	14.55	27	12.74	28	12.34	Nov. 30	11.73
Mar. 2	14.20	May 4	12.37	July 4	13.35	Dec. 28	11.05
8	14.47	10	11.85				

10. W. F. Beeson.

Water level, in feet above datum, 1940

Jan. 6	(a)	Mar. 16	12.36	May 17	11.40	July 12	10.14
13	(a)	23	11.58	24	11.38	19	10.16
20	8.65	30	11.55	31	11.20	26	10.31
Feb. 3	9.27	Apr. 6	9.62	June 7	11.43	Aug. 31	9.50
10	9.92	13	10.83	14	11.09	Sept. 28	8.50
17	10.29	20	11.81	21	11.09	Oct. 29	(a)
24	10.63	27	11.78	28	11.20	Nov. 30	9.25
Mar. 2	11.08	May 4	11.77	July 4	10.69	Dec. 28	9.44
8	11.17	10	11.70				

11. Emery Taylor.

Water level, in feet above datum, 1940

Jan. 6	(a)	Mar. 23	10.35	May 17	7.20	July 12	4.92
13	(a)	30	10.60	24	7.54	19	4.38
20	4.70	Apr. 6	9.71	31	10.82	26	4.18
Feb. 10	7.00	13	10.10	June 7	9.20	Aug. 31	3.42
17	8.80	20	9.23	14	8.40	Sept. 28	3.05
24	9.33	27	9.28	21	7.09	Oct. 29	(a)
Mar. 2	9.68	May 4	8.11	28	6.88	Nov. 30	7.18
9	9.45	10	7.35	July 4	5.55	Dec. 28	5.56
16	11.22						

20. Dr. Bush.

Water level, in feet above datum, 1940

Jan. 6	9.80	Mar. 8	10.40	May 11	11.72	July 12	11.71
13	9.78	16	11.05	17	11.74	19	11.41
20	9.89	23	11.18	24	11.75	28	11.50
27	9.96	30	11:16	31	12.10	Aug. 31	11.29
Feb. 3	9.98	Apr. 6	11.33	June 7	11.90	Sept. 28	10.90
10	10.22	13	11.44	14	11.92	Oct. 30	10.27
17	10.42	20	11.55	21	11.90	Nov. 30	10.18
24	10.62	27	11.48	28	11.88	Dec. 28	10.13
Mar. 2	10.76	May 4	11.68	July 5	11.78		

a Well dry.

Randolph County--Continued.

21. J. W. Young.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	9.65	Mar. 16	13.14	May 17	12.94	July 12	11.45
13	10.48	23	12.43	24	13.18	17	11.30
20	10.40	30	12.52	31	14.82	26	10.94
Feb. 2	10.32	Apr. 6	12.63	June 7	13.01	Aug. 31	10.82
10	11.92	13	12.88	14	12.68	Sept.28	9.55
17	11.50	20	13.02	21	12.38	Oct. 29	8.45
24	11.70	27	13.01	28	12.07	Nov. 30	9.54
Mar. 2	11.71	May 4	13.09	July 4	12.04	Dec. 28	10.89
8	11.97	10	13.04				

23. Mrs. Lonnie Pugh.

Water level, in feet above datum, 1940

Jan. 6	12.05	Mar. 16	14.74	May 17	13.32	July 12	13.59
13	12.15	23	13.02	24	13.80	19	13.56
20	12.70	30	12.96	31	15.32	26	13.50
Feb. 3	11.98	Apr. 6	12.86	June 7	13.81	Aug. 31	13.14
10	15.94	13	13.08	14	13.68	Sept.28	12.46
17	13.21	20	13.09	21	13.63	Oct. 29	11.69
24	13.27	27	13.12	28	13.63	Nov. 30	11.56
Mar. 2	12.57	May 4	13.23	July 4	13.58	Dec. 28	11.41
8	12.66	10	13.27				

25. J. S. White.

Water level, in feet above datum, 1940

Jan. 13	7.78	Mar. 16	10.01	May 17	10.21	July 12	9.74
20	8.05	23	10.07	24	10.10	19	9.63
27	8.12	30	10.09	31	10.76	26	9.43
Feb. 3	8.09	Apr. 6	10.13	June 7	10.41	Aug. 31	9.77
10	8.53	13	10.40	14	10.33	Sept.28	9.11
17	8.84	20	10.47	21	10.18	Oct. 30	8.38
24	9.17	27	10.40	28	10.00	Nov. 30	8.51
Mar. 2	9.40	May 4	10.50	July 5	9.77	Dec. 28	8.27
8	9.68	11	10.34				

27. Walter Lambeth.

Water level, in feet above datum, 1940

Jan. 6	(a)	Mar. 16	15.96	May 17	10.26	July 12	9.08
12	(a)	23	14.82	24	10.28	19	9.04
20	14.08	30	14.71	31	11.82	26	8.92
Feb. 3	14.05	Apr. 6	11.67	June 7	10.95	Aug. 31	14.05
10	15.02	13	11.92	14	10.22	Sept.28	10.06
17	17.52	20	11.97	21	9.92	Oct. 30	8.51
24	17.91	27	11.56	28	9.63	Nov. 30	9.61
Mar. 2	14.22	May 4	10.89	July 5	9.30	Dec. 28	14.78
8	14.08	11	10.45				

a Well dry.

ELIZABETH CITY AREA

By A. G. Fiedler

Observations of the fluctuations of ground-water level near Elizabeth City, N. C., were continued in 1940 through the cooperation of the Elizabeth City Public Utility Commission. The records reported herein are collected for obtaining reliable information on the fluctuations of ground-water level in the Elizabeth City well field and also in the same general region but sufficiently distant from the well field, where the water level is not especially affected by pumping from the field.

Records were obtained on two wells equipped with water-stage recorders. Well 31T is a shallow well about 2,500 feet northwest of the pumping plant in the city well field, and well 33T is a shallow well just west of the pumping plant and is within the well field proper. Detailed descriptions and water-level records of the wells for previous years are given in Water-Supply Paper 817 (pp. 225-228), Water-Supply Paper 840 (pp. 316-318), Water-Supply Paper 845 (pp. 343-345), and Water-Supply Paper 886 (pp. 523-526).

The water levels in well 31T are not appreciably affected by pumping in the well field, and accordingly they reflect the natural recharge and discharge from the underground reservoir. The records of water level taken from the recorder charts represent the lowest water level, in feet below the measuring point, for days for which records are available. The highest level during the year occurred on February 20 and was 1.95 feet below the bench mark. This level was only 0.13 foot lower than the highest level recorded in 1939, which likewise occurred in February. The lowest level during 1940 occurred on July 24 and 25 and was 7.69 feet below the bench mark. This level was 2.00 feet lower than the lowest level in 1939 and was 0.19 foot lower than the lowest level recorded since June 27, 1935, when records were started. The lowest water level on December 31, 1940, was 0.54 foot lower than the lowest level on the same date in 1939.

According to the records of the United States Weather Bureau, the precipitation at Elizabeth City, N. C., during 1940 was 48.54 inches and was 1.04 inches above normal. Precipitation was below normal in all months except April, July, August, September, and November. The lowest water

level occurred in July in spite of the fact that there occurred during this month 8.73 inches of precipitation, which was 2.63 inches in excess of normal. However, most of the precipitation occurred on July 13 and 24 when 3.35 inches and 3.57 inches respectively fell. In spite of the relatively large amount of precipitation falling on July 13, the lowest water level of the year occurred only 11 days thereafter. Throughout the latter part of June and the first half of July the water level declined persistently and the precipitation on July 13 interrupted this trend for only four days, July 14-17. The slight recovery of the water level from July 14 to 17 showed that only a small amount of recharge resulted from the rain of July 13. The reason for this is obvious--that is, the precipitation fell during a period of less than 24 hours and because of its intensity it was not greatly productive of recharge. The ability of the soil to absorb moisture and conduct it to the water table was exceeded and accordingly a large part of the precipitation was consumed in temporarily satisfying soil moisture deficiency or was rejected as surface runoff.

A similar recharge situation was repeated with the storm of July 24 which produced 3.57 inches of precipitation and interrupted the decline of the water level for only about 3 days following the precipitation. A total of only 1.96 inches of precipitation occurred during the period August 1-13, but it was well distributed and kept the soil sufficiently moist. As a result rains totaling 5.27 inches during the period August 14-18 produced more than 5 feet of rise in the water table, whereas a total of 6.92 inches of precipitation in the two storms in July produced only a few tenths of a foot rise.

The relation of precipitation and the fluctuations of the water level in well 31T during July and August 1940 illustrates clearly that because the capacity of the ground-water reservoir is not large persistent and marked declines of the water level will occur during periods of drought. Furthermore, because the infiltration capacity of the soil is limited, well distributed rains of moderate intensity are generally more productive of recharge in this area than heavy rainfall of short duration. These factors also indicate the need for careful attention to the position of the water table during extended periods of drought for, if such dry

periods are sufficiently long, the city may be compelled to distribute its pumping over a larger area to obtain an adequate supply of water.

The water level in well 33T, situated within the well field, reflects changes in recharge; but the strongest influence affecting the water level in it is created by the pumping of nearby wells. Records of water levels for this well, taken from the recorder charts, represent the minima on the days for which records are available. The highest water level recorded during the year in well 33T was 10.53 feet below the measuring point, and the lowest level was 14.38 feet below the measuring point on October 24 and 25. The lowest level on December 31 was 13.26 feet, 0.24 foot higher than the level on the corresponding date in 1939. There are several periods for which no records were obtained in 1940. It is believed, however, that records of the lowest level of the year were obtained, but it is likely that a slightly higher water level than the highest recorded during the year, may have occurred during a period when no record was obtained.

During 1940 the pumpage from the Elizabeth City well field amounted to approximately 186,000,000 gallons. Of this amount 140,800,000 gallons was recorded by a meter as being pumped from the small diameter wells and the remainder was pumped from the large diameter gravel-wall wells. The pumpage from the gravel-wall wells is estimated on the basis of metered pumpage for one day each month. The pumpage during 1939 estimated on the basis of incomplete records was about 160,000,000 gallons. In spite of the somewhat greater pumpage during 1940, the water level on December 31 was 0.24 foot higher than that of the same date of 1939. This apparently favorable status of the ground-water reservoir underlying the well field should not be construed as indicating that the pumpage from the field can be greatly increased for, on the other hand, the fact can not be overlooked that the lowest water level of the year was 0.88 foot lower than the lowest water level of 1939.

The following summary table gives the highest and lowest water levels recorded in wells 31T and 33T. The significant feature of the record for well 31T is that the lowest level for the 5⅝ years of record occurred on July 24, 25, 1940. This level was -0.19 foot lower than the previous lowest level recorded. The lowest water level for well 33T during the 3 years of record likewise occurred in 1940. The lowest water level in

well 33T, however, occurred in October, whereas the lowest level in 1940 in well 31T, which is outside of the well field proper and only remotely affected by pumping, if in fact it is affected at all, occurred in July. This difference in the date of the occurrence of the lowest level in the two wells is not however especially significant in view of the fact that well 33T is affected by the pumpage from the well field. Records of pumpage are not sufficiently detailed to permit a critical analysis of the particular pumping conditions that existed at the time when the lowest water level of the year was recorded in well 31T.

Summary, by calendar years, of ground-water levels for wells 31T and 33T, Elizabeth City area, N.C.

Well	First measured	Lowest observed water level (by calendar year)		Highest observed water level (by calendar year)	
		Water level (feet)	Date	Water level (feet)	Date
31T	June 27, 1935	7.50	Nov. 17, 1935	2.10	July 27, 1935
		6.64	June 1, 1936	1.87	Oct. 17, 1936
		7.14	July 7, 1937	2.03	Feb. 23, 1937
		7.15	Sept.16, 1938	2.03	Dec. 7, 1938
		a 5.69	Dec. 26, 1939	a 1.82	Feb. 11, 1939
		7.69	July 24, 25, 1940	1.95	Feb. 20, 1940
33T	Jan. 9, 1938	13.19	July 15, 1938	9.94	Dec. 27, 1938
		a13.50	Nov. 3, 1939	a 4.39	Mar. 18, 1939
		14.38	Oct. 24, 25, 1940	10.53	May 3, 1940

31T.

Lowest daily water level, in feet below measuring point, 1940

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.21	....	....	3.16	3.62	....	7.32	7.22	2.55	5.63	7.31	5.08
2	3.31	....	....	3.32	3.73	....	7.34	7.26	....	5.74	7.35	5.29
3	3.46	....	....	3.46	3.81	....	7.36	7.30	3.88	5.85	7.37	5.40
4	3.62	....	2.12	3.50	3.94	....	7.39	7.35	3.40	5.97	7.38	5.51
5	3.77	....	2.30	3.51	4.08	....	7.41	7.37	3.42	6.07	7.39	5.57
6	4.07	....	2.52	3.68	4.55	....	7.44	7.37	3.70	6.15	7.41	5.67
7	4.18	....	2.48	3.83	4.68	....	7.45	7.39	3.90	6.30	7.42	5.73
8	4.18	....	2.70	3.93	4.92	....	7.45	7.40	4.10	6.34	7.44	5.80
9	3.24	....	2.86	3.88	5.16	....	7.47	7.42	4.56	6.41	7.47	5.93
10	2.76	....	3.04	3.98	5.95	....	7.49	7.44	4.82	6.50	7.49	6.00
11	3.10	....	3.42	4.06	6.02	7.44	7.51	7.52	4.85	6.56	7.50	6.07
12	3.28	2.05	3.52	4.08	5.86	7.48	7.53	7.68	4.71	6.65	7.51	6.13
13	3.29	2.09	3.62	2.89	....	7.51	7.54	....	4.59	6.73	7.53	6.18
14	....	2.10	3.65	2.91	....	7.56	7.44	....	4.70	6.74	7.54	6.23
15	2.31	2.40	3.63	3.06	....	7.59	7.17	....	4.87	6.75	6.82	6.30
16	2.47	2.82	3.27	3.23	....	7.63	....	....	4.95	6.77	5.00	6.43
17	2.72	3.02	3.35	3.41	....	6.95	7.07	....	4.43	6.79	4.31	6.45
18	3.14	3.16	3.65	3.54	....	....	7.12	....	4.43	6.81	4.36	6.50
19	3.28	3.21	....	3.67	....	....	7.16	2.31	4.55	6.87	4.44	6.54
20	3.48	1.95	....	3.77	....	....	7.26	2.70	4.76	6.91	4.50	6.58
21	....	1.96	....	3.77	5.57	7.09	7.34	2.90	4.87	6.98	4.59	6.61
22	3.91	2.01	....	3.23	5.64	7.13	7.64	3.08	5.05	7.00	4.69	6.62
23	3.97	2.07	....	....	5.71	7.15	7.67	3.21	4.47	7.07	4.81	6.62

a From recorder chart.

31T.--Continued.

Lowest daily water level, in feet below measuring point, 1940

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
24	3.96	2.20	....	....	5.78	7.20	7.69	3.36	4.66	7.06	5.06	....
25	2.40	2.36	....	....	5.85	7.21	7.69	3.54	4.81	7.08	5.28	....
26	2.34	2.51	....	....	5.93	7.22	7.30	3.91	5.02	7.10	5.36	....
27	2.41	....	....	....	6.04	7.24	7.00	4.11	5.13	7.12	5.36	....
28	2.61	....	....	....	6.11	7.26	6.93	4.26	5.23	7.15	5.31	....
29	2.82	....	....	....	6.14	7.27	7.15	4.41	5.37	7.17	5.19	....
30	....	....	....	3.51	....	7.30	7.18	3.60	5.54	7.20	5.10	....
31	....	....	....	....	....	....	7.20	2.33	....	7.27	....	3.60

33T.

Lowest daily water level, in feet below measuring point, 1940

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	11.35	10.58	11.85	12.90	.....	.....	13.68	13.77	.....
2	.....	.....	.....	11.35	10.55	11.88	12.93	.....	12.67	13.72	13.72	.....
3	.....	.....	.....	11.33	10.53	11.93	12.96	.....	12.68	13.76	13.68	.....
4	.....	.....	12.31	11.27	10.57	.....	13.00	.....	12.68	13.80	13.66	.....
5	.....	.....	.....	11.27	10.64	.....	13.04	13.91	12.68	13.82	13.62	.....
6	13.51	.....	.....	11.28	10.67	.....	13.11	13.97	12.67	13.83	13.58	.....
7	13.46	.....	.....	11.27	.....	.....	13.19	14.00	12.67	13.81	13.57	.....
8	13.36	.....	.....	11.23	.....	.....	13.29	14.04	12.68	13.78	13.55	.....
9	13.32	.....	.....	11.23	.....	.....	13.37	14.07	12.69	13.84	13.53	.....
10	13.31	.....	.....	11.25	.....	.....	13.45	14.10	.....	13.89	13.52	.....
11	13.26	.....	11.76	11.24	.....	11.93	13.53	14.14	.....	.....	13.52	.....
12	.....	12.51	11.79	11.21	.....	11.99	13.60	14.15	.....	.....	13.49	.....
13	.....	12.51	11.81	11.17	.....	12.10	13.60	14.17	.....	.....	13.48	.....
14	.....	12.46	11.81	11.15	.....	12.17	13.49	14.19	.....	14.11	13.48	.....
15	.....	12.45	11.76	11.12	.....	12.17	.....	14.22	.....	14.13	13.46	.....
16	.....	12.46	11.77	11.07	.....	12.30	.....	14.22	13.15	14.16	13.45	13.03
17	.....	12.42	11.69	11.05	.....	12.36	13.27	13.90	13.16	14.18	13.45	13.06
18	.....	12.38	11.55	11.01	.....	12.31	13.39	13.67	13.18	14.20	13.44	13.08
19	.....	12.31	.....	10.97	.....	12.32	13.47	13.57	13.20	14.22	.....	13.09
20	.....	12.26	.....	10.92	.....	12.37	13.52	13.40	13.23	14.24	.....	13.09
21	.....	12.25	.....	10.85	11.31	12.41	13.58	13.28	13.28	14.29	.....	13.11
22	12.74	12.23	.....	10.85	11.35	12.43	13.63	13.19	13.33	14.32	.....	13.12
23	12.68	12.17	.....	.....	11.41	12.45	13.71	13.11	13.42	14.35	.....	13.14
24	12.59	12.12	.....	.....	11.45	12.48	13.74	13.06	13.45	14.38	.....	.....
25	12.59	12.03	.....	.....	11.50	12.65	13.78	13.03	13.49	14.38	.....	.....
26	.....	12.00	.....	.....	11.57	12.68	13.80	13.05	13.47	14.26	.....	.....
27	.....	.....	.....	.....	11.62	12.71	13.82	.....	13.42	14.13	.....	.....
28	.....	.....	.....	.....	11.69	12.73	13.84	.....	13.50	13.96	.....	.....
29	.....	.....	.....	.....	11.74	12.77	13.87	.....	13.56	13.95	.....	.....
30	.....	.....	.....	10.58	11.75	12.81	.....	.....	13.64	13.89	.....	.....
31	.....	.....	.....	.....	11.81	.....	.....	.....	.....	13.82	.....	13.26

SOUTH CAROLINA

GREENVILLE AND SPARTANBURG COUNTIES

TIGER RIVER AREA OF SOIL CONSERVATION SERVICE

By V. C. Fishel

The observation-well program in the Tiger River area, South Carolina[1/] was continued in 1940. Eight wells were being measured at the beginning of the year. Measurements were discontinued on 2 wells (1 and 2) and resumed on 3 wells (12, 18, and 35). The measurements were made by H. A. Dyer and J. W. Lynch of the Soil Conservation Service.

The accompanying illustration gives the average height of the water levels above arbitrary datum planes from July 1934 to March 1940 and the accumulative departure from normal precipitation from 1934 to 1940 as recorded by the station of the United States Weather Bureau at Spartanburg. Water level averages could not be computed for the greater part of 1940 as most of the wells were either in use or were dry.

The average annual precipitation at Spartanburg is about 50 inches. It was 46.65 inches in 1934, 38.70 inches in 1935, 70.16 inches in 1936, 53.64 inches in 1937, 39.59 inches in 1938, 40.34 inches in 1939, and 39.95 inches in 1940. There has been a deficit of about 30 inches of precipitation since October 1937.

The water-level measurements were started in the spring of 1934, at which time the water levels were at a low stage as a result of low precipitation during 1933 and the first part of 1934. The precipitation for 1934 was only about 4 inches below normal, but much of it occurred during the last half of the year, when normally very little ground-water recharge takes place. The precipitation during the last half of the year is usually required to meet the needs of the vegetation or to replenish the soil moisture deficiency caused by the vegetation. The low precipitation in 1935 produced an average rise of the water levels of only about 1.5 feet in the first half of the year and by the end of 1935 the water levels had receded to about the same average stage as at the beginning of the year.

1/ See Water-Supply Papers 777, 817, 840, 845, and 886.

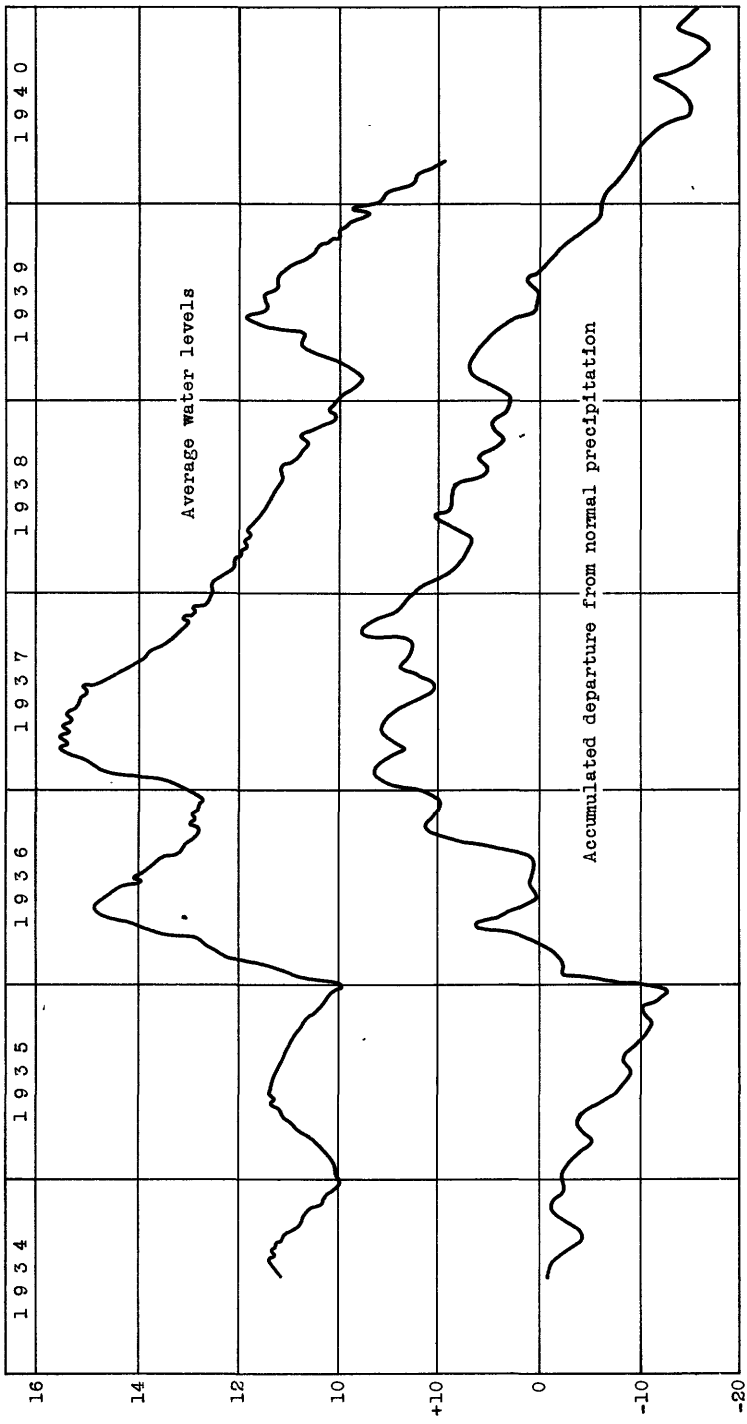

Figure 6.--Average water levels in wells in Greenville and Spartanburg Counties, S. C. and accumulative departure from normal precipitation at Spartanburg, S. C.

The precipitation in 1936 was about 12 inches during January, 5 inches during February, 6.5 inches during March, and 10 inches during April, making the precipitation for the 4-month period about 17 inches above normal. The water levels rose in response to the heavy precipitation an average of about 4.5 feet by May 18. They declined from May 18 to October 5 and then remained rather steady until the end of the year.

The precipitation during January 1937 was more than 6 inches above normal. This high precipitation together with normal precipitation in February caused the water levels to rise an average of 2.3 feet by April 5 at which time they were at the highest average stage during the period of record. The water levels declined gradually until the end of the year despite nearly normal precipitation.

In 1938, the precipitation for the first 3 months was about 6 inches below normal and for the next 3 months about normal. Nearly all the water that seeped into the ground was held in the soil and very little reached the water table. As a result water levels in the wells fluctuated unseasonably and the decline which began in April 1937 continued throughout 1938. The water levels declined about 2.5 feet during the year.

The water levels declined about half a foot from January 1 to February 15, 1939. They then rose an average of 2.3 feet by June 5, after which they declined during the rest of the year. The average declined 2.7 feet from June 5, 1939 to January 2, 1940.

The water levels continued to decline throughout 1940. They declined an average of more than a foot from January 1 to April 1. The precipitation for the first 6 months was about 8 inches below normal and it was about 10 inches below normal for the year. If the water levels in the last part of 1940 continued the same downward trend that they had during the period July 1, 1939 to April 1, 1940, they would have declined about 2 feet from April 1, 1940 to December 31, 1940. They would then be about 4 feet below the average on January 1, 1935 and about 16 feet below the average in March 1937.

Greenville County

15. A. W. Neves. Water levels, in feet above datum, 1940: Jan. 2, 9.18; Jan. 16, 9.03; Jan. 29, 8.57. Well dry rest of year.

Greenville County--Continued.

16. J. T. Bridewell.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level
Jan. 2	7.72	Feb. 12	6.76	Mar. 11	6.19
16	7.21	26	6.37	25	(a)
29	7.36				

18. Mrs. Hamit.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
July 30	10.37	Sept.10	10.37	Oct. 21	10.30	Dec. 2	10.23
Aug. 12	10.62	23	10.44	Nov. 4	10.37	17	10.16
23	10.48	Oct. 7	10.39	18	10.40	30	10.19

40. Will Neely.

Water level, in feet above datum, 1940

Jan. 2	8.68	Feb. 12	8.15	Mar. 25	7.39	May 6	6.85
16	8.46	26	7.79	Apr. 9	7.13	20	6.51
29	8.25	Mar. 11	7.59	22	7.97	June 3	6.39
						17	(a)

Spartanburg County

1. C. O. Fowler.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level
Jan. 2	12.40	Jan. 29	12.90	Feb. 26	11.60
15	12.25	Feb. 12	12.10		(a)

2. C. O. Fowler. Measurements discontinued Dec. 24, 1939.

6. J. D. Darby.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	9.48	Apr. 8	9.04	July 15	9.55	Oct. 21	9.30
16	9.26	22	9.28	30	9.47	Nov. 4	9.15
29	9.13	May 6	9.29	Aug. 12	9.33	18	8.99
Feb. 12	8.98	20	9.43	23	9.29	Dec. 2	8.88
26	8.90	June 3	9.48	Sept. 9	9.44	16	8.76
Mar. 11	8.76	17	9.54	23	9.36	30	8.70
25	8.89	July 1	9.57	Oct. 7	8.29		

12. J. G. R. Armstrong.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Aug. 12	10.39	Sept.23	10.24	Nov. 4	10.19	Dec. 16	9.94
23	10.42	Oct. 7	10.25	18	10.09	30	10.10
Sept.10	10.30	21	10.23	Dec. 2	10.05		

33. J. L. Foster.

Water level, in feet above datum, 1940

Jan. 2	9.70	Apr. 8	8.76	June 10	8.22	Sept.23	7.51
15	10.59	15	8.71	17	8.18	Oct. 7	7.41
29	9.40	22	8.64	24	8.16	21	7.29
Feb. 12	9.56	29	8.56	July 1	7.96	Nov. 4	7.20
26	9.15	May 6	8.50	15	7.67	18	7.08
Mar. 11	9.03	13	8.50	29	7.87	Dec. 2	6.98
18	8.99	20	8.43	Aug. 12	7.78	16	6.68
25	8.88	27	8.34	23	7.69	30	6.69
Apr. 1	8.83	June 3	8.28	Sept. 9	7.62		

a Well dry rest of year.
b Measurements discontinued.

Spartanburg County--Continued.

35. A. B. Grouse.

Water level, in feet above datum, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
July 31	6.88	Sept.10	6.89	Oct. 21	6.45	Dec. 2	5.65
Aug. 12	6.73	23	6.81	Nov. 4	6.19	16	5.42
23	6.83	Oct. 7	6.69	18	5.92	30	5.18

37. C. P. Cleveland.

Water level, in feet above datum, 1940

Jan. 2	7.60	Mar. 11	6.71	May 20	6.74	July 31	5.84
16	7.29	25	7.01	June 4	7.03	Aug. 13	8.68
29	7.94	Apr. 9	6.92	17	6.92	23	7.08
Feb. 12	7.07	22	6.33	July 1	6.54	Sept.10	(a)
26	6.88	May 6	6.81	15	6.38		

38. A. B. Grouse. Water level, in feet above datum, 1940: Jan. 2, 8.76; Jan. 16, 9.00; Jan. 29, 8.90; Feb. 12, 8.68; well dry rest of year.

a Well dry rest of year.

TENNESSEE

MEMPHIS

By F. H. Klaer, Jr.

The municipal water supply for the city of Memphis is taken entirely from wells at two locations. The water is raised by the air-lift system, except for one pumped well equipped with turbine pump, and is passed through iron removal plants consisting of aerators and filters and delivered by two pumping stations directly to the distribution system. The Parkway supply system consists of 37 wells situated along North Parkway from the pumping station at North Dunlap Street eastward for about 2 miles. Twenty-eight wells tap the so-called "500-foot" sand and range in depth from 350 to 525 feet. Nine wells tap the so-called "1,400-foot" sand and range in depth from 1,250 to 1,400 feet. The Sheahan supply system consists of 12 wells adjacent to the Sheahan pumping plant in the southeastern part of the city. Eight wells tap the "500-foot" sand and are from 400 to 525 feet deep and 4 wells tap the "1,400 foot" sand and are 1,300 to 1,400 feet deep. During 1940, the average pumpage for the municipal supply was about 21,500,000 gallons a day, about two-thirds of which was taken from the shallow wells and about one-third from the deep wells.

In addition to the water pumped for municipal supply, a large quantity of water is taken from private wells for industrial use and air-conditioning. It is estimated that this quantity is equal to or greater than that pumped for municipal supply.

Measurements of water level have been made in two wells in the Memphis area for several years. Automatic water-stage recorders have been maintained since 1932 on the Central Avenue well, which is in Peabody Park, near the corner of Central Avenue and Tanglewood Street, and since 1938 on the Sycamore Avenue well, near the intersection of Sycamore Avenue and Fifth Street. A description of the Central Avenue well is given on page 315 of Water-Supply Paper 817, and that of the Sycamore Avenue well is given on page 437 of Water-Supply Paper 845. Measurements of water level during the periods of record are given on pages 315-319 of Water-Supply Paper 817, pages 374-375 of Water-Supply Paper 840, pages 437-439 of Water-Supply Paper 845 and on pages 647-648 of Water-Supply Paper 886.

In 1940, a large industrial plant was constructed about 1 mile west of Millington and about 12 miles north of the city limits of Memphis. The water supply for the plant is taken from wells in both the shallow and deep water-bearing beds. It is planned to pump a quantity of water which may eventually nearly equal the quantity pumped for public supply.

In July 1940, the Memphis Division of Gas, Light and Water Commissioners, under the direction of C. M. McCord, Director of the Water Division, began a program of test drilling of wells for observation purposes. The city is having no difficulty in obtaining the quantity of water necessary for public supply, but it was felt desirable to set up a series of observation wells to check the fluctuations and the general trend of the water level in the shallow water-bearing beds. Many wells have been drilled for air-conditioning purposes near the center of the city and it is believed that pumpage from wells in this area has rapidly increased during the last few years.

In August 1940, an investigation of ground-water levels and pumpage was begun by the Federal Geological Survey in cooperation with the Memphis Board of Gas, Light, and Water Commissioners. The work is being done by F. H. Klaer, Jr., of the Geological Survey, under the general supervision of O. E. Meinzer, geologist in charge of the Division of Ground Water. During the last half of 1940, four test wells were drilled by the city of Memphis and were equipped with automatic water-stage recorders. In addition, automatic water-stage recorders were installed on well 17, which is 522 feet deep, and on well 32, which is 1,360 feet deep, both in the Parkway system. Measurements of water level in the six wells are included in this report.

During 1940, automatic water-stage recorders were maintained more or less irregularly throughout the year on two wells and during the last three months on six other wells for shorter periods. The water levels in the Central Avenue well and the Sycamore Avenue well were measured, and automatic water-stage recorders were maintained by J. L. Patterson and J. D. Pipkin under the direction of J. L. Saunders, district engineer of the Geological Survey at Fort Smith, Arkansas, from January 1 to September 1, 1940. On December 31, 1940, water-stage recorders were in operation on eight wells. During the year, about 250 measurements of water levels

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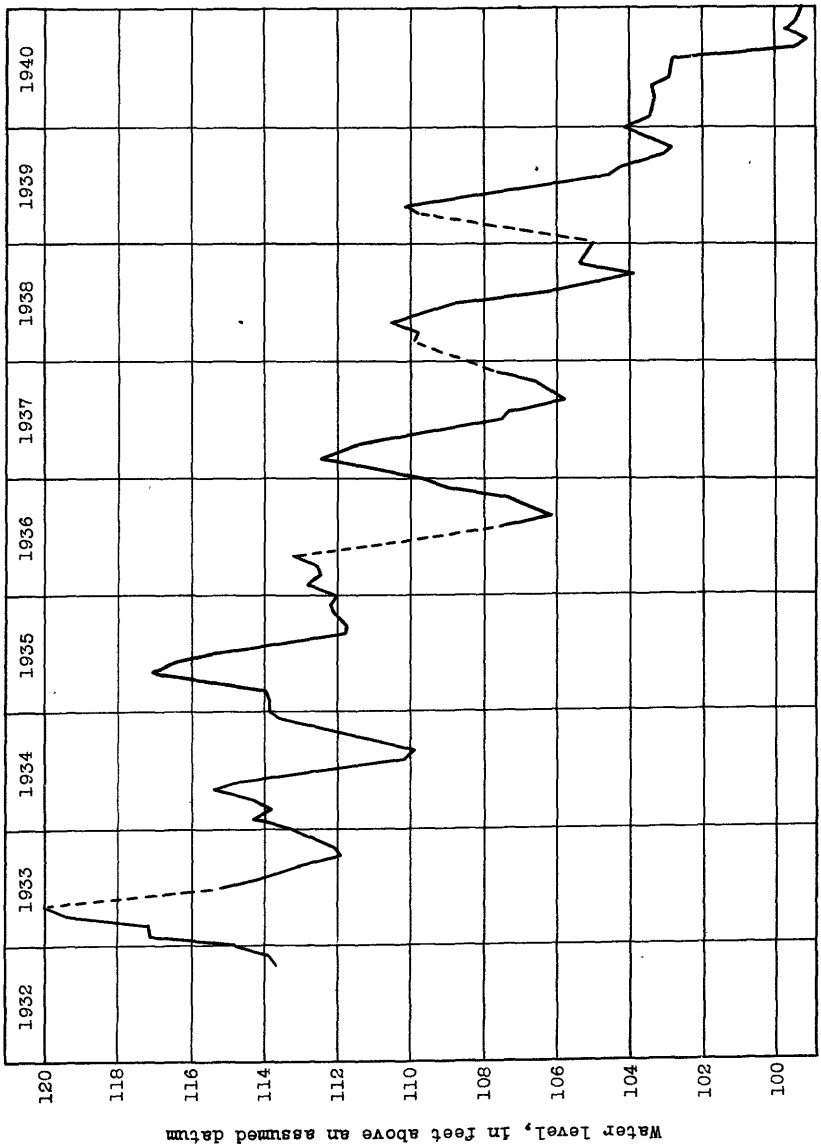

Figure 7.--Graph showing fluctuations of water level in Central Avenue well, Memphis, Tenn., 1932 to 1941.

were made by F. T. Schaefer, J. L. Patterson, J. D. Pipkin, D. G. Thompson, F. H. Klaer, Jr., of the Geological Survey, and A. J. Rumley and W. O. Haney, of the Memphis Water Division.

The ground-water resources of the Memphis area have been described in detail in Water-Supply Paper 638-A, "A preliminary report on the artesian water supply of Memphis, Tennessee", and in Water-Supply Paper 656, "Ground-water resources of western Tennessee".

The records of fluctuations of water levels during 1940 in the Memphis area are not complete and the period of record of measurements in observation wells established in 1940 is not long enough to show any significant trend. A study of the 8-year record of water-level measurements in the Central Avenue well shows, however, an apparent decline of about 16 feet for the 8-year period.

The Central Avenue well is in an area from which only small quantities of water are pumped and the water level in it is affected only in a general way by total pumpage from the Memphis area. The lowest level reached during 1940 was nearly 4 feet lower than the lowest level reached in 1939, and nearly 13 feet lower than the lowest level reached in 1933 (see accompanying illustration). The water level has declined more or less continuously since 1932, with the exception of 1935. The somewhat greater decline during 1940 may be due to the fact that the rise in water level during the winter and spring of 1940 was unusually small and that pumpage during 1940 was greater than during previous years.

The water level in the Sycamore Avenue well probably reached its highest level for 1940 in April and its lowest level for the year in September. The lowest level in September 1940 was slightly more than 2 feet lower than the lowest level reached during 1939, and nearly 4 feet lower than the lowest level reached during 1938.

The water levels in wells 17 and 32 are affected by pumping from nearby wells. Fluctuations of water level in well 17 are caused by pumping from the well of the Sears Roebuck Company, about 300 feet southwest of the well. The water level is also affected by the total pumpage from wells in the shallow water-bearing beds. The water level in well 32 is apparently affected chiefly by the total pumpage from the deep wells rather than by the pumpage from any one well.

The records of water level in the 4 test wells situated radially around the city about 5 miles from the centers of heavy pumpage are too short to show any significant trend in water level. Small fluctuations in water level due to changes in atmospheric pressure have been noted. Also in some of the wells there have been gradual changes amounting to several feet. However, the record is not yet long enough to show whether these large fluctuations are due to changes in pumpage, precipitation, or other causes.

The records of water level in the following tables are given as height of water level in feet above an assumed datum, which is 100 feet below the measuring point of each well for which measurements of water level were started during 1940. Because the water level at times during 1940 was below the assumed datum in the Central Avenue and Sycamore Avenue wells, these data were lowered 100 feet. All previous published measurements in Water-Supply Papers 817, 840, 845, and 886 may be corrected to the new data by adding 100. The new altitudes with respect to sea level of the data for the Central and Sycamore Avenue wells are given in the table of water-level measurements.

The lowest level reached each day, as determined from recorder charts, is published.

Central Avenue well. Assumed datum lowered 100 feet. New datum 185.00 feet below measuring point and 106.20 feet above mean Gulf datum.

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June
1	104.96	103.40	103.49	104.20	104.06	102.87
2	104.96	103.47	103.53	104.13	104.04	102.89
3	104.96	103.53	103.58	103.93	103.95	103.09
4	104.96	103.76	103.73	103.65	103.96	103.00
5	104.96	104.04	103.64	103.45	104.10	102.86
6	104.82	104.05	103.53	103.45	104.15	102.85
7	104.75	103.84	103.38	103.75	104.19	102.85
8	104.80	103.77	103.33	104.20	104.11	102.85
9	104.62	103.84	103.40	104.15	103.85	102.85
10	104.46	103.69	103.58	104.20	103.82	102.97
11	104.37	103.69	103.86	104.19	103.69	102.86
12	104.34	103.95	104.13	103.96	103.71	(a)
13	104.20	103.74	104.16	104.08	103.82	(a)
14	104.22	103.47	104.13	104.33	103.78	(a)
15	104.20	103.46	104.10	104.55	103.42	(a)
16	104.08	103.54	104.13	104.32	103.12	(a)
17	104.08	103.64	104.13	104.06	102.92	(a)
18	104.02	103.95	104.13	103.96	102.97	(a)
19	103.82	104.01	103.92	103.88	103.04	(a)
20	103.77	103.89	103.78	103.80	103.18	(a)
21	103.84	103.90	103.66	103.94	103.42	(a)
22	103.72	103.89	103.58	104.04	103.70	(a)

a Recorder not operating or record indeterminate.

Central Avenue well.--Continued.

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June
23	103.78	103.95	103.60	103.82	103.38	(a)
24	103.51	103.90	103.70	103.64	103.40	(a)
25	103.43	103.96	103.92	103.50	103.45	(a)
26	103.43	104.14	104.20	103.40	103.39	(a)
27	103.45	104.03	104.20	103.55	103.35	(a)
28	103.61	103.76	104.10	103.88	103.24	(a)
29	103.81	103.66	104.10	104.08	103.08	(a)
30	103.65	.....	104.10	104.18	102.89	(a)
31	103.59	.....	104.10	.....	102.86	.....

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	(a)	(a)	100.04	100.72	(a)	99.88
2	(a)	(a)	100.50	100.55	(a)	99.80
3	(a)	(a)	101.19	100.10	(a)	99.54
4	(a)	(a)	100.79	96.96	(a)	99.48
5	(a)	(a)	100.46	96.97	(a)	99.41
6	(a)	(a)	100.32	100.05	99.65	99.45
7	102.86	(a)	100.30	100.13	99.50	99.73
8	103.27	(a)	100.65	100.00	99.45	99.51
9	104.05	(a)	101.50	99.74	99.48	99.51
10	104.50	99.46	100.89	99.66	99.70	99.56
11	104.60	99.55	100.52	99.66	100.18	99.51
12	104.13	99.86	100.35	99.79	100.12	99.39
13	103.40	100.04	100.32	99.97	99.84	99.40
14	103.11	99.72	100.30	99.99	99.60	99.67
15	103.08	99.64	100.33	99.85	99.52	99.49
16	102.91	99.61	100.56	99.88	99.60	99.50
17	102.85	99.56	100.39	100.00	99.76	99.85
18	(a)	99.57	(a)	99.90	99.60	99.62
19	(a)	99.70	(a)	100.00	99.46	99.31
20	(a)	99.73	99.38	99.85	99.34	99.26
21	(a)	99.84	99.27	99.72	99.35	99.26
22	(a)	99.67	99.27	99.80	99.38	99.50
23	(a)	99.61	99.35	99.80	99.48	100.00
24	(a)	99.61	99.43	99.95	99.63	100.00
25	(a)	99.95	99.16	99.77	100.00	100.50
26	(a)	100.85	99.14	99.68	99.76	101.50
27	(a)	100.62	99.25	99.73	99.37	101.63
28	(a)	100.15	99.35	99.78	99.35	101.44
29	(a)	99.96	99.73	99.72	99.50	101.26
30	(a)	99.83	99.35	99.71	99.76	100.84
31	(a)	99.94	.....	99.82	.....	100.58

Sycamore Avenue well. Assumed datum lowered 100 feet. New datum, 142.00 feet below measuring point and 87.76 feet above mean Gulf datum.

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June
1	(a)	(a)	(a)	(a)	(a)	104.88
2	(a)	(a)	(a)	(a)	(a)	105.05
3	(a)	(a)	(a)	(a)	(a)	105.67
4	(a)	(a)	(a)	(a)	(a)	105.00
5	(a)	(a)	(a)	(a)	(a)	104.09
6	(a)	(a)	(a)	(a)	(a)	103.12
7	106.53	(a)	(a)	(a)	110.20	102.52
8	106.53	(a)	(a)	(a)	109.14	102.42
9	106.37	(a)	(a)	(a)	108.38	102.42
10	106.22	(a)	(a)	(a)	108.15	103.17
11	106.06	(a)	(a)	(a)	107.77	103.00
12	105.95	(a)	(a)	(a)	107.77	102.67

a Recorder not operating or record indeterminate.

Sycamore Avenue well.--Continued.

Lowest daily water level, in feet above an assumed datum, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June
13	106.07	(a)	(a)	(a)	107.97	102.49
14	106.05	(a)	(a)	(a)	106.83	102.43
15	106.11	(a)	(a)	(a)	105.79	102.19
16	106.21	(a)	(a)	(a)	105.47	102.15
17	105.68	(a)	(a)	(a)	104.97	102.56
18	105.57	(a)	(a)	(a)	104.40	102.67
19	104.41	(a)	(a)	(a)	104.40	102.32
20	104.20	(a)	(a)	(a)	104.92	101.86
21	104.20	(a)	(a)	(a)	104.72	101.27
22	104.31	(a)	107.02	(a)	104.32	101.07
23	104.43	(a)	106.82	(a)	101.10	101.07
24	104.19	(a)	106.78	(a)	104.10	(a)
25	104.05	(a)	106.87	(a)	104.39	(a)
26	(a)	(a)	107.24	(a)	104.56	(a)
27	(a)	(a)	107.10	(a)	104.94	(a)
28	(a)	(a)	106.85	(a)	105.28	(a)
29	(a)	(a)	106.67	(a)	104.90	100.22
30	(a)	.....	(a)	(a)	104.71	100.22
31	(a)	.....	.....	.....	104.71	.....

Lowest daily water level, in feet above an assumed datum, 1940 (from recorder charts)

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	100.95	(a)	99.01	(a)	(a)	102.94
2	101.21	(a)	99.53	b 101.12	(a)	103.08
3	101.04	(a)	99.74	b 101.10	(a)	103.29
4	101.04	(a)	99.83	b 100.86	b 103.02	103.32
5	101.46	(a)	99.63	b 100.59	(a)	103.24
6	101.80	(a)	99.31	(a)	b 102.85	103.24
7	102.12	(a)	99.22	b 100.92	(a)	103.32
8	103.04	(a)	99.22	b 100.94	(a)	103.40
9	103.48	(a)	99.81	b 100.93	(a)	103.72
10	102.85	97.90	99.66	(a)	(a)	103.70
11	102.28	97.90	99.66	b 101.25	(a)	103.44
12	101.84	98.72	100.03	(a)	b 103.51	103.14
13	101.80	98.88	100.52	(a)	b 103.46	102.98
14	101.80	98.58	100.89	b 101.83	(a)	102.96
15	102.34	98.29	100.92	(a)	(a)	102.96
16	102.24	98.00	101.35	(a)	(a)	103.15
17	101.82	97.82	100.96	b 102.12	(a)	103.23
18	101.52	97.82	99.46	b 102.14	(a)	103.28
19	101.28	98.36	99.88	b 102.00	b 103.20	103.19
20	101.28	98.85	99.18	(a)	(a)	103.08
21	101.33	99.01	98.68	b 102.23	102.66	103.07
22	101.92	99.10	98.67	(a)	102.54	103.07
23	(a)	99.30	98.89	b 101.97	102.45	103.22
24	(a)	99.25	98.70	(a)	102.44	103.43
25	(a)	99.25	98.68	b 101.73	102.52	103.06
26	(a)	99.81	b 99.03	(a)	102.92	102.92
27	(a)	99.72	(a)	(a)	102.70	103.27
28	(a)	99.59	(a)	(a)	102.64	103.47
29	(a)	99.28	(a)	b 101.26	102.65	103.53
30	(a)	98.97	(a)	(a)	102.87	.....
31	(a)	98.97	.....	(a)	.....	.....

a Recorder not operating or record indeterminate.
b Tape measurement.

17. City of Memphis. North Parkway, at end of North Garland Street, Memphis. Drilled well, diameter 8 inches, depth 522 feet. Well ends in 500-foot sand. Shallow well of Parkway system. Measuring point, top of 12-inch flange, 1.4 feet below top of wood floor over concrete well pit, 5 feet above land surface and 100.00 feet above assumed datum. Water level, Dec. 23, 1940, 71.09 feet below measuring point. Automatic water-stage recorder installed Aug. 26, 1940.

Lowest daily water level, in feet above an assumed datum, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Aug. 26	25.15	Sept. 27	25.72	Oct. 29	24.72	Nov. 30	25.77
27	22.34	28	26.36	30	26.89	Dec. 1	27.38
28	20.42	29	27.03	31	28.79	22	27.50
29	22.78	30	28.79	Nov. 1	29.82	3	26.59
30	23.73	Oct. 1	28.00	2	29.82	4	27.50
31	23.20	2	27.40	3	29.62	5	27.98
Sept. 1	24.52	3	26.85	4	28.93	6	28.44
2	27.40	4	26.72	5	27.90	7	28.90
3	27.92	5	25.44	6	27.70	8	29.00
4	25.09	6	26.80	7	27.82	9	28.98
5	24.70	7	26.43	8	28.07	10	27.30
6	24.74	8	26.02	9	27.80	11	26.94
7	24.65	9	25.92	10	28.27	12	27.40
8	27.57	10	25.98	11	29.62	13	27.64
9	26.04	11	25.99	12	28.00	14	28.22
10	24.21	12	24.18	13	27.70	15	28.50
11	25.79	13	25.43	14	27.20	16	28.22
12	27.15	14	27.40	15	27.00	17	27.95
13	26.62	15	26.80	16	27.19	18	26.63
14	25.27	16	27.60	17	27.20	19	26.12
15	26.62	17	27.72	18	27.46	20	26.00
16	25.77	18	25.20	19	25.80	21	27.90
17	23.85	19	24.40	20	25.80	22	28.28
18	22.80	20	24.37	21	25.60	23	28.90
19	.....	21	26.29	22	26.75	24	28.91
20	19.70	22	25.58	23	27.13	25	29.37
21	19.06	23	25.51	24	27.53	26	31.60
22	20.50	24	26.25	25	29.27	27	31.10
23	22.18	25	25.60	26	26.78	28	31.09
24	22.33	26	24.11	27	25.92	29	31.10
25	24.65	27	25.70	28	25.82	30	29.00
26	25.56	28	26.23	29	26.30	31	28.27

32. City of Memphis. North Evergreen Street at Louisville and Nashville Railroad. Drilled well, diameter 8 inches, depth 1,360 feet. Well ends in 1,400-foot sand. Deep well of Parkway system. Measuring point, top of 10-inch casing, 1.5 foot above land surface and 100.00 feet above assumed datum. Water level, Dec. 23, 1940, 39.99 feet below measuring point. Automatic water-stage recorder installed Sept. 26, 1940.

Lowest daily water level, in feet above an assumed datum, 1940 (from recorder charts)

Sept. 26	56.96	Oct. 11	58.30	Oct. 26	57.26	Nov. 10	61.22
27	57.25	12	58.09	27	57.51	11	62.28
28	57.40	13	57.94	28	57.46	12	62.18
29	57.56	14	57.91	29	57.18	13	(a)
30	57.70	15	57.72	30	57.27	19	60.10
Oct. 1	57.90	16	57.30	31	57.52	20	62.24
2	58.00	17	57.28	Nov. 1	57.23	21	62.10
3	58.12	18	57.40	2	57.20	22	62.01
4	58.12	19	57.39	3	57.36	23	62.00
5	58.44	20	57.28	4	57.40	24	61.93
6	58.66	21	57.40	5	57.87	25	61.93
7	58.93	22	57.28	6	58.23	26	61.94
8	59.13	23	57.15	7	57.87	27	61.89
9	59.17	24	57.15	8	57.70	28	62.03
10	59.06	25	57.16	9	57.71	29	62.24

a Recorder not operating or record indeterminate.

32. City of Memphis.--Continued.

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Nov. 30	58.48	Dec. 8	57.50	Dec. 16	60.37	Dec. 24	58.62
Dec. 1	58.28	9	58.19	17	60.28	25	58.51
2	58.54	10	58.33	18	60.15	26	58.86
3	61.66	11	59.68	19	59.86	27	62.10
4	58.28	12	59.94	20	59.42	28	62.62
5	57.36	13	59.94	21	59.78	29	63.04
6	57.13	14	59.89	22	59.24	30	61.28
7	56.94	15	59.89	23	60.02	31	60.38

T-1. City of Memphis. O. K. Robertson Road, 2.24 miles north from Memphis on U. S. Highway 51 and 0.36 mile north from U. S. Highway 51. Drilled test well, diameter 6 inches, depth 434 feet. Measuring point, top of 6-inch coupling, 0.8 foot above top of earth mound around well, about 4.5 above general land surface and 100.00 feet above assumed datum. Water level Dec. 23, 1940, 22.28 feet below measuring point. Automatic water-stage recorder installed Sept. 25, 1940.

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Sept. 8	a78.90	Oct. 15	78.12	Nov. 10	78.04	Dec. 6	77.77
9	a78.95	16	78.13	11	78.89	7	77.89
10	a79.17	17	78.09	12	77.96	8	77.91
11	a79.15	18	78.06	13	77.84	9	77.95
12	a79.05	19	78.12	14	77.82	10	77.96
13	a78.98	20	78.07	15	77.82	11	77.96
14	a78.95	21	78.05	16	77.86	12	77.92
25	b78.60	22	78.03	17	77.82	13	77.81
26	78.50	23	78.02	18	77.80	14	77.75
27	78.42	24	78.02	19	77.80	15	77.75
28	78.32	25	78.00	20	77.80	16	77.76
29	78.26	26	77.95	21	77.82	17	77.74
30	78.27	27	77.93	22	77.76	18	77.72
Oct. 1	78.34	28	77.96	23	77.73	19	77.74
2	78.34	29	78.00	24	77.68	20	77.71
3	78.35	30	78.00	25	77.72	21	77.69
4	78.33	31	78.01	26	77.71	22	77.71
5	78.28	Nov. 1	77.90	27	77.61	23	77.72
6	78.26	2	77.87	28	77.61	24	77.76
7	78.29	3	77.87	29	77.65	25	77.82
8	78.30	4	77.92	30	77.70	26	77.92
9	78.25	5	77.99	Dec. 1	77.61	27	78.02
10	78.19	6	77.95	2	77.61	28	78.16
11	78.15	7	77.93	3	77.67	29	78.07
12	78.11	8	77.90	4	77.74	30	78.03
13	78.07	9	77.94	5	77.76	31	78.04
14	78.09						

T-2. City of Memphis. Schiebler Road, 1.7 miles northeast from Raleigh and 1.4 miles northwest from Bartlett. Drilled test well, diameter 6 inches, depth 344 feet. Measuring point, top of 6-inch coupling, 2 feet above land surface and 100.00 feet above assumed datum. Water level, Dec. 23, 1940, 70.19 feet below measuring point. Automatic water-stage recorder installed Sept. 27, 1940.

Lowest daily water level, in feet above an assumed datum, 1940
(from recorder charts)

Sept. 27	30.66	Oct. 6	30.53	Oct. 15	30.43	Oct. 24	30.34
28	30.64	7	30.52	16	30.42	25	30.34
29	30.60	8	30.51	17	30.41	26	30.32
30	30.59	9	30.51	18	30.40	27	30.31
Oct. 1	30.57	10	30.50	19	30.40	28	30.30
2	30.57	11	30.49	20	30.39	29	30.29
3	30.56	12	30.47	21	30.38	30	30.28
4	30.56	13	30.45	22	30.37	31	30.28
5	30.54	14	30.44	23	30.35	Nov. 1	30.27

a Tape measurement.
b Recorder installed.

T-2. City of Memphis.--Continued.

Lowest daily water level, in feet above an assumed datum, 1940 (from recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Nov. 2	30.24	Nov. 14	30.13	Nov. 26	30.00	Dec. 7	29.85
3	30.23	15	30.12	27	29.98	8	29.85
4	30.21	16	30.10	28	29.97	9	29.86
5	30.20	17	30.09	29	29.96	10	29.86
6	30.18	18	30.09	30	29.95	11	29.86
7	30.17	19	30.07	Dec. 1	29.94	13	29.85
8	30.16	20	30.05	2	29.92	17	29.84
9	30.15	21	30.05	3	29.91	19	29.83
10	30.15	22	30.04	4	29.91	21	29.83
11	30.15	23	30.03	5	29.94	23	29.81
12	30.14	24	30.02	6	29.89	30	29.93
13	30.14	25	30.01				

T-3. City of Memphis. Macon Road, 0.6 mile east from Raleigh-La Grange Road and 6.7 miles east from Memphis. Drilled test well, diameter 6 inches, depth 383.5 feet. Measuring point, top of 6-inch coupling, 2 feet above land surface and 100.00 feet above assumed datum. Water level, Dec. 23, 1940, 76.69 feet below measuring point. Automatic water-stage recorder installed Oct. 28, 1940.

Lowest daily water level, in feet above an assumed datum, 1940 (from recorder charts)

Oct. 28	a23.21	Nov. 18	23.10	Dec. 3	23.00	Dec. 18	23.09
30	a23.19	19	23.10	4	23.04	19	23.18
Nov. 4	a23.10	20	23.11	5	23.06	20	23.23
6	23.05	21	23.14	6	23.06	21	23.24
7	23.05	22	23.13	7	23.14	22	23.24
8	23.04	23	23.12	8	23.11	23	23.30
9	23.06	24	23.13	9	23.13	24	23.34
10	23.22	25	23.13	10	23.11	25	23.38
11	23.14	26	23.18	11	23.11	26	23.47
12	23.05	27	23.01	12	23.14	27	23.48
13	23.02	28	23.00	13	23.08	28	23.43
14	23.01	29	23.06	14	23.07	29	23.30
15	23.02	30	23.13	15	23.08	30	23.17
16	23.07	Dec. 1	23.02	16	23.12	31	23.17
17	23.14	2	23.00	17	23.08		

T-4. City of Memphis. Mount Moriah Road and Roberson Lane, 5.3 miles east from municipal airport and 4.3 miles southeast from Memphis. Drilled test well, diameter 6-inches, depth 578 feet. Measuring point, top of 6-inch coupling, 2 feet above land surface and 100.00 feet above assumed datum. Water level Dec. 23, 1940, 80.26 feet below measuring point.

Water level, in feet above an assumed datum, 1940

Dec. 10	19.68	Dec. 18	19.79	Dec. 23	19.74	Dec. 31	19.98
11	19.66	20	19.75	30	20.00		

a Tape measurement.

VIRGINIA

NORTHERN VIRGINIA

By V. C. Fishel

The observation-well program in northern Virginia (see Water-Supply Papers 777, 817, 840, 845, and 886) was continued in 1940. Water-stage recorders were maintained on the Bacon, Ross, Swart Stream, Swart 5, and Swart 162 wells, and measurements were made about weekly in the other wells. About 700 individual measurements of water level were made during 1940.

The fluctuations of water levels in the Bacon, Glendale Farm, Halls Hill School, and Ross wells for the period of record are shown in the accompanying illustration. The water levels are expressed in heights above assumed datum planes. The depth to water level can be obtained by subtracting the height of the water level from the altitude of the measuring point above the arbitrary datum plane. The altitude of the measuring point above the datum plane for the Bacon, Glendale Farm, Halls Hill School, and Ross wells is given in the following tables.

In 1925, 1926, and 1927 the precipitation at the station of the United States Weather Bureau at Washington, D. C., was below normal, and by June 1928 the accumulated deficiency was about 20 inches. On the basis of this deficiency and the higher average water levels maintained during subsequent years of more normal precipitation, it is believed that the water levels in northern Virginia had a net decline during these years and stood at relatively low stages in June 1938, when observations on the Ross well began. In 1930 the precipitation was the lowest of record and the accumulated deficiency for the period January 1, 1925, to March 1931 reached about 45 inches.

The trend of the water level in the Ross well from June 1928 to March 1931 was generally downward except for moderate seasonal fluctuations. The water level declined continuously from the spring of 1930 until March 1931, when it rose slightly. The summer of 1931 was favorable for replenishment of the ground-water reservoir, and there was a small net rise of the water level. By January 1932 the water level in the Ross well stood somewhat more than a foot higher than at the low stage in March 1931.

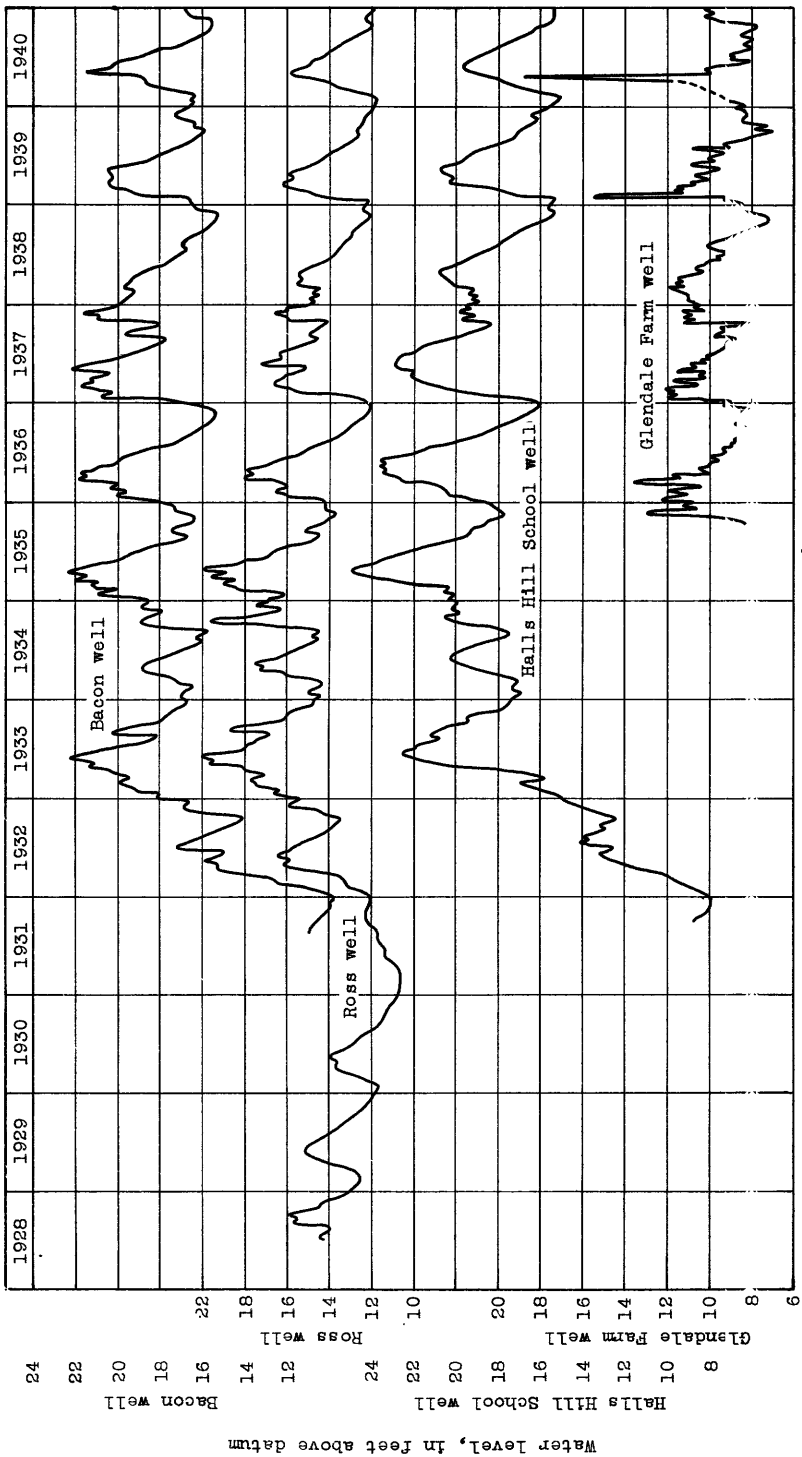

Figure 8.--Graphs showing fluctuations of water level in wells in northern Virginia, near Washington, D. C.

Observations were started on the Bacon well in August 1931 and on the Halls Hill School well in October 1931, when the water levels were doubtless still at low stages. More nearly normal precipitation during 1932 caused considerable recharge and the water levels rose in all three wells. Abundant precipitation in the first part of 1933 and heavy recharge raised the water levels notably. By the end of May 1933 the water level in the Bacon well had risen about 12 feet above the low level of the fall of 1931, and had reached the highest stage on record; the water level in the Ross well had risen about 9.5 feet above the low level of the spring of 1931 and also had reached the highest stage on record; and the water level in the Halls Hill School well had risen more than 14 feet above its low level of 1931. The excess precipitation of about 12 inches during 1932 and 1933 apparently caused complete recovery of the water levels from the low levels of 1930 and 1931.

From the middle of 1933 to the spring of 1935, there were large seasonal fluctuations of water level in all the wells. During the spring of 1935 the water levels rose from 3 to 5 feet and the water level in the Halls Hill School well reached the highest stage of record. However, declines of 6 to 7 feet occurred during the summer.

Appreciable rises of water level occurred in the wells in the spring of 1936, but a deficiency in precipitation of about 7 inches from May to October caused the water levels to decline to stages of 1 to 2 feet below the lowest stages of 1935. In December 1936 the water levels in all three wells were at their lowest stages since the recovery from the drought of 1930. The water levels in the Bacon and Halls Hill School wells still stood about 6 and 8 feet respectively above the low levels of 1931, but the water level in the Ross well was only 1.5 feet above its corresponding low level.

Observations on the water level in the Glendale Farm well were begun in October 1935. The water level rose about 4.5 feet during November due to recharge from heavy precipitation. It declined about 2 feet during the last week of November. There was considerable recharge to the underground reservoir in the spring of 1936, but the low precipitation during the summer caused the water level to decline more than 5 feet.

At the beginning of 1937 water levels were relatively low. Comparatively heavy rains in January totaling 7.83 inches caused rises of water level in the observation wells ranging from 2 to 4 feet. The water levels continued at high stages throughout the early part of February even though precipitation during this month was small. A rise of about 2 feet in April was caused by 6.85 inches of rain, most of which came during the last week of the month. From May until October, the water levels in most of the wells declined, the declines ranging from about 3 to 4.5 feet. There was 5.23 inches of rain in June and 6.70 inches in August. A rain of 4.71 inches during the last week of August caused some rise of water level in all the wells, but the rise was brief and the seasonal decline was soon resumed. Heavy rains in October totaled 8.81 inches and the water levels rose from 1.5 to 3 feet. Throughout November the water levels remained at about the same stages, and during December they declined an average of about 1 foot.

The year 1938 was one of unusually low water levels in northern Virginia. The precipitation in each of the first 6 months of 1938 was below normal. As a result, recharge to the underground reservoirs was small, and the usual seasonal decline in water levels began early in the year. The long downward trend of the water levels during the summer and fall of 1938 was finally terminated by the combined effects of a rain of 0.79 inch on November 19, a rain of 0.77 inch on November 24, and the slow melting of 7 inches of snow that fell on November 25. The water levels declined an average of about 4.5 feet during the summer and fall of 1938 and they had an average net decline of 2.9 feet in the year.

The precipitation was 1.95 inches above normal for the first 4 months of 1939 but subsequent low precipitation during the summer resulted in a deficit of 1.62 inches for the year. The high precipitation in January and February caused the water level in the Bacon well to rise 3.90 feet by March 6. The water level changed very little during March and April and was only 0.05 foot lower on May 1 than on March 6. It declined 4.31 feet by November 1, rose 1.46 feet during November and then declined 0.71 foot during December. The water level in the Glendale Farm well rose 6.80 feet by February 5, but declined 0.07 foot by February 12 and 4.33 feet more by February 19. The downward trend continued until about

October 8, at which time the water level reached the lowest stage on record. The water levels in the Halls Hill School and Ross wells rose about 5.5 feet and 3.8 feet respectively during the spring. They then declined, with the exception of minor rises in October and December, for the remainder of the year. The water level in the Halls Hill School well had a net rise of 0.16 foot in the year, whereas the water level in the Ross well had a net decline of 0.49 foot.

The precipitation at Washington in 1940 was only very little below normal and was well distributed. The maximum accumulated deficiency at any time was never more than 4 inches. The water levels declined slightly during January and the first part of February. Abundant precipitation during February, March, and April caused the water levels in the Bacon, Halls Hill School, and Ross wells to rise an average of 4.5 feet by June. The water level in the Glendale Farm well rose about 10 feet during the same period. The water level in the Bacon well then declined about 6 feet by the middle of November at which time the downward trend was stopped by the heavy precipitation. It recovered about 1.5 feet by December 31. The water level in the Glendale Farm well had a downward trend from May to November, but summer rains produced a number of small rises. The water level in the well rose about 2 feet during November and December. The water levels in the Halls Hill and Ross wells declined gradually an average of about 4 feet from June to November. The heavy precipitation in November halted the downward trend but produced practically no rise.

The water levels in the Bacon and Ross wells had an average rise of 0.20 foot in 1940 whereas the water level in the Halls Hill School well declined 0.15 foot. The water level in the Glendale Farm well had a net rise of 1.81 feet in 1940.

Precipitation and departure from normal precipitation, in inches, at Washington, D. C., in 1940.

Month	Recorded precipitation	Normal precipitation	Departure from normal	Accumulated departure from normal
January	2.12	3.55	-1.43	-1.43
February	2.77	3.37	- .60	-2.03
March	3.42	3.75	- .33	-2.36
April	6.19	3.27	+2.92	+ .56
May	3.10	3.70	- .60	- .04
June	.86	4.13	-3.27	-3.31
July	5.73	4.71	+1.02	-2.29
August	5.00	4.01	+ .99	-1.30
September	1.34	3.24	-1.90	-3.20
October	2.15	2.84	- .69	-3.89
November	5.26	2.37	+2.89	-1.00
December	2.27	3.32	-1.05	-2.05
Year	40.21	42.26	-2.05	-2.05

Arlington County

Halls Hill School well. Height of measuring point above datum planes, 44.80 feet since beginning of observations.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	27.15	Apr. 1	25.10	July 1	23.76	Sept.30	26.35
8	27.33	8	24.98	8	23.95	Oct. 7	26.33
15	27.42	15	24.63	15	24.14	14	26.66
22	27.49	22	24.08	22	24.30	28	27.05
29	27.62	29	23.71	29	24.49	Nov. 4	27.23
Feb. 5	27.62	May 6	23.41	Aug. 5	24.70	18	27.27
12	27.54	13	23.13	12	24.98	25	27.22
19	27.03	20	23.08	19	24.99	Dec. 2	27.24
26	26.81	27	23.04	26	25.31	9	27.27
Mar. 4	26.27	June 3	23.09	Sept. 2	25.47	16	27.35
11	25.98	10	23.16	9	25.47	23	27.34
18	25.53	17	23.40	23	26.10	30	27.30
25	25.28	24	23.32				

Ross well. Height of measuring point above datum plane, 35.60 feet from beginning of observations to June 22, 1936; 36.57 feet since June 22, 1936.

Daily water level at 2:00 a.m., in feet below measuring point, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	26.54	26.66	.....	24.55	22.37	23.05	23.98	24.63	25.29	.....	26.36	26.29
2	.....	26.64	.....	24.60	22.40	23.13	24.04	24.71	25.32	.....	26.36	26.32
3	.....	26.66	.....	24.53	22.36	23.16	24.07	24.74	25.36	.....	26.37	26.30
4	.....	26.67	.....	24.51	22.43	23.20	24.03	24.74	25.38	.....	26.39	26.30
5	.....	26.67	25.47	24.61	22.59	23.18	24.10	24.75	25.39	.....	26.39	26.29
6	.....	26.64	25.39	24.63	22.61	23.18	24.11	24.75	25.41	.....	26.39	26.32
7	.....	26.62	25.30	24.61	22.49	23.22	24.12	.....	25.42	25.9[illegible]	26.41	26.31
8	.....	26.65	25.22	24.59	22.57	23.25	24.10	.....	25.43	25.95	26.43	26.31
9	.....	26.66	25.18	24.46	22.50	23.27	24.11	.....	25.40	25.9[illegible]	26.46	26.33
10	.....	26.65	25.16	24.43	22.60	23.33	24.13	.....	25.43	26.0[illegible]	26.47	26.34
11	.....	26.59	25.16	24.32	22.59	23.36	24.14	.....	25.48	26.03	26.49	26.36
12	.....	26.62	25.17	24.16	22.68	23.35	24.14	24.95	25.52	26.05	26.50	26.38
13	.....	26.57	25.15	24.09	22.63	23.36	24.23	24.94	25.54	26.07	26.52	26.38
14	.....	26.51	25.13	24.02	22.64	23.41	24.28	24.92	25.56	26.08	26.51	26.41
15	26.62	26.50	25.06	23.97	22.71	23.40	24.28	24.96	25.57	26.08	26.48	26.42
16	.....	26.49	24.99	23.91	22.76	23.49	24.27	24.99	25.59	26.13	26.45	26.42
17	.....	26.45	24.87	23.92	22.76	23.60	24.34	24.99	25.61	26.14	26.40	26.40
18	.....	26.41	24.72	23.82	22.84	23.60	24.39	25.02	25.65	26.15	26.38	26.46
19	.....	26.32	24.60	23.78	22.84	23.52	24.42	25.02	25.66	26.19	26.38	26.49
20	.....	26.25	24.62	23.57	22.83	23.56	24.41	25.09	25.67	26.19	26.36	26.49
21	.....	26.15	24.62	23.08	22.91	23.71	24.43	25.13	25.68	26.20	26.34	.....
22	26.56	26.05	24.51	22.73	22.89	23.75	24.47	25.14	25.70	26.2[illegible]	26.34	.....
23	26.57	25.96	24.56	22.64	22.84	23.69	24.46	25.16	25.73	26.25	26.34	26.50
24	26.54	25.89	24.60	22.48	22.87	23.57	24.45	25.19	25.74	26.29	26.35	26.49
25	26.55	25.80	24.55	22.54	22.85	23.66	24.43	25.22	25.74	26.29	26.36	26.47
26	26.56	25.78	24.58	22.52	22.93	23.75	24.47	25.19	25.76	26.30	26.39	26.43
27	26.56	.....	24.56	22.53	22.98	23.85	24.50	25.23	25.78	26.30	26.35	26.43
28	26.56	.....	24.52	22.58	22.99	23.90	24.55	25.23	25.80	26.3[illegible]	26.35	26.44
29	26.58	.....	24.56	22.53	23.02	23.82	24.59	25.27	25.86	26.32	26.32	26.44
30	26.64	.....	24.50	22.45	23.11	23.98	24.60	25.30	25.88	26.35	26.32	26.45
31	26.64	.....	24.52	.....	22.93	.....	24.59	25.30	.....	26.36	.....	26.46

Fairfax County

Bacon well. Height of measuring point above datum plane, 33.60 feet from the beginning of observations to June 18, 1936; 35.52 feet since June 18, 1936.

Daily water level at 2:00 a.m., in feet below measuring point, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.78	19.00	17.75	16.67	14.50	15.33	16.68	17.88	18.88	19.62	20.02	18.79
2	18.81	19.00	17.77	16.72	14.53	15.38	16.73	17.95	18.89	19.63	20.03	18.78
3	18.85	18.98	17.74	16.73	14.53	15.44	16.78	18.00	18.93	19.63	19.96	18.77
4	18.88	18.97	17.58	16.69	14.59	15.47	16.78	18.03	18.97	19.64	19.90	18.77
5	18.90	18.96	17.28	16.69	14.69	15.51	16.77	18.05	19.00	19.67	19.91	18.73
6	18.91	19.03	17.15	16.77	14.73	15.54	16.83	18.09	19.03	19.69	19.92	18.73
7	18.96	19.01	17.08	16.78	14.69	15.58	16.87	18.12	19.05	19.71	19.93	18.72
8	18.97	19.01	17.03	16.77	14.75	15.62	16.90	18.17	19.08	19.71	19.96	18.70
9	18.98	18.99	17.04	16.31	14.75	15.66	16.93	18.21	19.08	19.72	19.97	18.70
10	19.03	18.96	17.03	16.01	14.80	15.70	16.97	18.26	19.10	19.75	20.00	18.70
11	19.04	18.87	17.05	15.96	14.83	15.77	17.00	18.31	19.13	19.76	20.05	18.70
12	19.04	18.87	17.07	15.89	14.88	15.80	17.04	18.33	19.17	19.77	20.05	18.71
13	19.05	18.82	17.08	15.87	14.90	15.83	17.10	18.36	19.20	19.78	20.05	18.69
14	19.07	18.80	17.08	15.82	14.88	15.88	17.15	18.39	19.23	19.80	20.03	18.69
15	18.97	18.75	16.99	15.81	14.94	15.92	17.18	18.42	19.26	19.82	19.84	18.71
16	18.87	18.75	16.79	15.79	14.99	15.97	17.21	18.45	19.27	19.83	19.60	18.70
17	18.85	18.71	16.70	15.78	14.98	16.04	17.26	18.47	19.30	19.85	19.25	18.66
18	18.84	18.67	16.65	15.66	15.04	16.06	17.30	18.50	19.33	19.86	19.25	18.66
19	18.85	18.58	16.58	15.55	15.07	16.05	17.35	18.51	19.36	19.88	19.27	18.66
20	18.87	18.26	16.60	.....	15.09	16.09	17.39	18.55	19.38	19.89	19.27	18.63
21	18.87	18.06	16.60	.....	15.10	16.19	17.43	18.60	19.41	19.90	19.25	18.60
22	18.88	18.00	16.59	.....	15.07	16.24	17.48	18.65	19.44	19.92	19.24	18.59
23	18.88	17.95	16.61	13.96	15.07	16.26	17.50	18.68	19.46	19.93	19.23	18.58
24	18.86	17.91	16.64	14.06	15.10	16.26	17.53	18.72	19.49	19.94	19.23	18.60
25	18.87	17.84	16.65	14.19	15.10	16.30	17.56	18.76	19.51	19.95	19.19	18.59
26	18.88	17.80	16.66	14.27	15.15	16.38	17.61	18.78	19.52	19.96	19.19	18.56
27	18.89	17.78	16.67	14.37	15.19	16.45	17.65	18.79	19.55	19.97	19.05	18.55
28	18.89	17.72	16.65	14.43	15.22	16.52	17.70	18.80	19.57	19.98	18.94	18.50
29	18.89	17.73	16.69	14.47	15.25	16.54	17.75	18.83	19.59	19.99	18.88	18.45
30	19.03	.....	16.68	14.50	15.32	16.63	17.80	18.86	19.61	20.00	18.83	18.41
31	19.03	.....	16.63	.....	15.28	.....	17.83	18.87	.....	20.00	.....	18.41

Bell well.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	6.53	Apr. 2	3.72	June 10	4.77	Oct. 28	10.72
Feb. 5	6.43	22	1.92	23	5.64	Nov. 25	6.50
Mar. 4	2.81	May 17	3.30	Aug. 31	10.05	Dec. 23	5.54

Jefferson School well.

Water level, in feet below measuring point, 1940

Jan. 14	26.23	Mar. 11	23.32	Apr. 22	21.40	Sept. 2	26.34
29	25.72	18	22.82	29	21.14	Oct. 28	26.93
Feb. 5	25.69	25	22.69	June 23	23.31	Dec. 9	25.01
19	24.97	Apr. 1	22.72	July 8	24.17	30	24.65
Mar. 4	23.65	15	22.15	Aug. 5	25.57		

Fairfax County--Continued.

Swart Stream well.

Daily water level at 2:00 a.m., in feet above assumed datum, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.80	1.72	1.79	1.84	1.82	1.73	1.62	1.53	1.65	1.51	1.58	1.62
2	1.79	1.72	1.78	1.84	1.82	1.72	1.60	1.52	1.56	1.64	2.62	1.62
3	1.79	1.72	2.04	1.84	1.83	1.70	1.59	1.52	1.55	1.53	1.66	1.61
4	1.82	1.72	2.44	1.84	1.83	1.69	....	1.52	1.55	1.54	1.63	1.59
5	1.81	1.71	1.93	1.84	1.83	1.69	....	1.53	1.54	1.53	1.63	1.59
6	1.81	1.70	1.86	1.84	1.83	1.69	....	1.54	1.54	1.53	1.62	1.60
7	1.80	1.85	1.84	1.84	1.85	1.76	....	1.54	1.54	1.54	1.62	1.61
8	1.80	1.81	1.82	1.84	1.84	1.73	1.60	1.53	1.54	1.54	1.61	1.62
9	1.77	1.77	1.81	2.27	1.83	1.72	1.60	1.53	1.51	1.54	1.61	1.58
10	1.77	1.78	1.80	1.98	1.82	1.71	1.60	1.53	1.51	1.54	1.61	1.58
11	1.77	1.88	1.79	1.95	1.82	1.67	1.59	1.53	1.51	1.54	1.57	1.58
12	1.77	1.77	1.80	1.91	1.81	1.66	1.59	1.54	1.51	1.54	1.58	1.57
13	1.78	1.76	1.80	1.99	1.82	1.65	1.59	1.53	1.51	1.54	1.63	1.57
14	1.80	1.75	1.80	1.97	1.80	1.65	1.59	1.53	1.51	1.54	....	1.57
15	2.08	1.85	2.28	1.94	1.79	1.64	1.59	1.55	1.51	1.59	....	1.60
16	1.86	1.80	1.91	2.06	1.79	1.64	1.59	1.56	1.52	1.63	....	1.61
17	1.82	1.79	1.86	1.99	1.82	1.63	1.65	1.56	1.53	1.65	....	1.74
18	1.79	1.78	1.85	1.98	1.82	1.67	1.60	1.56	1.53	1.66	1.63	1.69
19	1.77	2.57	1.85	1.93	1.81	1.67	1.58	1.55	1.53	1.66	1.63	1.67
20	1.76	1.90	1.85	4.94	1.80	1.65	1.57	1.55	1.53	1.64	1.62	1.67
21	1.76	1.91	1.85	2.09	2.22	1.64	1.56	1.53	1.53	1.64	1.61	1.66
22	1.75	1.77	1.85	1.94	1.87	1.63	1.56	1.53	1.53	1.61	1.60	1.65
23	1.70	1.74	1.85	1.87	1.86	1.63	1.58	1.52	1.52	1.61	1.60	1.61
24	1.70	1.73	1.84	1.86	1.86	1.63	1.61	1.52	1.53	1.61	1.58	1.60
25	1.72	1.72	1.85	1.85	1.85	1.62	1.58	1.52	1.54	1.61	1.60	1.60
26	1.73	1.71	1.85	1.84	1.85	1.60	1.57	1.62	1.56	1.61	1.59	1.60
27	1.72	1.78	1.84	1.83	1.85	1.62	1.56	1.59	1.55	1.62	2.19	1.66
28	1.72	1.78	1.84	1.83	1.92	1.62	1.56	1.58	1.54	1.65	1.79	1.68
29	1.72	1.80	1.84	1.83	1.77	1.62	1.55	1.57	1.54	1.65	1.75	1.73
30	1.72	....	1.84	1.83	1.74	1.62	1.54	1.56	1.49	1.67	1.62	1.70
31	1.72	....	1.87	....	1.73	....	1.54	1.55	....	1.60	....	1.66

Swart well 5.

Daily water level at 2:00 a.m., in feet above assumed datum, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.41	2.09	2.57	2.59	....	2.45	1.20	1.08	1.85	1.44	1.89	2.38
2	2.36	2.10	2.49	....	....	2.30	1.19	1.05	1.94	1.55	1.93	....
3	2.26	2.09	3.26	....	....	2.19	1.17	1.04	1.82	2.07	1.67	....
4	2.24	2.10	3.57	....	.....	2.09	1.93	1.03	1.66	2.00	1.43	....
5	2.21	2.13	3.11	....	.....	1.99	2.09	1.00	1.56	1.90	1.35	....
6	2.18	2.17	2.93	....	....	1.95	2.04	1.00	1.48	1.82	1.27	....
7	2.14	2.41	2.79	....	2.35	2.06	1.93	1.00	1.43	1.78	1.17	....
8	2.14	2.84	2.69	....	2.28	2.04	1.85	.99	1.42	1.71	1.11	....
9	2.16	2.89	2.60	3.16	2.23	1.96	1.76	.97	1.39	1.75	2.06	2.16
10	2.18	2.92	2.53	2.79	2.19	1.97	1.69	.95	1.31	1.76	2.02	2.14
11	2.18	3.07	2.47	2.59	2.14	1.92	1.61	.93	1.28	1.73	1.98	2.12
12	2.22	2.87	2.42	2.46	2.11	1.90	1.55	.97	1.24	1.71	1.99	2.09
13	2.26	2.80	2.40	2.98	2.08	1.85	1.54	.95	1.23	1.67	2.38	2.09
14	2.33	2.75	2.40	2.80	2.06	1.80	1.52	.94	1.21	1.64	3.04	2.10
15	3.18	3.02	3.50	2.60	2.02	1.74	1.47	.98	1.20	1.63	3.40	2.11
16	2.92	2.88	3.12	2.92	1.99	1.67	1.43	1.04	1.22	1.61	2.90	2.35
17	2.73	2.78	2.92	2.87	2.15	1.61	1.42	1.07	1.21	1.61	2.66	2.96
18	2.54	2.70	2.82	2.93	2.16	1.64	1.40	1.10	1.20	1.62	2.49	2.69
19	2.40	....	2.74	2.76	2.12	1.66	1.35	1.10	1.18	1.61	2.37	2.54
20	2.29	3.19	2.63	4.57	2.04	1.60	1.30	1.08	1.16	1.62	2.35	2.46

Fairfax County--Continued.

Swart well 5.--Continued.

Daily water level at 2:00 a.m., in feet above assumed datum, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.21	3.19	2.55	3.07	2.83	1.54	1.26	1.02	1.14	1.72	2.30	2.41
22	2.14	2.97	2.53	2.80	2.65	1.50	1.21	.99	1.11	1.77	2.27	2.35
23	2.08	2.99	2.47	....	2.53	1.48	1.19	.99	1.11	1.80	2.22	2.29
24	2.08	2.69	2.42	....	2.41	1.46	1.24	.99	1.12	1.82	2.22	2.24
25	2.06	2.65	2.41	....	2.38	1.41	1.24	.97	1.13	1.82	2.23	2.23
26	2.06	2.56	2.32	....	2.40	1.36	1.19	1.00	1.67	1.82	2.21	2.23
27	2.08	2.44	2.30	....	2.33	1.32	1.16	1.19	1.66	1.82	3.30	2.76
28	2.08	2.43	2.31	....	2.80	1.29	1.13	1.29	1.60	1.82	2.81	2.70
29	w.08	2.62	2.28	....	2.60	1.27	1.13	1.41	1.56	1.82	2.59	2.98
30	2.12	....	2.30	....	2.38	1.22	1.12	1.34	1.46	1.82	2.43	2.82
31	2.10	....	2.41	....	2.48	....	1.09	1.35	....	1.87	....	2.59

Water levels, in feet above assumed datum, in Swart wells 10, 35, 60, 85, 110 and 135, and weekly precipitation, in inches, recorded at the station of the United States Weather Bureau in Washington, D. C., 1940

Date	10	35	60	85	110	135	Precipitation
Jan. 1	2.58	2.79	2.76	3.65	4.73	4.96	.00
8	2.29	2.69	2.55	3.52	(a)	(a)	.36
15	3.38	3.96	3.61	4.30	(a)	(a)	.70
22	2.21	2.38	2.49	3.26	(a)	(a)	.02
29	2.23	2.32	2.46	3.52	(a)	(a)	1.04
Feb. 5	2.28	2.37	2.57	4.15	(a)	(a)	.01
12	3.11	3.62	3.85	4.20	(a)	5.14	.34
19	3.68	4.12	4.41	4.30	4.84	5.18	2.04
26	2.60	2.90	2.97	3.92	4.84	5.21	.16
Mar. 4	3.46	3.05	4.31	4.23	4.94	5.21	1.43
11	2.52	2.75	2.83	3.75	4.78	5.21	.00
18	2.86	3.20	3.36	4.09	4.96	5.22	1.71
25	2.39	2.53	2.66	3.55	4.78	5.17	.02
Apr. 1	2.67	2.92	3.11	3.95	4.81	5.20	.48
8	3.63	4.43	4.93	4.48	5.48	5.73	2.33
15	2.88	3.25	3.45	4.15	4.96	5.29	.87
22	3.15	3.69	4.04	3.76	5.07	5.39	2.99
29	2.77	3.71	2.83	3.71	4.92	5.34	.00
May 6	2.47	3.70	2.83	3.57	4.78	5.29	.45
13	2.10	2.20	2.25	3.00	4.48	5.15	.01
20	2.03	2.16	2.21	2.96	4.56	5.12	2.15
27	2.43	2.27	2.83	3.73	4.71	5.17	.13
June 3	2.18	2.29	2.46	3.03	4.67	5.15	.36
10	2.07	2.22	2.30	2.15	4.60	5.12	.09
17	1.65	1.71	1.70	2.62	4.29	3.92	.01
24	1.41	1.50	1.46	2.17	4.20	4.81	.03
July 1	1.06	1.14	1.18	1.95	4.09	4.62	.98
8	1.92	2.08	2.10	2.70	4.66	4.94	2.09
15	1.41	1.60	1.59	2.35	4.60	4.88	.43
22	.90	1.17	(b)	(b)	4.36	4.64	.01
29	.95	(b)	(b)	(b)	3.88	4.52	2.60
Aug. 4	.77	(b)	(b)	(b)	3.92	4.20	.35
11	.63	(b)	(b)	(b)	3.68	3.96	.08
18	.81	(b)	(b)	(b)	3.70	3.98	.56
25	(b)	(b)	(b)	(b)	3.66	3.92	.20
Sept. 1	2.08	1.05	3.58	4.06	3.53	4.50	4.16
8	1.25	1.54	1.63	2.46	4.01	4.52	.34
15	1.14	1.25	1.25	2.23	3.90	3.42	.07
22	.95	(b)	(b)	(b)	3.71	4.26	.00
29	1.58	1.90	2.01	2.99	4.16	4.52	.93
Oct. 6	1.97	2.26	2.43	3.32	4.38	4.64	1.04
13	1.76	1.96	2.05	3.05	4.28	4.71	.25
20	1.78	1.87	2.03	3.75	4.41	4.70	.63

a Ice in well.
b Well dry.

Fairfax County--Continued.

Water levels, in feet above assumed datum, in Swart wells 10, 35, 60, 85, 110 and 135, and weekly precipitation, in inches, recorded at the station of the United States Weather Bureau in Washington, D. C., 1940--Continued.

Date	10	35	60	85	110	135	Precipitation
Oct. 27	1.91	2.05	2.14	3.23	4.30	4.73	.03
Nov. 3	2.78	3.36	3.65	4.05	4.75	4.34	1.45
10	2.09	2.27	2.38	3.39	4.54	4.87	T
17	2.81	3.33	3.59	4.10	4.96	5.06	2.72
24	2.31	2.63	2.88	4.03	4.82	5.09	.25
Dec. 1	2.48	2.84	3.08	4.00	4.91	5.14	1.04
8	2.35	2.63	2.87	3.93	4.81	5.14	.16
15	2.45	2.80	3.06	4.03	4.80	5.10	.29
22	2.43	2.72	2.97	3.95	4.84	5.13	.45
29	3.25	3.82	4.13	4.20	4.96	5.06	1.37

Swart well 162.

Daily water level at 2:00 a.m., in feet above assumed datum, 1940 (from recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.59	4.48	4.91	4.94	4.86	4.80	3.85	3.52	4.34	3.90	4.24	4.81
2	4.55	4.50	4.83	4.76	5.37	4.65	3.99	3.45	4.31	4.19	....	4.75
3	4.52	4.50	5.41	4.68	5.11	4.54	3.92	3.40	4.17	4.58	4.67	4.70
4	4.48	4.50	5.60	4.78	5.04	4.43	5.27	3.37	4.07	4.43	4.61	4.64
5	4.44	4.59	5.51	4.75	4.94	4.35	4.80	3.32	3.99	4.30	4.49	4.64
6	4.47	4.73	5.36	4.63	4.80	4.37	4.55	3.34	3.92	4.21	4.43	4.76
7	4.44	5.14	5.23	4.58	4.69	4.68	4.41	3.33	3.87	4.17	4.36	4.70
8	4.41	5.23	5.14	4.57	4.63	4.49	4.34	3.29	3.81	4.12	4.35	4.67
9	4.48	5.19	5.05	5.74	4.59	4.54	4.26	3.24	3.86	4.21	4.30	4.62
10	4.49	5.21	4.96	5.52	4.59	4.50	4.23	3.19	3.82	4.21	4.29	4.61
11	4.49	5.32	4.87	5.35	4.54	4.40	4.17	3.14	3.81	4.21	4.27	4.59
12	4.50	5.14	4.76	5.20	4.54	4.40	4.10	3.15	3.75	4.21	4.35	4.59
13	4.51	5.06	4.74	5.43	4.50	4.34	4.21	3.12	3.71	4.21	4.72	4.62
14	4.61	5.02	4.72	5.28	4.46	4.28	4.26	3.07	3.67	4.06	5.12	4.66
15	4.71	5.17	5.59	5.19	4.44	4.24	4.17	3.08	3.64	4.04	5.75	4.78
16	5.09	5.10	5.39	5.44	4.42	4.19	4.11	3.24	3.63	4.00	5.35	....
17	4.97	5.04	5.26	5.49	....	4.15	4.10	3.36	3.62	4.00	5.11	4.72
18	4.82	5.02	5.17	5.41	....	4.30	4.06	3.45	3.58	3.99	4.94	....
19	4.70	4.94	5.11	5.32	....	4.32	3.98	3.49	3.54	3.96	4.80	....
20	4.60	5.59	5.00	5.84	....	4.28	3.91	3.48	3.50	4.04	4.73	....
21	4.53	5.54	4.89	5.76	5.38	4.15	3.84	3.37	3.47	4.28	4.66	....
22	4.50	5.34	4.83	5.67	4.94	4.10	3.76	3.29	3.41	4.25	4.62	....
23	4.50	5.24	4.78	5.58	4.84	4.09	3.78	3.23	3.35	4.21	4.58	4.71
24	4.51	5.09	4.74	5.52	4.73	4.06	3.94	3.17	3.32	4.19	4.56	4.69
25	4.53	5.06	4.75	5.47	4.79	4.03	4.01	3.13	3.29	4.17	4.69	4.69
26	4.55	4.94	4.71	5.38	4.83	4.01	3.89	3.09	4.20	4.17	4.58	4.71
27	4.57	4.87	4.72	5.30	4.76	3.97	3.76	3.79	4.09	4.15	5.32	5.16
28	4.56	4.98	4.68	5.18	5.26	3.94	3.67	3.98	4.00	4.11	5.58	5.13
29	4.53	4.99	4.65	5.07	4.88	3.89	3.63	3.95	3.94	4.09	4.97	5.30
30	4.50	....	4.71	4.92	4.68	3.84	3.58	3.90	3.91	4.14	4.87	5.28
31	4.49	....	5.11	....	4.98	....	3.53	3.88	....	4.28	....	5.14

Fauquier County

Glendale Farm well. Height of measuring point above datum plane, 26.00 feet from beginning of observations. Measurements made by J. E. Johnson.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	15.60	Apr. 11	12.91	May 5	13.74	June 2	14.05
14	15.70	14	13.19	12	14.05	9	14.46
21	14.99	21	5.00	19	14.07	16	15.91
29	15.15	28	13.67	26	13.86	23	14.95

T Trace.

Fauquier County--Continued.

Glendale Farm well.--Continued.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
June 30	15.15	Aug. 18	15.76	Oct. 6	15.70	Nov. 17	14.25
July 7	15.10	25	15.44	13	15.83	24	14.18
14	14.92	Sept. 2	15.63	20	15.95	Dec. 1	13.70
21	15.09	15	15.93	27	16.36	8	13.75
28	15.38	22	16.05	Nov. 3	15.95	15	14.23
Aug. 4	15.58	29	15.26	10	15.56	21	13.79
11	15.94						

SOUTHEASTERN VIRGINIA

By D. J. Cederstrom

Periodic measurements of water levels in selected wells in southeastern Virginia were continued in 1940 in connection with a cooperative ground-water investigation by the Federal Geological Survey and the Virginia Geological Survey, Arthur Bevan, State Geologist. The area thus far investigated consists of that part of the Coastal Plain lying south of the James River.

Seven observation wells were being measured periodically at the end of the year. One of the wells is measured monthly; the others are measured weekly. Two of the wells measured weekly are equipped with automatic water-stage recorders. A total of 273 individual measurements of water level was made in the wells in 1940.

Bulletin 51-E of the Virginia Geological Survey, "Geology and artesian-water resources of a part of the southern Virginia Coastal Plain", by D. J. Cederstrom, was issued in 1940.

The numbers of four of the five observation wells whose records appear in Water-Supply Paper 886 have been changed to correspond to numbers assigned them in a report in preparation on the Coastal Plain area south of the James River. Well 97, in Nansemond County, has been changed to 105, and wells 42, 51, and 56, in Prince George County, have been changed to 2, 15, and 13 respectively.

Except for a temporary rise of 0.42 foot from November 5 to November 19, the water level in well 36, in Chesterfield County, declined from October 9, 1939--the date of installation of the automatic recorder--to January 7, 1940, (see accompanying illustration). In this period the water level declined from 18.04 feet below the measuring point to 18.97 feet, largely as a consequence of subnormal rainfall.

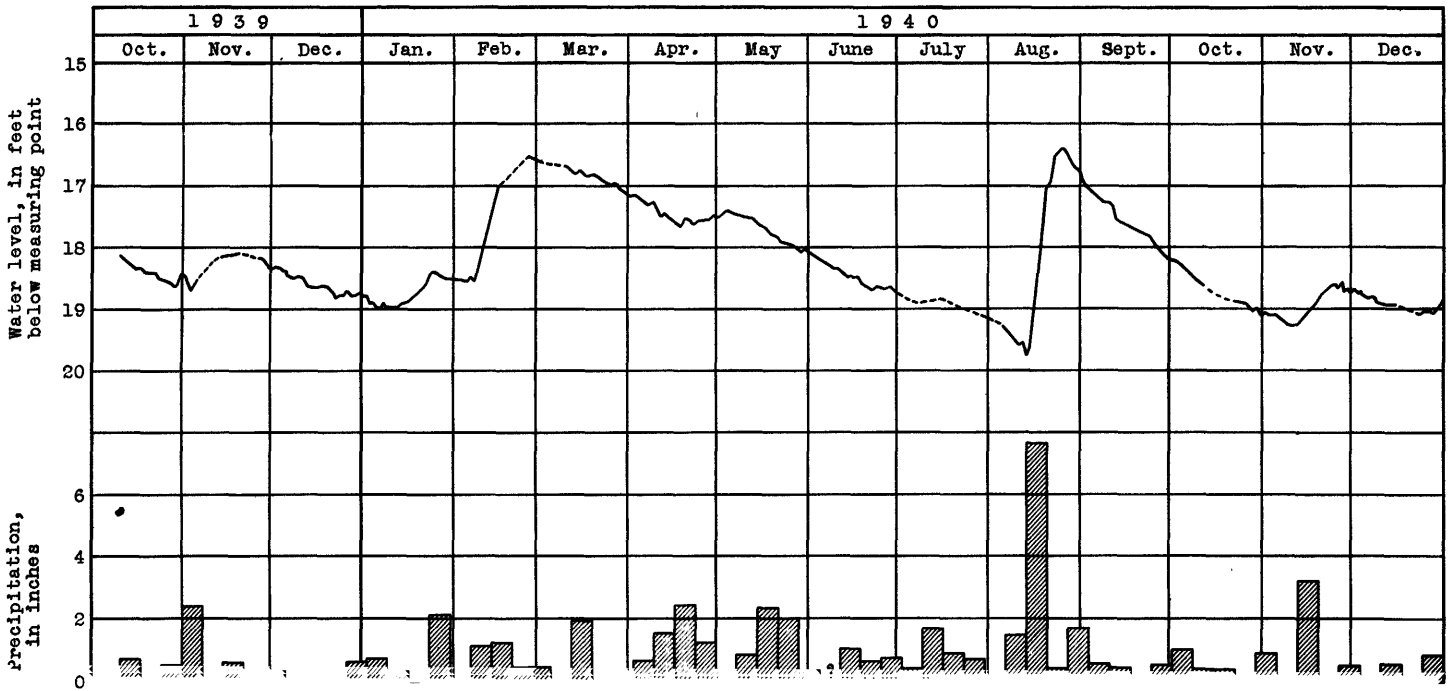

Figure 9.--Graphs showing fluctuation of water level in a well near Petersburg, Va., and precipitation at Richmond, Va.

The water level rose 2.01 feet in the period February 7 to February 25. Inasmuch as the rainfall was only 1.3 inches above normal in the 4-week period ending February 20, during which time the greatest part of the rise took place, it seems apparent that the rise of water level may be largely attributed to absence of transpiration in a period of only moderately heavy precipitation.

This conclusion is confirmed by the record of water levels from February 25 to August 11, during which period the water level continued to decline almost without interruption in spite of heavy rains in April and May. Rains aggregating 4.6 inches (2.3 inches above normal) in the 3-week period ending April 30, brought about only a temporary rise of water level of 0.22 foot and 3.3 inches of rain (1.6 inches above normal) in the 2 week period ending May 28 produced no appreciable change in the downward trend of the water level in the well. The accumulated departure from normal rainfall on August 6 was -2.77 inches.

From the low point of the year, 19.75 feet below the measuring point, which was recorded on August 13, the water level rose to 16.45 feet by August 25, a net gain of 3.30 feet, in response to 9.10 inches of rain that occurred in that 2-week period. The precipitation during this period was 7.15 inches above normal.

The water level declined steadily from August 25 to November 12 and on the latter date was 2.82 feet below the high level of August 25. During this period the accumulated departure had decreased from +4.38 inches to +1.22 inches. A rain of 3.22 inches in the week ending November 19 (2.63 inches above normal) appeared largely responsible for the 0.67 foot rise in water level in the period November 12 to 24. Recharge may have been facilitated by the absence of transpiration. The water level again declined and on December 22 it was 19.06 feet below the measuring point. A slight rise occurred near the end of the year and on December 30, 1940, the water level was 18.96 feet below the measuring point, 0.22 foot below the stage recorded on December 31, 1939.

The accumulated departure from normal precipitation from August 20 to the end of the year was positive due chiefly to heavy rains in the week ending August 20, and on December 31 it was +1.88 inches. Had the excess rainfall been more evenly distributed it appears likely that a water level more nearly commensurate with the accumulated departure might have been recorded.

The piezometric surface in well 105, Nansemond County, remained nearly constant during 1940, with the exception of a fluctuation of 0.5 foot recorded on November 4.

Well 2, Prince George County, shows fluctuations similar to those in well 36, Chesterfield County, in that the water-bearing strata appear to be recharged almost immediately following periods of very heavy rains or following periods of moderately heavy rains, when transpiration is small. This fact is of particular interest because well 36 is in the Fall Zone where water occurs under water-table conditions whereas well 2 is in the Coastal Plain about 3 miles east of the Fall Zone and water occurs under artesian conditions. Heavy industrial pumping at Hopewell does not appear to affect the water level in well 2 since marked changes in water levels at Hopewell have had no observable counterpart in the record of water levels in the well. The water level in well 2 does not appear to fluctuate through as wide a range, due to the increased load placed on the aquifers during high stages of adjacent rivers, as do the water levels in wells 90, Sussex County, and 201b, Southampton County. Some effects due to loading are recognized, however.

The water level in well 2 reached its lowest stage in 1939 on December 27, when the depth to water level was 19.21 feet below the measuring point. The decline, which had begun December 5, 1939, reached a low point on January 9, 1940--19.79 feet below the measuring point. The water levels fluctuated only slightly during the next few weeks but a sharp rise began on February 6. The depth to water level decreased from 19.74 feet on February 6 to 17.89 feet on March 6, a net rise in water level of 1.85 feet. This rise may be correlated with the rise in water level of 2.01 feet that took place on the Fall Zone in well 36, Chesterfield County, from February 7 to 25.

The water level declined 2.30 feet from March 6 to August 13. Recharge took place following 9.10 inches of rain in the 2-week period ending August 20 and the water level rose 2.02 feet. The rise is comparable to the rise of 3.30 feet that occurred in about the same period in well 36, Chesterfield County.

From August 27 to November 5 the water level declined from 18.34 feet below the measuring point to 21.29 feet, a net decline of 2.95 feet. Although this part of the record is similar to that for well 36, Chesterfield County, for the same period, the temporary rise of water level early in October had no counterpart in well 36. The temporary rise is attributed to increased load placed on the aquifer by the Appomattox River due to the increased stage following 1.06 inches of rain in the week ending October 8.

The water level in well 2 rose 0.73 foot from November 5 to December 4 but declined 0.51 foot from December 4 to 26. A rise of 0.86 foot took place in the week ending January 2, 1941. On that day the water level was 2.32 feet below the highest level of 1940, which occurred March 6, and 1.08 feet below the lowest level of the year, which occurred November 5.

A continuous record of the fluctuations of water level in well 13, Prince George County, was obtained throughout 1940. The water level in the well is subject to sudden fluctuations ranging from 4 feet to 8 feet, due to changes in the pumping rate of nearby industrial wells. Many of these changes were not properly recorded due to the fact that the automatic recorder operated on the well for most of the year was not of the proper gear ratio. On December 6, 1940, a 1 to 10 ratio recorder was installed and it appears that all changes of water level will be accurately recorded henceforth.

On January 1, 1940, the water level in well 13 was 39.87 feet below the measuring point, and at that time appeared to have fully recovered from the low summer levels (the maximum recorded depth to water was 49.63 feet below measuring point on October 2). Although marked fluctuations occurred during January and February, the water level was only 0.41 foot higher on February 20 than on January 1. In March, however, the water level rose and in the last half of the month stood at stages more than 3.5 feet higher than the stage of January 1. It is reported that artificial recharge of the water-bearing strata by wells for the purpose of temporarily storing cold water was attempted by an industrial concern in March. The amount and period of recharge is not known. The record of water levels suggest, however, that recharge took place from March 5 or March 6 to or nearly to the end of the month.

In April the water level declined from 36.30 feet below the measuring point to 37.02 feet. On May 6 the water level in well 13 was the same as a week previous. Industrial pumpage, probably in excess of 1,000 gallons a minute, apparently began on May 9 and water level declined sharply and with little interruption until July 1, when depth to water level was 49.47 feet.

The water level fluctuated irregularly during July, August, September and during the first three weeks in October. The lowest recorded water level in that period was 49.88 feet below the measuring point--8.99 feet below the level of January 1, 13.64 feet below the level of March 18, and 0.25 foot below the lowest level recorded in 1939.

In the period October 18 to November 16 the water level rose from a depth of 49.64 feet below the measuring point to 40.83 feet. A further rise of 0.44 foot took place from November 16 to December 14 and on that date the water level was only 0.96 foot below the level of January 1, 1940. In the latter half of December the water level rose sharply, possibly in response to artificial recharge, and during the last few days of the year fluctuated widely. On January 1, 1941, the water level was about 38.10 feet below the measuring point.

Weekly measurements of water level are made in well 15, Prince George County. Fluctuations similar to those observed in well 13 are recorded. Inasmuch as this well is at a greater distance from heavily pumped wells, the magnitude of the fluctuations is less.

Periodic measurements of depth to water level in well 201b, Southampton County, were begun April 3, 1940. The water level in the well, and in the well at Waverly, is subject to marked fluctuations due to changes in stage of nearby major streams, the Nottoway and Blackwater Rivers. The following discussion is based on the hydrograph constructed by drawing a smooth curve through certain of the plotted measurements in an attempt to minimize these effects and to bring out seasonal changes in water level due to variations in recharge and discharge from the water-bearing beds.

On April 20, the depth to water level below the measuring point in well 201b was 15.84 feet. During May, June, and July, the water level declined and on July 20 the lowest stage of the year--17.58 feet below the measuring point--was recorded. The water level in the well gradually rose during the remainder of the year and on December 28 the depth to water level was 16.48--0.64 foot below the high stage on April 20.

Periodic measurements of water levels in well 90, Sussex County, were begun on April 7, 1940. The water level is subject to temporary fluctuations of at least 0.7 foot due to changes in stage of adjacent streams and to the effects of local pumping. The following discussion of fluctuations of water level in the well will also be based on a hydrograph constructed by drawing a smooth curve through certain of the plotted measurements. On April 16 the depth to water level was 64.55 feet below the measuring point. The water level gradually declined during the following weeks and on July 22 it was 65.96 feet below the measuring point--1.41 feet below the level recorded on April 16. By October 15 the water level had risen 0.72 foot above the low stage of July 22, in the following weeks it declined and on November 11 was 65.64 feet below the measuring point--only 0.32 foot above the low stage of July 22. A gradual rise in water level occurred in November and December, and on December 30 the water level was still 0.80 foot below the high stage of April 16 and 0.61 foot above the low level of July 22.

The difference between the highest and lowest water level of the year is small and it might be accounted for entirely by the seasonal variation in river stage. Longer records will be necessary before the fluctuations of water level in the well can be accurately interpreted.

Frequent references to the precipitation have been made in the preceding paragraphs in the discussion of water-level fluctuations. The prompt response to precipitation can be easily observed by an inspection of the fluctuations of water level in wells 36, Chesterfield County, and 2, Prince George County. The water levels in wells farther from the Fall Zone appear to fluctuate much less in response to the precipitation.

An indirect effect of rainfall on water levels in wells is the fluctuations produced by the changes in stage of rivers. The increase in volume of water in the rivers during periods of high runoff produces a compaction of the sediments that comprise the aquifers and the water levels in wells undergo an immediate although temporary rise. The rises and subsequent declines may be considered similar to temporary fluctuations caused by changes in atmospheric pressure and corrections for them must be made before the record of water levels may be properly interpreted.

Chesterfield County

36.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	18.97	Apr. 7	17.32	July 7	18.90	Oct. 13	18.68
14	18.89	14	17.49	15	18.85	21	18.87
21	18.62	21	17.55	Aug. 5	19.26	27	19.00
28	18.48	28	17.56	11	19.58	Nov. 3	19.11
Feb. 4	18.53	May 5	17.42	18	17.91	10	19.25
11	17.97	12	17.53	23	16.50	17	18.99
18	18.40	19	17.78	25	16.45	24	18.60
25	16.54	26	17.97	Sept. 1	16.75	Dec. 1	18.69
Mar. 3	16.62	June 2	18.12	8	17.28	8	18.83
10	16.67	10	18.35	15	17.57	15	18.95
17	16.85	16	18.50	22	17.80	22	19.06
24	16.96	24	18.64	29	18.20	30	18.96
30	17.10	July 1	18.74	Oct. 6	18.42		

Nansemond County

105. Formerly well 97.

Water level, in feet above measuring point, 1940

Date	Water level	Date	Water level	Date	Water level
Apr. 1	20.0	June 1	20.0	Sept. 4	20.0
May 1	20.0	July 1	20.0	Nov. 4	19.5

Prince George County

2. Formerly well 42.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	19.39	Apr. 2	18.38	July 9	19.97	Oct. 1	19.95
9	19.79	9	18.68	16	20.14	8	19.80
16	19.73	16	18.93	23	20.23	15	20.52
23	19.56	23	19.00	30	20.21	22	20.87
30	19.63	30	18.80	Aug. 6	20.19	30	20.98
Feb. 6	19.74	May 7	18.66	13	20.36	Nov. 5	21.29
13	18.75	14	18.80	20	18.70	19	20.90
20	18.14	21	19.02	27	18.34	26	20.68
27	18.00	28	18.96	Sept. 4	18.55	Dec. 4	20.56
Mar. 6	17.89	June 19	19.70	10	18.74	10	20.65
12	18.21	25	19.81	17	19.25	17	20.88
19	17.97	July 2	20.10	24	19.58	26	21.07
26	18.21						

13. Formerly well 56. Measuring point, 52.5 feet above sea level. In Water-Supply Paper 886, water level on Oct. 2, 1939, was erroneously given to be 47.63 feet; the correct level is 49.63 feet.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	39.87	Feb. 26	39.46	Apr. 22	41.77	June 17	48.52
8	40.02	Mar. 4	39.11	29	37.02	24	48.81
15	38.40	11	39.90	May 6	37.02	July 1	49.47
22	39.80	18	36.24	13	38.78	8	49.59
28	39.90	25	36.30	20	40.12	14	49.60
Feb. 5	38.61	Apr. 1	36.30	27	45.13	20	49.66
12	39.52	8	36.70	June 3	47.25	27	49.67
19	44.11	15	36.87	10	48.10	Aug. 3	49.88

Prince George County--Continued.

13.--Continued.

Water level, in feet below measuring point, 1940

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Aug. 10	49.76	Sept.21	49.39	Oct. 26	47.78	Nov. 30	40.47
17	46.65	28	49.60	Nov. 2	43.82	Dec. 7	40.37
24	49.36	Oct. 5	49.55	9	42.50	14	40.39
31	49.52	12	49.51	16	40.83	21	38.31
Sept. 7	49.50	19	49.52	23	40.92	28	33.77
14	49.30						

15. Formerly well 51. Measuring point, 51.7 feet above sea level.

Water level, in feet below measuring point, 1940

Jan. 4	34.50	May 2	32.43	July 11	40.32	Oct. 11	40.26
11	34.31	11	33.17	18	40.46	19	40.25
18	34.18	16	33.46	25	40.76	Nov. 15	35.20
25	34.30	24	36.21	Aug. 1	40.71	22	35.15
Feb. 1	34.15	June 3	38.58	9	40.72	29	35.50
9	34.06	10	39.28	16	40.75	Dec. 6	34.57
16	33.93	17	39.71	23	40.46	12	34.59
24	34.00	24	39.96	29	40.67	20	33.87
Apr. 16	32.42	July 3	40.34	Oct. 4	40.26	27	33.17
26	32.67						

Southampton County

201b. Camp Manufacturing Company. About 0.75 mile north-northwest of Franklin, in farmyard. Abandoned jetted well, diameter 3 inches, depth 275 feet. Measuring point, top of casing, 34± feet above sea level. Taps artesian water in Cretaceous sands.

Water level, in feet below measuring point, 1940

Apr. 3	16.14	June 8	16.80	Aug. 17	14.90	Oct. 26	16.92
6	16.15	15	17.10	24	15.73	Nov. 2	16.98
13	16.00	22	17.27	31	16.67	8	16.87
20	15.84	28	17.90	Sept. 7	17.00	16	16.57
27	15.94	July 6	16.98	13	16.87	23	16.52
May 4	16.09	13	16.90	24	16.93	30	16.64
11	16.28	20	17.38	28	17.05	Dec. 7	16.73
18	16.38	27	17.68	Oct. 4	17.10	14	16.40
25	16.48	Aug. 3	17.58	12	17.00	21	16.53
June 1	16.52	10	17.42	19	16.97	28	16.48

Sussex County

90. Jeb. S. White. Wakefield. Abandoned drilled well, diameter 3 inches, depth 225 feet. Measuring point, plug 4 inches above 4-inch coupling, 101.7 feet above sea level. Taps artesian water in Cretaceous sand. On Apr. 1, 1940, water levels varied from 65.15 to 64.77 feet below measuring point in response to nearby pumping.

Water level, in feet below measuring point, 1940

Apr. 8	64.88	June 17	65.22	Aug. 19	64.92	Oct. 28	65.42
16	64.55	24	65.76	26	65.20	Nov. 4	65.50
22	64.61	July 1	65.51	Sept. 2	65.52	11	65.64
May 1	64.60	8	65.64	10	65.37	20	65.27
7	64.87	15	65.43	16	65.13	26	64.92
13	64.69	22	65.96	23	65.62	Dec. 2	64.93
20	65.03	29	65.28	30	65.05	9	65.19
28	65.19	Aug. 5	65.68	Oct. 7	65.21	23	65.49
June 3	65.22	12	65.38	15	65.24	30	65.35
10	65.24						

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