UNITED STATES DEPARTMENT OF THE INTERIOR

CHEMICAL CHARACTER OF SURFACE WATERS OF GEORGIA

Prepared in cooperation with the
DIVISION OF MINES, MINING, AND GEOLOGY OF THE
GEORGIA DEPARTMENT OF NATURAL RESOURCES

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BY

WILLIAM L. LAMAR

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By WILLIAM L. LAMAR

ABSTRACT

Information on the character of surface waters of Georgia, as shown by 470 analyses of samples collected at 96 sampling points, is useful in connection with the distribution of many commodities, the location of industrial plants, the selection of sources for public or industrial supplies and the planning of their treatment.

Each of 10 tables (Nos. 12–21) gives 36 analyses of 10-day composites of samples collected daily for a year at or near a gaging station. These tables include arithmetical and weighted averages for the year. Table 22 gives also analyses for 90 spot samples.

Surface waters vary in composition during the year. However, most of the surface waters in Georgia are soft and low in mineral content at all times. The total mineral content of the waters, even at times of maximum concentration, is not likely to amount to 80 parts per million except in the northwestern and southwestern parts of the State, where it may exceed 130 parts per million. The 470 analyses show that practically the only mineral constituents exceeding 10 parts per million are silica, calcium, and bicarbonate. Bicarbonate (including the equivalent of any carbonate if present) had the greatest range (3 to 156 parts per million) of all the mineral constituents. The hardness of most of the surface waters was generally within the range of 8 to 25 parts per million, and even at times of maximum concentration it is not likely to exceed 30 or 40 parts per million. The hardest surface waters are found in the northwestern and southwestern parts of the State, where the maximum hardness as shown by the analyses was 131 parts per million.

Many of the surface waters originating in the eastern and southern parts of the Coastal Plain are highly colored. The suspended matter carried by different streams and by the same stream at different times covers a wide range. Streams originating in the eastern and southern parts of the Coastal Plain, where the run-off is gradual, carry very little suspended matter.

The temperature of the water was measured daily at six of the sampling stations and twice daily at three others. The daily temperatures of the water are given in tables 3 to 11 and are shown graphically in figures 16 to 24.

In regard to salt-water intrusion in the Savannah River, the author concludes that a discharge of about 4,500 second-feet at Clyo is necessary to prevent the advance of noticeable salinity above the vicinity of the Atlantic Coastal Highway Bridge at high tide.

INTRODUCTION

A comprehensive program to obtain information on discharge and quality of water of streams in Georgia was initiated in 1937 by the Geological Survey of the United States Department of the Interior with the cooperation of the Georgia Division of Mines, Mining, and Geology. An adequate supply of water of good quality is a vital necessity for the well-being and prosperity of a State or nation. Information on the character of surface waters is useful in connection with the distribution of many commodities; the location of industrial plants; the selection of sources for public or industrial supplies and the planning for their treatment.

Studies of discharge and of quality of water of streams are so intimately related that a study of one without the other is inadequate for many purposes. It is true, also, that for some streams a single analysis may be about as misleading as a single discharge measurement. For many of the streams in Georgia the most profitable study of the chemical character of the water can be made by an analysis of three composites of daily samples each month for a year. When comprehensive data concerning the quality of water are made available for selected streams, the analyses may be valuable in the study of other streams where conditions are similar.

The results of analyses of composite samples covering a year for 10 stations on rivers in Georgia are given in tables 12 to 21 (pp. 352–371). Each of these tables gives 36 complete analyses and includes arithmetical and weighted averages for the year. Table 22 (pp. 372–377) includes the analyses of 90 spot samples collected at gaging stations or at other points on streams and also the arithmetical averages for the 10 stations indicated above. A total of 470 complete analyses is given in this report. The daily temperature of the water is reported for 9 of the 10 stations indicated above, as information concerning it is of value to industry, particularly in connection with the use of water for cooling purposes.

This investigation was made possible through the cooperation of Capt. Garland Peyton, Director of the Georgia Division of Mines, Mining, and Geology. The bulk of the analyses were made by A. T. Ness and C. G. Seegmiller, of the Quality of Water Division of the Geological Survey. The other analyses were made by W. L. Lamar except for a few that were made by other members of the division.

PHYSIOGRAPHY

The physical features [1] that characterize different parts of Georgia may be classified according to their distinctive topographic and geologic nature. The State lies in two major physiographic divisions, the Appalachian Highlands and the Atlantic Plain. The Appalachian Highlands are north and the Atlantic Plain south of an irregular line passing through the cities of Augusta, Macon, and Columbus.

The Appalachian Highlands make up about two-fifths of the total area of the State and include the Piedmont, the Blue Ridge, and the

[1] Fenneman, N. M., Physiography of eastern United States, 1st ed., McGraw-Hill Book Co., 1938; Physical divisions of the United States (map), 1930. LaForge, Laurence, Cooke, Wythe, Keith, Arthur, Campbell, M. R., and McCallie, S. W., Physical geography of Georgia: Georgia Geol. Survey Bull. 42, 1925.

Valley and Ridge provinces, and the edge of the Cumberland Plateau section of the Appalachian Plateaus province in the northwest corner of the State. They range in elevation from about 400 feet above sea level in places near the Fall Line to more than 4,000 feet above sea level on the peaks of the mountains. At the Fall Line most of the valleys cut by the large streams are less than 400 feet above sea level. The Piedmont province has considerable relief. It is essentially an upland of hilly and broken country in which the larger streams have cut deep valleys. It also has scattered small mountains called monadnocks. The Blue Ridge province is essentially mountainous. Both the Piedmont and the Blue Ridge are made up of igneous and metamorphic rocks such as gneiss, granite, schist, quartzite, slate, and their disintegration products, all of which are composed largely of relatively insoluble silicate minerals. The rocks have been deeply weathered in many places. The Valley and Ridge province, as the name indicates, is a region of parallel valleys and ridges. The structure and resistance of the rocks in the ridges and the more easily erodible rocks of the valleys have produced the characteristic relief of this province. The Cumberland Plateau, which includes only the northwest corner of the State, occupies all Dade County and parts of Walker and Chattooga Counties. It is an area of flat-topped mountains and is represented in Georgia by Sand, Lookout, and Pigeon Mountains. In both the Valley and Ridge province and the Cumberland Plateau section the rocks are largely shale, limestone, dolomite, sandstone, and conglomerate.

The Atlantic Plain includes the Coastal Plain and the Continental Shelf provinces. The submerged portion of the plain under the shallow coastal waters is called the Continental Shelf.

The Coastal Plain makes up about three-fifths of the total area of the State. In general, it includes hilly and broken sections in the northern part and rolling land that merges into flat country toward the coast. The extent of swamp land increases seaward. The topography along the large streams ranges from valleys where the streams have cut deep courses to flat swampy flood plains. In a broad sense the streams in the eastern part of the Coastal Plain flow into the Atlantic Ocean, while those in the western part flow into the Gulf of Mexico. The islands along the Atlantic coast present a prominent feature.

The Coastal Plain is made up of sedimentary deposits of sand, clay, gravel, limestone, and marl. As the coast is approached the surface cover becomes predominantly sandy. The swamps are covered with varying amounts of humus from the decomposition of leaves, plants, and roots.

CLIMATE

The discharge of streams is obviously related to climate, and the quality of water is influenced by variations in discharge. During dry periods the dissolved mineral content of water increases. Heavy rains cause many streams to carry large quantities of suspended matter. The organic content and color of surface waters may be appreciably affected by the kind and amount of discharge. The data on climate given here were abstracted from reports [2] of the United States Weather Bureau.

Georgia has a relatively warm climate and ample rainfall for growing crops. Throughout the State, particularly from north to south, there are variations in climate that are caused by the topography, the latitude, and the ocean. The southern and southeastern parts of the Coastal Plain have long warm summers, during which the changes in temperature from day to day are usually small, and short, very mild winters. In north Georgia the higher altitudes have a pronounced effect in lowering the temperature and increasing the rainfall. From the city of Atlanta northward the summers are more moderate than would be expected from the latitude; also, as the prevailing winds are westerly in winter, changes in temperature between summer and winter are pronounced. For the State as a whole, records for the period 1892 to 1941 show that the maximum temperature was more than 100° every year and that during severe cold waves zero temperature or below zero was recorded for 20 different years. The mean temperature for the period was 63.9°.

Records for a number of years show that precipitation has varied throughout the State and that the average annual precipitation has ranged from about 45–46 inches for a few stations in the Coastal Plain and also for about two stations of low altitude in the Piedmont to 70 inches for the station at Clayton, which is in the Blue Ridge. The average annual precipitation for the whole State for the period from 1892 to 1941 amounted to 49.7 inches. The northeastern part of Georgia, including Rabun and Towns Counties, receives a remarkably heavy rainfall, which is not exceeded anywhere in the United States except on the northern Pacific coast. The moist winds from the Atlantic Ocean are forced upward against the mountain slopes and cause heavy precipitation by the cooling of the moist air. In some wet years precipitation of more than 80 inches has been recorded in the northeastern section.

Tables 1 and 2, which are based on the Climatological data reports of the United States Weather Bureau, contain information on air temperature and precipitation for the calendar years 1937–41.

[2] U. S. Weather Bureau, Climatological data for Georgia, monthly and annual; Climatic summary of the United States, 1930, sec. 102, Western Georgia, sec. 103, Central and eastern Georgia.

TABLE 1.—*Air temperature (° F.) in Georgia, 1937–41*

[From U. S. Weather Bureau]

Division	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1937													
Northern division	52.8	44.5	50.5	58.8	69.2	78.2	78.2	78.2	71.0	58.4	47.5	42.8	60.8
Middle division	58.0	48.3	53.8	62.0	72.4	80.5	80.2	80.0	72.8	62.5	50.9	46.4	64.0
Southern division	63.6	53.0	57.0	65.1	74.1	80.8	81.0	80.8	75.5	66.2	54.5	50.4	66.8
1938													
Northern division	43.4	50.9	57.9	60.4	69.5	73.6	77.3	79.5	72.3	62.2	53.1	43.3	62.0
Middle division	47.1	54.7	61.9	63.6	72.9	76.5	79.0	81.7	75.2	65.1	57.2	47.1	65.2
Southern division	51.8	58.5	65.8	66.9	75.9	78.3	80.1	82.8	76.8	66.3	61.0	50.9	67.9
1939													
Northern division	44.5	49.3	54.7	59.1	67.6	77.7	78.7	76.5	74.6	64.0	49.3	44.9	61.7
Middle division	49.6	54.2	59.2	62.9	70.7	79.9	81.1	78.7	77.0	66.9	52.2	48.3	65.1
Southern division	54.8	59.1	62.6	66.2	72.8	80.9	81.7	79.7	79.1	69.7	56.2	52.7	68.0
1940													
Northern division	30.6	42.5	50.1	58.7	66.2	75.6	76.3	77.4	70.5	62.2	50.3	47.4	59.0
Middle division	34.4	45.9	53.4	61.7	69.6	78.1	78.5	79.7	73.0	65.3	54.5	50.5	62.0
Southern division	40.0	50.3	58.1	64.4	72.1	79.9	80.8	81.7	75.1	67.6	58.8	55.8	65.4
1941													
Northern division	43.5	39.9	46.5	62.5	70.5	76.0	78.6	78.8	75.4	68.4	50.8	46.6	61.5
Middle division	47.4	43.2	49.9	65.7	73.4	78.9	80.9	81.4	77.8	71.5	54.9	50.0	64.6
Southern division	51.3	47.4	54.1	68.0	74.6	80.4	81.7	83.1	78.7	74.3	59.1	53.9	67.2

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TABLE 2.—*Precipitation (inches) in Georgia, 1937–41*

[From U. S. Weather Bureau]

Division	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1937													
Northern division	10.03	5.27	2.98	7.74	2.50	3.56	3.17	6.63	1.40	7.60	1.50	2.22	54.60
Middle division	6.65	5.19	3.70	7.03	2.15	3.91	4.49	5.74	1.74	4.61	1.65	2.23	49.10
Southern division	3.87	5.41	4.39	6.11	1.87	5.43	7.22	6.61	4.46	3.92	2.93	1.64	53.87
1938													
Northern division	2.69	1.31	5.84	7.80	3.49	5.55	9.24	2.57	1.91	.15	4.64	2.66	47.85
Middle division	1.74	.97	3.17	9.10	3.54	5.29	6.97	2.80	1.90	.52	2.38	2.74	41.14
Southern division	1.61	1.07	2.13	3.74	3.38	5.63	6.49	3.69	4.30	1.42	1.12	2.63	37.21
1939													
Northern division	5.60	9.85	5.31	3.43	4.48	3.64	4.24	6.98	2.49	.52	.73	3.28	50.55
Middle division	3.23	9.61	5.43	2.70	3.61	4.20	5.24	6.33	2.76	.11	.65	3.57	47.44
Southern division	2.49	7.86	2.52	4.82	4.28	6.14	5.02	7.97	3.39	.36	1.07	2.98	48.90
1940													
Northern division	4.71	5.23	5.26	3.41	2.42	4.28	5.44	8.85	.92	1.18	3.76	4.56	50.12
Middle division	4.94	4.97	4.11	2.75	1.84	4.36	7.38	6.59	1.08	.86	4.16	4.11	47.15
Southern division	3.68	5.71	2.73	2.92	2.17	5.40	7.25	5.84	1.12	.63	3.27	3.75	44.47
1941													
Northern division	2.46	1.64	4.63	2.66	.95	5.30	9.06	3.97	1.08	1.70	2.49	6.50	42.44
Middle division	1.72	2.40	4.17	1.87	.74	6.31	5.95	4.03	1.97	1.72	1.19	8.32	40.39
Southern division	1.35	2.51	4.63	1.64	1.01	7.19	6.54	4.87	2.83	3.55	1.35	7.03	44.50

COLLECTION AND EXAMINATION OF SAMPLES

Samples were collected daily at or near gaging stations on 10 rivers for a year, and 90 spot samples were collected at gaging stations or other points on streams throughout the State. (See tables Nos. 12–22, pp. 352–377.) The daily samples were collected in 12-ounce bottles and were poured into gallon bottles to make three composite samples per station each month as follows: Samples for first 10 days, next 10 days, and rest of month, except for February, when the composites consisted of 10, 9, and 9 samples, respectively. Each of the spot samples was collected in a gallon bottle and in a 12-ounce bottle. The 12-ounce sample was used for the determination of suspended matter.

The results for suspended matter are only approximations, as the samples were collected and examined primarily to determine the dissolved constituents. An attempt was made, however, to get integrated samples at a point in the stream where the flow was good. The quantity of suspended matter was determined by filtering a suitable sample through an asbestos mat in a Gooch crucible and weighing the dried residue.

In order to show some indication of probable organic pollution oxygen consumed was determined on the unfiltered and filtered samples in accordance with the procedure in Standard methods.[3]

The samples for analysis were filtered through fine diatomaceous filter cylinders. It is believed that very little silica, other than that in the suspended matter, and very little color were lost by this method of filtration. The filtration removed all noticeable turbidity caused by the finely divided suspended clay, much of which contained appreciable quantities of iron and silica.

The color of the filtered water was measured by the commonly adopted platinum-cobalt standard proposed by Hazen[4] in 1892. A brief discussion of certain difficulties encountered and precautions used in the analysis of colored waters is given under the heading "Color."

The methods of analysis[5] regularly followed in the water-resources laboratory of the Geological Survey were used in determining the mineral constituents. Total hardness as $CaCO_3$ was calculated from the quantities of calcium and magnesium.

[3] Am. Public Health Assoc. and Am. Water Works Assoc., Standard methods for the examination of water and sewage, 8th ed., pp. 136–139, 1936.

[4] Hazen, Allen, A new color standard for natural waters: Am. Chem. Jour., vol. 14, pp. 300–310, 1892. Am. Public Health Assoc. and Am. Water Works Assoc., op. cit., pp. 12–14.

[5] Collins, W. D., Notes on practical water analysis: U. S. Geol. Survey Water-Supply Paper 596–H, pp. 235–261, 1928.

STREAM FLOW

Records of discharge of streams as published in reports [6] on surface water supply of the United States were furnished by F. M. Bell and M. T. Thomson, district engineers of the Surface Water Division of the Geological Survey. The discharge for the period of collection of the samples is reported in the tables of analyses (pp. 352–377). Tables 12 to 21 give the mean discharge for the period indicated. Table 22 gives the mean discharge for the day or period indicated except for several streams for which the measured discharge at the time of collection of the sample is given.

RAINFALL AND DISCHARGE DURING SAMPLING YEARS

Samples were collected daily from the Altamaha, Chattahoochee, Ocmulgee, Oconee, Ogeechee, and Satilla Rivers from May 1, 1937, to April 30, 1938, during which period the State was deficient about 6.4 inches in rainfall and the discharge of these streams was somewhat below average. During this period, February 1938 was the driest month and April 1938 the wettest. Samples were collected daily from the Savannah River near Clyo from May 1, 1938, to April 30, 1939. The State received about average rainfall during this period and the discharge of the Savannah River near Clyo was about average. During this period, October 1938 with 0.70 inch was the driest month and February 1939 with 9.11 inches was the wettest, these 2 months being considerably below and above normal, respectively. Samples were collected daily from the Etowah River near Cartersville from October 1, 1938, to September 30, 1939. The State received about average rainfall during this period, October 1938 and February 1939 being the driest and wettest months, respectively. Samples were collected daily from the Chattahoochee River at Columbus and near Hilton from October 1, 1940, to September 30, 1941, during which period the State was deficient in rainfall about 10 inches and the discharge of this river was considerably below average. The monthly average rainfall was less than 2.5 inches for 6 months during this period. The driest month was October 1940 with 0.89 inch, and the wettest month was July 1941 with 7.18 inches.

[6] Surface water supply of the United States, part 2, South Atlantic slope and eastern Gulf of Mexico basins, reports for 1937, 1938, 1939, 1940, and 1941: U. S. Geol. Survey Water-Supply Papers 822, 852, 872, 892, and 922.

WATER TEMPERATURE

Tables 3 to 11 and figures 16 to 24 show the temperature of the water for nine river stations where samples of water were collected daily. Figures 16 to 24 were prepared by plotting the average temperature for each 2-day period. At six locations the temperature of the water was measured daily when the samples were collected, as follows: Altamaha River at Doctortown at 8 a. m.; Chattahoochee River near Vinings from 1 to 7:30 p. m.; Chattahoochee River at Columbus usually at 10 a. m.; Chattahoochee River near Hilton at 8 a. m.; Etowah River near Cartersville from 6 to 7 a. m.; and Ocmulgee River at Macon usually between 6 and 9 a. m. At three locations the temperature of the water was measured twice daily, once each morning when the sample was collected and once in the afternoon, as follows: Ogeechee River near Eden at 8 a. m. and from 4 to 6 p. m.; Satilla River near Waycross from 7:15 to 8:15 a. m. and at 5 p. m.; and Savannah River at Clyo at 7 a. m. and 5 p. m. There were certain exceptions to the times given above for some of the stations.

For the larger streams the water temperature is appreciably more uniform throughout the day than the air temperature, but it varies somewhat. Although the water temperature was measured only once or twice each day, the average monthly water temperature agreed reasonably well with the mean monthly air temperature, the difference generally being not more than about 2°. Occasionally the difference between the average monthly water temperature and the mean monthly air temperature amounted to as much as 5°. In spring the water temperature has a tendency to lag behind the air temperature, whereas in the latter part of summer and in autumn it may exceed the air temperature.

TABLE 3.—*Temperature (°F.) of water of Altamaha River at Doctortown, Ga., 1937–38*

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	67	81	83	84	83	70	60	60	55	50	52	72
2	67	81	81	83	80	76	64	55	55	50	54	73
3	65	82	82	82	80	77	60	50	54	54	57	65
4	65	82	79	82	80	74	66	55	51	53	56	64
5	66	80	80	83	80	79	67	50	51	54	59	64
6	66	82	82	84	80	79	60	46	53	54	61	65
7	67	82	83	84	82	80	55	45	55	56	57	67
8	67	82	83	84	83	79	60	45	50	52	57	69
9	71	83	83	82	83	79	60	55	49	56	60	60
10	67	84	83	83	80	75	64	60	50	56	62	57
11	68	83	83	83	80	70	64	45	50	57	61	67
12	69	84	83	85	82	75	60	45	50	60	60	60
13	69	84	83	82	80	70	60	55	47	60	60	63
14	70	83	84	83	79	75	60	56	49	60	64	65
15	69	83	83	82	77	70	57	57	50	60	65	64
16	70	83	82	83	79	65	56	57	46	62	65	64
17	69	83	84	83	80	65	55	59	49	68	63	65
18	------	83	84	82	76	------	51	60	51	63	63	67
19	72	80	83	83	76	70	56	56	50	63	62	70
20	73	83	84	82	75	69	50	54	53	59	66	76
21	73	82	83	83	75	65	46	56	54	56	66	68
22	73	83	82	84	76	69	45	50	54	57	67	71
23	75	84	84	84	75	60	40	55	55	60	67	65
24	75	83	84	83	76	57	45	50	57	60	67	65
25	76	84	84	83	74	65	55	50	54	55	66	66
26	77	81	84	85	75	60	60	55	50	52	67	65
27	78	81	84	80	76	65	62	55	47	54	70	67
28	79	83	83	84	72	57	65	56	56	54	66	69
29	80	80	83	83	73	57	60	50	45	------	67	70
30	81	80	83	82	70	57	55	54	50	------	70	70
31	80	------	84	82	------	65	------	53	51	------	72	------

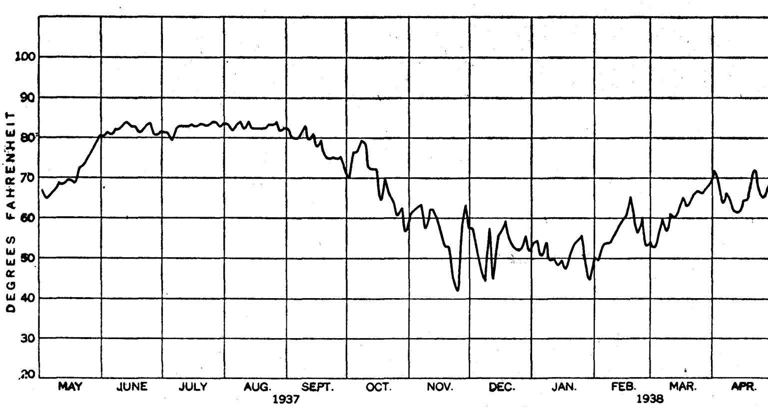

FIGURE 16.—Temperature of water of Altamaha River at Doctortown, Ga., 1937–38.

TABLE 4.—*Temperature (°F.) of water of Chattahoochee River near Vinings, Ga., 1937–38*

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	------	------	------	80	80	65	57	48	48	44	49	63
2	------	------	------	83	82	66	------	47	47	44	51	59
3	------	------	------	85	80	76	57	46	47	47	56	58
4	------	------	------	80	82	75	55	46	47	51	55	58
5	------	------	------	78	80	78	56	45	46	52	56	59
6	------	------	------	82	82	76	55	37	45	55	56	58
7	------	------	------	80	82	78	52	38	44	55	54	62
8	------	------	------	80	83	70	54	38	46	55	53	57
9	------	------	------	82	81	66	55	38	42	55	54	57
10	------	------	------	82	80	64	58	37	41	57	53	54
11	------	------	------	78	82	65	55	35	43	56	54	56
12	------	------	------	85	80	68	53	37	44	56	55	59
13	------	------	88	81	79	64	56	38	43	56	55	61
14	------	------	88	85	76	63	55	43	42	59	57	63
15	------	------	88	82	75	63	55	45	43	60	59	64
16	------	------	86	83	77	63	51	47	45	57	60	65
17	------	------	87	85	73	59	50	51	46	54	56	67
18	------	------	87	85	73	65	48	53	46	56	57	65
19	------	------	84	86	76	66	46	52	47	55	56	68
20	------	------	85	87	77	63	42	50	48	49	59	67
21	------	------	85	86	77	64	40	46	50	51	61	67
22	------	------	85	85	77	58	38	46	53	49	64	66
23	------	------	82	80	76	58	40	45	53	50	62	65
24	------	------	85	80	74	55	40	46	57	48	63	66
25	------	------	83	80	75	57	43	47	49	46	62	68
26	------	------	83	77	66	57	49	48	44	48	64	69
27	------	------	83	79	68	55	49	48	40	50	60	69
28	------	------	85	82	68	54	51	50	38	50	61	71
29	------	------	85	75	66	56	50	50	39	------	63	70
30	------	------	84	77	67	57	50	49	41	------	65	71
31	------	------	81	80	------	60	------	48	43	------	65	------

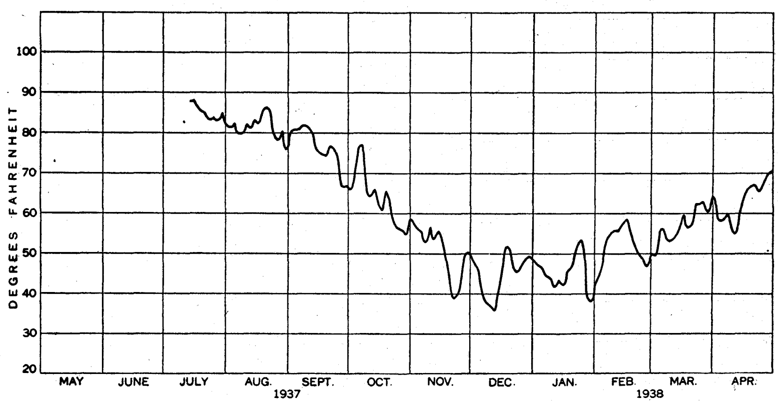

FIGURE 17.—Temperature of water of Chattahoochee River near Vinings, Ga., 1937–38.

TABLE 5.—*Temperature (°F.) of water of Chattahoochee River at Columbus, Ga., 1940–41*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	71	68	53	53	49	45	54	67	76	79	81	81
2	71	66	52	53	49	45	55	68	77	80	81	81
3	71	65	52	54	49	46	56	68	77	81	81	82
4	71	65	50	52	48	47	57	68	79	81	81	82
5	71	65	51	51	47	47	57	67	79	80	81	81
6	71	65	50	51	48	47	57	67	77	80	81	82
7	71	63	50	50	49	49	57	68	77	80	80	82
8	70	61	50	50	48	50	57	69	78	79	80	82
9	69	61	50	50	47	49	57	70	78	79	81	81
10	69	61	49	49	46	49	61	70	79	80	81	81
11	68	62	50	48	45	50	60	68	81	80	81	81
12	68	62	50	47	46	50	59	68	82	79	81	80
13	69	61	51	47	46	50	60	68	79	79	82	80
14	71	59	52	47	47	50	61	68	79	80	82	80
15	70	54	52	48	46	50	62	68	79	80	80	80
16	67	54	52	47	46	51	63	69	79	80	79	78
17	66	54	51	47	46	52	63	71	79	81	80	78
18	66	55	50	47	47	50	63	72	79	80	80	78
19	65	54	50	46	47	49	64	72	79	80	80	77
20	67	55	50	45	47	51	66	72	79	80	80	76
21	66	55	50	46	47	50	65	74	79	80	79	75
22	66	55	50	48	48	50	65	75	79	80	79	77
23	66	56	51	49	46	50	66	74	79	80	79	76
24	67	57	52	48	46	51	66	76	79	80	80	75
25	67	58	53	47	47	51	66	76	79	80	81	75
26	67	57	53	48	47	52	64	76	79	80	82	76
27	68	55	53	49	46	53	66	76	79	80	83	76
28	67	55	53	49	45	52	67	76	79	80	82	77
29	67	54	52	49	------	52	67	76	79	81	81	78
30	68	52	52	49	------	53	66	78	79	81	81	78
31	68	------	52	48	------	54	------	78	------	81	80	------

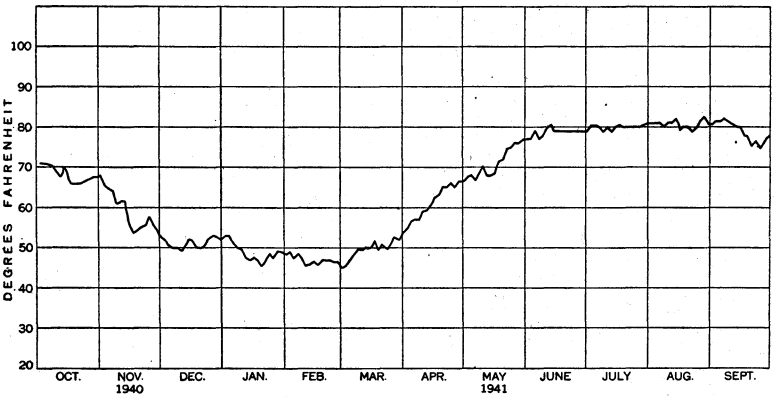

FIGURE 18.—Temperature of water of Chattahoochee River at Columbus, Ga., 1940–41.

TABLE 6.—*Temperature (°F.) of water of Chattahoochee River near Hilton, Ga. 1940–41*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	------	69	56	50	46	42	56	69	80	78	85	81
2	------	67	52	52	49	44	57	69	80	80	84	82
3	------	63	51	56	51	------	59	70	80	81	84	83
4	------	62	------	50	46	53	62	70	80	81	84	83
5	------	65	51	51	45	50	60	71	80	80	84	83
6	------	66	48	48	47	52	59	71	80	79	83	83
7	------	62	50	46	47	56	60	71	80	80	82	83
8	------	58	52	45	45	53	60	72	81	80	83	83
9	------	59	49	45	45	53	62	72	81	81	83	82
10	------	60	48	45	44	51	63	71	82	81	82	82
11	------	62	48	45	44	52	64	71	83	82	82	80
12	------	62	------	45	44	51	64	69	84	82	83	80
13	------	61	53	45	44	54	63	68	83	82	84	78
14	------	57	57	46	48	50	------	67	81	83	84	77
15	------	48	58	49	45	49	64	69	79	82	82	77
16	------	47	59	51	47	51	65	70	80	82	82	77
17	------	48	53	50	49	53	68	72	79	81	81	77
18	------	------	52	49	46	50	67	73	80	81	81	78
19	------	------	51	46	47	49	68	77	78	80	83	78
20	------	52	51	45	48	51	69	77	78	80	83	75
21	------	61	51	44	47	54	69	79	79	81	82	75
22	------	64	51	46	45	54	68	78	79	81	82	75
23	------	------	52	47	45	54	70	78	79	82	82	75
24	------	61	51	49	47	55	70	79	79	81	82	76
25	------	64	53	48	47	55	69	79	79	81	81	76
26	------	64	56	49	48	56	65	79	80	81	82	75
27	------	57	56	51	50	56	68	80	81	81	82	75
28	------	57	56	48	41	54	68	80	81	82	82	76
29	------	54	55	47	------	57	------	80	82	82	82	79
30	------	54	51	46	------	54	68	80	80	84	80	81
31	------	------	50	45	------	55	------	81	------	84	81	------

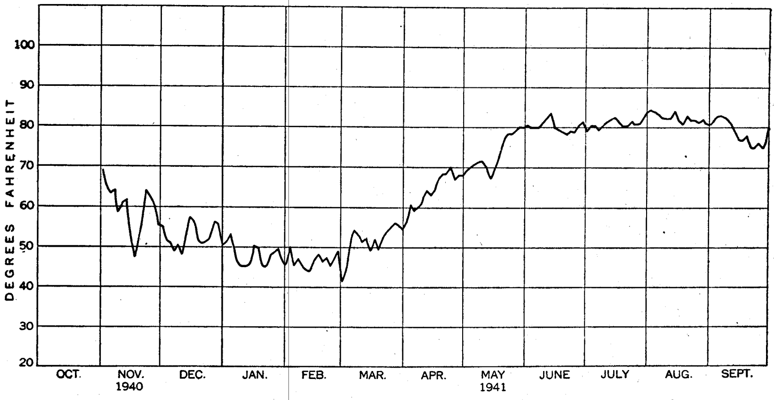

FIGURE 19.—Temperature of water of Chattahoochee River near Hilton, Ga., 1940–41.

TABLE 7.—*Temperature (°F.) of water of Etowah River near Cartersville, Ga., 1938–39*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	65	55	38	39	43	51	58	61	74	76	76	72
2	63	56	38	39	45	49	56	61	72	76	77	72
3	62	56	43	40	48	48	54	60	73	75	76	73
4	63	60	47	45	43	48	56	59	73	75	75	74
5	62	61	49	50	45	50	56	60	74	75	76	74
6	64	59	48	50	47	54	59	61	75	76	76	72
7	65	64	45	47	47	54	54	64	75	77	76	74
8	63	64	47	45	47	52	51	64	75	77	76	75
9	64	54	46	43	51	51	50	64	76	78	78	76
10	62	56	41	47	54	54	56	64	76	78	79	77
11	64	55	44	49	54	54	60	64	76	76	79	76
12	65	55	45	------	51	55	59	66	74	75	80	76
13	62	60	44	48	49	53	55	66	73	75	79	76
14	62	59	45	44	52	54	56	65	74	78	78	78
15	64	51	44	45	53	56	58	61	73	78	76	76
16	63	53	41	44	51	53	61	59	74	76	75	75
17	63	54	43	42	48	51	64	60	76	76	74	76
18	63	56	45	46	48	50	60	64	76	76	74	76
19	63	59	38	42	52	48	64	66	76	79	74	71
20	65	53	39	40	55	48	58	66	76	76	75	70
21	60	54	41	46	55	50	57	68	78	77	75	68
22	57	52	41	44	45	52	56	68	78	78	75	68
23	58	55	43	41	44	53	58	69	77	77	74	68
24	60	55	45	39	41	------	60	70	75	77	74	69
25	54	50	43	37	41	54	64	70	78	78	74	69
26	54	45	47	40	44	59	66	72	76	77	71	70
27	55	41	44	42	46	61	66	72	76	77	73	71
28	54	36	40	38	51	60	65	72	76	78	73	71
29	53	37	40	42	------	60	64	72	76	79	73	71
30	55	35	40	45	------	60	64	72	76	77	74	72
31	55	------	39	45	------	59	------	72	------	76	71	------

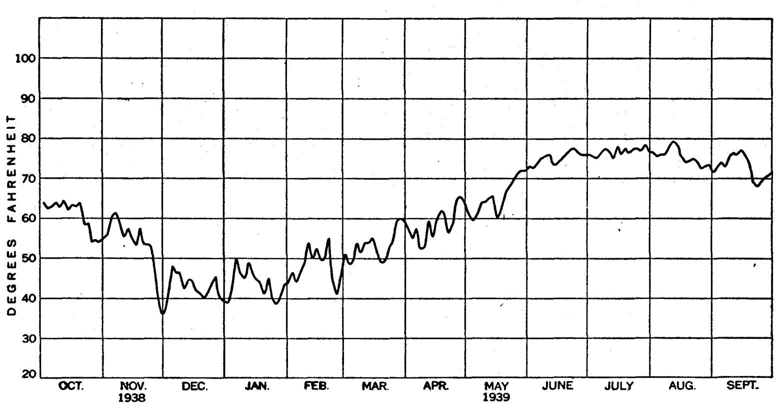

FIGURE 20.—Temperature of water of Etowah River near Cartersville, Ga., 1938–39.

TABLE 8.—*Temperature (°F.) of water of Ocmulgee River at Macon, Ga., 1937–38*

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	63	77	80	83	79	68	60	59	51	50	53	58
2	63	77	79	82	82	73	62	58	52	50	53	59
3	63	77	78	82	78	68	60	56	52	50	53	59
4	63	76	79	82	82	70	58	57	50	51	54	59
5	------	77	76	82	80	74	56	58	50	51	54	60
6	63	76	79	81	80	72	56	47	54	50	53	60
7	64	77	82	81	82	74	------	40	50	53	53	61
8	64	77	83	82	80	74	58	41	53	53	54	60
9	64	78	83	82	82	72	60	42	50	52	54	60
10	64	78	84	81	80	70	63	43	53	53	------	60
11	65	79	84	80	80	67	53	43	52	53	55	61
12	64	79	88	79	78	66	52	39	50	53	55	62
13	68	80	87	78	80	66	58	47	50	53	56	63
14	68	80	84	78	78	67	54	50	50	53	57	62
15	66	81	85	78	76	66	60	54	49	53	58	62
16	67	80	83	79	76	62	54	54	52	54	58	63
17	69	80	87	81	76	64	53	53	52	53	57	63
18	70	80	86	78	71	64	51	54	52	54	57	64
19	70	80	82	84	72	66	50	50	53	54	57	64
20	70	78	82	85	73	67	44	48	53	54	58	64
21	71	80	82	84	75	66	50	51	53	54	58	64
22	72	82	82	86	74	64	49	51	54	54	58	64
23	72	80	83	84	76	60	49	52	54	54	59	64
24	71	79	79	82	75	58	52	52	54	54	57	65
25	74	79	82	83	74	58	52	52	52	53	58	65
26	73	81	83	84	73	60	54	53	50	52	57	65
27	73	81	83	83	72	62	56	53	48	53	58	66
28	73	83	84	81	72	60	59	51	48	54	58	64
29	73	82	83	82	68	58	56	52	48	------	58	65
30	75	79	84	81	67	58	54	51	50	------	58	65
31	76	------	81	82	------	60	------	51	51	------	59	------

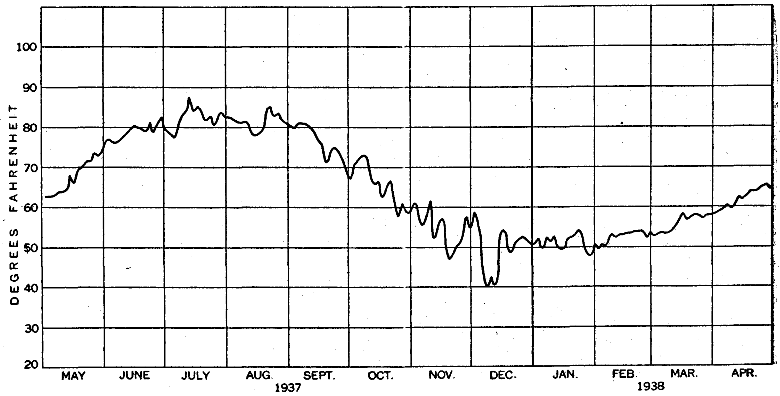

FIGURE 21.—Temperature of water of Ocmulgee River at Macon, Ga., 1937–38.

TABLE 9.—*Temperature (°F.) of water of Ogeechee River near Eden, Ga., 1937-38*

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	66	78	80	80	78	70	60	54	53	48	54	72
2	66	79	80	80	78	70	60	53	53	48	54	70
3	66	78	80	80	79	74	60	50	52	50	56	68
4	66	80	80	80	78	76	58	48	52	51	56	64
5	66	79	79	80	78	76	59	49	51	52	59	64
6	68	80	80	80	78	76	59	47	50	56	61	64
7	68	80	80	81	80	77	57	44	52	57	59	66
8	68	81	81	82	78	76	57	43	51	56	58	67
9	69	82	81	81	78	72	57	44	49	57	60	64
10	69	81	80	81	78	72	58	43	47	57	60	60
11	69	82	81	82	78	70	60	42	50	58	62	60
12	70	82	82	81	77	68	60	42	48	60	62	59
13	70	82	84	80	76	69	60	42	48	60	61	60
14	70	82	84	80	76	68	59	44	49	60	62	61
15	70	81	84	80	75	64	60	44	48	61	63	62
16	70	82	83	80	75	64	57	46	48	60	64	63
17	70	82	83	79	74	64	58	49	48	60	64	64
18	70	81	83	79	74	65	55	52	49	61	64	64
19	72	80	83	80	73	68	55	52	50	62	64	66
20	71	80	83	80	73	68	54	50	51	60	67	66
21	73	81	83	80	73	66	48	50	54	58	68	67
22	73	81	83	80	72	64	46	46	54	58	69	68
23	74	80	81	80	73	62	46	48	55	58	69	67
24	74	80	82	80	74	60	46	50	56	60	70	67
25	75	80	82	81	74	58	48	50	55	56	68	66
26	75	79	82	82	74	60	50	50	52	54	70	65
27	76	80	82	82	74	60	52	52	48	54	70	66
28	78	82	82	81	73	59	56	52	46	54	68	67
29	78	80	80	80	72	58	54	52	45	------	68	68
30	78	80	80	78	71	58	54	52	46	------	68	68
31	79	------	80	78	------	57	------	53	46	------	69	------

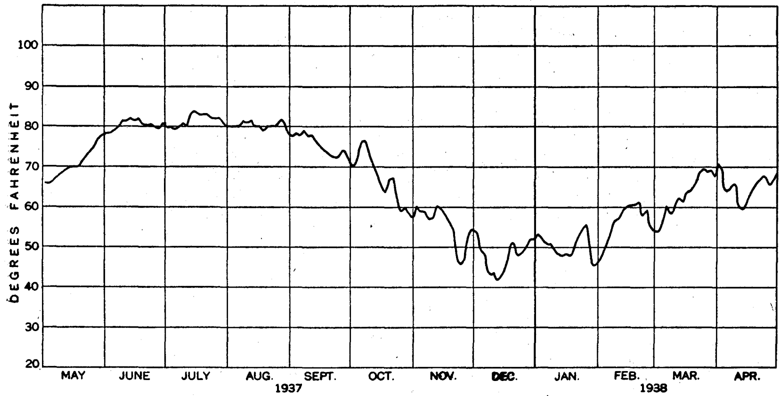

FIGURE 22.—Temperature of water of Ogeechee River near Eden, Ga., 1937-38.

TABLE 10.—*Temperature (°F.) of water of Satilla River near Waycross, Ga., 1937–38*

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	68	84	85	78	82	69	65	54	57	52	58	76
2	68	84	84	79	82	72	66	54	58	52	59	74
3	67	83	84	80	81	74	66	52	56	54	62	68
4	68	82	85	80	80	77	63	50	56	56	63	67
5	69	83	84	80	82	78	62	49	55	62	66	68
6	70	82	83	81	82	79	62	46	54	62	68	68
7	72	84	84	82	83	79	60	44	56	64	65	71
8	71	85	86	84	84	78	62	44	54	62	64	73
9	72	84	86	80	82	76	63	45	51	62	66	67
10	72	84	86	80	81	74	64	44	50	62	67	64
11	72	84	88	81	81	71	64	44	52	62	66	66
12	73	84	86	80	80	70	64	44	53	64	66	68
13	73	84	86	80	79	70	64	45	51	64	64	71
14	73	84	88	78	78	69	64	50	51	64	66	71
15	74	85	82	78	78	66	62	52	50	65	67	72
16	74	85	80	81	78	64	58	54	50	64	67	74
17	76	85	80	80	78	66	58	56	52	62	68	74
18	76	82	82	80	77	70	56	58	56	65	67	76
19	79	81	82	81	76	72	56	56	56	65	68	76
20	80	80	82	82	75	72	52	54	56	62	70	75
21	81	82	84	82	74	68	48	54	59	60	71	75
22	81	84	82	81	74	67	46	51	59	60	73	76
23	82	85	80	81	75	62	46	54	60	63	72	74
24	81	84	80	82	76	60	46	55	62	63	74	74
25	82	83	81	83	74	60	50	54	58	58	72	74
26	83	84	82	83	74	60	52	56	54	56	74	74
27	82	86	82	84	74	64	58	56	50	58	74	75
28	84	87	80	84	72	63	60	58	48	60	72	77
29	84	84	80	83	71	62	59	57	46	------	74	78
30	84	84	80	82	69	62	56	56	49	------	75	78
31	84	------	78	82	------	62	------	56	50	------	76	------

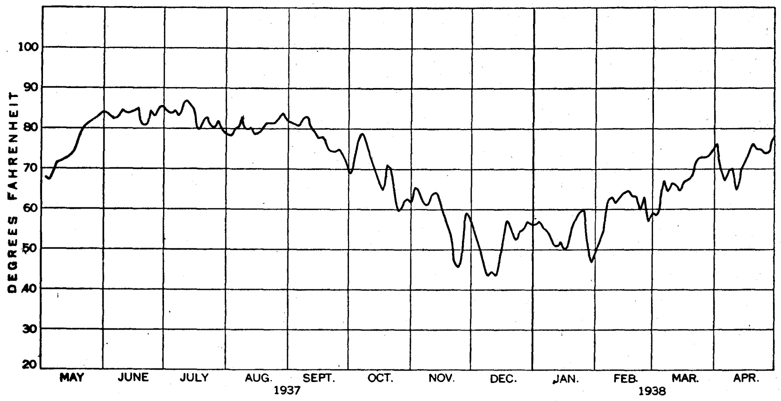

FIGURE 23.—Temperature of water of Satilla River near Waycross, Ga., 1937–38.

TABLE 11.—*Temperature (°F.) of water of Savannah River near Clyo, Ga., 1938–39*

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	71	76	78	78	84	72	64	48	46	49	56	64
2	72	76	80	78	84	71	64	48	46	51	56	65
3	74	75	80	78	84	69	64	49	48	52	53	64
4	76	76	80	78	84	68	64	51	49	50	54	63
5	76	76	80	78	84	68	65	51	51	52	54	63
6	76	75	80	78	84	68	66	50	51	54	56	62
7	76	76	82	80	84	68	66	50	52	54	56	62
8	76	76	82	80	82	68	67	48	51	54	56	62
9	76	76	82	81	82	68	66	48	52	54	56	61
10	74	77	84	81	81	68	66	48	52	56	58	62
11	75	78	82	82	80	69	66	48	52	58	58	64
12	74	79	83	82	80	68	66	49	55	56	60	64
13	74	81	82	84	81	68	66	50	54	55	60	62
14	75	81	82	84	81	70	66	50	53	56	60	62
15	74	81	82	84	81	70	64	50	53	56	62	64
16	73	80	82	84	81	70	64	49	52	54	62	65
17	74	80	83	84	80	70	64	49	50	54	60	66
18	74	82	84	85	80	70	64	49	49	56	60	66
19	75	82	82	86	80	70	64	48	48	56	62	66
20	76	82	82	86	80	70	63	48	48	58	58	66
21	78	81	82	86	78	70	63	48	48	58	58	66
22	79	81	82	86	76	68	63	48	49	56	58	68
23	80	81	82	86	76	68	63	48	48	54	59	68
24	80	82	80	86	76	67	62	50	49	51	60	68
25	79	82	80	86	76	66	55	49	48	51	62	68
26	79	80	80	86	75	65	55	50	47	51	62	70
27	79	80	80	86	76	64	52	50	46	56	63	71
28	78	80	78	86	75	62	50	48	46	56	64	72
29	76	80	78	86	73	62	49	48	48	------	64	71
30	76	78	78	85	72	62	48	48	48	------	64	72
31	74	------	78	85	------	62	------	48	49	------	64	------

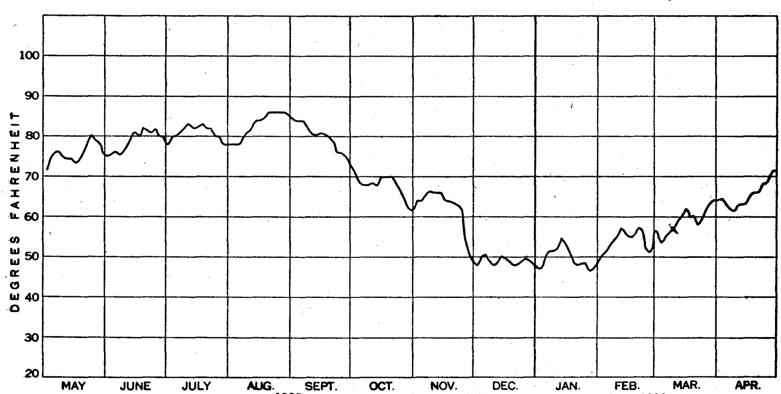

FIGURE 24.—Temperature of water of Savannah River near Clyo, Ga., 1938-39.

COMPOSITION OF SURFACE WATERS

The dissolved and suspended matter carried by surface water is taken up by the water as it flows over the surface or percolates through the ground. Part of the material carried by streams may come from industrial or human wastes, but in Georgia this generally does not amount to much and, as a rule, has no serious effect on the quality of the water except locally at places where the natural flow of the streams is not sufficient to dilute the polluting substances. As the dissolved and suspended matter of surface waters is dependent upon the amount and kind of rainfall and upon the character of the ground on which the rain falls, the composition of the waters varies from time to time.

A report [7] published in 1942 on the industrial quality of public water supplies in Georgia includes a number of analyses of surface waters. A report [8] published in 1909 on the quality of surface waters in the United States includes a series of analyses of composites of daily samples for six rivers in Georgia.

MINERAL CONSTITUENTS IN SOLUTION

The mineral matter in natural waters is dissolved from rocks and soils. In general, most of the surface waters of Georgia come in contact with relatively insoluble silicate minerals, and therefore these waters are soft and low in mineral content. In the northwestern part of the State some of the waters come in contact with limestone and dolomite and in the southwestern part they come in contact with limestone, and consequently the surface waters in these regions are likely to be appreciably harder than most of the surface waters in other parts of the State.

The 470 analyses in this report show that the only mineral constituents exceeding 10 parts per million were silica, calcium, and bicarbonate except one result for magnesium and one for nitrate. Silica generally did not amount to more than 15 parts per million. The analyses of the composite samples, tables 12 to 21, show that the average silica content of 10 rivers ranged from 5.8 parts per million for the Satilla River near Waycross to 16 parts per million for the Oconee River at Milledgeville. The waters contained very little iron, generally less than 0.1 or 0.2 part per million. Analyses for the Ogeechee River near Eden show that the iron content ranged from 0.06 to 0.48 part per million, with an average of 0.27 part per million. Most of the analyses show that the calcium content was less than 5 parts per million. A number of the waters, however, contained more

[7] Lamar, W. L., Industrial quality of public water supplies in Georgia, 1940: U. S. Geol. Survey Water-Supply Paper 912, 1942.

[8] Dole, R. B., The quality of surface waters in the United States, part 1, Analyses of Waters East of the One-Hundredth Meridian: U. S. Geol. Survey Water-Supply Paper 236, 1909.

than this amount, the maximum reported being 36 parts per million for Mill Creek at Dalton. With only a few exceptions magnesium was less than 5 parts per million, and potassium was always less than this amount. Sodium, sulfate, and chloride were generally less than 5 parts per million. Bicarbonate is the principal acid radicle of the surface waters of Georgia. The bicarbonate content of the waters covered a considerable range; the minimum amount reported was 3.0 parts per million and the maximum, including the equivalent of any carbonate present, was 156 parts per million. The highly colored waters of the Coastal Plain—except those of the Ogeechee River, as shown by the analyses of samples collected near Eden—were among the waters containing the smallest quantities of bicarbonate. Only four of the analyses show more than 0.2 part per million of fluoride. Two of these—one for the South River near McDonough and one for the Ocmulgee River near Jackson—show fluoride of 2.0 parts and 0.7 part per million, respectively. Subsequent examinations of water from the South and Ocmulgee Rivers between Atlanta and Jackson showed variable fluoride content. The relatively larger quantities of fluoride presumably come from waste water from fertilizer plants. The acid treatment of phosphate rock in the manufacture of fertilizer sets free hydrofluoric acid, which is absorbed in water and discharged as waste into the South River and its tributaries near Atlanta. Smaller quantities of fluoride were found in the Ocumlgee River near Jackson, owing to natural dilution of the water of the South River, which flows into the Ocmulgee River. The nitrate was usually less than 1 part per million; but some of the analyses show higher amounts of nitrate and one shows 12 parts per million. Most of the streams in Georgia, even at times of maximum concentration, are not likely to carry in solution as much as 80 parts per million of dissolved solids. The principal exceptions are in the northwestern and southwestern parts of the State where, as shown by the analyses in this report, the dissolved solids amounted to as much as 131 parts per million. The dissolved solids of the soft highly colored waters in the Coastal Plain contain a large proportion of organic matter.

The minimum and maximum analyses for each of 10 rivers, as reported in tables 12 to 21, are shown graphically in figures 25 and 26. These analyses were selected on the basis of the minimum and maximum equivalents per million and, as the organic matter and silica are not included, the analyses do not necessarily represent the extremes of total dissolved solids.

588562—44——4

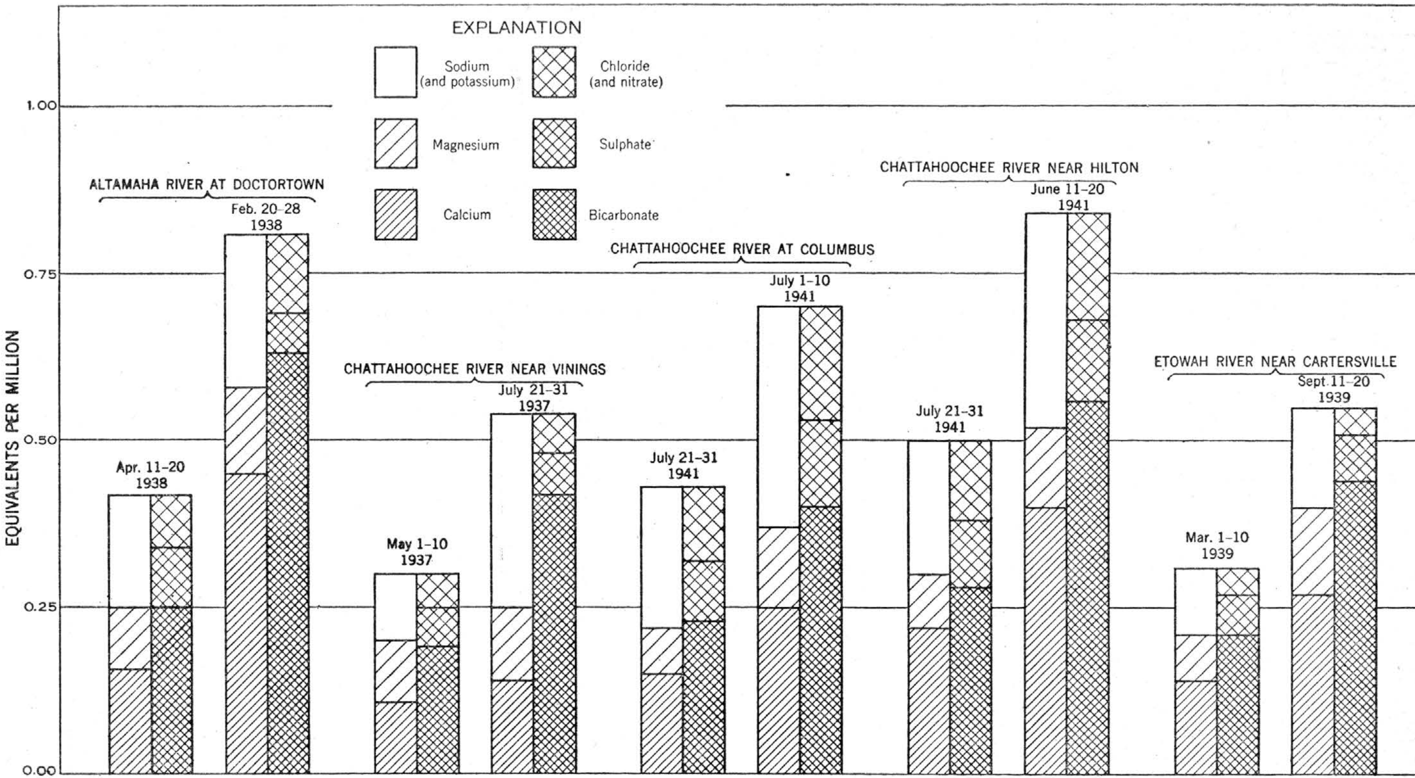

FIGURE 25.—Analyses showing minimum and maximum mineral content of waters of Altamaha, Chattahoochee, and Etowah Rivers.

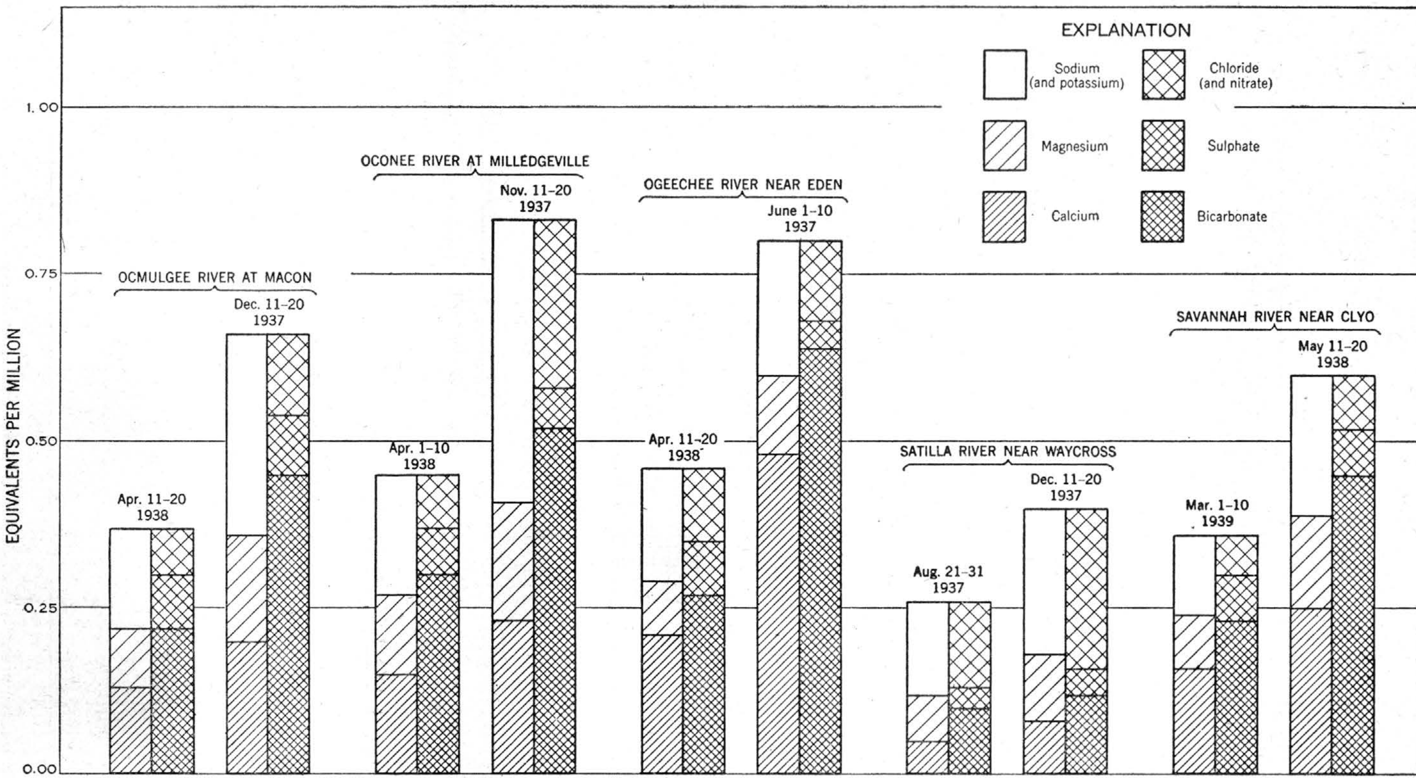

FIGURE 26.—Analyses showing minimum and maximum mineral content of waters of Ocmulgee, Oconee, Ogeechee, Satilla, and Savannah Rivers.

HARDNESS

Hardness is that characteristic which determines the usefulness and economic value of water for many purposes. Hard water is objectionable in many industries and in the home. To those who use hard water its soap-consuming capacity is apparent. The hardness of water is practically always caused by calcium and magnesium; it is commonly reported as calcium carbonate ($CaCO_3$) equivalent to the calcium and magnesium. The hardness caused by calcium and magnesium equivalent to the bicarbonate or carbonate in water is called carbonate hardness, and the hardness caused by other compounds of calcium and magnesium is called noncarbonate hardness. The waters examined contained little or no noncarbonate hardness.

Most of the surface waters in the State are very soft, the hardness generally being within the range of 8 to 25 parts per million. For some streams the hardness of the water, at times of maximum concentration, is not likely to exceed 20 parts per million; for others it is not likely to exceed 30 or 40 parts per million. Some of the highly colored waters originating in the Coastal Plain are very soft. The highly colored water of the Satilla River near Waycross did not exceed 10 parts per million in hardness during the period of investigation. The principal exceptions are in the northwestern and southwestern parts of the State, where the hardest surface waters are found. In these two areas the range in hardness is comparatively wide. The maximum hardness as shown by the analyses given in this report was 131 parts per million. The hardness of the water in the northwestern part of the State is caused by calcium and magnesium bicarbonates, whereas in the southwestern part it is mostly due to calcium bicarbonate.

Regular examinations at several points on the Chattahoochee River and on the Altamaha River system showed a small increase in hardness as these rivers flowed southward through the Coastal Plain. The available analyses indicate that the Flint River increases noticeably in hardness as it flows southward through the Coastal Plain.

COLOR

In water analyses the term "color" refers to the appearance of water that is free from suspended matter. In general, most of the streams in the Appalachian Highlands in Georgia, particularly the larger ones, appear to be yellow or reddish yellow, owing to finely suspended clay. Usually when the suspended matter is removed, these waters are nearly colorless, that is, they have a true color of less than 10. For the large streams in the Coastal Plain, which also have an appreciable part of their watershed in the Appalachian Highlands, the color of the water is largely dependent upon the proportion of the watershed in well-drained areas and in swampy areas. Many of the surface waters originating in the eastern and southern parts of the Coastal Plain are highly colored.

Natural color in water is caused almost entirely by organic matter extracted from decomposed plant and animal residues. This organic or humic matter presents some difficulties in water analysis when the color is high enough to interfere with colorimetric determinations such as those for bicarbonate, chloride, fluoride, nitrate, and pH. For some waters not too highly colored the comparisons for the determination of fluoride and pH can be made by compensating for the color of the water. For the determinations of chloride and nitrate the color may be removed with alumina cream. The residue from evaporation, dried at 180° C. and used for subsequent determinations, should be ignited sufficiently to destroy all organic matter.

Analyses of the waters containing appreciable color from humic matter did not balance well; that is, the equivalents of the bases and acids did not agree to the extent required of an accurate analysis. The error is positive, which means that the sum of the equivalents of the bases is more than the sum of the equivalents of the acids because the amount and kind of organic complex or "humic acids" in the water was not determined.

The pH of most of the highly colored waters was low. For the Satilla River near Waycross the average color was 90 and the average pH was 6.1. The lowest pH, 4.1, and the highest color, 360, were reported for a spot sample from the Suwannee River, which drains the Okefenokee Swamp.

OXYGEN CONSUMED

The results of analyses given in tables 12 to 21 under the heading "Oxygen consumed" furnish a rough indication of the oxidizable organic matter in the unfiltered and filtered samples. Oxygen consumed is a measure of the material oxidized by potassium permanganate under prescribed conditions. Oxygen consumed was not reported for the analyses of the spot samples given in table 22, as a single determination is often of little value and may be misleading.

Oxygen consumed may be roughly proportional to the intensity of the color of natural waters. Waters that are not noticeably colored may contain oxidizable material, but generally the polluting material colors the water. The naturally highly colored waters in the Coastal Plain had relatively high oxygen consumed. An analysis of a sample of water from the Suwannee River at Fargo indicated a color of 360 and an oxygen-consumed value of 58 for the filtered water. The organic content of a number of the highly colored streams in the Coastal Plain comes almost entirely from decomposed plants.

SUSPENDED MATTER

The suspended matter reported in the tables of analyses is the weight in parts per million of the suspended or insoluble material carried by the water. The suspended matter carried by streams in Georgia may vary widely for the same stream from time to time, and for streams draining areas of different topography and geology. Many of the streams draining the Appalachian Highlands and the hilly sections of the Coastal Plain carry suspended matter of finely divided clay that produces a persistent turbidity. The quantity of suspended matter may vary considerably in accordance with the nature and condition of the ground upon which the rain falls. Hilly land that is freshly plowed or denuded of trees and vegetation is subject to destructive erosion, particularly from heavy showers. A sudden heavy rain will wash into a stream much more suspended material than the same quantity of water falling as a gentle rain. There is no direct relation between suspended load and discharge although, in general, the suspended load is greater at times of high discharge than at times of low discharge.

As previously indicated, the results for suspended matter given in this report are only approximations for no systematic study was made of the suspended loads carried by any of the streams. The results for suspended matter were obtained in connection with the analysis of the dissolved mineral content and serve for purposes where accurate determination of the suspended load is not needed. For streams carrying very little suspended matter at any time the results are nearly as adequate as those obtained from a more extensive investigation.

At five sampling stations on four rivers in the Appalachian Highlands the average quantities of suspended matter carried during a year ranged from 43 parts per million (Chattahoochee River at Columbus, 1940–41) to 207 parts per million (Chattahoochee River near Vinings, 1937–38). The relatively small quantity of suspended matter in the water at Columbus was partly due to the large reservoirs above the sampling station. Studies for the year 1937–38 showed that the Altamaha River, which is formed by the confluence of the Ocmulgee and Oconee Rivers, carried at Doctortown less suspended matter in parts per million than the Ocmulgee River at Macon or the Oconee River at Milledgeville.

In the eastern and southern parts of the Coastal Plain the land is gently rolling to nearly level. Many of the streams are bordered by swamps, and in some places they appear to have no definite channel. The soil is mostly sandy and porous; in some areas there are numerous lime sinks. Streams originating in the Coastal Plain have a gradual runoff, and they generally carry very little suspended matter. The suspended matter carried by the Satilla River near Waycross during the year ending September 30, 1938, ranged from 4 to 35 parts per million, with an average of 10 parts per million. The suspended matter carried by the Ogeechee River near Eden during the same period ranged from 3 to 14 parts per million, with an average of 7 parts per million. However, the Ogeechee River near Eden, as the result of heavy rains in the upper part of the watershed, may carry considerably higher maximum quantities of suspended matter than is indicated by the data obtained during the period of investigation.

ALTAMAHA RIVER

The Altamaha River system [9] is the largest one lying wholly within the State. It is formed by the junction of the Ocmulgee and Oconee Rivers at a point on the southeast boundary of Wheeler County. The headwaters rise on the south slope of the Chattahoochee Ridge. The waters of this river, which flow in a southeasterly direction, drain a large part of the Piedmont province and the Coastal Plain and empty into the Atlantic Ocean near the town of Darien. The Altamaha River proper is wholly within the Coastal Plain and flows through a wide flood plain that is swampy in many places. The Altamaha from the junction of the Ocmulgee and Oconee to its mouth is about 137 miles in length. It is tidal to a point about 33 miles above its mouth. The drainage area of the entire system is 14,400 square miles. For the 10-year period ending September 30, 1941, the average discharge at Doctortown (drainage area, 13,600 square miles) was 11,650 second-feet.

The Altamaha Basin is made up of igneous and metamorphic rocks, clays, and sands in the Piedmont province and sedimentary rocks, clays, and sands in the Coastal Plain.

Analyses were made of composites of daily samples from the Altamaha River at Doctortown for the year ending April 30, 1938. The analyses (pp. 352–353) show that the river water is soft and low in mineral content at all times. Bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceeded 10 parts per million during the investigation. The concentration of suspended matter was low; sometimes it was considerably less than the total dissolved solids, sometimes considerably more. Much of the stream flow of the Altamaha River comes from the well-drained land in the Piedmont province and the Coastal Plain, although some is derived from low and swampy areas in the Coastal Plain, where the water is often highly colored.

[9] Altamaha, Oconee, and Ocmulgee Rivers, Ga., Report from the Chief of Engineers: 74th Cong., 1st sess., H. Doc. 68, 1935.

CHATTAHOOCHEE RIVER

The Chattahoochee River [10] rises in the Blue Ridge, in the northeastern part of the State, flows in a southwesterly direction to the vicinity of the town of West Point, and thence in a southerly direction until it joins the Flint River to form the Apalachicola River, which empties into the Gulf of Mexico. The Chattahoochee River from the southwest corner of Troup County to its mouth forms the western boundary of Georgia. The river crosses the Fall Line at Columbus. Above the Fall Line the river has considerable slope and is an excellent source of water power. The largest falls are located in a 30-mile stretch of the river from just below West Point to Columbus, and a large amount of water power has been developed in this section. In the Coastal Plain the river is generally deeply entrenched and has little or no swamp land bordering its course. The drainage basin ranges in elevation from about 4,000 feet above sea level in the mountains to less than 100 feet where the Chattahoochee unites with the Flint River. The elevation of the water surface at Columbus near the Fall Line is about 200 feet above sea level.

The Chattahoochee from its source to the confluence with the Flint has a length of about 430 miles. The drainage area is about 8,750 square miles. For the 13-year period ending September 30, 1941, the average discharge at Columbia, Ala. (drainage area, 8,040 square miles), was 10,400 second-feet.

Above the Fall Line the formations of the area drained consist of crystalline rocks, clays, and sands; below the Fall Line they consist chiefly of sands and clays with some outcrops of marl and limestone.

Analyses were made of composites of daily samples from the Chattahoochee River as follows: Near Vinings for the year ending April 30, 1938; at Columbus for the year ending September 30, 1941; and near Hilton [11] for the year ending September 30, 1941. The analyses (pp. 354–359) show that the river water is soft and low in mineral content at all times. Bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceeded 10 parts per million. From Vinings to Hilton the water increased slightly in mineral content and hardness. The suspended matter in samples from all three stations ranged from 6 to 746 parts per million.

[10] Apalachicola, Chattahoochee, and Flint Rivers, Ga. and Fla., Report from the Chief of Engineers; 76th Cong., 1st sess., H. Doc. 342, 1939.

[11] The discharge measurement station for the Chattahoochee River at this point is designated as at Columbia, Ala.

ETOWAH RIVER

The headwaters of the Etowah River[12] are in Lumpkin County, on the southern slope of the Blue Ridge. For a short distance the river flows in a southerly direction; then it meanders in a westerly direction to its confluence with the Oostanaula River at Rome to form the Coosa River. The Etowah River flows through mountainous, hilly, and broken country. The watershed is in parts of three provinces—the Blue Ridge, the Piedmont, and the Valley and Ridge. The river has considerable slope. The highest elevations in the drainage basin are more than 3,000 feet in the mountains (Springer Mountain, elevation 3,787 feet, and Hightower, elevation 3,586 feet), and in most of the drainage basin the higher elevations are more than 1,000 feet above sea level. However, much of the river channel is deeply entrenched, and the water surface at Rome is about 570 feet above sea level. The drainage area of the Etowah River is 1,810 square miles. The average discharge at Rome was 1,654 second-feet for the 2-year period ending September 30, 1941.

Analyses were made of composites of daily samples from the Etowah River near Cartersville for the year ending September 30, 1939. The analyses (pp. 360–361) show that bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceeded 10 parts per million during the period of investigation. Above Cartersville the water is soft and low in mineral content; below Cartersville it increases in hardness from the solution of limestone and dolomite in this part of the area. Mining operations above the sampling station near Cartersville increased at times the quantity of suspended matter in the water.

OCMULGEE RIVER

The Ocmulgee River[13] is formed by the junction of the South and Yellow Rivers at Lloyd Shoals Reservoir near the south corner of Newton County. The Alcovy River also enters this reservoir. The Ocmulgee River crosses the Fall Line at Macon. Above the Fall Line the river and its tributaries flow through very hilly country and have considerable slope. The elevations at the headwaters reach a maximum of more than 1,000 feet above sea level. The drainage area of the Ocmulgee River is 6,085 square miles. The river proper is about 255 miles in length. For the 6-year period ending September 30, 1942, the average discharge at Lumber City (drainage area, 5,180 square miles) was 4,837 second-feet.

Above the Fall Line at Macon the formations drained are in the Piedmont and are made up of crystalline rocks, clays, and sands that are composed largely of relatively insoluble silicate minerals.

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[12] Alabama-Coosa branch of Mobile River system, Report from the Chief of Engineers: 74th Cong., 1st sess., H. Doc. 66, 1935.

[13] Altamaha, Oconee, and Ocmulgee Rivers, Ga., Report from the Chief of Engineers: 74th Cong., 1st sess., H. Doc. 68, 1935.

Analyses were made of composites of daily samples from the Ocmulgee River at Macon for the year ending April 30, 1938. The analyses (pp. 362–363) show that the river water is soft and low in mineral content at all times. Bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceeded 10 parts per million during the investigation. The results show that the suspended matter varied considerably, the extremes being 10 and 432 parts per million.

OCONEE RIVER

The headwater streams of the Oconee River [14] rise near Gainesville, on the southern slope of the Chattahoochee Ridge. The Oconee River crosses the Fall Line in the vicinity of Milledgeville. Above the Fall Line the river and its tributaries flow through very hilly country and have considerable slope. The elevations at the headwaters reach a maximum of more than 1,000 feet above sea level. The drainage area of the Oconee River is 5,318 square miles. The river is more than 270 miles in length. For the 4-year period ending September 30, 1942, the average discharge near Mount Vernon (drainage area, 5,110 square miles) was 4,650 second-feet.

Above the Fall Line the formations drained are in the Piedmont and consist of crystalline rocks, clays, and sands that are composed largely of relatively insoluble silicate minerals.

Analyses were made of composites of daily samples from the Oconee River at Milledgeville for the year ending April 30, 1938. The analyses (pp. 364–365) show that the river water is soft and low in mineral content at all times. Bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceeded 10 parts per million during the period of investigation. The results show that the suspended matter varied widely, the extremes being 14 and 409 parts per million.

OGEECHEE RIVER

The Ogeechee River [15] rises in Greene County, in the northeastern part of the State, flows in a southeasterly direction, and empties into the Atlantic Ocean. The river basin is wholly within the State and lies between the Savannah and Altamaha River Basins. All but the headwaters of the Ogeechee River are in the Coastal Plain. The terrain is hilly at the headwaters, merges into gently rolling country, and becomes flat near the seacoast. The elevation ranges from about 650 feet above sea level at the headwaters to sea level. From the vicinity of the town of Millen the flood plain through which the Ogeechee River flows is largely a continuous swamp, and for the last 10 miles is a tidal marsh. The river is about 245 miles in length and is tidal to about 44 miles above its mouth. The drainage area of the basin is 4,180

[14] Op. cit. (74th Cong., 1st sess., H. Doc. 68).
[15] Ogeechee River, Ga., Report from the Chief of Engineers: 74th Cong., 1st sess., H. Doc. 271, 1935.

square miles. For the 5-year period ending September 30, 1942, the average discharge near Eden (drainage area, 2,650 square miles) was 1,906 second-feet.

Analyses were made of composites of daily samples from the Ogeechee River near Eden for the year ending April 30, 1938. The sampling station was above the mouth of the Canoochee River, which is the principal tributary. These analyses (pp. 366–367) show that the river water was soft and low in mineral content, but it was the hardest of the highly colored waters. Bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceed 10 parts per million during the investigation. As certain parts of the drainage basin below Millen are swampy, the color of the water increases with the drainage from these parts. The sum of the mineral constituents frequently does not agree well with the determined total dissolved solids because of the presence of noticeable quantities of organic matter. The river near Eden carried very little suspended matter during the investigation. There are some changes in the characteristics of the Ogeechee River water from the upper to the lower parts of the river.

Examination of samples of water collected on December 12, 1937, at the Atlantic Coast Line Railroad bridge (river mile 30.7) near Richmond Hill when the stream flow was considerably less than average indicated some salt-water intrusion at this point.

SATILLA RIVER

The Satilla River [16] rises in Ben Hill County near the city of Fitzgerald, meanders generally south of east through the Coastal Plain, and empties into the Atlantic Ocean through St. Andrew Sound. The topography of the drainage basin ranges from gently rolling to nearly level land. The lower areas in much of the basin are poorly drained and swampy. As the banks of the Satilla River and its tributaries are low, the water spreads out in many places to form dense swamps, and through the last 30 miles of its course the river is bordered by a tidal marsh. The Satilla River is about 256 miles in length, and it is tidal to about 67 miles above its mouth. The drainage area of the basin is about 3,530 square miles. For the 10-year period ending September 30, 1941, the average discharge at Atkinson (drainage area, 2,880 square miles) was 1,534 second-feet.

The surface cover in the Satilla River basin is sandy with varying amounts of humus in the swampy places.

Analyses were made of composites of daily samples from the Satilla River near Waycross for the year ending April 30, 1938. These analyses (pp. 368–369) and the analysis of a single sample of water collected

[16] Satilla River, Ga., Report from the Chief of Engineers: 71st Cong., 2d sess., H. Doc. 52, 1930.

at Atkinson show that the river water is very soft and low in mineral content at all times. None of the mineral constituents exceeded 10 parts per million during the investigation. Of the 10 rivers (analyses on pp. 352–371) examined for a period of a year the Satilla River had the highest chloride content. The determined total dissolved solids was considerably higher than the sum of the mineral constituents because of the presence of quantities of organic matter, which frequently amounted to more than the total mineral matter. The water was highly colored. The amber-colored water appeared almost black when viewed in the stream. The river carried very little suspended matter.

SAVANNAH RIVER

The headwater streams of the Savannah River [17] rise in the Blue Ridge in North Carolina. The Savannah is formed by the confluence of the Tugaloo and Seneca Rivers at a point on the northeast boundary of Hart County above the town of Hartwell. It flows in a southeasterly direction and empties into the Atlantic Ocean 17 miles below the city of Savannah. The river forms most of the boundary between Georgia and South Carolina. It is about 314 miles in length and is tidal for about 50 miles above its mouth. The entrance and lower 22 miles of the river have been improved to form the Savannah Harbor for deep-draft ocean-going vessels. The Savannah River, with its tributaries, drains parts of the Blue Ridge and Piedmont provinces and a part of the Coastal Plain, which it enters at the Fall Line, at the city of Augusta. Above the Fall Line the river and its tributaries have considerable slope and are a good source of water power. The elevations in the drainage basin in Georgia range from about 4,000 feet in the mountains (Chestnut Mountain, elevation 4,600 feet) to sea level at the mouth. The elevation of the water surface near the Fall Line, at the city of Augusta, is about 100 feet above sea level. Below Augusta the river is generally bordered by swamps, although bluffs rise along parts of the river. The drainage area of the Savannah River Basin is 10,580 square miles. For the 5-year period ending September 30, 1942, the average discharge near Clyo (drainage area, 9,850 square miles) was 10,120 second-feet.

The river drains a region of igneous and metamorphic rocks, clays, and sands in the Appalachian Highlands and of sedimentary rocks, clays, and sands in the Coastal Plain.

Analyses were made of composites of daily samples from the Savannah River near Clyo for the year ending April 30, 1939. The analyses (pp. 370–371) show that the river water is soft and low in mineral content at all times. Bicarbonate (HCO_3) and silica (SiO_2) were the only mineral constituents that exceeded 10 parts per million during the

[17] Savannah River, Ga., S. C., and N. C., Report from the Chief of Engineers: 74 Cong., 1st sess., H. Doc. 64, 1935.

investigation. The quantity of suspended matter carried by the river varies considerably. The silting of Savannah Harbor is due in part to the precipitation of the suspended matter by the action of the incoming salt water.

A study [18] of the salinity of the lower Savannah River was made by the Geological Survey for the year ending November 30, 1938, and also for the period from July 21 to September 30, 1939. The river up to and including the vicinity of Savannah is subject to salt-water intrusion. Changes in stream flow and in tidal intensity, as well as other forces, more or less minor or intermittent, cause variations in salinity from day to day. During the greater part of the period of investigation the most advanced position of noticeable salinity, conductivity ($K \times 10^5$ at 25° C.) 20 or chloride 42 parts per million advanced and retreated from time to time in the stretch of the river from just above the Atlantic Coastal Highway bridge to just below the Seaboard Railway bridge. Occasionally the limit of salt-water intrusion (noticeable salinity) retreated to about Bull Street, Savannah, and during floods it retreated farther down the river. The retreat during a flood depends upon the size and duration of the flood. A river discharge of about 4,500 second-feet at Clyo prevented, at high tide, the advance of noticeable salinity (conductivity 20) above the vicinity of the Atlantic Coastal Highway Bridge. Owing to changes in tidal intensity and other forces from day to day the position of noticeable salinity as determined for a given discharge is not stationary. There is some advance and retreat from day to day, but for a given discharge the most advanced position of noticeable salinity is in the vicinity of the determined average position.

ANALYSES

The analyses are reported in parts per million; and for calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, fluoride, and nitrate the equivalents per million are also given. The discharge of the streams is reported in second-feet (see "Stream flow," p. 324). The temperature of the water is expressed in degrees Fahrenheit.

Detailed analyses of composite samples, arranged alphabetically by the names of the streams, are given in tables 12 to 21, which include data for a period of a year for the Altamaha River, Chattahoochee River, Etowah River, Ocmulgee River, Oconee River, Ogeechee River, Satilla River, and Savannah River. The sampling points for these streams are given below.

Altamaha River at Doctortown: Sampling station at Atlantic Coast Line Railroad bridge at Doctortown, about 4½ miles northeast of Jesup. Samples collected near south shore at the discharge measurement station.

[18] Lamar, W. L., Salinity of the lower Savannah River in relation to stream flow and tidal action: Am. Geophys. Union Trans. of 1940, pp. 463–470.

Chattahoochee River near Vinings: Sampling station at Pace Ferry Bridge, 1 mile southeast of Vinings, 1 mile downstream from Rotten Wood Creek, 2½ miles upstream from Peachtree Creek, and 8 miles northwest of Atlanta. Samples collected from bridge at the discharge measurement station.

Chattahoochee River at Columbus: Sampling station at filtration plant of Columbus Water Works, just north of Columbus, 1½ miles upstream from North Highlands Dam, 8 miles downstream from Goat Rock Dam, and 13½ miles downstream from Bartletts Ferry Dam. Samples collected at waterworks intake 4 miles upstream from the discharge measurement station at lower Central of Georgia Railway bridge in Columbus.

Chattahoochee River near Hilton: Sampling station at bridge on Georgia State Highway 62, a quarter of a mile downstream from Central of Georgia Railway bridge, half a mile above mouth of Omussee Creek, and half a mile east of Columbia, Ala. Samples collected from highway bridge at the discharge measurement station referred to in reports on surface water supply of the United States as Chattahoochee River at Columbia, Ala.

Etowah River near Cartersville: Sampling station at bridge on United States Highway 41, half a mile downstream from Nashville, Chattanooga and St. Louis Railway bridge, 2 miles southeast of Cartersville, and 3¾ miles downstream from Allatoona Creek. Samples collected from highway bridge 2½ miles downstream from the discharge measurement station.

Ocmulgee River at Macon: Sampling station at filtration plant of Macon Water Works. Samples collected at waterworks intake 3 miles upstream from the discharge measurement station at Fifth Street Bridge in Macon.

Oconee River at Milledgeville: Sampling station at bridge on State Highway 24 at Milledgeville, 0.4 mile upstream from Fishing Creek, and 2 miles downstream from Georgia Railroad bridge. Samples collected from highway bridge at the discharge measurement station.

Ogeechee River near Eden: Sampling station at bridge on United States Highways 25, 80, and 280, 2 miles west of Eden, 2 miles upstream from Seaboard Railway bridge, and 3 miles upstream from Black Creek. Samples collected from the highway bridge at the discharge measurement station.

Satilla River near Waycross: Sampling station at Atlantic Coast Line Railroad bridge, 200 feet downstream from bridge on State Highway 38, and 3 miles northeast of Waycross. Samples collected from railroad bridge at the discharge measurement station.

Savannah River near Clyo: Sampling station at Seaboard Railway bridge, 3 miles north of Clyo. Samples collected from bridge at the discharge measurement station.

These detailed analyses show the chemical character of the water throughout the year. The arithmetical average represents the composition of the water as it would be obtained by analyzing a composite sample made from equal portions of daily samples for a period of a year. The weighted average represents the composition of the water as it would be obtained by analyzing a composite sample made from daily aliquots, the size of which is in proportion to the discharge. The weighted average analysis would represent the composition of the mixed water in a reservoir holding the total flow of the river for a year.

Table 22 gives 100 analyses, which include 90 single analyses and 10 average analyses for the streams represented in tables 12 to 21. The variations in composition of surface waters from time to time should be considered in applying data from a single analysis. Many of the surface waters of Georgia, however, are soft and low in mineral content at all times.

TABLES OF ANALYSES

TABLE 12.—*Analyses of water from the Altamaha River at Doctortown, Ga., 1937–38*

[Analyses by William L. Lamar and Arthur T. Ness. Drainage area, 13,600 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed: Unfiltered	Oxygen consumed: Filtered	Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
May 1-10, 1937	25,180	67	72	6.0	4.8	25	8.6	0.05	4.7	1.2	2.9	1.1	21	2.3	2.0	0.2	0.20	44	17
May 11-20	36,790	70	82	5.0	3.4	28	9.1	.08	4.8	1.2	3.0	1.1	21	2.5	1.8	.2	.40	45	17
May 21-31	12,870	77	53	4.0	2.1	30	11	.10	6.8	1.7	4.8	1.0	32	2.7	2.5	.0	.71	54	24
June 1-10	8,396	82	77	4.2	1.4	10	13	.04	8.0	1.7	4.6	1.0	36	3.5	2.8	.0	.76	57	27
June 11-20	7,851	83	51	2.5	1.1	14	12	.06	7.8	1.6	3.7	.9	35	2.8	2.8	.0	.80	56	26
June 21-30	7,884	82	108	4.3	3.3	18	12	.04	7.5	1.8	4.2	1.0	32	4.0	2.8	.0	.64	56	26
July 1-10	7,224	82	112	5.0	3.8	24	11	.07	7.7	1.4	4.1	1.1	32	3.3	2.8	.0	.52	54	25
July 11-20	7,923	83	81	5.0	3.5	26	13	.04	6.4	1.4	3.4	1.2	27	3.8	2.8	.0	.73	52	22
July 21-31	6,798	84	68	6.6	4.2	26	12	.07	7.7	1.4	3.3	1.1	32	3.0	2.8	.0	.44	56	25
Aug. 1-10	8,052	83	68	6.4	5.1	30	14	.07	6.5	1.4	4.8	1.1	32	2.6	2.6	.0	.40	58	22
Aug. 11-20	8,084	83	82	7.0	5.9	30	11	.06	6.6	1.5	3.6	1.0	26	3.1	2.9	.0	.40	53	23
Aug. 21-31	7,665	83	118	6.8	5.2	25	11	.10	7.0	1.4	3.9	1.1	28	3.4	2.9	.0	.51	54	23
Sept. 1-10	9,984	81	120	11	5.7	28	12	.08	5.6	1.4	3.9	1.3	23	3.5	2.9	.0	.40	50	20
Sept. 11-20	7,771	78	73	9.4	5.2	26	12	.11	6.6	1.5	4.0	1.4	25	4.0	3.2	.0	.40	53	23
Sept. 21-30	5,089	74	48	6.2	4.4	28	13	.14	9.0	1.9	3.7	1.4	36	3.3	3.5	.1	.48	58	30
Oct. 1-10	4,595	77	36	5.6	4.2	24	12	.06	9.6	1.6	4.0	1.2	37	2.8	3.6	.0	.56	59	31
Oct. 11-20	4,379	70	42	3.5	2.8	15	13	.06	8.6	1.5	4.7	.8	38	3.3	3.2	.0	.48	56	28
Oct. 21-31	7,225	62	119	5.8	3.4	22	11	.05	6.8	1.5	3.6	.9	30	3.7	3.1	.0	.45	49	23
Nov. 1-10	8,747	62	56	5.4	3.6	16	11	.10	5.6	1.4	3.5	1.7	23	3.9	3.1	.0	.28	45	20
Nov. 11-20	6,102	57	44	3.8	2.6	18	13	.12	8.0	1.6	3.9	1.5	35	3.4	3.8	.0	.26	56	27
Nov. 21-30	6,572	53	34	4.0	3.0	20	14	.20	7.4	1.6	4.1	1.5	32	3.5	3.8	.0	.20	57	25
Dec. 1-10	6,136	52	32	2.6	1.6	14	14	.13	8.0	1.7	4.4	1.5	36	3.0	3.5	.0	.32	56	27
Dec. 11-20	5,908	54	22	2.0	1.4	14	15	.12	8.2	1.8	4.9	1.4	36	2.8	3.8	.0	.28	59	28
Dec. 21-31	6,949	53	38	3.4	2.6	14	14	.14	7.6	1.7	4.3	1.5	34	2.8	4.1	.0	.36	57	26
Jan. 1-10, 1938	8,112	52	44	4.2	2.8	14	13	.12	6.8	1.9	4.2	1.4	28	3.6	4.0	.0	.28	53	25
Jan. 11-20	8,113	50	36	3.4	2.2	12	13	.12	7.0	1.7	4.3	1.3	30	3.3	3.9	.0	.40	53	24
Jan. 21-31	6,914	51	33	3.4	1.8	12	14	.27	8.0	1.5	5.2	.5	35	2.7	4.0	.0	.48	56	26
Feb. 1-10	6,232	54	31	2.8	2.0	10	13	.09	8.2	1.6	4.4	1.2	35	3.2	3.8	.0	.32	56	27
Feb. 11-19	5,680	61	28	3.2	2.6	8	14	.03	8.8	1.7	4.4	1.4	38	3.0	3.9	.0	.48	60	29
Feb. 20-28	5,440	56	27	3.6	2.6	8	12	.02	9.1	1.6	4.5	1.2	38	3.0	3.9	.0	.50	59	29
Mar. 1-10	5,644	58	28	4.6	2.2	12	13	.12	8.7	1.7	4.6	1.2	38	3.1	3.9	.0	.50	58	29
Mar. 11-20	5,621	63	27	4.4	1.8	10	14	.11	8.7	1.8	4.9	1.2	38	2.5	3.5	.0	.64	60	29
Mar. 21-31	8,908	68	103	6.2	2.8	12	13	.12	6.7	1.6	4.4	1.3	29	3.5	3.5	.0	.62	55	23
Apr. 1-10	8,685	66	76	5.6	3.0	14	14	.13	6.8	1.7	4.3	1.6	33	3.7	3.1	.0	.72	56	24
Apr. 11-20	43,570	66	55	17	7.6	28	8.7	.25	3.2	1.1	3.0	1.8	15	4.4	2.5	.0	.33	44	13
Apr. 21-30	35,240	68	34	12	6.8	30	11	.09	4.7	1.3	3.2	1.4	21	3.8	2.8	.0	.25	47	17
Average	-------	-------	60	5.4	3.4	19	12	.10	7.2	1.6	4.1	1.2	31	3.2	3.2	.0	.46	54	25
Weighted average	10,330	-------	62	7.1	4.1	22	11	.11	6.2	1.4	3.8	1.3	27	3.3	2.9	.0	.42	51	21

Equivalents per million

May 1-10, 1937	25, 180								0. 235	0. 099	0. 126	0. 028	0. 344	0. 048	0. 056	0. 010	0. 003		
May 11-20	36, 790								. 240	. 099	. 130	. 028	. 344	. 052	. 051	. 010	. 006		
May 21-31	12, 870								. 339	. 140	. 209	. 026	. 524	. 056	. 070	. 000	. 011		
June 1-10	8, 396								. 399	. 140	. 200	. 026	. 590	. 073	. 079	. 000	. 012		
June 11-20	7, 851								. 389	. 132	. 161	. 023	. 574	. 058	. 079	. 000	. 013		
June 21-30	7, 884								. 374	. 148	. 183	. 026	. 524	. 083	. 079	. 000	. 010		
July 1-10	7, 224								. 384	. 115	. 178	. 028	. 524	. 069	. 079	. 000	. 008		
July 11-20	7, 923								. 319	. 115	. 148	. 031	. 443	. 079	. 079	. 000	. 012		
July 21-31	6, 798								. 384	. 115	. 144	. 028	. 524	. 062	. 079	. 000	. 007		
Aug. 1-10	8, 052								. 324	. 115	. 209	. 028	. 524	. 054	. 073	. 000	. 006		
Aug. 11-20	8, 084								. 329	. 123	. 156	. 026	. 426	. 064	. 082	. 000	. 006		
Aug. 21-31	7, 665								. 349	. 115	. 170	. 028	. 459	. 071	. 082	. 000	. 008		
Sept. 1-10	9, 984								. 280	. 115	. 170	. 033	. 377	. 073	. 082	. 000	. 006		
Sept. 11-20	7, 771								. 329	. 123	. 174	. 036	. 410	. 083	. 090	. 000	. 006		
Sept. 21-30	5, 089								. 449	. 156	. 161	. 036	. 590	. 069	. 099	. 005	. 008		
Oct. 1-10	4, 595								. 479	. 132	. 174	. 031	. 606	. 058	. 102	. 000	. 009		
Oct. 11-20	4, 379								. 429	. 123	. 204	. 020	. 623	. 069	. 090	. 000	. 008		
Oct. 21-31	7, 225								. 339	. 123	. 156	. 023	. 492	. 077	. 087	. 000	. 007		
Nov. 1-10	8, 747								. 280	. 115	. 152	. 044	. 377	. 081	. 087	. 000	. 004		
Nov. 11-20	6, 102								. 399	. 132	. 170	. 038	. 574	. 071	. 107	. 000	. 004		
Nov. 21-30	6, 572								. 369	. 132	. 178	. 038	. 524	. 073	. 107	. 000	. 003		
Dec. 1-10	6, 136								. 399	. 140	. 191	. 038	. 590	. 062	. 099	. 000	. 005		
Dec. 11-20	5, 908								. 409	. 148	. 213	. 036	. 590	. 058	. 107	. 000	. 004		
Dec. 21-31	6, 949								. 379	. 140	. 187	. 038	. 557	. 058	. 116	. 000	. 006		
Jan. 1-10, 1938	8, 112								. 339	. 156	. 183	. 036	. 459	. 075	. 113	. 000	. 004		
Jan. 11-20	8, 113								. 349	. 140	. 187	. 033	. 492	. 069	. 110	. 000	. 006		
Jan. 21-31	6, 914								. 399	. 123	. 226	. 013	. 574	. 056	. 113	. 000	. 008		
Feb. 1-10	6, 232								. 409	. 132	. 191	. 031	. 574	. 067	. 107	. 000	. 005		
Feb. 11-19	5, 680								. 439	. 140	. 191	. 036	. 623	. 062	. 110	. 000	. 008		
Feb. 20-28	5, 440								. 454	. 132	. 196	. 031	. 623	. 062	. 110	. 000	. 008		
Mar. 1-10	5, 644								. 434	. 140	. 200	. 031	. 623	. 064	. 110	. 000	. 008		
Mar. 11-20	5, 621								. 434	. 148	. 213	. 031	. 623	. 052	. 099	. 000	. 010		
Mar. 21-31	8, 908								. 334	. 132	. 191	. 033	. 475	. 073	. 099	. 000	. 010		
Apr. 1-10	8, 685								. 339	. 140	. 187	. 041	. 541	. 077	. 087	. 000	. 012		
Apr. 11-20	43, 570								. 160	. 090	. 130	. 046	. 246	. 092	. 070	. 000	. 005		
Apr. 21-30	35, 240								. 235	. 107	. 139	. 036	. 344	. 079	. 079	. 000	. 004		
Average									. 359	. 132	. 178	. 031	. 508	. 067	. 090	. 000	. 007		
Weighted average	10, 330								. 310	. 115	. 165	. 033	. 443	. 069	. 082	. 000	. 007		

Maximum total dissolved solids 60, Feb. 11–19, Mar. 11–20, 1938; minimum total dissolved solids 44, May 1–10, 1937, Apr. 11–20, 1938.
Maximum total hardness 31, Oct. 1–10, 1937; minimum total hardness 13, Apr. 11–20, 1938.

TABLE 13.—*Analyses of water from the Chattahoochee River near Vinings, Ga., 1937–38*

[Analyses by William L. Lamar and Arthur T. Ness. Drainage area, 1,450 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
May 1–10, 1937	4,671	63	298	5.3	1.0	8	8.1	0.02	2.2	1.1	2.3	0.5	11	3.0	1.5	0.0	0.46	29	10
May 11–20	2,691	69	48	2.5	2.8	8	10	.04	2.5	1.1	3.0	.7	13	2.5	1.8	.0	.20	31	11
May 21–31	2,298	74	51	------	.2	8	10	.03	2.3	1.3	3.3	1.0	14	3.8	2.0	.0	.32	32	11
June 1–10	2,070	------	86	4.0	.7	10	11	.05	2.4	1.1	3.5	.8	14	3.5	1.6	.0	.48	34	11
June 11–20	2,039	80	122	1.6	.2	7	11	.02	2.4	1.4	3.0	1.2	16	2.8	1.5	.0	.42	33	12
June 21–30	1,870	82	446	5.2	.8	18	12	.03	2.1	1.2	3.9	1.2	16	3.2	1.8	.0	.82	36	10
July 1–10	1,952	80	632	10	2.4	12	10	.02	2.4	.9	3.3	.9	13	4.9	1.8	.0	.63	33	9.7
July 11–20	1,369	87	70	3.4	1.4	14	13	.05	2.7	1.2	4.1	1.2	17	2.8	2.2	.0	.56	37	12
July 21–31	1,393	84	181	3.2	2.0	28	25	.05	2.8	1.4	6.2	1.1	25	3.0	2.2	.0	.12	60	13
Aug. 1–10	1,567	81	637	7.4	1.6	8	10	.02	2.2	.9	3.5	1.5	13	2.8	2.0	.0	.66	31	9.2
Aug. 11–20	1,516	84	537	6.7	1.2	12	15	.02	2.4	1.2	4.4	1.0	18	2.8	2.0	.0	.43	40	11
Aug. 21–31	2,676	80	688	13	1.4	6	8.7	.02	2.2	.8	3.1	1.2	13	2.9	1.6	.0	.64	28	8.8
Sept. 1–10	2,299	81	436	6.8	2.8	6	6.7	.03	2.3	.9	3.5	1.6	14	1.8	1.8	.0	.63	30	9.4
Sept. 11–20	1,193	77	72	2.2	1.2	8	17	.05	2.7	1.1	4.8	1.2	19	2.4	2.2	.0	.32	41	11
Sept. 21–30	943	71	23	1.8	1.5	10	11	.07	2.5	1.6	3.3	1.4	20	2.6	2.2	.0	.38	34	13
Oct. 1–10	1,819	71	141	3.8	1.4	10	9.8	.05	2.4	1.1	3.1	1.3	17	2.4	1.9	.0	.25	31	11
Oct. 11–20	2,827	64	430	7.6	1.2	6	10	.01	2.4	1.1	3.7	1.0	16	2.6	2.0	.0	.28	32	11
Oct. 21–31	3,286	57	244	6.0	1.4	8	8.0	.01	2.2	1.0	2.9	1.6	13	3.0	2.0	.0	.33	27	9.6
Nov. 1–10	1,643	55	22	1.8	.9	6	10	.02	2.4	1.4	2.9	1.3	18	2.3	1.9	.0	.08	30	12
Nov. 11–20	1,472	51	19	1.6	1.2	6	10	.06	2.8	1.4	3.3	1.5	18	2.6	2.0	.0	.12	32	13
Nov. 21–30	1,539	45	13	1.4	1.0	8	10	.05	2.6	1.3	3.1	1.2	17	2.4	2.0	.0	.10	32	12
Dec. 1–10	1,484	42	12	3.2	1.6	6	13	.04	2.8	1.2	4.2	1.0	20	2.3	2.0	.0	.18	36	12
Dec. 11–10	1,409	45	14	4.0	1.8	8	15	.07	2.8	1.4	3.8	1.0	20	2.8	2.0	.0	.14	39	13
Dec. 21–31	1,862	48	38	2.2	1.0	8	11	.09	2.4	1.0	2.9	1.4	15	2.7	1.9	.0	.26	31	10
Jan. 1–10, 1938	1,902	45	26	1.8	1.0	8	10	.05	2.6	1.2	2.5	1.2	16	2.1	1.9	.0	.22	29	11
Jan. 11–20	1,588	45	15	1.2	.6	6	9.9	.10	3.0	1.3	2.9	1.1	16	2.1	2.0	.0	.25	30	13
Jan. 21–31	1,574	46	24	2.0	.8	6	11	.06	2.6	1.2	3.6	.6	18	2.1	2.2	.0	.25	32	11
Feb. 1–10	1,477	52	16	2.0	.6	8	10	.06	2.4	1.0	3.3	1.0	16	2.1	2.0	.0	.28	30	10
Feb. 11–19	1,319	57	15	2.4	.6	8	11	.06	2.6	1.2	3.7	1.1	18	2.2	2.0	.0	.22	32	11
Feb. 20–28	1,712	49	75	3.2	2.0	8	10	.08	2.6	1.1	3.1	1.4	16	2.5	2.0	.0	.32	32	11
Mar. 1–10	1,769	54	107	6.4	1.8	6	9.9	.04	2.3	1.2	3.0	1.0	16	2.4	1.9	.0	.37	32	11
Mar. 11–20	4,743	57	682	15	1.2	6	8.1	.03	2.0	.9	2.7	1.0	12	3.0	1.6	.0	.96	28	8.7
Mar. 21–31	2,995	63	218	5.4	1.0	8	10	.03	2.4	1.0	3.0	1.0	15	3.0	1.8	.0	.74	32	10
Apr. 1–10	6,838	58	746	14	1.2	6	7.5	.03	2.0	.9	2.3	1.3	12	2.8	1.4	.0	.94	26	8.7
Apr. 11–20	3,211	64	118	7.0	2.0	8	12	.06	2.1	1.2	2.5	1.2	14	2.6	1.4	.0	.56	31	10
Apr. 21–30	2,693	68	149	6.4	2.2	6	12	.04	2.2	1.0	2.7	1.1	14	2.5	2.0	.0	.50	31	9.6
Average	------	------	207	4.9	1.3	9	11	.04	2.4	1.1	3.3	1.1	16	2.7	1.9	.0	.40	33	11
Weighted average	2,220	------	275	6.2	1.3	8	10	.04	2.4	1.1	3.1	1.1	15	2.8	1.8	.0	.47	32	11

Equivalents per million

May 1-10, 1937	4,671								0.110	0.090	0.100	0.013	0.180	0.062	0.042	0.000	0.007		
May 11-20	2,691								.125	.090	.130	.018	.213	.052	.051	.000	.003		
May 21-31	2,298								.115	.107	.144	.026	.230	.079	.056	.000	.005		
June 1-10	2,070								.120	.090	.152	.020	.230	.073	.045	.000	.008		
June 11-20	2,039								.120	.115	.130	.031	.262	.058	.042	.000	.007		
June 21-30	1,870								.105	.099	.170	.031	.262	.067	.051	.000	.013		
July 1-10	1,952								.120	.074	.144	.023	.213	.102	.051	.000	.010		
July 11-20	1,369								.135	.099	.178	.031	.279	.058	.062	.000	.009		
July 21-31	1,393								.140	.115	.270	.028	.410	.062	.062	.000	.002		
Aug. 1-10	1,567								.110	.074	.152	.038	.213	.058	.056	.000	.011		
Aug. 11-20	1,516								.120	.099	.191	.026	.295	.058	.056	.000	.007		
Aug. 21-31	2,676								.110	.066	.135	.031	.213	.060	.045	.000	.010		
Sept. 1-10	2,299								.115	.074	.152	.041	.230	.038	.051	.000	.010		
Sept. 11-20	1,193								.135	.090	.209	.031	.311	.050	.062	.000	.005		
Sept. 21-30	943								.125	.132	.144	.036	.328	.054	.062	.000	.006		
Oct. 1-10	1,819								.120	.090	.135	.033	.279	.050	.054	.000	.004		
Oct. 11-20	2,827								.120	.090	.161	.026	.262	.054	.056	.000	.004		
Oct. 21-31	3,286								.110	.082	.126	.041	.213	.062	.056	.000	.005		
Nov. 1-10	1,643								.120	.115	.126	.033	.295	.048	.054	.000	.001		
Nov. 11-20	1,472								.140	.115	.144	.038	.295	.054	.056	.000	.002		
Nov. 21-30	1,539								.130	.107	.135	.031	.279	.050	.056	.000	.002		
Dec. 1-10	1,484								.140	.099	.183	.026	.328	.048	.056	.000	.003		
Dec. 11-20	1,409								.140	.115	.165	.026	.328	.058	.056	.000	.002		
Dec. 21-31	1,862								.120	.082	.126	.036	.246	.056	.054	.000	.004		
Jan. 1-10, 1938	1,902								.130	.099	.109	.031	.262	.044	.054	.000	.004		
Jan. 11-20	1,588								.150	.107	.126	.028	.262	.044	.056	.000	.004		
Jan. 21-31	1,574								.130	.099	.156	.015	.295	.044	.062	.000	.004		
Feb. 1-10	1,477								.120	.082	.144	.026	.262	.044	.056	.000	.004		
Feb. 11-19	1,319								.130	.099	.161	.028	.295	.046	.056	.000	.004		
Feb. 20-28	1,712								.130	.090	.135	.036	.262	.052	.056	.000	.005		
Mar. 1-10	1,769								.115	.099	.130	.026	.262	.050	.054	.000	.006		
Mar. 11-20	4,743								.100	.074	.117	.026	.197	.062	.045	.000	.016		
Mar. 21-31	2,995								.120	.082	.130	.026	.246	.062	.051	.000	.012		
Apr. 1-10	6,838								.100	.074	.100	.033	.197	.058	.040	.000	.015		
Apr. 11-20	3,211								.105	.099	.109	.031	.230	.054	.040	.000	.009		
Apr. 21-30	2,693								.110	.082	.117	.028	.230	.052	.056	.000	.008		
Average									.120	.090	.144	.028	.262	.056	.054	.000	.006		
Weighted average	2,220								.120	.090	.135	.028	.246	.058	.051	.000	.008		

Maximum total dissolved solids 60, July 21-31, 1937; minimum total dissolved solids 26, Apr. 1-10, 1938.
Maximum total hardness 13, July 21-31, Sept. 21-30, Nov. 11-20, Dec. 11-20, 1937; Jan. 11-20, 1938; minimum total hardness 8.7, Mar. 11-20, Apr. 1-10, 1938.

TABLE 14.—*Analyses of water from the Chattahoochee River at Columbus, Ga., 1940–41*

[Analyses by William L. Lamar and Charles G. Seegmiller. Drainage area, 4,670 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
Oct. 1–10, 1940	1,730	70	18	2.7	2.2	12	10	0.03	3.9	1.5	5.2	1.6	21	5.4	3.4	0.1	1.0	44	16
Oct. 11–20	1,536	68	13	2.9	2.5	11	12	.08	4.2	1.4	5.9	1.3	22	5.1	3.8	.1	.99	47	16
Oct. 21–31	1,531	67	10	2.0	1.8	8	11	.05	4.2	1.5	6.2	1.5	22	6.8	4.0	.1	.98	47	17
Nov. 1–10	1,753	64	8	1.7	1.6	13	10	.08	4.4	1.5	6.6	1.5	23	6.0	4.2	.1	1.2	49	17
Nov. 11–20	2,715	57	18	2.2	1.6	17	10	.10	4.2	1.6	6.4	1.8	23	6.2	4.6	.1	1.2	50	17
Nov. 21–30	2,750	55	16	2.0	1.7	18	11	.16	4.0	1.5	6.2	1.5	22	6.1	4.4	.1	1.1	50	16
Dec. 1–10	2,948	51	18	2.0	1.4	14	12	.14	3.9	1.5	5.9	1.5	23	4.5	4.5	.1	1.2	50	16
Dec. 11–20	4,444	51	20	--------	1.6	6	11	.11	4.3	1.5	6.0	1.5	21	5.5	4.1	.1	1.1	48	17
Dec. 21–31	5,430	52	46	2.4	1.5	7	12	.13	4.0	1.4	5.2	1.3	19	4.8	3.9	.1	.89	45	16
Jan. 1–10, 1941	6,311	51	76	2.7	1.5	7	9.9	.05	3.8	1.2	4.2	1.3	17	4.7	3.2	.1	.91	40	14
Jan. 11–20	5,971	47	41	1.9	1.2	6	12	.05	3.7	1.2	4.5	1.2	16	5.6	3.1	.1	.85	37	14
Jan. 21–31	4,475	48	22	2.2	1.4	8	11	.06	3.9	1.4	4.7	.9	19	4.4	3.4	.1	.49	43	15
Feb. 1–10	3,606	48	14	1.3	.8	2	13	.01	3.8	1.2	5.0	1.5	20	4.1	3.5	.1	1.4	42	14
Feb. 11–19	4,234	46	18	1.4	1.1	2	12	.02	4.1	1.4	5.1	1.3	21	3.5	3.5	.1	1.4	44	16
Feb. 20–28	4,247	47	22	1.6	1.0	2	11	.01	3.0	1.3	4.9	1.3	20	4.0	3.4	.1	1.4	42	13
Mar. 1–10	4,575	47	30	1.9	.8	5	11	.02	3.2	1.4	4.9	1.5	19	3.8	3.5	.1	1.4	42	14
Mar. 11–20	6,893	50	41	2.2	1.2	20	10	.05	3.4	1.2	4.2	1.4	17	4.1	3.1	.1	1.1	40	13
Mar. 21–31	6,512	52	28	4.4	2.5	14	12	.05	3.6	1.4	4.5	1.4	20	4.0	2.8	.1	1.2	45	15
Apr. 1–10	5,968	57	32	6.0	2.4	14	12	.05	4.4	1.3	4.4	1.6	22	4.3	2.8	.1	.92	46	16
Apr. 11–20	5,043	62	29	5.6	2.2	11	12	.04	3.5	1.3	4.5	1.0	19	4.0	2.8	.1	1.1	42	14
Apr. 21–30	3,680	66	24	5.2	2.4	7	12	.02	4.2	1.4	4.6	1.4	21	4.4	3.0	.1	.98	44	16
May 1–10	3,537	68	35	1.8	1.8	6	12	.02	4.1	1.6	5.2	1.6	24	4.3	3.2	.1	1.1	45	17
May 11–20	2,732	70	13	3.9	1.9	6	12	.03	4.6	1.4	5.5	1.5	25	4.3	3.5	.2	.87	46	17
May 21–31	2,125	76	7	2.2	2.0	5	12	.02	4.9	1.4	5.6	1.5	26	3.7	3.6	.2	.61	45	18
June 1–10	1,421	78	6	3.2	3.1	5	12	.03	4.2	1.5	6.2	1.6	26	4.3	3.9	.1	.70	47	17
June 11–20	1,403	80	7	1.4	1.2	5	12	.01	4.2	1.4	7.1	1.7	28	4.9	4.2	.1	.81	50	16
June 21–30	1,329	79	14	1.7	1.2	5	12	.02	4.2	1.5	7.0	1.8	27	4.7	4.5	.1	1.5	52	17
July 1–10	3,908	80	81	3.2	2.1	2	10	.02	5.2	1.4	6.6	2.2	24	6.1	4.4	.2	1.6	53	19
July 11–20	7,006	80	223	5.4	2.2	13	8.8	.01	3.2	1.1	4.1	1.8	15	4.1	2.8	.2	2.3	38	13
July 21–31	4,917	80	168	5.2	2.2	6	8.5	.02	3.0	.9	3.9	1.6	14	4.1	2.5	.2	1.6	35	11
Aug. 1–10	2,782	81	113	4.3	2.9	14	9.1	.03	2.9	1.0	4.1	1.5	14	4.4	2.6	.2	1.2	37	11
Aug. 11–20	6,458	80	109	4.3	2.4	10	9.4	.04	3.0	1.0	4.4	1.4	16	3.8	2.6	.2	1.3	37	12
Aug. 21–31	2,958	81	89	4.2	2.9	14	8.8	.02	3.2	1.2	3.6	1.4	16	4.2	2.4	.2	.69	37	13
Sept. 1–10	2,466	82	63	4.0	2.8	6	9.5	.02	4.0	1.2	4.2	1.6	18	5.0	2.8	.2	.90	41	15
Sept. 11–20	2,098	79	54	3.6	2.8	7	10	.07	3.6	1.3	4.5	1.7	19	4.2	3.2	.2	.76	42	14
Sept. 21–30	1,739	76	31	3.6	2.2	7	10	.04	3.7	1.4	5.1	1.8	21	4.9	3.4	.2	.98	44	15
Average	--------	--------	43	3.0	1.9	9	11	.05	3.9	1.3	5.2	1.5	21	4.7	3.5	.1	1.1	44	15
Weighted average	3,704	--------	54	3.3	1.9	9	11	.05	3.8	1.3	4.9	1.5	20	4.5	3.3	.1	1.2	43	15

Equivalents per million

Oct. 1-10, 1940	1,730	------	------	------	------	------	------	------	------	0.195	0.123	0.226	0.041	0.344	0.112	0.096	0.005	0.016	------	------
Oct. 11-20	1,536	------	------	------	------	------	------	------	------	.210	.115	.257	.033	.361	.106	.107	.005	.016	------	------
Oct. 21-31	1,531	------	------	------	------	------	------	------	------	.210	.123	.270	.038	.361	.142	.113	.005	.016	------	------
Nov. 1-10	1,753	------	------	------	------	------	------	------	------	.220	.123	.287	.038	.377	.125	.118	.005	.019	------	------
Nov. 11-20	2,715	------	------	------	------	------	------	------	------	.210	.132	.278	.046	.377	.129	.130	.005	.019	------	------
Nov. 21-30	2,750	------	------	------	------	------	------	------	------	.200	.123	.270	.038	.361	.127	.124	.005	.018	------	------
Dec. 1-10	2,948	------	------	------	------	------	------	------	------	.195	.123	.257	.038	.377	.094	.127	.005	.019	------	------
Dec. 11-20	4,444	------	------	------	------	------	------	------	------	.215	.123	.261	.038	.344	.114	.116	.005	.018	------	------
Dec. 21-31	5,430	------	------	------	------	------	------	------	------	.200	.115	.226	.033	.311	.100	.110	.005	.014	------	------
Jan. 1-10, 1941	6,311	------	------	------	------	------	------	------	------	.190	.099	.183	.033	.279	.098	.090	.005	.015	------	------
Jan. 11-20	5,971	------	------	------	------	------	------	------	------	.185	.099	.196	.031	.262	.117	.087	.005	.014	------	------
Jan. 21-31	4,475	------	------	------	------	------	------	------	------	.195	.115	.204	.023	.311	.092	.096	.005	.008	------	------
Feb. 1-10	3,606	------	------	------	------	------	------	------	------	.190	.099	.217	.038	.328	.085	.099	.005	.023	------	------
Feb. 11-19	4,234	------	------	------	------	------	------	------	------	.205	.115	.222	.033	.344	.073	.099	.005	.023	------	------
Feb. 20-28	4,247	------	------	------	------	------	------	------	------	.150	.107	.213	.033	.328	.083	.096	.005	.023	------	------
Mar. 1-10	4,575	------	------	------	------	------	------	------	------	.160	.115	.213	.038	.311	.079	.099	.005	.023	------	------
Mar. 11-20	6,893	------	------	------	------	------	------	------	------	.170	.099	.183	.036	.279	.085	.087	.005	.018	------	------
Mar. 21-31	6,512	------	------	------	------	------	------	------	------	.180	.115	.196	.036	.328	.083	.079	.005	.019	------	------
Apr. 1-10	5,968	------	------	------	------	------	------	------	------	.220	.107	.191	.041	.361	.090	.079	.005	.015	------	------
Apr. 11-20	5,043	------	------	------	------	------	------	------	------	.175	.107	.196	.026	.311	.083	.079	.005	.018	------	------
Apr. 21-30	3,680	------	------	------	------	------	------	------	------	.210	.115	.200	.036	.344	.092	.085	.005	.016	------	------
May 1-10	3,537	------	------	------	------	------	------	------	------	.205	.132	.226	.041	.393	.090	.090	.005	.018	------	------
May 11-20	2,732	------	------	------	------	------	------	------	------	.230	.115	.239	.038	.410	.090	.099	.010	.014	------	------
May 21-31	2,125	------	------	------	------	------	------	------	------	.245	.115	.244	.038	.426	.077	.102	.010	.010	------	------
June 1-10	1,421	------	------	------	------	------	------	------	------	.210	.123	.270	.041	.426	.090	.110	.005	.011	------	------
June 11-20	1,403	------	------	------	------	------	------	------	------	.210	.115	.309	.044	.459	.102	.118	.005	.013	------	------
June 21-30	1,329	------	------	------	------	------	------	------	------	.210	.123	.304	.046	.443	.098	.127	.005	.024	------	------
July 1-10	3,908	------	------	------	------	------	------	------	------	.260	.115	.287	.056	.393	.127	.124	.010	.026	------	------
July 11-20	7,006	------	------	------	------	------	------	------	------	.160	.090	.178	.046	.246	.085	.079	.010	.037	------	------
July 21-31	4,917	------	------	------	------	------	------	------	------	.150	.074	.170	.041	.230	.085	.070	.010	.026	------	------
Aug. 1-10	2,782	------	------	------	------	------	------	------	------	.145	.082	.178	.038	.230	.092	.073	.010	.019	------	------
Aug. 11-20	6,458	------	------	------	------	------	------	------	------	.150	.082	.191	.036	.262	.079	.073	.010	.021	------	------
Aug. 21-31	2,958	------	------	------	------	------	------	------	------	.160	.099	.156	.036	.262	.087	.068	.010	.011	------	------
Sept. 1-10	2,466	------	------	------	------	------	------	------	------	.200	.099	.183	.041	.295	.104	.079	.010	.014	------	------
Sept. 11-20	2,098	------	------	------	------	------	------	------	------	.180	.107	.196	.044	.311	.087	.090	.010	.012	------	------
Sept. 21-30	1,739	------	------	------	------	------	------	------	------	.185	.115	.222	.046	.344	.102	.096	.010	.016	------	------
Average	------	------	------	------	------	------	------	------	------	.195	.107	.226	.038	.344	.098	.099	.005	.018	------	------
Weighted average	3,704	------	------	------	------	------	------	------	------	.190	.107	.213	.038	.328	.094	.093	.005	.019	------	------

Maximum total dissolved solids 53, July 1-10, 1941; minimum total dissolved solids 35, July 21-31, 1941.
Maximum total hardness 19, July 1-10, 1941; minimum total hardness 11, July 21-31, Aug. 1-10, 1941.

TABLE 15.—*Analyses of water from the Chattahoochee River near Hilton, Ga., 1940–41* [1]

[Analyses by William L. Lamar and Charles G. Seegmiller. Drainage area, 8,040 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (°F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
Oct. 1–10, 1940	2,705	-------	33	2.4	2.0	7	11	0.03	6.6	1.4	5.3	1.3	25	6.7	4.0	0.1	0.94	51	22
Oct. 11–20	2,534	-------	23	2.8	2.0	7	9.7	.05	6.8	1.4	5.5	1.3	26	6.6	4.6	.1	.87	51	23
Oct. 21–31	2,390	-------	19	2.5	1.6	5	9.5	.02	6.6	1.3	5.8	1.4	27	6.6	4.8	.0	1.0	53	22
Nov. 1–10	2,741	63	21	2.3	1.4	6	10	.05	6.5	1.6	6.0	1.6	29	6.1	5.0	.0	.98	54	23
Nov. 11–20	5,035	55	70	3.4	1.8	13	9.8	.10	5.8	1.4	4.8	1.6	23	6.1	4.5	.1	.96	50	20
Nov. 21–30	4,313	60	47	2.8	1.6	7	11	.02	5.8	1.4	5.1	1.6	24	6.7	4.8	.1	.83	50	20
Dec. 1–10	4,597	51	32	2.8	1.8	6	9.5	.02	5.4	1.4	4.8	1.4	22	6.7	4.2	.1	.76	48	19
Dec. 11–20	6,656	54	46	3.1	1.7	7	11	.02	5.0	1.4	4.7	1.4	21	5.5	4.5	.1	1.0	48	18
Dec. 21–31	9,182	53	85	10	8.2	8	9.7	.03	5.0	1.3	4.8	1.2	20	5.1	4.5	.1	.05	45	18
Jan. 1–10, 1941	9,730	49	98	3.4	1.7	6	9.9	.03	4.6	1.2	4.1	1.2	17	5.4	3.8	.1	.93	40	16
Jan. 11–20	8,999	47	62	2.9	1.5	5	11	.04	4.4	1.2	4.0	1.1	18	5.3	3.6	.1	.89	41	16
Jan. 21–31	6,438	47	52	2.0	1.1	4	10	.03	5.3	1.6	4.2	1.3	21	5.6	3.6	.0	1.1	44	20
Feb. 1–10	6,468	46	70	2.6	1.1	2	8.7	.02	4.6	1.5	4.2	1.2	20	4.6	4.0	.0	1.1	43	18
Feb. 11–19	7,367	46	66	3.6	1.4	6	8.3	.05	4.8	1.2	4.4	1.2	20	5.4	3.8	.0	.94	42	17
Feb. 20–28	6,836	46	53	2.5	1.1	6	11	.07	5.2	1.1	4.7	1.1	20	5.1	4.1	.0	.83	44	18
Mar. 1–10	9,007	50	98	3.6	1.6	14	8.4	.08	4.7	1.1	4.2	1.2	19	5.9	3.9	.1	.49	41	16
Mar. 11–20	10,120	51	69	6.0	2.3	11	10	.01	4.5	1.3	3.9	1.2	18	4.9	3.5	.0	.91	43	17
Mar. 21–31	10,490	55	48	5.6	2.4	8	11	.01	5.2	1.4	4.1	1.2	21	4.4	3.4	.1	.94	44	19
Apr. 1–10	8,932	60	53	5.7	2.4	7	11	.01	5.2	1.3	4.1	1.3	21	4.7	3.2	.1	.86	44	18
Apr. 11–20	7,885	66	64	5.3	2.4	6	11	.01	5.0	1.3	4.0	1.3	21	4.3	3.4	.1	1.0	46	18
Apr. 21–30	5,380	68	59	-------	-------	7	12	.01	5.6	1.3	4.1	1.2	22	4.2	3.5	.0	.94	46	19
May 1–10	5,021	71	66	2.0	1.9	5	11	.01	5.6	1.4	4.5	1.6	25	4.0	3.9	.1	.93	44	20
May 11–20	3,956	71	46	1.8	1.2	3	11	.01	6.0	1.5	5.2	1.7	27	5.6	4.2	.1	.75	47	21
May 21–31	2,922	79	29	2.1	1.7	5	10	.02	6.7	1.5	5.7	1.8	30	4.7	4.8	.1	.61	50	23
June 1–10	2,192	80	24	2.4	2.0	5	12	.01	7.7	1.5	6.5	2.0	34	4.8	5.0	.2	.54	59	25
June 11–20	2,524	80	43	2.2	1.5	6	11	.01	8.1	1.5	6.3	1.8	34	5.9	5.0	.1	.60	61	26
June 21–30	2,768	80	45	2.3	1.6	4	10	.02	6.6	1.5	5.6	1.6	29	5.1	5.0	.1	1.1	56	23
July 1–10	5,678	80	179	6.6	2.4	7	10	.03	6.6	1.3	5.2	1.5	24	6.6	4.2	.2	1.7	52	22
July 11–20	9,171	82	249	6.1	2.2	8	9.1	.03	4.5	1.1	4.6	1.5	16	5.5	3.6	.2	2.2	43	16
July 21–31	7,036	82	183	5.5	2.0	3	8.9	.05	4.6	1.0	3.8	1.5	17	4.8	3.2	.1	1.7	40	16
Aug. 1–10	3,746	83	124	4.4	2.1	4	9.5	.03	5.4	1.1	4.7	1.5	21	4.6	3.8	.2	1.7	45	18
Aug. 11–20	7,577	82	150	5.2	2.8	9	9.5	.01	4.7	1.0	4.2	1.4	18	5.0	3.4	.2	1.4	42	16
Aug. 21–31	5,164	82	143	4.7	2.4	5	9.0	.01	5.0	1.3	3.5	1.4	19	4.7	3.2	.2	1.1	42	18
Sept. 1–10	3,290	82	86	3.6	2.6	8	9.6	.03	5.6	1.3	4.3	1.5	22	5.1	3.8	.2	.92	45	19
Sept. 11–20	3,075	78	88	3.5	3.4	11	10	.02	6.1	1.5	5.0	1.5	24	5.8	4.2	.2	.88	49	21
Sept. 21–30	3,174	76	90	4.2	2.5	5	9.3	.01	6.0	1.3	5.1	1.6	23	6.5	4.9	.2	1.1	50	20
Average	-------	-------	75	3.8	2.1	7	10	.03	5.6	1.3	4.8	1.4	23	5.4	4.1	.1	.99	47	19
Weighted average	5,700	-------	84	4.2	2.2	7	10	.03	5.3	1.3	4.5	1.4	21	5.3	3.9	.1	1.0	45	19

Equivalents per million

Oct. 1-10, 1940	2,705	-----	-----	-----	-----	-----	-----	-----	0.329	0.115	0.230	0.033	0.410	0.140	0.113	0.005	0.015	-----	-----
Oct. 11-20	2,534	-----	-----	-----	-----	-----	-----	-----	.339	.115	.239	.033	.426	.137	.130	.005	.014	-----	-----
Oct. 21-31	2,390	-----	-----	-----	-----	-----	-----	-----	.329	.107	.252	.036	.443	.137	.135	.000	.016	-----	-----
Nov. 1-10	2,741	-----	-----	-----	-----	-----	-----	-----	.324	.132	.261	.041	.475	.127	.141	.000	.016	-----	-----
Nov. 11-20	5,035	-----	-----	-----	-----	-----	-----	-----	.290	.115	.209	.041	.377	.127	.127	.005	.016	-----	-----
Nov. 21-30	4,313	-----	-----	-----	-----	-----	-----	-----	.290	.115	.222	.041	.393	.140	.135	.005	.013	-----	-----
Dec. 1-10	4,597	-----	-----	-----	-----	-----	-----	-----	.270	.115	.209	.036	.361	.140	.118	.005	.012	-----	-----
Dec. 11-20	6,656	-----	-----	-----	-----	-----	-----	-----	.250	.115	.204	.036	.344	.114	.127	.005	.016	-----	-----
Dec. 21-31	9,182	-----	-----	-----	-----	-----	-----	-----	.250	.107	.209	.031	.328	.106	.127	.005	.001	-----	-----
Jan. 1-10, 1941	9,730	-----	-----	-----	-----	-----	-----	-----	.230	.099	.178	.031	.279	.112	.107	.005	.015	-----	-----
Jan. 11-20	8,999	-----	-----	-----	-----	-----	-----	-----	.220	.099	.174	.028	.295	.110	.102	.005	.014	-----	-----
Jan. 21-31	6,438	-----	-----	-----	-----	-----	-----	-----	.264	.132	.183	.033	.344	.117	.102	.000	.018	-----	-----
Feb. 1-10	6,468	-----	-----	-----	-----	-----	-----	-----	.230	.123	.183	.031	.328	.096	.113	.000	.018	-----	-----
Feb. 11-19	7,367	-----	-----	-----	-----	-----	-----	-----	.240	.099	.191	.031	.328	.112	.107	.000	.015	-----	-----
Feb. 20-28	6,836	-----	-----	-----	-----	-----	-----	-----	.260	.090	.204	.028	.328	.106	.116	.000	.013	-----	-----
Mar. 1-10	9,007	-----	-----	-----	-----	-----	-----	-----	.235	.090	.183	.031	.311	.123	.110	.005	.008	-----	-----
Mar. 11-20	10,120	-----	-----	-----	-----	-----	-----	-----	.225	.107	.170	.031	.295	.102	.099	.000	.015	-----	-----
Mar. 21-31	10,490	-----	-----	-----	-----	-----	-----	-----	.260	.115	.178	.031	.344	.092	.096	.005	.015	-----	-----
Apr. 1-10	8,932	-----	-----	-----	-----	-----	-----	-----	.260	.107	.178	.033	.344	.098	.090	.005	.014	-----	-----
Apr. 11-20	7,885	-----	-----	-----	-----	-----	-----	-----	.250	.107	.174	.033	.344	.090	.096	.005	.016	-----	-----
Apr. 21-30	5,380	-----	-----	-----	-----	-----	-----	-----	.280	.107	.178	.031	.361	.087	.099	.000	.015	-----	-----
May 1-10	5,021	-----	-----	-----	-----	-----	-----	-----	.280	.115	.196	.041	.410	.083	.110	.005	.015	-----	-----
May 11-20	3,956	-----	-----	-----	-----	-----	-----	-----	.300	.123	.226	.044	.443	.117	.118	.005	.012	-----	-----
May 21-31	2,922	-----	-----	-----	-----	-----	-----	-----	.334	.123	.248	.046	.492	.098	.135	.005	.010	-----	-----
June 1-10	2,192	-----	-----	-----	-----	-----	-----	-----	.384	.123	.283	.051	.557	.100	.141	.010	.009	-----	-----
June 11-20	2,524	-----	-----	-----	-----	-----	-----	-----	.404	.123	.274	.046	.557	.123	.141	.005	.010	-----	-----
June 21-30	2,768	-----	-----	-----	-----	-----	-----	-----	.329	.123	.244	.041	.475	.106	.141	.005	.018	-----	-----
July 1-10	5,678	-----	-----	-----	-----	-----	-----	-----	.329	.107	.226	.038	.393	.137	.118	.010	.027	-----	-----
July 11-20	9,171	-----	-----	-----	-----	-----	-----	-----	.225	.090	.200	.038	.262	.114	.102	.010	.036	-----	-----
July 21-31	7,036	-----	-----	-----	-----	-----	-----	-----	.230	.082	.165	.038	.279	.100	.090	.005	.027	-----	-----
Aug. 1-10	3,746	-----	-----	-----	-----	-----	-----	-----	.270	.090	.204	.038	.344	.096	.107	.010	.027	-----	-----
Aug. 11-20	7,577	-----	-----	-----	-----	-----	-----	-----	.235	.082	.183	.036	.295	.104	.096	.010	.023	-----	-----
Aug. 21-31	5,164	-----	-----	-----	-----	-----	-----	-----	.250	.107	.152	.036	.311	.098	.090	.010	.018	-----	-----
Sept. 1-10	3,290	-----	-----	-----	-----	-----	-----	-----	.280	.107	.187	.038	.361	.106	.107	.010	.015	-----	-----
Sept. 11-20	3,075	-----	-----	-----	-----	-----	-----	-----	.304	.123	.217	.038	.393	.121	.118	.010	.014	-----	-----
Sept. 21-30	3,174	-----	-----	-----	-----	-----	-----	-----	.300	.107	.222	.041	.377	.135	.138	.010	.018	-----	-----
Average	-----	-----	-----	-----	-----	-----	-----	-----	.280	.107	.209	.036	.377	.112	.116	.005	.016	-----	-----
Weighted average	5,700	-----	-----	-----	-----	-----	-----	-----	.265	.107	.196	.036	.344	.110	.110	.005	.016	-----	-----

[1] Samples collected at the gaging station referred to in reports on surface water supply of the United States as Chattahoochee River at Columbia, Ala.

Maximum total dissolved solids 61, June 11-20, 1941; minimum total dissolved solids 40, Jan. 1-10, July 21-31, 1941.
Maximum total hardness 26, June 11-20, 1941; minimum total hardness 16, Jan. 1-10, 11-20, Mar. 1-10, July 11-20, 21-31, Aug. 11-20, 1941.

TABLE 16.—*Analyses of water from the Etowah River near Cartersville, Ga., 1938–39*

[Analyses by William L. Lamar, Arthur T. Ness, F. H. Davis, and N. A. Talvitie. Drainage area, 1,110 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
Oct. 1–10, 1938	456	63	61	2.0	1.6	4	13	0.03	4.4	1.6	3.5	1.1	26	3.3	1.8	0.0	0.05	41	18
Oct. 11–20	399	63	40	1.6	1.6	6	11	.04	4.4	1.5	2.8	1.0	24	2.6	1.6	.0	.0	37	17
Oct. 21–31	404	56	126	2.6	1.6	8	11	.05	4.4	1.7	2.9	1.2	26	3.7	1.8	.0	.06	37	18
Nov. 1–10	605	58	52	3.0	2.3	10	11	.05	4.4	1.5	2.6	1.5	24	3.1	1.9	.0	.10	38	17
Nov. 11–20	905	56	102	4.2	2.4	12	10	.12	4.7	1.5	2.8	1.4	25	2.9	1.8	.0	.10	38	18
Nov. 21–30	746	46	34	4.4	2.2	10	13	.04	4.2	1.4	3.0	1.2	25	2.8	1.9	.0	.08	40	16
Dec. 1–10	588	44	25	1.7	1.0	4	10	.04	4.6	1.7	3.1	1.1	24	3.4	1.8	.0	.18	40	18
Dec. 11–20	541	43	16	1.4	1.2	6	11	.06	4.4	1.7	3.1	1.1	25	2.6	1.5	.0	.06	40	18
Dec. 21–31	827	42	82	3.1	1.4	6	12	.04	4.6	1.7	2.9	1.2	24	3.3	1.6	.0	.20	41	18
Jan. 1–10, 1939	1,028	44	246	4.9	1.4	5	12	.01	4.4	1.7	3.1	1.2	24	2.8	1.5	.0	.25	40	18
Jan. 11–20	1,807	44	166	4.5	1.6	8	12	.01	3.8	1.3	2.9	1.0	20	3.7	1.5	.0	.25	38	15
Jan. 21–31	1,609	42	366	4.3	1.2	6	11	.01	4.6	1.3	2.9	1.0	24	4.0	1.4	.0	.19	37	17
Feb. 1–10	3,246	47	116	8.1	1.3	5	8.0	.01	3.0	1.0	1.8	1.0	15	3.1	1.4	.0	.38	28	12
Feb. 11–19	3,071	51	357	6.2	1.1	5	8.2	.02	3.3	1.0	1.8	.9	15	3.3	1.2	.0	.33	27	12
Feb. 20–28	3,033	47	337	6.0	1.2	7	8.6	.02	3.9	1.1	1.7	.9	16	3.5	1.2	.0	.20	29	14
Mar. 1–10	3,849	51	347	6.4	------	6	8.5	.01	2.7	.9	1.7	1.0	13	2.8	1.0	.0	.42	27	10
Mar. 11–20	2,555	52	201	5.1	1.5	5	10	.02	3.2	1.0	2.4	.8	16	2.1	1.1	.0	.25	30	12
Mar. 21–31	1,928	57	119	4.2	1.6	5	11	.03	3.4	1.1	2.3	.9	18	2.1	1.1	.0	.20	32	13
Apr. 1–10	1,964	55	122	4.3	1.5	5	10	.02	3.3	1.0	2.2	.9	17	1.9	1.0	.0	.20	30	12
Apr. 11–20	1,794	60	254	5.5	1.5	5	10	.01	3.2	1.0	2.4	.9	17	2.1	1.1	.0	.30	30	12
Apr. 21–30	2,109	62	349	5.4	1.1	6	13	.02	4.0	1.2	2.9	.9	20	3.4	1.4	.0	.16	40	15
May 1–10	1,619	62	149	3.5	.8	5	10	.03	3.4	1.1	2.6	.8	19	2.2	1.4	.0	.16	32	13
May 11–20	1,462	64	74	2.1	1.3	3	11	.02	3.7	1.1	2.8	.9	19	3.7	1.6	.0	.13	33	14
May 21–31	1,888	71	414	6.4	1.0	3	10	.02	4.5	1.2	2.7	1.1	22	3.5	1.6	.0	.32	36	16
June 1–10	1,559	74	322	5.6	1.5	3	10	.01	4.2	1.2	2.8	.9	21	4.6	1.6	.0	.20	36	15
June 11–20	1,496	75	292	5.4	1.0	5	11	.03	3.9	1.2	3.1	.8	21	3.0	1.8	.0	.30	36	15
June 21–30	1,011	77	94	2.2	.8	3	11	.02	4.0	1.2	3.3	.9	22	2.7	1.6	.0	.26	37	15
July 1–10	1,014	76	156	3.4	1.0	4	11	.02	4.2	1.2	2.8	.9	20	2.4	1.9	.0	.23	36	15
July 11–20	755	76	156	3.4	1.0	3	10	.01	3.8	1.3	2.9	.9	22	2.3	1.8	.0	.26	36	15
July 21–31	834	77	229	4.3	1.4	3	9.3	.01	4.2	1.2	3.0	1.1	23	4.0	1.2	.0	.28	36	15
Aug. 1–10	694	76	205	4.6	1.8	9	12	.01	4.6	1.4	3.4	1.1	25	4.0	1.5	.0	.20	40	17
Aug. 11–20	1,548	76	415	7.5	1.6	8	10	.02	4.1	1.3	3.4	1.2	23	4.5	1.2	.0	.36	37	16
Aug. 21–31	888	73	104	4.0	1.6	5	11	.02	4.0	1.3	3.3	1.0	24	3.5	1.4	.0	.19	36	15
Sept. 1–10	846	74	202	4.7	1.6	7	9.7	.02	3.8	1.3	3.0	1.1	22	3.6	1.4	.0	.15	35	15
Sept. 11–20	554	75	48	2.8	1.6	3	11	.02	5.2	1.6	2.7	1.1	28	3.3	1.2	.0	.21	40	20
Sept. 21–30	829	70	90	3.4	1.6	3	10	.05	5.0	1.4	2.7	1.2	26	3.7	1.4	.0	.18	38	18
Average	------	------	180	4.2	1.4	6	11	.03	4.0	1.3	2.8	1.0	22	3.2	1.5	.0	.21	36	15
Weighted average	1,389	------	222	5.0	1.4	5	10	.02	3.8	1.2	2.5	1.0	20	3.1	1.4	.0	.24	34	14

Equivalents per million

Oct. 1-10, 1938	456								0.220	0.132	0.152	0.028	0.426	0.069	0.051	0.000	0.001		
Oct. 11-20	399								.220	.123	.122	.026	.393	.054	.045	.000	.000		
Oct. 21-31	404								.220	.140	.126	.031	.426	.077	.051	.000	.001		
Nov. 1-10	605								.220	.123	.113	.038	.393	.064	.054	.000	.002		
Nov. 11-20	905								.235	.123	.122	.036	.410	.060	.051	.000	.002		
Nov. 21-30	746								.210	.115	.130	.031	.410	.058	.054	.000	.001		
Dec. 1-10	588								.230	.140	.135	.028	.393	.071	.051	.000	.003		
Dec. 11-20	541								.220	.140	.135	.028	.410	.054	.042	.000	.001		
Dec. 21-31	827								.230	.140	.126	.031	.393	.069	.045	.000	.003		
Jan. 1-10, 1939	1,028								.220	.140	.135	.031	.393	.058	.042	.000	.004		
Jan. 11-20	1,807								.190	.107	.126	.026	.328	.077	.042	.000	.004		
Jan. 21-31	1,609								.230	.107	.126	.026	.393	.083	.040	.000	.003		
Feb. 1-10	3,246								.150	.082	.078	.026	.246	.064	.040	.000	.006		
Feb. 11-19	3,071								.165	.082	.078	.023	.246	.069	.034	.000	.005		
Feb. 20-28	3,033								.195	.090	.074	.023	.262	.073	.034	.000	.003		
Mar. 1-10	3,849								.135	.074	.074	.026	.213	.058	.028	.000	.007		
Mar. 11-20	2,555								.160	.082	.104	.020	.262	.044	.031	.000	.004		
Mar. 21-31	1,928								.170	.090	.100	.023	.295	.044	.031	.000	.003		
Apr. 1-10	1,964								.165	.082	.096	.023	.279	.040	.028	.000	.003		
Apr. 11-20	1,794								.160	.082	.104	.023	.279	.044	.031	.000	.005		
Apr. 21-30	2,109								.200	.099	.126	.023	.328	.071	.040	.000	.003		
May 1-10	1,619								.170	.090	.113	.020	.311	.046	.040	.000	.003		
May 11-20	1,462								.185	.090	.122	.023	.311	.077	.045	.000	.002		
May 21-31	1,888								.225	.099	.117	.028	.361	.073	.045	.000	.005		
June 1-10	1,559								.210	.099	.122	.023	.344	.096	.045	.000	.003		
June 11-20	1,496								.195	.099	.135	.020	.344	.062	.051	.000	.005		
June 21-30	1,011								.200	.099	.144	.023	.361	.056	.045	.000	.004		
July 1-10	1,014								.210	.099	.122	.023	.328	.050	.054	.000	.004		
July 11-20	755								.190	.107	.126	.023	.361	.048	.051	.000	.004		
July 21-31	834								.210	.099	.130	.028	.377	.083	.034	.000	.004		
Aug. 1-10	694								.230	.115	.148	.028	.410	.083	.042	.000	.003		
Aug. 11-20	1,548								.205	.107	.148	.031	.377	.094	.034	.000	.006		
Aug. 21-31	888								.200	.107	.144	.026	.393	.073	.040	.000	.003		
Sept. 1-10	846								.190	.107	.130	.028	.361	.075	.040	.000	.002		
Sept. 11-20	554								.260	.132	.117	.028	.459	.069	.034	.000	.003		
Sept. 21-30	829								.250	.115	.117	.031	.426	.077	.040	.000	.003		
Average									.200	.107	.122	.026	.361	.067	.042	.000	.003		
Weighted average	1,389								.190	.099	.109	.026	.328	.064	.040	.000	.004		

Maximum total dissolved solids 41, Oct. 1-10, Dec. 21-31, 1938; minimum total dissolved solids 27, Feb. 11-19, Mar. 1-10, 1939.
Maximum total hardness 20, Sept. 11-20, 1939; minimum total hardness 10, Mar. 1-10, 1939.

TABLE 17.—*Analyses of water from the Ocmulgee River at Macon, Ga., 1937–38*

[Analyses by William L. Lamar and Arthur T. Ness. Drainage area, 2,240 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
May 1-10, 1937	9,150	63	260	4.1	1.2	14	7.2	0.03	2.6	1.2	2.7	1.2	14	3.5	1.8	0.0	1.0	33	11
May 11-20	3,283	68	128	2.5	1.0	6	11	.01	3.0	1.3	3.4	1.3	17	3.6	1.9	.1	.85	38	13
May 21-31	2,542	73	104	3.1	.7	7	12	.03	3.4	1.5	4.8	1.4	21	4.2	2.2	.1	.96	42	15
June 1-10	2,203	77	48	2.3	.3	6	12	.09	3.8	1.6	4.8	1.2	22	3.2	2.5	.1	1.2	45	16
June 11-20	1,848	80	92	1.2	.1	8	12	.03	3.6	1.6	4.8	1.5	23	3.9	2.5	.0	1.3	46	16
June 21-30	1,705	81	62	.8	.2	10	12	.02	3.6	1.7	4.2	1.5	23	3.9	2.6	.0	1.4	45	16
July 1-10	2,200	80	108	3.0	1.9	18	12	.04	3.5	1.7	4.5	1.4	22	4.3	2.6	.1	.90	46	16
July 11-20	1,177	85	54	2.6	2.1	12	13	.08	3.8	1.5	4.5	1.6	23	4.4	2.9	.0	1.3	47	16
July 21-31	1,076	82	105	2.9	2.6	15	12	.09	4.0	1.4	4.0	1.5	22	4.7	2.8	.0	1.1	46	16
Aug. 1-10	1,522	82	115	3.6	1.2	12	13	.04	3.7	1.7	4.9	1.6	23	3.9	2.6	.0	1.2	46	16
Aug. 11-20	2,262	80	209	4.2	2.1	8	11	.04	3.3	1.5	4.9	1.7	22	4.0	3.0	.1	1.1	44	14
Aug. 21-31	2,022	83	216	4.0	2.1	8	10	.03	3.3	1.5	4.0	1.8	19	3.7	2.8	.1	1.1	41	14
Sept. 1-10	2,593	80	202	4.7	2.1	10	11	.04	3.0	1.3	4.4	2.0	18	4.8	2.5	.1	.60	41	13
Sept. 11-20	1,530	76	90	3.7	2.3	12	11	.05	3.4	1.4	4.4	2.0	20	4.2	3.0	.1	.77	41	14
Sept. 21-30	1,076	73	46	3.0	2.4	14	12	.09	3.6	1.7	4.6	1.9	24	3.4	3.1	.1	.96	46	16
Oct. 1-10	1,175	72	32	2.4	1.8	8	12	.05	4.0	1.7	5.3	1.4	24	3.9	3.4	.0	.82	46	17
Oct. 11-20	1,777	66	69	2.8	1.6	8	12	.02	4.0	1.6	5.1	1.5	25	3.3	3.2	.0	.73	45	17
Oct. 21-31	4,151	60	137	5.4	3.0	12	8.6	.06	2.9	1.5	4.0	2.0	19	3.6	2.6	.1	.96	37	13
Nov. 1-10	1,523	59	38	4.0	3.4	12	10	.04	3.2	1.6	4.0	2.0	19	3.5	2.9	.0	.71	40	15
Nov. 11-20	1,865	53	43	3.2	2.0	10	11	.10	3.4	1.6	4.2	2.1	22	3.7	3.0	.0	.32	44	15
Nov. 21-30	1,856	53	22	2.2	1.8	14	13	.16	3.4	1.6	4.6	2.1	23	3.4	3.2	.1	.55	46	15
Dec. 1-10	1,731	50	25	1.6	.8	10	12	.11	3.6	1.7	4.8	1.8	20	5.8	3.4	.0	.60	46	16
Dec. 11-20	1,210	49	15	1.0	.6	8	17	.05	4.2	2.0	6.0	1.8	27	4.5	3.5	.1	.64	54	19
Dec. 21-31	1,966	52	52	2.8	1.6	10	19	.11	4.0	1.8	6.4	1.4	28	4.0	3.5	.1	.64	57	17
Jan. 1-10, 1938	1,594	52	30	2.0	1.8	8	13	.12	4.4	2.2	4.8	1.7	24	4.2	3.2	.0	.82	49	20
Jan. 11-20	1,756	51	27	1.8	1.2	6	13	.09	4.4	1.9	4.7	2.0	24	3.5	3.2	.0	1.2	46	19
Jan. 21-31	1,116	51	22	1.8	.8	6	14	.18	4.2	1.7	5.6	.7	26	2.7	3.5	.1	1.0	47	17
Feb. 1-10	1,367	51	20	2.2	.8	6	14	.08	4.0	1.6	5.1	1.6	24	3.0	3.5	.1	1.1	45	17
Feb. 11-19	1,107	53	18	2.6	1.6	6	13	.03	4.2	1.7	4.9	2.0	26	4.0	3.5	.0	1.2	48	17
Feb. 20-28	1,007	54	10	2.2	1.8	5	13	.02	4.1	1.8	5.3	1.7	26	3.8	3.6	.0	1.0	49	18
Mar. 1-10	1,362	53	16	3.4	1.4	6	13	.08	3.9	1.8	5.3	1.5	26	3.2	3.2	.0	1.2	48	17
Mar. 11-20	2,062	57	45	2.3	1.2	8	13	.05	3.8	1.8	5.2	1.4	24	3.7	3.1	.0	1.5	49	17
Mar. 21-31	2,103	58	119	3.4	1.6	10	12	.07	3.7	1.6	4.6	1.8	22	3.9	3.0	.0	1.4	46	16
Apr. 1-10	18,400	60	432	10	2.0	8	7.8	.05	2.5	1.2	2.9	1.7	13	4.7	2.0	.0	1.1	33	11
Apr. 11-20	3,933	63	240	14	3.0	8	7.6	.02	2.6	1.1	2.7	1.5	13	4.0	1.9	.1	.94	31	11
Apr. 21-30	3,378	65	181	5.8	3.0	8	10	.06	2.7	1.3	3.6	1.5	17	3.6	2.2	.0	.82	37	12
Average	-------	-------	95	3.4	1.6	9	12	.06	3.6	1.6	4.6	1.6	22	3.9	2.9	.0	.97	44	16
Weighted average	2,573	-------	180	5.0	1.7	9	11	.06	3.2	1.5	4.0	1.6	19	4.0	2.5	.0	.99	40	14

Equivalents per million

May 1-10, 1937	9,150								0.130	0.099	0.117	0.031	0.230	0.073	0.051	0.000	0.016		
May 11-20	3,283								.150	.107	.148	.033	.279	.075	.054	.005	.014		
May 21-31	2,542								.170	.123	.209	.036	.344	.087	.062	.005	.016		
June 1-10	2,203								.190	.132	.209	.031	.361	.067	.070	.005	.019		
June 11-20	1,848								.180	.132	.209	.038	.377	.081	.070	.000	.021		
June 21-30	1,705								.180	.140	.183	.038	.377	.081	.073	.000	.023		
July 1-10	2,200								.175	.140	.196	.036	.361	.090	.073	.005	.014		
July 11-20	1,177								.190	.123	.196	.041	.377	.092	.082	.000	.021		
July 21-31	1,076								.200	.115	.174	.038	.361	.098	.079	.000	.018		
Aug. 1-10	1,522								.185	.140	.213	.041	.377	.081	.073	.000	.019		
Aug. 11-20	2,262								.165	.123	.213	.044	.361	.083	.085	.005	.018		
Aug. 21-31	2,022								.165	.123	.174	.046	.311	.077	.079	.005	.018		
Sept. 1-10	2,593								.150	.107	.191	.051	.295	.100	.070	.005	.010		
Sept. 11-20	1,530								.170	.115	.191	.051	.328	.087	.085	.005	.012		
Sept. 21-30	1,076								.180	.140	.200	.049	.393	.071	.087	.005	.016		
Oct. 1-10	1,175								.200	.140	.230	.036	.393	.081	.096	.000	.013		
Oct. 11-20	1,777								.200	.132	.222	.038	.410	.069	.090	.000	.012		
Oct. 21-31	4,151								.145	.123	.174	.051	.311	.075	.073	.005	.016		
Nov. 1-10	1,523								.160	.132	.174	.051	.311	.073	.082	.000	.011		
Nov. 11-20	1,865								.170	.132	.183	.054	.361	.077	.085	.000	.005		
Nov. 21-30	1,856								.170	.132	.200	.054	.377	.071	.090	.005	.009		
Dec. 1-10	1,731								.180	.140	.209	.046	.328	.121	.096	.000	.010		
Dec. 11-20	1,210								.210	.164	.261	.046	.443	.094	.099	.005	.010		
Dec. 21-31	1,966								.200	.148	.278	.036	.459	.083	.099	.005	.010		
Jan. 1-10, 1938	1,594								.220	.181	.209	.044	.393	.087	.090	.000	.013		
Jan. 11-20	1,756								.220	.156	.204	.051	.393	.073	.090	.000	.019		
Jan. 21-31	1,116								.210	.140	.244	.018	.426	.056	.099	.005	.016		
Feb. 1-10	1,367								.200	.132	.222	.041	.393	.062	.099	.005	.018		
Feb. 11-19	1,107								.210	.140	.213	.051	.426	.083	.099	.000	.019		
Feb. 20-28	1,007								.205	.148	.230	.044	.426	.079	.102	.000	.016		
Mar. 1-10	1,362								.195	.148	.230	.038	.426	.067	.090	.000	.019		
Mar. 11-20	2,062								.190	.148	.226	.036	.393	.077	.087	.000	.024		
Mar. 21-31	2,103								.185	.132	.200	.046	.361	.081	.085	.000	.023		
Apr. 1-10	18,400								.125	.099	.126	.044	.213	.098	.056	.000	.018		
Apr. 11-20	3,933								.130	.090	.117	.038	.213	.083	.054	.005	.015		
Apr. 21-30	3,378								.135	.107	.156	.038	.279	.075	.062	.000	.013		
Average									.180	.132	.200	.041	.361	.081	.082	.000	.016		
Weighted average	2,573								.160	.123	.174	.041	.311	.083	.070	.000	.016		

Maximum total dissolved solids 57, Dec. 21-31, 1937; minimum total dissolved solids 31, Apr. 11-20, 1938.
Maximum total hardness 20, Jan. 1-10, 1938; minimum total hardness 11, May 1-10, 1937, Apr. 1-10, 11-20, 1938.

TABLE 18.—*Analyses of water from the Oconee River at Milledgeville, Ga., 1937–38*

[Analyses by William L. Lamar and Arthur T. Ness. Drainage area, 2,950 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed: Unfiltered	Oxygen consumed: Filtered	Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
May 1-10, 1937	9,565	64	175	3.2	1.0	3	12	0.02	3.4	1.4	3.5	1.0	21	3.0	1.8	0.0	0.35	41	14
May 11-20	3,750	71	101	3.9	1.1	8	13	.06	4.0	1.9	4.5	1.1	28	3.6	2.5	.0	.80	49	18
May 21-31	2,624	76	117	3.8	1.4	14	14	.03	4.0	1.8	4.7	1.1	27	3.4	2.2	.0	.76	48	17
June 1-10	2,013	79	80	2.8	.3	8	17	.09	4.0	2.1	5.4	1.3	28	2.5	2.4	.0	.77	52	19
June 11-20	2,145	80	298	2.9	.2	6	14	.05	3.8	1.9	4.5	1.5	25	3.1	2.2	.1	.96	49	17
June 21-30	1,838	82	230	2.8	.7	8	14	.02	3.7	1.8	4.4	1.6	25	2.6	2.2	.0	1.1	48	17
July 1-10	2,360	82	408	5.6	2.5	14	13	.04	4.1	1.4	4.0	1.4	24	3.5	2.0	.0	.22	48	16
July 11-20	1,263	84	55	2.0	1.7	14	17	.02	3.8	1.8	4.6	1.5	24	3.8	2.8	.0	1.0	52	17
July 21-31	1,303	83	79	1.9	1.5	10	19	.03	3.6	1.6	5.0	1.4	26	2.4	2.8	.0	1.2	54	16
Aug. 1-10	2,010	86	165	2.9	1.5	8	15	.01	3.4	1.6	4.8	1.8	26	2.7	2.5	.0	1.2	50	15
Aug. 11-20	1,680	78	212	3.6	1.2	10	13	.03	3.6	1.6	4.1	1.7	24	2.6	2.4	.0	1.2	42	16
Aug. 21-31	2,134	79	362	5.8	2.3	10	13	.25	3.7	1.6	4.4	1.4	23	2.8	2.5	.1	.82	45	16
Sept. 1-10	2,480	78	127	3.2	1.8	6	18	.02	3.4	1.7	4.5	1.8	26	2.6	2.9	.1	1.4	49	15
Sept. 11-20	1,108	78	262	6.2	1.7	8	17	.04	4.2	2.1	5.3	1.8	29	2.8	3.0	.0	.64	50	19
Sept. 21-30	746	79	387	5.6	1.5	10		.02			7.1	1.9		3.1	4.2	.1	1.6		
Oct. 1-10	1,417	71	303	7.6	1.9	12	18	.08	4.5	1.7	6.1	2.3	31	2.7	4.5	.0	2.8	59	18
Oct. 11-20	1,877	65	178	5.2	1.6	8	16	.01	4.0	1.3	5.1	1.8	26	1.9	3.2	.0	1.1	49	15
Oct. 21-31	5,455	62	349	5.8	2.4	8		.05			8.7	3.2		3.3	6.2	.0	.08		
Nov. 1-10	1,582	60	74	2.2	1.0	8	18	.05	3.4	1.6	4.8	1.6	22	1.8	3.1	.0	2.4	51	15
Nov. 11-20	1,742	49	142	4.6	3.2	8	17	.02	4.6	2.2	7.8	3.6	31	3.0	7.8	.0	1.1	65	21
Nov. 21-30	1,550	44	61	2.4	.9	6	18	.04	5.4	2.0	4.5	2.0	31	2.6	3.0	.0	1.9	56	22
Dec. 1-10	1,526	40	125	4.0	1.6	6	18	.02	4.0	1.5	4.8	2.0	26	2.3	3.2	.0	2.4	54	16
Dec. 11-20	1,446	42	80	5.0	2.6	10	19	.02	4.5	2.2			32	5.7		.0	2.4		20
Dec. 21-31	2,449	49	270	4.6	1.4	8	17	.03	3.8	1.5	4.7	2.0	25	2.1	3.4	.0	1.4	50	16
Jan. 1-10, 1938	2,262	48	396	6.8	1.0	6	18	.02	4.2	1.7	4.4	2.2	26	2.2	3.2	.0	2.5	52	17
Jan. 11-20	1,981	51	22	1.6	1.0	6	15	.10	4.8	2.4	5.1	1.6	29	3.0	3.1	.0	.60	51	22
Jan. 21-31	1,672	47	16	3.2	1.8	8	16	.08	4.6	2.2	7.0	.7	32	2.8	4.2	.0	.40	57	21
Feb. 1-10	1,495	53	26	7.8	5.8	6	17	.02	5.2	2.2	5.6	2.0	36	2.2	3.8	.0	.05	65	22
Feb. 11-19	1,360		15	2.4	1.2	8	17	.09	4.5	2.0	5.5	1.5	30	2.4	3.0	.0	.60	50	19
Feb. 20-28	1,557	58	14	2.4	2.2	8	15	.06	4.8	2.1	5.5	1.4	29	3.5	3.5	.0	.48	53	21
Mar. 1-10	1,399	56	28	3.2	1.6	8	15	.16	4.8	1.9	5.5	1.5	30	2.8	3.5	.0	2.6	54	20
Mar. 11-20	3,111		216	5.6	2.1	8	14	.11	4.0	1.8	4.8	1.4	25	3.4	2.8	.0	.67	51	17
Mar. 21-31	2,510	69	193	4.2	2.3	8	15	.06	4.8	1.9	4.8	1.6	30	3.0	2.8	.0	.53	53	20
Apr. 1-10	22,190	67	409	10	2.6	10	10	.04	3.6	1.4	3.2	1.7	18	3.2	2.2	.0	1.2	38	13
Apr. 11-20	4,307	63	142	23	3.4	8	15	.01	4.0	1.7	5.5	1.8	24	4.0	4.5	.1	1.5	52	17
Apr. 21-30	3,076	64	125	13	2.8	8	17	.04	3.9	1.7	5.1	2.0	27	2.6	3.0	.1	1.8	54	17
Average			173	5.0	1.8	8	16	.05	4.1	1.8	5.1	1.7	27	2.9	3.2	.0	1.2	51	18
Weighted average	2,863		229	6.4	1.9	8	14	.05	3.8	1.7	4.7	1.7	24	3.0	3.0	.0	1.1	47	16

Equivalents per million

May 1-10, 1937	9,565								0.170	0.115	0.152	0.026	0.344	0.062	0.051	0.000	0.006		
May 11-20	3,750								.200	.156	.196	.028	.459	.075	.070	.000	.013		
May 21-31	2,624								.200	.148	.204	.028	.443	.071	.062	.000	.012		
June 1-10	2,013								.200	.173	.235	.033	.459	.052	.068	.000	.012		
June 11-20	2,145								.190	.156	.196	.038	.410	.064	.062	.005	.016		
June 21-30	1,838								.185	.148	.191	.041	.410	.054	.062	.000	.018		
July 1-10	2,360								.205	.115	.174	.036	.393	.073	.056	.000	.004		
July 11-20	1,263								.190	.148	.200	.038	.393	.079	.079	.000	.016		
July 21-31	1,303								.180	.132	.217	.036	.426	.050	.079	.000	.019		
Aug. 1-10	2,010								.170	.132	.209	.046	.426	.056	.070	.000	.019		
Aug. 11-20	1,680								.180	.132	.178	.044	.393	.054	.068	.000	.019		
Aug. 21-31	2,134								.185	.132	.191	.036	.377	.058	.070	.005	.013		
Sept. 1-10	2,480								.170	.140	.196	.046	.426	.054	.082	.005	.023		
Sept. 11-20	1,108								.210	.173	.230	.046	.475	.058	.085	.000	.010		
Sept. 21-30	746										.309	.049		.064	.118	.005	.026		
Oct. 1-10	1,417								.225	.140	.265	.059	.508	.056	.127	.000	.045		
Oct. 11-20	1,877								.200	.107	.222	.046	.426	.040	.090	.000	.018		
Oct. 21-31	5,455										.378	.082		.069	.175	.000	.001		
Nov. 1-10	1,582								.170	.132	.209	.041	.361	.038	.087	.000	.039		
Nov. 11-20	1,742								.230	.181	.339	.092	.508	.062	.220	.000	.018		
Nov. 21-30	1,550								.270	.164	.196	.051	.508	.054	.085	.000	.031		
Dec. 1-10	1,526								.200	.123	.209	.051	.426	.048	.090	.000	.039		
Dec. 11-20	1,446								.225	.181			.524	.119		.000	.039		
Dec. 21-31	2,449								.190	.123	.204	.051	.410	.044	.096	.000	.023		
Jan. 1-10, 1938	2,262								.210	.140	.191	.056	.426	.046	.090	.000	.040		
Jan. 11-20	1,981								.240	.197	.222	.041	.475	.062	.087	.000	.010		
Jan. 21-31	1,672								.230	.181	.304	.018	.524	.058	.118	.000	.006		
Feb. 1-10	1,495								.260	.181	.244	.051	.590	.046	.107	.000	.001		
Feb. 11-19	1,360								.225	.164	.239	.038	.492	.050	.085	.000	.010		
Feb. 20-28	1,557								.240	.173	.239	.036	.475	.073	.099	.000	.008		
Mar. 1-10	1,399								.240	.156	.239	.038	.492	.058	.099	.000	.042		
Mar. 11-20	3,111								.200	.148	.209	.036	.410	.071	.079	.000	.011		
Mar. 21-31	2,510								.240	.156	.209	.041	.492	.062	.079	.000	.008		
Apr. 1-10	22,190								.150	.115	.139	.044	.295	.067	.062	.000	.019		
Apr. 11-20	4,307								.200	.140	.239	.046	.393	.083	.127	.005	.024		
Apr. 21-30	3,076								.195	.140	.222	.051	.443	.054	.085	.005	.029		
Average									.205	.148	.222	.044	.443	.060	.090	.000	.019		
Weighted average	2,863								.190	.140	.204	.044	.393	.062	.085	.000	.018		

Maximum total dissolved solids 65, Nov. 11-20, 1937, Feb. 1-10, 1938; minimum total dissolved solids 38, Apr. 1-10, 1938.
Maximum total hardness 22, Nov. 21-31, 1937, Jan. 11-20, Feb. 1-10, 1938; minimum total hardness 13, Apr. 1-10, 1938.

TABLE 19.—*Analyses of water from the Ogeechee River near Eden, Ga., 1937–38*

[Analyses by William L. Lamar and Arthur T. Ness. Drainage area, 2,650 square miles]

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids[1]	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
			Parts per million																
May 1–10, 1937	4,962	67	9	13	11	80	6.7	0.19	5.8	1.3	3.3	0.7	24	1.6	3.2	0.0	0.34	54	20
May 11–20	5,973	70	10	11	10	86	8.1	.35	6.3	1.2	3.1	.7	22	2.1	3.5	.0	.27	55	21
May 21–31	2,471	76	7	9.6	6.4	36	8.8	.45	8.5	1.4	4.2	.7	33	2.1	3.5	.0	.45	63	27
June 1–10	1,489	80	7	8.4	6.8	56	11	.48	10	1.5	4.3	.7	38	2.1	3.8	.0	.50	67	31
June 11–20	1,104	82	7	6.2	5.0	38	10	.41	9.8	1.6	3.8	.8	36	2.5	3.8	.0	.41	65	31
June 21–30	1,599	80	7	9.2	7.1	44	12	.43	8.5	1.2	3.4	.6	31	2.8	3.5	.0	.18	62	26
July 1–10	1,285	80	7	11	8.2	44	10	.18	8.6	1.1	3.6	.6	31	2.5	3.8	.0	.17	62	26
July 11–20	1,350	83	7	13	12	56	10	.24	7.2	1.3	3.5	.7	26	2.7	4.0	.0	.26	61	23
July 21–31	1,054	82	9	12	11	56	9.4	.16	7.4	1.3	3.7	.7	26	3.3	4.0	.0	.24	59	24
Aug. 1–10	1,718	80	8	14	15	72	9.0	.16	5.6	1.0	3.5	.6	19	2.8	3.5	.0	.24	56	18
Aug. 11–20	1,821	80	9	16	15	66	8.3	.20	6.2	1.2	3.0	.8	21	2.8	3.2	.0	.22	58	20
Aug. 21–31	1,617	80	7	15	13	64	11	.26	6.6	1.1	3.3	.6	22	2.6	3.8	.0	.20	58	21
Sept. 1–10	3,101	78	9	26	24	108	10	.06	5.4	1.1	3.3	1.0	17	3.1	4.0	.0	.18	64	18
Sept. 11–20	3,010	75	7	23	20	90	12	.16	5.3	1.0	3.0	.8	20	2.3	4.0	.0	.24	63	17
Sept. 21–30	1,549	73	6	14	14	56	12	.36	6.2	1.1	3.1	.8	22	2.3	4.5	.0	.28	61	20
Oct. 1–10	904	74	8	14	13	60	11	.14	7.2	1.1	3.5	.7	26	2.3	5.0	.0	.28	60	23
Oct. 11–20	798	67	6	10	9.6	42	12	.16	7.8	1.2	3.5	.7	28	3.0	4.5	.0	.18	58	24
Oct. 21–31	774	60	7	11	10	40	12	.30	7.8	1.3	3.7	1.6	28	2.6	4.5	.0	.14	57	25
Nov. 1–10	953	59	8	9.8	9.0	46	12	.36	5.9	1.4	3.1	.9	20	3.7	4.8	.0	.08	54	20
Nov. 11–20	1,122	58	7	12	11	54	12	.22	6.6	1.2	3.6	1.2	24	2.9	4.0	.0	.08	58	21
Nov. 21–30	981	50	3	9.0	8.4	40	12	.45	7.4	1.4	3.5	1.1	28	2.1	5.0	.0	.06	58	24
Dec. 1–10	984	48	4	6.8	6.0	35	14	.33	7.8	1.5	3.9	1.2	29	2.2	5.2	.0	.08	58	26
Dec. 11–20	1,043	46	4	6.8	-------	26	13	.16	9.4	1.4	4.0	.8	34	2.3	5.2	.0	.08	61	29
Dec. 21–31	1,368	50	5	9.8	-------	40	23	.22	7.6	1.5	6.1	.7	32	3.0	5.8	.0	.08	75	25
Jan. 1–10, 1938	1,608	51	5	9.4	8.4	36	19	.30	6.2	1.3	4.0	1.1	24	3.1	5.5	.0	.08	62	21
Jan. 11–20	1,502	49	5	7.4	6.0	32	13	.42	6.2	1.1	4.1	.2	22	2.5	5.8	.0	.08	53	20
Jan. 21–31	1,366	51	5	7.6	5.8	34	12	.30	7.0	1.2	4.4	.4	26	1.8	5.5	.0	.06	54	22
Feb. 1–10	1,156	53	6	8.4	7.2	28	11	.20	8.0	1.2	4.2	.6	32	2.3	4.8	.0	.12	52	25
Feb. 11–19	1,028	60	8	8.0	7.2	34	9.4	.30	9.5	1.2	3.9	.8	35	2.1	5.0	.0	.08	56	29
Feb. 20–28	1,074	57	5	9.8	8.6	34	8.5	.20	9.4	1.3	3.6	.8	35	1.8	4.8	.0	.06	56	29
Mar. 1–10	1,063	58	5	8.4	7.2	36	7.6	.32	9.2	1.2	3.8	.8	33	2.1	4.8	.0	.08	55	28
Mar. 11–20	932	63	5	6.2	5.4	34	7.1	.12	10	1.2	3.8	.7	37	1.9	4.2	.0	.12	56	30
Mar. 21–31	1,148	69	7	8.4	7.2	35	8.8	.28	9.5	1.2	4.0	1.0	35	2.3	4.5	.0	.12	59	29
Apr. 1–10	1,301	66	9	10	8.8	36	10	.22	9.0	1.4	3.8	1.2	34	2.9	4.5	.0	.16	61	28
Apr. 11–20	6,540	62	14	24	19	62	8.9	.18	4.4	1.0	3.3	1.2	16	3.7	3.8	.0	.16	57	15
Apr. 21–30	4,772	67	11	20	19	64	12	.43	5.7	1.0	3.4	1.0	23	2.8	3.2	.0	.12	62	18
Average	-------	-------	7	12	10	50	11	.27	7.5	1.2	3.7	.8	27	2.5	4.3	.0	.18	59	24
Weighted average	1,844	-------	8	14	12	59	10	.27	6.8	1.2	3.6	.8	25	2.6	4.1	.0	.20	59	22

Equivalents per million

May 1-10, 1937	4,962	-----	-----	-----	-----	-----	-----	-----	0.290	0.107	0.144	0.018	0.393	0.033	0.090	0.000	0.006	-----	-----
May 11-20	5,973	-----	-----	-----	-----	-----	-----	-----	.314	.099	.135	.018	.361	.044	.099	.000	.004	-----	-----
May 21-31	2,471	-----	-----	-----	-----	-----	-----	-----	.424	.115	.183	.018	.541	.044	.099	.000	.007	-----	-----
June 1-10	1,489	-----	-----	-----	-----	-----	-----	-----	.499	.123	.187	.018	.623	.044	.107	.000	.008	-----	-----
June 11-20	1,104	-----	-----	-----	-----	-----	-----	-----	.489	.132	.165	.020	.590	.052	.107	.000	.007	-----	-----
June 21-30	1,599	-----	-----	-----	-----	-----	-----	-----	.424	.099	.148	.015	.508	.058	.099	.000	.003	-----	-----
July 1-10	1,285	-----	-----	-----	-----	-----	-----	-----	.429	.090	.156	.015	.508	.052	.107	.000	.003	-----	-----
July 11-20	1,350	-----	-----	-----	-----	-----	-----	-----	.359	.107	.152	.018	.426	.056	.113	.000	.004	-----	-----
July 21-31	1,054	-----	-----	-----	-----	-----	-----	-----	.369	.107	.161	.018	.426	.069	.113	.000	.004	-----	-----
Aug. 1-10	1,718	-----	-----	-----	-----	-----	-----	-----	.280	.082	.152	.015	.311	.058	.099	.000	.004	-----	-----
Aug. 11-20	1,821	-----	-----	-----	-----	-----	-----	-----	.310	.099	.130	.020	.344	.058	.090	.000	.004	-----	-----
Aug. 21-31	1,617	-----	-----	-----	-----	-----	-----	-----	.329	.090	.144	.015	.361	.054	.107	.000	.003	-----	-----
Sept. 1-10	3,101	-----	-----	-----	-----	-----	-----	-----	.270	.090	.144	.026	.279	.064	.113	.000	.003	-----	-----
Sept. 11-20	3,010	-----	-----	-----	-----	-----	-----	-----	.264	.082	.130	.020	.328	.048	.113	.000	.004	-----	-----
Sept. 21-30	1,549	-----	-----	-----	-----	-----	-----	-----	.310	.090	.135	.020	.361	.048	.127	.000	.004	-----	-----
Oct. 1-10	904	-----	-----	-----	-----	-----	-----	-----	.359	.090	.152	.018	.426	.048	.141	.000	.004	-----	-----
Oct. 11-20	798	-----	-----	-----	-----	-----	-----	-----	.389	.099	.152	.018	.459	.062	.127	.000	.003	-----	-----
Oct. 21-31	774	-----	-----	-----	-----	-----	-----	-----	.389	.107	.161	.041	.459	.054	.127	.000	.002	-----	-----
Nov. 1-10	953	-----	-----	-----	-----	-----	-----	-----	.294	.115	.135	.023	.328	.077	.135	.000	.001	-----	-----
Nov. 11-20	1,122	-----	-----	-----	-----	-----	-----	-----	.329	.099	.156	.031	.393	.060	.113	.000	.001	-----	-----
Nov. 21-30	981	-----	-----	-----	-----	-----	-----	-----	.369	.115	.152	.028	.459	.044	.141	.000	.001	-----	-----
Dec. 1-10	984	-----	-----	-----	-----	-----	-----	-----	.389	.123	.170	.031	.475	.046	.147	.000	.001	-----	-----
Dec. 11-20	1,043	-----	-----	-----	-----	-----	-----	-----	.469	.115	.174	.020	.557	.048	.147	.000	.001	-----	-----
Dec. 21-31	1,368	-----	-----	-----	-----	-----	-----	-----	.379	.123	.265	.018	.524	.062	.164	.000	.001	-----	-----
Jan. 1-10, 1938	1,608	-----	-----	-----	-----	-----	-----	-----	.310	.107	.174	.028	.393	.064	.155	.000	.001	-----	-----
Jan. 11-20	1,502	-----	-----	-----	-----	-----	-----	-----	.310	.090	.178	.005	.361	.052	.164	.000	.001	-----	-----
Jan. 21-31	1,366	-----	-----	-----	-----	-----	-----	-----	.349	.099	.191	.010	.426	.038	.155	.000	.001	-----	-----
Feb. 1-10	1,156	-----	-----	-----	-----	-----	-----	-----	.399	.099	.183	.015	.524	.048	.135	.000	.002	-----	-----
Feb. 11-19	1,028	-----	-----	-----	-----	-----	-----	-----	.474	.099	.170	.020	.574	.044	.141	.000	.001	-----	-----
Feb. 20-28	1,074	-----	-----	-----	-----	-----	-----	-----	.469	.107	.156	.020	.574	.038	.135	.000	.001	-----	-----
Mar. 1-10	1,063	-----	-----	-----	-----	-----	-----	-----	.459	.099	.165	.020	.541	.044	.135	.000	.001	-----	-----
Mar. 11-20	932	-----	-----	-----	-----	-----	-----	-----	.499	.099	.165	.018	.606	.040	.118	.000	.002	-----	-----
Mar. 21-31	1,148	-----	-----	-----	-----	-----	-----	-----	.474	.099	.174	.026	.574	.048	.127	.000	.002	-----	-----
Apr. 1-10	1,301	-----	-----	-----	-----	-----	-----	-----	.449	.115	.165	.031	.557	.060	.127	.000	.003	-----	-----
Apr. 11-20	6,540	-----	-----	-----	-----	-----	-----	-----	.220	.082	.144	.031	.262	.077	.107	.000	.003	-----	-----
Apr. 21-30	4,772	-----	-----	-----	-----	-----	-----	-----	.284	.082	.148	.026	.377	.058	.090	.000	.002	-----	-----
Average	-----	-----	-----	-----	-----	-----	-----	-----	.374	.099	.161	.020	.443	.052	.121	.000	.003	-----	-----
Weighted average	1,844	-----	-----	-----	-----	-----	-----	-----	.339	.099	.156	.020	.410	.054	.116	.000	.003	-----	-----

[1] Includes a large proportion of organic matter for some of the analyses.

Maximum total dissolved solids 75, Dec. 21-31, 1937; minimum total dissolved solids 52, Feb. 1-10, 1938.
Maximum total hardness 31, June 1-10, 11-20, 1937; minimum total hardness 15, Apr. 11-20, 1938.

TABLE 20.—*Analyses of water from the Satilla River near Waycross, Ga., 1937–38*

[Analyses by William L. Lamar and Arthur T. Ness. Drainage area, 1,300 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids[1]	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
May 1–10, 1937	1,684	70	35	23	16	108	5.3	0.04	1.6	0.9	3.7	0.6	4.0	2.1	4.5	0.1	0.36	50	7.7
May 11–20	652	75	18	23	15	95	5.6	.07	1.3	.9	3.8	.7	4.0	2.8	6.0	.0	.27	51	6.9
May 21–31	135	82	9	16	14	90	5.8	.06	1.8	.8	4.1	.5	6.0	2.7	5.5	.0	.29	50	7.8
June 1–10	244	84	11	14	13	88	5.7	.06	1.7	.8	3.9	.5	6.0	2.1	4.8	.0	.18	47	7.5
June 11–20	374	83	12	14	14	92	3.8	.05	1.3	1.1	3.3	.6	5.0	2.2	4.2	.0	.14	46	7.8
June 21–30	246	84	10	14	13	74	4.9	.05	1.1	1.1	3.4	.5	6.0	1.8	4.2	.0	.16	43	7.3
July 1–10	226	85	11	16	15	84	5.5	.10	1.7	.7	3.3	.5	5.0	2.8	4.2	.0	.12	46	7.1
July 11–20	494	84	17	17	15	96	5.2	.04	1.6	1.0	3.0	.6	4.0	2.3	3.8	.0	.12	44	8.1
July 21–31	1,296	81	18	25	22	108	5.7	.04	2.3	1.0	3.5	.8	6.0	2.4	4.5	.0	.14	52	9.8
Aug. 1–10	1,553	80	19	25	22	116	5.1	.05	1.9	1.1	3.3	.9	5.0	1.6	4.2	.0	.16	53	9.3
Aug. 11–20	1,147	80	12	29	26	120	4.0	.07	1.8	.9	3.3	.7	6.0	2.0	4.5	.0	.16	52	8.2
Aug. 21–31	704	82	12	28	25	116	4.5	.06	1.0	1.0	3.2	.9	5.0	1.6	4.0	.0	.12	50	6.6
Sept. 1–10	504	82	13	27	25	114	6.5	.08	1.8	1.0	3.3	.8	5.0	2.5	5.0	.0	.12	54	8.6
Sept. 11–20	347	78	12	28	26	110	5.4	.13	1.4	1.0	3.1	.7	6.0	2.2	4.5	.0	.18	51	7.6
Sept. 21–30	1,373	73	14	30	27	120	5.1	.09	2.0	1.0	2.8	.8	6.0	1.9	5.0	.0	.18	55	9.1
Oct. 1–10	1,102	76	10	29	28	124	6.0	.07	1.7	1.1	3.4	.7	5.0	2.5	5.5	.0	.14	56	8.8
Oct. 11–20	415	69	6	30	28	130	6.6	.11	1.8	1.0	3.6	.6	6.0	2.6	5.0	.0	.12	59	8.6
Oct. 21–31	182	63	4	26	24	110	6.9	.16	1.6	1.0	3.8	.8	5.0	2.3	5.5	.0	.12	55	8.1
Nov. 1–10	148	63	5	22	20	92	7.2	.14	1.4	1.0	3.7	.7	5.0	2.0	6.5	.0	.08	51	7.6
Nov. 11–20	206	60	9	22	19	95	7.6	.08	1.8	1.2	3.9	.9	5.0	1.9	7.0	.0	.10	53	9.4
Nov. 21–30	328	52	7	21	19	88	6.1	.10	1.8	1.4	3.7	.8	6.0	1.3	8.0	.0	.08	54	10
Dec. 1–10	230	48	5	19	20	86	8.1	.07	1.4	1.4	4.3	.8	5.0	1.7	8.2	.0	.08	53	9.2
Dec. 11–20	174	51	5	20	18	72	8.2	.08	1.6	1.2	4.7	.7	7.0	2.1	8.2	.0	.15	49	8.9
Dec. 21–31	345	55	6	20	19	86	8.1	.10	1.4	1.2	4.1	.6	6.0	1.7	8.0	.0	.10	53	8.4
Jan. 1–10, 1938	311	55	6	20	18	72	7.0	.12	1.8	1.3	4.4	.8	6.0	1.9	8.5	.0	.08	52	9.8
Jan. 11–20	266	53	5	19	16	72	7.3	.08	1.8	1.0	4.6	.3	6.0	1.6	8.0	.0	.10	51	8.6
Jan. 21–31	353	54	5	22	18	82	6.9	.16	1.6	1.2	4.7	.3	6.0	.8	8.5	.0	.06	52	8.9
Feb. 1–10	267	59	5	24	23	76	5.4	.06	1.8	.9	3.9	.6	6.0	1.1	8.0	.0	.10	49	8.2
Feb. 11–19	163	64	5	23	20	70	6.4	.10	1.9	1.1	4.2	.7	6.0	1.3	7.5	.0	.08	46	9.3
Feb. 20–28	121	60	4	22	20	74	4.8	.11	2.0	.9	4.1	.7	6.0	1.9	7.5	.0	.08	46	8.7
Mar. 1–10	124	64	6	20	18	68	4.2	.06	1.6	1.0	4.3	.7	6.0	2.0	7.5	.0	.08	43	8.1
Mar. 11–20	163	67	10	18	15	70	3.4	.04	1.6	1.0	4.7	.8	6.0	2.1	7.0	.0	.12	40	8.1
Mar. 21–31	295	73	11	22	19	76	4.7	.04	1.6	1.0	4.7	.9	6.0	1.8	7.2	.0	.10	51	8.1
Apr. 1–10	68.5	70	8	18	16	64	5.7	.02	1.5	1.0	4.3	.8	7.0	1.8	6.5	.0	.14	42	7.8
Apr. 11–20	74.3	72	10	20	16	48	4.5	.08	1.6	.8	4.0	.8	7.0	2.5	6.5	.0	.10	39	7.3
Apr. 21–30	62.3	75	10	19	17	50	4.9	.08	1.4	.8	4.1	.8	7.0	2.3	6.5	.0	.14	41	6.8
Average	--------	--------	10	22	19	90	5.8	.08	1.6	1.0	3.8	.7	5.7	2.0	6.1	.0	.13	49	8.1
Weighted average	457	--------	14	24	21	104	5.6	.07	1.7	1.0	3.6	.7	5.4	2.0	5.4	.0	.16	51	8.4

Equivalents per million

May 1-10, 1937	1,684	----	----	----	----	----	----	----	0.080	0.074	0.161	0.015	0.066	0.044	0.127	0.005	0.006	----	----
May 11-20	652	----	----	----	----	----	----	----	.065	.074	.165	.018	.066	.058	.169	.000	.004	----	----
May 21-31	135	----	----	----	----	----	----	----	.090	.066	.178	.013	.098	.056	.155	.000	.005	----	----
June 1-10	244	----	----	----	----	----	----	----	.085	.066	.170	.013	.098	.044	.135	.000	.003	----	----
June 11-20	374	----	----	----	----	----	----	----	.065	.090	.144	.015	.082	.046	.118	.000	.002	----	----
June 21-30	246	----	----	----	----	----	----	----	.055	.090	.148	.013	.098	.038	.118	.000	.003	----	----
July 1-10	226	----	----	----	----	----	----	----	.085	.058	.144	.013	.082	.058	.118	.000	.002	----	----
July 11-20	494	----	----	----	----	----	----	----	.080	.082	.130	.015	.066	.048	.107	.000	.002	----	----
July 21-31	1,296	----	----	----	----	----	----	----	.115	.082	.152	.020	.098	.050	.127	.000	.002	----	----
Aug. 1-10	1,553	----	----	----	----	----	----	----	.095	.090	.144	.023	.082	.033	.118	.000	.003	----	----
Aug. 11-20	1,147	----	----	----	----	----	----	----	.090	.074	.144	.018	.098	.042	.127	.000	.003	----	----
Aug. 21-31	704	----	----	----	----	----	----	----	.050	.082	.139	.023	.082	.033	.113	.000	.002	----	----
Sept. 1-10	504	----	----	----	----	----	----	----	.090	.082	.144	.020	.082	.052	.141	.000	.002	----	----
Sept. 11-20	347	----	----	----	----	----	----	----	.070	.082	.135	.018	.098	.046	.127	.000	.003	----	----
Sept. 21-30	1,373	----	----	----	----	----	----	----	.100	.082	.122	.020	.098	.040	.141	.000	.003	----	----
Oct. 1-10	1,102	----	----	----	----	----	----	----	.085	.090	.148	.018	.082	.052	.155	.000	.002	----	----
Oct. 11-20	415	----	----	----	----	----	----	----	.090	.082	.156	.015	.098	.054	.141	.000	.002	----	----
Oct. 21-31	182	----	----	----	----	----	----	----	.080	.082	.165	.020	.082	.048	.155	.000	.002	----	----
Nov. 1-10	148	----	----	----	----	----	----	----	.070	.082	.161	.018	.082	.042	.183	.000	.001	----	----
Nov. 11-20	206	----	----	----	----	----	----	----	.090	.099	.170	.023	.082	.040	.197	.000	.002	----	----
Nov. 21-30	328	----	----	----	----	----	----	----	.090	.115	.161	.020	.098	.027	.226	.000	.001	----	----
Dec. 1-10	230	----	----	----	----	----	----	----	.070	.115	.187	.020	.082	.035	.231	.000	.001	----	----
Dec. 11-20	174	----	----	----	----	----	----	----	.080	.099	.204	.018	.115	.044	.231	.000	.002	----	----
Dec. 21-31	345	----	----	----	----	----	----	----	.070	.099	.178	.015	.098	.035	.226	.000	.002	----	----
Jan. 1-10, 1938	311	----	----	----	----	----	----	----	.090	.107	.191	.020	.098	.040	.240	.000	.001	----	----
Jan. 11-20	266	----	----	----	----	----	----	----	.090	.082	.200	.008	.098	.033	.226	.000	.002	----	----
Jan. 21-31	353	----	----	----	----	----	----	----	.080	.099	.204	.008	.098	.017	.240	.000	.001	----	----
Feb. 1-10	267	----	----	----	----	----	----	----	.090	.074	.170	.015	.098	.023	.226	.000	.002	----	----
Feb. 11-19	163	----	----	----	----	----	----	----	.095	.090	.183	.018	.098	.027	.212	.000	.001	----	----
Feb. 20-28	121	----	----	----	----	----	----	----	.100	.074	.178	.018	.098	.040	.212	.000	.001	----	----
Mar. 1-10	124	----	----	----	----	----	----	----	.080	.082	.187	.018	.098	.042	.212	.000	.001	----	----
Mar. 11-20	163	----	----	----	----	----	----	----	.080	.082	.204	.020	.098	.044	.197	.000	.002	----	----
Mar. 21-31	295	----	----	----	----	----	----	----	.080	.082	.204	.023	.098	.038	.203	.000	.002	----	----
Apr. 1-10	68.5	----	----	----	----	----	----	----	.075	.082	.187	.020	.115	.038	.183	.000	.002	----	----
Apr. 11-20	74.3	----	----	----	----	----	----	----	.080	.066	.174	.020	.115	.052	.183	.000	.002	----	----
Apr. 21-30	62.3	----	----	----	----	----	----	----	.070	.066	.178	.020	.115	.048	.183	.000	.002	----	----
Average	----	----	----	----	----	----	----	----	.080	.082	.165	.018	.093	.042	.172	.000	.002	----	----
Weighted average	457	----	----	----	----	----	----	----	.085	.082	.156	.018	.088	.042	.152	.000	.003	----	----

[1] Includes a large proportion of organic matter.

Maximum total dissolved solids 59, Oct. 11-20, 1937; minimum total dissolved solids 39, Apr. 11-20, 1938.
Maximum total hardness 10, Nov. 21-30, 1937; minimum total hardness 6.6, Aug. 21-31, 1937.

TABLE 21.—*Analyses of water from the Savannah River near Clyo, Ga., 1938–39*

[Analyses by William L. Lamar, Arthur T. Ness, and N. A. Talvitie. Drainage area, 9,850 square miles]

Parts per million

Date	Mean discharge (second-feet)	Temperature (° F.)	Suspended matter	Oxygen consumed		Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
				Unfiltered	Filtered														
May 1-10, 1938	8,974	75	76	6.6	2.2	8	12	0.02	5.0	1.7	4.1	1.2	27	2.7	2.6	0.0	0.46	47	19
May 11-20	7,460	74	77	4.9	2.0	8	13	.08	5.2	1.7	4.1	1.2	27	3.3	2.6	.0	.47	49	20
May 21-31	6,656	78	76	5.6	1.8	8	12	.03	4.9	1.5	3.8	1.0	25	3.2	2.5	.0	.53	45	18
June 1-10	10,840	76	152	7.6	2.7	10	11	.03	3.9	1.3	3.5	1.2	22	3.5	2.1	.0	.56	42	15
June 11-20	9,067	80	141	6.1	2.1	8	10	.03	4.3	1.3	3.4	1.0	22	3.2	2.1	.0	.56	40	16
June 21-30	9,127	81	185	5.0	2.2	8	11	.04	3.8	1.3	3.3	1.2	21	3.0	2.2	.0	.63	40	15
July 1-10	6,387	81	120	4.8	2.2	8	10	.04	4.4	1.4	3.4	1.0	24	2.8	2.2	.0	.63	42	17
July 11-20	6,294	82	98	4.3	1.7	10	11	.06	4.6	1.4	3.5	1.2	24	2.5	2.5	.0	.59	43	17
July 21-31	10,520	80	272	10	3.2	12	10	.02	3.9	1.2	2.7	2.1	19	3.2	2.0	.0	.69	39	15
Aug. 1-10	31,170	79	42	6.9	6.3	18	9.2	.03	4.0	1.2	2.2	2.2	20	2.9	1.6	.0	.37	40	15
Aug. 11-20	11,220	84	121	5.0	2.7	12	11	.05	4.1	1.3	2.5	2.0	20	2.8	2.0	.0	.41	39	16
Aug. 21-31	6,245	86	69	4.2	1.9	12	12	.08	4.4	1.3	2.8	1.8	23	2.4	2.0	.0	.34	40	16
Sept. 1-10	5,145	83	42	8.0	2.4	10	16	.07	5.2	1.4	3.7	1.7	29	1.7	2.4	.0	.18	50	19
Sept. 11-20	5,901	80	68	4.0	2.2	8	12	.03	4.2	1.2	4.0	.9	23	3.0	2.2	.0	.20	40	15
Sept. 21-30	4,472	75	44	2.8	1.3	8	13	.08	4.7	1.2	3.7	1.0	24	2.9	2.2	.0	.25	43	17
Oct. 1-10	4,833	69	40	3.6	2.2	10	12	.08	5.0	1.2	3.7	1.0	23	3.1	2.5	.0	.25	43	17
Oct. 11-20	4,115	69	33	2.4	1.4	10	12	.11	4.7	1.2	3.6	1.1	24	2.4	2.4	.0	.16	42	17
Oct. 21-31	3,841	65	25	2.8	2.0	10	12	.07	5.3	1.4	3.4	1.4	25	3.1	2.2	.0	.12	42	19
Nov. 1-10	4,402	65	29	3.7	2.0	10	11	.06	5.1	1.3	3.4	1.2	24	3.4	2.5	.0	.10	41	18
Nov. 11-20	5,437	64	42	4.2	2.5	8	11	.04	4.6	1.6	3.0	1.3	23	3.0	2.5	.0	.15	39	18
Nov. 21-30	6,702	56	51	4.9	2.8	10	11	.03	4.3	1.2	3.5	1.2	22	3.0	2.8	.0	.14	40	16
Dec. 1-10	5,793	49	38	2.9	2.2	11	12	.05	4.6	1.4	3.6	1.3	23	3.1	2.8	.0	.20	42	17
Dec. 11-20	5,966	49	28	3.2	2.0	11	11	.08	4.4	1.4	3.7	1.1	21	4.6	2.9	.0	.20	43	17
Dec. 21-31	6,067	49	39	2.7	1.9	8	11	.10	4.4	1.4	3.7	1.0	22	3.5	2.6	.0	.20	42	17
Jan. 1-10, 1939	8,374	50	155	4.5	2.6	13	10	.03	4.0	1.4	3.5	1.2	19	4.5	3.0	.0	.43	39	16
Jan. 11-20	8,487	51	94	4.1	2.1	11	11	.03	4.2	1.4	3.9	1.2	21	3.3	3.0	.0	.24	42	16
Jan. 21-31	8,139	48	79	3.4	2.0	11	15	.12	4.7	1.5	3.6	1.2	24	2.6	2.9	.0	.10	46	18
Feb. 1-10	10,910	53	216	5.6	2.2	11	11	.09	3.4	1.3	3.3	1.0	19	3.1	2.8	.0	.26	39	14
Feb. 11-19	24,040	56	118	6.9	4.0	18	8.8	.03	3.3	1.1	2.8	1.2	15	4.8	2.5	.0	.17	36	13
Feb. 20-28	27,800	55	66	6.5	4.1	21	9.4	.05	3.2	1.0	2.9	1.1	16	3.6	2.5	.0	.15	35	12
Mar. 1-10	51,590	55	78	7.4	5.2	44	7.4	.02	3.2	1.0	2.2	1.1	14	3.3	2.1	.0	.15	34	12
Mar. 11-20	29,270	60	38	6.1	3.6	19	10	.04	3.6	1.1	3.4	1.2	17	2.9	2.4	.0	.30	38	14
Mar. 21-31	13,980	62	48	5.8	2.6	10	11	.02	3.8	1.2	3.6	1.0	21	2.3	2.5	.0	.40	39	14
Apr. 1-10	16,260	63	68	6.2	3.6	16	10	.02	4.0	1.3	3.6	1.2	21	2.3	2.5	.0	.50	41	15
Apr. 11-20	14,390	65	46	5.0	3.2	14	11	.02	4.4	1.3	3.8	1.1	22	2.1	2.5	.0	.40	42	16
Apr. 21-30	10,140	69	56	4.4	2.9	29	12	.07	4.4	1.3	4.0	1.1	23	1.8	2.6	.0	.60	44	16
Average	-------	-------	82	5.1	2.6	13	11	.05	4.3	1.3	3.4	1.2	22	3.0	2.4	.0	.34	41	16
Weighted average	11,240	-------	83	5.8	3.3	17	10	.04	4.0	1.2	3.2	1.3	20	3.1	2.4	.0	.33	40	15

Equivalents per million

May 1-10, 1938	8,974								0.250	0.140	0.178	0.031	0.443	0.056	0.073	0.000	0.007		
May 11-20	7,460								.260	.140	.178	.031	.443	.069	.073	.000	.008		
May 21-31	6,656								.245	.123	.165	.026	.410	.067	.070	.000	.008		
June 1-10	10,840								.195	.107	.152	.031	.361	.073	.059	.000	.009		
June 11-20	9,067								.215	.107	.148	.026	.361	.067	.059	.000	.009		
June 21-30	9,127								.190	.107	.144	.031	.344	.062	.062	.000	.010		
July 1-10	6,387								.220	.115	.148	.026	.393	.058	.062	.000	.010		
July 11-20	6,294								.230	.115	.152	.031	.393	.052	.070	.000	.010		
July 21-31	10,520								.195	.099	.117	.054	.311	.067	.056	.000	.011		
Aug. 1-10	31,170								.200	.099	.096	.056	.328	.060	.045	.000	.006		
Aug. 11-20	11,220								.205	.107	.109	.051	.328	.058	.056	.000	.007		
Aug. 21-31	6,245								.220	.107	.122	.046	.377	.050	.056	.000	.006		
Sept. 1-10	5,145								.260	.115	.161	.044	.475	.035	.068	.000	.003		
Sept. 11-20	5,901								.210	.099	.174	.023	.377	.062	.062	.000	.003		
Sept. 21-30	4,472								.235	.099	.161	.026	.393	.060	.062	.000	.004		
Oct. 1-10	4,833								.250	.099	.161	.026	.377	.064	.070	.000	.004		
Oct. 11-20	4,115								.235	.099	.156	.028	.393	.050	.068	.000	.003		
Oct. 21-31	3,841								.264	.115	.148	.036	.410	.064	.062	.000	.002		
Nov. 1-10	4,402								.255	.107	.148	.031	.393	.071	.070	.000	.002		
Nov. 11-20	5,437								.230	.132	.130	.033	.377	.062	.070	.000	.002		
Nov. 21-30	6,702								.214	.099	.152	.031	.361	.062	.079	.000	.002		
Dec. 1-10	5,793								.230	.115	.156	.033	.377	.064	.079	.000	.003		
Dec. 11-20	5,966								.220	.115	.161	.028	.344	.096	.082	.000	.003		
Dec. 21-31	6,067								.220	.115	.161	.026	.361	.073	.073	.000	.003		
Jan. 1-10, 1939	8,374								.200	.115	.152	.031	.311	.094	.085	.000	.007		
Jan. 11-20	8,487								.210	.115	.170	.031	.344	.069	.085	.000	.004		
Jan. 21-31	8,139								.235	.123	.156	.031	.393	.054	.082	.000	.002		
Feb. 1-10	10,910								.170	.107	.144	.026	.311	.064	.079	.000	.004		
Feb. 11-19	24,040								.165	.090	.122	.031	.246	.100	.070	.000	.003		
Feb. 20-28	27,800								.160	.082	.126	.028	.262	.075	.070	.000	.002		
Mar. 1-10	51,590								.160	.082	.096	.028	.230	.069	.059	.000	.002		
Mar. 11-20	29,270								.180	.090	.148	.031	.279	.060	.068	.000	.005		
Mar. 21-31	13,980								.190	.099	.156	.026	.344	.048	.070	.000	.006		
Apr. 1-10	16,260								.200	.107	.156	.031	.344	.048	.070	.000	.008		
Apr. 11-20	14,390								.220	.107	.165	.028	.361	.044	.070	.000	.006		
Apr. 21-30	10,140								.220	.107	.174	.028	.377	.038	.073	.000	.010		
Average									.215	.107	.148	.031	.361	.062	.068	.000	.006		
Weighted average	11,240								.200	.099	.139	.033	.328	.064	.068	.000	.005		

Maximum total dissolved solids 50, Sept. 1-10, 1938; minimum total dissolved solids 34, Mar. 1-10, 1939.
Maximum total hardness 20, May 11-20, 1938; minimum total hardness 12, Feb. 20-28, Mar. 1-10, 1939.

TABLE 22.—*Analyses of surface waters of Georgia*

[Analyses by William L. Lamar, Arthur T. Ness, and Charles G. Seegmiller]

Parts per million

Source	Date	Discharge (second-feet)	Suspended matter	Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
Alapaha River near Alapaha	Apr. 26, 1937	577	24	58	3.1	0.05	1.4	0.9	2.5	0.6	7.0	1.3	4.2	0.0	0.30	[1] 35	7.2
Alapaha River at Statenville	Nov. 11, 1937	235	8	60	8.2	.24	1.5	1.2	2.8	.6	5.0	1.8	5.0	.0	.08	[2] 45	8.7
Altamaha River at Doctortown [3]	1937–38	10,330	60	19	12	.10	7.2	1.6	4.1	1.2	31	3.2	3.2	.0	.46	54	25
Amicalola Creek near Dawsonville	June 10, 1941	74	12	5	7.8	.02	2.0	.8	1.5	1.0	10	1.6	1.0	.1	.10	19	8.3
Apalachee River near Buckhead	June 2, 1937	455	134	16	12	.04	3.1	1.4	3.2	1.3	19	2.4	2.2	.2	1.2	39	13
Beaverdam Creek near Elberton	Sept. 22, 1938			4	12	.02	2.2	1.0	3.9		16	1.9	1.9	.0	.42	33	9.6
Big Creek at Lakeland	Apr. 24, 1937	52	33	210	2.5	.04	1.4	1.4	3.2	1.0	5.0	1.3	5.2	.1	.56	[4] 64	9.2
Brier Creek near Waynesboro	Jan. 17, 1938		4	15	9.3	.12	4.8	.9	2.6	.8	20	1.7	3.2	.1	.26	37	16
Brier Creek at Millhaven	Dec. 4, 1937	456	2	22	10	.19	6.2	1.2	2.3	.8	22	1.5	4.0	.0	.10	45	20
Broad River near Bell	June 3, 1937	1,110	90	7	16	.04	4.0	1.7	4.4	1.0	25	2.2	2.5	.0	1.1	50	17
Burnt Fork near Decatur	May 7, 1938			6	13	.03	3.9	1.6	4.1		25	1.4	2.0	.0	.67	42	16
Canoochee River near Claxton	Dec. 4, 1937	94	10	72	11	.16	1.5	1.2	3.3	.8	5.0	1.2	7.5	.0	.08	[5] 51	8.7
Cartecay River near Ellijay	Apr. 1, 1937	290	5	6	7.5	.02	1.2	.7	2.0	.5	9.0	1.7	.9	.1	.08	19	5.9
Cedar Creek near Winder	Sept. 21, 1938			4	13	.02	1.5	.6	3.9		12	1.6	1.9	.0	.74	30	6.2
Chattahoochee River near Leaf	June 10, 1941	116	11	6	10	.04	2.2	.7	1.9	1.0	11	1.9	.8	.1	.17	25	8.4
Chattahoochee River near Gainesville	June 3, 1937	1,050	177	5	9.4	.01	2.0	.9	2.5	.7	10	3.5	1.6	.0	.83	27	8.7
Chattahoochee River near Norcross	Aug. 22, 1941	710	73	7	9.5	.08	3.0	1.0	2.7	1.0	15	2.2	2.2	.2	.30	31	12
Chattahoochee River near Vinings [6]	1937–38	2,220	207	9	11	.04	2.4	1.1	3.3	1.1	16	2.7	1.9	.0	.40	33	11
Chattahoochee River near Whitesburg	May 19, 1941	1,320	24	9	17	.05	4.6	1.7	5.4	1.8	15	3.4	4.8	.1	12	64	18
Chattahoochee River at West Point	Feb. 16, 1938	2,460	9	6	11	.09	3.8	1.5	5.0	1.2	24	2.0	3.6	.0	1.1	40	16
Chattahoochee River at Columbus [7]	1940–41	3,704	43	9	11	.05	3.9	1.3	5.2	1.5	21	4.7	3.5	.1	1.1	44	15
Chattahoochee River near Omaha	May 27, 1938		57	8	11	.06	3.4	1.5	6.0		24	3.3	2.9	.0	.72	40	15
Chattahoochee River near Hilton [8]	1940–41	5,700	75	7	10	.03	5.6	1.3	4.8	1.4	23	5.4	4.1	.1	.99	47	19
Chattooga River (Mobile River Basin) at Summerville.	Mar. 31, 1937	268	28	3	5.4	.01	27	5.9	1.9	.8	110	3.6	2.2	.0	1.5	99	92
Chattooga River (Savannah River Basin) near Clayton.	June 11, 1941	224	2	2	9.1	.02	1.6	.8	1.3	.8	9.0	1.7	.5	.1	.05	18	7.3
Chestatee River near Dahlonega	June 10, 1941	107	15	2	9.1	.01	2.2	.7	1.7	1.1	11	2.1	.8	.0	.14	24	8.4
Chickasawhatchee Creek at Elmodel	May 21, 1941	24	2	16	5.2	.01	31	1.2	2.8	.8	103	.7	3.5	.0	.65	100	82
Coahulla Creek near Varnell	Sept. 19, 1941	12.4	30	2	7.0	.01	34	10	1.0	1.4	154	2.4	1.1	.1	.85	128	126
Conasauga River at Tilton	do	112	8	5	3.5	.01	22	7.0	3.9	1.7	100	3.2	5.4	.1	.30	93	84
Coosa River near Rome	Mar. 30, 1937	5,600	14	6	8.9	.02	9.5	3.0	2.7	1.0	43	4.7	1.6	.0	.53	52	36
Coosawattee River near Ellijay	May 16, 1941	205	14	7	8.1	.01	1.8	1.3	1.2	.6	11	1.9	1.4	.0	.05	26	9.8
Coosawattee River at Carters	Mar. 31, 1937	1,090	6	6	7.8	.04	1.9	.9	2.5	1.0	11	3.9	1.0	.0	.08	25	8.4
Coosawattee River at Pine Chapel	Aug. 28, 1941	635	71	3	8.4	.02	4.5	1.6	1.4	.7	22	2.4	.9	.2	.20	31	18
Dikes Creek near Rome	May 14, 1941	3.7	7	5	6.7	.01	22	12	.9	.7	[9] 126	1.6	1.5	.0	.70	105	104
Dried Indian Creek at Covington	Sept. 13, 1938			10	15	.10	2.3	.9	4.5		18	.9	2.1	.0	.78	38	9.4

Equivalents per million

Alapaha River near Alapaha	Apr. 26, 1937	577	----	----	----	----	0.070	0.074	0.109	0.015	0.115	0.027	0.118	0.000	0.005	----	----
Alapaha River at Statenville	Nov. 11, 1937	235	----	----	----	----	.075	.099	.122	.015	.082	.038	.141	.000	.001	----	----
Altamaha River at Doctortown [3]	1937–38	10,330	----	----	----	----	.359	.132	.178	.031	.508	.067	.090	.000	.007	----	----
Amicalola Creek near Dawsonville	June 10, 1941	74	----	----	----	----	.100	.066	.065	.026	.164	.033	.028	.005	.002	----	----
Apalachee River near Buckhead	June 2, 1937	455	----	----	----	----	.155	.115	.139	.033	.311	.050	.062	.010	.019	----	----
Beaverdam Creek near Elberton	Sept. 22, 1938	----	----	----	----	----	.110	.082	.170		.262	.040	.054	.000	.007	----	----
Big Creek at Lakeland	Apr. 24, 1937	52	----	----	----	----	.070	.115	.139	.026	.082	.027	.147	.005	.009	----	----
Brier Creek near Waynesboro	Jan. 17, 1938	----	----	----	----	----	.240	.074	.113	.020	.328	.035	.090	.005	.004	----	----
Brier Creek at Millhaven	Dec. 4, 1937	456	----	----	----	----	.310	.099	.100	.020	.361	.031	.113	.000	.002	----	----
Broad River near Bell	June 3, 1937	1,110	----	----	----	----	.200	.140	.191	.026	.410	.046	.070	.000	.018	----	----
Burnt Fork near Decatur	May 7, 1928	----	----	----	----	----	.195	.132	.178		.410	.029	.056	.000	.011	----	----
Canoochee River near Claxton	Dec. 4, 1937	94	----	----	----	----	.075	.099	.144	.020	.082	.025	.212	.000	.001	----	----
Cartecay River near Ellijay	Apr. 1, 1937	290	----	----	----	----	.060	.058	.087	.013	.148	.035	.025	.005	.001	----	----
Cedar Creek near Winder	Sept. 21, 1938	----	----	----	----	----	.075	.049	.170		.197	.033	.054	.000	.012	----	----
Chattahoochee River near Leaf	June 10, 1941	116	----	----	----	----	.110	.058	.083	.026	.180	.040	.023	.005	.003	----	----
Chattahoochee River near Gainesville	June 3, 1937	1,050	----	----	----	----	.100	.074	.109	.018	.164	.073	.045	.000	.013	----	----
Chattahoochee River near Norcross	Aug. 22, 1941	710	----	----	----	----	.150	.082	.117	.026	.246	.046	.062	.010	.005	----	----
Chattahoochee River near Vinings [6]	1937–38	2,220	----	----	----	----	.120	.090	.144	.028	.262	.056	.054	.000	.006	----	----
Chattahoochee River near Whitesburg	May 19, 1941	1,320	----	----	----	----	.230	.140	.235	.046	.246	.071	.135	.005	.194	----	----
Chattahoochee River at West Point	Feb. 16, 1938	2,460	----	----	----	----	.190	.123	.217	.031	.393	.042	.102	.000	.018	----	----
Chattahoochee River at Columbus [7]	1940–41	3,704	----	----	----	----	.195	.107	.226	.038	.344	.098	.099	.005	.018	----	----
Chattahoochee River near Omaha	May 27, 1938	----	----	----	----	----	.170	.123	.262		.393	.069	.082	.000	.012	----	----
Chattahoochee River near Hilton [8]	1940–41	5,700	----	----	----	----	.280	.107	.209	.036	.377	.112	.116	.005	.016	----	----
Chattooga River (Mobile River Basin) at Summerville.	Mar. 31, 1937	268	----	----	----	----	1.348	.485	.083	.020	1.803	.075	.062	.000	.024	----	----
Chattooga River (Savannah River Basin) near Clayton.	June 11, 1941	224	----	----	----	----	.080	.066	.056	.020	.148	.035	.014	.005	.001	----	----
Chestatee River near Dahlonega	June 10, 1941	107	----	----	----	----	.110	.058	.074	.028	.180	.044	.023	.000	.002	----	----
Chickasawhatchee Creek at Elmodel	May 21, 1941	24	----	----	----	----	1.547	.099	.122	.020	1.688	.015	.099	.000	.010	----	----
Coahulla Creek near Varnell	Sept. 19, 1941	12.4	----	----	----	----	1.697	.822	.044	.036	2.524	.050	.031	.005	.014	----	----
Conasauga River at Tilton	do	112	----	----	----	----	1.098	.576	.170	.043	1.639	.067	.152	.005	.005	----	----
Coosa River near Rome	Mar. 30, 1937	5,600	----	----	----	----	.474	.247	.117	.026	.705	.098	.045	.000	.008	----	----
Coosawattee River near Ellijay	May 16, 1941	205	----	----	----	----	.090	.107	.052	.015	.180	.040	.040	.000	.001	----	----
Coosawattee River at Carters	Mar. 31, 1937	1,090	----	----	----	----	.095	.074	.109	.026	.180	.081	.028	.000	.001	----	----
Coosawattee River at Pine Chapel	Aug. 28, 1941	635	----	----	----	----	.225	.132	.061	.018	.361	.050	.025	.010	.003	----	----
Dikes Creek near Rome	May 14, 1941	3.7	----	----	----	----	1.098	.987	.039	.018	2.065	.033	.042	.000	.011	----	----
Dried Indian Creek at Covington	Sept. 13, 1938	----	----	----	----	----	.115	.074	.196		.295	.019	.059	.000	.013	----	----

[1] Large proportion of organic matter; sum of mineral constituents 18 parts.
[2] Large proportion of organic matter; sum of mineral constituents 24 parts.
[3] Average of analyses of composites of daily samples (see pp. 352–353).
[4] Large proportion of organic matter; sum of mineral constituents 19 parts.
[5] Large proportion of organic matter; sum of mineral constituents 29 parts.
[6] Average of analyses of composites of daily samples (see pp. 354–355).
[7] Average of analyses of composites of daily samples (see pp. 356–357).
[8] Average of analyses of composites of daily samples (see pp. 358–359).
[9] Includes equivalent of 7.9 parts of carbonate (CO_3).

TABLE 22.—*Analyses of surface waters of Georgia*—Continued

Parts per million

Source	Date	Discharge (second-feet)	Suspended matter	Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
East Amicalola Creek at Juno	June 10, 1941	26	10	5	7.7	0.04	1.5	0.6	1.4	1.0	8.0	1.1	1.0	0.0	0.15	18	6.2
Echeconnee Creek near Macon	Mar. 20, 1937	4,430	134	25	7.7	.35	2.2	.9	2.4	1.6	12	2.9	1.2	.0	.42	34	9.2
Echeconnee Creek near Macon	Mar. 25, 1937	404	41	15	15	.58	3.0	1.5	4.5	1.5	22	2.8	2.6	.0	.20	47	14
Etowah River near Dawsonville	Sept. 5, 1941	84	16	4	9.5	.01	2.6	1.0	1.3	1.1	13	1.6	1.0	.0	.12	24	11
Etowah River at Canton	Apr. 1, 1937	1,280	34	4	8.5	.01	2.8	1.0	2.1	.8	14	2.1	1.0	.1	.20	26	11
Etowah River near Cartersville [10]	1938–39	1,389	180	6	11	.03	4.0	1.3	2.8	1.0	22	3.2	1.5	.0	.21	36	15
Etowah River near Kingston	Mar. 30, 1937	2,600	38	5	11	.06	6.4	2.5	2.2	1.0	33	3.0	1.4	.0	.28	43	26
Etowah River at Rome	May 14, 1941	1,020	21	12	11	.07	11	4.3	2.4	1.0	58	2.2	1.8	.0	.98	61	45
Euharlee Creek at Rockmart	Apr. 19, 1938	------	------	6	6.7	.02	18	5.2	2.3		80	3.0	1.4	.0	.74	75	66
Fishing Creek near Milledgeville	Jan. 19, 1938	------	------	12	20	.03	7.1	3.8	9.1	1.9	43	5.6	10	.0	.20	80	33
Flint River near Griffin	Mar. 13, 1937	332	17	10	13	.34	4.0	1.4	3.9	.8	23	2.3	2.0	.0	.39	43	16
Flint River near Griffin	Apr. 9, 1937	1,920	96	15	5.6	.06	2.8	1.2	2.5	1.0	17	2.1	1.2	.0	.41	33	12
Flint River near Culloden	Apr. 10, 1937	9,840	159	9	4.4	.03	2.4	1.1	2.6	1.1	14	2.3	1.6	.1	.61	30	11
Flint River at Montezuma	Jan. 20, 1938	2,340	22	8	7.9	.11	3.4	1.2	2.3	1.2	16	2.4	2.5	.0	.25	30	13
Flint River at Oakfield	Jan. 21, 1938	2,930	13	8	9.1	.11	6.6	1.5	3.1	1.2	26	2.6	2.8	.0	.34	42	23
Flint River at Albany	Jan. 19, 1938	4,060	13	12	9.8	.16	7.0	1.2	3.6	.6	30	1.7	3.0	.0	.40	43	22
Flint River at Bainbridge	Dec. 9, 1937	5,540	7	10	8.2	.09	18	1.3	3.2	1.0	60	1.6	2.9	.0	.44	68	50
Hannahatchee Creek at Omaha	May 27, 1938	------	11	10	11	.04	5.3	1.3	2.8		16	7.4	2.6	.0	.33	41	19
Ichawaynochaway Creek at Milford	May 21, 1941	270	7	11	7.1	.01	11	1.2	.9	.7	35	.9	2.9	.0	1.4	47	32
Ichawaynochaway Creek near Newton	Jan. 18, 1938	900	5	14	7.5	.25	18	.9	2.8	.4	58	.9	3.2	.0	.50	66	49
Jacks Creek at Monroe	Sept. 21, 1938	------	------	3	10	.02	2.1	.9	2.8		13	1.4	1.8	.0	.57	27	8.9
Little Ocmulgee River at Towns	Apr. 3, 1937	567	8	69	7.4	.16	2.5	.9	2.9	.8	10	1.4	3.5	.0	.30	[11] 41	9.9
Little River near Adel	May 24, 1941	9.6	3	35	9.7	.03	4.0	.8	3.1	.7	11	1.9	5.9	.0	.05	43	13
Little Tallapoosa River at Carrollton	Mar. 24, 1937	178	27	20	13	.31	3.1	1.2	3.0	1.2	19	3.0	1.8	.0	.25	38	13
Long Cane Creek near La Grange	May 16, 1938	------	------	6	21	.05	4.7	2.0	4.4	1.1	31	2.5	1.9	.0	.32	54	20
Middle Oconee River near Athens	Nov. 30, 1937	280	13	8	14	.08	3.0	1.8	3.4	1.6	21	2.0	2.1	.0	.33	39	15
Mill Creek at Dalton	Jan. 5, 1940	------	------	2	7.5	.01	36	10	1.2		[12] 156	3.1	1.5	.1	.25	131	131
Mountaintown Creek near Ellijay	May 16, 1941	36	8	5	7.2	.01	2.0	.7	1.4	.7	10	1.4	.9	.0	.0	20	7.9
Ochlockonee River near Thomasville	Dec. 8, 1937	406	6	38	9.4	.13	1.2	1.3	3.7	.8	8.0	1.5	6.0	.0	.06	40	8.3
Ocmulgee River near Jackson	June 19, 1941	368	16	8	14	.04	4.4	1.7	6.1	2.2	24	4.5	4.2	.7	1.9	53	18
Ocmulgee River at Macon [13]	1937–38	2,573	95	9	12	.06	3.6	1.6	4.6	1.6	22	3.9	2.9	.0	.97	44	16
Ocmulgee River at Abbeville	Apr. 7, 1937	8,480	24	21	8.3	.31	5.7	1.5	3.4	1.0	25	4.0	2.6	.0	.57	48	20
Ocmulgee River at Lumber City	Nov. 10, 1937	3,000	50	10	11	.11	10	1.7	3.8	1.7	39	3.3	3.1	.0	.38	58	32
Oconee River at Athens	Nov. 15, 1940	------	------	6	15	.05	3.9	1.8	3.8	1.2	25	2.9	2.1	.1	.31	43	17
Oconee River near Greensboro	June 2, 1937	1,030	70	8	15	.07	3.1	1.5	3.7	1.2	21	3.2	2.1	.0	1.2	43	14

Equivalents per million

East Amicalola Creek at Juno	June 10, 1941	26	------	------	------	------	0.075	0.049	0.061	0.026	0.131	0.023	0.028	0.000	0.002	------	------
Echeconnee Creek near Macon	Mar. 20, 1937	4,430	------	------	------	------	.110	.074	.104	.041	.197	.060	.034	.000	.007	------	------
	Mar. 25, 1937	404	------	------	------	------	.150	.123	.196	.038	.361	.058	.073	.000	.003	------	------
Etowah River near Dawsonville	Sept. 5, 1941	84	------	------	------	------	.130	.082	.057	.028	.213	.033	.028	.000	.002	------	------
Etowah River at Canton	Apr. 1, 1937	1,280	------	------	------	------	.140	.082	.091	.020	.230	.044	.028	.005	.003	------	------
Etowah River near Cartersville [10]	1938–39	1,38[illegible]	------	------	------	------	.200	.107	.122	.026	.361	.067	.042	.000	.003	------	------
Etowah River near Kingston	Mar. 30, 1937	2,600	------	------	------	------	.319	.206	.096	.026	.541	.062	.040	.000	.004	------	------
Etowah River at Rome	May 14, 1941	1,020	------	------	------	------	.549	.354	.104	.026	.951	.046	.051	.000	.016	------	------
Euharlee Creek at Rockmart	Apr. 19, 1938	------	------	------	------	------	.898	.428	.100		1.311	.062	.040	.000	.012	------	------
Fishing Creek near Milledgeville	Jan. 19, 1938	------	------	------	------	------	.354	.312	.396	.049	.705	.117	.282	.000	.003	------	------
Flint River near Griffin	Mar. 13, 1937	332	------	------	------	------	.200	.115	.170	.020	.377	.048	.056	.000	.006	------	------
	Apr. 9, 1937	1,920	------	------	------	------	.140	.099	.109	.026	.279	.044	.034	.000	.007	------	------
Flint River near Culloden	Apr. 10, 1937	9,840	------	------	------	------	.120	.090	.113	.028	.230	.048	.045	.005	.010	------	------
Flint River at Montezuma	Jan. 20, 1938	2,340	------	------	------	------	.170	.099	.100	.031	.262	.050	.070	.000	.004	------	------
Flint River at Oakfield	Jan. 21, 1938	2,930	------	------	------	------	.329	.123	.135	.031	.426	.054	.079	.000	.006	------	------
Flint River at Albany	Jan. 19, 1938	4,060	------	------	------	------	.349	.099	.156	.015	.492	.035	.085	.000	.006	------	------
Flint River at Bainbridge	Dec. 9, 1937	5,540	------	------	------	------	.898	.107	.139	.026	.984	.033	.082	.000	.007	------	------
Hannahatchee Creek at Omaha	May 27, 1938	------	------	------	------	------	.264	.107	.122		.262	.154	.073	.000	.005	------	------
Ichawaynochaway Creek at Milford	May 21, 1941	270	------	------	------	------	.549	.099	.039	.018	.574	.019	.082	.000	.023	------	------
Ichawaynochaway Creek near Newton	Jan. 18, 1938	900	------	------	------	------	.898	.074	.122	.010	.951	.019	.090	.000	.008	------	------
Jacks Creek at Monroe	Sept. 21, 1938	------	------	------	------	------	.105	.074	.122		.213	.029	.051	.000	.009	------	------
Little Ocmulgee River at Towns	Apr. 3, 1937	567	------	------	------	------	.125	.074	.126	.020	.164	.029	.099	.000	.005	------	------
Little River near Adel	May 24, 1941	9.6	------	------	------	------	.200	.066	.135	.018	.180	.040	.166	.000	.001	------	------
Little Tallapoosa River at Carrollton	Mar. 24, 1937	178	------	------	------	------	.155	.099	.130	.031	.311	.062	.051	.000	.004	------	------
Long Cane Creek near La Grange	May 16, 1938	------	------	------	------	------	.235	.164	.191	.028	.508	.052	.054	.000	.005	------	------
Middle Oconee River near Athens	Nov. 30, 1937	280	------	------	------	------	.150	.148	.148	.041	.344	.042	.059	.000	.005	------	------
Mill Creek at Dalton	Jan. 5, 1940	------	------	------	------	------	1.797	.822	.052		2.557	.064	.042	.005	.004	------	------
Mountaintown Creek near Ellijay	May 16, 1941	36	------	------	------	------	.100	.058	.061	.018	.164	.029	.025	.000	.000	------	------
Ochlockonee River near Thomasville	Dec. 8, 1937	406	------	------	------	------	.060	.107	.161	.020	.131	.031	.169	.000	.001	------	------
Ocmulgee River near Jackson	June 19, 1941	368	------	------	------	------	.220	.140	.265	.056	.393	.094	.118	.037	.031	------	------
Ocmulgee River at Macon [13]	1937–38	2,573	------	------	------	------	.180	.132	.200	.041	.361	.081	.082	.000	.016	------	------
Ocmulgee River at Abbeville	Apr. 7, 1937	8,480	------	------	------	------	.284	.123	.148	.026	.410	.083	.073	.000	.009	------	------
Ocmulgee River at Lumber City	Nov. 10, 1937	3,000	------	------	------	------	.499	.140	.165	.044	.639	.069	.087	.000	.006	------	------
Oconee River at Athens	Nov. 15, 1940	------	------	------	------	------	.195	.148	.165	.031	.410	.060	.059	.005	.005	------	------
Oconee River near Greensboro	June 2, 1937	1,030	------	------	------	------	.155	.123	.161	.031	.344	.067	.059	.000	.019	------	------

[10] Average of analyses of composites of daily samples (see pp. 360–361).
[11] Large proportion of organic matter; sum of mineral constituents 25 parts.
[12] Includes equivalent of 5.9 parts of carbonate (CO_3).
[13] Average of analyses of composites of daily samples (see pp. 362–363).

TABLE 22.—*Analyses of surface waters of Georgia*—Continued

Parts per million

Source	Date	Discharge (second-feet)	Suspended matter	Color	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total dissolved solids	Total hardness as $CaCO_3$
Oconee River at Milledgeville [14]	1937-38	2,863	173	8	16	0.05	4.1	1.8	5.1	1.7	27	2.9	3.2	0.0	1.2	51	18
Oconee River at Dublin	Nov. 9, 1937	1,960	40	10	14	.06	5.4	2.1	5.2	2.0	27	3.7	4.2	.0	2.0	55	22
Oconee River near Mount Vernon	do	2,130	54	12	14	.12	6.8	1.8	4.0	1.8	34	2.9	2.9	.0	.24	54	24
Ogeechee River near Louisville	Dec. 5, 1937	421	4	16	13	.42	2.8	1.4	3.3	1.0	16	1.7	4.0	.0	.08	40	13
Ogeechee River at Scarboro	Dec. 4, 1937	745	3	25	13	.39	9.2	1.3	2.9	1.0	33	1.3	4.0	.0	.10	56	28
Ogeechee River near Eden [15]	1937-38	1,844	7	50	11	.27	7.5	1.2	3.7	.8	27	2.5	4.3	.0	.18	59	24
Ohoopee River near Reidsville	Dec. 3, 1937	144	4	36	12	.13	4.2	1.1	2.9	.8	14	1.6	4.8	.0	.06	46	15
Oostanaula River at Resaca	Mar. 31, 1937	2,240	11	4	7.7	.02	9.0	2.4	1.8	.9	39	3.3	1.2	.0	.29	44	32
Oostanaula River at Rome	May 14, 1941	871	28	9	7.9	.01	14	3.6	2.5	.8	63	2.4	2.2	.0	.60	63	50
Potato Creek above Thomaston	Apr. 10, 1937	744	54	14	5.6	.04	2.2	1.0	2.5	1.2	12	2.1	1.8	.1	.36	32	9.6
Sandy Creek near Athens	May 10, 1938	----	----	12	12	.12	2.9	1.5	3.0	1.5	20	2.3	2.0	.0	.60	37	13
Satilla River near Waycross [16]	1937-38	457	10	90	5.8	.08	1.6	1.0	3.8	.7	5.7	2.0	6.1	.0	.13	[3] 49	8.1
Satilla River at Atkinson	Nov. 11, 1937	324	6	90	8.0	.12	1.4	1.1	4.2	.6	5.0	2.1	7.0	.0	.12	[17] 51	8.0
Savannah River at Augusta	Nov. 3, 1937	----	397	12	10	.07	2.4	1.4	3.1	1.5	16	2.5	2.0	.0	.18	34	12
Savannah River at Stoney Bluff Landing	do	----	125	14	9.0	.05	2.9	1.5	2.8	1.6	16	2.9	2.2	.0	.16	34	13
Savannah River near Clyo	do	18,600	77	14	8.8	.06	3.4	1.2	3.0	1.6	16	2.9	2.5	.0	.20	36	13
Savannah River near Clyo [18]	1938-39	11,240	82	13	11	.05	4.3	1.3	3.4	1.2	22	3.0	2.4	.0	.34	41	16
Scarecorn Creek at Hinton	Aug. 29, 1941	7.6	7	6	12	.10	3.2	1.4	1.9	1.7	17	2.5	1.1	.1	.10	33	14
Seventeenmile Creek near Douglas	Apr. 6, 1937	650	16	91	3.2	.05	2.0	.9	3.0	.8	6.0	1.4	3.8	.0	.50	[4] 38	8.7
Soque River near Demorest	Sept. 6, 1941	77	21	6	11	.03	1.8	.9	1.5	1.0	11	1.4	1.1	.1	.20	24	8.2
South River near McDonough	June 19, 1941	154	62	6	16	.06	5.6	1.9	8.3	2.6	20	5.8	7.5	2.0	5.4	67	22
Spring Creek near Iron City	Jan. 18, 1938	363	5	12	4.9	.06	34	1.0	2.8	.5	109	1.1	3.2	.0	.28	102	89
Suwannee River at Fargo	Apr. 21, 1937	5,930	4	360	1.6	.02	2.8	1.4	4.6	1.7	3.0	1.3	7.8	.4	.25	[19] 106	13
Sweetwater Creek near Austell	Mar. 25, 1937	435	28	14	14	.14	4.3	1.7	3.4	1.0	23	4.1	1.8	.0	.40	42	18
Tired Creek near Cairo	May 20, 1941	----	12	35	7.7	.02	4.5	.9	2.3	.8	15	1.0	3.6	.0	.30	36	15
Tobesofkee Creek near Macon	Mar. 20, 1937	2,490	1,606	25	7.2	.23	2.0	.9	4.0	2.0	15	3.2	1.5	.1	.40	42	8.7
Tobesofkee Creek near Macon	Mar. 25, 1937	406	40	18	13	.13	2.8	1.2	4.1	1.8	19	2.3	2.8	.1	.37	40	12
Tugaloo River near Hartwell	June 23, 1941	502	4	7	11	.08	2.2	.9	2.8	1.0	14	2.1	1.4	.1	.23	29	9.2
Withlacoochee River near Quitman	Apr. 22, 1937	1,390	13	56	5.2	.11	1.4	1.6	3.0	.9	9.0	1.4	6.0	.4	.36	[11] 44	10
Yellow River at Porterdale	Sept. 13, 1938	----	----	5	14	.02	3.3	1.2	5.4		24	1.6	2.1	.0	.82	42	13

Equivalents per million

Oconee River at Milledgeville [14]	1937–38	2,863					0.205	0.148	0.222	0.044	0.443	0.060	0.090	0.000	0.019		
Oconee River at Dublin	Nov. 9, 1937	1,960					.270	.173	.226	.051	.443	.007	.118	.000	.032		
Oconee River near Mount Vernon	do	2,130					.339	.148	.174	.046	.557	.060	.082	.000	.004		
Ogeechee River near Louisville	Dec. 5, 1937	421					.140	.115	.144	.026	.262	.035	.113	.000	.001		
Ogeechee River at Scarboro	Dec. 4, 1937	745					.459	.107	.126	.026	.541	.027	.113	.000	.002		
Ogeechee River near Eden [15]	1937–38	1,844					.374	.099	.161	.020	.443	.052	.121	.000	.003		
Ohoopee River near Reidsville	Dec. 3, 1937	144					.210	.090	.126	.020	.230	.033	.135	.000	.001		
Oostanaula River at Resaca	Mar. 31, 1937	2,240					.449	.197	.078	.023	.639	.069	.034	.000	.005		
Oostanaula River at Rome	May 14, 1941	871					.699	.296	.109	.020	1.033	.050	.062	.000	.010		
Potato Creek above Thomaston	Apr. 10, 1937	744					.110	.082	.109	.031	.197	.044	.051	.005	.006		
Sandy Creek near Athens	May 10, 1938						.145	.123	.130	.038	.328	.048	.056	.000	.010		
Satilla River near Waycross [16]	1937–38	457					.080	.082	.165	.018	.093	.042	.172	.000	.002		
Satilla River at Atkinson	Nov. 11, 1937	324					.070	.090	.183	.015	.082	.044	.197	.000	.002		
Savannah River at Augusta	Nov. 3, 1937						.120	.115	.135	.038	.262	.052	.056	.000	.003		
Savannah River at Stoney Bluff Landing	do						.145	.123	.122	.041	.262	.060	.062	.000	.003		
Savannah River near Clyo	do	18,600					.170	.099	.130	.041	.262	.060	.070	.000	.003		
Savannah River near Clyo [18]	1938–39	11,240					.215	.107	.148	.031	.361	.062	.068	.000	.006		
Scarecorn Creek at Hinton	Aug. 29, 1941	7.6					.160	.115	.083	.043	.279	.052	.031	.005	.002		
Seventeenmile Creek near Douglas	Apr. 6, 1937	650					.100	.074	.130	.023	.098	.029	.107	.000	.008		
Soque River near Demorest	Sept. 6, 1941	77					.090	.074	.065	.026	.180	.029	.031	.005	.003		
South River near McDonough	June 19, 1941	154					.280	.156	.361	.066	.328	.121	.212	.105	.087		
Spring Creek near Iron City	Jan. 18, 1938	363					1.697	.082	.122	.013	1.787	.023	.090	.000	.004		
Suwannee River at Fargo	Apr. 21, 1937	5,930					.140	.115	.200	.044	.049	.027	.220	.021	.004		
Sweetwater Creek near Austell	Mar. 25, 1937	435					.215	.140	.148	.026	.377	.085	.051	.000	.006		
Tired Creek near Cairo	May 20, 1941						.225	.074	.100	.020	.246	.021	.102	.000	.005		
Tobesofkee Creek near Macon	Mar. 20, 1937	2,490					.100	.074	.174	.051	.246	.067	.042	.005	.006		
	Mar. 25, 1937	406					.140	.099	.178	.046	.311	.048	.079	.005	.006		
Tugaloo River near Hartwell	June 23, 1941	502					.110	.074	.122	.026	.230	.044	.040	.005	.004		
Withlacoochee River near Quitman	Apr. 22, 1937	1,390					.070	.132	.130	.023	.148	.029	.169	.021	.006		
Yellow River at Porterdale	Sept. 13, 1938						.165	.099	.235		.393	.033	.059	.000	.013		

[2] Large proportion of organic matter; sum of mineral constituents 24 parts.
[4] Large proportion of organic matter; sum of mineral constituents 19 parts.
[11] Large proportion of organic matter; sum of mineral constituents 25 parts.
[14] Average of analyses of composites of daily samples (see pp. 364–365).
[15] Average of analyses of composites of daily samples (see pp. 366–367).
[16] Average of analyses of composites of daily samples (see pp. 368–369).
[17] Large proportion of organic matter; sum of mineral constituents 27 parts.
[18] Average of analyses of composites of daily samples (see pp. 370–371).
[19] Large proportion of organic matter; sum of mineral constituents 23 parts.

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