

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of Claiborne Parish, Louisiana

Introduction

This fact sheet presents a brief overview of groundwater and surface-water resources in Claiborne Parish, Louisiana (fig. 1). Information on the availability, use, and quality of water from groundwater and surface-water sources in the parish are discussed. Previously published reports and data stored in the U.S. Geological Survey's National Water Information System are the primary sources of this information.

In 2010, about 2.60 million gallons per day (Mgal/d) of water were withdrawn in Claiborne Parish, Louisiana,

including about 2.42 Mgal/d from groundwater sources and 0.18 Mgal/d from surface-water sources¹ (table 1). Public-supply use accounted for about 84 percent of the total water withdrawn. Other categories of use included industrial, rural domestic, livestock, and general irrigation (table 2). Water-use data collected at 5-year intervals from 1960 to 2010 indicated that total water withdrawals in the parish have ranged from about 2.6 to 3.9 Mgal/d (fig. 2).

¹Tabulation of numbers in text and tables may result in different totals because of rounding; nonrounded numbers are used for calculation of totals.

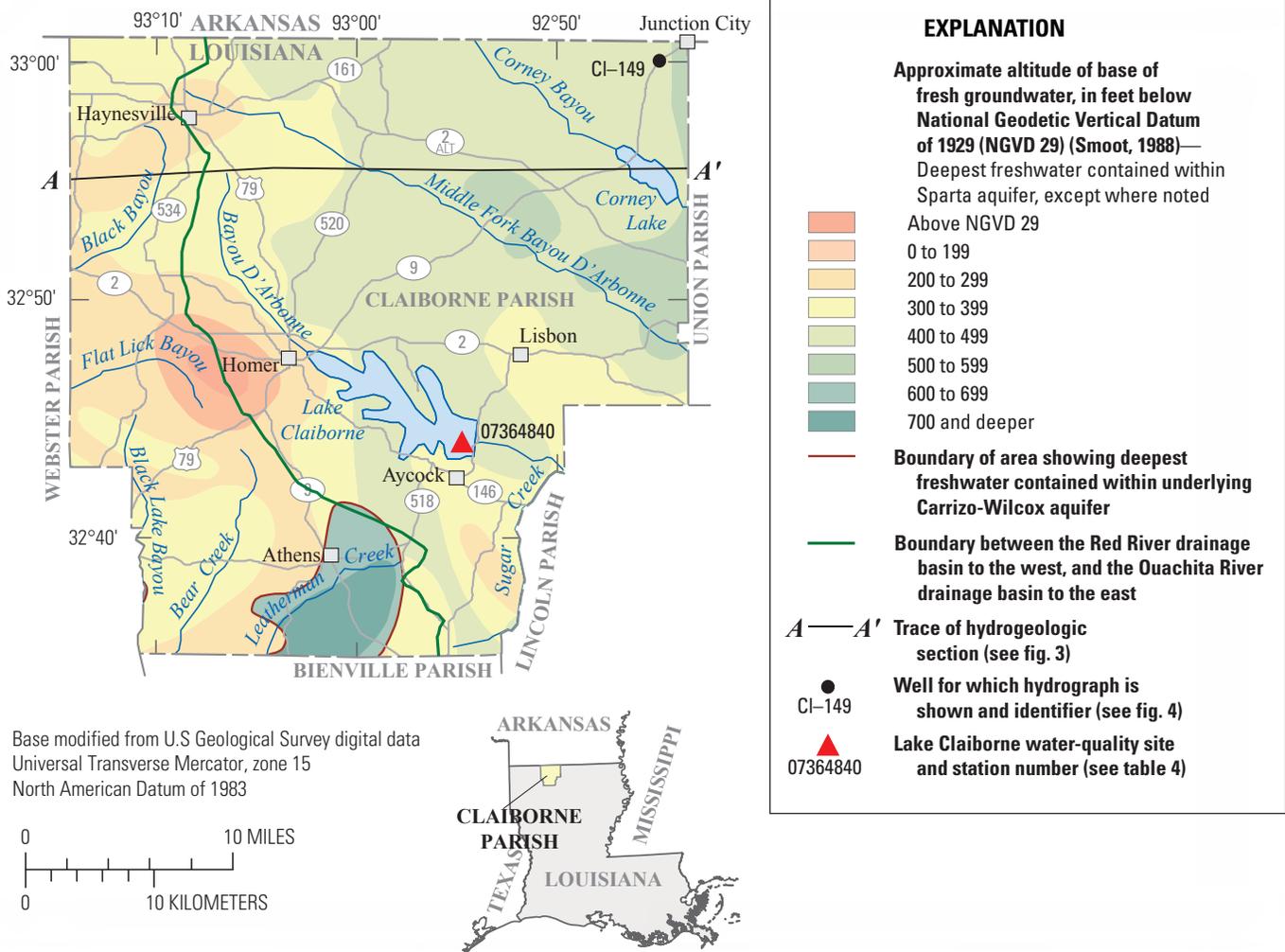


Figure 1. Location of study area, Claiborne Parish, Louisiana.

Groundwater Resources

The primary fresh (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) groundwater sources in Claiborne Parish, from near surface to deepest, are the Cockfield aquifer, Cook Mountain aquifer, and Sparta aquifer (fig. 3). The underlying Carrizo-Wilcox aquifer contains saltwater throughout Claiborne Parish except for an irregular area extending from north of Athens, southward to the Claiborne-Bienville Parish line (fig. 1) (Ryals, 1984). According to State well-registration records, there were no active water-supply wells screened in the freshwater area of the Carrizo-Wilcox aquifer in Claiborne Parish in 2009 and there were no reported withdrawals from the aquifer in that area for 2010.

Fresh groundwater is generally available throughout the parish. The base of fresh groundwater within Claiborne Parish is located at depths generally ranging from 0 feet (ft) to 700 ft below the National Geodetic Vertical Datum of 1929 (NGVD 29) (fig. 1) (Smoot, 1988). Recharge to aquifers in Claiborne Parish is from precipitation, leakage from adjacent aquifers and confining units, and seasonal input from streams. Discharge from the aquifers is by natural flow into streams, leakage into adjacent aquifers and confining units, and withdrawals from wells.

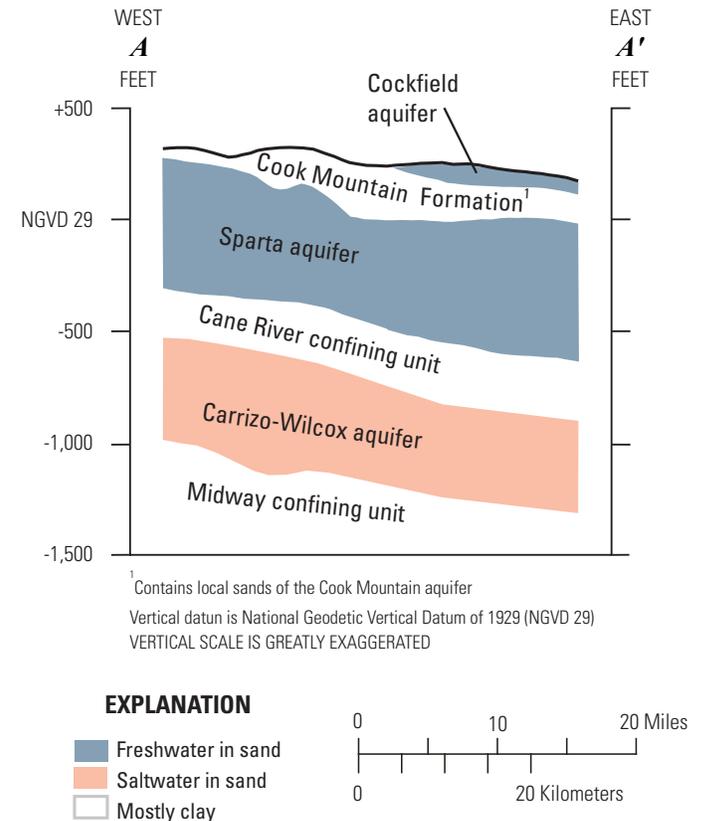


Figure 3. Generalized west-to-east hydrogeologic section showing aquifer and confining-unit intervals through Claiborne Parish, Louisiana (modified from Ryals, 1984). Individual sand and clay layers not shown. Trace of section shown on figure 1.

Table 1. Water withdrawals, in million gallons per day, by source in Claiborne Parish, Louisiana, 2010 (modified from Sargent, 2011)

Aquifer, confining unit, or surface-water body	Groundwater	Surface water
Cockfield aquifer	0.01	
Cook Mountain aquifer	0.04	
Sparta aquifer	2.38	
Miscellaneous streams		0.18
Total	2.42	0.18

Table 2. Water withdrawals, in million gallons per day, by category in Claiborne Parish, Louisiana, 2010 (modified from Sargent, 2011)

Category	Groundwater	Surface water	Total
Public supply	2.19	0.00	2.19
Industrial	0.00	0.15	0.15
Rural domestic	0.17	0.00	0.17
Livestock	0.03	0.03	0.06
General irrigation	0.04	0.00	0.04
Total	2.42	0.18	2.60

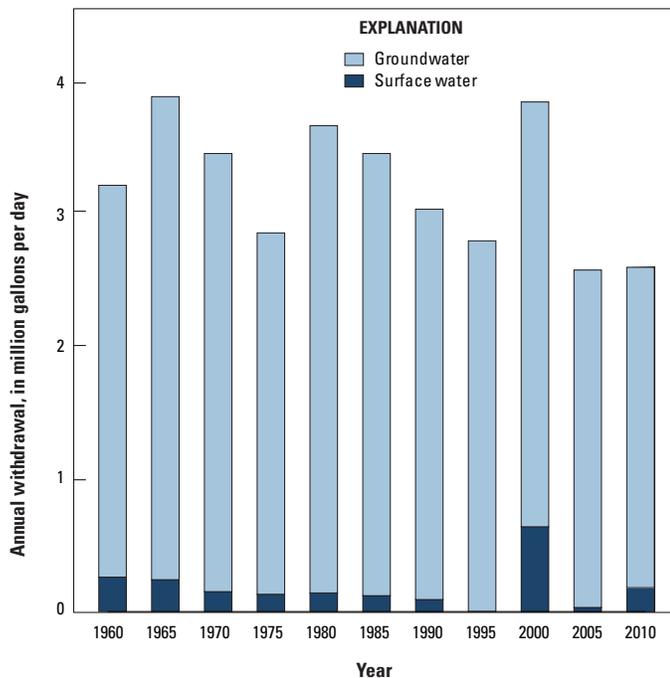


Figure 2. Water withdrawals in Claiborne Parish, Louisiana, 1960-2010.

State well-registration records listed 255 active water wells (public supply, industrial, domestic, irrigation, or power generation) in Claiborne Parish in 2009, including 99 domestic, 62 public supply, 47 industrial, and 47 irrigation wells. In 2010, groundwater withdrawals for various uses included public supply, rural domestic, livestock, and general irrigation (table 2).

Cockfield Aquifer

In Claiborne Parish, the Cockfield aquifer is composed of very fine to fine sands (Stuart and others, 1994). The aquifer is present and outcrops at land surface in much of the northern half of the parish but is absent in stream valleys. The aquifer is also present in small, scattered areas in south-central Claiborne Parish (Snead and McCulloh, 1984). The thickness of the Cockfield aquifer in Claiborne Parish generally ranges from 0 to 200 ft, and the base of the aquifer generally is greater than 100 ft above NGVD 29 (Ryals, 1984). The principal source of recharge to the Cockfield aquifer is precipitation.

State well-registration records listed 13 active wells screened in the Cockfield aquifer in Claiborne Parish in 2009, including 11 domestic and 2 irrigation wells. Depths of these wells ranged from 16 to 81 ft below land surface, with a median depth of 45 ft. State well-registration records for Claiborne Parish indicated that yields from wells screened in the Cockfield aquifer range from 3 to 50 gallons per minute (gal/min). In 2010, withdrawals from the aquifer in Claiborne Parish were about 0.01 Mgal/d (table 1).

Cook Mountain Aquifer

The Cook Mountain aquifer is present as local sands within the Cook Mountain Formation, which underlies the Cockfield aquifer in northern Claiborne Parish, but outcrops or subcrops in stream valleys in the northern half of the parish and throughout most of the southern half of the parish where the Cockfield aquifer is absent (fig. 3). The formation is generally composed of clay but locally contains sands, which form the aquifer and are sources of freshwater for wells (Hosman, 1978). The full thickness of the formation ranges from 0 to 200 ft in Claiborne Parish (Ryals, 1984).

State well-registration records listed 24 active water wells screened in the Cook Mountain aquifer in Claiborne Parish in 2009, including 11 domestic, 7 irrigation, 3 public-supply, and 3 livestock wells. Depths of these wells ranged from 15 to 248 ft below land surface, with a median depth of 140 ft. State well-registration records for Claiborne Parish indicated that yields from wells screened in the unit range from 3 to 40 gal/min. In 2010, withdrawals from the Cook Mountain aquifer in Claiborne Parish were about 0.04 Mgal/d (table 1).

Sparta Aquifer

The largest source of fresh groundwater in Claiborne Parish is the Sparta aquifer, which underlies the Cook Mountain Formation. The Sparta aquifer is present throughout Claiborne Parish and consists of 200 to 800 ft (Ryals, 1984) of sand,

silty sand, and silty shale with occasional lignites and lignitic shales (Martin and others, 1954). Sand composes about 30 to 70 percent of the total thickness of the Sparta aquifer (Hosman, 1978), and the total sand thickness of the aquifer ranges from about 400 to 600 ft in Claiborne Parish (Ryals, 1984). The Sparta aquifer dips gently to the east and northeast in Claiborne Parish (Brantly and others, 2002). The base of the aquifer is generally about 300 ft below NGVD 29 along the western parish line and deepens to the east and northeast to depths of 450 to 600 ft below NGVD 29 along the eastern parish line (fig. 3). The base of the aquifer is shallowest, about 100 ft above NGVD 29, a few miles west of the town of Homer (Brantly and others, 2002). The aquifer is recharged by precipitation, and groundwater flow in Claiborne Parish is generally to the northeast (Brantly and others, 2002).

In 2007, water levels in the Sparta aquifer in Claiborne Parish ranged from about 160 ft above NGVD 29 in the southwest corner of the parish to nearly 60 ft below NGVD 29 in the northeast corner of the parish (Schradler, 2008). Regionally, water levels throughout much of the aquifer have declined steadily since the early 1920s when water withdrawals for industrial purposes began (Brantly and others, 2002). In 2004, withdrawals from the Sparta aquifer in Arkansas, north of Claiborne Parish, were reduced sharply through conservation efforts and the use of surface water (Freiwald and Johnson, 2008). This reduction in withdrawals has affected water levels in the Sparta aquifer in northern Claiborne Parish; water levels in well CI-149, located near Junction City, have risen about 25 ft from 2000 to 2010 (fig. 4). For the 10-year period 1990–99, water levels in well CI-149 had declined at a rate of about 2 ft per year (Tomaszewski and others, 2002).

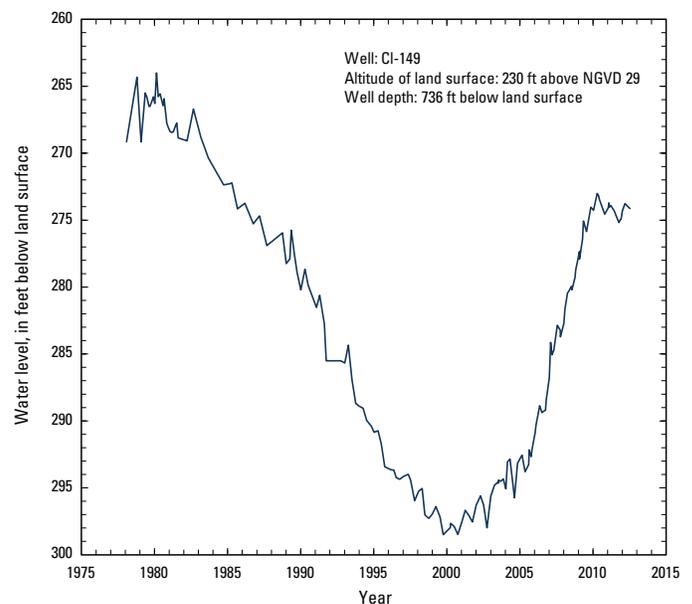


Figure 4. Water levels in well CI-149, screened in the Sparta aquifer and located near Junction City, Louisiana (see fig. 1 for well location; U.S. Geological Survey, 2012a). Land surface is measured in feet (ft) above the National Geodetic Vertical Datum of 1929.

Surface-Water Resources

State well-registration records listed 191 active wells screened in the Sparta aquifer in Claiborne Parish in 2009, including 69 domestic, 56 public-supply, 37 industrial, and 29 irrigation wells. Depths of these wells ranged from 60 to 792 ft below land surface, with a median depth of 492 ft. State well-registration records for Claiborne Parish indicated that yields from wells screened in the Sparta aquifer range from 3 to 901 gal/min. In 2010, groundwater withdrawals from the Sparta aquifer in Claiborne Parish totaled about 2.38 Mgal/d and included about 2.19 Mgal/d for public-supply, 0.13 Mgal/d for rural-domestic use, 0.03 Mgal/d for livestock, and 0.03 Mgal/d for general irrigation.

A statistical summary of selected water-quality characteristics for freshwater samples collected from 80 wells screened in the Sparta aquifer in Claiborne Parish is listed in table 3. Based on median values of constituents, freshwater from the aquifer generally is soft² and generally does not exceed the U.S. Environmental Protection Agency's (EPA) Secondary Maximum Contaminant Levels³ (SMCLs) for drinking water for pH, chloride, and dissolved solids. Water in some areas exceeds the SMCLs for iron, manganese, and color.

²Hardness ranges, expressed as milligrams per liter of calcium carbonate, are as follows: 0–60, soft; 61–120, moderately hard; 121–180, hard; greater than 180, very hard (Hem, 1985).

³The SMCLs are nonenforceable Federal guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water. At high concentrations or values, health implications as well as aesthetic degradation might exist. SMCLs were established as guidelines for the states by the U.S. Environmental Protection Agency (1992).

In 2010, about 0.18 Mgal/d of surface water were withdrawn in Claiborne Parish, which included about 0.15 Mgal/d for industrial use and 0.03 Mgal/d for livestock (table 2). All water withdrawals came from miscellaneous streams (table 1). Notable streams in the parish include Corney Bayou, which drains the northeastern corner of the parish, Middle Fork Bayou D'Arbonne, which drains the north-central area of the parish, and Bayou D'Arbonne, which drains the central part of the parish (fig. 1). These three streams generally flow towards the southeast and are part of the Ouachita River drainage basin. Black Lake Bayou, Bear Creek, and Leatherman Creek (fig. 1) drain the southwestern corner of the parish. These three streams generally flow towards the south and are part of the Red River drainage basin (Prakken and Wright, 2009). Black Bayou and Flat Lick Bayou (fig. 1) drain western areas of the parish and are part of the Red River drainage basin.

Lake Claiborne formed after a dam on Bayou D'Arbonne was completed in 1966. The spillway crest has an elevation of 185 ft, and when full, the reservoir has a surface area of 10 square miles (mi²) (6,400 acres), an average depth of 16 ft, and a drainage area of 133 mi². Data collected in the 1960s and 1970s (table 4) indicated that water in the reservoir is generally soft, with low chloride and sulfate concentrations. During the summer months, the lake becomes stratified and the oxygen in the water near the bottom becomes depleted. This lack of oxygen allows the concentrations of hydrogen sulfide, iron, and manganese to increase to nuisance levels (Shampine, 1971).

Table 3. Summary of selected water-quality characteristics for freshwater in the Sparta aquifer in Claiborne Parish, Louisiana (U.S. Geological Survey, 2012b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; PCU, platinum cobalt units; µS/cm, microsiemens per centimeter; SU, standard units; CaCO₃, calcium carbonate; µg/L, micrograms per liter; NA, not applicable; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012)]

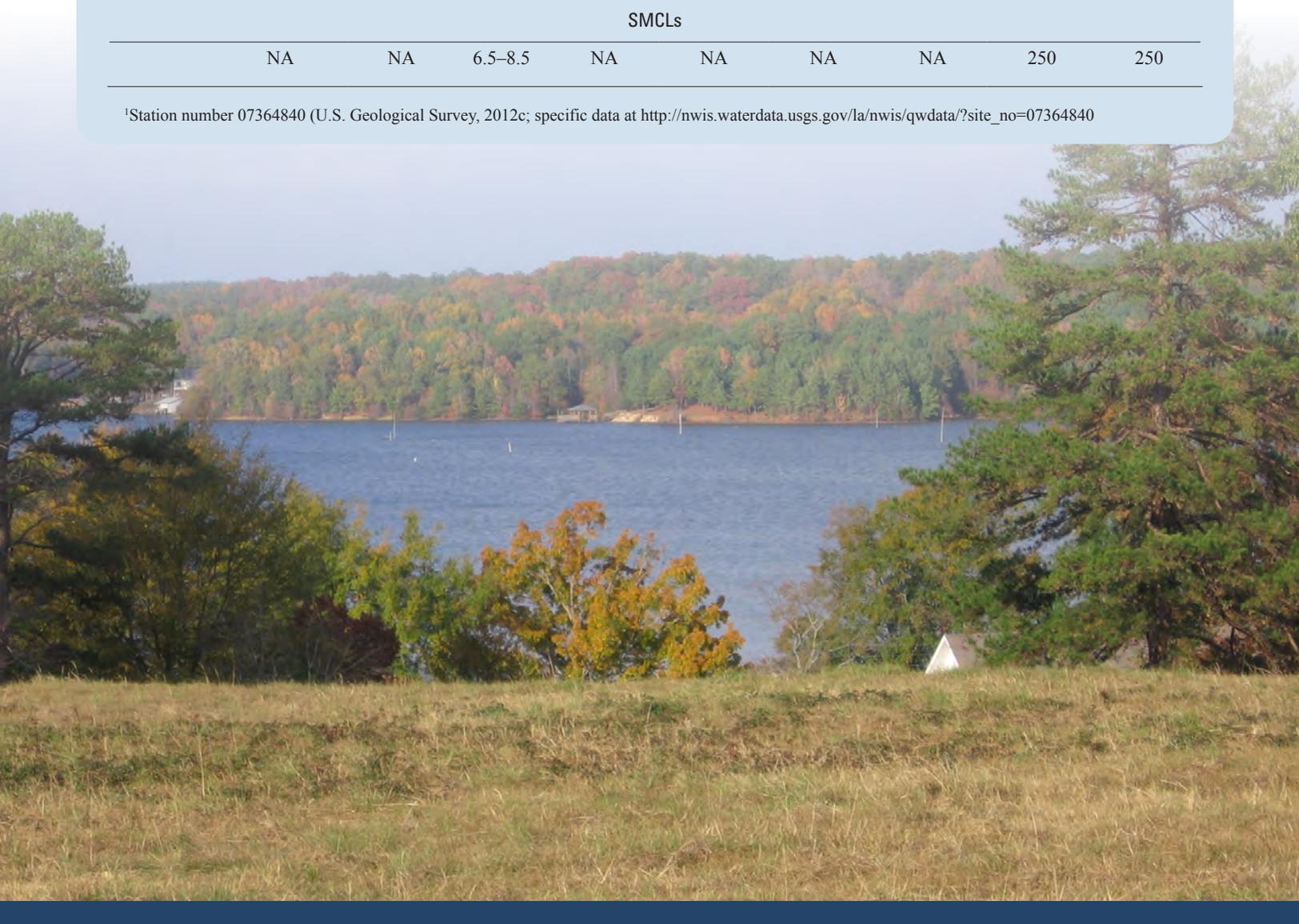
	Temperature (°C)	Color, (PCU)	Specific conductance, field (µS/cm at 25 °C)	pH, field (SU)	Hardness (as CaCO ₃)	Chloride, filtered (as Cl)	Iron, filtered (µg/L as Fe)	Manganese, filtered (µg/L as Mn)	Dissolved solids, filtered
Sparta aquifer (1942–2009) (80 wells)									
Median	22.0	10	226	7.6	19	11	250	10	171
10th percentile	21.0	5	120	6.6	4	4.9	40	0	113
90th percentile	24.0	40	506	8.4	97	28	2,100	100	308
Number of samples	29	45	46	46	79	78	38	28	47
Percentage of samples that do not exceed SMCLs	NA	62	NA	87	NA	100	55	71	100
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

Table 4. Selected water-quality characteristics for Lake Claiborne near Aycock, Louisiana (U.S. Geological Survey, 2012c).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; $\mu\text{S}/\text{cm}$, microsiemens per centimeter; SU, standard units; $\mu\text{g}/\text{L}$, micrograms per liter; CaCO_3 , calcium carbonate; NA, not applicable; —, no data; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012)]

Sample Date	Specific conductance, field ($\mu\text{S}/\text{cm}$ at 25 °C)	Oxygen, dissolved	pH, field (SU)	Hardness (as CaCO_3)	Calcium, filtered (as Ca)	Magnesium, filtered (as Mg)	Sodium, filtered (as Na)	Chloride, filtered (as Cl)	Sulfate, filtered (as SO_4)
Lake Claiborne, 1969–76 ¹									
3/24/1969	63	—	6.8	19	5.5	1.3	3.9	4.9	4.4
7/9/1969	60	—	6.5	18	5.0	1.3	3.7	3.9	4.0
9/15/1969	67	—	7.0	19	6.4	0.7	4	4.5	2.6
2/2/1970	69	—	7.0	20	5.5	1.5	4	5.0	3.8
7/12/1970	57	—	6.3	16	5.2	0.7	3.2	4.0	4.4
11/18/1975	43	7.8	6.8	10	2.4	1.0	2.7	3.5	3.6
2/25/1976	41	10	6.2	10	2.3	1.0	2.9	4.0	5.6
4/14/1976	44	8.1	6.6	8	2.0	0.7	3.5	4.7	6.0
7/14/1976	49	8.2	7.2	10	3.2	0.5	3.3	4.2	5.2
SMCLs									
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250

¹Station number 07364840 (U.S. Geological Survey, 2012c; specific data at http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site_no=07364840)



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This fact sheet was published by the U.S. Geological Survey, in cooperation with the Louisiana Department of Transportation and Development (DOTD). Thanks are given to Zahir “Bo” Bolourchi, Director, Water Resources Programs, Louisiana Department of Transportation and Development, who contributed to the content and design of the fact sheet.

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