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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of Jackson Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in Jackson Parish, Louisiana (fig. 1), is critical for proper water-supply management. The purpose of this fact sheet is to present information that can be used by water managers, parish residents, and others for stewardship of this vital resource. In 2014, about 4.38 million gallons per day (Mgal/d) of water were withdrawn in Jackson Parish: 4.36 Mgal/d from groundwater sources and 0.02 Mgal/d from surface-water sources[1] (table 1). Withdrawals for public-supply use accounted for about 42 percent (1.85 Mgal/d) of the total water withdrawn, and industrial use accounted for about 54 percent (2.36 Mgal/d) (table 2). Other categories of use included livestock and rural domestic. Water-use data collected at 5-year intervals from 1960 to 2010 and again in 2014 indicate that water withdrawals peaked in 1975 at about 15.26 Mgal/d (fig. 2). The significant decrease in water use from 1975 to 1980 was caused by a reduction of 10.38 Mgal/d in withdrawals for industrial use (U.S. Geological Survey [USGS], 2017a).

[1]Water-withdrawal data are based on estimated or reported site-specific data and aggregated data, which are distributed to sources. For a full description of water-use estimate methodology, see "Data Collection" in Sargent (2011). Tabulation of numbers in text and tables may result in different totals because of rounding; nonrounded numbers are used for calculation of totals.

Groundwater Resources

The primary freshwater-bearing aquifer underlying Jackson Parish is the Sparta aquifer (figs. 1, 3). The Cockfield and the Cook Mountain aquifers also underlie the parish and may provide limited supplies of freshwater in localized areas, though no withdrawals from the Cook Mountain aquifer were reported in 2014. The base of fresh groundwater in Jackson Parish (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) is present in the Sparta aquifer at altitudes ranging from less than 200 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) in the southwestern corner of the parish to greater than 800 ft below NGVD 29 in the southeastern part (fig. 1; Smoot, 1988).

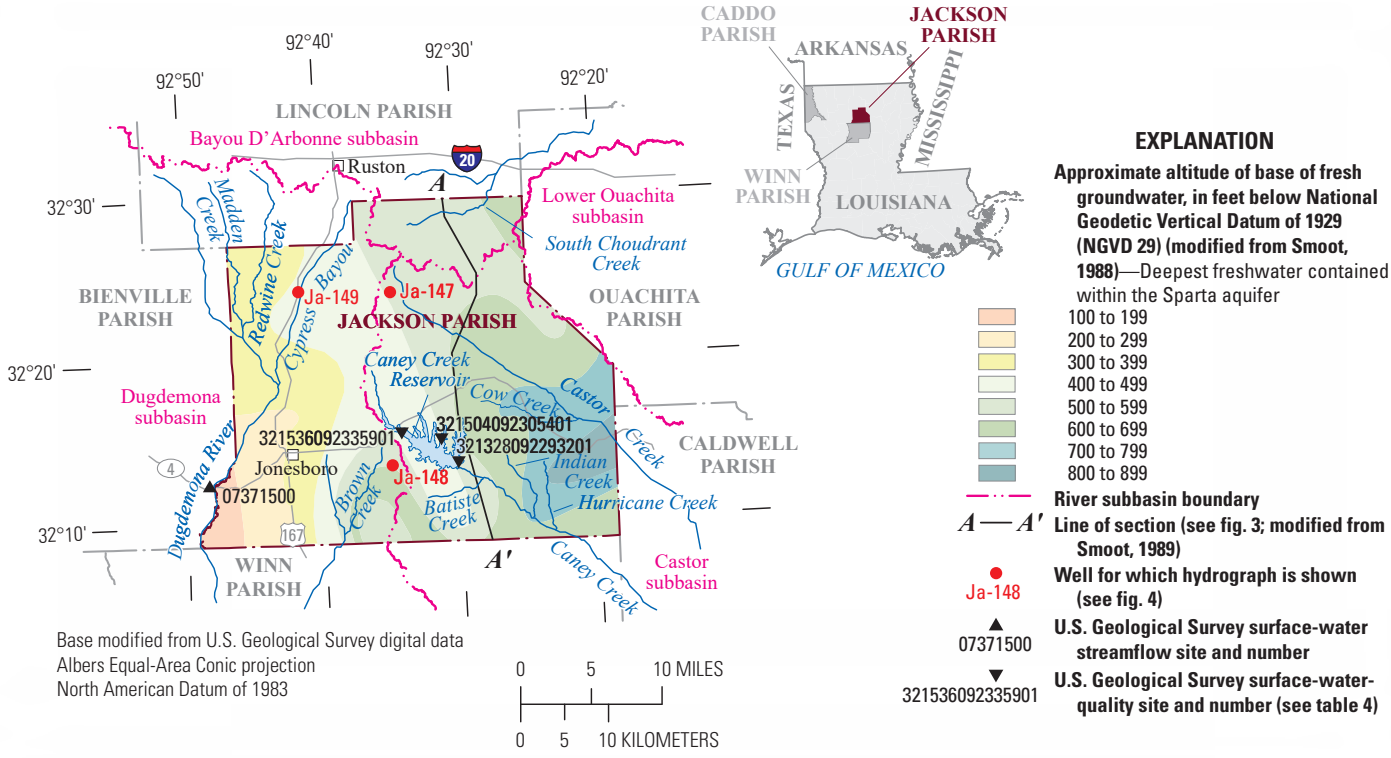

Figure 1. Location of study area, Jackson Parish, Louisiana.

Table 1. Water withdrawals, in million gallons per day, by source in Jackson Parish, Louisiana, 2014 (Collier, 2018).

Aquifer or surface-water body	Groundwater	Surface water
Cockfield aquifer	0.08	
Sparta aquifer	4.29	
Miscellaneous streams		0.02
Total	**4.36**	**0.02**

Table 2. Water withdrawals, in million gallons per day, by use category in Jackson Parish, Louisiana, 2014 (Collier, 2018).

[<, less than]

Use category	Groundwater	Surface water	Total
Public supply	1.85	0.00	1.85
Rural domestic	0.15	0.00	0.15
Livestock	<0.01	0.02	0.02
Industrial	2.36	0.00	2.36
Total	**4.36**	**0.02**	**4.38**

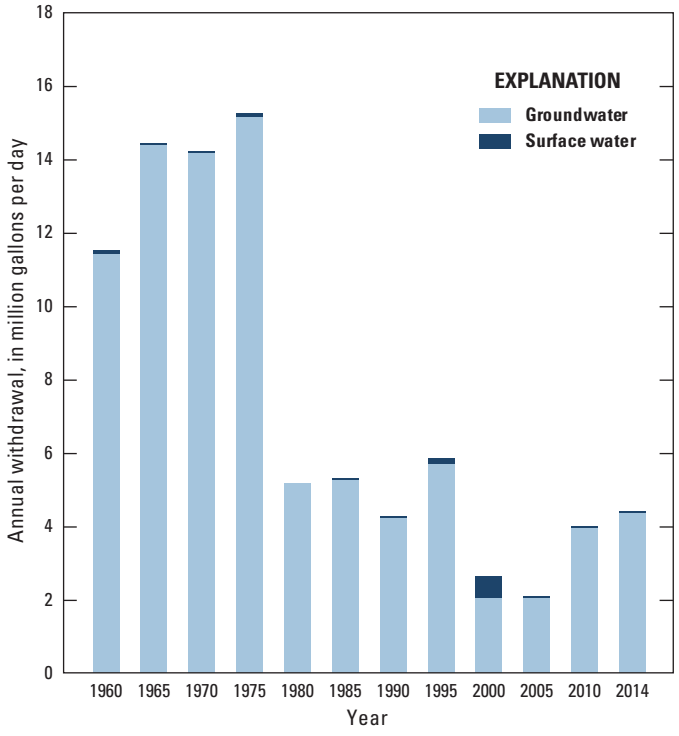

Figure 2. Water withdrawals in Jackson Parish, Louisiana, 1960–2014 (U.S. Geological Survey, 2017a; Collier, 2018).

Cockfield Aquifer

The Cockfield aquifer is present and outcrops in about the eastern two-thirds of Jackson Parish (Brantly and Seanor, 1996). In most of the parish, the aquifer ranges from 0 to 200 ft thick, but thickness increases to 200–400 ft in the southeastern corner of the parish. The altitude of the base of the aquifer ranges from about 50 ft below NGVD 29 in the southeastern corner to greater than 200 ft above NGVD 29 at the western extent of the aquifer near Jonesboro (Ryals, 1984). The sands that compose the aquifer are generally fine grained but may locally be medium grained and are often interbedded with silt, clay, and lignite (Sanford, 1973; Ryals, 1982). The Cook Mountain Formation, which is mostly clay, underlies the Cockfield aquifer and generally acts as a confining layer (also called a confining unit), impeding vertical flow between the Cockfield aquifer and the deeper Sparta aquifer (Sanford, 1973; Ryals, 1984).

State well-registration records listed 76 active water wells screened in the Cockfield aquifer in Jackson Parish in 2016: 58 domestic wells, 2 industrial wells, 12 irrigation wells, and 4 public-supply wells. Well depths ranged from 22 to 243 ft below land surface, and reported yields ranged from 4 to 100 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2016). In 2014, about 0.08 Mgal/d were withdrawn from the Cockfield aquifer in Jackson Parish: less than 0.01 Mgal/d for livestock and 0.07 Mgal/d for rural domestic purposes (Collier, 2018).

Cook Mountain Aquifer

The Cook Mountain aquifer is part of the larger Cook Mountain Formation. Although this formation is generally composed of clay and functions as a confining layer between the Sparta aquifer and Cockfield aquifer, localized sand layers within the clay can yield minor supplies of groundwater (Sanford, 1973; Ryals, 1982). The altitude of the base of the formation ranges from less than 200 ft below NGVD 29 in the southeastern part of the parish to greater than 100 ft above NGVD 29 in the western part where the formation outcrops or subcrops. The thickness of the formation ranges from less than 150 ft to 200 ft or more (Ryals, 1984). State well-registration records listed one active domestic water well screened in the Cook Mountain aquifer in Jackson Parish in 2016. The depth of this well is 163 ft below land surface (Louisiana Department of Natural Resources, 2016).

Sparta Aquifer

The Sparta aquifer is a regional aquifer underlying various parishes in north-central Louisiana, including all of Jackson Parish. The altitude of the base of the aquifer ranges from greater than 900 ft below NGVD 29 in the southeastern corner of the parish to less than 250 ft below NGVD 29 in the southwestern corner (Brantly and others, 2002). The altitude of the top of the aquifer ranges from greater than 200 ft below NGVD 29 in the southeastern part of the parish to greater than 150 ft above NGVD 29 in the western part. In general, the composition of the Sparta aquifer varies by depth and location and is composed of sand layers of very fine to medium sand that are interbedded with silt, clay, and lignite, with the thicker sand layers near the base. The individual sand layers usually do not continue for great distances, but many of these layers are interconnected and form the larger spatially extensive aquifer. The aquifer crops out and receives recharge from precipitation along its western edge in an area extending from northern Caddo Parish to Winn Parish, including the southwestern part of Jackson Parish (Brantly and others, 2002).

A regional survey of water-level altitudes in wells screened in the Sparta aquifer conducted in 2012 indicated that levels

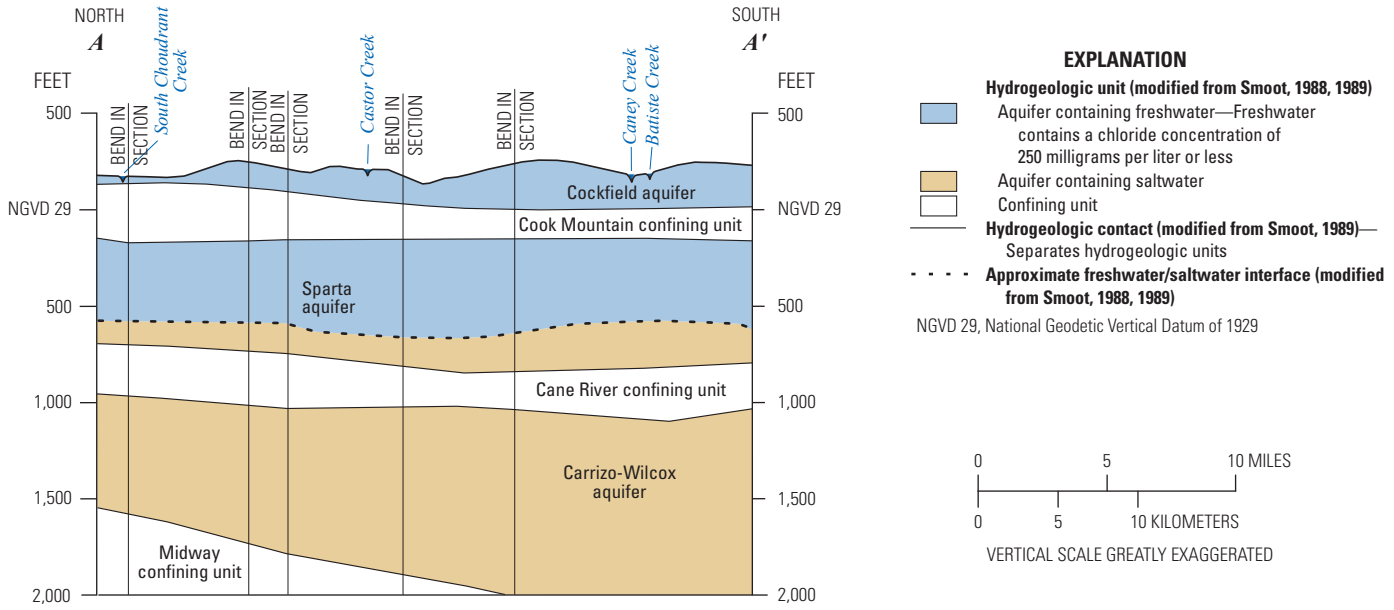

Figure 3. Idealized north-to-south hydrogeologic section through Jackson Parish, Louisiana, showing aquifer and confining unit intervals (individual sand and clay layers not shown). (Modified from Smoot, 1988, 1989). Trace of section shown on figure 1.

in Jackson Parish ranged from about 80 ft below NGVD 29 along the northeastern border to about 80 ft above NGVD 29 in the southwestern corner of the parish. The general direction of groundwater flow in the Sparta aquifer in Jackson Parish is northeastward towards pumping centers in neighboring Ouachita Parish (McGee and Brantly, 2015). Water levels in wells Ja-147, Ja-148, and Ja-149 (USGS site numbers 322357092341701, 321338092345801, and 322433092412101, respectively), located in the central and northwestern parts of the parish and screened in the Sparta aquifer (fig. 1), declined similarly from 1975 to about 2012, when water levels at well Ja-147 began to recover (fig. 4).

State well-registration records listed 144 active water wells screened in the Sparta aquifer in Jackson Parish in 2016: 56 domestic wells, 67 public-supply wells, 17 irrigation wells, and 4 industrial wells. Depths of these wells ranged from 33 to 940 ft below land surface with reported yields ranging from 1 to 1,227 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2016). In 2014, about 4.29 Mgal/d were withdrawn from the Sparta aquifer in Jackson Parish: 1.85 Mgal/d for public supply, 2.36 Mgal/d for industry, 0.08 Mgal/d for rural domestic use, and less than 0.01 Mgal/d for livestock (Collier, 2018).

Groundwater Quality

Groundwater samples were collected during 1940–2015 from 88 wells screened in the Sparta aquifer in Jackson Parish as part of a long-term program to monitor the State's groundwater resources. The median hardness[2] value for these samples was in the soft range. Median values for pH and for concentrations of chloride, sulfate, iron, manganese, and dissolved solids were within the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels[3] (SMCLs) (table 3). The median value for color exceeded the SMCL of 15 platinum cobalt units, and localized iron concentrations can greatly exceed the SMCL of 300 micrograms per liter (µg/L). Groundwater quality of the Cockfield and Cook Mountain aquifers underlying Jackson Parish could not be characterized because of insufficient data.

[2]Hardness 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).

Surface-Water Resources

Surface-water resources in Jackson Parish are present within four drainage subbasins (fig. 1). The Dugdemona subbasin (Hydrologic Unit Code [HUC] 08040303) drains the western part of the parish, the Castor subbasin (HUC 08040302) drains the eastern part of the parish, the Bayou D'Arbonne subbasin (HUC 08040206) drains the northeastern corner of the parish, and the Lower Ouachita subbasin (HUC 08040207) drains narrow strips of land along part of the eastern border of the parish. In 2014, about 0.02 Mgal/d were withdrawn from miscellaneous streams in these subbasins for livestock use (tables 1–2) (Collier, 2018).

Dugdemona Subbasin

The Dugdemona subbasin drains the western part of the parish in a general southerly direction. Streams in the subbasin in Jackson Parish include the Dugdemona River, Brown Creek, Redwine Creek, Madden Creek, and Cypress Bayou (USGS, 2017b). The annual average streamflow of the Dugdemona River near Jonesboro (USGS site number 07371500) was 428 cubic feet per second (ft^3/s) during 1938–96 from a drainage area of 355 square miles (mi^2) with the highest monthly average streamflow during February (1,053 ft^3/s) and the lowest during September (31.3 ft^3/s) (Garrison and others, 1996).

[3]The SMCLs are Federal guidelines regarding cosmetic effects (such as tooth or skin discoloration), aesthetic effects (such as taste, odor, or color), or technical effects (such as damage to water equipment or reduced effectiveness of treatment for other contaminants) of potential constituents of drinking water. SMCLs were established as guidelines by the U.S. Environmental Protection Agency (2016).

Table 3. Summary of selected water-quality characteristics for 88 wells screened in the Sparta aquifer in Jackson Parish, Louisiana, 1940–2015 (U.S. Geological Survey, 2017b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard unit; $CaCO_3$, calcium carbonate; µg/L, micrograms per liter; <, less than; E, estimated; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2016); NA, not applicable]

	Temperature (°C)	Color (platinum cobalt units)	Specific conductance, field (µS/cm at 25 °C)	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)	Iron, filtered, in µg/L (as Fe)	Manganese, filtered, in µg/L (as Mn)	Dissolved solids, filtered
Median	25.3	18.5	417	7.8	4	0.85	0.1	98	15	20	70	<2.5	260
10th percentile	21.5	5	277	6.7	0	0	0	58	6.7	5.9	E5	<0.2	194
90th percentile	27.2	50	1,040	8.9	42.6	14	7.2	220	155	41.2	684	44	565
Number of samples	52	74	78	93	125	88	85	86	133	98	67	33	84
Percentage of samples that do not exceed SMCLs	NA	49	NA	99	NA	NA	NA	NA	99	98	72	94	74
SMCLs	NA	15	NA	6.5–8.5	NA	NA	NA	NA	250	250	300	50	500

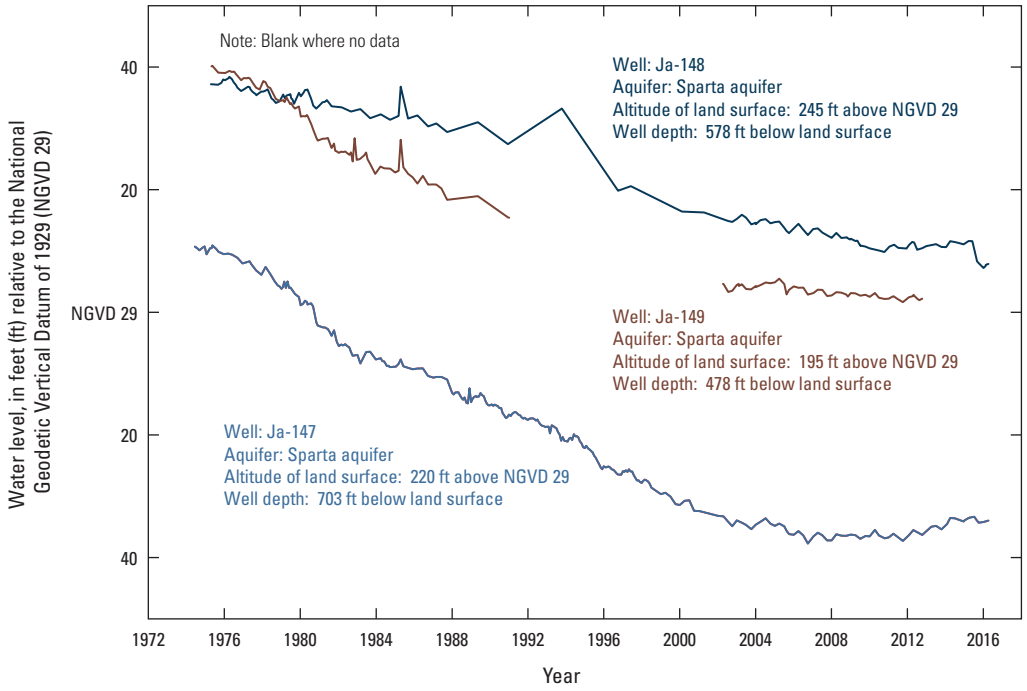

Figure 4. Water levels in wells Ja-147, Ja-148, and Ja-149 screened in the Sparta aquifer in Jackson Parish, Louisiana (see figure 1 for well locations; U.S. Geological Survey, 2017b).

Castor Subbasin

The Castor subbasin drains the eastern part of the parish and includes various streams and the Caney Creek Reservoir. The basin drains in a generally southeasterly or southerly direction. Castor and Caney Creeks are the primary streams in the subbasin within the parish. The subbasin also contains Indian Creek, Hurricane Creek, Batiste Creek, and other small streams (fig. 1). Caney Creek was dammed in 1986 near the western boundary of the subbasin to form Caney Creek Reservoir. The reservoir is used for hunting, skiing, swimming, fishing, and residential irrigation (Louisiana Department of Wildlife and Fisheries, 2017). The reservoir covers approximately 5,000 acres with a drainage basin of 41.5 mi^2 and an average depth of 16 ft.

Bayou D'Arbonne and Lower Ouachita Subbasins

The Bayou D'Arbonne and Lower Ouachita subbasins are located in the northeastern part of the parish (fig. 1). South Choudrant Creek and its multiple smaller tributaries drain the Bayou D'Arbonne subbasin in Jackson Parish. The Lower Ouachita subbasin provides little more than drainage area for streams in Ouachita Parish. These basins drain primarily in a northeasterly and easterly direction.

Surface-Water Quality

USGS surface-water-quality data are limited for Jackson Parish; however, results are available for samples collected during 2014–16 from Caney Creek Reservoir as part of an ongoing program to monitor the State's surface-water resources. These samples were within SMCLs (table 4) for concentrations of chloride, sulfate, iron, and dissolved solids. The pH values for more than 80 percent of samples were within the SMCL. The SMCL for manganese concentrations (50 µg/L) was exceeded in more than 40 percent of samples. The median dissolved-oxygen concentration was 7.6 mg/L; 5 mg/L is considered the minimum value for a diverse population of fresh, warmwater biota, including sport fish (Louisiana Department of Environmental Quality, 2008). Hardness values were generally within the soft range.

State waterbody management plans indicate that water quality in Caney Creek Reservoir varies spatially because of variation in lake depth. During warmer months, the deeper parts of the lake will stratify by temperature. Once stratified, the cooler part of the lake's water column will contain less dissolved oxygen which may affect fish availability. This stratification does not occur in shallower parts of the lake (Louisiana Department of Wildlife and Fisheries, 2017).

Table 4. Summary of selected water-quality characteristics for samples from three sites[1] on Caney Creek Reservoir in Jackson Parish, Louisiana, 2014–16 (U.S. Geological Survey, 2017b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard unit; $CaCO_3$, calcium carbonate; µg/L, micrograms per liter; <, less than; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2016); NA, not applicable]

	Temperature (°C)	Specific conductance, field (µS/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)	Iron, filtered, in µg/L (as Fe)	Manganese, filtered, in µg/L (as Mn)	Dissolved solids, filtered
Median	26.2	59	7.6	6.9	12.1	2.7	1.3	5.0	5.0	5.8	26.5	4.4	41.5
10th percentile	17.4	44	0.3	6.3	10.2	2.2	1.0	3.4	3.6	4.4	<4	0.8	34.7
90th percentile	31.1	72	9.1	7.7	14.9	3.5	1.4	5.3	5.1	6.5	153	4,990	60.3
Number of samples	24	24	24	24	18	18	18	18	18	18	18	18	18
Percentage of samples that do not exceed SMCLs	NA	NA	NA	83	NA	NA	NA	NA	100	100	100	56	100
SMCLs	NA	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300	50	500

[1]U.S. Geological Survey site numbers 321536092335901, 321504092305401, and 321328092293201 (see fig. 1).

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This fact sheet has been prepared by the USGS, in cooperation with the Louisiana Department of Transportation and Development (DOTD), as part of a program to document water use, availability, and quality in the parishes of Louisiana. Information on the availability, past and current water use, use trends, and water quality from groundwater and surface-water sources in the parish is presented here. Previously published reports (see References Cited section) and data stored in the USGS National Water Information System (USGS, 2017b) are the primary sources of the information presented here. Special thanks are given to Doug Taylor, Director, and Zahir "Bo" Bolourchi (retired), DOTD Cooperative Program with the USGS.

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