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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of St. Helena Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in St. Helena Parish, Louisiana (fig. 1), is critical for proper water-resource 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. Information on the availability, past and current use, use trends, and water quality from groundwater and surface-water sources in the parish is presented. Previously published reports (see References Cited section) and data stored in the U.S. Geological Survey's National Water Information System (http://waterdata.usgs.gov/nwis) are the primary sources of the information presented here.

In 2010, about 1.06 million gallons per day (Mgal/d) of water were withdrawn in St. Helena Parish, including about 1.05 Mgal/d from groundwater sources and 0.01 Mgal/d from surface-water sources[1] (table 1). Withdrawals for rural-domestic use accounted for about 50 percent (0.53 Mgal/d) of the total water withdrawn (table 2). Other categories of use included public supply, industrial, and livestock. Water-use data collected at 5-year intervals from 1960 to 2010 indicated that water withdrawals peaked in 1960, dropped to less than 1.00 Mgal/d in 1965 and 1975, and have remained between 1.00 and 1.50 Mgal/d since 1980 (fig. 2).

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

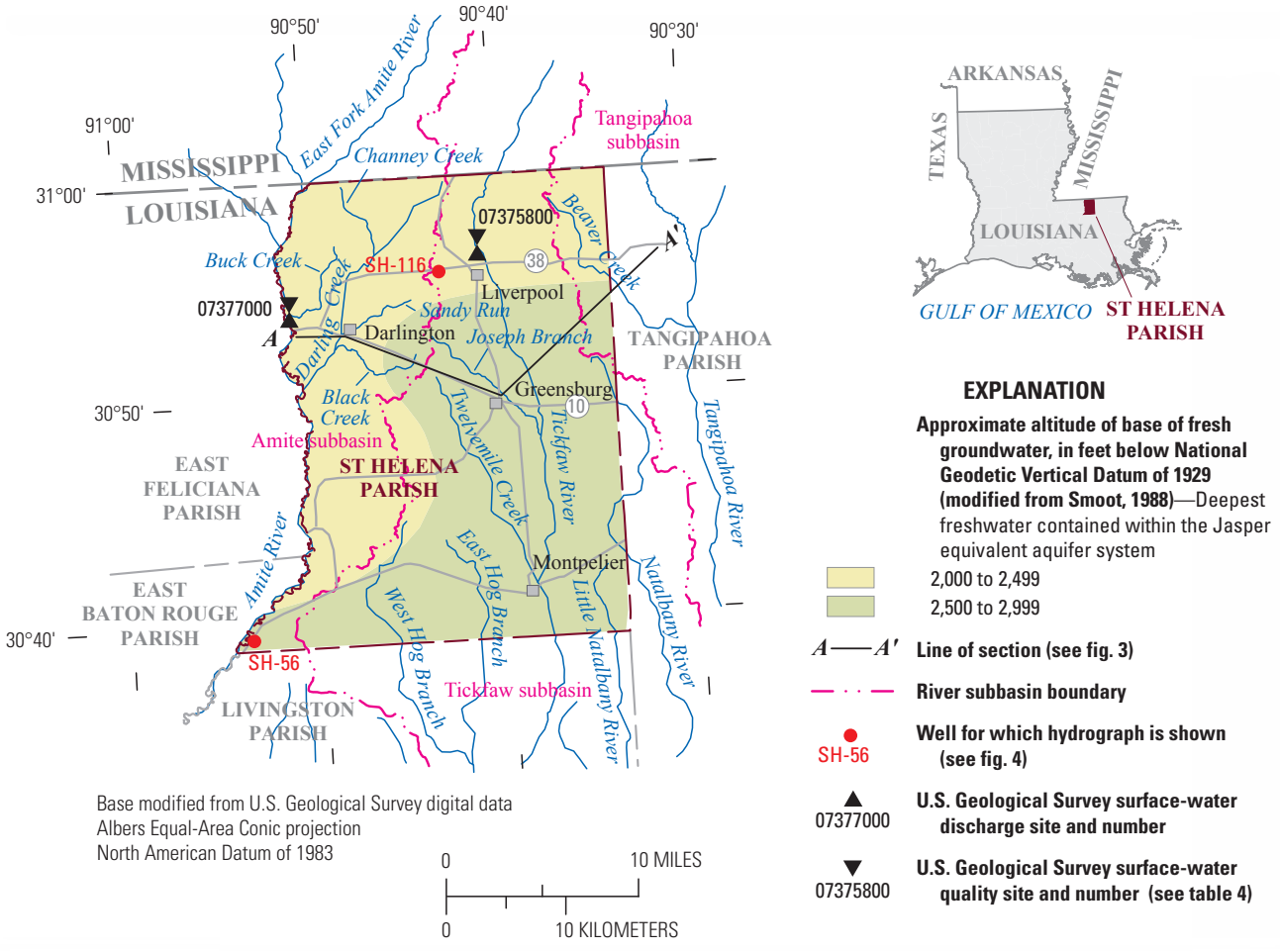

Figure 1. Location of study area, St. Helena Parish, Louisiana.

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

Aquifer, aquifer system, or surface-water body	Groundwater	Surface water
Upland terrace aquifer	0.70	
Evangeline equivalent aquifer system	0.00	
Jasper equivalent aquifer system	0.35	
Catahoula aquifer	0.00	
Miscellaneous streams		0.01
Total	**1.05**	**0.01**

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

Use category	Groundwater	Surface water	Total
Public supply	0.39	0.00	0.39
Industrial	0.03	0.00	0.03
Rural domestic	0.53	0.00	0.53
Livestock	0.09	0.01	0.11
Total	**1.05**	**0.01**	**1.06**

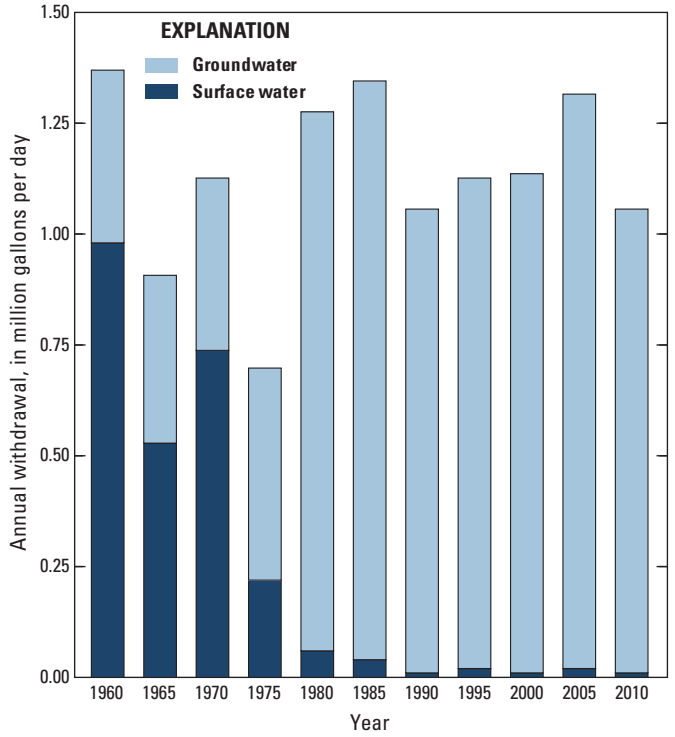

Figure 2. Water withdrawals in St. Helena Parish, Louisiana, 1960–2010 (Sargent, 2011).

Groundwater Resources

Primary sources of fresh groundwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) in St. Helena Parish are, from shallowest to deepest, the Chicot equivalent, Evangeline equivalent, and Jasper equivalent aquifer systems and the Catahoula aquifer (fig. 3). Deeper aquifers underlying the parish contain saltwater. The base of fresh groundwater ranges from greater than 2,000 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) in

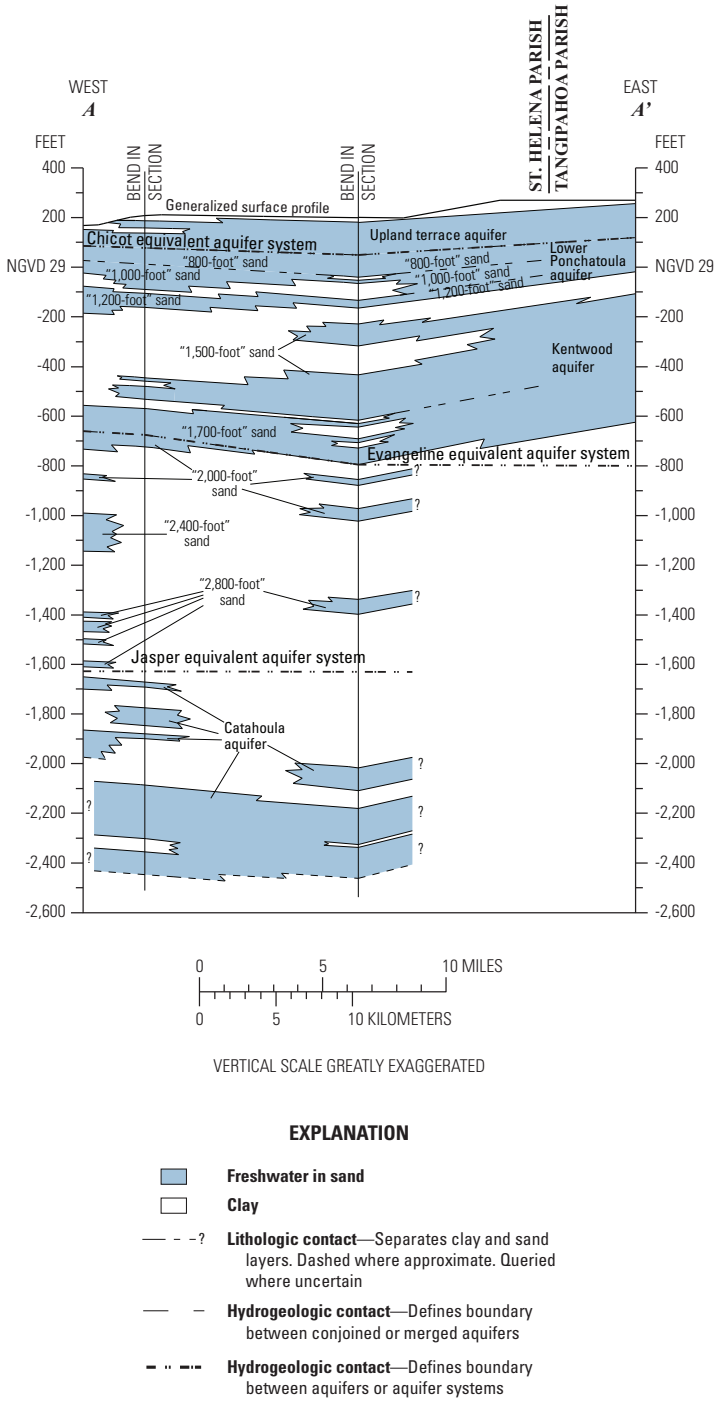

Figure 3. West-to-east hydrogeologic section through St. Helena Parish, Louisiana (modified from Griffith, 2003). Trace of section shown on figure 1.

the northwestern part of the parish to less than 3,000 ft below NGVD 29 along the southern parish boundary (fig. 1; Smoot, 1988). The primary source of recharge to the freshwater aquifers in St. Helena Parish comes from infiltration of precipitation falling in a large area extending from within the parish to about 100 miles northward into the State of Mississippi. Flow from streams may also contribute recharge to a lesser degree than precipitation. Discharge from aquifers in the parish is by leakage into adjacent aquifers, flow into streams, and withdrawals from wells. All of the aquifers containing freshwater in the parish generally dip south to southwest towards the Gulf of Mexico (Griffith, 2003).

The Chicot Equivalent Aquifer System

The sole aquifer composing the Chicot equivalent aquifer system in St. Helena Parish is the Upland terrace aquifer, which is a broad, discontinuous, near-surface aquifer that is present throughout the parish. The Upland terrace aquifer extends westward into East Feliciana Parish, eastward into Tangipahoa Parish, and northward into Mississippi. The aquifer crops out along ridges and alongside stream valleys within the parish and generally dips south to southwest at a rate of 10–30 ft per mile. Near the southern parish line, the Upland terrace aquifer correlates with the "400-foot" and "600-foot" sands of the Baton Rouge area. Upland terrace sediments range in grain size from clay through silt and sand to gravel and can be over 300 ft thick. The aquifer is composed primarily of medium- to coarse-grained sand (Morgan, 1963). Regionally, the proximity of the Upland terrace aquifer to the surface allows the aquifer to be recharged by infiltration of rainfall and to transmit some of this water to recharge deeper aquifers underlying the parish (Griffith, 2003).

In 2009, water levels in the Upland terrace aquifer in St. Helena Parish ranged from a low of about 75 ft above NGVD 29 along the southern parish line to a high of more than 250 ft above NGVD 29 in the northeastern corner of the parish. The general direction of groundwater flow was southward, with localized flow direction towards the Amite River and the Tickfaw River. In St. Helena Parish, the water-level surface generally follows the topography (Tomaszewski, 2011). The water-level hydrograph of well SH-56, located in the extreme southwestern corner of the parish (fig. 1) and screened in the Upland terrace aquifer, indicates that water levels generally fluctuate less than 3 ft per year (fig. 4).

State well-registration records listed 1,201 active water wells screened in the Upland terrace aquifer in St. Helena Parish in 2015, including 1,074 domestic, 70 public supply, 49 irrigation, and 8 industrial. Depths of these wells ranged from 18 to 366 ft below land surface. Reported yields from wells screened in the Upland terrace aquifer in St. Helena Parish ranged from 5 to 225 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2015). In 2010, withdrawals from the Upland terrace aquifer in St. Helena Parish totaled about 0.70 Mgal/d (table 1) and included about 0.07 Mgal/d for public supply, 0.53 Mgal/d for rural-domestic use, and 0.09 Mgal/d for livestock (B.P. Sargent, U.S. Geological Survey, written commun., 2015).

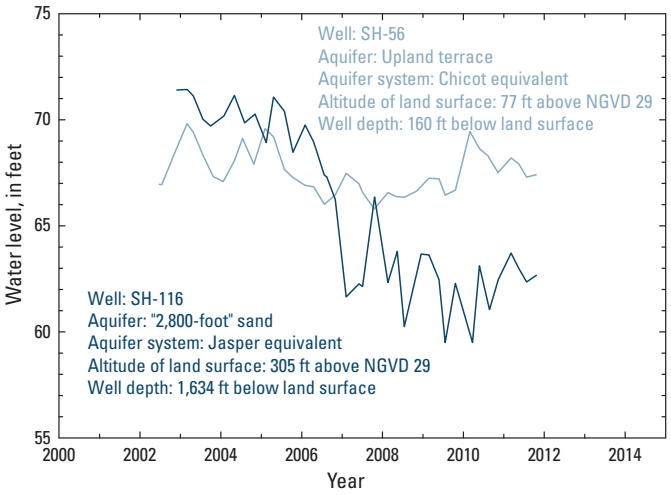

Figure 4. Water levels in well SH-56 screened in the Upland terrace aquifer and well SH-116 screened in the Jasper equivalent aquifer system in St. Helena Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2012a). Land surface is measured in feet (ft) above the National Geodetic Vertical Datum of 1929 (NGVD 29).

The Evangeline Equivalent Aquifer System

The aquifers composing the Evangeline equivalent aquifer system in St. Helena Parish are the "800-foot," "1,000-foot," "1,200-foot," "1,500-foot," and "1,700-foot" sands of the Baton Rouge area (fig. 3). These aquifers contain freshwater and are generally fine- to coarse-grained sand. Layers of clay usually separate the individual sands; however, many sands merge with overlying and underlying sands (Griffith, 2003). The altitude of the base of the aquifer system ranges from about 450 ft below NGVD 29 near the northern parish line to about 1,200 ft below NGVD 29 near the southern parish line (Griffith, 2003). In 2003, water levels in the "1,500-foot" and "1,700-foot" sands ranged from about 215 ft above NGVD 29 in the extreme northeastern corner of the parish to about 35 ft below NGVD 29 in the extreme southwestern corner of the parish. The direction of groundwater flow in the parish was generally to the southwest towards withdrawal centers in East Baton Rouge Parish (Prakken, 2004).

State well-registration records listed 26 active water wells screened in the Evangeline equivalent aquifer system in St. Helena Parish in 2015, including 19 domestic, 3 irrigation, 3 public supply, and 1 industrial. Depths of these wells ranged from 120 to 665 ft below land surface. Reported yields from wells screened in the Evangeline equivalent aquifer system in St. Helena Parish ranged from about 40 to 300 gal/min (Louisiana Department of Natural Resources, 2015). In 2010, there were no reported water withdrawals from the Evangeline equivalent aquifer system in St. Helena Parish (B.P. Sargent, U.S. Geological Survey, written commun., 2015).

The Jasper Equivalent Aquifer System

The aquifers composing the Jasper equivalent aquifer system in St. Helena Parish are the "2,000-foot," "2,400-foot," and "2,800-foot" sands of the Baton Rouge area (fig. 3). These

aquifers also generally contain freshwater and are composed of fine- to coarse-grained sand. Layers of clay usually separate the individual sands; however, many sands merge with overlying and underlying sands (Griffith, 2003).

The altitude of the base of the aquifer system is not well defined but is probably about 1,800 ft below NGVD 29 near the northern parish line to about 2,000 ft below NGVD 29 near the southern parish line (Griffith, 2003). In 2006, the general direction of groundwater flow in the "2,800-foot" sand in St. Helena Parish was to the southwest, and water levels ranged from about 80 ft above NGVD 29 in the northeastern corner of the parish to about 20 ft above NGVD 29 in the extreme southwestern corner (Fendick, 2007). The hydrograph of well SH-116, located in north-central St. Helena Parish (fig. 1) and screened in the "2,800-foot" sand, indicates that water levels have fluctuated up to 5 ft annually and generally declined from 2002 to 2011 (fig. 4).

State well-registration records listed 18 active water wells screened in the Jasper equivalent aquifer system in St. Helena Parish in 2010, including 14 public supply, 3 industrial, and 1 domestic. Depths of these wells ranged from 1,422 to 2,120 ft below land surface. Reported yields from wells screened in the Jasper equivalent aquifer system in St. Helena Parish ranged from about 60 to 1,200 gal/min (Louisiana Department of Natural Resources, 2015). In 2010, withdrawals from the Jasper equivalent aquifer system in St. Helena Parish were about 0.35 Mgal/d (table 1) and included about 0.32 Mgal/d for public supply and 0.03 Mgal/d for industrial use (B.P. Sargent, U.S. Geological Survey, written commun., 2015).

Catahoula Aquifer

The Catahoula aquifer is present and contains freshwater at altitudes from about 2,000 to 2,450 ft below NGVD 29 in central St. Helena Parish and between about 1,900 and about 2,350 ft below NGVD 29 in the northwestern corner of the parish. Saltwater is present in the deepest sand layers composing the aquifer (Griffith, 2003). State well-registration records reported one domestic well registered at a depth of 2,135 ft yielding 70 gal/min (Louisiana Department of Natural Resources, 2015).

Groundwater Quality

A statistical summary of selected water-quality characteristics for freshwater samples collected from the Upland terrace aquifer (15 wells) and Jasper equivalent aquifer system (12 wells) indicates that sample water is generally soft[2] and does not exceed the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels[3] (SMCLs) for chloride and dissolved solids (table 3). Locally, concentrations of iron and manganese may greatly exceed SMCLs in the Jasper equivalent aquifer system. Limited samples and stratigraphic position indicated that water quality in the Evangeline equivalent aquifer system in St. Helena Parish is generally between that of the Upland terrace aquifer and the Jasper equivalent aquifer system (U.S. Geological Survey, 2012b).

Surface-Water Resources

Surface-water resources in St. Helena Parish are present in the regional Lake Maurepas drainage basin. In St. Helena Parish, the Lake Maurepas Basin (Hydrologic Unit Code [HUC] 080702) is divided into three subbasins: the Amite subbasin (HUC 08070202) drains the western third of the parish, the Tickfaw subbasin (HUC 08070203) drains the central part of the parish, and the Tangipahoa subbasin (HUC 08070205) drains a small area in the northeastern corner of the parish (fig. 1). Streams in St. Helena Parish generally flow in a southerly direction, receiving flow from precipitation and groundwater within the parish and from areas to the north in Mississippi. In 2010, about 0.01 Mgal/d of surface water were withdrawn from miscellaneous streams (table 1) in St. Helena Parish for livestock (table 2).

Amite Subbasin

The Amite subbasin is drained primarily by the Amite River, which flows along most of the western border of St. Helena Parish (fig. 1). Multiple smaller streams flow into the Amite River, including the East Fork Amite River, Sandy Run, and Darling, Buck, Black, and Channey Creeks. The annual average flow of the Amite River near Darlington (site number 07377000) was about 906 cubic feet per second (ft^3/s) during 1951–2014 from a drainage area of about 580 square miles (mi^2) (U.S. Geological Survey, 2015). During this same period, the highest and lowest annual average flows were 1,924 ft^3/s during 1982–83 and 328 ft^3/s during 1999–2000.

Tickfaw Subbasin

The Tickfaw subbasin is drained primarily by the Tickfaw River, which originates in Mississippi, flows into St. Helena Parish, and flows out into Livingston Parish to the south of Montpelier (fig. 1). Tributaries of the Tickfaw River include Twelvemile Creek, Joseph Branch, and East and West Hog Branches (fig. 1). The Natalbany River starts in St. Helena Parish and flows into Tangipahoa Parish and back into and out of St. Helena Parish before flowing into the Tickfaw River in Livingston Parish. The Little Natalbany River also begins in St. Helena Parish and flows into Livingston Parish. The average flow of the Tickfaw River near Liverpool (site number 07375800) was about 111 ft^3/s during 1956–2014 from a drainage area of about 89.7 mi^2 (U.S. Geological Survey, 2015). During this same period, the highest and lowest annual average flows were 208 ft^3/s during 2012–13 and 52 ft^3/s during 2005–6.

[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).

[3]The SMCLs are nonenforceable 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 drinking water. SMCLs were established as guidelines by the U.S. Environmental Protection Agency (2016).

Table 3. Summary of selected water-quality characteristics for freshwater in the Upland terrace aquifer and Jasper equivalent aquifer system in St. Helena Parish, Louisiana (U.S. Geological Survey, 2012b).

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

	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
Upland terrace aquifer, 1940–2001 (15 wells)									
Median	20.8	5	32	5.2	6	5.2	30	3	32
10th percentile	20.0	3	24	4.4	4	3.9	<10	<3	25
90th percentile	22.9	16	63	5.6	13	9.6	210	110	46
Number of samples	13	9	13	13	15	15	7	8	12
Percentage of samples that do not exceed SMCLs	NA	89	NA	0	NA	100	86	88	100
Jasper equivalent aquifer system, 1954–84 (12 wells)									
Median	27.2	16	337	8.6	3	3.9	40	<10	233
10th percentile	23.4	5	171	7.0	1	2.1	20	<10	154
90th percentile	30.0	30	454	9.0	11	4.5	1,000	335	309
Number of samples	12	11	11	12	12	12	8	6	12
Percentage of samples that do not exceed SMCLs	NA	45	NA	42	NA	100	88	67	92
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

Tangipahoa Subbasin

The Tangipahoa subbasin is present only in a small area in the northeastern corner of the parish and is drained by Beaver Creek. Beaver Creek flows south and east into Tangipahoa Parish, eventually flowing into the Tangipahoa River.

Surface-Water Quality

Water samples taken from the Amite River near Darlington during the period 1961–76 and from the Tickfaw River near Liverpool during the period 1961–98 were found to be generally soft with respect to hardness and did not exceed SMCLs for pH and concentrations of chloride, sulfate, or iron (table 4). Limited data indicated that dissolved-oxygen concentrations in these rivers were generally greater than 5 mg/L, which is considered the minimum value for a diverse population of fresh, warmwater biota, including sport fish (Louisiana Department of Environmental Quality, 2008). Median values for pH in the Amite and Tickfaw Rivers were 6.6 and 6.3 standard units, respectively. Amite River samples presented median values for acid neutralizing capacity of 10 mg/L unfiltered as calcium carbonate and for potassium concentrations of 1 mg/L filtered. Tickfaw River samples presented median values for acid neutralizing capacity of 8.5 mg/L unfiltered as calcium carbonate and for potassium concentrations of 0.7 mg/L filtered (U.S. Geological Survey, 2012b).

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Table 4. Summary of selected water-quality characteristics for the Amite River and Tickfaw River in St. Helena Parish, Louisiana (U.S. Geological Survey, 2012b).

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

	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 (µg/L as Fe)
Amite River near Darlington, 1961–76[1]										
Median	36	9.0	6.6	8	2.0	0.6	3.9	4.2	0.6	180
10th percentile	34	—	6.0	6	1.6	0.2	3.0	3.4	0.1	—
90th percentile	42	—	6.9	10	2.8	0.8	4.8	6.4	2.1	—
Number of samples	16	4	16	16	16	16	16	16	16	2
Percentage of samples that do not exceed SMCLs	NA	NA	75	NA	NA	NA	NA	100	100	100
Tickfaw River near Liverpool, 1961–98[2]										
Median	32	8.4	6.3	7	1.6	0.7	3.3	4.0	0.4	60
10th percentile	29	—	5.8	5	1.4	0.5	2.6	3.3	0.2	—
90th percentile	40	—	6.8	9	2.4	0.9	4.2	5.0	2.1	—
Number of samples	12	5	11	12	12	12	11	11	12	5
Percentage of samples that do not exceed SMCLs	NA	NA	45	NA	NA	NA	NA	100	100	100
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

[1]Site number 07377000.

[2]Site number 07375800.

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