

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of Acadia Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in Acadia 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. 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In 2010, about 231 million gallons per day (Mgal/d) of water were withdrawn in Acadia Parish, including about 183 Mgal/d from groundwater sources and 47.6 Mgal/d from surface-water sources¹ (table 1). Withdrawals for rice irrigation accounted for about 70 percent (161 Mgal/d) of the total water withdrawn (table 2). Other categories of use included public supply, industrial, power generation, rural domestic, livestock, general irrigation, and aquaculture. Water-use data collected at 5-year intervals from 1960 to 2010 (fig. 2) indicated that water withdrawals peaked in 1980 when withdrawals for rice irrigation were about 295 Mgal/d.

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

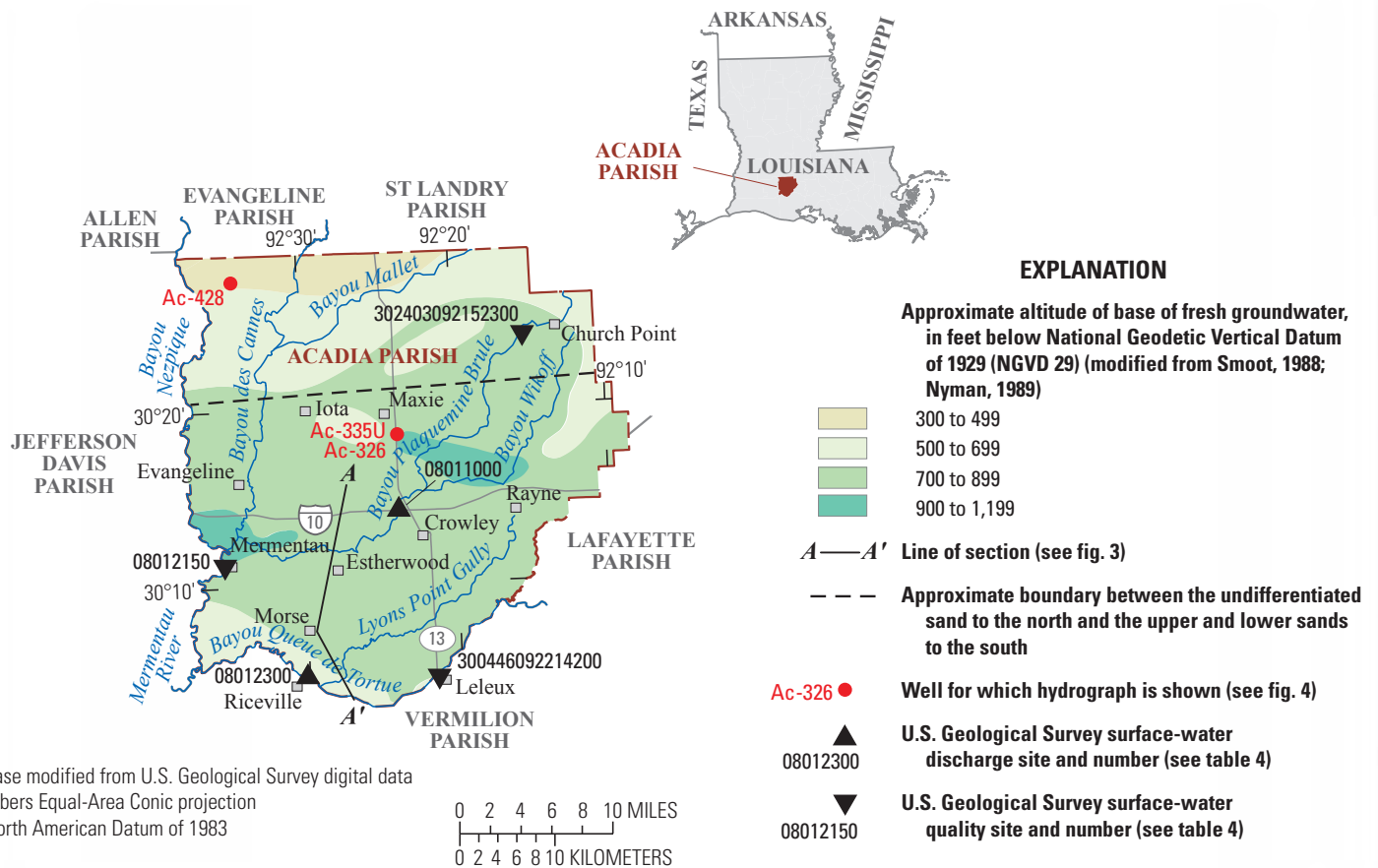


Figure 1. Location of study area, Acadia Parish, Louisiana.

Groundwater Resources

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

Aquifer system or surface-water body	Groundwater	Surface water
Chicot aquifer system	183.25	
Bayou Mallet		0.79
Bayou Nezpique		2.67
Bayou Plaquemine Brule		10.01
Bayou Queue De Tortue		11.95
Lyons Point Gully		5.87
Mermentau River		5.87
Miscellaneous streams		10.44
Total	183.25	47.60

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

Use category	Groundwater	Surface water	Total
Public supply	5.81	0.00	5.80
Industrial	0.01	0.00	0.01
Power generation	1.33	0.79	2.12
Rural domestic	1.34	0.00	1.34
Livestock	0.09	0.01	0.10
Rice irrigation	126.79	34.68	161.47
General irrigation	1.41	1.41	2.82
Aquaculture	46.47	10.71	57.18
Total	183.25	47.60	230.85

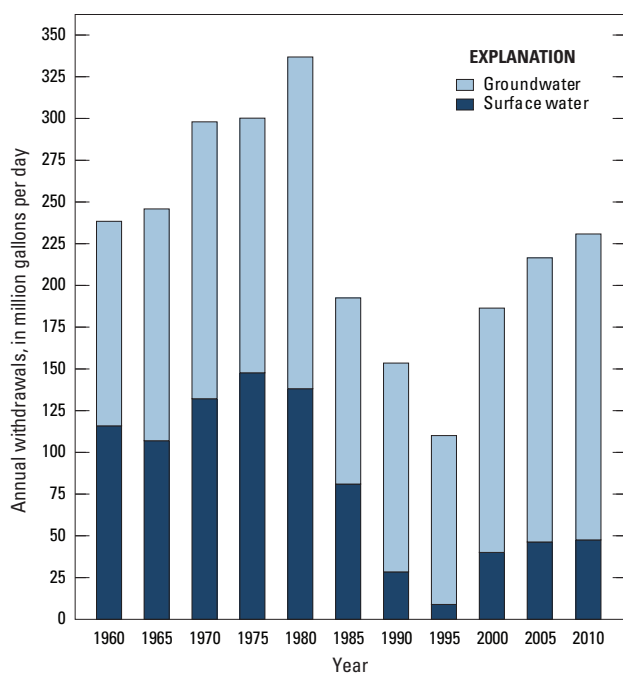


Figure 2. Water withdrawals in Acadia Parish, Louisiana, 1960–2010 (Sargent, 2011).

The primary source of fresh groundwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) in Acadia Parish is the Chicot aquifer system (fig. 3). Generally, the base of fresh groundwater in Acadia Parish is within the Chicot aquifer system at depths of about 400 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) near the northwestern corner of the parish to about 900 ft below NGVD 29 in the southwestern and east-central areas of the parish (fig. 1) (Smoot, 1988). The underlying Evangeline aquifer generally contains saltwater (water with a chloride concentration greater than 250 mg/L) (Nyman, 1989).

The Chicot aquifer system thickens and dips to the south at a rate of about 30 ft per mile (Nyman and others, 1990). Recharge to the Chicot aquifer system is from infiltration of precipitation, vertical leakage, and lateral flow from other aquifers. Recharge from precipitation primarily occurs in areas where the aquifer system outcrops in parts of Beauregard, Vernon, Allen, Rapides, and Evangeline Parishes (Nyman, 1989). The general direction of groundwater flow in the Chicot aquifer system in 2003 in Acadia Parish was toward the north-central part of the parish (Lovelace and others, 2004). In January 2003, water levels in the aquifer system ranged from about 37 ft below NGVD 29 near the southern parish line to about 60 ft below NGVD 29 in north-central Acadia Parish. The direction of flow is a result of large groundwater withdrawals, primarily for rice irrigation in Acadia Parish and surrounding parishes, which are the major sources of discharge for the aquifer system. Groundwater withdrawals in Acadia Parish in 2010 for various categories of use are presented in table 2.

In Acadia Parish, the Chicot aquifer system is composed of the shallow sand, the undifferentiated aquifer, and the upper and lower sands. A surficial confining layer of clay (the Chicot aquifer system surficial confining unit) is present throughout the parish from land surface to depths of 80 to 120 ft below land surface; however, in some areas, the thickness can reach 160 ft (Sargent, 2004). Within the surficial confining clay are scattered sand streaks and lenses. These streaks and lenses are known collectively as the shallow sand of the Chicot aquifer system (Prakken, 2003). State well-registration records listed 83 active water wells screened in the shallow sand in Acadia Parish in 2010, including 80 domestic and 3 irrigation. Depths of these wells ranged from 18 to 95 ft below land surface, with a median depth of 39 ft. Reported yields from wells screened in the shallow sand in Acadia Parish ranged from 6 to 8 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2011). In 2005, withdrawals from the shallow sand in Acadia Parish totaled about 0.10 Mgal/d and included about 0.05 Mgal/d for rural-domestic use and 0.04 Mgal/d for livestock.

Below the surficial confining unit and the shallow sands, the Chicot aquifer system consists of the undifferentiated, upper, and lower sand units. The undifferentiated sand unit is a single massive sand present in the northern third of Acadia Parish. In the southern two-thirds of the parish, a clay layer generally is present at depths ranging from about 400 to 450 ft below NGVD 29, separating the aquifer system into the upper and lower sand units. The altitude of the base of the Chicot aquifer system ranges from about 500 ft below NGVD 29 in the northwestern corner of the parish to over 1,000 ft below NGVD 29 at the southern boundary of the parish (fig. 3) (Nyman, 1989). Saltwater generally is present near the base of the lower sand at depths ranging from 700 to 800 ft below NGVD 29 (Nyman, 1989).

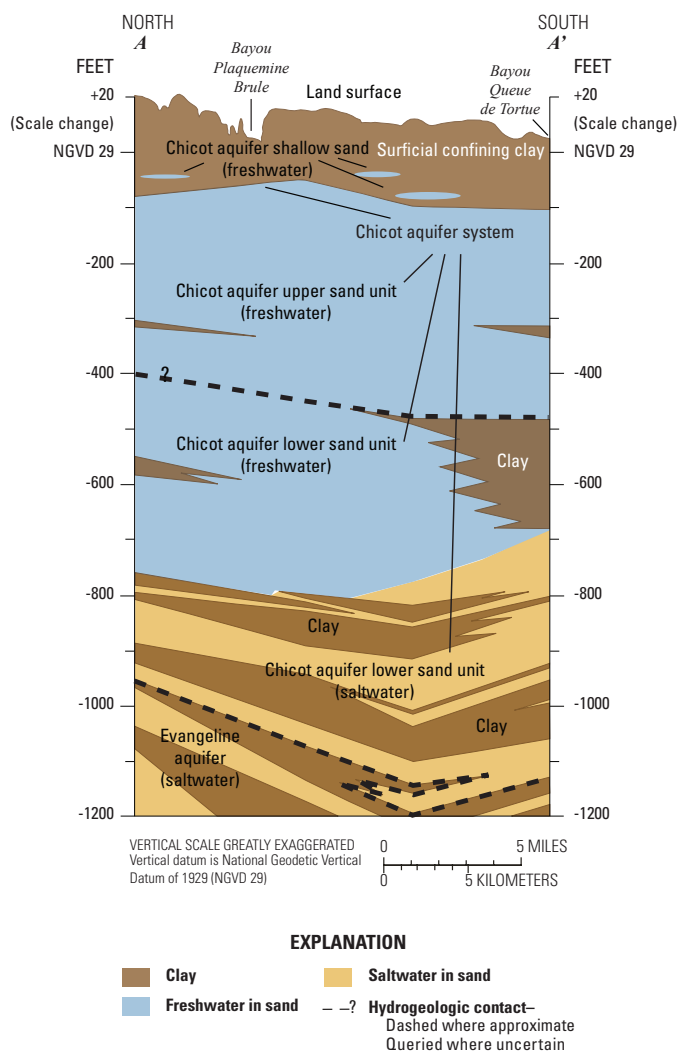


Figure 3. Generalized north-to-south hydrogeologic section through southern Acadia Parish, Louisiana (modified from Whitman and Kilburn, 1963). Trace of section shown on figure 1.

State well-registration records listed 2,701 active water wells screened in the undifferentiated and upper sands in Acadia Parish in 2010, including 1,644 domestic, 871 irrigation, 135 public supply, 48 industrial, and 3 power generation. Depths of these wells ranged from 96 to 453 ft below land surface. Yields from these wells have reportedly ranged from 4 to 5,000 gal/min (Louisiana Department of Natural Resources, 2011). In 2010, withdrawals totaled 182.6 Mgal/d, and categories of use included 5.52 Mgal/d for public supply, 0.01 Mgal/d for industrial, 1.33 Mgal/d for power generation, 1.29 Mgal/d for rural domestic, 0.05 Mgal/d for livestock, 126.8 Mgal/d for rice irrigation, 1.41 Mgal/d for general irrigation, and 46.5 Mgal/d for aquaculture.

State well-registration records listed only two active water wells (both public supply) screened in the lower sand in Acadia Parish in 2010. Depths of these wells are 910 and 927 ft below land surface, and reported yields from wells screened in the lower sand in Acadia Parish ranged from 40 to 752 gal/min (Louisiana Department of Natural Resources, 2011). In 2010, withdrawals from the lower sand in Acadia Parish totaled about 0.29 Mgal/d.

A statistical summary of selected water-quality characteristics for water samples collected from 155 wells screened in the undifferentiated sand and upper sand in Acadia Parish is listed in table 3. Freshwater from the aquifer is generally very hard² and exceeds the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels (SMCLs)³ for iron and manganese. The median concentration of iron in 42 samples, 1,700 micrograms per liter ($\mu\text{g/L}$), greatly exceeds the SMCL of 300 $\mu\text{g/L}$. The median concentration of manganese in 35 samples, 120 $\mu\text{g/L}$, exceeds the SMCL of 50 $\mu\text{g/L}$. All sampled wells contained freshwater which generally did not exceed SMCLs for pH or concentrations of chloride and dissolved solids. Generally, freshwater in the upper and lower sands is of similar water quality (Nyman, 1989).

In Acadia Parish, water levels in the Chicot aquifer system generally fluctuate seasonally 5 to 20 ft in response to seasonal pumping for rice irrigation (Lovelace and others, 2004). Figure 4 shows seasonal water-level fluctuations at well Ac-428, located in northwestern Acadia Parish (fig. 1), and at wells Ac-326 and Ac-335U, located in central Acadia Parish (fig. 1). Water levels in the Chicot aquifer system in Acadia Parish generally have declined 50 ft or more since groundwater development began around 1900 (Lovelace and others, 2004). During the 10-year period 1996–2005, which included the drought years of 1999–2000, water levels at wells Ac-326 and Ac-335U declined about 1 foot per year (ft/yr) (fig. 4) (Prakken and Wright, 2009).

Surface-Water Resources

In 2010, about 47.6 Mgal/d of surface water were withdrawn in Acadia Parish, primarily for rice irrigation and aquaculture. Other categories of use included power generation, livestock, and general irrigation (table 2). Major surface-water sources in Acadia Parish include Bayou Queue De Tortue, Bayou Plaquemine Brule, Lyons Point Gully, Mermentau River, and miscellaneous streams (table 1). Other streams in the parish include Bayou des Cannes, Bayou Mallet, Bayou Nezpique, and Bayou Wikoff.

About 10.0 Mgal/d of water were withdrawn in Acadia Parish from Bayou Plaquemine Brule in 2010. Few discharge data are available for Bayou Plaquemine Brule, but during the period 1942–47, the average daily discharge for Bayou Plaquemine Brule near Crowley (site number 08011000) (fig. 1) was about 543 cubic feet per second (ft^3/s) (U.S. Geological Survey, 2013). A limited number of water samples collected from Bayou Plaquemine Brule near Church Point (site number 302403092152300) (fig. 1) from 1989 to 2001 (table 4) indicated that, in general, the water is hard and generally does not exceed SMCLs for pH and for concentrations of chloride,

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).

Table 3. Summary of selected water-quality characteristics for freshwater in the undifferentiated sand and upper sand of the Chicot aquifer in Acadia Parish, Louisiana (U.S. Geological Survey, 2011b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; PCU, platinum cobalt units; $\mu\text{S}/\text{cm}$, microsiemens per centimeter; SU, standard units; CaCO_3 , calcium carbonate; $\mu\text{g}/\text{L}$, micrograms per liter; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012); NA, not applicable]

	Temperature(°C)	Color, (PCU)	Specific conductance, field ($\mu\text{S}/\text{cm}$ at 25 °C)	pH, field (SU)	Hardness (as CaCO_3)	Chloride, filtered (as Cl)	Iron, filtered ($\mu\text{g}/\text{L}$ as Fe)	Manganese, filtered ($\mu\text{g}/\text{L}$ as Mn)	Dissolved solids, filtered
Undifferentiated sand and upper sand of the Chicot aquifer, 1939–2009 (155 wells)									
Median	21.5	10	672	7.5	200	44	1,700	120	382
10th percentile	21.0	5	492.6	7.2	140	24	841	70.26	303
90th percentile	22.5	30	764.3	8.3	253.3	78	2,290	210	450
Number of samples	112	20	114	64	88	151	42	35	46
Percentage of samples that do not exceed SMCLs	NA	70	NA	98	NA	100	5	3	96
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

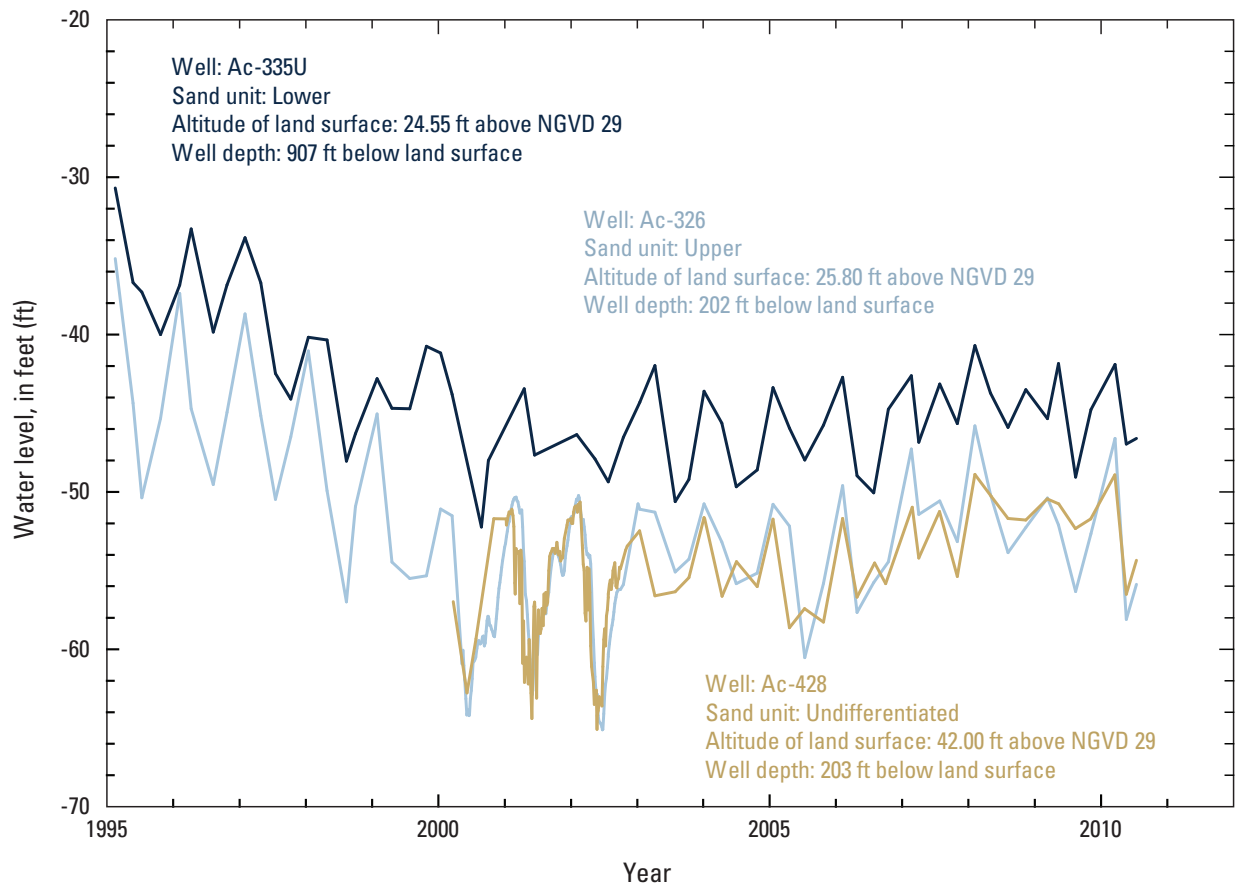


Figure 4. Water levels in wells Ac-326, Ac-335U, and Ac-428 screened in the Chicot aquifer system in Acadia Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2011a). Land surface and water level are measured in feet (ft) relative to the National Geodetic Vertical Datum of 1929.

Table 4. Summary of selected water-quality characteristics for Bayou Plaquemine Brule, Bayou Queue De Tortue, and Mermentau River in Acadia Parish, Louisiana (U.S. Geological Survey, 2011b).

[Values are in milligrams per liter, except as noted. $\mu\text{S}/\text{cm}$, microsiemens per centimeter; $^{\circ}\text{C}$, degrees Celsius; SU, standard units; $\mu\text{g}/\text{L}$, micrograms per liter; CaCO_3 , calcium carbonate; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012); NA, not applicable; E, estimated]

	Specific conductance, field ($\mu\text{S}/\text{cm}$ at 25 $^{\circ}\text{C}$)	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 ($\mu\text{g}/\text{L}$ as Fe)
Bayou Plaquemine Brule at LA-Hwy 370 near Church Point, 1989–2001 ¹										
Median	548	7.0	8.1	150	37	16	48	44	4.0	30
10th percentile	351	4.6	7.7	120	28	11	26	25	0.5	10
90th percentile	659	11.7	8.3	190	41	21	66	53	8.3	60
Number of samples	9	8	9	8	8	8	9	8	8	9
Percentage of samples that do not exceed SMCLs	NA	NA	89	NA	NA	NA	NA	100	100	100
Bayou Queue De Tortue at LA-Hwy 13 near Leleux, 2000–01 ²										
Median	406	1.4	7.8	96	22	10	48	29	4.4	20
10th percentile	259	0.9	7.4	73	18	6.8	24	16	2.9	E8
90th percentile	554	4.8	8.0	130	31	13	70	44	7.5	40
Number of samples	8	8	8	8	8	8	7	8	8	8
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	100	100	100
Mermentau River at Mermentau, 1979–2011 ³										
Median	163	4.0	7.1	40	10	3.6	15	17	4.2	170
10th percentile	70	1.1	6.2	17	4.5	1.6	5.7	6.7	2.3	20
90th percentile	329	7.0	7.6	77	18	7.6	39	37	8.4	340
Number of samples	192	176	192	126	126	126	124	188	187	103
Percentage of samples that do not exceed SMCLs	NA	NA	84	NA	NA	NA	NA	100	100	79
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

¹Station number 302403092152300 (U.S. Geological Survey, 2011b; specific data at http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site_no=302403092152300).

²Station number 300446092214200 (U.S. Geological Survey, 2011b; specific data at http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site_no=300446092214200).

³Station number 08012150 (U.S. Geological Survey, 2011b; specific data at http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site_no=08012150).

sulfate, and iron. Dissolved oxygen concentrations are generally greater than 5 mg/L, which is considered the minimum value for a diversified population of fresh, warmwater biota, including sport fish (Louisiana Department of Environmental Quality, 2008).

In 2010, about 11.95 Mgal/d of water were withdrawn in Acadia Parish from Bayou Queue De Tortue. During the period 1985–90, the average discharge for Bayou Queue De Tortue at Riceville (site number 08012300) (fig. 1) was about 364 ft³/s (U.S. Geological Survey, 2013). Wind and tide affect this station, and reverse flow (northeasterly) can occur at this site. A limited number of water samples collected from Bayou Queue De Tortue from near Leleux (site number 300446092214200) during 2000–1 (table 4) indicated that, in general, the water is moderately hard and does not exceed SMCLs for pH and for concentrations of chloride, sulfate, and iron. Dissolved oxygen concentrations are generally below 5 mg/L.

In 2010, about 5.87 Mgal/d of water were withdrawn in Acadia Parish from the Mermentau River. During the period 1989–2003, the average discharge of the Mermentau River at Mermentau (site number 08012150) was about 2,243 ft³/s (U.S. Geological Survey, 2013). During 1979–2011, water samples collected from the Mermentau River at Mermentau indicated the water is generally soft. The pH of the water and concentrations of chloride, sulfate, and iron are generally below the SMCLs (table 4). Dissolved oxygen concentrations are generally below 5 mg/L.

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