

In cooperation with the Louisiana Department of Transportation and Development

# Water Resources of Rapides Parish

## Introduction

Rapides Parish, located in central Louisiana (fig. 1), contains fresh groundwater and surface-water resources. In 2005, about 443 million gallons per day (Mgal/d) were withdrawn from water sources in Rapides Parish (fig. 2). About 92 percent (409 Mgal/d) was withdrawn from surface water, and 8 percent (34 Mgal/d) was withdrawn from groundwater (table 1). Withdrawals for power generation accounted for 91 percent (403 Mgal/d) of the

total water withdrawn (table 2). Withdrawals for other uses included public supply (27 Mgal/d), irrigation (9 Mgal/d), and aquaculture (3 Mgal/d). Water withdrawals in the parish generally increased from 1960 to 1995 and decreased from 1995 to 2005 (fig. 2).

This fact sheet summarizes basic information on the water resources of Rapides Parish, La. Information on groundwater and surface-water availability, quality, development, use, and trends is based on previously published reports listed in the references section.

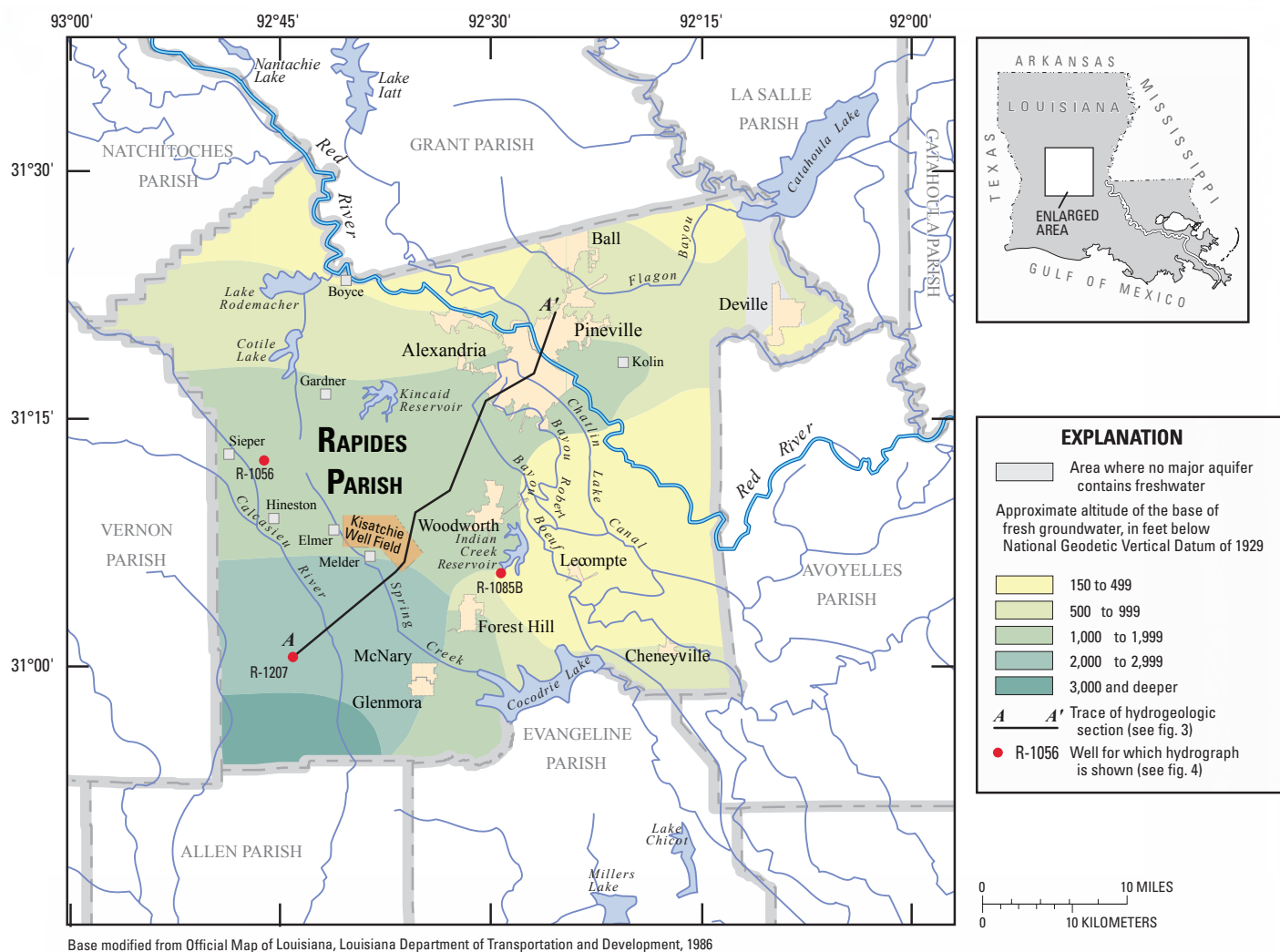


Figure 1. Location of study area, Rapides Parish, Louisiana.

## Groundwater Resources

The groundwater resources of Rapides Parish, from near surface to deepest, include the Red River alluvial and upland terrace aquifers; the Chicot aquifer system; and the Evangeline, Williamson Creek, and Carnahan Bayou aquifers (fig. 3). Fresh groundwater (water with a chloride concentration less than 250 milligrams per liter [mg/L]) is present from land surface to about 500 ft below National Geodetic Vertical Datum of 1929 (NGVD 29) in northern and southeastern Rapides Parish (fig. 1) and to about 3,000 ft below NGVD 29 in the southwestern part of the parish. Recharge to the aquifers is from rainfall, leakage from overlying aquifers, and seasonal input from rivers. Discharge from the aquifers is by natural flow into rivers, leakage into underlying aquifers, and withdrawal from wells. Well-registration records from the Louisiana Department of Transportation and Development (DOTD) indicate that there are about 1,310 active wells screened in the aquifers in Rapides Parish, including about 770 domestic, 300 irrigation, 190 public-supply, and 40 industrial wells.

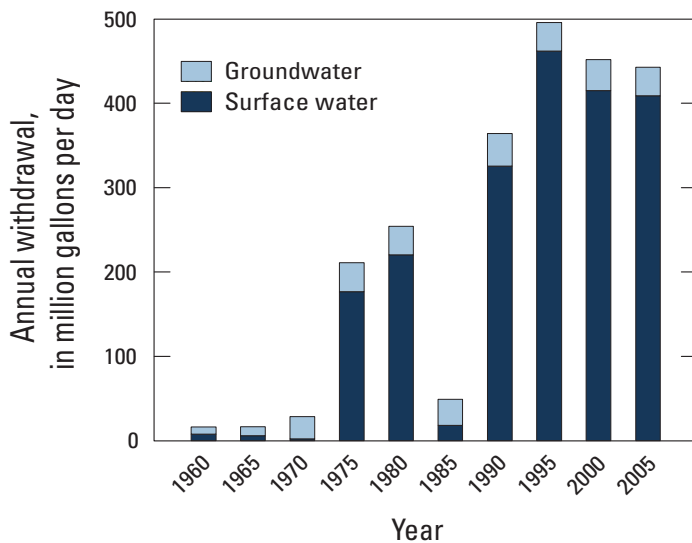
In 2005, about 27 Mgal/d of groundwater were withdrawn in Rapides Parish for public supply. The Alexandria Water System withdrew about 18 Mgal/d from well fields in the Kisatchie National Forest and in Alexandria. Water was also withdrawn for rice irrigation (3 Mgal/d) and aquaculture (1 Mgal/d).

## Shallow Aquifers

For the purpose of this fact sheet, the Red River alluvial aquifer, upland terrace aquifer, and the Chicot aquifer system are grouped as shallow aquifers. These aquifers generally consist of fine to coarse sand and are present at depths shallower than 200 ft below NGVD 29. About 610 wells are screened in the shallow aquifers, and most are used for domestic (336), irrigation (225), public-supply (41), or industrial (12) purposes.

The Red River alluvial aquifer is 20 to 80 ft thick and is present in about 30 percent of the parish in a band that extends from north-central to southeastern Rapides Parish. The aquifer yields very hard water (greater than 180 mg/L as calcium carbonate [ $\text{CaCO}_3$ ]), and iron and manganese concentrations generally exceed the U.S. Environmental Protection Agency's (EPA) 2006 Secondary Maximum Contaminant Levels (SMCLs)<sup>1</sup> for drinking water. Chloride concentrations generally are less than 180 mg/L; however, local areas contain saltwater (water with a chloride concentration that exceeds 250 mg/L). Reported well yields are generally about 70 gallons per minute (gal/min) but may be as much as 2,500 gal/min where the aquifer is

<sup>1</sup> The 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).



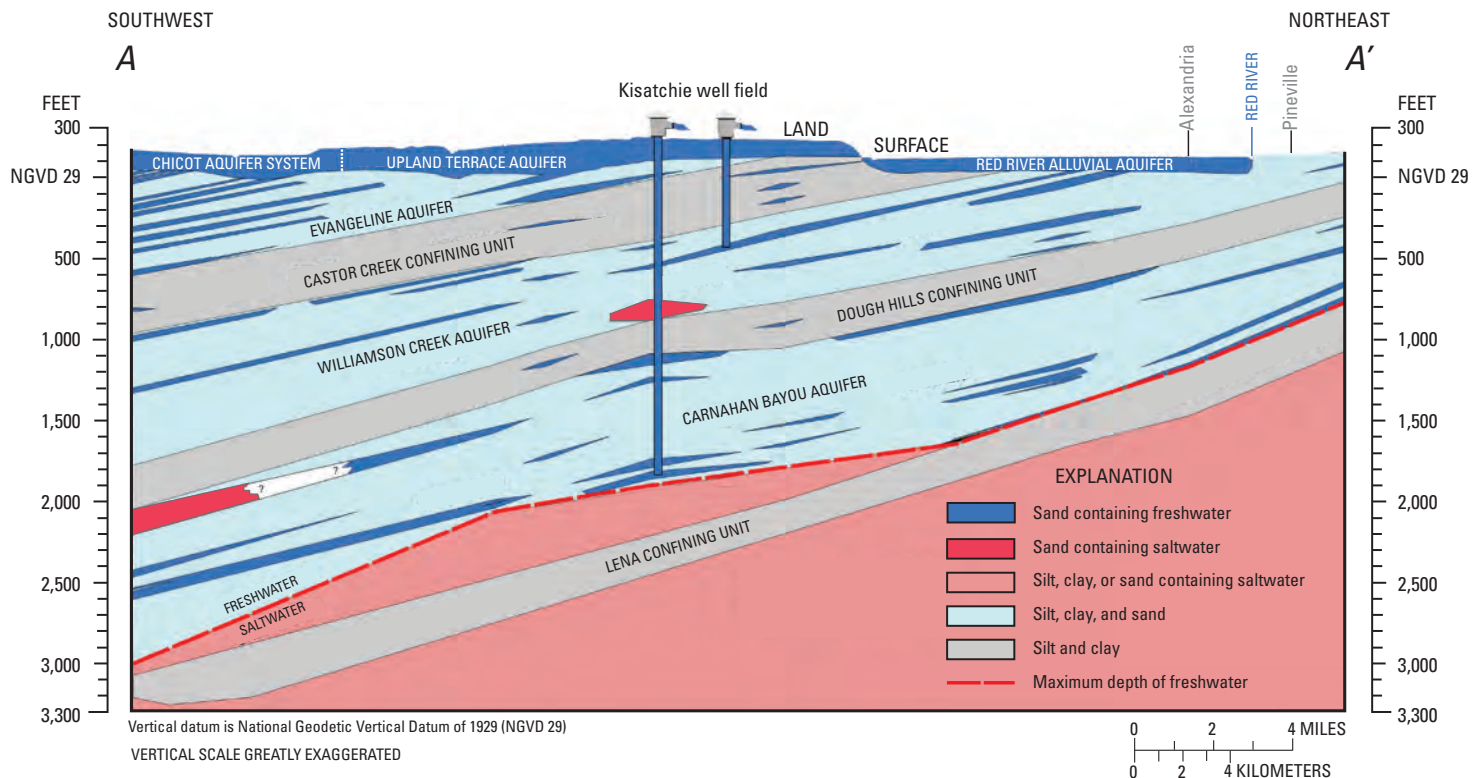
**Figure 2.** Water withdrawals in Rapides Parish, Louisiana, 1960–2005.

**Table 1.** Water withdrawals, in million gallons per day, by source in Rapides Parish, Louisiana, 2005 (Sargent, 2007).

Aquifer, aquifer system, or major water body	Groundwater	Surface water
Red River alluvial aquifer	1.38	
Upland terrace aquifer	9.02	
Chicot aquifer system	.76	
Evangeline aquifer	3.05	
Jasper aquifer system	18.5	
Other aquifers	.91	
Bayou Boeuf		2.94
Bayou Robert		.95
Chatlin Lake Canal		1.9
Lake Rodemacher		402.39
Other water bodies		.91
<b>Total</b>	<b>33.63</b>	<b>409.09</b>

**Table 2.** Water withdrawals, in million gallons per day, by category in Rapides Parish, Louisiana, 2005 (Sargent, 2007).

	Groundwater	Surface water	Total
Public supply	27.17	0	27.17
Industrial	.65	0	.65
Power generation	.12	402.39	402.51
Rural domestic	.5	0	.5
Livestock	.03	.12	.15
Rice irrigation	3.03	4.54	7.57
General irrigation	.69	.69	1.39
Aquaculture	1.44	1.35	2.79
<b>Total</b>	<b>33.63</b>	<b>409.09</b>	<b>442.72</b>



**Figure 3.** Generalized southwest-to-northeast hydrogeologic section through Rapides Parish, Louisiana (Tomaszewski, 2007). Trace of section shown on figure 1.

thicker. Withdrawals from the Red River alluvial aquifer were about 1 Mgal/d in 2005. Water levels are about 50 to 70 ft above NGVD 29. A comparison of water-level data from 1972 with data from 2000 indicates that water levels have changed little during the period.

The upland terrace aquifer and Chicot aquifer system are merged and indistinguishable in Rapides Parish. The aquifer and aquifer system are 70 to 160 ft thick and are present in the approximate southwestern 60 percent of the parish. The upland terrace aquifer and Chicot aquifer system yield freshwater that is generally soft (hardness less than 60 mg/L as  $\text{CaCO}_3$ ) and does not exceed the EPA's SMCLs for chloride, iron, manganese, and dissolved solids. Reported well yields range from about 5 to 950 gal/min. Withdrawals in 2005 were about 9 Mgal/d from the upland terrace aquifer and about 1 Mgal/d from the Chicot aquifer system. About 6 Mgal/d were withdrawn at the Kisatchie well field in 2005. Water levels in the aquifer and aquifer system are close to predevelopment levels in western Rapides Parish; however, near the Kisatchie well field, water levels have declined locally by 10 to 20 ft since withdrawals from the well field began in about 1968.

## Evangeline Aquifer

The Evangeline aquifer is present in the southern one-third of Rapides Parish and probably merges with the overlying Red River alluvial aquifer, upland terrace

aquifer, and Chicot aquifer system. The base of the aquifer dips to the south and ranges from about 0 ft NGVD 29 near Woodworth to about 1,000 ft below NGVD 29 south of Glenmora. The aquifer generally consists of about 50 feet of fine to medium sand and some locally occurring coarse sand. The aquifer yields freshwater that is generally soft and does not exceed the EPA's SMCLs for chloride, iron, manganese, and dissolved solids. About 130 wells are screened in the Evangeline aquifer, and most are used for domestic (60), irrigation (37), public-supply (27), or industrial (4) purposes. Reported well yields range from about 30 to 540 gal/min, and withdrawals from the Evangeline aquifer were about 3 Mgal/d in 2005. Water levels in the Evangeline aquifer have generally declined by about 5 to 20 ft from 1980 to 2004 and ranged from about 40 to 220 ft above NGVD 29 in 2005.

## Williamson Creek and Carnahan Bayou Aquifers

The Williamson Creek aquifer and underlying Carnahan Bayou aquifer compose the Jasper aquifer system in Rapides Parish. These aquifers are the deepest source of fresh groundwater in the parish, dip to the south, and crop out at ground surface in northern Rapides Parish. Withdrawals from the Jasper aquifer system are primarily from wells in the Kisatchie well field and Alexandria.

The Williamson Creek aquifer is present in the approximate southern 90 percent of Rapides Parish. The aquifer consists of numerous lenses of very fine to medium



sand and some locally occurring coarse sands that are typically about 50 ft thick. The base of the aquifer ranges from 0 ft NGVD 29 in the northwest to 2,500 ft below NGVD 29 in the south. The aquifer yields freshwater that is generally soft and does not exceed the EPA's SMCLs for chloride, iron, manganese, and dissolved solids (table 3). About 270 wells are screened in the Williamson Creek aquifer, and most are used for domestic (193) or public-supply (44) purposes. Reported well yields range from about 20 to 550 gal/min. Withdrawals from the Williamson Creek aquifer were about 4 Mgal/d in 2005. Water levels in the Williamson Creek aquifer have been lowered (fig. 4) by withdrawals in the Alexandria-Pineville area and at the Kisatchie well field. In southeastern Rapides Parish, the aquifer is underlain with saltwater.

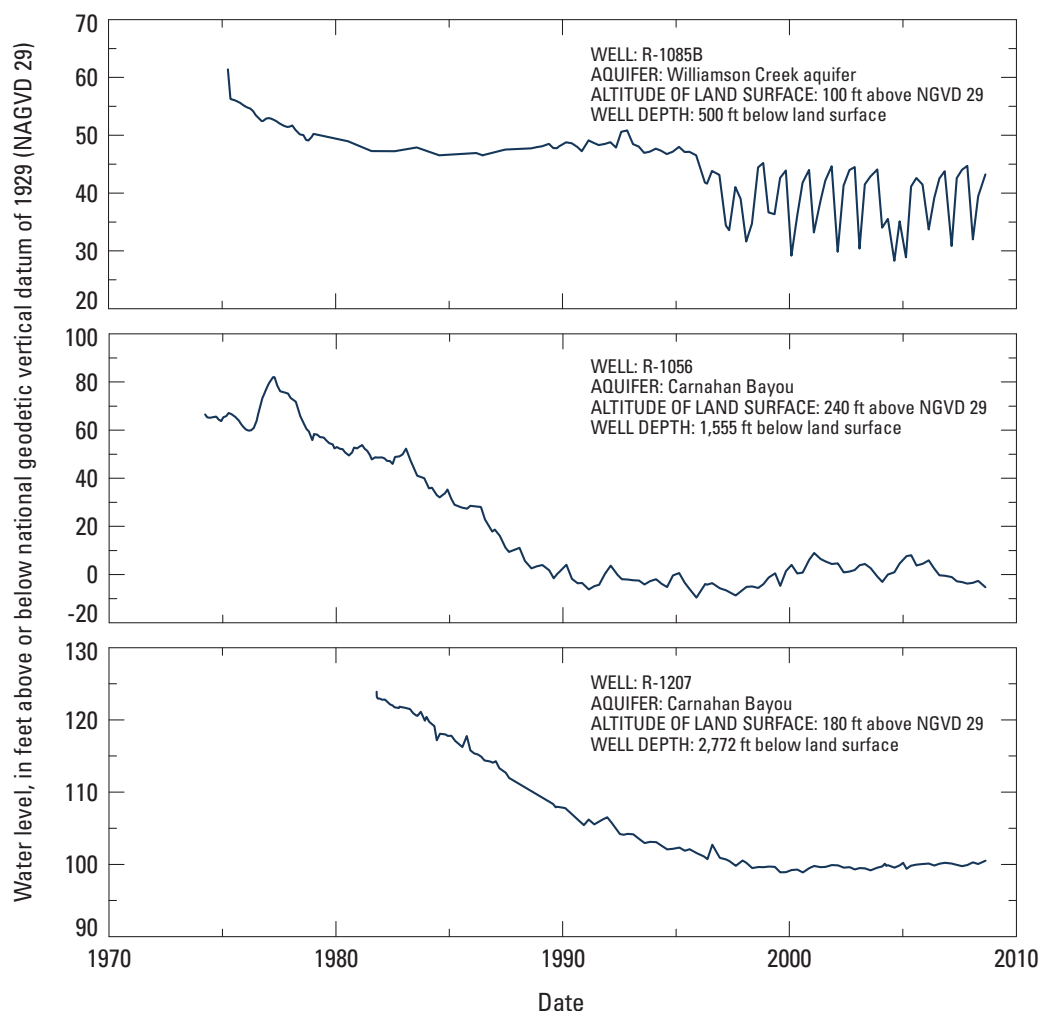
The Carnahan Bayou aquifer is present throughout Rapides Parish; however, large areas contain saltwater. The aquifer consists of numerous lenses of very fine to medium sand that are typically about 40 ft thick. The base of the Carnahan Bayou aquifer ranges from 0 ft NGVD 29 in northwestern areas of the parish to 4,000 ft below NGVD

29 in southern areas. In most of Rapides Parish, the aquifer yields fresh water that is soft and does not exceed the EPA's SMCLs for chloride, iron, manganese, and dissolved solids (table 3); however, in areas south of the cities of Sieper, Alexandria, and Kolin, the aquifer contains freshwater underlain with saltwater or only contains saltwater. About 210 wells are screened in the Carnahan Bayou aquifer, and most are used for domestic (122) or public-supply (71) purposes. Reported well yields range from 5 to 710 gal/min. Withdrawals from the Carnahan Bayou aquifer were about 14 Mgal/d in 2005. Water levels in the Carnahan Bayou aquifer declined from 1968 to 1989 but have been stable since 1989 (fig. 4). The greatest declines (up to 150 ft) have occurred in the Alexandria-Pineville area where water levels are deeper than 200 ft below NGVD 29. Saltwater encroachment has degraded water quality at the Kisatchie well field and Alexandria-Pineville areas. Saltwater encroachment will likely continue under 2004 pumping conditions.

**Table 3.** Summary of selected water-quality characteristics for freshwater in the Williamson Creek and the Carnahan Bayou aquifers in Rapides Parish, Louisiana, 1937–2003 (U.S. Geological Survey, 2008b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; PCU, platinum cobalt units; µS/cm, microsiemens per centimeter; SU, standard units; CaCO<sub>3</sub>, calcium carbonate; µg/L, micrograms per liter; NA, not applicable; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency, 2006]

	Temperature (°C)	Color (PCU)	Specific conductance, field (µS/cm at 25 °C)	pH, field (SU)	Hardness (as CaCO <sub>3</sub> )	Chloride, filtered (as Cl)	Iron, filtered (µg/L as Fe)	Manganese, filtered (µg/L as Mn)	Dissolved solids, filtered
Williamson Creek aquifer									
Median	22	5	475.5	7.8	15	17	100	20	304
10th percentile	20	0	248.1	6.64	8	4.1	21	0	167.9
90th percentile	25.5	11.5	799.3	8.46	58.2	77.6	594	98	523.5
Number of samples	24	36	44	45	93	93	32	23	40
Percentage of samples that meet SMCLs	NA	92	NA	84	NA	100	77	72	87
Carnahan Bayou aquifer									
Median	23.5	10	454.5	7.9	10	15	120	15	319.5
10th percentile	20	0	269	7.2	1.3	6	20	0	203.7
90th percentile	28	26.5	964.5	8.3	31.4	69	350	60	539.6
Number of samples	76	118	126	145	254	258	77	40	118
Percentage of samples that meet SMCLs	NA	67	NA	91	NA	100	87	84	87
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500



**Figure 4.** Water levels in well R-1085B screened in the Williamson Creek aquifer and wells R-1056 and R-1207 screened in the Carnahan Bayou aquifer in Rapides Parish, Louisiana (see fig. 1 for well locations).

## Surface-Water Resources

The Red River, Bayou Boeuf, Calcasieu River, Chatlin Lake Canal, and Lake Rodemacher are primary sources of fresh surface water in Rapides Parish. Other sources of fresh surface water in the parish include Bayou Robert, Cotile Lake, and the Indian Creek and Kincaid Reservoirs. In 2005, about 409 Mgal/d of surface water were withdrawn in Rapides Parish for power generation (402 Mgal/d), rice irrigation (5 Mgal/d), and aquaculture (1 Mgal/d).

The Red River is a potential source of substantial volumes of water in the parish. The average discharge for the Red River at Alexandria was about 30,900 cubic feet per second (ft<sup>3</sup>/s) (19,900 Mgal/d) for the period 1929–83. Water in the Red River is hard (121–180 mg/L as CaCO<sub>3</sub>) to very hard (greater than 181 mg/L as CaCO<sub>3</sub>) (table 4). Water in the Red River generally does not exceed the EPA's SMCLs for pH and for chloride, sulfate, and iron concentrations. Dissolved oxygen concentrations generally range from 5.9 to 11 mg/L. Water withdrawals from Bayou Boeuf were about 3 Mgal/d in 2005 and were for irrigation, livestock, and aquaculture use. The average

discharge in Bayou Boeuf before 1966 was about 2,800 ft<sup>3</sup>/s (1,800 Mgal/d).

The Calcasieu River is also a potential source of water in the parish. The average discharge for the Calcasieu River near Glenmora was about 780 ft<sup>3</sup>/s (500 Mgal/d) for the period 1985–2008. Analyses of water quality samples from the river indicate that the water is somewhat acidic (pH less than 6.5) but otherwise does not exceed the EPA's SMCLs (table 4).

Water withdrawals from the Chatlin Lake Canal for irrigation, livestock, and aquaculture use were about 2 Mgal/d in 2005. The average discharge for Chatlin Lake Canal near Lecompte was about 232 ft<sup>3</sup>/s (150 Mgal/d) for the period 1922–2008. No water quality data are available for Chatlin Lake Canal.

Lake Rodemacher is in northwestern Rapides Parish about 2 miles west of Boyce. It is owned and used by Cleco, Louisiana Energy and Power Authority, and Lafayette Utilities System as a source of cooling water for two power-generating units. Water withdrawals for power generation were about 402 Mgal/d in 2005. The lake has a surface area of about 3,320 acres and a maximum storage capacity of about 14,100 acre-feet. No water quality data are available for Lake Rodemacher.

**Table 4.** Summary of selected water-quality characteristics for the Red and Calcasieu Rivers in Rapides Parish, Louisiana, 1944–2008 (U.S. Geological Survey, 2008b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard units; µg/L, micrograms per liter; CaCO<sub>3</sub>, calcium carbonate; NA, not applicable; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency, 2006]

	Specific conductance, field (µS/cm at 25°C)	Oxygen, dissolved	pH, field (SU)	Hardness (as CaCO <sub>3</sub> )	Calcium, filtered (as Ca)	Magnesium, filtered (as Mg)	Sodium, filtered (as Na)	Chloride, filtered (as Cl)	Sulfate, filtered (as SO <sub>4</sub> )	Iron, filtered (µg/L as Fe)
Red River at Alexandria <sup>1</sup>										
Median	506	8	7.6	130	36	9.1	42	72.3	49.5	42
10th percentile	243	5.9	7.1	70	20	4.2	15	25.5	19	7
90th percentile	1,210	11	8.1	280	78	24	110	215	147	134
Number of samples	729	362	779	719	551	552	381	777	772	127
Percentage of samples that meet SMCLs	NA	NA	99	NA	NA	NA	NA	94	100	98
Calcasieu River near Glenmora <sup>2</sup>										
Median	46	8	6.4	13.5	3.5	1	4.5	5.8	2.6	210
10th percentile	30	6.7	6	7.9	2	.4	2	2.6	1.2	142
90th percentile	67	9.5	7	17	5	1.2	7	7.7	4	230
Number of samples	21	10	37	20	20	20	18	37	37	5
Percentage of samples that meet SMCLs	NA	NA	48	NA	NA	NA	NA	100	100	100
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

<sup>1</sup>Station number 07355500 (U.S. Geological Survey, 2008b; specific data at [[http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site\\_no=07355500](http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site_no=07355500)]).

<sup>2</sup>Station number 08013000 (U.S. Geological Survey, 2008b; specific data at [[http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site\\_no=08013000](http://nwis.waterdata.usgs.gov/la/nwis/qwdata/?site_no=08013000)]).

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