

In cooperation with the Louisiana Department of Transportation and Development

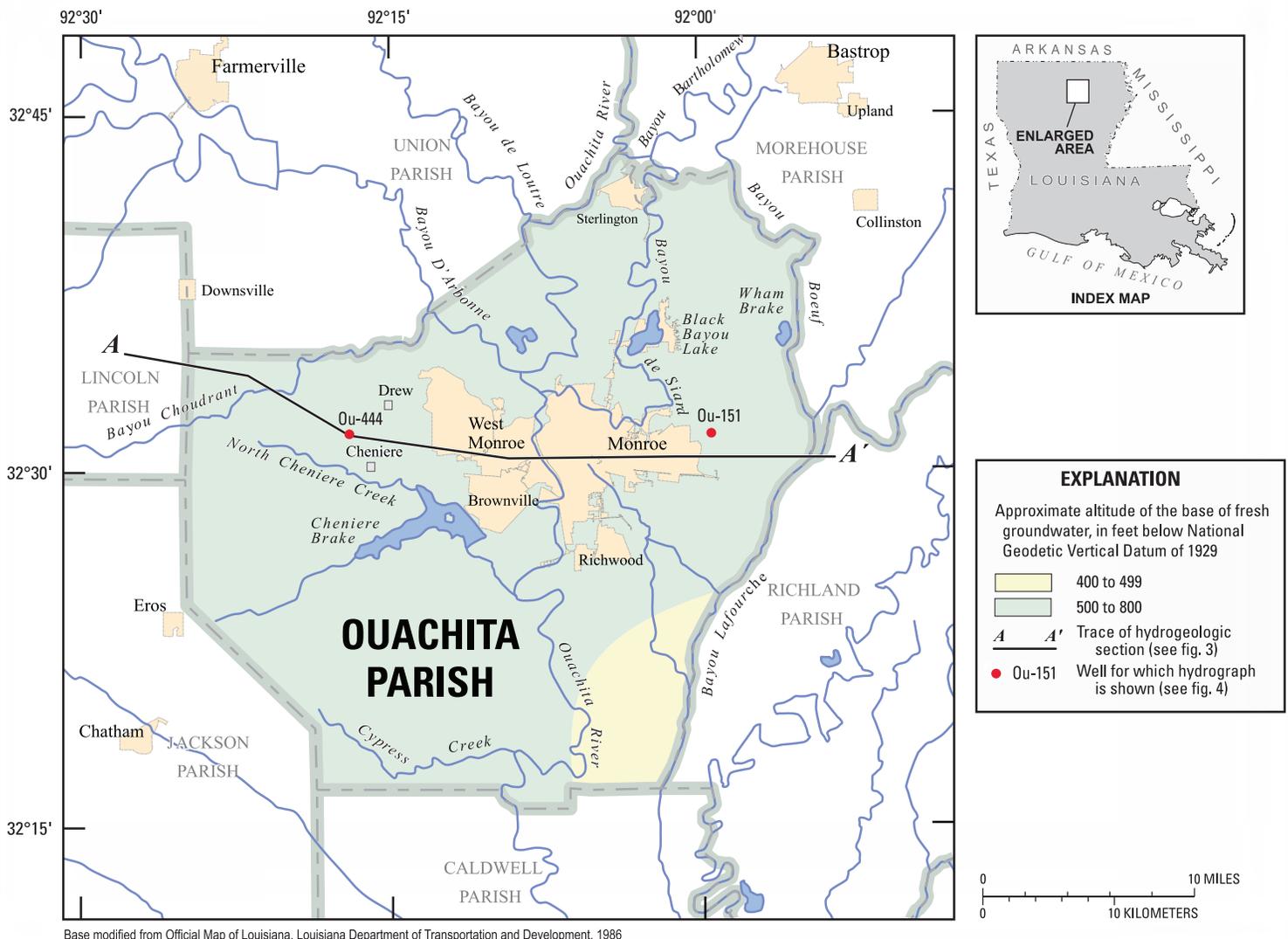
# Water Resources of Ouachita Parish

## Introduction

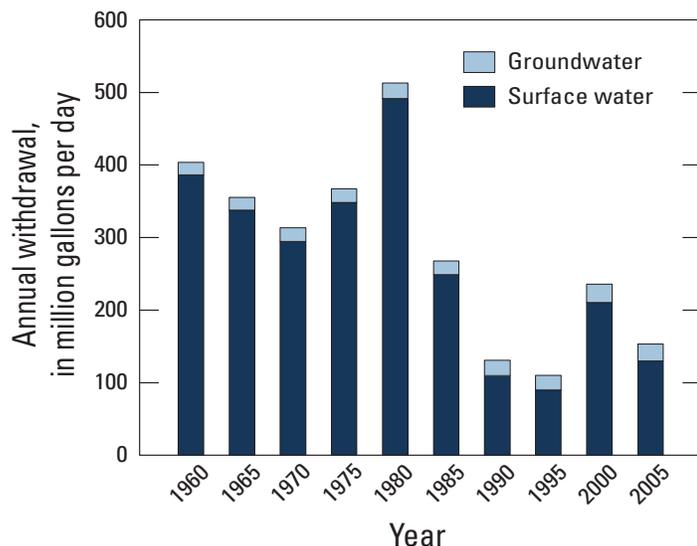
Ouachita Parish, located in north-central Louisiana (fig. 1), contains fresh groundwater and surface-water resources. In 2005, about 152 million gallons per day (Mgal/d) were withdrawn from water sources in Ouachita Parish (fig. 2). About 84 percent (128 Mgal/d) was withdrawn from surface water, and 16 percent (24 Mgal/d) was withdrawn from groundwater

(table 1). Power generation (87 Mgal/d) accounted for 58 percent of the total water withdrawn (table 2). Withdrawals for other uses included public supply (22 Mgal/d), industrial (24 Mgal/d), and irrigation (18 Mgal/d).

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



**Figure 1.** Location of study area, Ouachita Parish, Louisiana.



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

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

Aquifer or major surface-water body	Groundwater	Surface water
Shallow aquifers	1.20	
Sparta aquifer	22.32	
Ouachita River		105.37
Bayou de Siard		11.05
Bayou Lafourche		5.22
Other water bodies		6.39
<b>Total</b>	<b>23.52</b>	<b>128.02</b>

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

Category of use	Groundwater	Surface water	Total
Public supply	10.83	11.07	21.90
Industrial	11.00	12.91	23.91
Power generation		87.23	87.26
Rural domestic	.43		.43
Livestock		.05	.05
Rice irrigation	.84	13.00	13.84
General irrigation	.43	3.70	4.13
Aquaculture		.02	.02
<b>Total</b>	<b>23.52</b>	<b>128.02</b>	<b>151.54</b>

## Groundwater Resources

The groundwater resources of Ouachita Parish, from near surface to deepest, include the upland terrace, Mississippi River alluvial, Ouachita River alluvial, Cockfield, and Sparta aquifers (fig. 3). Fresh groundwater is present from land surface to about 800 feet (ft) below National Geodetic Vertical Datum of 1929 (NGVD 29) (sea level) in the parish. Recharge to the aquifers is typically from infiltration of rainfall in outcrop areas, seasonal inflow from rivers, and leakage from overlying aquifers. Discharge from the aquifers is by seasonal outflow to rivers, leakage into underlying aquifers, and withdrawal from wells. Well-registration records from the Louisiana Department of Transportation and Development (DOTD) indicate in Ouachita Parish there are nearly 700 active wells screened in the aquifers: about 365 domestic, 115 irrigation, 55 industrial, and 160 public-supply wells.

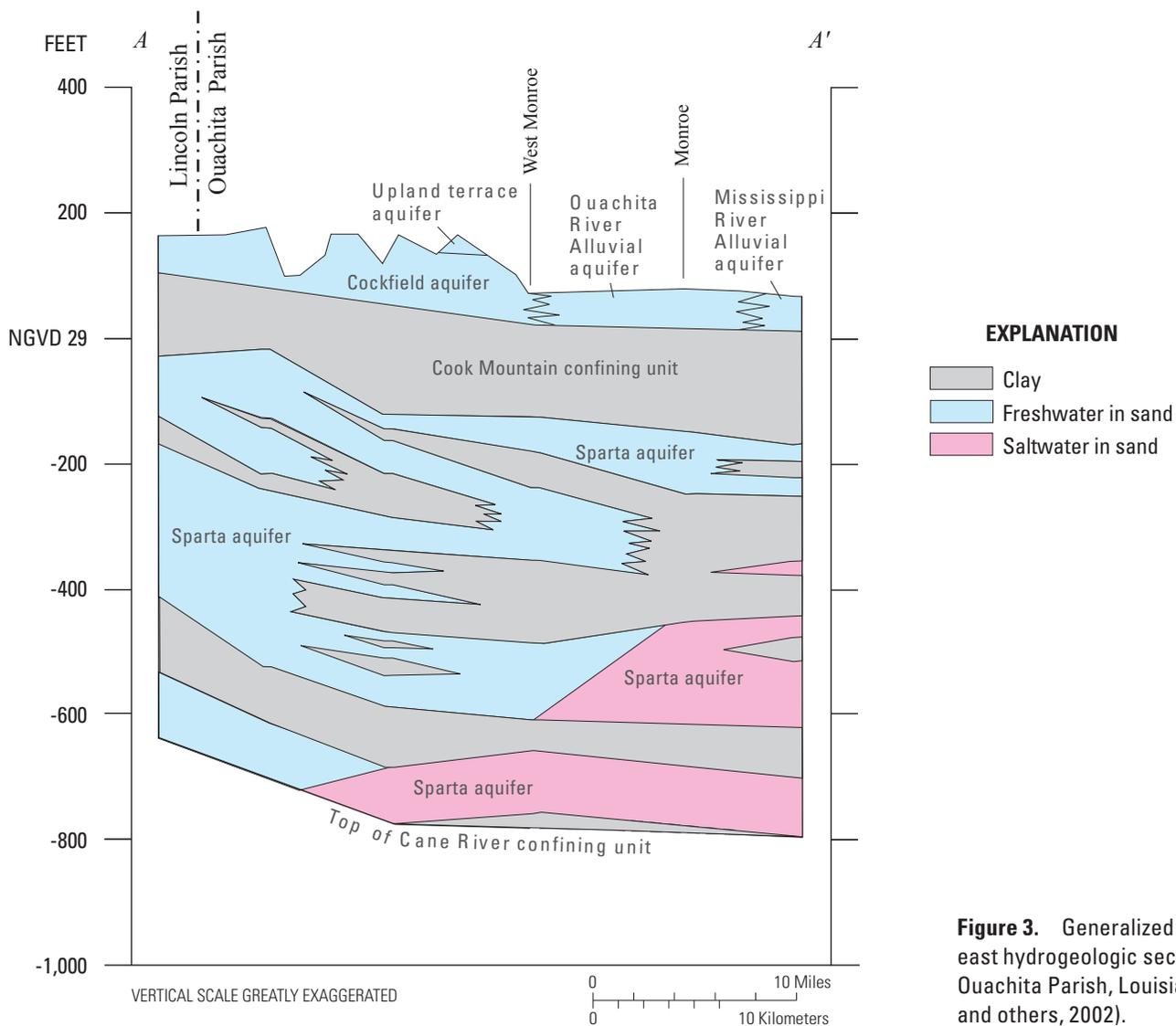
## Shallow Aquifers

For the purpose of this fact sheet, the upland terrace, Mississippi River alluvial, Ouachita River alluvial, and Cockfield aquifers are grouped as shallow aquifers. These aquifers generally are near land surface at depths shallower than 100 to 250 ft below NGVD 29.

The upland terrace aquifer is present as a narrow, north-to-south band west of the Ouachita River in central Ouachita Parish. The aquifer is present east of Bayou de Siard in the northeastern corner of the parish. In central Ouachita Parish, the aquifer is generally thin, rarely more than 100 ft in thickness, and consists of basal gravel that grades upward into sand, silt, and clay. In some areas of central Ouachita Parish, much of the aquifer may be unsaturated and only suitable for low-yielding wells. In northeastern Ouachita Parish, the upland terrace aquifer has better potential for supplying wells. Previous investigators reported that yields of 500 to 1,000 gal/min (gallons per minute) may be possible where the aquifer thickens to more than 100 ft. The upland terrace aquifer is continuous with alluvial aquifers in northeastern Ouachita Parish. Water in the upland terrace aquifer ranges from soft (0–60 mg/L [milligrams per liter] as calcium carbonate) to hard (121–180 mg/L as calcium carbonate), and contains concentrations of iron that exceed the U.S. Environmental Protection Agency's (EPA) Secondary Maximum Contaminant Level (SMCL)<sup>1</sup> for drinking water of 300 µg/L (micrograms per liter).

The Mississippi River and Ouachita River alluvial aquifers are present at or near land surface in the eastern half of Ouachita Parish. The aquifers contain basal gravel overlain with sand, silt, and clay. The aquifers generally contain 20–50 ft of sand and gravel and reported well yields of as much as 330 gal/min. Water from the alluvial aquifers is hard and generally exceeds the EPA's SMCLs for color, iron, and manganese (table 3).

<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 3.** Generalized west-to-east hydrogeologic section through Ouachita Parish, Louisiana (Brantly and others, 2002).

**Table 3.** Summary of selected water-quality characteristics for freshwater in the Sparta aquifer in Ouachita Parish, Louisiana, 1941–2007 (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 at 25 °C; SU, standard units; μg/L, micrograms per liter; SMCL, Secondary Maximum Contaminant Level for drinking water established by the U.S. Environmental Protection Agency (2006); NA, not applicable]

	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
Median	23	40	900	8.4	4	92	80	<10	580
10th percentile	22	15	450	7.8	2	19	20	<10	300
90th percentile	25	85	1,280	8.8	14	220	376	35	740
Number of samples	28	66	57	82	229	230	42	26	41
Percent of samples meeting SMCLs	NA	6	NA	45	NA	98	82	92	41
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

About 270 wells are screened in shallow aquifers and primarily used for domestic purposes or irrigation. Twenty-one wells screened in alluvial aquifers and one well screened in the upland terrace aquifer had yields of 100 gal/min or more. These larger yielding wells were mostly for irrigation or industrial use. Withdrawals from the shallow aquifers in 2005 totaled about 1.2 Mgal/d in Ouachita Parish.

Because the rate of water withdrawals from the Mississippi River alluvial aquifer has been low, water levels in the aquifer have not shown long-term declines. Water levels in well Ou-151, screened in the Mississippi River alluvial aquifer in eastern Ouachita Parish, fluctuated seasonally by about 10 to 15 ft from 1953 to 2008 (fig. 4).

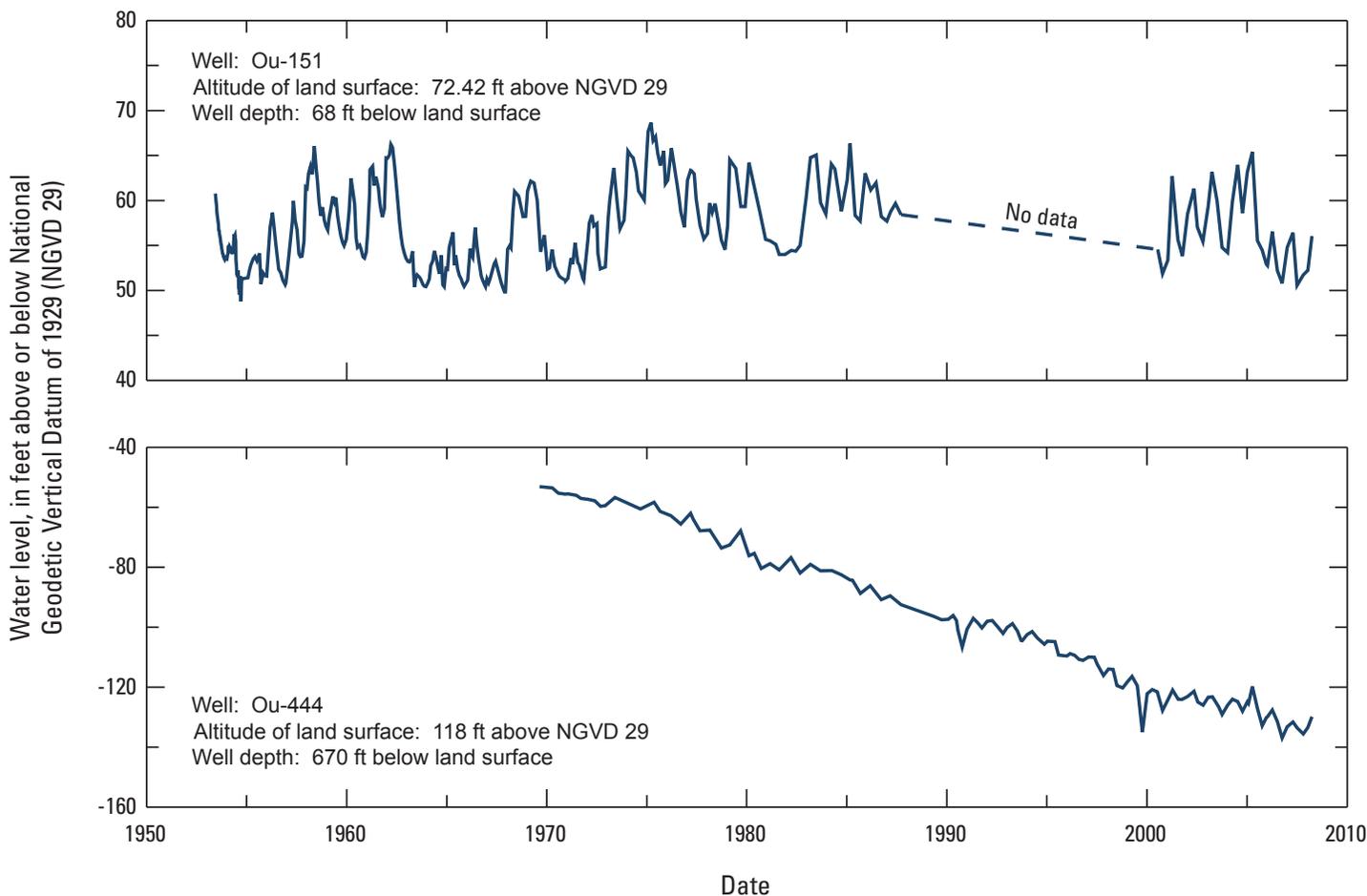
The Cockfield aquifer is present as scattered erosional remnants below terrace deposits, primarily in western parts of Ouachita Parish. In most of central and eastern Ouachita Parish, erosion by ancestral streams and the Ouachita River has removed the Cockfield aquifer. The Cockfield aquifer contains fine to medium sand. Reported well yields are about 20 gal/min. Yields as high as 100 gal/min are possible in some areas but could cause dewatering because of the limited extent and shallow depths of the aquifer.

## Sparta Aquifer

The Sparta aquifer underlies all of Ouachita Parish and is the most important source of groundwater. In the parish, the base of the aquifer ranges from 650 to 850 ft below NGVD 29, and the aquifer ranges from about 600 to 700 ft in thickness. The Sparta aquifer generally consists of layers of sand, silt, and clay. Although the Sparta aquifer is also known locally as the “Sparta Sand,” in some areas the aquifer contains mostly silt and clay. In most areas, the Sparta aquifer contains one or more sands at least 50 ft thick and locally contains sands 100 to 250 ft thick.

About 344 wells registered with Louisiana DOTD are screened in the Sparta aquifer in the parish. Many of the wells (152) are privately owned domestic wells, but about 117 of the wells are used for public supply. Reported yields from wells ranged from less than 10 to about 1,720 gal/min. In 2005, about 22 Mgal/d were withdrawn from the Sparta aquifer in the parish (table 1).

Water levels in the Sparta aquifer in Ouachita Parish ranged from about 40 to 200 ft below NGVD 29 in 2006. The lowest water levels were at West Monroe where about



**Figure 4.** Water levels in well Ou-151 screened in the Mississippi River alluvial aquifer and well Ou-444 screened in the Sparta aquifer in Ouachita Parish, Louisiana (see fig. 1 for well locations).

14 Mgal/d were withdrawn in 2005. In the West Monroe area, water levels have declined about 300 ft since the early 1900s as a result of withdrawals, mostly for public supply and industry. Withdrawals in this area have altered the flow pattern in the Sparta aquifer throughout most of its extent in northern Louisiana. Prior to development, water in the Sparta aquifer generally moved from northwest to southeast. Current (2009) water movement in the aquifer is generally toward the West Monroe area. The hydrograph for well Ou-444 shows that during the period 1970–2008, water-level declines of as much as 80 ft have occurred in the Sparta aquifer in the parish.

Selected water-quality data from wells screened in the Sparta aquifer are summarized in table 3. In much of Ouachita Parish, the Sparta aquifer yields freshwater that is soft and has concentrations of chloride, iron, and manganese that generally do not exceed the EPA's SMCLs. Chloride concentrations in freshwater-yielding wells generally range between 19 and 220 mg/L. Values for color and concentrations of dissolved solids generally exceed SMCLs, the latter because of elevated chloride concentrations (water containing 100 mg/L or more chloride).

In most of Ouachita Parish, the Sparta aquifer contains freshwater that is underlain with saltwater (water with a chloride concentration that exceeds 250 mg/L) at the base of the aquifer. Chloride concentrations in the Sparta aquifer increase with depth. Saltwater increases in thickness (more sands become salty) toward the eastern boundary. A few miles to the

east in Richland Parish, the aquifer contains only saltwater. Throughout the parish, there is a risk of saltwater encroachment in the Sparta aquifer, mostly through upconing, during which pumping wells draw water up from deeper, salty areas of the aquifer into shallower, freshwater areas.

## Surface-Water Resources

The Ouachita River and Bayou de Siard are primary sources of fresh surface water in Ouachita Parish. Most of the water withdrawn from these sources is used for public supply, industry, power generation, and irrigation. Other bodies of freshwater in the parish include Bayous Boeuf, Choudrant, Bartholomew, de Loutre, D'Arbonne and Lafourche; North Cheniere and Cypress Creeks; Cheniere and Wham Brakes; and Black Bayou Lake.

About 105 Mgal/d of water were withdrawn from the Ouachita River in 2005 for industry (13 Mgal/d), power generation (87 Mgal/d), and irrigation (5 Mgal/d). Most of the water used for power generation and industry was for once-through cooling and was discharged back into the river. The average discharge for the Ouachita River near Monroe is 18,900 cubic feet per second (12,200 Mgal/d) (U.S. Geological Survey, 2008c). Selected water-quality data for the Ouachita River are summarized in table 4. Water in the Ouachita River is soft. Chloride and sulfate concentrations meet the EPA's SMCLs, but

**Table 4.** Summary of selected water-quality characteristics for the Ouachita River and Bayou de Siard in Ouachita Parish, Louisiana, 1954–2000 (U.S. Geological Survey, 2008b).

[Values are in milligrams per liter, except as noted.  $\mu\text{S/cm}$ , microsiemens per centimeter at 25 °C;  $\mu\text{g/L}$ , micrograms per liter; SU, standard units; NA, not applicable; -- no value; SMCL, Secondary Maximum Contaminant Level for drinking water established by the U.S. Environmental Protection Agency (2006)]

	Specific conductance, field ( $\mu\text{S/cm}$ at 25 °C)	Oxygen, dissolved	pH, field (SU)	Hardness (as $\text{CaCO}_3$ )	Calcium, filtered (as Ca)	Magnesium, filtered (as Mg)	Sodium, filtered (as Na)	Chloride, filtered (as Cl)	Sulfate, filtered (as $\text{SO}_4$ )	Iron, filtered ( $\mu\text{g/L}$ as Fe)
Ouachita River										
Median	210	6.2	6.6	37	11	2.2	26	40	10	250
10th percentile	97	3	6.0	20	6	1.3	10	17	6	140
90th percentile	450	9.5	7.0	62	19	4.1	64	93	18	470
Number of samples	231	160	217	189	189	189	188	193	203	15
Percent of samples meeting SMCLs	NA	NA	34	NA	NA	NA	NA	100	100	73
Bayou de Siard										
Median	93	8	7.1	26	7.3	2	7	6.9	2	--
10th percentile	71	7.1	6.6	22	5.9	1.7	5	5.1	.4	--
90th percentile	128	8.7	7.4	34	9.1	2.9	13	16	3.5	--
Number of samples	6	4	6	6	6	6	6	6	6	0
Percent of samples meeting SMCLs	NA	NA	83	NA	NA	NA	NA	100	100	--
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

pH generally is low (less than 7 mg/L) and met the SMCL in only 34 percent of samples. Iron concentrations also exceeded the SMCL in 27 percent of samples.

About 11 Mgal/d of water were withdrawn from Bayou de Siard for public supply during 2005. Streamflow data for Bayou de Siard were not available, but there is little flow in the stream because of a dam constructed across the bayou near its confluence with the Ouachita River. Analyses of six samples collected from the bayou in Ouachita Parish indicate the water quality generally is within the EPA's SMCLs (table 4).

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