

Prepared in cooperation with the Louisiana Department of Transportation and Development

# Water Resources of West Feliciana Parish, Louisiana

## Introduction

Information concerning the availability, use, and quality of water in West Feliciana 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 discussed. 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In 2010, about 41.7 million gallons per day (Mgal/d) of water were withdrawn in West Feliciana Parish, including about 37.0 Mgal/d (89 percent) from surface-water sources and 4.68 Mgal/d from groundwater sources<sup>1</sup> (table 1). Withdrawals for industry and power generation accounted for about 89 percent (37.1 Mgal/d) of the total water withdrawn (table 2). Water-use data collected at 5-year intervals from 1960 to 2010 (fig. 2) indicated that surface-water withdrawals for industrial use increased from 0.00 Mgal/d in 1965 to 32.0 Mgal/d in 1970. Between 1980 and 1985, withdrawals for power generation increased from 0.00 to 24.5 Mgal/d.

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

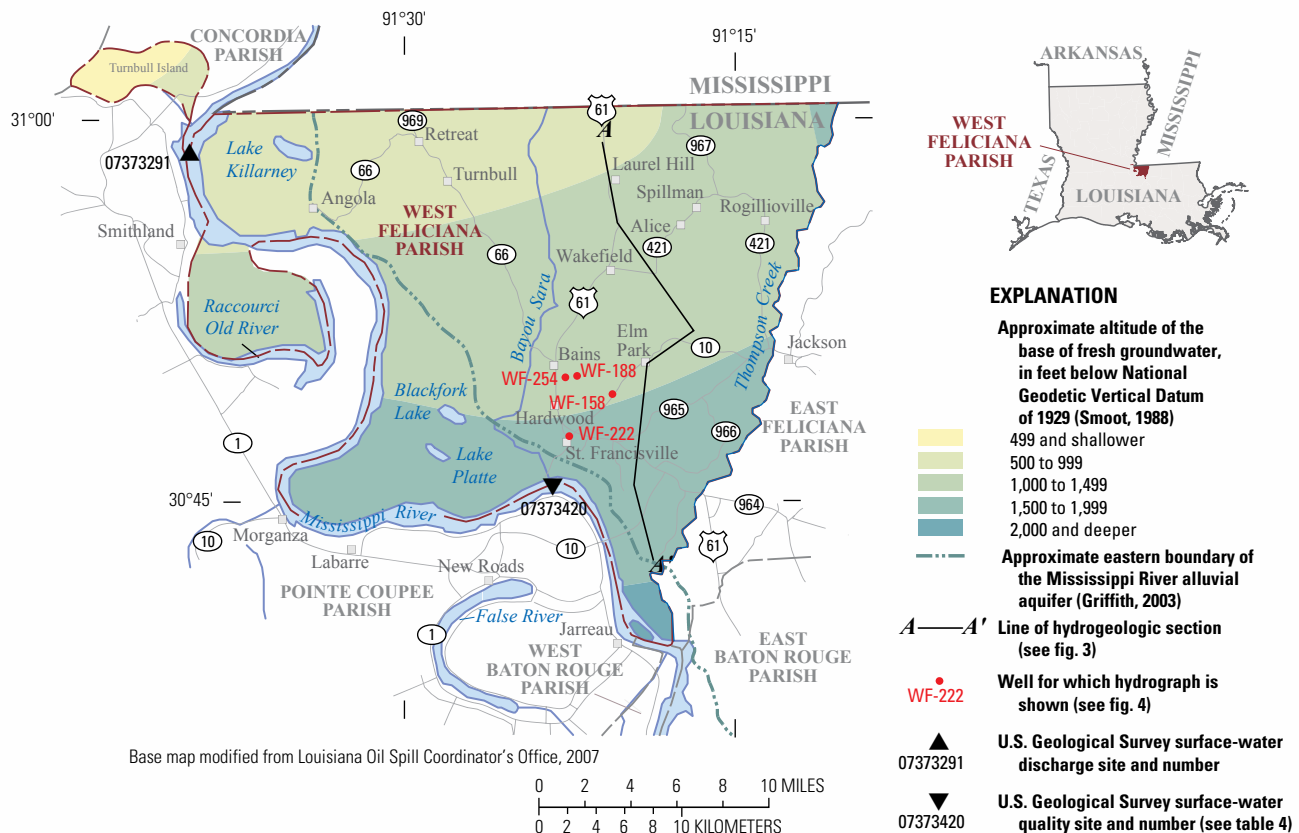


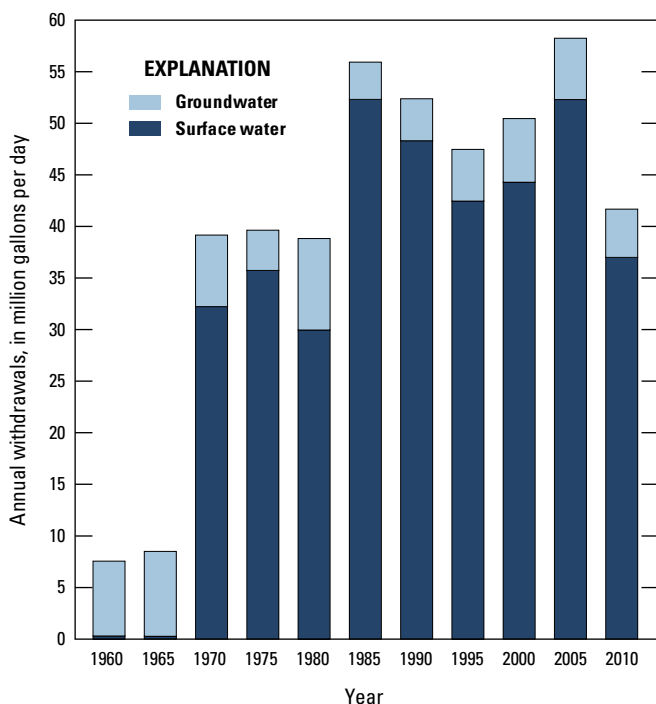
Figure 1. Location of study area, West Feliciana Parish, Louisiana.

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

Aquifer, aquifer system, or surface-water body	Groundwater	Surface water
Mississippi River alluvial aquifer	0.04	
Chicot equivalent aquifer system	0.45	
Evangeline equivalent aquifer system	0.02	
Jasper equivalent aquifer system	4.17	
Mississippi River		36.69
Miscellaneous streams		0.31
<b>Total</b>	<b>4.68</b>	<b>37.00</b>

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

Use category	Groundwater	Surface water	Total
Public supply	4.15	0.00	4.15
Industrial	0.41	18.29	18.70
Power generation	0.02	18.40	18.42
Rural domestic	0.10	0.00	0.10
Livestock	0.00	0.05	0.05
General irrigation	0.00	0.26	0.26
<b>Total</b>	<b>4.68</b>	<b>37.00</b>	<b>41.69</b>



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

## Groundwater Resources

The groundwater resources underlying West Feliciana Parish, from near surface to deepest, include the Mississippi River alluvial aquifer and the Chicot, Evangeline, and Jasper equivalent aquifer systems (Stuart and others, 1994). The aquifers within these aquifer systems primarily consist of beds of unconsolidated sand that generally thicken and dip to the south (Tomaszewski, 1996) (fig. 3). Although the aquifers vary in thickness and can be missing locally, the individual aquifers generally are at least 75 feet (ft) thick and can be more than 200 ft thick. The confining units between the aquifers primarily consist of clay and silt, which generally are at least 100 ft thick but can be as much as 500 ft thick in some areas (Tomaszewski, 1996).

The base of freshwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) is present at depths of about 300–600 ft below the National Geodetic Vertical Datum of 1929 (NGVD 29) in the extreme northwestern corner of the parish (Turnbull Island, fig. 1). The base of freshwater reaches depths of about 2,000 ft below NGVD 29 near the southern boundary of the parish (fig. 1) (Smoot, 1988). Below 2,000 ft, aquifers generally contain saltwater (water with a chloride concentration greater than 250 mg/L).

Recharge to aquifers in West Feliciana Parish is from precipitation, leakage from overlying aquifers, and seasonally from rivers. Precipitation is the primary source of recharge (Morgan, 1963). Generally, groundwater moves down and in a southerly to southwesterly direction through the aquifers at rates that range from tens to hundreds of feet per year (Buono, 1983). Discharge is by evapotranspiration, natural leakage into rivers, leakage into underlying aquifers, and withdrawal from wells. State well-registration records listed 264 active water wells in West Feliciana Parish in 2009, including 153 domestic, 52 irrigation, 41 public supply, 16 industrial, and 2 power generation (Louisiana Department of Natural Resources, 2009).

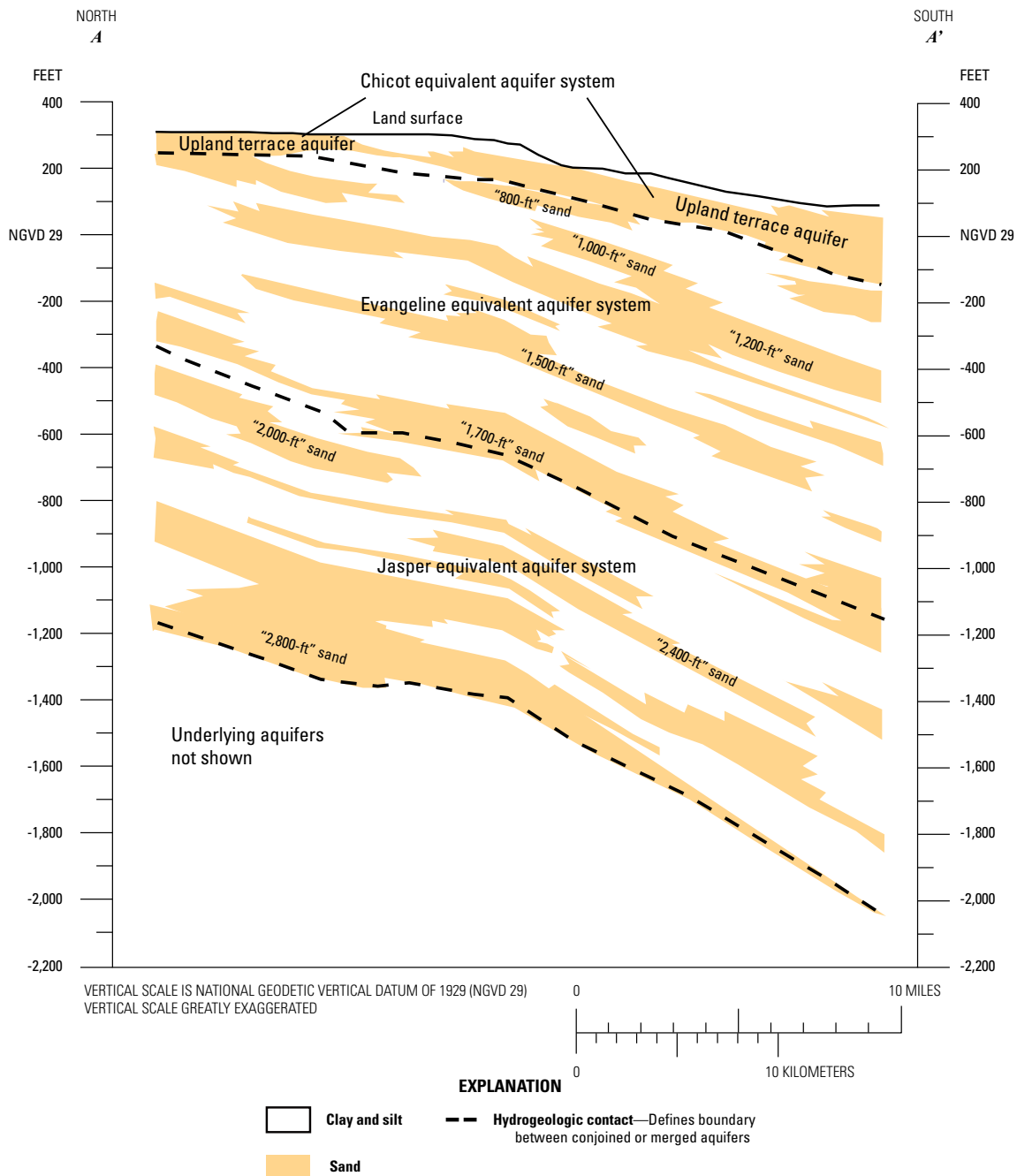
### The Mississippi River Alluvial Aquifer and Chicot Equivalent Aquifer System

The Mississippi River alluvial aquifer is located within the Mississippi River flood plain in the western part of the parish (fig. 1). The top of the aquifer ranges from about 0 to 50 ft below NGVD 29, and the base of the aquifer ranges in depth from about 100 to 150 ft below NGVD 29. The top and base of the aquifer are generally flat within the parish, with no discernible dip. Although the Mississippi River alluvial aquifer constitutes a large fresh groundwater resource in Louisiana, State well-registration records listed only 10 wells screened in the aquifer in West Feliciana Parish in 2009, including 5 irrigation, 3 rural domestic, 1 industrial, and 1 public supply. Depths of these wells ranged from 117 to 216 ft below land surface, with a median depth of 137 ft (Louisiana Department of Natural Resources, 2009). Generally, freshwater from the Mississippi River alluvial aquifer is very hard<sup>2</sup> and exceeds the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels (SMCLs)<sup>3</sup> for drinking water for iron and manganese (Tomaszewski, 2003).

The Chicot equivalent aquifer system is present in most of West Feliciana Parish east of the Mississippi River alluvial aquifer (Stuart and others, 1994) and consists of the Upland terrace aquifer (fig. 3). The altitude of the base of the Chicot equivalent aquifer system ranges from about 250 ft above to 250 ft below NGVD 29 in West Feliciana Parish. Water levels in the Chicot equivalent aquifer system at well WF-188 (fig. 4), screened in the Upland terrace aquifer near Bains (fig. 1), showed no appreciable change from 1960 to 1990 but showed slight declines from 1998 to 2010 at well WF-158 (fig. 4), screened in the Upland terrace aquifer northeast of St. Francisville (fig. 1).

<sup>2</sup>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).

<sup>3</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 could result. SMCLs were established as guidelines for the States by the U.S. Environmental Protection Agency (1992).



**Figure 3.** Generalized north-to-south hydrogeologic section through West Feliciana Parish, Louisiana (modified from Griffith, 2003). Trace of section shown on figure 1.

State well-registration records listed 64 active water wells screened in the Chicot equivalent aquifer system in West Feliciana Parish in 2009, including 49 rural domestic, 12 irrigation, and 3 public supply. Well depths ranged from 14 to 200 ft, and reported yields ranged from 3 to 1,950 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2009). Freshwater from the Chicot equivalent aquifer system generally is soft and low in dissolved solids. Locally, iron or saltwater may be present (Stuart and others, 1994).

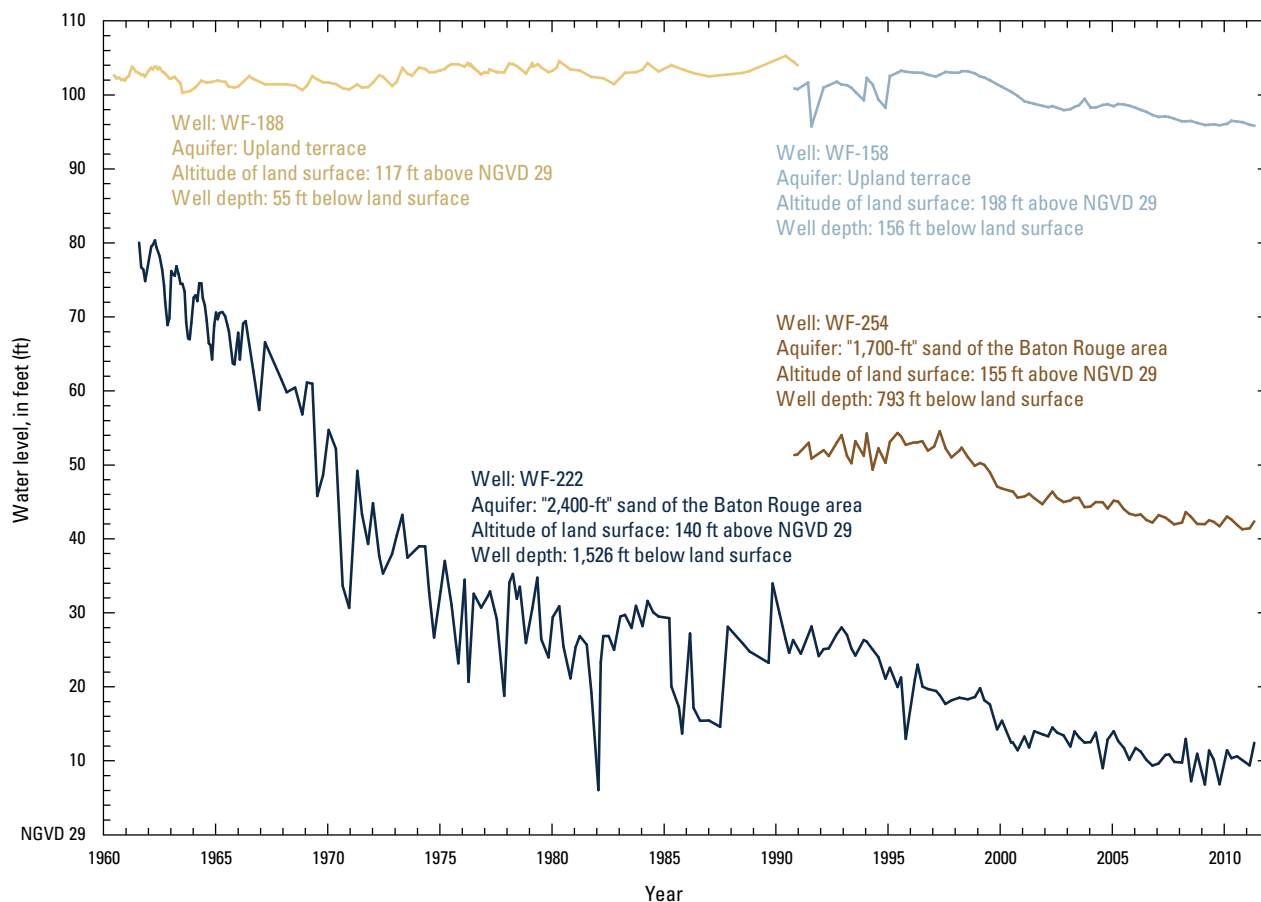
## The Evangeline Equivalent Aquifer System

The Evangeline equivalent aquifer system underlying West Feliciana Parish consists of, from near surface to deepest, the “800-foot,” “1,000-foot,” “1,200-foot,” “1,500-foot,” and “1,700-foot” sands of the Baton Rouge area (Stuart and others, 1994). The Evangeline equivalent aquifer system is present throughout the parish with the exception of the

Angola area and Turnbull Island (fig. 1) (Morgan, 1963). The Evangeline equivalent aquifer system is present at depths between 200 ft above and 300 ft below NGVD 29 in the northern part of the parish (about 500 ft thick) and between about 300 ft and 1,200 ft below NGVD 29 in the southern part of the parish (about 900 ft thick). Aquifers in the system typically consist of fine to medium sand units from 100 to 200 ft thick (fig. 3).

Flow in the Evangeline equivalent aquifer system is primarily southward. In 2003, water levels in the “1,200-foot,” “1,500-foot,” and “1,700-foot” sands of the Baton Rouge area (fig. 3) ranged from about 140 ft above NGVD 29 in the northeastern part of the parish to 40 ft below NGVD 29 in the southern part (Griffith and Lovelace, 2003a, b; Prakken, 2004). Water levels in well WF-254, screened in the Evangeline equivalent aquifer system (“1,700-foot” sand) near the town of Bains (fig. 1), have declined about 10 ft since 1996 (fig. 4).

State well-registration records listed 128 active water wells screened in the Evangeline equivalent aquifer system in West Feliciana Parish



**Figure 4.** Water levels in wells WF-188 and WF-158 of the Chicot equivalent aquifer system, well WF-222 of the Evangeline equivalent aquifer system, and well WF-254 of the Jasper equivalent aquifer system in West Feliciana Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2011a). Altitude of land surface and water level is measured in feet (ft) above the National Geodetic Vertical Datum of 1929 (NGVD 29).

in 2009, including 75 domestic, 32 irrigation, 12 public supply, and 9 industrial. Depths of these wells ranged from 90 to 793 ft below land surface, with a median depth of 259 ft. Reported yields from these wells ranged from 3 to 400 gal/min (Louisiana Department of Natural Resources, 2009). Water from the aquifer system generally is soft and generally does not exceed the SMCLs for pH and concentrations of chloride, iron, and dissolved solids (table 3).

## The Jasper Equivalent Aquifer System

The Jasper equivalent aquifer system underlies the Evangeline equivalent aquifer system in West Feliciana Parish and consists of, from shallowest to deepest, the "2,000-foot," "2,400-foot," and "2,800-foot" sands of the Baton Rouge area (Stuart and others, 1994) (fig. 3). The base of the aquifer system ranges from about 1,000 ft below NGVD 29 in the northern part of the parish to about 2,000 ft below NGVD 29 in the southern part of the parish. Aquifers in the Jasper equivalent aquifer system are typically composed of fine- to medium-grained sand units (Morgan, 1963) that commonly range from 50 to 150 ft thick (Griffith, 2003).

Water-level data collected in 2002 and 2006 indicated that levels in the Jasper equivalent aquifer system ranged from about 40 ft above NGVD 29 in the northern part of the parish to about 20 ft below NGVD 29 in the southern part. Flow in the Jasper equivalent aquifer system is primarily southward toward water-withdrawal centers in East Baton Rouge Parish (Tomaszewski and Accardo, 2004a, b). Water levels in the Jasper equivalent aquifer system at well WF-222, screened in the "2,400-foot" sand at St. Francisville, have declined about 70 ft since 1960 (fig. 4).

State well-registration records listed 46 active water wells screened in the Jasper equivalent aquifer system in West Feliciana Parish in 2009,

including 24 public supply, 14 domestic, 6 rural domestic, and 2 power generation. Depths of these wells ranged from 484 to 2,083 ft below land surface, with a median depth of 852 ft. Reported yields from these wells ranged from 6 to 1,900 gal/min (Louisiana Department of Natural Resources, 2009). Freshwater from the Jasper equivalent aquifer system generally is soft and generally does not exceed SMCLs for drinking water for color, pH, and concentrations of iron, manganese, and dissolved solids (table 3).

## Surface-Water Resources

In 2010, about 37.0 Mgal/d of surface water were withdrawn in West Feliciana Parish for industrial use, power generation, livestock, and general irrigation (table 2). All surface-water withdrawals for industrial and power-generation use in West Feliciana Parish came from the Mississippi River. Most of this water was used for cooling purposes and was returned to the river after use (Sargent, 2011). Notable streams in West Feliciana Parish include Thompson Creek and Bayou Sara (fig. 1).

According to U.S. Army Corps of Engineers records, the average flow of the Mississippi River downstream from the Old River diversion at Red River and Tarbert Landings (site number 07373291), located about 40 river miles upstream from St. Francisville (fig. 1), was about 460,000 cubic feet per second (about 298,000 Mgal/d) for the period 1928–76 (Wells, 1980). Water from the Mississippi River is generally hard and does not exceed SMCLs for pH and concentrations of chloride, sulfate, and iron (table 4). Dissolved oxygen concentration is 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).

**Table 3.** Summary of selected water-quality characteristics of freshwater for the Evangeline and Jasper equivalent aquifer systems in West Feliciana Parish, Louisiana (U.S. Geological Survey, 2011b).

[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; <, less than; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012); 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
Evangeline equivalent aquifer system, 1946–75 (24 wells)									
Median	20.5	20	171	6.9	50	7.3	110	120	154
10th percentile	19.0	5	106	6.3	20	4.4	10	<10	92
90th percentile	21.0	30	253	7.2	77	11	960	140	192
Number of samples	13	22	18	24	24	23	5	5	18
Percentage of samples that do not exceed SMCLs	NA	41	NA	79	NA	100	80	40	100
Jasper equivalent aquifer system, 1940–2005 (51 wells)									
Median	24.8	5	288	7.8	12	3.5	160	20	197
10th percentile	22.0	0	242	6.8	4	1.7	20	<10	184
90th percentile	28.0	20	438	8.9	56	11	600	100	325
Number of samples	32	34	41	45	47	48	28	21	36
Percentage of samples that do not exceed SMCLs	NA	76	NA	78	NA	100	68	81	100
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

**Table 4.** Summary of selected water-quality characteristics for the Mississippi River in West Feliciana Parish, Louisiana (U.S. Geological Survey, 2011b).

[Values are in milligrams per liter, except as noted. µS/cm, microsiemens per centimeter; °C, degrees Celsius; SU, standard units; CaCO<sub>3</sub>, calcium carbonate; µg/L, micrograms per liter; <, less than; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012); NA, not applicable]

	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)
Mississippi River near St. Francisville, 1978–2010 <sup>1</sup>										
Median	380	8.6	7.8	150	38	12	17	20	44	10
10th percentile	298	6.5	7.3	110	31	8.7	11	14	32	<10
90th percentile	473	11.8	8.0	180	46	16	27	28	66	40
Number of samples	412	402	407	400	400	405	346	410	409	393
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	100	100	100
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

<sup>1</sup>Site number 07373420.

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