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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of East Feliciana Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in East Feliciana 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 is presented on the availability, past and current use, use trends, and water quality from groundwater and surface-water sources in the parish. 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In 2010, about 3.76 million gallons per day (Mgal/d) of water were withdrawn in East Feliciana Parish, including about 3.51 Mgal/d from groundwater sources and 0.25 Mgal/d from surface-water sources[1] (table 1). Withdrawals for public supply accounted for about 80 percent (3.00 Mgal/d) of total water use (table 2). Other categories of use included industrial, rural domestic, livestock, and general irrigation. Water-use data collected at 5-year intervals from 1960 to 2010 (fig. 2) indicated that water withdrawals peaked in 1960 at about 4.29 Mgal/d. The general increase in groundwater withdrawals since 1975 is largely attributable to increasing withdrawals for public supply, from 0.20 Mgal/d in 1960 to 3.00 Mgal/d in 2010.

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

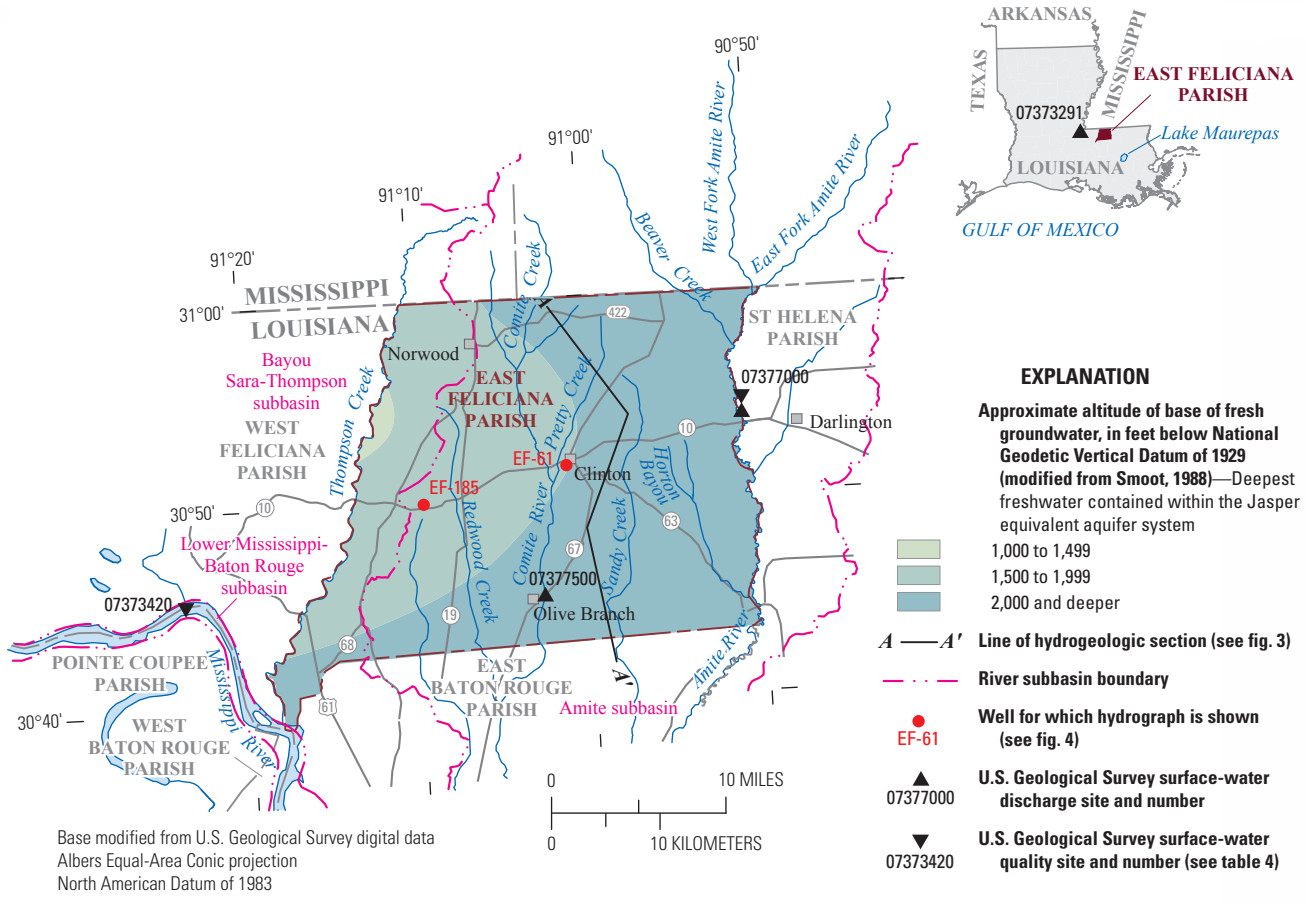

Figure 1. Location of study area, East Feliciana Parish, Louisiana.

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

Aquifer, aquifer system, or surface-water body	Groundwater	Surface water
Chicot equivalent aquifer system	0.34	
Evangeline equivalent aquifer system	0.29	
Jasper equivalent aquifer system	2.12	
Catahoula aquifer	0.76	
Miscellaneous streams		0.25
Total	**3.51**	**0.25**

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

Use category	Groundwater	Surface water	Total
Public supply	3.00	0.00	3.00
Industrial	0.03	0.00	0.03
Rural domestic	0.27	0.00	0.27
Livestock	0.02	0.19	0.22
General irrigation	0.18	0.06	0.24
Total	**3.51**	**0.25**	**3.76**

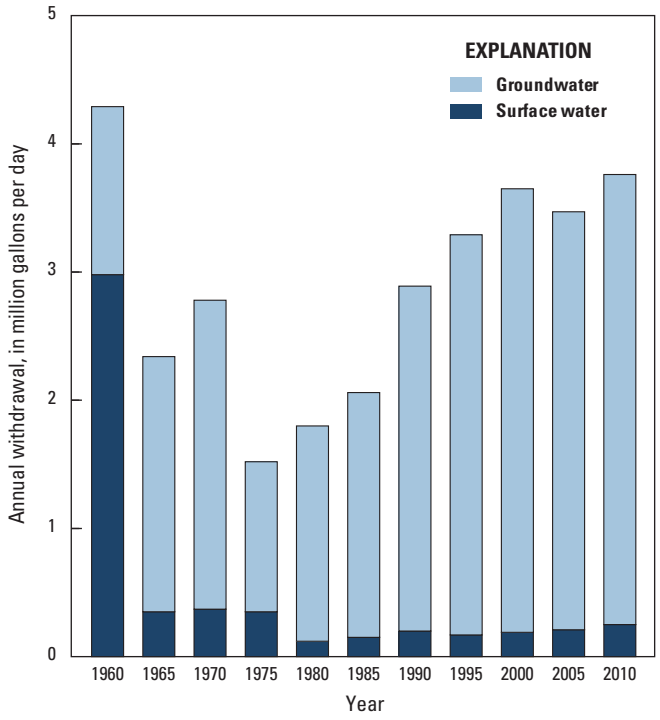

Figure 2. Water withdrawals in East Feliciana Parish, Louisiana, 1960–2010 (Sargent, 2011).

Groundwater Resources

The primary sources of fresh groundwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) in East Feliciana Parish are, from shallowest to deepest, the Chicot, Evangeline, and Jasper equivalent aquifer systems and the Catahoula aquifer (fig. 3). Deeper aquifers underlying the parish contain saltwater (water with a chloride concentration greater than 250 mg/L). The base of freshwater is shallowest on the western parish border at less than 1,500 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) and deepest in the eastern half of East Feliciana Parish (fig. 1), with depths up to 2,300 ft below NGVD 29 in the northeastern corner (Griffith, 2003). The primary source of recharge to the aquifers containing freshwater in East Feliciana Parish comes from infiltration of precipitation falling in the parish and northward to about 100 miles into Mississippi. Flow from streams may also contribute recharge to a lesser degree. Discharge from aquifers in the parish is by leakage into adjacent aquifers, flow into streams, and withdrawals from wells. Aquifers in the parish generally dip south to southwest (Griffith, 2003). Individual aquifers, which are primarily composed of sand, are generally separated by layers of clay but merge in areas where the clay layers are missing (Griffith, 2003).

The Chicot Equivalent Aquifer System

The sole aquifer composing the Chicot equivalent aquifer system in East Feliciana Parish is the Upland terrace aquifer, which is a broad, somewhat discontinuous near-surface aquifer that is present throughout the parish. The Upland terrace 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, eventually merging with the "400-foot" and "600-foot" sands of the Baton Rouge area near the southern parish line. Upland terrace sediments range in grain size from clay through silt and sand to gravel and can reach a thickness of 300 ft or greater. Aquifer materials are composed mainly of the medium- to coarse-grained sand portion of the sediments (Morgan, 1963). Regionally, the proximity of the Upland terrace aquifer to the surface allows the aquifer to receive infiltration of rainfall and transmit this water to recharge the deeper aquifers underlying the parish. The base of the Upland terrace aquifer is greater than 200 ft above NGVD 29 in the northern part of the parish and reaches from 100 to 200 ft below NGVD 29 at the southern end of the parish (Griffith, 2003).

In 2009, water levels in wells screened in the Upland terrace aquifer in East Feliciana Parish ranged from a low of about NGVD 29 near the Mississippi River in the extreme southwestern corner of the parish to a high of over 230 ft above NGVD 29 northeast of Clinton (fig. 1). The direction of groundwater flow in the Upland terrace aquifer in East Feliciana Parish largely corresponds to land-surface topography; the general direction of groundwater flow is southward, with localized flow towards stream valleys (Tomaszewski, 2011).

State well-registration records listed 494 active water wells screened in the Upland terrace aquifer in East Feliciana Parish in 2015, including 428 domestic, 53 irrigation, 11 public supply, and 2 industrial. Depths of these wells ranged from 21 to 273 ft below land surface, and reported yields ranged from 3 to 543 gallons per minute (gal/min). In 2010, withdrawals from the Upland terrace aquifer in East Feliciana Parish totaled about 0.34 Mgal/d, and use categories included about 0.19 Mgal/d for rural domestic, 0.02 Mgal/d for livestock, and 0.13 Mgal/d for general irrigation (Louisiana Department of Natural Resources, 2015).

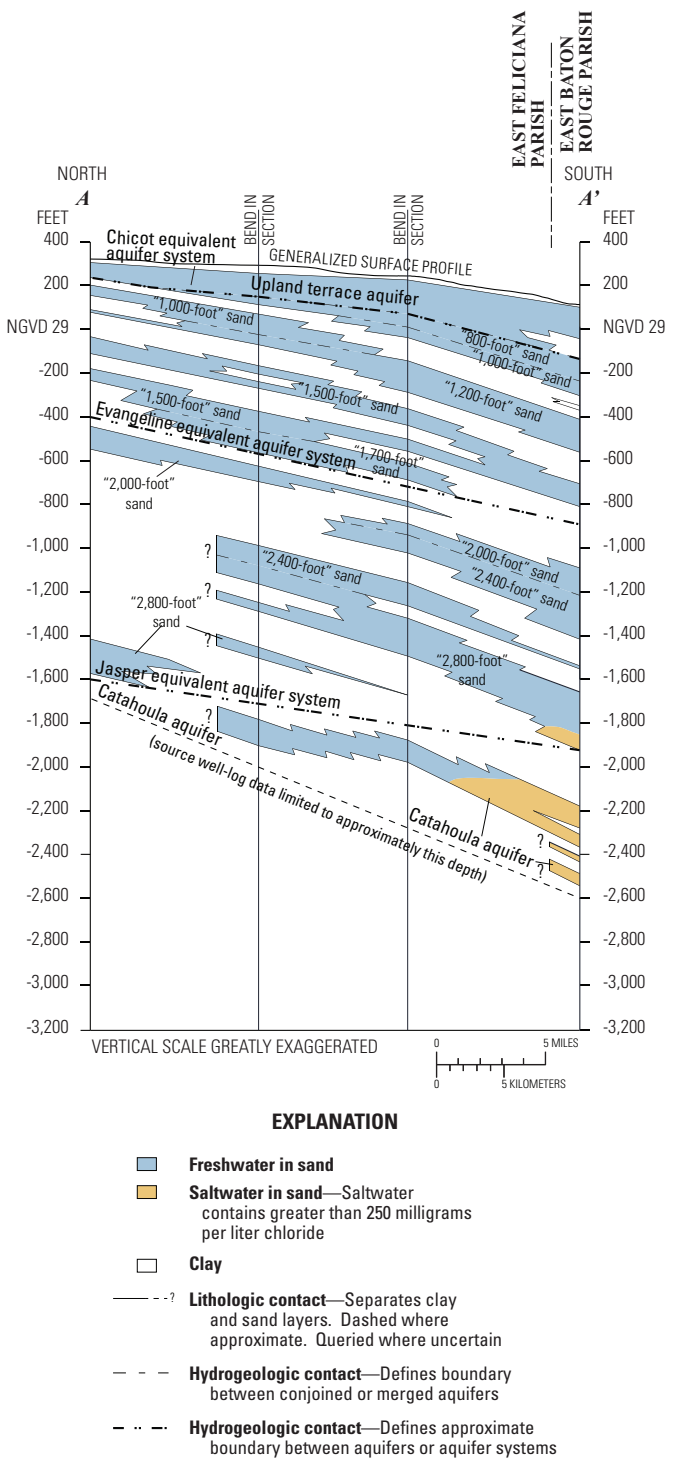

Figure 3. Generalized north-to-south hydrogeologic section through East Feliciana Parish, Louisiana (modified from Griffith, 2003). Trace of section shown on figure 1.

The Evangeline Equivalent Aquifer System

The aquifers composing the Evangeline equivalent aquifer system in East Feliciana 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 comprise fine- to coarse-grained sand. The altitude of the base of the aquifer system ranges from over 300 ft below NGVD 29 near the northern parish line to about 800–1,300 ft below NGVD 29 near the southern parish line (fig. 3) (Griffith, 2003).

In 2003, water levels in wells screened in the "1,500-foot" and "1,700-foot" sands ranged from about 165 ft above NGVD 29 near the northeastern parish line to about 45 ft below NGVD 29 in the extreme southwestern corner of the parish. The direction of groundwater flow was generally to the southwest towards pumping centers in East Baton Rouge Parish (Prakken, 2004). Water levels in the "1,200-foot" sand at well EF-61 (site number 305144091010901), located in the town of Clinton (fig. 1), declined about 8 ft from 1995 to 2008, changed little between 2008 and 2013, and then rose about 5 ft from 2013 to 2015 (fig. 4).

State well-registration records listed 269 active water wells screened in the Evangeline equivalent aquifer system in East Feliciana Parish in 2015, including 237 domestic, 17 irrigation, 11 public supply, and 4 industrial. Depths of these wells ranged from 100 to 1,122 ft below land surface, and reported yields ranged from 8 to 1,108 gal/min. In 2010, withdrawals from the Evangeline equivalent aquifer system in East Feliciana Parish were about 0.29 Mgal/d (table 1), and use categories included about 0.15 Mgal/d for public supply, 0.02 Mgal/d for industry, 0.07 Mgal/d for rural domestic, and 0.05 Mgal/d for general irrigation (Louisiana Department of Natural Resources, 2015).

The Jasper Equivalent Aquifer System

The aquifers composing the Jasper equivalent aquifer system in East Feliciana Parish are the "2,000-foot"; "2,400-foot"; and "2,800-foot" sands of the Baton Rouge area (fig. 3), generally contain freshwater, and are generally composed of fine- to coarse-grained sand. The altitude of the base of the aquifer system is not well defined but is probably from greater than 1,500 ft below NGVD 29 near the northern parish line to about 1,900–2,300 ft below NGVD 29 near the southern parish line (fig. 3) (Griffith, 2003).

In 2006, the general direction of groundwater flow in the "2,800-foot" sand in East Feliciana Parish was to the southwest towards a pumping center in northwestern East Baton Rouge Parish. Water levels at wells screened in the "2,800-foot" sand in 2006 ranged from about 60 ft above NGVD 29 in the extreme northeastern corner of the parish to about 40 ft below NGVD 29 in the extreme southwestern corner (Fendick, 2007). Water levels at well EF-185 (site number 304959091093001), located in west-central East Feliciana Parish (fig. 1) and screened in the "2,800-foot" sand, declined about 10 ft between 1996 and 2005 but changed little between 2005 and 2015 (fig. 4).

State well-registration records listed 20 active water wells screened in the Jasper equivalent aquifer system in East Feliciana Parish in 2015, including 18 public supply, 1 domestic, and 1 industrial. Depths of these wells ranged from 1,051 to 2,012 ft below land surface, and reported yields ranged from 205 to 1,507 gal/min. In 2010, withdrawals from the Jasper equivalent aquifer system in East Feliciana Parish were about 2.12 Mgal/d (table 1), and use categories included about 2.10 Mgal/d for public supply and 0.02 Mgal/d for industry (Louisiana Department of Natural Resources, 2015).

The Catahoula Aquifer

The Catahoula aquifer underlies all of East Feliciana Parish; however, the extent and thickness are not well defined. Freshwater is present in the upper part of the aquifer in northern areas of the parish, with saltwater present in most of the aquifer near the southern parish line (fig. 3). Near the town of Norwood, the Catahoula aquifer is present at a depth of about 1,500–2,100 ft below NGVD 29. The major sand layers of the aquifer can reach a thickness of over 450 ft, with saltwater present in the lowest of these layers (Morgan, 1963).

State well-registration records listed seven active water wells screened in the Catahoula aquifer in East Feliciana Parish in 2015. All of these wells were used for public supply. Depths of these wells ranged from 1,966 to 2,218 ft below land surface, and reported yields ranged from 150 to 1,500 gal/min. In 2010, withdrawals from the Catahoula aquifer in East Feliciana Parish totaled about 0.76 Mgal/d (table 1) and were used for public supply (Louisiana Department of Natural Resources, 2015).

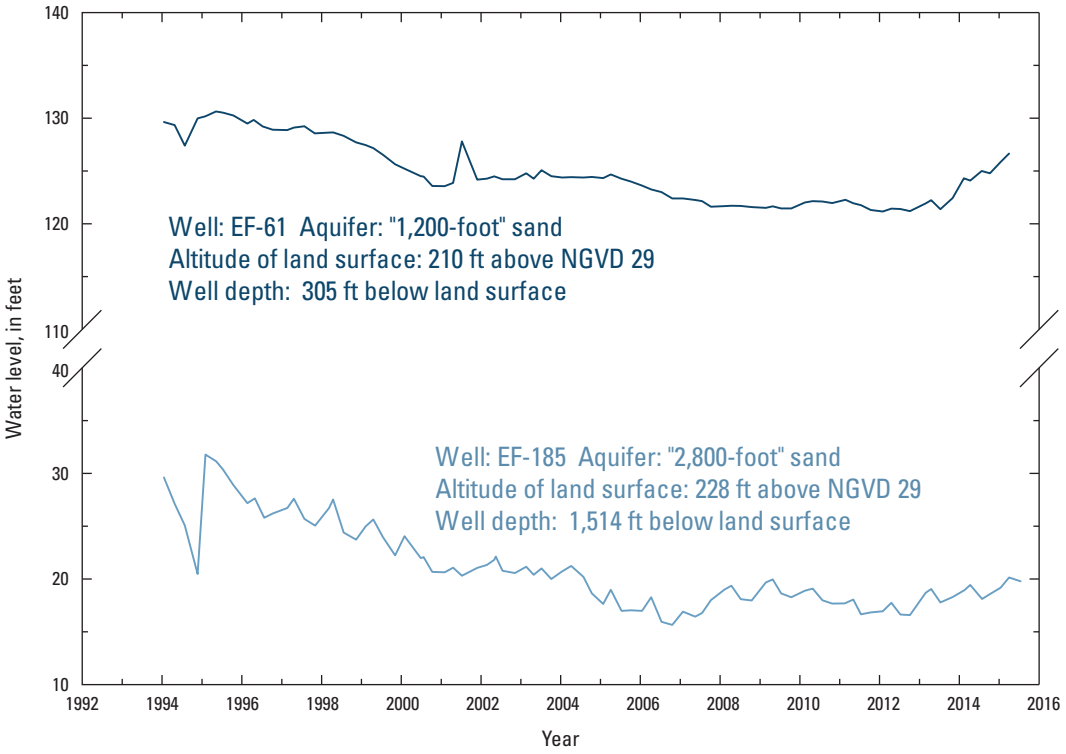

Figure 4. Water levels in well EF-61 screened in the "1,200-foot" sand and well EF-185 screened in the "2,800-foot" sand in East Feliciana Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2015a). Land surface and water levels are in feet (ft) above the National Geodetic Vertical Datum of 1929 (NGVD 29).

Groundwater Quality

A statistical summary of selected water-quality characteristics for freshwater samples collected from 26 wells screened in the Chicot equivalent aquifer system, 29 wells screened in the Evangeline equivalent aquifer system, and 27 wells screened in the Jasper equivalent aquifer system in East Feliciana Parish is presented in table 3. Median values for each set of samples were found to be soft[2] with respect to hardness and did not exceed the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels (SMCLs)[3] for color or concentrations of iron, manganese, and dissolved solids. Median pH ranged from 5.7 to 8.3 standard units, with values generally increasing with aquifer depth. Median temperature ranged from 20.0 to 28.2 degrees Celsius (from 68.0 to 82.8 degrees Fahrenheit), with temperature values also increasing with aquifer depth. Based on sample values, localized iron concentrations can greatly exceed the SMCL in the Evangeline and Jasper equivalent aquifer systems, and localized manganese concentrations can greatly exceed the SMCL in the Jasper equivalent aquifer system. Limited water-quality data indicated that water from the Catahoula aquifer is soft and alkaline and does not exceed SMCLs for iron, manganese, or dissolved-solids concentrations (U.S. Geological Survey, 2012).

[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).

Surface-Water Resources

Surface-water resources in East Feliciana Parish are located within the Lower Mississippi-Baton Rouge Basin (Hydrologic Unit Code [HUC] 080701) and the Lake Maurepas Basin (HUC 080702). The Lake Maurepas Basin is divided into two subbasins within the parish. The eastern approximately three-fourths of the parish is within the Amite River subbasin (HUC 08070202), and most of the western approximately one-fourth is within the Bayou Sara-Thompson subbasin (HUC 08070201), which runs parallel to the western parish border. Only the extreme southwestern tip of the parish is within the Lower Mississippi-Baton Rouge Basin and subbasin (HUC 08070100) (fig. 1). In 2010, about 0.25 Mgal/d of surface water were withdrawn from miscellaneous streams (table 1) in East Feliciana Parish for livestock and general irrigation (table 2).

Lower Mississippi-Baton Rouge Basin

The Lower Mississippi-Baton Rouge Basin receives drainage from Thompson Creek; however, more than 40 percent of the conterminous United States drains into the Lower Mississippi-Baton Rouge Basin, contributing to an average streamflow of the Mississippi River near Red River Landing (site number 07373291; fig. 1 index map) of about 460,000 cubic feet per second (ft^3/s) for the period 1928–76 (Wells, 1980; Demcheck and others, 2004).

Table 3. Summary of selected water-quality characteristics for freshwater in the Chicot, Evangeline, and Jasper equivalent aquifer systems in East Feliciana Parish, Louisiana (U.S. Geological Survey, 2012).

[Values are in milligrams per liter, except as noted. °C, degree 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
Chicot equivalent aquifer system, 1940–2001 (26 wells)									
Median	20.0	5	82	5.7	12	10	<10	<10	66
10th percentile	19.4	<1	45	5.1	6	5.2	<10	<3	41
90th percentile	21.5	10	225	6.3	38	24	200	69	157
Number of samples	18	18	20	24	26	26	13	12	22
Percentage of samples that do not exceed SMCLs	NA	94	NA	4	NA	100	100	67	100
Evangeline equivalent aquifer system, 1950–2006 (29 wells)									
Median	21.4	10	116	6.5	22	5.0	190	10	92
10th percentile	20.5	0	62	6.1	10	3.8	<20	<10	57
90th percentile	23.8	26	191	7.1	40	10	1,700	75	176
Number of samples	16	19	23	27	25	25	10	6	16
Percentage of samples that do not exceed SMCLs	NA	63	NA	56	NA	100	60	67	100
Jasper equivalent aquifer system, 1956–2005 (27 wells)									
Median	28.2	5	264	8.3	8	4.0	70	20	202
10th percentile	25.2	0	156	6.7	3	2.3	<20	<10	141
90th percentile	30.0	20	415	8.9	25	5.9	1,900	170	260
Number of samples	18	23	25	26	27	27	15	13	25
Percentage of samples that do not exceed SMCLs	NA	78	NA	62	NA	100	60	54	100
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

Lake Maurepas Basin

The Amite subbasin contains the Amite River, Beaver Creek, Comite Creek, Comite River, Horton Bayou, Pretty Creek, Sandy Creek, and Redwood Creek (fig. 1). The Amite River forms in the northeastern corner of East Feliciana Parish from the junction of the West Fork and East Fork Amite Rivers, which originate in Mississippi, and flows southward along the eastern parish boundary. The annual average streamflow of the Amite River near Darlington (site number 07377000; fig. 1) was about 906 ft^3/s during 1951–2014 from a drainage area of 580 square miles (mi^2) (U.S. Geological Survey, 2015b). The Comite River drains the central part of the parish and receives streamflow from Comite Creek, Pretty Creek, and other smaller drainages. The annual average streamflow for the Comite River near Olive Branch (site number 07377500; fig. 1) was 231 ft^3/s for the period 1943–2014 from a drainage area of 145 mi^2 (U.S. Geological Survey, 2015b).

The Bayou Sara-Thompson subbasin covers a much smaller segment of land running approximately parallel to the western border of East Feliciana Parish. The primary stream draining this subbasin is Thompson Creek, which is fed by smaller creeks and drainages in East Feliciana Parish and eventually flows into the Mississippi River.

Surface-Water Quality

Water samples taken from the Mississippi River near St. Francisville (site number 07373420) from 1978 to 2010 and the Amite River near Darlington (site number 07377000) from 1961 to 1976 (fig. 1; table 4) were found to have median values for pH and concentrations of chloride, sulfate, and iron that did not exceed SMCLs. Dissolved-oxygen samples from the Mississippi River were generally greater than 5 mg/L, which is considered the minimum value for a diverse population of fresh,

Table 4. Summary of selected water-quality characteristics for the Mississippi and Amite Rivers near East Feliciana Parish, Louisiana (U.S. Geological Survey, 2012).

[Values are in milligrams per liter, except as noted. °C, degree Celsius; µS/cm, microsiemen per centimeter; SU, standard unit; µg/L, microgram per liter; $CaCO_3$, calcium carbonate; <, less than; 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)
Mississippi River near St. Francisville, 1978–2010[1]										
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	<5
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
Amite River near Darlington, 1961–76[2]										
Median	36	9.0	6.6	8	2.0	0.6	3.9	4.2	0.6	180
10th percentile	34	NA	6.0	6	1.6	0.2	3.0	3.4	0.1	NA
90th percentile	42	NA	6.9	10	2.8	0.8	4.8	6.4	2.1	NA
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
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

[1]Site number 07373420 (see fig. 1).

[2]Site number 07377000 (see fig. 1).

warmwater biota, including sport fish (Louisiana Department of Environmental Quality, 2008). Mississippi River water quality varies seasonally because of the rate and distribution of precipitation and land-use patterns. Water-quality constituents, such as agricultural pesticides and nutrients, generally have the highest concentrations in June and July, representing the "spring flush" that results from the runoff of upstream applications of these pesticides and nutrients (Demcheck and others, 2004).

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