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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of Evangeline Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in Evangeline 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. In 2014, about 282.66 million gallons per day (Mgal/d) of water were withdrawn in Evangeline Parish, including about 122.05 Mgal/d from groundwater sources and 160.61 Mgal/d from surface-water sources[1] (table 1). Withdrawals for agricultural use, composed of aquaculture, general irrigation, livestock, and rice irrigation, accounted for 45 percent (126.86 Mgal/d) of the total water withdrawn (table 2). Withdrawals for power-generation use accounted for about 52 percent (146.33 Mgal/d) of the total water withdrawn (table 2). Other categories of use included public supply, industry, and rural domestic. Water-use data collected at 5-year intervals from 1960 to 2010 and again in 2014 indicated that water withdrawals peaked in 1980 (fig. 2).

[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.

Groundwater Resources

The primary freshwater-bearing aquifers in Evangeline Parish are the Chicot aquifer system and Evangeline aquifer (figs. 1 and 3). The underlying Jasper aquifer system contains freshwater in the northwestern part of the parish; however, this system is not discussed in this report because no withdrawals are reported. The depth of the base of fresh groundwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) varies depending on location in the parish. The base of fresh groundwater is primarily present in the Evangeline aquifer at altitudes of less than 300 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) to greater than 2,000 ft below NGVD 29 (fig. 1). The base of fresh groundwater is present in the Chicot aquifer system in the extreme southern part of the parish.

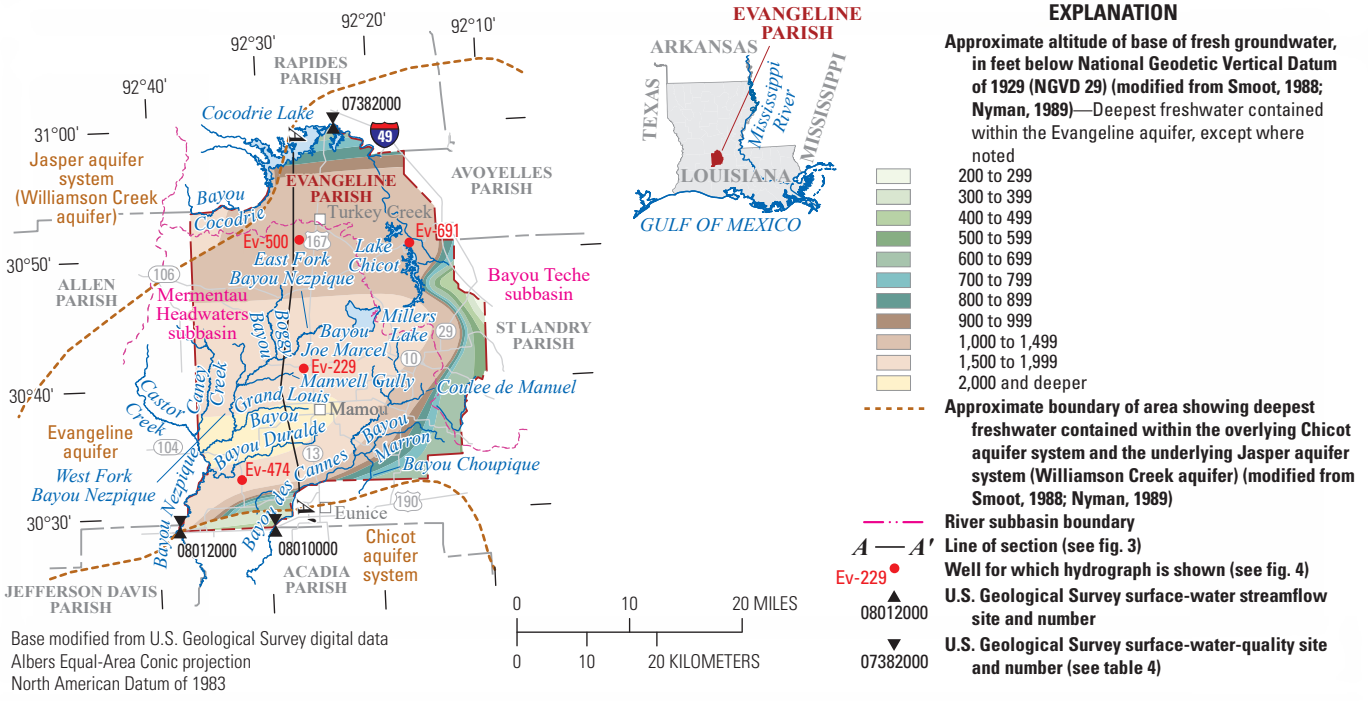

Figure 1. Location of study area, Evangeline Parish, Louisiana.

Table 1. Water withdrawals, in million gallons per day, by source in Evangeline Parish, Louisiana, 2014 (Collier, 2018).

Aquifer or surface-water body	Groundwater	Surface water
Evangeline aquifer	9.87	
Chicot aquifer system	112.18	
Bayou Choupique		1.25
Bayou Cocodrie		148.94
Bayou des Cannes		1.63
Bayou Marron		1.63
Millers Lake		1.50
Miscellaneous surface waters		5.66
Total	**122.05**	**160.61**

Table 2. Water withdrawals, in million gallons per day, by use category in Evangeline Parish, Louisiana, 2014 (Collier, 2018).

Use category	Groundwater	Surface water	Total
Public supply	5.85	0.00	5.85
Industrial	3.27	0.00	3.27
Power generation	0.16	146.17	146.33
Rural domestic	0.34	0.00	0.34
Livestock	0.18	0.06	0.24
Rice irrigation	77.46	8.61	86.06
General irrigation	5.57	0.62	6.19
Aquaculture	29.21	5.16	34.37
Total	**122.05**	**160.61**	**282.66**

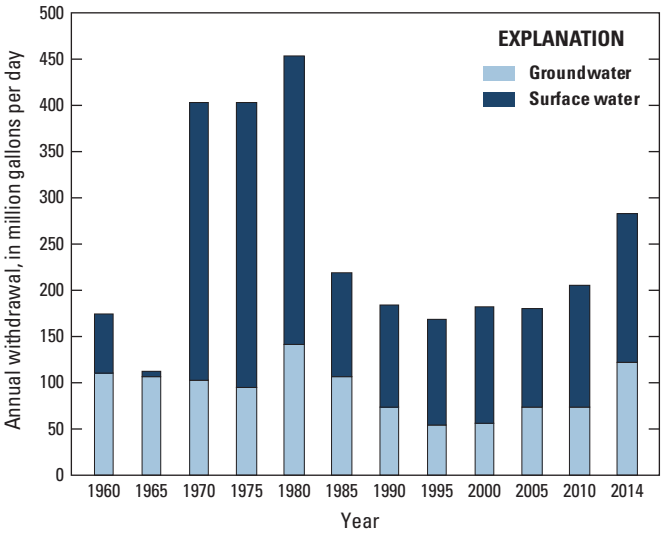

Figure 2. Water withdrawals in Evangeline Parish, Louisiana, 1960–2014 (Collier, 2018; U.S. Geological Survey, 2018a).

Chicot Aquifer System

The Chicot aquifer system is present in southwestern Louisiana. The depth to the top of the Chicot aquifer system in Evangeline Parish is generally from less than 50 to greater than 100 ft below land surface (Jones and others, 1956). In Evangeline Parish, the Chicot aquifer system is composed of a massive

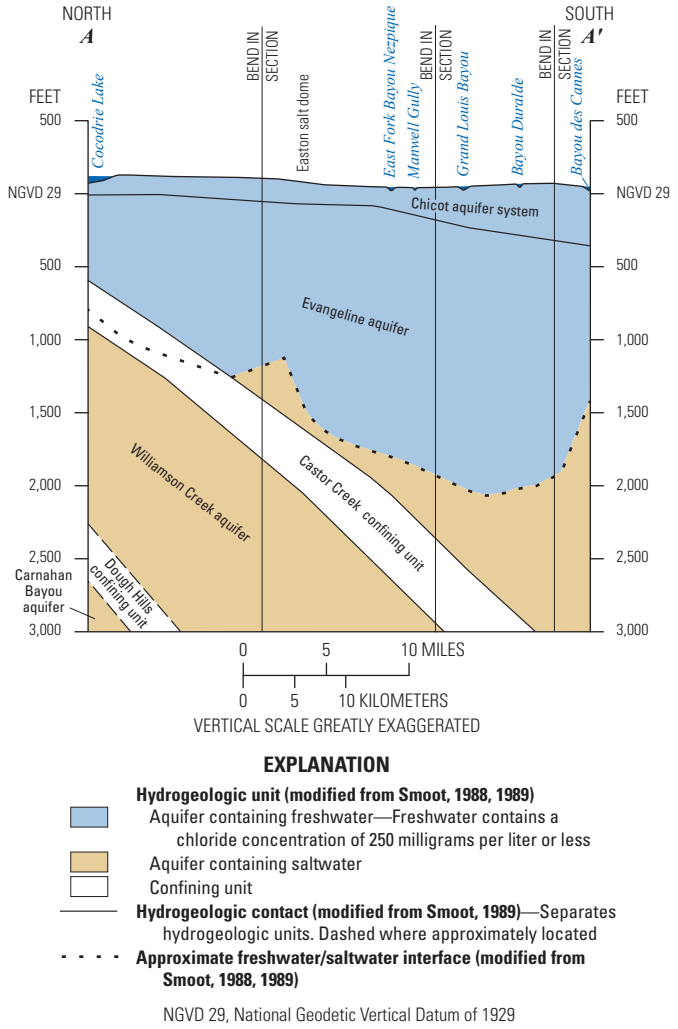

Figure 3. Idealized north-to-south hydrogeologic section through Evangeline Parish, Louisiana, showing aquifer and confining unit intervals (individual sand and clay layers not shown). Modified from Smoot (1988, 1989). Trace of section shown on figure 1.

undifferentiated sand that is characterized by thick beds of coarse sand with gravel (Nyman, 1989). The altitude of the base of the aquifer system in Evangeline Parish ranges from about NGVD 29 to greater than 400 ft below NGVD 29 (Nyman, 1989) with a southward dip. The aquifer system is at or near land surface in the northern part of the parish. The system receives recharge from rainfall where the aquifer system crops out or is exposed by stream incision (Lovelace and others, 2004).

In January 2003, water-level altitudes measured in wells screened in the Chicot aquifer system ranged from greater than 60 ft above NGVD 29 in the northern part of the parish to greater than 60 ft below NGVD 29 near Mamou (Lovelace and others, 2004). Water levels at well Ev-229 (U.S. Geological Survey [USGS] site number 304120092263001), located in the central part of the parish, fluctuated annually and, overall, have declined more than 30 ft during 1948–2018 (fig. 4). Water levels at well Ev-500 (USGS site number 305130092263601), located near Turkey Creek (fig. 1), have fluctuated little annually and, overall, have declined less than 5 ft during 1953–2018 (fig. 4).

State well-registration records listed 895 active water wells screened in the Chicot aquifer system in Evangeline Parish in 2017: 545 irrigation wells, 302 domestic wells, 24 public-supply

wells, 20 industrial wells, and 4 power-generation wells. Well depths ranged from 14 to 500 ft below land surface, and reported yields ranged from 2 to 4,600 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2017). In 2014, about 112.18 Mgal/d were withdrawn from the Chicot aquifer system, with use categories including 0.45 Mgal/d for public supply, 2.20 Mgal/d for industry, 0.16 Mgal/d for power generation, 0.27 Mgal/d for rural domestic, 0.18 Mgal/d for livestock, 74.36 Mgal/d for rice irrigation, 5.35 Mgal/d for general irrigation, and 29.21 Mgal/d for aquaculture (Collier, 2018).

Evangeline Aquifer

The Evangeline aquifer is present and contains freshwater in Evangeline Parish and various other parishes of southwestern Louisiana. When water levels in the Chicot aquifer system are high enough for groundwater to flow into the Evangeline aquifer, then recharge to the Evangeline aquifer occurs in Rapides and Avoyelles Parishes and in the northern part of Evangeline Parish (Whitfield, 1975). The upper part of the Evangeline aquifer dips to the south at about 20 ft per mile, and the lower part of the aquifer dips to the south at about 60 ft per mile. The altitude of the top of the Evangeline aquifer ranges from about NGVD 29 in the northern part of the parish to about 500 ft below NGVD 29 near the southern border (Whitfield, 1975). The base of the Evangeline aquifer in Evangeline Parish ranges from an altitude of greater than 500 ft below NGVD 29 to greater than 3,000 ft below NGVD 29 (Nyman, 1989). The Evangeline aquifer is separated from the underlying Jasper aquifer system by the Castor Creek confining unit (fig. 3), which is composed primarily of clay (Whitfield, 1975).

A 2004 survey of water levels measured in the Evangeline aquifer indicated that levels ranged from greater than 40 ft above NGVD 29 in the northwestern corner of the parish to greater than 60 ft below NGVD 29 near Mamou (Fendick, 2005). Water levels at well Ev-691 (USGS site number 305049092164102), located north of Lake Chicot (fig. 1), have fluctuated less than about 2 ft annually and declined about 15 ft during 1967–2018 (fig. 4). Water levels at well Ev-474 (USGS site number 303257092321501), screened in the Evangeline aquifer in the southwestern corner of Evangeline Parish, have generally fluctuated less than about 5 ft annually and have declined about 25 ft during 1991–2010.

State well-registration records listed 114 active water wells screened in the Evangeline aquifer in Evangeline Parish in 2017: 53 domestic wells, 37 public-supply wells, 15 industrial wells, and 9 irrigation wells. Well depths ranged from 190 to 1,804 ft below land surface, and reported yields ranged from 6 to 2,700 gal/min (Louisiana Department of Natural Resources, 2017). In 2014, about 9.87 Mgal/d were withdrawn from the Evangeline aquifer in Evangeline Parish with use categories including 5.40 Mgal/d for public supply, 1.08 Mgal/d for industry, 0.07 Mgal/d for rural domestic, 3.10 Mgal/d for rice irrigation, and 0.22 Mgal/d for general irrigation (Collier, 2018).

Groundwater Quality

Groundwater samples were collected during 1940–2015 from 131 wells screened in the Chicot aquifer system and during 1948–2015 from 78 wells screened in the Evangeline aquifer in Evangeline Parish as part of an ongoing, long-term monitoring program for the State's groundwater resources (table 3). Median values for hardness were within the hard[2] range for the Chicot aquifer system and within the soft range for the Evangeline aquifer. Chloride and sulfate concentrations were below the U.S. Environmental Protection Agency's Secondary Maximum

[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).

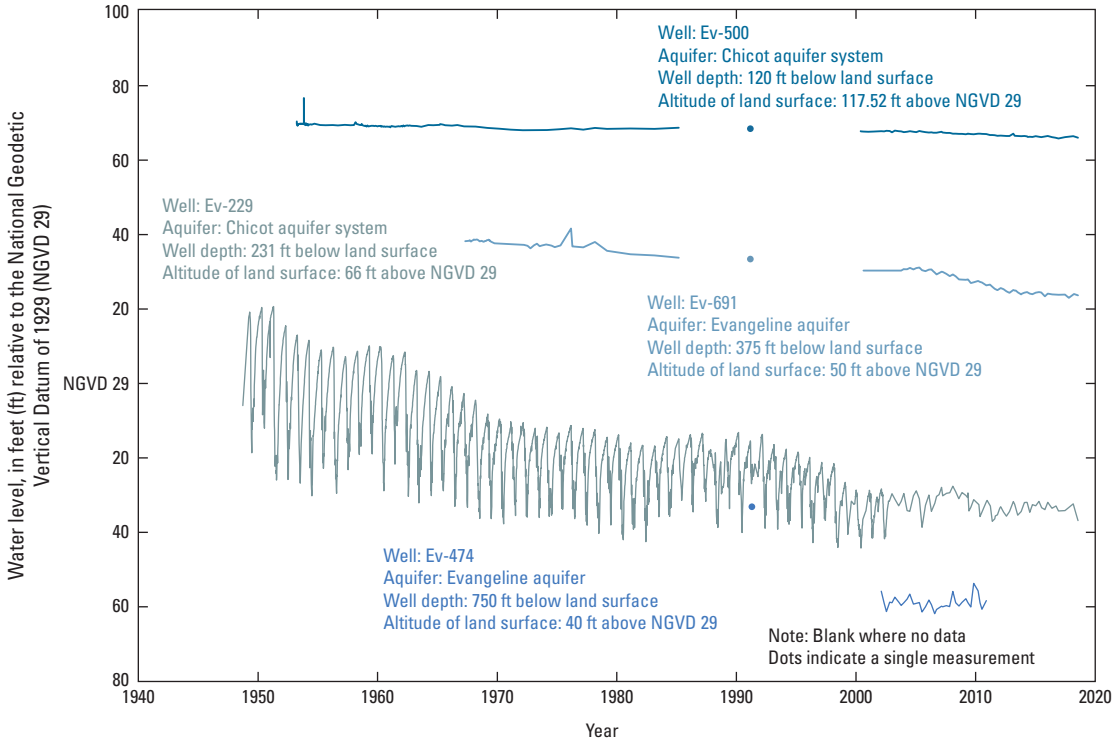

Figure 4. Water levels in wells Ev-500 and Ev-229 screened in the Chicot aquifer system and wells Ev-691 and Ev-474 screened in the Evangeline aquifer in Evangeline Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2018b).

Table 3. Summary of selected water-quality characteristics for samples from 131 wells screened in the Chicot aquifer system and 78 wells screened in the Evangeline aquifer in Evangeline Parish, Louisiana (U.S. Geological Survey, 2018b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard unit; $CaCO_3$, calcium carbonate; µg/L, micrograms per liter; E, estimated; <, less than; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2016); NA, not applicable]

	Temperature (°C)	Color (platinum cobalt units)	Specific conductance, field (µS/cm at 25 °C)	Dissolved oxygen	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)	Manganese, filtered (µg/L as Mn)	Dissolved solids, filtered
Chicot aquifer system, 131 wells (1940–2015)														
Median	21	10	479	0.9	7.2	130	35.5	12.4	36.2	37	2.8	1,250	200	298
10th percentile	20.5	0	304	0.1	6.5	60	12	5.3	19.4	21	0.2	E<7.1	<3.7	174
90th percentile	21.8	32	748	6.2	8.3	230	89.7	41.0	120.9	95	17.8	3,850	588	844
Number of samples	307	25	200	22	87	170	56	56	48	422	59	48	45	39
Percentage of samples that do not exceed SMCLs	NA	76	NA	NA	91	NA	NA	NA	NA	99	100	29	27	77
Evangeline aquifer, 78 wells (1948–2015)														
Median	22.5	20	594	0.2	7.9	18	3.7	1	160	28	<0.3	200	40	403
10th percentile	21	5	416	0.2	7.1	2	0.6	0.1	64	11	0	50	<9.2	285
90th percentile	25	70	1,330	0.4	8.5	120	24	6.8	320	180	5.5	1,100	115	825
Number of samples	65	75	108	3	98	157	86	86	86	165	86	100	50	68
Percentage of samples that do not exceed SMCLs	NA	48	NA	NA	92	NA	NA	NA	NA	95	100	62	70	68
SMCLs	NA	15	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300	50	500

Contaminant Levels (SMCLs)[3] for at least 95 percent of samples in the Chicot aquifer system and Evangeline aquifer. Iron and manganese concentrations exceeded SMCLs in the Chicot aquifer system in more than 70 percent of samples. Median values for pH and dissolved-solids concentration were below the SMCLs for the aquifer system and aquifer.

Surface-Water Resources

Numerous surface-water resources in Evangeline Parish are present in two regional drainage subbasins. The Mermentau Headwaters subbasin (Hydrologic Unit Code [HUC] 08080201) in the central and southwestern part of the parish drains in a southerly and southwesterly direction. The Bayou Teche subbasin (HUC 08080102) in the northern and eastern part of the parish drains in an easterly and southerly direction (USGS, 2018b). In 2014, 5.66 Mgal/d were withdrawn from miscellaneous surface waters (table 1) for livestock (0.06 Mgal/d), rice irrigation (3.10 Mgal/d), general irrigation (0.62 Mgal/d), and aquaculture (1.88 Mgal/d) (Collier, 2018).

Mermentau Headwaters Subbasin

The primary drainages of the Mermentau Headwaters subbasin (fig. 1) in Evangeline Parish are Bayou Nezpique and Bayou des Cannes. Bayou Nezpique results from the confluence of East Fork Bayou Nezpique and West Fork Bayou Nezpique in the west-central part of the parish. Other tributaries include Castor Creek, Boggy Bayou, and Caney Creek. The annual mean streamflow for Bayou Nezpique near Basile (USGS site number 08012000), located near the southwestern tip of the parish, was 816 cubic feet per second (ft^3/s) during water years (water year is from Oct. 1 to Sept. 30) 1939–2014. During this period, the highest monthly mean streamflow at this site occurred during February (1,555 ft^3/s) and the lowest during August (362 ft^3/s) (USGS, 2018b). Records at this site may be affected by irrigation pumping. Bayou des Cannes forms to the east of Mamou from the confluence of Coulee de Manuel and Bayou Joe Marcel. The annual mean streamflow for Bayou des Cannes near Eunice (USGS site number 08010000) was 275 ft^3/s during water years 1939–2017. During this period, the highest monthly mean streamflow at this site occurred during January (460 ft^3/s) and the lowest during October (155 ft^3/s) (USGS, 2018b). Streamflow at this site may also be affected by a diversion.

[3] The SMCLs are 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 potential constituents of drinking water. SMCLs were established as guidelines by the U.S. Environmental Protection Agency (2016).

Table 4. Summary of selected water-quality characteristics for samples from Bayou Nezpique near Basile, Bayou des Cannes near Eunice, and Bayou Cocodrie near Clearwater, Evangeline Parish, Louisiana (U.S. Geological Survey, 2018b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard unit; $CaCO_3$, calcium carbonate; NA, not applicable; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2016)]

	Temperature (°C)	Color (platinum cobalt units)	Specific conductance, field (µS/cm at 25 °C)	Dissolved oxygen	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)	Dissolved solids, filtered
Bayou Nezpique near Basile (1943–98)[1]												
Median	19.0	100	170	NA	6.5	28	7.2	2.5	19.5	15.5	2.7	122
10th percentile	12.0	80	51	NA	5.8	11.2	3.1	0.8	7.1	6.7	0.5	77
90th percentile	27.5	208	302	NA	7.1	51	15.6	6.5	34	40	5.6	156
Number of samples	4	13	7	[2]1	15	17	7	7	6	16	16	9
Percentage of samples that do not exceed SMCLs	NA	0	NA	NA	53	NA	NA	NA	NA	100	100	100
Bayou des Cannes near Eunice (1967–2001)[3]												
Median	20.9	115	300	5.6	7.5	72	17.7	6.8	27.1	28.7	4.8	169
10th percentile	11.8	45	126	3.5	6.9	33.2	8.1	3.0	9.8	11.0	2.2	86
90th percentile	29.4	150	462	8.5	7.9	114.2	27.9	11.2	43.3	45.5	8.1	276
Number of samples	46	4	46	39	49	47	47	48	47	47	46	47
Percentage of samples that do not exceed SMCLs	NA	0	NA	NA	100	NA	NA	NA	NA	100	100	98
Bayou Cocodrie near Clearwater (1944–79)[4]												
Median	19	80	61	5.9	7.1	13	2.9	1.3	6	6	2	47
10th percentile	10.6	30	40	3.3	6.4	9	2	0.7	3.1	3.5	1.2	38
90th percentile	27.4	140	122	7.7	7.6	37	9	3.5	8.4	8.0	5.7	63
Number of samples	15	59	123	8	123	123	123	123	103	123	122	16
Percentage of samples that do not exceed SMCLs	NA	2	NA	NA	87	NA	NA	NA	NA	100	100	100
SMCLs	NA	15	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	500

[1]U.S. Geological Survey site number 08012000 (see fig. 1).

[2]Dissolved oxygen was measured once at this site on July 20, 1998, and the concentration was 4 milligrams per liter.

[3]U.S. Geological Survey site number 08010000 (see fig. 1).

[4]U.S. Geological Survey site number 07382000 (see fig. 1).

In 2014, 1.63 Mgal/d were withdrawn from Bayou des Cannes for rice irrigation (1.03 Mgal/d) and aquaculture (0.59 Mgal/d); 1.50 Mgal/d were withdrawn from Millers Lake for rice irrigation (0.95 Mgal/d) and for aquaculture (0.55 Mgal/d); 1.25 Mgal/d were withdrawn from Bayou Choupique for rice irrigation (0.77 Mgal/d) and aquaculture (0.48 Mgal/d); and 1.63 Mgal/d were withdrawn from Bayou Marron for rice irrigation (1.03 Mgal/d) and aquaculture (0.60 Mgal/d) (Collier, 2018).

Bayou Teche Subbasin

The primary drainage of the Bayou Teche subbasin in Evangeline Parish is Bayou Cocodrie, which begins near the northwestern corner of the parish and flows through Cocodrie Lake before turning gradually south and flowing out of the parish near Lake Chicot. The annual mean streamflow for Bayou Cocodrie near Clearwater (USGS site number 07382000) was 412 ft^3/s for water years 1923–2017. During this period, the highest monthly mean streamflow at this site occurred during February (664 ft^3/s) and the lowest during October (198 ft^3/s). In 2014, 148.94 Mgal/d were withdrawn from Bayou Cocodrie for power generation (146.17 Mgal/d), rice irrigation (1.72 Mgal/d), and aquaculture (1.05 Mgal/d) (Collier, 2018).

Cocodrie Lake is located on the northern border of the parish and covers approximately 6,000 acres with an average depth of 5–6 ft (Louisiana Department of Wildlife and Fisheries, 2018). The lake is covered extensively with trees including cypress and tupelo. The lake was created in 1959 primarily for irrigation and power generation and secondarily for recreation.

Lake Chicot was created in 1942 for recreational purposes and is surrounded by Chicot State Park. The lake covers about 1,600 acres with about 32 miles of shoreline and has an average depth of about 7 ft (Louisiana Department of Wildlife and Fisheries, 2018).

Surface-Water Quality

Water samples were collected from Bayou Nezpique near Basile (USGS site number 08012000) during 1943–98, from Bayou des Cannes near Eunice (USGS site number 08010000) during 1967–2001, and from Bayou Cocodrie near Clearwater (USGS site number 07382000) during 1944–79 (fig. 1) as part of an ongoing, long-term program to monitor the State's surface-water resources (table 4). Samples from Bayou Nezpique and Bayou Cocodrie had median hardness values that were within the soft range; samples from Bayou des Cannes had a median hardness value in the moderately hard range. Chloride, sulfate, and dissolved-solids concentrations were below SMCLs for at least 98 percent of samples at the three sites. Median values for dissolved-oxygen concentrations were greater than 5.5 mg/L for Bayou des Cannes and Bayou Cocodrie. Bayou Nezpique had a single measurement for dissolved-oxygen concentration of 4 mg/L; generally 5 mg/L is considered the minimum value for a diverse population of fresh, warmwater biota, including sport fish (Louisiana Department of Environmental Quality, 2008).

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This fact sheet has been prepared by the U.S. Geological Survey (USGS), in cooperation with the Louisiana Department of Transportation and Development (DOTD), as part of a program to document water use, availability, and quality in the parishes of Louisiana. Information on the availability, past and current water use, use trends, and water quality from groundwater and surface-water sources in the parish is presented here. Previously published reports (see References Cited section) and data stored in the USGS National Water Information System (USGS, 2017) are the primary sources of the information presented here. Special thanks are given to Doug Taylor, Director, and Zahir "Bo" Bolourchi (retired), DOTD Cooperative Program with the USGS.

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