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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of La Salle Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in La Salle 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 presented. 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In 2010, about 2.40 million gallons per day (Mgal/d) of water were withdrawn in La Salle Parish, including about 2.29 Mgal/d from groundwater sources and 0.10 Mgal/d from surface-water sources[1] (table 1). Categories of use included public supply, rural domestic, livestock, general irrigation, and aquaculture (table 2). Water-use data collected at 5-year intervals from 1960 to 2010 (fig. 2) indicated that water withdrawals peaked in 1960.

[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.

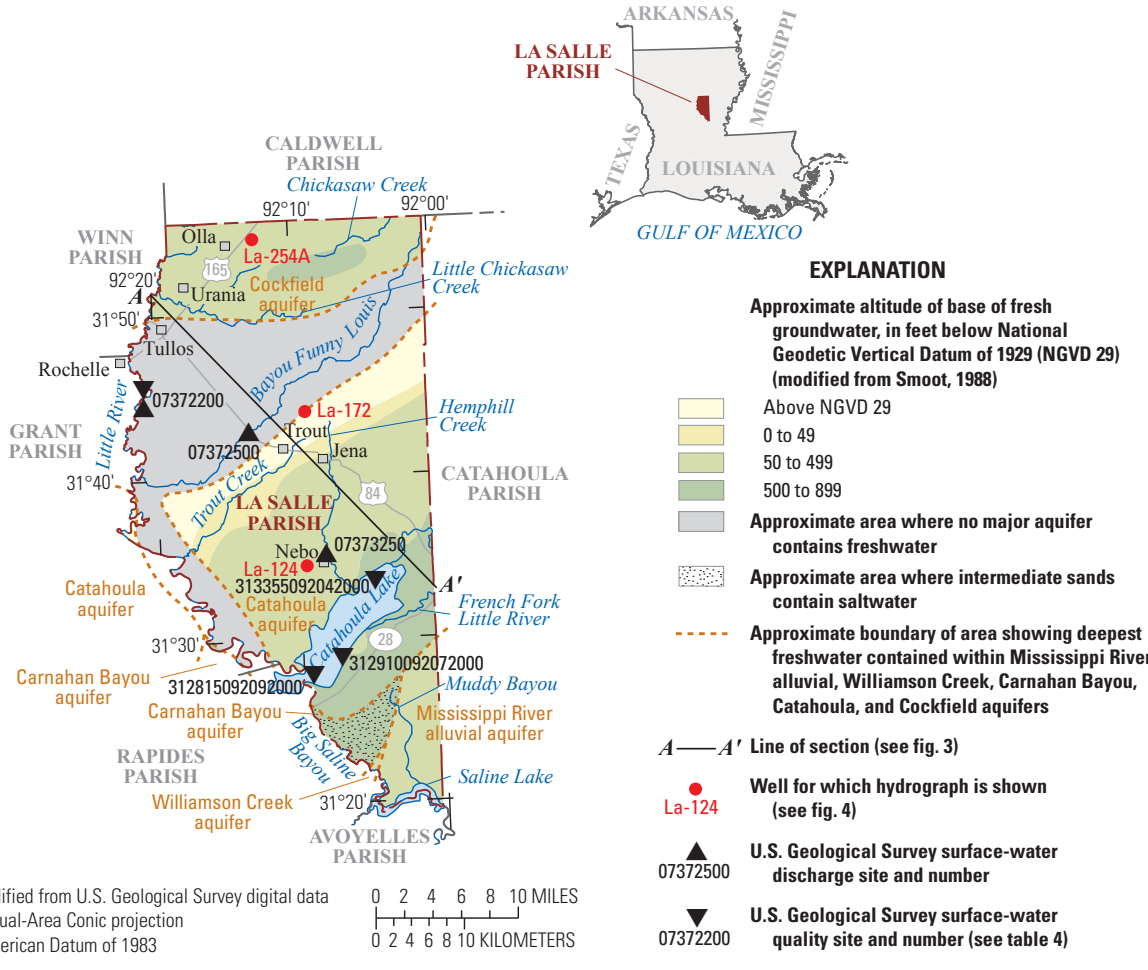

Figure 1. Location of study area, La Salle Parish, Louisiana.

Table 1. Water withdrawals, in million gallons per day, by source in La Salle Parish, Louisiana, 2010 (Sargent, 2011; B.P. Sargent, unpub. data, 2011).

[<, less than]

Aquifer or surface-water body	Groundwater	Surface water
Mississippi River alluvial aquifer	<0.003	
Upland terrace aquifer	1.28	
Catahoula aquifer	0.16	
Cockfield aquifer	0.86	
Miscellaneous streams and ponds		0.10
Total	2.29	0.10

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

Use category	Groundwater	Surface water	Total
Public supply	2.18	0.00	2.18
Rural domestic	0.06	0.00	0.06
Livestock	0.01	0.03	0.03
General irrigation	0.00	0.08	0.08
Aquaculture	0.06	0.00	0.06
Total	2.29	0.10	2.40

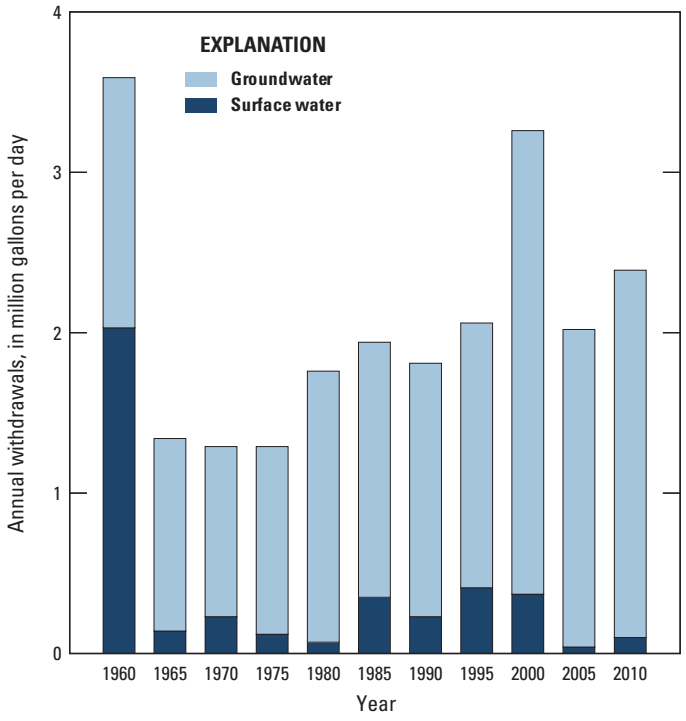

Figure 2. Water withdrawals in La Salle Parish, Louisiana, 1960–2010 (Sargent, 2011).

Groundwater Resources

Fresh groundwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) is generally available in La Salle Parish along the northern parish line and in central and southern parts of the parish (fig. 1). Where present, the base of freshwater is generally at depths ranging from near the National Geodetic Vertical Datum of 1929 (NGVD 29) to about 800 feet (ft) below NGVD 29 (Smoot, 1988). The primary sources of fresh groundwater in La Salle Parish are the Mississippi River alluvial, Upland terrace, Catahoula, and Cockfield aquifers (table 1). The Williamson Creek and Carnahan Bayou aquifers could also be sources of fresh groundwater in small areas of southern La Salle Parish (fig. 1); however, they will not be discussed further because no wells have been reported as screened in these aquifers. Recharge to aquifers in the parish is from precipitation, leakage from adjacent aquifers, and seasonal flow from streams. Discharge from the aquifers is by natural seasonal flow into streams, evapotranspiration, leakage into adjacent aquifers, and withdrawals from wells.

State well-registration records listed 168 active water wells screened in the primary groundwater sources in La Salle Parish in 2014, including 107 domestic, 35 public supply, 20 industrial, and 6 irrigation. In 2010, categories of use for groundwater withdrawals included public supply, rural domestic, livestock, and aquaculture (table 2) (Louisiana Department of Natural Resources, 2014).

Mississippi River Alluvial Aquifer

The Mississippi River alluvial aquifer is present near land surface in an area extending from about 2 miles (mi) northwest of Catahoula Lake southward to the southern tip of La Salle Parish. The aquifer comprises basal sand and gravel components of alluvial deposits that grade upward to silt and clay. The alluvial deposits composing the Mississippi River alluvial aquifer range in thickness from 150 to 200 ft and overlie the Williamson Creek, Carnahan Bayou, and Catahoula aquifers. In La Salle Parish, groundwater in the Mississippi River alluvial aquifer is unconfined or semiconfined and generally moves northeast toward a topographic low near the eastern end of Catahoula Lake (Seanor and Smoot, 1995). Infiltration of precipitation through the surficial silts and clays is the primary source of recharge, with additional recharge coming from underlying aquifers and seasonal flow from streams (Whitfield, 1975).

State well-registration records listed 9 active wells screened in the Mississippi River alluvial aquifer in La Salle Parish in 2014, including 5 domestic, 2 irrigation, and 2 industrial. Well depths ranged from 24 to 220 ft below land surface. Reported yields from wells screened in the Mississippi River alluvial aquifer in La Salle Parish ranged from 100 to 1,500 gallons per minute (gal/min; Louisiana Department of Natural Resources, 2014).

Upland Terrace Aquifer

The Upland terrace aquifer outcrops at land surface in much of central La Salle Parish, where it overlies the Catahoula aquifer (fig. 3), and in small areas in northern La Salle Parish, where it overlies the Cockfield aquifer and Vicksburg-Jackson confining layer. The Upland terrace aquifer comprises basal sands and gravels of terrace deposits that grade upward to silt

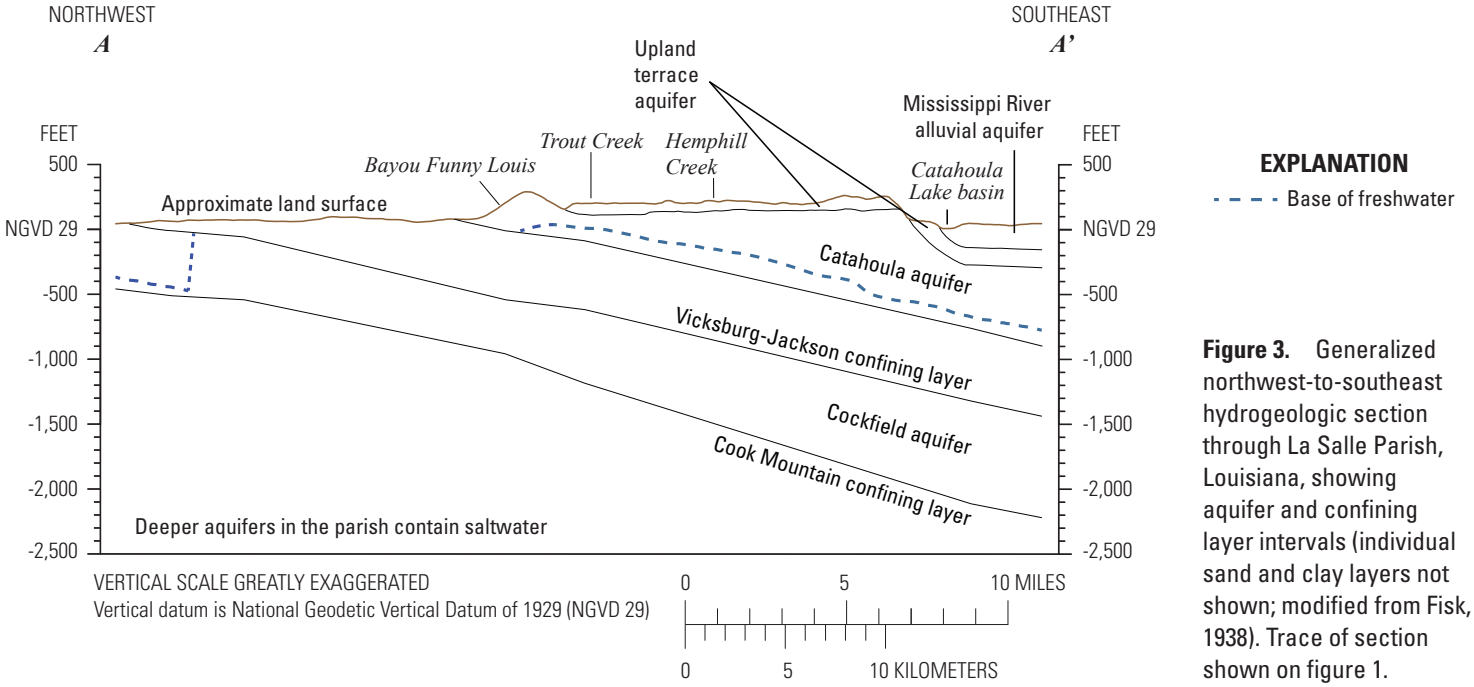

Figure 3. Generalized northwest-to-southeast hydrogeologic section through La Salle Parish, Louisiana, showing aquifer and confining layer intervals (individual sand and clay layers not shown; modified from Fisk, 1938). Trace of section shown on figure 1.

and clay. In La Salle Parish, the thickness of the terrace deposits generally ranges from 30 to 50 ft in small outcrops in northern La Salle Parish and from 100 to 150 ft in the main outcrop area in central parts of the parish (Sloss and others, 1961). The aquifer is recharged by precipitation and is generally under water-table (unconfined) conditions. Groundwater in the aquifer moves from topographically high positions to local stream valleys (Rollo, 1960). The aquifer generally contains freshwater, but in the topographically low areas near Catahoula Lake, saltwater (water with a chloride concentration greater than 250 mg/L) is present.

State well-registration records listed 82 active water wells screened in the Upland terrace aquifer in La Salle Parish in 2014, including 61 domestic, 17 public supply, 3 irrigation, and 1 industrial. Well depths ranged from 8 to 227 ft below land surface. Reported yields from wells screened in the Upland terrace aquifer in La Salle Parish ranged from 2 to 350 gal/min (Louisiana Department of Natural Resources, 2014). In 2010, withdrawals from the Upland terrace aquifer in La Salle Parish totaled about 1.28 Mgal/d and included about 1.25 Mgal/d for public supply and 0.03 Mgal/d for rural-domestic use. Freshwater from the Upland terrace aquifer is generally soft[2] and generally does 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 (table 3).

Catahoula Aquifer

The Catahoula aquifer outcrops at land surface or subcrops beneath terrace deposits across central La Salle Parish in a southwest-to-northeast direction. In La Salle Parish, the base of freshwater in the Catahoula aquifer generally ranges from near the NGVD 29 in central areas to about 800 ft below NGVD 29 near the southern end of the parish (fig. 1). In the southwestern corner of the parish, the Catahoula aquifer contains only saltwater (fig. 1).

The Catahoula aquifer is recharged by infiltration of precipitation in outcrop areas within the parish and flow from the overlying Upland terrace aquifer. Much of the water entering the aquifer is discharged to nearby streams, but some may be lost to evapotranspiration. Water that is not discharged locally moves downgradient southward toward discharge areas at lower altitudes and toward the Little River Valley (Martin and Whiteman, 1986). Water levels in the Catahoula aquifer in La Salle Parish fluctuate annually but showed little increase or decrease from 2002 to 2012, as illustrated by water levels in well La-172 (fig. 4), located in the outcrop area about 4 mi north of Jena, and in well La-124, located about 6 mi south of Jena (fig. 1).

State well-registration records listed 38 active water wells screened in the Catahoula aquifer in La Salle Parish in 2014, including 25 domestic, 9 public supply, 3 industrial, and 1 irrigation. Well depths ranged from 21 to 873 ft below land surface. Reported yields from wells screened in the Catahoula aquifer in La Salle Parish ranged from 24 to 350 gal/min (Louisiana Department of Natural Resources, 2014). In 2010, withdrawals from the Catahoula aquifer in La Salle Parish totaled about 0.16 Mgal/d and included about 0.08 Mgal/d for public supply, 0.05 Mgal/d for aquaculture, and 0.03 Mgal/d for rural-domestic use and livestock. A statistical summary of selected water-quality characteristics for freshwater samples collected from 44 wells screened in the Catahoula aquifer in La Salle Parish is presented in table 3.

Cockfield Aquifer

The Cockfield aquifer is present throughout La Salle Parish but contains freshwater only in a roughly 3–7-mi-wide band along the northern parish line where the altitude of the base of freshwater ranges from about 300 to greater than 500 ft below NGVD 29 (fig. 1). The Cockfield aquifer is overlain by clays of the Vicksburg-Jackson confining layer throughout most of the parish (fig. 3) but outcrops at land surface near Olla (fig. 1) in the northwestern

[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) or aesthetic effects (such as taste, odor, or color) of drinking water. At high concentrations or values, health implications as well as aesthetic degradation may result. SMCLs were established as guidelines for the States by the U.S. Environmental Protection Agency (1992).

Table 3. Summary of selected water-quality characteristics of freshwater in the Upland terrace, Catahoula, and Cockfield aquifers in La Salle Parish, Louisiana (U.S. Geological Survey, 2013c).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; PCU, platinum cobalt units; µS/cm, microsiemens per centimeter; SU, standard units; $CaCO_3$, 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 $CaCO_3$)	Chloride, filtered (as Cl)	Iron, filtered (µg/L as Fe)	Manganese, filtered (µg/L as Mn)	Dissolved solids, filtered
Upland terrace aquifer, 1939–84 (72 wells)									
Median	19.8	0	62	6.4	15	9.8	90	25	74
10th percentile	19.0	0	39	5.5	6	3.1	27	<10	53
90th percentile	20.5	10	193	6.9	60	50	700	87	151
Number of samples	12	39	39	39	72	72	38	34	39
Percentage of samples that do not exceed SMCLs	NA	97	NA	41	NA	100	87	82	97
Catahoula aquifer, 1945–83 (44 wells)									
Median	21.5	5	296	7.6	15	10	120	50	268
10th percentile	19.8	0	108	6.4	2	4.1	30	26	130
90th percentile	21.6	17	860	8.0	32	110	370	100	584
Number of samples	9	23	24	23	44	44	22	9	26
Percentage of samples that do not exceed SMCLs	NA	87	NA	83	NA	100	77	56	81
Cockfield aquifer, 1939–85 (39 wells)									
Median	21.0	100	1,130	8.4	8	35	110	30	622
10th percentile	20.0	5	655	7.7	0.5	11	56	<10	426
90th percentile	22.0	240	1,468	8.7	225	79	240	380	817
Number of samples	11	26	29	19	36	39	19	10	24
Percentage of samples that do not exceed SMCLs	NA	27	NA	79	NA	100	89	80	38
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

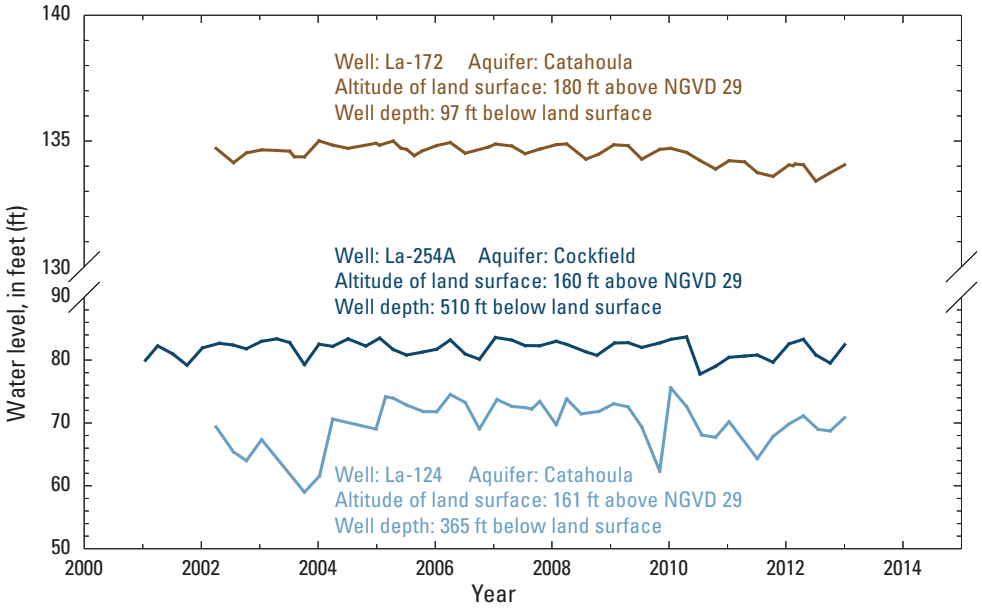

Figure 4. Water levels in wells La-124 and La-172 screened in the Catahoula aquifer and well La-254A screened in the Cockfield aquifer in La Salle Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2013a). Altitude of land surface and water levels are measured in feet (ft) above the National Geodetic Vertical Datum of 1929 (NGVD 29).

corner of the parish. The aquifer dips to the southeast, and the altitude of the base of the aquifer ranges from about 400 ft above NGVD 29 in the northwestern corner of the parish to more than 2,000 ft below NGVD 29 in the southeastern corner. Aquifer thickness ranges from about 400 to 800 ft in the freshwater area along the northern parish line (Ryals, 1984).

Recharge to the aquifer is primarily from infiltration of precipitation in areas where the aquifer outcrops in La Salle, Winn, Caldwell, and Jackson Parishes and other parishes to the north. The direction of groundwater flow in the Cockfield aquifer in La Salle Parish is generally to the south or southeast (Brantly and Seanor, 1996). Discharge from the aquifer is to local streams in the outcrop area, by evapotranspiration, by wells, and by seepage through the confining layer to overlying aquifers in areas where the aquifer is confined. The clayey confining layers above and below the aquifer have impeded flushing of saltwater from the aquifer downgradient (Rollo, 1960). The water level in well La-254A, located in northern La Salle Parish (fig. 1) and screened 510 ft below land surface in the Cockfield aquifer, fluctuates annually, but water levels have remained relatively stable since 2001 (fig. 4).

State well-registration records listed 39 active wells screened in the Cockfield aquifer in La Salle Parish in 2014, including 16 domestic, 14 industrial, and 9 public supply. Well depths ranged from 25 to 1,665 ft below land surface. Reported yields from wells screened in the Cockfield aquifer in La Salle Parish ranged from 3 to 335 gal/min (Louisiana Department of Natural Resources, 2014). Water withdrawals from the Cockfield aquifer in La Salle Parish totaled about 0.86 Mgal/d in 2010 (table 1) and included about 0.85 Mgal/d for public supply and 0.01 Mgal/d for rural-domestic use. A statistical summary of selected water-quality characteristics of freshwater from 39 wells screened in the Cockfield aquifer in La Salle Parish is presented in table 3. In general, samples did not exceed the SMCLs for concentrations of chloride, iron, and manganese but did exceed SMCLs for color and concentrations of dissolved solids.

Surface-Water Resources

In 2010, about 0.10 Mgal/d of surface water were withdrawn in La Salle Parish (table 2). Notable surface-water bodies in the parish include the Little River, Bayou Funny Louis, Chickasaw and Little Chickasaw Creeks, Hemphill Creek, Trout Creek, Saline Lake, Muddy Bayou, Big Saline Bayou, French Fork Little River, and Catahoula Lake (fig. 1).

Discharge data for streams in La Salle Parish are limited; however, during 1978–95, Hemphill Creek at Nebo (site number 07373250; fig. 1) had an average daily discharge of 63 cubic feet per second (ft^3/s) from a drainage area of 35 square miles (mi^2). During 1939–70, Bayou Funny Louis near Trout (site number 07372500; fig. 1) had an average daily discharge of 123 ft^3/s from a drainage area of 92 mi^2 (U.S. Geological Survey, 2013b). During 1958–96 and 1998–2011, the Little River near Rochelle (site number 07372200; fig. 1) had an average discharge of 2,182 ft^3/s from a drainage area of 1,899 mi^2 (U.S. Geological Survey, 2012).

Water samples collected during 1964–86 indicated that water in the Little River near Rochelle is generally soft and generally does not exceed SMCLs for pH and concentrations of chloride and sulfate (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).

Catahoula Lake is the largest natural inland freshwater lake in Louisiana, covering more than 46 mi^2. The lake, located on the Little River (fig. 1), is a principal stopover and wintering area for hundreds of thousands of migratory waterfowl and shorebirds. The management plan for the lake includes maintaining seasonal trends of winter and spring high water and summer and fall drawdown, primarily to provide optimal habitat for migratory birds (Doyle and others, 2002). Water samples from Catahoula Lake, which were analyzed during the period 1976–78, are presented in table 4. The median value for hardness fell into the soft range, dissolved oxygen concentrations were generally greater than 5 mg/L, and the median value for manganese was 90 mg/L.

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Table 4. Summary of selected water-quality characteristics for Little River near Rochelle and Catahoula Lake at three locations in La Salle Parish, Louisiana (U.S. Geological Survey, 2013c).

[Values are in milligrams per liter, except as noted. PCU, platinum cobalt units; µS/cm, microsiemens per centimeter; °C, degrees Celsius; SU, standard units; $CaCO_3$, calcium carbonate; µg/L, micrograms per liter; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012); NA, not applicable]

	Color (PCU)	Specific conductance, field (µS/cm at 25 °C)	Oxygen, dissolved	pH, field (SU)	Hardness (as $CaCO_3$)	Calcium, filtered (as Ca)	Chloride, filtered (as Cl)	Iron, filtered, (µg/L as Fe)	Manganese, filtered (µg/L as Mn)	Sulfate, filtered (as SO_4)	Dissolved solids
Little River near Rochelle, 1964–86[1]											
Median	100	314	7.0	6.7	30	8.1	56	380	185	17	225
10th percentile	40	81	4.9	6.1	14	4.0	8.9	180	71	8.6	73.6
90th percentile	200	1,750	10.0	7.4	90	20	620	940	445	69	1,734
Number of samples	225	234	140	211	202	196	204	36	32	205	214
Percentage of samples that do not exceed SMCLs	1	NA	NA	68	NA	NA	84	39	9	99	75
Catahoula Lake at three locations, 1976–78[2]											
Median	90	173.5	9.1	7.0	27	7.2	26	170	90	18.5	106
10th percentile	70	94.9	6.8	6.4	17.8	5.1	13	109	28	8.3	75.9
90th percentile	102	446.3	10.8	7.4	38.3	11	80.2	350	146	54.1	262.9
Number of samples	20	20	20	20	20	20	20	20	19	20	20
Percentage of samples that do not exceed SMCLs	0	NA	NA	85	NA	NA	100	85	26	100	100
SMCLs											
	15	NA	NA	6.5–8.5	NA	NA	250	300	50	250	500

[1]Site number 07372200.

[2]Datasets from sites 312815092092000, 312910092072000, 313355092042000.

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