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Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of St. Charles Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in St. Charles 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In 2010, about 2,476 million gallons per day (Mgal/d) of water were withdrawn in St. Charles Parish, Louisiana, including about 2,471 Mgal/d from surface-water sources and about 4.24 Mgal/d from groundwater sources[1] (table 1). Withdrawals for power generation accounted for about 79 percent of the total water withdrawn (table 2). Other use categories included public supply, industrial, rural domestic, and livestock. Water-use data collected at 5-year intervals from 1960 to 2010 indicated that total water withdrawals in the parish generally increased from 1960 to 2005 but decreased by about 20 percent from 2005 to 2010 (fig. 2). Most of the decrease resulted from reduced surface-water withdrawals for industrial uses (U.S. Geological Survey, 2014a).

[1]Water-withdrawal data are based on reported site-specific 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 across text and tables may result in different totals because of rounding; nonrounded numbers are used for calculation of totals.

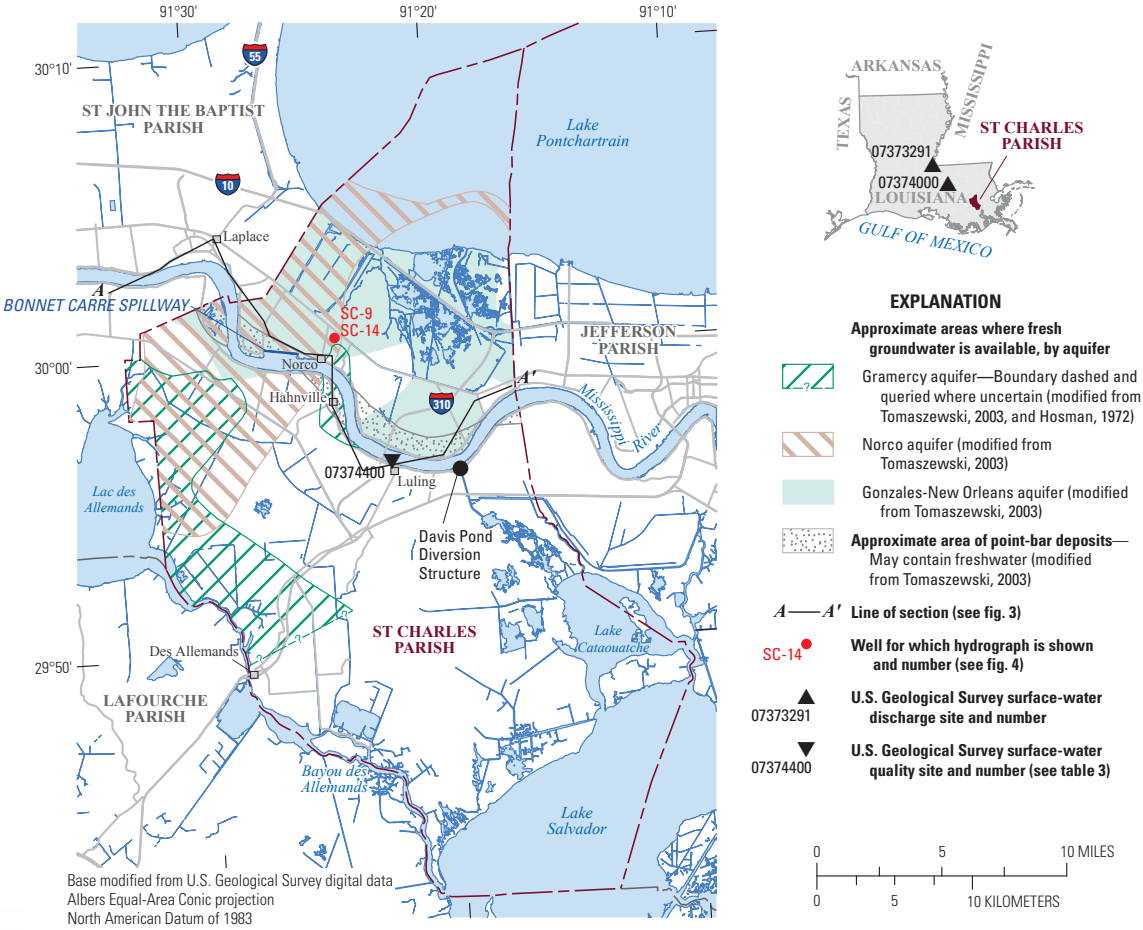

Figure 1. Location of study area, St. Charles Parish, Louisiana.

Table 1. Water withdrawals, in million gallons per day, by source in St. Charles Parish, Louisiana, 2010 (Sargent, 2011; Sargent, unpub. data, 2011).

[<, less than]

Aquifer or surface-water body	Groundwater	Surface water
Point-bar deposits	<0.01	
Gramercy aquifer	0.02	
Norco aquifer	0.48	
Gonzales-New Orleans aquifer	3.74	
Mississippi River		2,471.23
Miscellaneous streams		0.05
Total	4.24	2,471.28

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

Use category	Groundwater	Surface water	Total
Public supply	0.00	8.50	8.50
Industrial	4.21	503.20	507.41
Power generation	0.00	1,959.53	1,959.53
Rural domestic	0.02	0.00	0.02
Livestock	0.01	0.05	0.05
Total	4.24	2,471.28	2,475.51

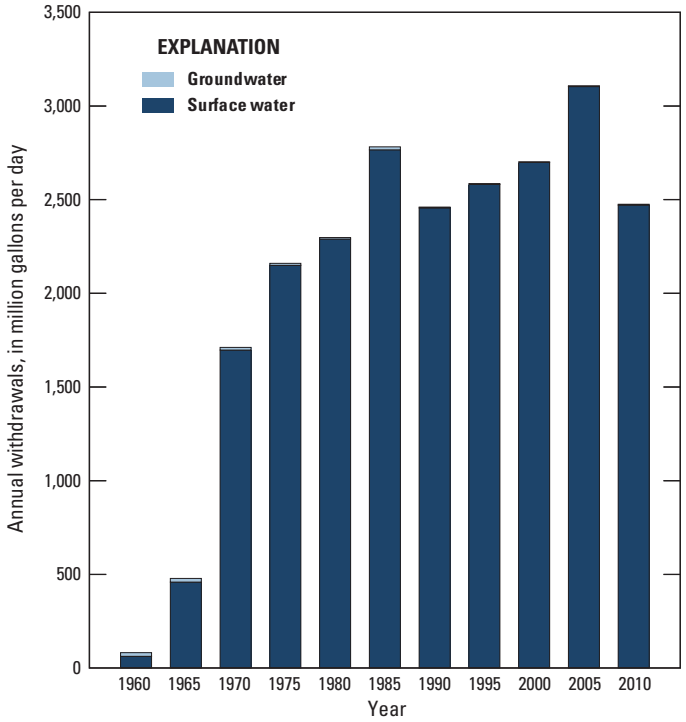

Figure 2. Water withdrawals in St. Charles Parish, Louisiana, 1960–2010 (Sargent, 2011).

Groundwater Resources

The primary aquifers that contain freshwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) in St. Charles Parish, from shallowest to deepest, include the Gramercy aquifer, Norco aquifer, and the Gonzales-New Orleans aquifer (fig. 3).

Mississippi River point-bar deposits also contain limited supplies of freshwater; however, the water is generally high in iron content and very hard,[2] with little reported pumpage (less than 0.01 Mgal/d in 2010; table 1). Deeper aquifers in St. Charles Parish contain only saltwater (water with chloride concentrations greater than 250 mg/L). In 2010, groundwater withdrawals for various uses included industrial, rural domestic, and livestock (table 2; Louisiana Department of Natural Resources, 2011).

In general, the base of fresh groundwater in St. Charles Parish ranges from about 350 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) near the town of Des Allemands to over 700 ft below NGVD 29 in an area about 2 miles (mi) south of the Lake Pontchartrain shoreline. Little or no fresh groundwater is available in the southern half of St. Charles Parish (fig. 1; Hosman, 1972; Tomaszewski, 2003). Recharge to aquifers is from downward percolating rainfall in areas north of the parish where the aquifers are at or near land surface, from upward and downward vertical leakage from other aquifers through confining layers or in areas where aquifers are directly connected, and from the Mississippi River via point-bar deposits (Hosman, 1972). Discharge from the aquifers is generally by upward and downward vertical leakage through confining layers into adjacent aquifers, flow into rivers and lakes, and withdrawals from wells.

Gramercy Aquifer

The Gramercy aquifer contains freshwater in western St. Charles Parish and in a localized area near Norco and Hahnville (fig. 1; Tomaszewski, 2003). The aquifer is composed of fine to coarse sand and is the least continuous of the three major aquifers underlying St. Charles Parish (Hosman, 1972). The aquifer is thin or missing in northern St. Charles Parish along the Lake Pontchartrain shoreline (Tomaszewski, 2003). North of a line between the southeastern tip of Lac des Allemands and Lake Cataouatche, structural contour data indicated that the altitude of the top of the Gramercy aquifer, although variable, is generally between 100 and 250 ft below NGVD 29 (Hosman, 1972; Tomaszewski, 2003). Where the aquifer is present, thickness ranges from less than 100 to 150 ft or more (fig. 3; Tomaszewski, 2003). The Gramercy aquifer is in contact with and hydraulically connected to a point-bar deposit of the Mississippi River in the vicinity of Hahnville (fig. 3). Water levels in the Gramercy aquifer fluctuate seasonally, reaching highs in the spring and lows in the fall, corresponding to Mississippi River levels (Hosman, 1972).

State well-registration records listed 27 active water wells screened in the Gramercy aquifer in St. Charles Parish in 2014, including 12 domestic, 9 irrigation, 3 industrial, and 3 public supply. Well depths ranged from 60 to 357 ft below land surface.

[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).

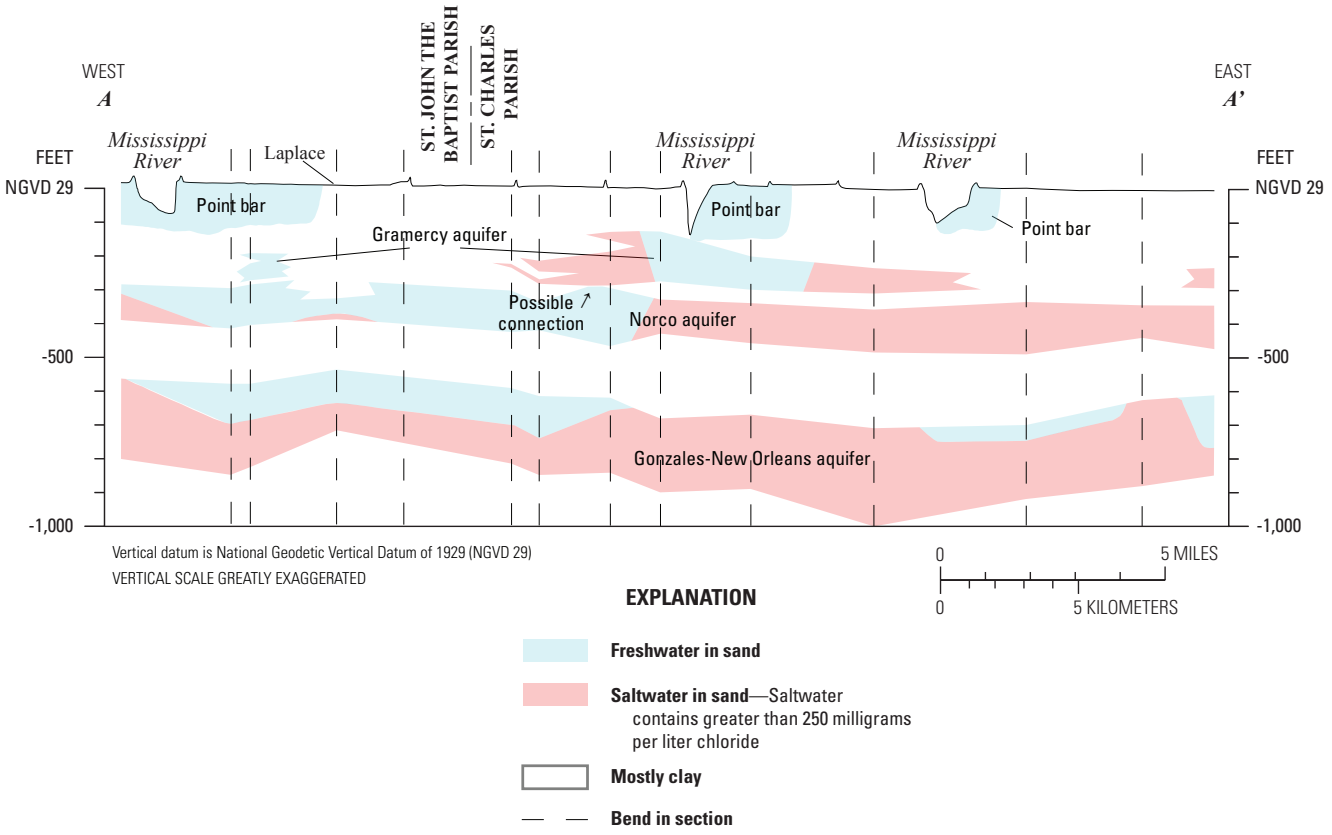

Figure 3. West-to-east hydrogeologic section through St. Charles Parish, Louisiana (modified from Hosman, 1972). Trace of section shown on figure 1.

Reported yields from wells screened in the Gramercy aquifer in St. Charles Parish have ranged from 25 to 500 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2014). In 2010, groundwater withdrawals from the Gramercy aquifer in St. Charles Parish totaled about 0.02 Mgal/d.

The quality of freshwater in the Gramercy aquifer varies widely in response to vertical leakage from adjacent aquifers. Where the quality is not affected by vertical flow from other aquifers, the water is generally a mixed calcium and magnesium-bicarbonate, sodium-chloride type and is very hard. Downdip, the water becomes a sodium-chloride type (Hosman, 1972).

Norco Aquifer

The Norco aquifer contains freshwater in northwestern St. Charles Parish. North of a line between the southeastern tip of Lac des Allemands and Lake Cataouatche, structural contour data indicated that the altitude of the top of the Norco aquifer, although variable, is generally between 250 and 400 ft below NGVD 29 in St. Charles Parish (Hosman, 1972; Tomaszewski, 2003). The aquifer thickness ranges from about 25 ft to about 275 ft in the parish. The aquifer contains fine to coarse sand but is mostly medium to coarse sand and is well sorted in the vicinity of the Mississippi River and possibly elsewhere (Hosman, 1972).

Water levels rose in the Norco aquifer in the Norco area from the 1950s to the mid-1990s in response to reduced groundwater withdrawals. Water levels in the Norco aquifer at well SC-14, located north of the Mississippi River near Norco (fig. 1), rose about 60 ft from 1958 to 1995 (fig. 4).

State well-registration records listed 26 active wells screened in the Norco aquifer in St. Charles Parish in 2014, including 14 industrial, 8 irrigation, and 4 domestic. Well depths ranged from about 320 to 460 ft below land surface. Reported yields from wells screened in the Norco aquifer in St. Charles Parish have ranged from 175 to 2,000 gal/min (Louisiana Department of Natural Resources, 2014). In 2010, groundwater withdrawals from the Norco aquifer in St. Charles Parish totaled about 0.48 Mgal/d, entirely for industrial use, except for a less than 0.01-Mgal/d split between rural domestic and livestock use.

Water in the Norco aquifer ranges from a sodium-bicarbonate type to a sodium-chloride type. Where groundwater is fresh, hardness ranges from 40 to 60 mg/L as calcium carbonate; hardness increases with salinity to more than 500 mg/L. Iron concentration is generally less than 500 micrograms per liter. Dissolved solids concentration ranges from about 750 to 1,000 mg/L where the water is fresh to more than 2,500 mg/L where the water is salty. Color of the water in the aquifer ranges from 5 to 180 platinum cobalt units (PCU). At Norco, water color ranges from 50 to 100 PCU in the Norco aquifer. These values exceed the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels[3] (SMCLs) for color of 15 PCU (Hosman, 1972).

[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 be present. SMCLs were established as guidelines for the States by the U.S. Environmental Protection Agency (1992).

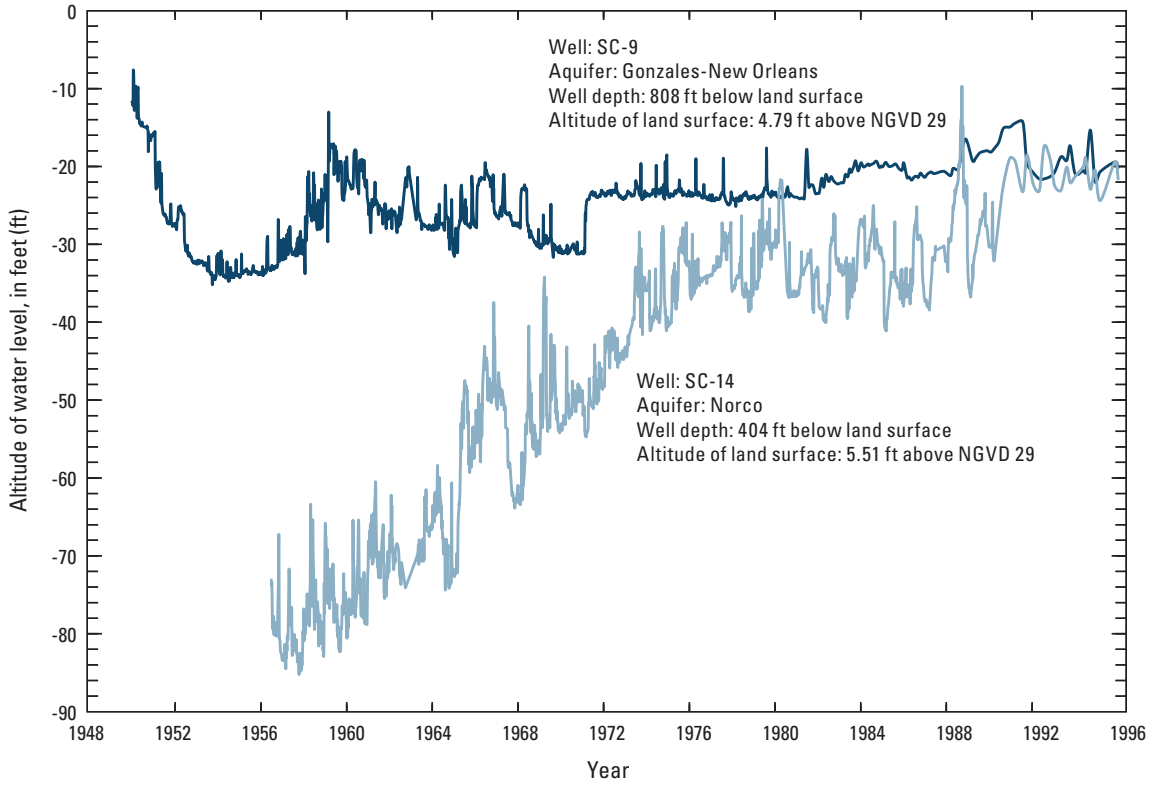

Figure 4. Water levels in well SC-9 screened in the Gonzales-New Orleans aquifer and well SC-14 screened in the Norco aquifer in St. Charles Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2012a). Altitude of land surface and water level is measured in feet (ft) relative to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Gonzales-New Orleans Aquifer

The Gonzales-New Orleans aquifer generally contains saltwater in the southern half of St. Charles Parish and freshwater underlain with saltwater in the northern half (Tomaszewski, 2003). North of a line between the southeastern tip of Lac des Allemands and Lake Cataouatche, structural contour data indicated that the altitude of the top of the Gonzales-New Orleans aquifer, although variable, is generally between 450 ft below NGVD 29 near Lake Pontchartrain and over 800 ft below NGVD 29 near Lake Cataouatche (Hosman, 1972; Tomaszewski, 2003). Aquifer thickness ranges from about 175 to about 325 ft (Hosman, 1972) and contains fine to very fine sand (Hosman, 1972). The aquifer has a general regional dip of 25 to 50 ft per mile to the south.

Water levels in the Gonzales-New Orleans aquifer in the Norco area initially declined in the early 1950s because of groundwater withdrawals (Eddards and others, 1956). Water levels in the aquifer at well SC-9, located north of the Mississippi River near Norco (fig. 1), were stable from 1972 to 1982, except for brief fluctuations, and were at about 20 ft below NGVD 29 when data collection at the well ended in 1995 (fig. 4).

State well-registration data listed 3 active wells screened in the Gonzales-New Orleans aquifer in St. Charles Parish in 2014, including 1 industrial, 1 irrigation, and 1 domestic. Well depths ranged from 670 to 754 ft below land surface. One of these wells had reported a yield of 1,293 gal/min (Louisiana Department of Natural Resources, 2014). In 2010, reported groundwater withdrawals from the Gonzales-New Orleans aquifer in St. Charles Parish totaled about 3.74 Mgal/d, entirely for industrial use, except for less than 0.002 Mgal/d for domestic use.

Groundwater in the Gonzales-New Orleans aquifer ranges from a mixed sodium-bicarbonate-chloride type in freshwater areas to a sodium-chloride type in saltwater areas. Freshwater in the aquifer is soft. As mineralization increases downdip and vertically downward, the water changes to a sodium-chloride type and becomes harder (Hosman, 1972). Freshwater hardness ranges from about 10 to 40 mg/L as calcium carbonate, whereas saltwater hardness increases to more than 300 mg/L. Color is generally above the SMCL of 15 PCU (Hosman, 1972).

Surface-Water Resources

The Mississippi River is the primary source of fresh surface water in St. Charles Parish (table 1). In 2010, about 2,470 Mgal/d of surface water were withdrawn in the parish, including about 503 Mgal/d for industrial use and 1,960 Mgal/d for power generation. Other use categories included public supply and livestock (table 2). Almost all the surface-water withdrawals came from the Mississippi River. Most surface water withdrawn for power generation and industrial purposes was used for cooling and was returned to its source after use (Sargent, 2011). Other major surface-water bodies bordering the parish include Lake Pontchartrain, Lake Cataouatche, Lake Salvador, Lac des Allemands, and Bayou des Allemands (fig. 1); however, there were no reported withdrawals from these water bodies in 2010.

Mississippi River

The Mississippi River drains more than 40 percent of the continental United States. Water quality and quantity in the Mississippi River are affected by both natural processes and human activities in the Mississippi River Basin upstream of St. Charles Parish. These processes and activities include precipitation, erosion, and the effects of dams and diversions. Water quality is also affected by runoff, discharge, and contamination from agricultural, municipal, and industrial activities. Water quantity and quality both vary seasonally because of the rate and distribution of precipitation and land-use patterns. Water-quality constituents such as agricultural pesticides and nutrients are generally highest in June and July, representing the "spring flush," which results from the runoff of upstream applications of these pesticides and nutrients (Demcheck and others, 2004). Suspended sediment concentrations are generally highest in late winter and early spring and lowest in late summer and fall (Wells, 1980). Water quantity can vary appreciably, as indicated by record discharges at the Mississippi River at Baton Rouge, Louisiana (fig. 1; site number 07374000), of 1,436,000 cubic feet per second (ft^3/s) in May 2011 and 132,800 ft^3/s in October 2012 (U.S. Geological Survey, 2014b).

The average flow of the Mississippi River near Red River Landing, Louisiana (site number 07373291; fig. 1, index map), located about 175 river miles upstream of Norco, was about 460,000 ft^3/s (about 298,000 Mgal/d) during 1928–76 (Wells, 1980). The flow in the Mississippi River at Red River Landing is representative of flows in St. Charles Parish because there are no major tributaries or distributaries, and the river is mostly leveed between the landing and the parish boundary.

Water samples collected and analyzed during 1957–99 indicated that water in the Mississippi River at Luling (fig. 1; site number 07374400) is generally hard (table 3) and usually does not exceed the SMCLs for pH and concentrations of chloride, sulfate, and iron. 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).

Two diversion structures, the Bonnet Carre Spillway and the Davis Pond Freshwater Diversion Structure, are located on the Mississippi River in St. Charles Parish (fig. 1). The Bonnet Carre Spillway, located on the north bank of the river between Laplace and Norco, includes a 7,000-ft-wide flood control structure capable of diverting up to 250,000 ft^3/s of Mississippi River water through a 5.7-mile-long, 8,000-acre spillway into Lake Pontchartrain (U.S. Army Corps of Engineers, 2009). The Davis Pond Freshwater Diversion Structure, located on the south bank of the river about 2 mi east of Luling (fig. 1), uses a combination of culverts and pumps to divert freshwater (at rates up to 10,650 ft^3/s), nutrients, and sediment from the Mississippi River into nearby wetlands to mitigate land loss, enhance vegetation, and improve fish and wildlife habitat (U.S. Army Corps of Engineers, 2000).

Lakes

Lake Pontchartrain (partially shown on fig. 1) has a surface area of 621 square miles (mi^2) and an average depth of about 11 ft. There are appreciable spatial variations in salinity because Lake Pontchartrain is connected to the Gulf of Mexico. The northwestern and western areas of the lake may be fresh during

Table 3. Summary of selected water-quality characteristics for the Mississippi River in St. Charles Parish, Louisiana, 1957–99 (U.S. Geological Survey, 2012b).

[Values are in milligrams per liter, except as noted. µS/cm, microsiemens per centimeter; °C, degrees Celsius; 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]

	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 at Luling[1]										
Median	398	8.2	7.6	150	40	11	21	24	50	<20
10th percentile	298	6.2	7.2	110	32	7.9	12	16	36	<10
90th percentile	500	11.2	7.9	180	48	15	34	36	71	60
Number of samples	665	328	656	659	634	636	365	662	662	294
Percent of samples that do not exceed SMCLs	NA	NA	99.8	NA	NA	NA	NA	100	100	98.6
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

[1]Station number 07374400.

some parts of the year (Shampine, 1971). Lac des Allemands has a surface area of about 23 mi^2 and an average depth of about 5 ft. Water quality in the lake varies spatially and seasonally. Chloride concentrations are moderately high and will occasionally exceed the SMCL of 250 mg/L (Shampine, 1971).

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