

Prepared in cooperation with the Louisiana Department of Transportation and Development

# Water Resources of Terrebonne Parish, Louisiana

## Introduction

Information concerning the availability, use, and quality of water in Terrebonne 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In 2010, 5.81 million gallons per day (Mgal/d) of water were withdrawn in Terrebonne Parish, including about 5.20 Mgal/d

from surface-water sources and 0.61 Mgal/d from groundwater sources<sup>1</sup> (table 1). Public-supply use accounted for 70 percent (4.06 Mgal/d) of the total water withdrawn. Other categories of use included industrial, rural domestic, livestock, and aquaculture (table 2). Water-use data collected at 5-year intervals from 1960 to 2010 (fig. 2) indicated that water withdrawals peaked in 1975 at about 21.0 Mgal/d. Industrial use peaked at about 11.6 Mgal/d in 1970 and dropped to 0.07 Mgal/d in 1980. Aquaculture withdrawals were calculated to be about 11.9 Mgal/d in 1990 and about 3.38 Mgal/d in 1995; however, most of the apparent decrease was due to a change in the calculations used to estimate water withdrawals for aquaculture, primarily crawfish farming (Lovelace and Johnson, 1996).

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

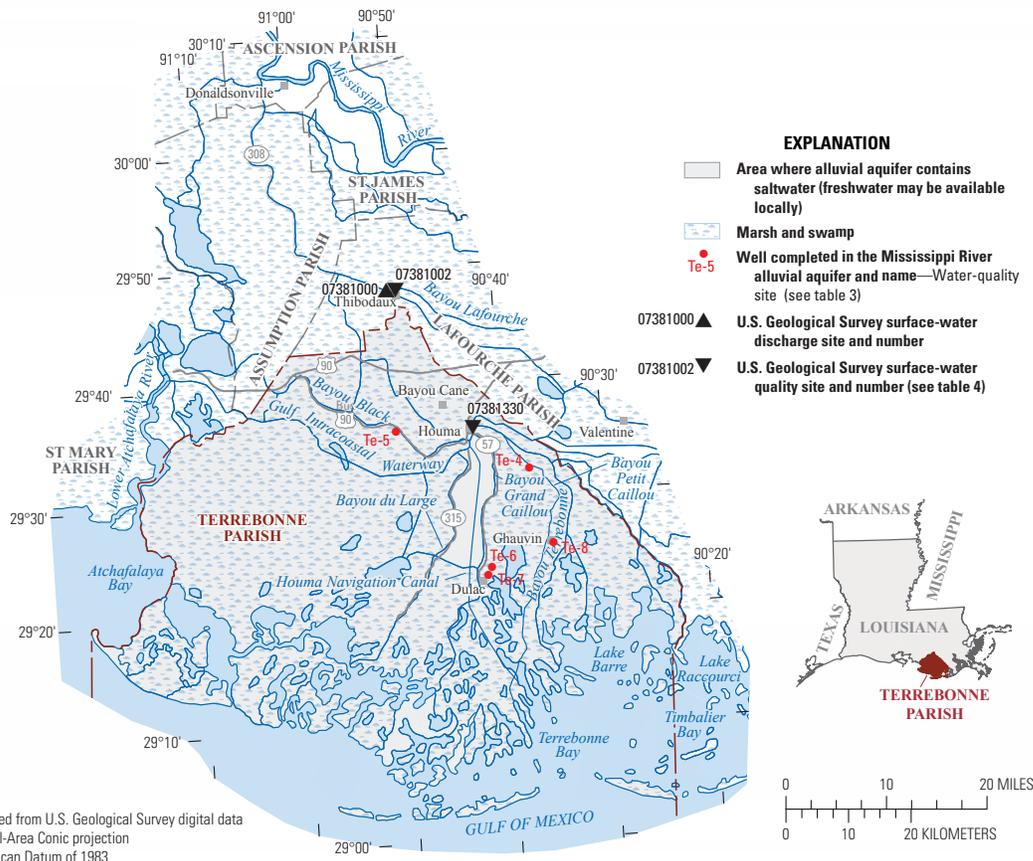


Figure 1. Location of study area, Terrebonne Parish, Louisiana.

## Groundwater Resources

In 2010, all reported groundwater withdrawals in Terrebonne Parish came from the Mississippi River alluvial aquifer. The Mississippi River alluvial aquifer is present throughout Terrebonne Parish and contains saltwater (water with chloride concentrations greater than 250 milligrams per liter [mg/L]); however, supplies of freshwater (water with chloride concentrations of 250 mg/L or less) can be found locally (Turcan, 1953). Within the parish, the base of the alluvial aquifer ranges from a maximum depth of about 425 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) to about 75 ft below NGVD 29 in the southwestern corner of the parish. The base of the aquifer is about 300 ft below NGVD 29 in the vicinity of Houma (Saucier, 1994).

The aquifer generally contains fine to medium sand in the upper part of the aquifer and grades to coarse sand and gravel in the lower part (Tomaszewski, 2003). Overlying the alluvial aquifer is a clayey surficial confining unit. The Mississippi River alluvial aquifer is hydraulically connected to the Mississippi River, which seasonally recharges the aquifer. The aquifer also is recharged by infiltration of rainfall through the surficial confining unit and by upward leakage from underlying aquifers. Discharge from the aquifer is by natural flow into rivers or canals, downward and lateral leakage into adjacent aquifers, and withdrawals from wells.

State well-registration records indicated that 41 active wells were screened in the Mississippi River alluvial aquifer in Terrebonne Parish in 2009, including 12 industrial, 11 irrigation, 9 domestic, and 9 public supply. Depths of these wells ranged from 165 to 320 ft below land surface, with a median well depth of 240 ft. Reported yields from registered wells screened in the alluvial aquifer in Terrebonne Parish ranged from 4 gallons per minute (gal/min) for individual-user wells to 1,200 gal/min for large-capacity industrial wells (Louisiana Department of Natural Resources, 2012). In 2010, withdrawals from the alluvial aquifer in Terrebonne Parish were 0.61 Mgal/d, and uses included about 0.24 Mgal/d for industry, 0.01 Mgal/d for rural-domestic purposes, 0.01 Mgal/d for livestock, and 0.35 Mgal/d for aquaculture (tables 1 and 2).

Selected water-quality characteristics for the Mississippi River alluvial aquifer in Terrebonne Parish from five wells (fig. 1) are listed in table 3. Hardness levels were found to be in the very hard<sup>2</sup> range for these water samples from the aquifer. The U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels (SMCLs)<sup>3</sup> for drinking water were exceeded for color and concentrations of chloride, iron, manganese, and dissolved solids.

<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).

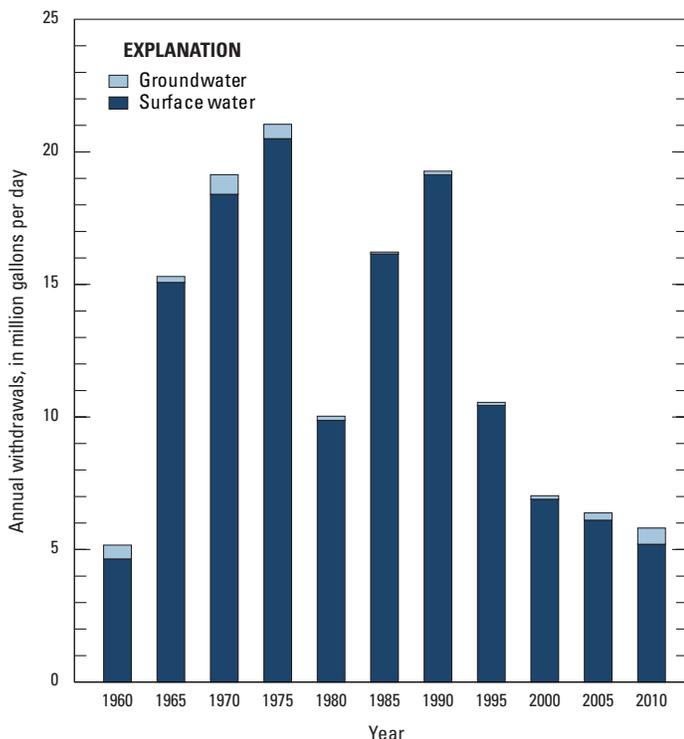
<sup>3</sup>The SMCLs are nonenforceable Federal guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water. At high concentrations or values, health implications as well as aesthetic degradation may result. SMCLs were established as guidelines for the States by the U.S. Environmental Protection Agency (1992).

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

Aquifer or surface-water body	Groundwater	Surface water
Mississippi River alluvial aquifer	0.61	
Bayou Black		0.23
Gulf Intracoastal Waterway		3.83
Other water bodies		1.14
<b>Total</b>	<b>0.61</b>	<b>5.20</b>

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

Use category	Groundwater	Surface water	Total
Public supply	0.00	4.06	4.06
Industrial	0.24	0.00	0.24
Rural domestic	0.01	0.00	0.01
Livestock	0.01	0.03	0.03
Aquaculture	0.35	1.12	1.47
<b>Total</b>	<b>0.61</b>	<b>5.20</b>	<b>5.81</b>



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

**Table 3.** Selected water-quality characteristics for wells screened in the Mississippi River alluvial aquifer in Terrebonne Parish, Louisiana, 1954–76 (U.S. Geological Survey, 2012).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; PCU, platinum cobalt units;  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter; SU, standard units;  $\text{CaCO}_3$ , calcium carbonate;  $\mu\text{g}/\text{L}$ , micrograms per liter; —, insufficient data; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency, 2011; NA, not applicable]

Well name	Well depth (in feet, below land surface)	Sample date	Temperature (°C)	Color, (PCU)	Specific conductance, field ( $\mu\text{S}/\text{cm}$ at 25 °C)	pH, field (SU)	Hardness (as $\text{CaCO}_3$ )	Chloride, filtered (as Cl)	Iron, unfiltered, recoverable ( $\mu\text{g}/\text{L}$ as Fe)	Manganese, unfiltered, recoverable ( $\mu\text{g}/\text{L}$ as Mn)	Dissolved solids, filtered
Te-4	188	Jan. 19, 1954	21.5	20	6,760	7.0	1,400	2,000	66,000	—	—
Te-5	219	Feb. 2, 1962	20.5	100	2,070	7.0	620	460	16,000	400	1,390
Te-6	300	Oct. 19, 1976	23.0	—	8,390	—	1,400	2,500	—	—	—
Te-7	282	Oct. 19, 1976	—	—	7,430	—	1,200	2,100	—	—	—
Te-8	280	Oct. 20, 1976	—	—	14,600	—	2,200	4,800	—	—	—
SMCLs											
			NA	15	NA	6.5–8.5	NA	250	300	50	500

## Surface-Water Resources

In 2010, about 5.20 Mgal/d of surface water were withdrawn in Terrebonne Parish. Surface-water withdrawals in Terrebonne Parish for public supply came from the Gulf Intracoastal Waterway (GIWW) (3.83 Mgal/d) and Bayou Black (0.23 Mgal/d). Withdrawals for aquaculture (1.12 Mgal/d) and livestock (0.03 Mgal/d) from other water bodies accounted for the rest of the surface-water withdrawals in Terrebonne Parish (tables 1 and 2). Other notable water bodies, which did not have reported withdrawals, include Houma Navigation Canal and Bayous du Large, Terrebonne, Grand Caillou, and Petit Caillou (fig. 1).

In 2010, about 9.93 Mgal/d of surface water were withdrawn from Bayou Lafourche in Lafourche Parish for use in Terrebonne Parish for public supply (Sargent, 2011). Bayou Lafourche is supplied by water from the Mississippi River at Donaldsonville. The bayou flows through southwestern Ascension Parish and northeastern Assumption Parish and into Lafourche Parish (fig. 1). Bayou Lafourche was a distributary channel of the Mississippi River until February 23, 1904, when flow from the river was cut off by a dam at Donaldsonville to alleviate flooding. The dam turned Bayou

Lafourche into a stagnant channel, and in 1955, a pumping plant at Donaldsonville began diverting about 250 cubic feet per second ( $\text{ft}^3/\text{s}$ ) (161 Mgal/d) from the Mississippi River into Bayou Lafourche by a combined siphoning and pumping operation (Cardwell and others, 1965). During 1984–2013, the average daily discharge for Bayou Lafourche at Thibodaux (site number 07381000) (fig. 1) was about 191  $\text{ft}^3/\text{s}$  (123 Mgal/d) (U.S. Geological Survey, 2013).

Water samples analyzed during 1996–99 indicated that water in Bayou Lafourche below the weir at Thibodaux (site number 07381002) (fig. 1) is generally hard and does not exceed the SMCLs for pH and concentrations of chloride, sulfate, and iron (table 4). Data analysis indicated that dissolved oxygen concentrations are 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).

In addition to providing the majority of freshwater within the parish, the GIWW is a major resource for commerce as the largest continuous ship channel in coastal Louisiana, traversing the entire Louisiana coast along the wetland-upland interface. Flow in the GIWW is generally from west to east in Terrebonne Parish as it captures freshwater from the Lower Atchafalaya River (Swarzenski, 2003).

**Table 4.** Summary of selected water-quality characteristics for Bayou Lafourche below weir at Thibodaux, Louisiana, and the Gulf Intracoastal Waterway (GIWW) at Houma, Louisiana (U.S. Geological Survey, 2012).

[Values are in milligrams per liter, except as noted.  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter;  $^{\circ}\text{C}$ , degrees Celsius; SU, standard units;  $\text{CaCO}_3$ , calcium carbonate;  $\mu\text{g}/\text{L}$ , micrograms per liter; <, less than; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency, 2011; NA, not applicable]

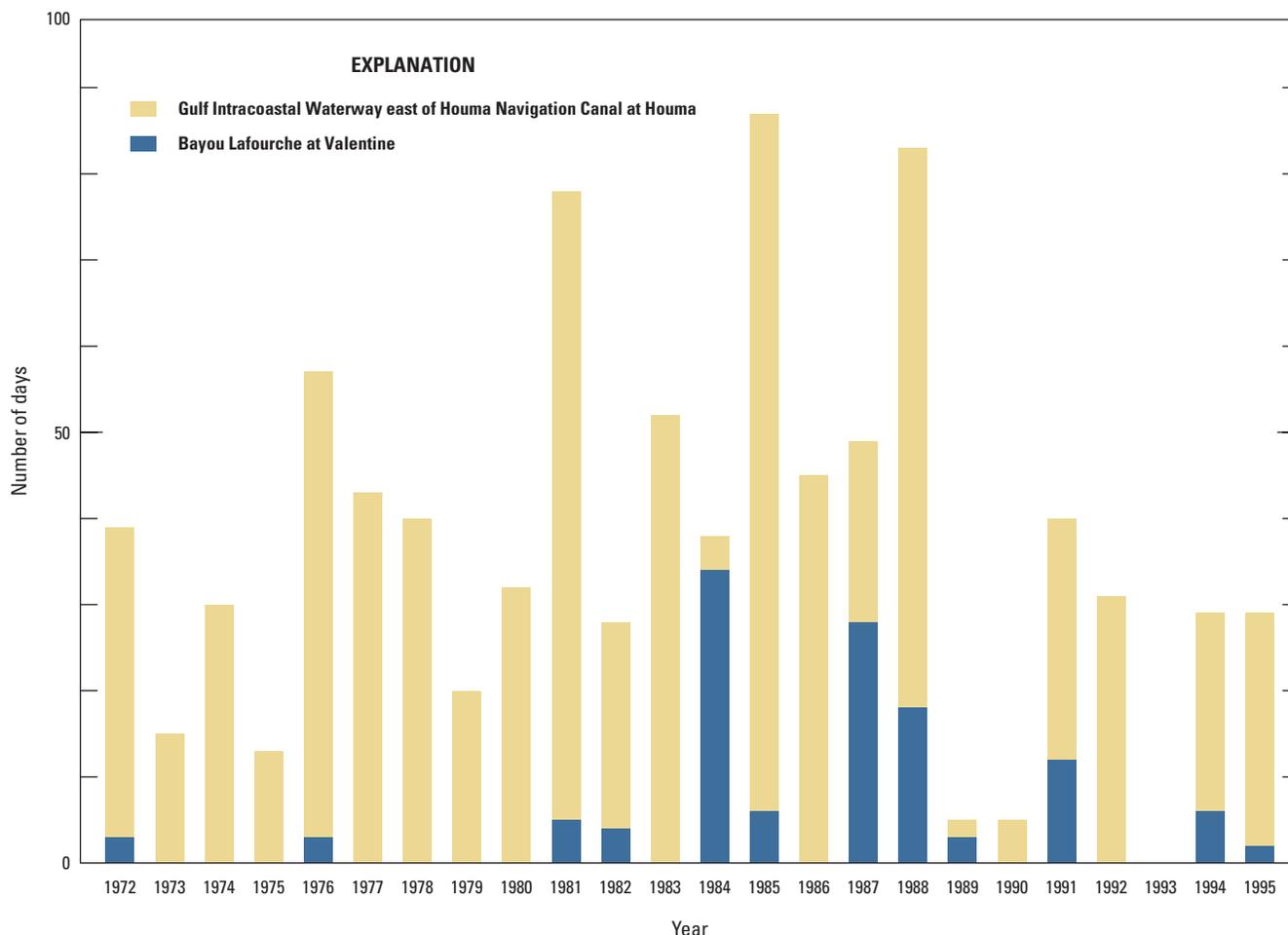
	Specific conductance, field ( $\mu\text{S}/\text{cm}$ at 25 $^{\circ}\text{C}$ )	Oxygen, dissolved	pH, field (SU)	Hardness (as $\text{CaCO}_3$ )	Calcium, filtered (as Ca)	Magnesium, filtered (as Mg)	Sodium, filtered (as Na)	Chloride, filtered (as Cl)	Sulfate, filtered (as $\text{SO}_4$ )	Iron, filtered ( $\mu\text{g}/\text{L}$ as Fe)
Bayou Lafourche below weir at Thibodaux, 1996–99 <sup>1</sup>										
Median	429	6.5	7.6	150	39	12	21	26	46	<10
10th percentile	337	5.0	7.3	140	36	11	12	14	36	<10
90th percentile	510	10.0	7.9	180	46	15	30	33	58	10
Number of samples	9	8	10	11	11	11	10	10	11	8
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	100	100	100
GIWW at Houma, 1978–81 <sup>2</sup>										
Median	403	6.4	7.5	130	32	11	36	54	37	30
10th percentile	247	5.0	7.3	71	19	5.7	17	22	12	<10
90th percentile	2,930	9.2	7.8	420	62	64	490	810	150	140
Number of samples	25	24	25	24	24	24	24	25	25	24
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	72	92	100
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

<sup>1</sup>Site number 07381002 (U.S. Geological Survey, 2012; specific data at [http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site\\_no=07381002](http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=07381002)).

<sup>2</sup>Site number 07381330 (U.S. Geological Survey, 2012; specific data at [http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site\\_no=07381330](http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=07381330)).

Water samples analyzed during 1978–81 indicated that the median value for hardness fell into the hard range in the GIWW at Houma (site number 07381330) (fig. 1). Constituent levels did not exceed the SMCLs for pH and iron and generally were below the SMCLs for concentrations of chloride and sulfate (table 4). Dissolved oxygen concentrations are generally greater than 5 mg/L. Saltwater from the Gulf of Mexico periodically intrudes into the GIWW and Bayou Lafourche, usually during low-flow or storm-surge events. This saltwater intrusion can cause substantial increases in specific conductance, hardness, and concentrations of calcium, magnesium, sodium, chloride,

and sulfate. In the 5 years prior to the opening of Houma Navigation Canal in 1961, chloride concentrations above 250 mg/L were unusual in the GIWW; however, from 1972 to 1995, chloride concentrations in the GIWW breached the 250 mg/L mark in all but 1 year. There were also several incidents of high chloride levels in Bayou Lafourche at Valentine. Because these two sources constitute about 87 percent of the Terrebonne Parish water supply, periods of elevated chlorides may affect the availability of freshwater in the parish (Johnson-Thibaut and others, 1998) (fig. 3).



**Figure 3.** Days per year with chloride concentrations exceeding 250 milligrams per liter in the Gulf Intracoastal Waterway east of Houma Navigation Canal at Houma and Bayou Lafourche at Valentine, Louisiana, 1972–95 (modified from Johnson-Thibaut and others, 1998).

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***By Lawrence B. Prakken, John K. Lovelace, and Vincent E. White***

**For additional information, contact:**

Director, USGS Louisiana Water Science Center  
3535 S. Sherwood Forest Blvd., Suite 120  
Baton Rouge, LA 70816  
E-mail: [dc\\_la@usgs.gov](mailto:dc_la@usgs.gov)  
Fax: (225) 298–5490  
Telephone: (225) 298–5481  
Home Page: <http://la.water.usgs.gov>

