

Prepared in cooperation with the Louisiana Department of Transportation and Development

# Water Resources of Grant Parish, Louisiana

## Introduction

Information concerning the availability, use, and quality of water in Grant 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 In 2014, about 5.43 million gallons per day (Mgal/d) of water were withdrawn in Grant Parish, including about 2.39 Mgal/d from groundwater sources and 3.03 Mgal/d from surface-water sources<sup>1</sup> (table 1). Withdrawals for public-supply use accounted for 71 percent (3.84 Mgal/d) of the total water withdrawn (table 2). Withdrawals for agricultural use, composed of general irrigation and livestock uses, accounted for 24 percent (1.28 Mgal/d) of the total water withdrawn (table 2). Other categories of use included industrial 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 1960 (fig. 2).

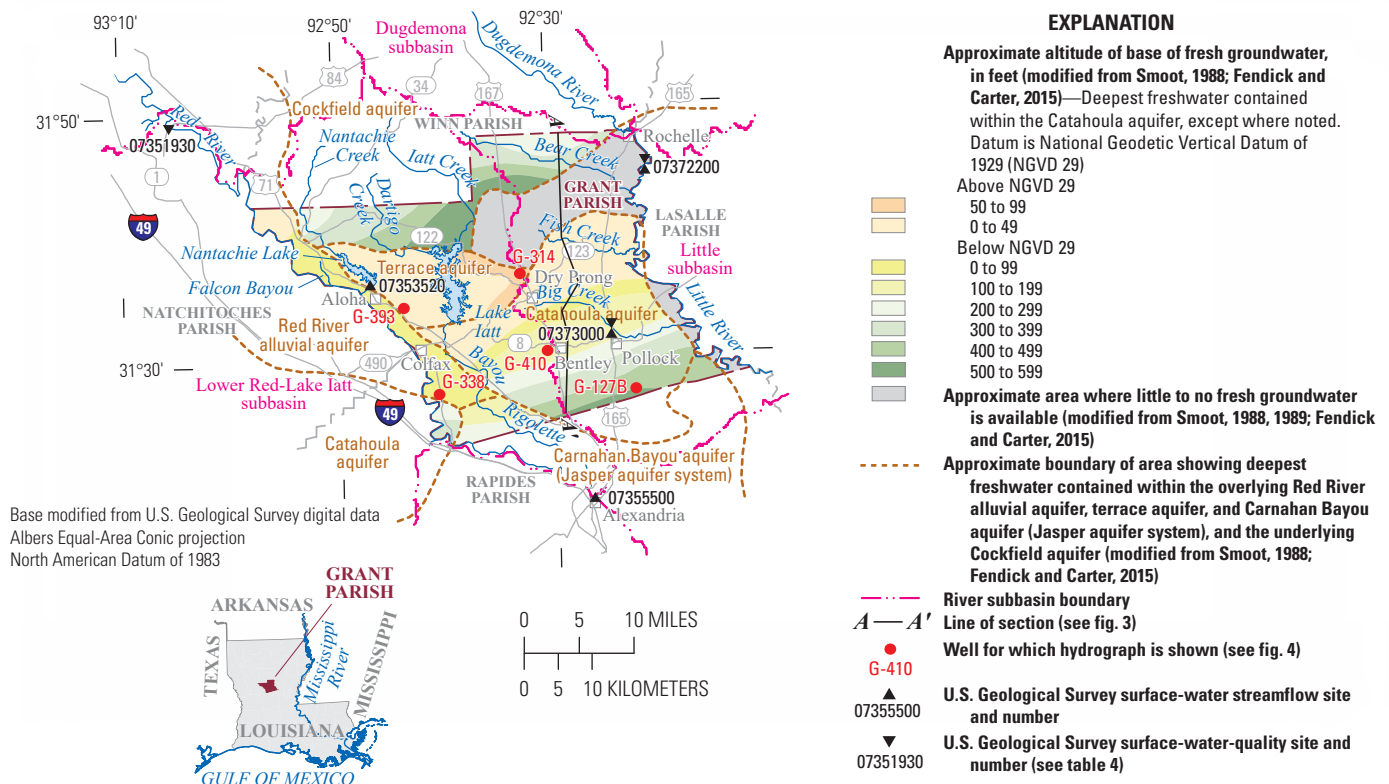
<sup>1</sup>Water-withdrawal data are based on estimated or reported site-specific data and aggregated data, which are distributed to sources. For a full description of water-use estimate methodology, see "Data Collection" in Sargent (2011). Tabulation of numbers in text and tables may result in different totals because of rounding; nonrounded numbers are used for calculation of totals.

## Groundwater Resources

The primary freshwater-bearing aquifers underlying Grant Parish are the Red River alluvial and terrace aquifers, Carnahan Bayou aquifer of the Jasper aquifer system, Catahoula aquifer, and Cockfield aquifer. The base of fresh groundwater (water with a chloride concentration of 250 milligrams per liter [mg/L] or less) is present at various depths in each of these aquifers, depending on location, from altitudes of greater than 50 feet (ft) above the National Geodetic Vertical Datum of 1929 (NGVD 29) to greater than 500 ft below NGVD 29 (fig. 1). Little to no fresh groundwater is available in the northeastern part of the parish and a small area in the southeast along the Little River.

### Red River Alluvial and Terrace Aquifers

The Red River alluvial aquifer is present in the lowlands along the Red River (fig. 1). The Red River alluvial aquifer is composed of the sand and gravel portion of alluvial deposits that generally range in thickness from less than 5 ft to 130 ft (Maher, 1941). The terrace aquifers (fig. 3), also called the Williana-Bentley, Montgomery, and Prairie aquifers, are composed of sand and gravel. The terrace aquifers are present in the upland areas of the parish, except in the northeastern part of the parish (Snider and Sanford, 1981). The terrace aquifers in



**Figure 1.** Location of study area, Grant Parish, Louisiana.

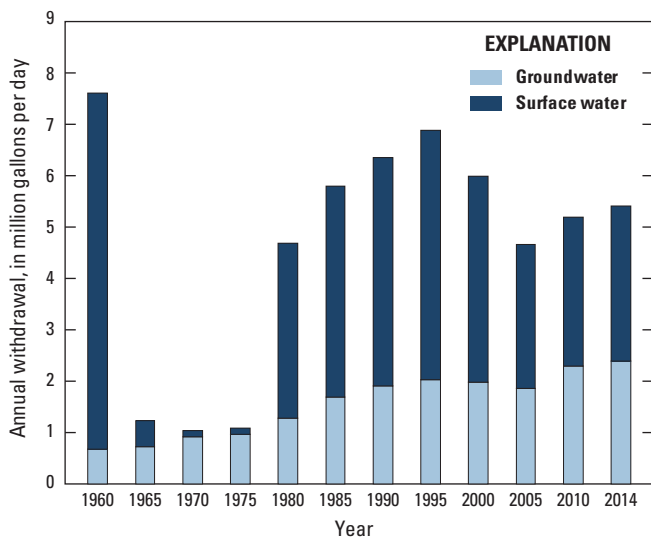
**Table 1.** Water withdrawals, in million gallons per day, by source in Grant Parish, Louisiana, 2014 (Collier, 2018).

Aquifer or surface-water body	Groundwater	Surface water
Red River alluvial aquifer	0.01	
Terrace aquifers	1.15	
Jasper aquifer system (Carnahan Bayou aquifer)	0.49	
Catahoula aquifer	0.60	
Cockfield aquifer	0.14	
Big Creek		1.75
Falcon Bayou		0.66
Miscellaneous streams		0.62
<b>Total</b>	<b>2.39</b>	<b>3.03</b>

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

[<, less than]

Use category	Groundwater	Surface water	Total
Public supply	2.09	1.75	3.84
Industrial	0.08	0.00	0.08
Rural domestic	0.22	0.00	0.22
Livestock	<0.01	<0.01	0.01
General irrigation	0.00	1.27	1.27
<b>Total</b>	<b>2.39</b>	<b>3.03</b>	<b>5.43</b>



**Figure 2.** Water withdrawals in Grant Parish, Louisiana, 1960–2014 (Sargent, 2011; Collier, 2018).

this part of Louisiana generally range from less than 5 ft to more than 120 ft thick (Maher, 1941). The base of the terrace aquifers ranges from about 40 ft to greater than 220 ft above NGVD 29 (Snider and Sanford, 1981). The terrace aquifers are generally unconfined, and water levels vary seasonally (Snider and Sanford, 1981).

A potentiometric-surface map produced in 1981 from water levels measured during 1942–77 indicated that water levels in the terrace aquifers ranged from 240 ft above NGVD 29 to less than

100 ft above NGVD 29 (Snider and Sanford, 1981). Groundwater in the terrace aquifers generally moves laterally and flows into streams (Snider and Sanford, 1981). Water levels at well G-338 (U.S. Geological Survey [USGS] site number 312714092403601) (fig. 1) screened in the Red River alluvial aquifer southeast of Colfax have fluctuated about 10 ft or less during 1973–2018 (fig. 4) and overall remained stable. Water levels at well G-314 (USGS site number 313156092324101) screened in the terrace aquifers northwest of Dry Prong (fig. 1) fluctuated less than about 15 ft during 1971–2018 and overall remained stable (fig. 4). Water levels at well G-127B (USGS site number 312703092224801) screened in the terrace aquifers near the southern parish boundary fluctuated less than about 5 ft during 1956–2016 and overall remained stable.

State well-registration records listed 21 active water wells screened in the Red River alluvial aquifer in Grant Parish in 2017: 11 irrigation wells, 9 domestic wells, and 1 industrial well. Well depths ranged from 16 to 120 ft below land surface, and reported yields were available for two wells: 75 and 100 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2017). In 2014, less than 0.007 Mgal/d were withdrawn from the Red River alluvial aquifer, with use categories including 0.004 Mgal/d for rural domestic and 0.002 Mgal/d for livestock (Collier, 2018).

State well-registration records listed 223 active water wells screened in the terrace aquifers in Grant Parish in 2017: 178 domestic wells, 28 public-supply wells, 10 irrigation wells, and 7 industrial wells. Well depths ranged from 8 to 165 ft below land surface, and reported yields ranged from 3 to 450 gal/min (Louisiana Department of Natural Resources, 2017). In 2014, about 1.15 Mgal/d were withdrawn from the terrace aquifers, with use categories including 0.99 Mgal/d for public supply, 0.15 Mgal/d for rural domestic, and 0.02 Mgal/d for industry (Collier, 2018).

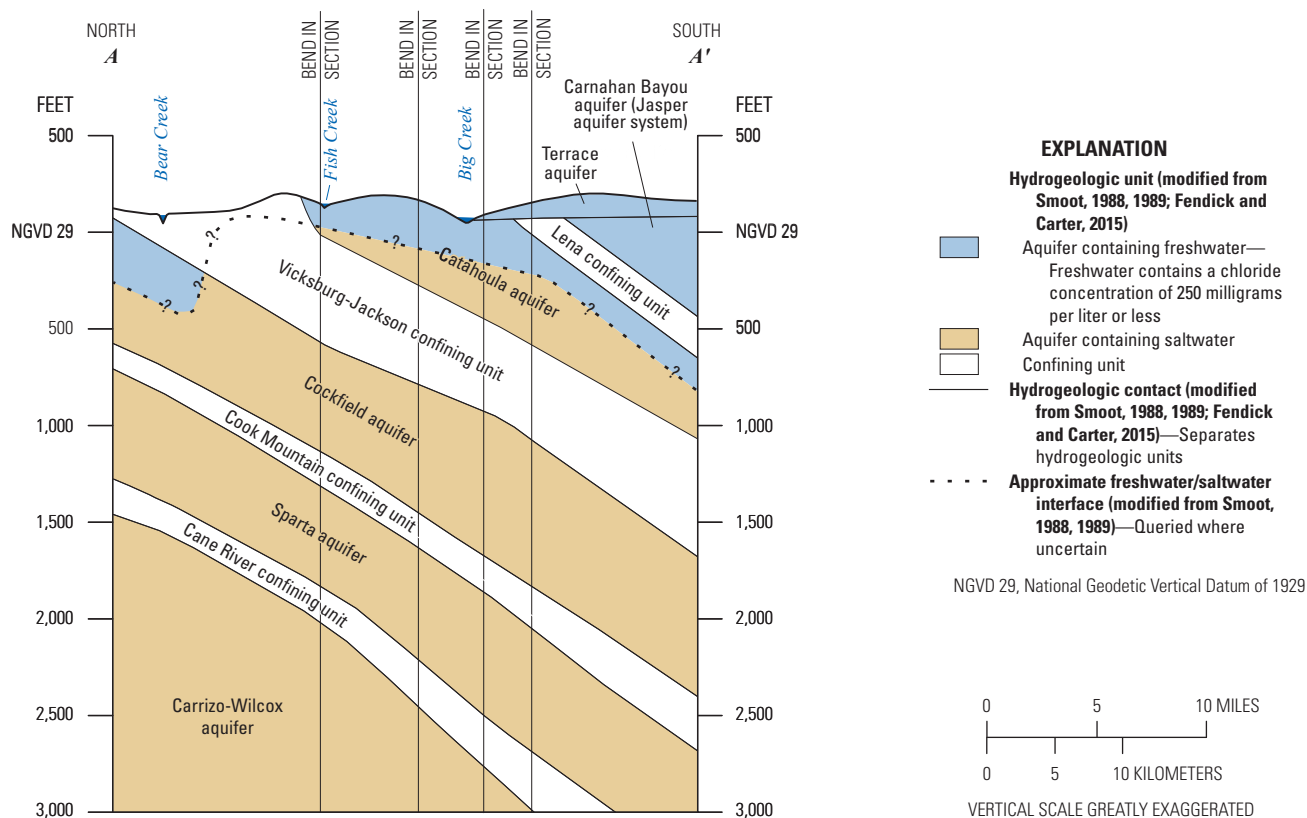
### Jasper Aquifer System (Carnahan Bayou Aquifer)

The Carnahan Bayou aquifer (fig. 3), part of the Jasper aquifer system, is present in Grant Parish in the area between about Pollock and the southern parish border (Martin and others, 1988). A water-level survey conducted in 1984 indicated that water levels in the Carnahan Bayou aquifer in Grant Parish ranged from about 140 ft above NGVD 29 near Bentley to about 60 ft below NGVD 29 near the southwestern tip of the parish (Martin and others, 1988). Water levels at well G-410 (USGS site number 313100092300403), screened in the Carnahan Bayou aquifer near Bentley, declined from their first measurement in 1981 but generally increased during 2002–16 (fig. 4).

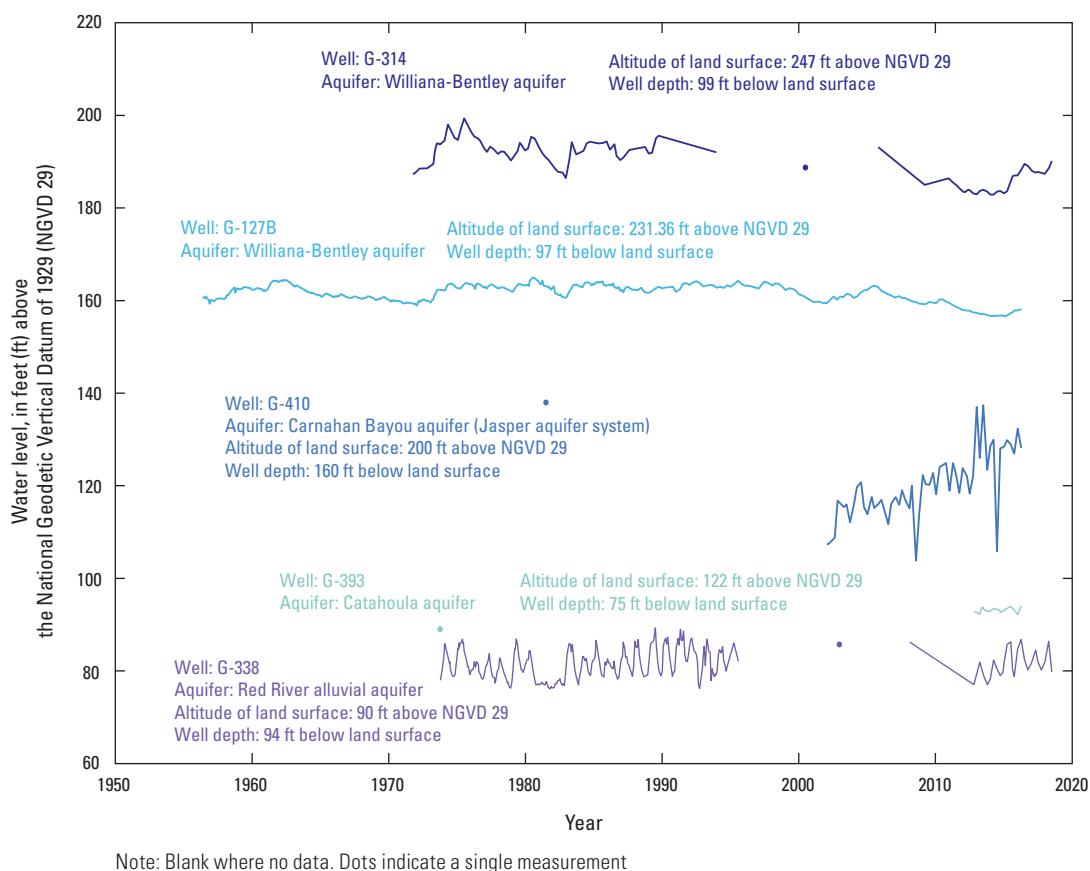
State well-registration records listed 46 active water wells screened in the Carnahan Bayou aquifer in Grant Parish in 2017: 29 domestic wells, 8 irrigation wells, 8 public-supply wells, and 1 industrial well. Depths of these wells ranged from 86 to 425 ft below land surface, and reported yields ranged from 10 to 1,800 gal/min (Louisiana Department of Natural Resources, 2017). In 2014, about 0.49 Mgal/d were withdrawn from the Carnahan Bayou aquifer of the Jasper aquifer system, with use categories including 0.45 Mgal/d for public supply, 0.04 Mgal/d for rural domestic, and less than 0.01 Mgal/d for livestock (Collier, 2018).

### Catahoula Aquifer

The Catahoula aquifer is present in roughly the southern half of Grant Parish (Martin and Whiteman, 1986). A map of water levels in 1980 indicated that water levels ranged from 120 ft above NGVD 29 in the central part of the parish to less than 60 ft above NGVD 29 in the southeastern corner. Water levels at well G-393 (USGS site number 313412092434601) screened in the Catahoula aquifer northwest of Colfax have generally been stable during 2012–16 but higher than the first water-level measurement in 1973 (fig. 4). State well-registration records listed 56 active water wells screened in the Catahoula aquifer in Grant Parish in 2017: 44 domestic wells, 6 public-supply wells,



**Figure 3.** Idealized north-to-south hydrogeologic section through Grant Parish, Louisiana, showing aquifer and confining layer intervals (individual sand and clay layers not shown; Smoot, 1989). Trace of section shown on figure 1.



**Figure 4.** Water levels in well G-338 screened in the Red River alluvial aquifer, G-314 and G-127B screened in the terrace aquifers, G-393 screened in the Catàhoula aquifer, and G-410 screened in the Carnahan Bayou aquifer in Grant Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2018).

3 irrigation wells, and 3 industrial wells. Well depths ranged from 30 to 909 ft below land surface, and reported yields ranged from 2 to 700 gal/min (Louisiana Department of Natural Resources, 2017). In 2014, about 0.60 Mgal/d were withdrawn from the Catahoula aquifer, with use categories including 0.52 Mgal/d for public supply, 0.06 Mgal/d for industry, and 0.02 Mgal/d for rural domestic (Collier, 2018).

Cockfield Aquifer

The Cockfield aquifer (fig. 3) is present in Grant Parish but only contains freshwater near most of the northern border of the parish (Brantly and Seanor, 1996). In 1992–93, water levels in the Cockfield aquifer in Grant Parish ranged from about 160 to 50 ft above NGVD 29 (Brantly and Seanor, 1996). State well-registration records listed 21 active water wells screened in the Cockfield aquifer in Grant Parish in 2017: 13 domestic wells and 8 public-supply wells. Well depths ranged from 135 to 380 ft below land surface, and reported yields ranged from 28 to 201 gal/min (Louisiana Department of Natural Resources, 2017). In 2014, about 0.14 Mgal/d were withdrawn from the Cockfield aquifer, with use categories including 0.13 Mgal/d for public supply and 0.01 Mgal/d for rural domestic (Collier, 2018).

Groundwater Quality

Groundwater samples were collected during 1939–2015 from 107 wells screened in the terrace aquifers, during 1939–83 from 26 wells screened in the Carnahan Bayou aquifer, and during 1938–83 from 65 wells screened in the Catahoula aquifer as part of a long-term monitoring program for the State’s groundwater resources (table 3) (USGS, 2018). Median hardness was within the soft<sup>2</sup> range for each of these aquifers. Sulfate, manganese, and dissolved-solids concentrations were generally below the U.S. Environmental Protection Agency’s Secondary Maximum Contaminant Levels (SMCLs)<sup>3</sup> for each of these aquifers. Chloride concentrations exceeded the SMCL in the Catahoula aquifer for 31 percent of samples but were generally below SMCLs in the terrace and Carnahan Bayou aquifers.

<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 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 3.** Summary of selected water-quality characteristics for samples from 107 wells screened in the terrace aquifers, 26 wells screened in the Carnahan Bayou aquifer, and 65 wells screened in the Catahoula aquifer in Grant Parish, Louisiana (U.S. Geological Survey, 2018).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard unit; CaCO<sub>3</sub>, calcium carbonate; µg/L, micrograms per liter; <, less than; E, estimated; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2016); NA, not applicable]

	Tem- pera- ture (°C)	Color (plati- num cobalt units)	Specific conduc- tance, field (µS/cm at 25 °C)	pH, field (SU)	Hard- ness (as CaCO <sub>3</sub> )	Cal- cium, filtered (as Ca)	Mag- nesium, filtered (as Mg)	Sodium, filtered (as Na)	Chlo- ride, filtered (as Cl)	Sulfate, filtered (as SO <sub>4</sub> )	Iron, filtered, in µg/L (as Fe)	Man- ganese, filtered, in µg/L (as Mn)	Dis- solved solids, filtered
Terrace aquifers, 107 wells (1939–2015)													
Median	20	5	46	5.9	18	2.1	0.7	5.2	12	<1.4	75	20	47
10th percentile	19.1	0	29	5.1	6	1.2	0.2	2.4	2.9	<0.2	13	<10	30
90th percentile	21.3	20	319	7.0	131	12.2	6.0	34.8	142	22.4	653	E<57	236
Number of samples	26	55	55	79	140	60	60	57	139	79	64	44	52
Percentage of samples that do not exceed SMCLs	NA	85	NA	35	NA	NA	NA	NA	94	97	83	E89	92
Carnahan Bayou aquifer, 26 wells (1939–83)													
Median	20	10	281	7.6	14	4.8	0.45	74.5	12	2.4	130	<30	270
10th percentile	19.7	5	121	6.6	6	1	0.11	18.3	5.7	<0.2	24	<16.2	118
90th percentile	20.8	14.5	462	8.1	40	8.4	0.95	100	24	9.2	3,700	<60	323
Number of samples	5	12	16	18	31	16	16	14	31	21	15	9	12
Percentage of samples that do not exceed SMCLs	NA	100	NA	94	NA	NA	NA	NA	100	100	67	89	100
Catahoula aquifer, 65 wells (1938–83)													
Median	21	5	419	7.5	14.5	2.2	0.4	85	80	1	105	20	281
10th percentile	20.5	0	185	6.8	2	0.2	<0.02	36	6.6	0	40	0	151
90th percentile	22	30	1,754	8.1	170	19.6	6.22	456	920	20.8	355	E<82	613
Number of samples	20	39	39	50	78	43	43	39	81	57	34	19	32
Percentage of samples that do not exceed SMCLs	NA	85	NA	96	NA	NA	NA	NA	69	100	85	E84	84
SMCLs	NA	15	NA	6.5–8.5	NA	NA	NA	NA	250	250	300	50	500



Surface-Water Resources

Surface-water resources in Grant Parish are present in three drainage subbasins: the Lower Red-Lake Iatt subbasin (Hydrologic Unit Code [HUC] 11140207) in the western part of the parish, the Little subbasin (HUC 08040304) in the eastern part of the parish, and the Dugdemona subbasin (HUC 08040303) in the northeastern part of parish (USGS, 2018). In 2014, 3.03 Mgal/d of surface water were withdrawn in Grant Parish: 1.75 Mgal/d from Big Creek for public supply, 0.66 Mgal/d from Falcon Bayou for general irrigation, and 0.62 Mgal/d from miscellaneous streams for livestock (less than 0.01 Mgal/d) and general irrigation (0.61 Mgal/d) (tables 1–2).

Lower Red-Lake Iatt Subbasin

The Red River is the primary drainage in this subbasin in Grant Parish and generally follows the western border of the parish eventually flowing into Rapides Parish. Other surface-water bodies in the subbasin include Iatt Creek, Dartigo Creek, Bayou Rigolette, Lake Iatt, Nantachie Lake, and Nantachie Creek. The average streamflow downstream from Grant Parish, for the Red River at Alexandria (USGS site number 07355500; fig. 1) was 30,770 cubic feet per second (ft<sup>3</sup>/s) during 1928–82 (Carlson and others, 1983). The dam and spillway which impound Lake Iatt were completed in 1956 (Louisiana Department of Wildlife and Fisheries, 2018). The lake has an average depth of about 4.5 ft with a maximum depth

of about 19 ft; however, annual lake-level variations of 3–4 ft are common and sometimes can be as much as 10 ft. The lake is about 7,100 acres and is covered extensively with cypress and tupelo trees. Nantachie Lake was created by impounding Nantachie Creek in 1964 for purposes of wildlife and fisheries habitat and recreation. The lake covers about 1,580 acres with an average depth of about 7 ft and a maximum depth of about 17 ft. Water levels commonly vary from 1 to 2 ft and uncommonly up to 6 ft (Louisiana Department of Wildlife and Fisheries, 2018). The average streamflow at the Nantachie Lake near Aloha (USGS site number 07353520) for water years (Oct. 1–Sept. 30) 1970–72 and 1974–79 was 72.6 ft<sup>3</sup>/s (USGS, 1979).

Little and Dugdemona Subbasins

The Little River is the primary drainage of the Little subbasin. The Little River flows in a general southerly direction and follows the eastern border of the parish. Many tributaries flow in an easterly direction into the Little River directly or indirectly including Bear Creek and Big Creek (fig. 1). The annual mean streamflow for Big Creek at Pollock (USGS site number 07373000) during water years 1943–2018 was 61.7 ft<sup>3</sup>/s (USGS, 2018). The highest monthly mean streamflow occurred during February (109 ft<sup>3</sup>/s), and the lowest occurred during August (24 ft<sup>3</sup>/s). The annual mean streamflow for Little River near Rochelle (USGS site number 07372200) was 2,232 ft<sup>3</sup>/s for water years 1958–2017. The highest monthly mean streamflow occurred during March (4,741 ft<sup>3</sup>/s), and the lowest

**Table 4.** Summary of selected water-quality characteristics for samples from Red River at Grand Ecore, Big Creek at Pollock, and Little River near Rochelle, Louisiana (U.S. Geological Survey, 2018).  
[Values are in milligrams per liter, except as noted. °C, degrees Celsius; µS/cm, microsiemens per centimeter; SU, standard unit; CaCO<sub>3</sub>, calcium carbonate; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2016); NA, not applicable]

	Tem- perature (°C)	Color (platinum cobalt units)	Specific conduc- tance, field (µS/cm at 25 °C)	Dis- solved oxygen	pH, field (SU)	Hardness (as CaCO <sub>3</sub> )	Calcium, filtered (as Ca)	Chloride, filtered (as Cl)	Sulfate, filtered (as SO <sub>4</sub> )	Dissolved solids, filtered
Red River at Grand Ecore (1987–2000) <sup>1</sup>										
Median	20	30	474	8.5	7.6	123	35	57	59	277
10th percentile	11.5	10	236	6.5	7.2	67	19	20	22	139
90th percentile	30	100	1,171	10.8	8.1	300	77	160	160	700
Number of samples	151	147	154	147	155	152	152	154	152	152
Percentage of samples that do not exceed SMCLs	NA	30	NA	NA	100	NA	NA	99	99	70
Big Creek at Pollock (1943–2004) <sup>2</sup>										
Median	18	30	40	8.6	6.5	8	2	4.1	2	47
10th percentile	9.5	15	34	7.1	5.9	6.2	1.6	3.3	0.2	37
90th percentile	26	58	45	10.9	7.0	10	2.9	5.3	4.1	57
Number of samples	255	226	260	213	260	255	255	259	255	253
Percentage of samples that do not exceed SMCLs	NA	12	NA	NA	57	NA	NA	100	100	100
Little River near Rochelle (1957–86) <sup>3</sup>										
Median	19.4	100	314	7.0	6.7	30	8.1	64	17	225
10th percentile	8	40	81	4.9	6.1	14	4.0	9.2	8.4	74
90th percentile	28.5	200	1,750	10.0	7.4	122	20.5	906	68	1,734
Number of samples	239	225	234	140	228	219	196	221	221	214
Percentage of samples that do not exceed SMCLs	NA	1	NA	NA	66	NA	NA	81	99	75
SMCLs	NA	15	NA	NA	6.5–8.5	250	250	250	250	500

<sup>1</sup>U.S. Geological Survey site number 07351930 (see fig. 1).  
<sup>2</sup>U.S. Geological Survey site number 07373000 (see fig. 1).  
<sup>3</sup>U.S. Geological Survey site number 07372200 (see fig. 1).

occurred during August (286 ft<sup>3</sup>/s). The main drainage of the Dugdemona subbasin is the Dugdemona River; however, the river is only present in Grant Parish in a short course in the extreme northeastern part of the parish.

## Surface-Water Quality

Water samples were collected from Red River at Grand Ecore (USGS site number 07351930, fig. 1) during 1987–2000, Big Creek at Pollock (USGS site number 07373000) during 1943–2004, and Little River near Rochelle (USGS site number 07372200) during 1957–86 (fig. 1) as part a long-term program to monitor the State's surface-water resources (USGS, 2018). These samples had median hardness values that were within the hard range for the Red River and within the soft range for Big Creek and Little River (table 4). Median chloride, sulfate, and dissolved-solids concentrations and pH were within SMCLs. Median values for dissolved-oxygen concentrations were at least 7.0 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 was prepared by the 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, 2018) 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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