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LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Prepared in cooperation with the Louisiana Department of Transportation and Development

Water Resources of Orleans Parish, Louisiana

Introduction

Information concerning the availability, use, and quality of water in Orleans 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In 2010, about 615 million gallons per day (Mgal/d) of water were withdrawn in Orleans Parish, including about 602 Mgal/d from surface-water sources and about 13.0 Mgal/d from groundwater sources[1] (table 1). Power generation accounted for about 75 percent (464 Mgal/d) of the total water withdrawn. Other categories of use in 2010 included public supply, industrial, rural domestic, livestock, and general irrigation (table 2). Water-use data collected at 5-year intervals from 1960 to 2010 (fig. 2) indicated that water withdrawals peaked in 1985 at nearly 1,050 Mgal/d.

[1]Tabulation of numbers across text and tables may result in different totals because of rounding; nonrounded numbers are used for calculation of totals.

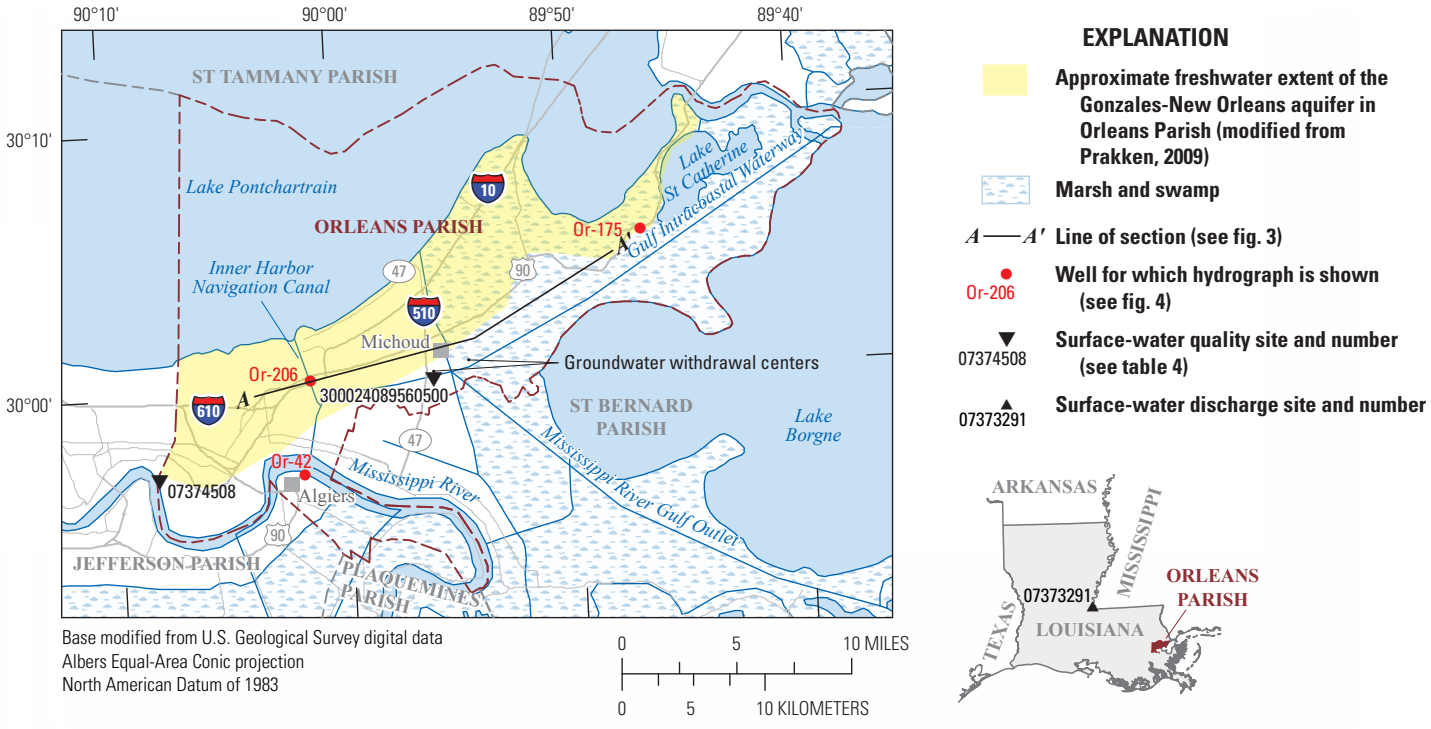

Figure 1. Location of study area, Orleans Parish, Louisiana.

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

Aquifer or surface-water body	Groundwater	Surface water
Gramercy aquifer	0.02	
Gonzales-New Orleans aquifer	12.93	
Gulf Intracoastal Waterway		453.20
Mississippi River		149.14
Other water bodies		0.02
Total	12.95	602.37

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

Use category	Groundwater	Surface water	Total
Public supply	0.00	149.14	149.14
Industrial	1.88	0.00	1.88
Power generation	10.87	453.20	464.07
Rural domestic	0.17	0.00	0.17
Livestock	0.00	0.02	0.03
General irrigation	0.02	0.00	0.02
Total	12.95	602.37	615.31

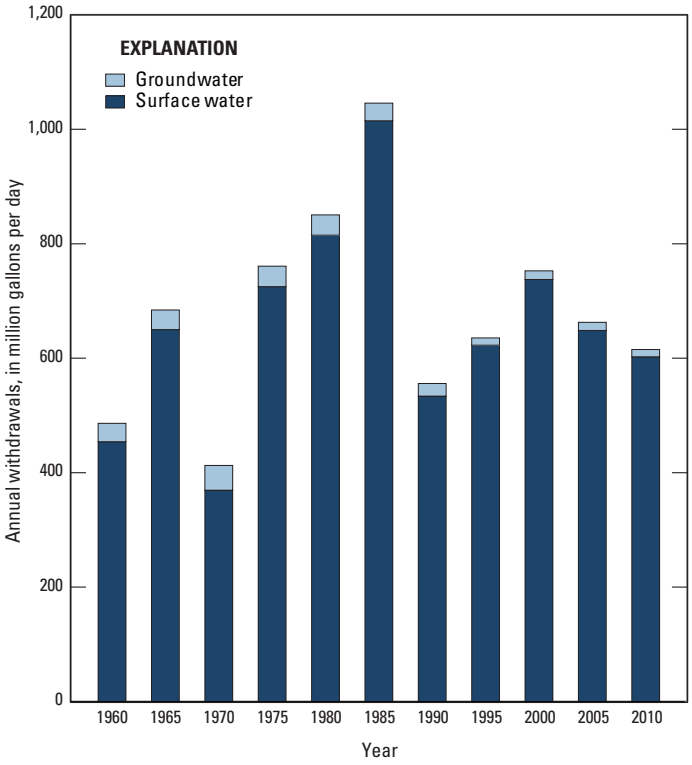

Figure 2. Water withdrawals in Orleans Parish, Louisiana, 1960–2010 (Sargent, 2011).

Groundwater Resources

The primary fresh groundwater resource underlying Orleans Parish is the Gonzales-New Orleans aquifer (fig. 3). Other aquifers underlying the parish include Mississippi River point bar deposits, the shallow aquifers of the New Orleans area, the Gramercy and Norco aquifers, and the "1,200-foot" sand of the New Orleans area. These other aquifers generally contain very hard[2] water with high iron concentrations (greater than 300 micrograms per liter [µg/L]) or only saltwater (water with chloride concentrations greater than 250 milligrams per liter [mg/L]). Because of these water-quality concerns, these aquifers generally are not utilized for water supply in Orleans Parish (Prakken, 2009) and are not discussed further in this report. Fresh groundwater also is available from the Evangeline equivalent aquifer system at depths between 2,000 and 2,500 feet (ft) below the National Geodetic Vertical Datum of 1929 (NGVD 29) in a small area in the extreme northeastern part of the parish (Smoot, 1988). Because of the limited extent of the Evangeline equivalent aquifer system within the parish, it is not utilized for water supply in Orleans Parish and is not discussed further in this report.

State well-registration records listed 244 active water wells in Orleans Parish in 2009, including 162 domestic, 46 industrial, 17 public supply, 15 irrigation, and 4 power generation (Louisiana Department of Natural Resources, 2009). In 2010, groundwater withdrawals for various uses included industrial, power generation, rural domestic, and general irrigation (table 2). Almost all groundwater withdrawals in Orleans Parish came from the Gonzales-New Orleans aquifer; water withdrawals from the Gramercy aquifer totaled about 0.02 Mgal/d (table 1).

Gonzales-New Orleans Aquifer

The Gonzales-New Orleans aquifer is continuous throughout Orleans Parish and dips in a southerly direction (Tomaszewski, 2003). The aquifer consists of mostly fine to medium sand of uniform texture (Dial and Sumner, 1989). The top of the aquifer is about 230 ft below NGVD 29 in the extreme northeastern corner of the parish (Griffith, 2003) and about 650–700 ft below NGVD 29 in the southern part of the parish (Tomaszewski, 2003). In northeastern Orleans Parish, the Gonzales-New Orleans aquifer is composed of two distinct hydrologic units: a thick basal sand unit bearing saltwater and a thinner upper sand unit bearing freshwater (fig. 3) (Rollo, 1966). Thickness of the basal sands of the aquifer is variable but is generally about 150–200 ft or more in Orleans Parish (Prakken, 2009). Locally, sand lenses and sand streaks thicken the aquifer.

The Gonzales-New Orleans aquifer receives recharge from precipitation and infiltration in areas where it outcrops or subcrops north of Lake Pontchartrain (Dial and Tomaszewski, 1988). The aquifer also receives recharge through overlying and underlying confining units and from adjacent aquifers (Dial and Tomaszewski, 1988). Discharge from the aquifer is primarily by withdrawals from wells.

[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).

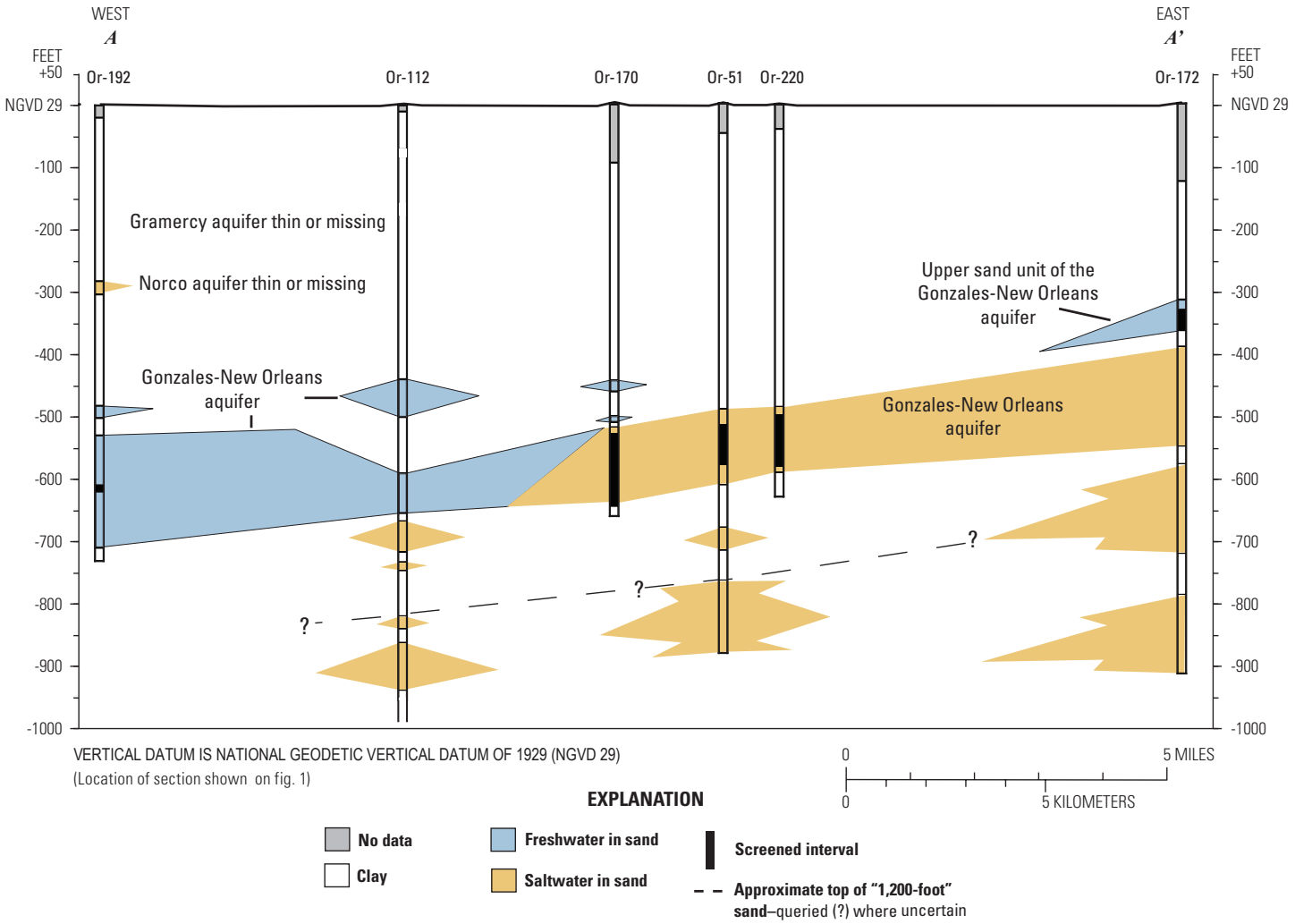

Figure 3. Hydrogeologic section *A-A'* showing major sand units from central to northeastern Orleans Parish, Louisiana (modified from Prakken, 2009). Trace of section shown on figure 1.

As discussed previously, fresh groundwater is available from the Gonzales-New Orleans aquifer in Orleans Parish, but saltwater also is present in the aquifer. Within the Gonzales-New Orleans aquifer, the base of freshwater generally ranges from about 350 ft below NGVD 29 in northeastern Orleans Parish to about 750 ft below NGVD 29 in western areas of the parish. In general, the aquifer contains freshwater in areas of the parish north of U.S. Highway 90 and saltwater in areas to the south (fig. 1).

State well-registration records listed 206 active wells screened in the Gonzales-New Orleans aquifer in Orleans Parish in 2009, including 131 domestic, 42 industrial, 16 public supply, 13 irrigation, and 4 power generation. Depths of these wells ranged from 220 to 815 ft below land surface, with a median depth of 490 ft. In Orleans Parish, reported well yields have ranged from 1 to 2,600 gallons per minute (Louisiana Department of Natural Resources, 2009).

In 2010, over 98 percent of withdrawals from the Gonzales-New Orleans aquifer in the parish occurred at two locations where the aquifer contains only saltwater. About 10.9 Mgal/d were withdrawn at a powerplant located about 1.5 miles (mi) southwest of Michoud (fig. 1) near the Gulf Intracoastal Waterway (GIWW), and about 1.88 Mgal/d were withdrawn in an industrial area located about 1 mi southeast of Michoud.

In 2008, water levels in the Gonzales-New Orleans aquifer in Orleans Parish ranged from about 21 ft below NGVD 29 in northeastern Orleans Parish to about 145 ft below NGVD 29 near Michoud (Prakken, 2009), and the general direction of water movement in the aquifer was radially toward the withdrawal center southwest of Michoud. Water levels in the Gonzales-New Orleans aquifer generally have risen since the 1970s in response to reduced groundwater withdrawals. Total groundwater withdrawals in Orleans Parish, which have been primarily from the Gonzales-New Orleans aquifer, decreased from 43.4 Mgal/d in 1970 (Dial, 1970) to 12.95 Mgal/d in 2010 (Sargent, 2011) (fig. 2). Water levels at well Or-42, located south of the Mississippi River in Algiers (fig. 1), have risen about 70 ft since 1970 (fig. 4). Water levels in well Or-206, located on the east bank of the Inner Harbor Navigation Canal (fig. 1), rose about 119 ft from 1972 to 2011 (fig. 4). Water levels in the well rose abruptly about 18 ft in 2005 after Hurricane Katrina. Water levels in well Or-175, located in northeastern Orleans Parish (fig. 1) about 8 mi from any pumping center, generally have changed little since 1970 (fig. 4).

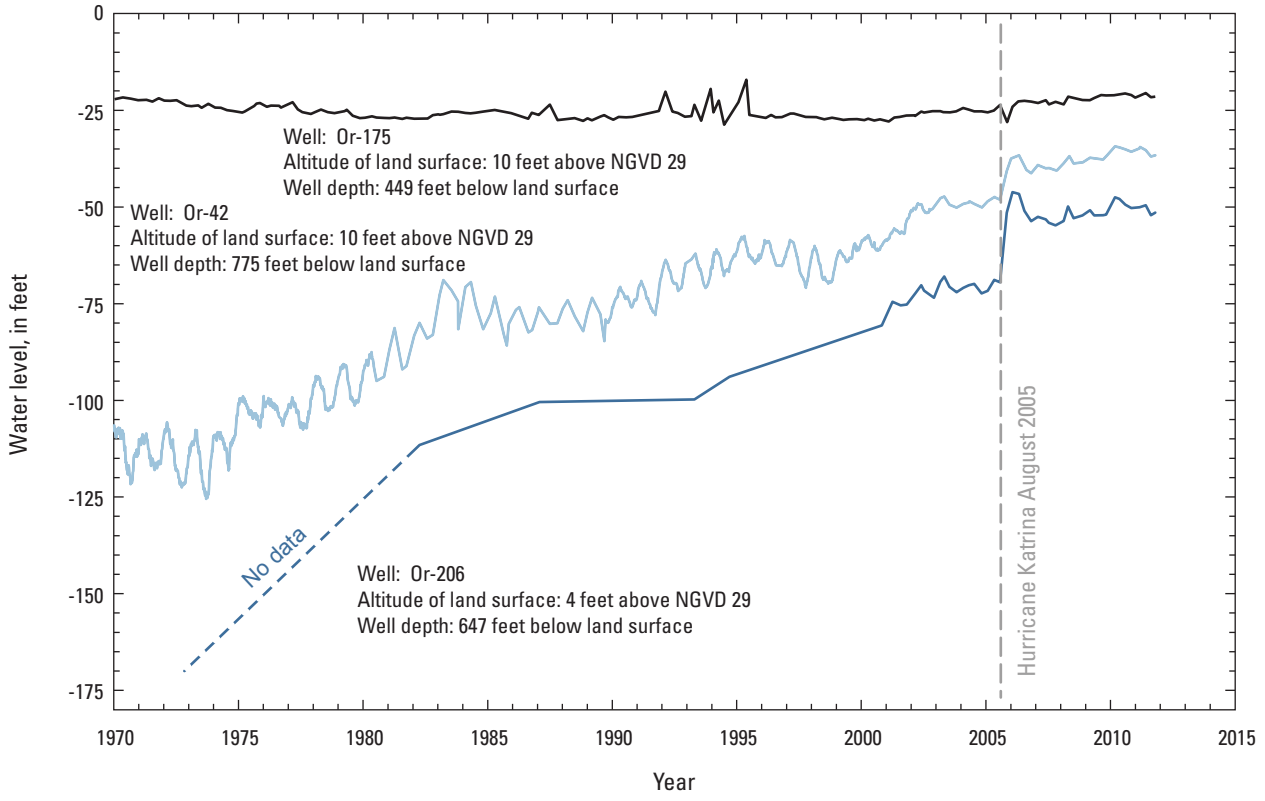

Figure 4. Water levels in wells Or-175, Or-42, and Or-206 screened in the Gonzales-New Orleans aquifer in Orleans Parish, Louisiana (see fig. 1 for well locations; U.S. Geological Survey, 2012a, b, c). Land surface and water level are measured in feet relative to the National Geodetic Vertical Datum of 1929 (NGVD 29).

A statistical summary of selected water-quality characteristics for freshwater samples collected from 84 wells screened in the Gonzales-New Orleans aquifer in Orleans Parish is presented in table 3. The median value for hardness fell within the soft range. Median values for iron and manganese fell below the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Levels (SMCLs).[3] Chloride concentrations were below the SMCL and tended to increase toward saltwater areas. Dissolved solids concentrations generally exceed the SMCL of 500 mg/L. Water in the aquifer has a yellow color and exceeds the SMCL of 15 platinum cobalt units.

Surface-Water Resources

In 2010, about 602 Mgal/d of surface water were withdrawn in the parish, including about 453 Mgal/d for power generation, 149 Mgal/d for public supply, and 0.02 Mgal/d for livestock (table 2). Although Orleans Parish extends into Lake Pontchartrain, there were no reported water withdrawals from the lake. All public-supply water came from the Mississippi River, which is the primary source of fresh surface water in the parish. Water samples analyzed during the period 1967–88 indicated that water in the Mississippi River at New Orleans (site number 07374508) (fig. 1) is generally hard and does not exceed the SMCLs for pH and concentrations of chloride, sulfate, and iron (table 4). 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).

Mississippi River discharge data are not available for Orleans Parish, but the average flow of the Mississippi River near Red River Landing (site number 07373291), about 210 river miles upstream of the parish (fig. 1, index map), was about 460,000 cubic feet per second (about 298,000 Mgal/d) for the period 1928–76 (Wells, 1980). The flow in the Mississippi River near Red River Landing is representative of flows in Orleans Parish because there are no major tributaries or distributaries, and the river is mostly leveed between the landing and the parish.

The GIWW is a deepwater navigation channel that extends through much of Orleans Parish and intersects with the Mississippi River (fig. 1). Locks prevent continuous water exchange between the GIWW and the river. In 2010, about 453 Mgal/d were withdrawn from the GIWW (table 1) at a power-generation plant near Michoud. Most surface water withdrawn for power generation was used for cooling and returned to the GIWW after use (Sargent, 2011). Water samples analyzed during the period 1974–84 indicated that

[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 for freshwater in the Gonzales-New Orleans aquifer in Orleans Parish, Louisiana, 1942–2008 (U.S. Geological Survey, 2011).

[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; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency, 2011; 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
Gonzales-New Orleans aquifer (84 wells)									
Median	25.0	160	972.5	8.1	19.5	82.5	140	25	594
10th percentile	23.0	92	721.6	7.2	10	37.6	45	13	438.5
90th percentile	15.5	268	1264	8.3	37	170	975	569	812.5
Number of samples	27	33	40	39	76	84	6	4	22
Percentage of samples that do not exceed SMCLs	NA	0	NA	100	NA	100	67	75	36
SMCLs									
	NA	15	NA	6.5–8.5	NA	250	300	50	500

Table 4. Summary of selected water-quality characteristics for the Mississippi River and the Gulf Intracoastal Waterway in Orleans Parish, Louisiana (U.S. Geological Survey, 2011).

[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, 2011; 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 New Orleans, 1967–88[1]										
Median	406	8.0	7.6	150	41	12	22	24	53	20
10th percentile	310	6.1	7.1	120	33	8.7	14	16	40	<10
90th percentile	498	11.0	8.0	180	48	15	33	34	74	50
Number of samples	198	158	186	181	181	181	180	183	182	43
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	100	100	100
Gulf Intracoastal Waterway at New Orleans Public Service Incorporated (NOPSI) Plant near Paris Road at New Orleans, 1974–84[2]										
Median	13,400	8.2	7.6	1,400	97	280	3,000	4,400	570	30
10th percentile	3,690	6.3	7.4	390	38	67	1,400	1,600	140	<10
90th percentile	20,700	10.2	7.9	2,400	150	480	3,800	7,000	980	70
Number of samples	126	120	126	120	111	112	48	125	123	125
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	0	16	99
SMCLs										
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

[1]Site number 07374508 (U.S. Geological Survey, 2010; specific data at http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=07374508).

[2]Site number 300024089560500 (U.S. Geological Survey, 2009; specific data at http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=300024089560500).

water in the GIWW, east of the Mississippi River, at the former New Orleans Public Service Incorporated Plant[4] (site number 300024089560500) (fig. 1) is generally very hard and does not exceed the SMCL for pH (table 4). The water is salty with chloride concentrations well above the 250 mg/L SMCL. The median value for sulfate concentrations exceeds the SMCL of 250 mg/L. Dissolved oxygen concentrations are generally greater than 5 mg/L.

[4]New Orleans Public Service Incorporated Plant is now known as Entergy Michoud Plant.

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