Abstract

The U.S. Geological Survey constructed the potentiometric surface of the Upland terrace and upper Ponchatoula aquifers and the "400-foot" sand using the altitude of water levels from 121 wells measured January 2014 to March 2015. Differences in water levels in the Upland terrace and upper Ponchatoula aquifers and "400-foot" sand were measured at 55 wells in 2009 and again at the same wells in 2014–15. Long-term hydrographs for most wells screened in the Upland terrace aquifer and "400-foot" sand show seasonal fluctuations with little net change in water levels. The potentiometric surface of the "600-foot" sand was constructed by using the altitude of water levels from 14 wells measured from January 2014 to March 2015. Differences in water levels between 2009 and 2014-15 were determined in the "600-foot" sand by using measurements collected at seven wells. These differences do not necessarily indicate a trend but show water levels declined by more than 5 feet from 2009 to 2015. Long-term hydrographs for two wells screened in the "600-foot" sand show declines in water levels but vary in their drawdown and recovery based on location relative to areas of substantial groundwater withdrawal.

Introduction

In 2012, the U.S. Geological Survey (USGS), in cooperation with the Louisiana Department of Natural Resources, began a study to document water levels in selected aquifers in the State. The Chicot equivalent aquifer system is an important source of fresh groundwater in southeastern Louisiana. Aquifers presented in this report include the Upland terrace, upper Ponchatoula, and the "400-foot" and "600-foot" sands of the Baton Rouge area (herein after referred to as the "400-foot" and "600-foot" sands). The study area includes East Baton Rouge, East Feliciana, Livingston, St. Helena, St. Tammany, Tangipahoa, Washington, West Baton Rouge, and West Feliciana Parishes

In 2014, about 39 million gallons per day were withdrawn from the Chicot equivalent aquifer system (Collier, 2018) from the parishes listed above (table 1). More than one-third of the withdrawal (about 40 percent) was from East Baton Rouge Parish and used primarily for public supply and industry (Collier, 2018). Additional knowledge about the effects of withdrawals on water levels and flow directions in the Chicot equivalent aquifer system is needed to assess the condition of the aquifers.

This report presents data collected during the period from January 2014 to April 2015 and maps that illustrate the potentiometric surface and water-level differences for the Chicot equivalent aquifer system. The potentiometric-surface maps can be used to determine the direction of groundwater flow, hydraulic gradients, and the effects of withdrawals on the groundwater. Water-level data collected for this study are stored in the USGS National Water Information System (NWIS) (U.S. Geological Survey, 2018) and are on file at the USGS office in Baton Rouge, Louisiana.

The Chicot equivalent aquifer system also includes a number of aquifers in the New Orleans area. These aquifers contain mostly saline water (greater than 250 parts per million chloride) and therefore will not be discussed further in this report.

Hydrogeology

The Chicot equivalent aquifer system consists of southerly dipping unconsolidated deposits of silt, sand, and gravel that are separated by discontinuous units of clay and sandy clay. These deposits crop out throughout the study area except in floodplains of major streams where they are overlain by similar, younger alluvial deposits (Walters, 1995). The aquifer system is regionally extensive and extends north and east of the study area into Mississippi (Tomaszewski, 2011). In the northern half of the study area, the Chicot equivalent aquifer system consists of upland

terrace deposits (herein after referred to as the "Upland terrace aquifer") that contain large amounts of sand and gravel and generally range from 100 to 400 feet (ft) in thickness (fig. 2). These sand and gravel deposits are hydraulically connected to the major streams in the area and supply base flow to

In the southern half of the study area, the Upland terrace aquifer dips beneath younger deposits of the Coastal Plain and becomes the subsurface equivalent of the "400-foot" and "600-foot" sands in the western part of the study area and the upper Ponchatoula aquifer in the eastern part of the study area (fig. 2). In the southernmost part of the study area, these deposits become finer grained, more discontinuous, and locally contain saline water.

Water in the Chicot equivalent aquifer system is confined except where the aquifer system crops out and water-table conditions exist. Recharge to the aquifer system occurs primarily in the northern half of the study area by infiltration of precipitation in areas where the aquifer crops out and by infiltration from overlying sandy deposits elsewhere (Tomaszewski, 2011). Recharge may also occur from the Mississippi River through the Mississippi River alluvial aquifer, which is hydraulically connected to the "400-foot" and "600-foot" sands (Kuniansky, 1989). Discharge from the Chicot equivalent aquifer system is primarily into streams and rivers and to pumping wells screened in the aquifer system.

Previous investigations (Whiteman, 1979; Tomaszewski, 1996) have shown the Baton Rouge Fault, (fig. 1) affects water levels, but south of the fault, water levels were only measured in two wells. The amount of effect in this area is not discussed herein, as the primary focus was on water levels north of the fault.

Table 1. Groundwater withdrawals from the Chicot equivalent aquifer system in southeast Louisiana, 2014 (Collier, 2018).

[Mgal/d, million gallons per day]

| Parish | Withdrawals (Mgal/d) |
|------------------|-------------------------|
| East Baton Rouge | 16.49 |
| East Feliciana | 0.44 |
| Livingston | 3.06 |
| St. Helena | 0.96 |
| St. Tammany | 5.41 |
| Tangipahoa | 4.47 |
| Washington | 7.66 |
| West Baton Rouge | 0.01 |
| West Feliciana | 0.02 |

| System | | | Hydrologic units | | | | | | | |
|-----------|-------------|---|---|---|---|---|---------------------------------|--|--|--|
| | | | Aquifer system or confining unit | | Aquifer or confining unit | | | | | |
| | Series | Stratigraphic unit | | | East Baton Rouge, West Baton Rouge Parish, East Feliciana, Livingston, St. Helena, and | St. Tammany, Tangipahoa, and Washington Parishes | | | | |
| | | | | | West Feliciana Parishes | North | South | | | |
| Quatemary | Holocene | Mississippi River and other alluvial deposits | | surface aquifers or cial confining units | Mississippi River alluvial aquifer | No regionally extensive hydrologic units | | | | |
| | Pleistocene | Unnamed Pleistocene deposits | Southern Hills regional aquifer system | Chicot equivalent aquifer system or surficial confining unit | Shallow sands | Shallow aquifer | | | | |
| | | | | | Upland terrace aquifer "400-foot" sand "600-foot" sand | Upland terrace aquifer | Upper Ponchatoula aquifer | | | |
| | | | Sou | | Sequence of aquifers and clay co | nfining units | | | | |

Figure 2. Correlation of hydrogeologic units in the Chicot equivalent aquifer system in southeastern Louisiana (modified from Tomaszewski, 2011).

Prepared in cooperation with the

Louisiana Department of Natural Resources

Potentiometric Surface of the Upland Terrace and Upper Ponchatoula **Aquifers and "400-Foot" Sand of the Baton Rouge Area**

The potentiometric surface of the Upland terrace and upper Ponchatoula aquifers and "400foot" sand (fig. 1) was constructed by using the altitude of water levels measured in 121 wells from January 2014 through March 2015 (table 2). Water levels were measured by using a steel or electric tape marked with 0.01-ft graduations and were reported to one-hundredths of a foot, following the procedure in Cunningham and Schalk (2011). Water levels were only measured in wells that were not being pumped at the time of measurement. The altitude of water levels ranged from -19.3 ft below the National Geodetic Vertical Datum of 1929 (NGVD 29) in East Baton Rouge Parish to 280.58 ft above NGVD 29 in Washington Parish.

Groundwater movement in the Upland terrace and upper Ponchatoula aquifers and "400foot" sand is generally toward the south, toward local streams and rivers and toward areas of heavy withdrawals. In the northern part of the recharge area, stage readings from local rivers were consistent with water-level altitudes in the aquifers (data not shown). The resulting contours indicate that groundwater is generally contributing to streamflow. Localized cones of depression in the potentiometric surface, caused by heavy withdrawals, are located in northwestern and southeastern East Baton Rouge Parish. (fig. 1).

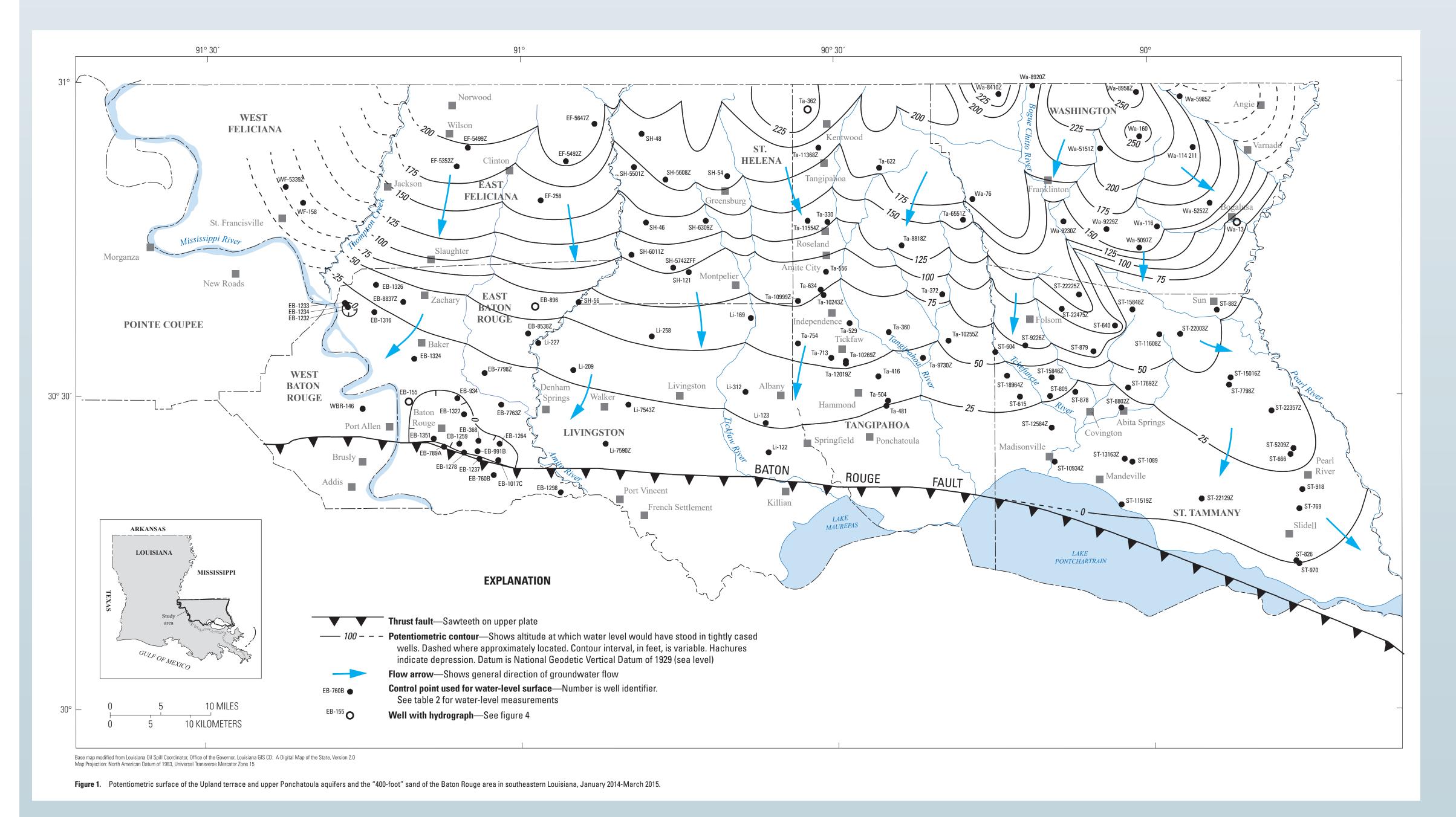


Table 2. Water-level data used to construct maps of the potentiometric surface, January 2014 to March 2015, and water-level differences, 2009 to 2014-15, in the Upland terrace and upper Ponchatoula aquifers, and the "400-foot" sand of the Baton Rouge area in southeast Louisiana. [Dates shown as month, day, year. USGS, U.S. Geological Survey; Aquifer codes: 11204BR, "400-foot" sand; 112PNCLU, upper Ponchatoula; 112UPTC, Upland terrace; NGVD 29, National Geodetic Vertical

| USGS station number | USGS station name | Aquifer code | Altitude of land surface (feet above NGVD 29) | Well depth (feet) | Date measured | 2009 water level (feet above or below NGVD 29) ¹ | Date measured | 2014–15 water level (feet below land surface) ² | 2014–15 water level (feet above or below NGVD 29) ¹ | Difference in water level between 2009 and 2014–15 (feet) ³ |
|------------------------------------|------------------------|----------------------|--|----------------------|-----------------------------|---|------------------------|---|--|--|
| 302930091101501 | EB-155 | 11204BR | 60 | East Bat | on Rouge Paris 2/19/2009 | | 3/21/2014 | 59.05 | 0.95 | -4.51 |
| 302557091035101 302250091021202 | EB-368 EB-760B | 11204BR 11204BR | 48 30 | 450 640 | | | 1/22/2014 1/17/2014 | 51.74 16.66 | -3.74 13.34 | |
| 02511091070401 | EB-789A | 11204BR | 37 | 711 | 2/6/2009 | 12.43 | 2/3/2014 | 22.04 | 14.96 | 2.53 |
| 03905090583301 02955091060501 | EB-896 EB-934 | 11204BR 11204BR | 82 51 | 73 385 | 2/5/2009 2/5/2009 | 61.01 0.9 | 2/3/2014 1/31/2014 | 18.99 52.30 | 63.01 -1.30 | 2.00 -2.20 |
| 02508091035402 | EB-991B | 11204BR | 44 | 565 | | | 2/19/2014 | 47.37 | -3.37 | |
| 02406091021203 03849091161301 | EB-1017C EB-1232 | 11204BR 11204BR | 36 83 | 567 250 | | | 2/19/2014 7/11/2014 | 45.82 102.30 | -9.82 -19.30 | |
| 03910091164501 | EB-1233 | 11204BR | 94 | 250 | 2/11/2000 | | 7/11/2014 | 91.58 | 2.42 | |
| 03853091165801 02411091034501 | EB-1234 EB-1237 | 11204BR 11204BR | 97 30 | 250 600 | 2/11/2009 | -6.64 | 2/11/2014 1/15/2014 | 97.49 22.20 | -0.49 7.80 | 6.15 |
| 302534091054502 302543091015001 | EB-1259 EB-1264 | 11204BR 11204BR | 45 38 | 515 498 | 2/5/2009 | -3.29 | 1/23/2014 1/31/2014 | 60.15 40.34 | -15.15 -2.34 | 0.95 |
| 02501091052601 | EB-1204 EB-1278 | 11204BR 11204BR | 31 | 547 | 4/21/2009 | -3.29 -2.28 | 3/18/2014 | 33.09 | -2.34 -2.09 | 0.93 |
| 02105090560001 03818091135001 | EB-1298 EB-1316 | 11204BR 11204BR | 15 90 | 695 200 | | | 2/20/2014 1/14/2014 | 15.13 66.65 | -0.13 23.35 | |
| 03346091101101 | EB-1310 | 11204BR 11204BR | 65 | 264 | | | 1/15/2014 | 50.66 | 14.34 | |
| 304055091135501 302825091053301 | EB-1326 EB-1327 | 11204BR 11204BR | 100 50 | 195 500 | 6/7/2009 | 33.99 | 2/7/2014 1/15/2014 | 59.92 55.87 | 40.08 -5.87 | 6.09 |
| 302607091080501 | EB-1351 | 11204BR | 42 | 500 | | | 3/31/2015 | 46.77 | -4.77 | |
| 302929091015501 303245091031701 | EB-7763Z EB-7798Z | 11204BR 11204BR | 50 60 | 325 280 | | | 1/15/2014 3/10/2014 | 46.33 48.89 | 3.67 11.11 | |
| 03613090591801 | EB-8538Z | 11204BR | 70 | 180 | | | 1/14/2014 | 28.76 | 41.24 | |
| 03912091113101 | EB-8837Z | 11204BR | 85 | 228 East Fe | eliciana Parish | | 1/31/2014 | 51.80 | 33.20 | |
| 04858090575601 05212091055901 | EF-256 EF-5352Z | 112UPTC 112UPTC | 210 270 | 184 140 | 6/19/2009 | 162.59 | 2/18/2014 4/11/2014 | 46.60 77.21 | 163.40 192.79 | 0.81 |
| 05242090553201 | EF-5492Z | 112UPTC | 300 | 130 | | | 2/19/2014 | 69.64 | 230.36 | |
| 05400091045401 05609090525301 | EF-5499Z EF-5647Z | 112UPTC 112UPTC | 272 250 | 120 140 | 6/22/2009 | 200.24 | 1/16/2015 1/16/2015 | 72.48 48.67 | 199.52 201.33 | -0.72 |
| | | | | Livin | gston Parish | | | | | |
| 302450090355601 302737090360301 | Li-122 Li-123 | 11204BR 11204BR | 11 27 | 500 520 | 5/15/2009 | 9.46 | 1/6/2014 3/5/2014 | 2.58 1.20 | 8.42 25.80 | -1.04 |
| 03747090374801 | Li-169 | 11204BR | 85 | 260 | 2/26/2009 | 73.49 | 1/7/2014 | 13.31 | 71.69 | -1.80 |
| 03247090544601 | Li-209 Li-227 | 11204BR 11204BR | 59 67 | 305 225 | 5/26/2009 | 30.32 | 1/6/2014 2/5/2014 | 28.74 30.31 | 30.26 36.69 | -0.06 |
| 03558090471501 | Li-258 | 11204BR | 73 | 335 | 5/15/2009 | 53.26 | 1/6/2014 | 20.60 | 52.40 | -0.86 |
| 03043090381001 02928090493501 | Li-312 Li-7543Z | 11204BR 11204BR | 50 40 | 375 280 | | | 3/5/2014 3/5/2014 | 7.16 17.30 | 42.84 22.70 | |
| 02600090513701 | Li-7590Z | 11204BR | 25 | 380 | | | 2/3/2014 | 7.15 | 17.85 | |
| 04651090475201 | SH-46 | 112UPTC | 185 | St. H | elena Parish 5/1/2009 | 149.74 | 2/18/2014 | 36.50 | 148.50 | -1.24 |
| 05519090481801 | SH-48 | 112UPTC | 245 | 92 | 5/26/2009 | 185.77 | 2/18/2014 | 59.75 | 185.25 | -0.52 |
| 05118090400701 03912090542701 | SH-54 SH-56 | 112UPTC 112UPTC | 235 77 | 100 160 | 5/1/2009 5/26/2009 | 190.75 67.22 | 3/14/2014 3/19/2014 | 54.43 6.70 | 180.57 70.30 | -10.18 3.08 |
| 04206090434701 | SH-121 | 112UPTC | 150 | 360 | | | 3/19/2014 | 51.08 | 98.92 | |
| 05205090490201 05058090460001 | SH-5501Z SH-5608Z | 112UPTC 112UPTC | 177 250 | 100 95 | 5/4/2009 5/5/2009 | 168.19 178.16 | 2/18/2014 2/18/2014 | 9.40 71.16 | 167.60 178.84 | -0.59 0.68 |
| 304232090451701 | SH-5742Z | 112UPTC | 162 | 160 | 5/1/2009 | 112.76 | 2/18/2014 | 50.20 | 111.80 | -0.96 |
| 04345090491601 04701090421001 | SH-6011Z SH-6309Z | 112UPTC 112UPTC | 120 215 | 80 120 | 5/1/2009 | 147.76 | 3/13/2014 3/13/2014 | 16.53 68.32 | 103.47 146.68 | -1.08 |
| 03425090143501 | ST-604 | 112PNCLU | 66 | St. Tai | mmany Parish 7/23/2009 | 52.57 | 3/13/2014 | 10.30 | 54.70 | 2.13 |
| 303423090143301 303010090120701 | ST-615 | 112UPTC | 38 | 34 | | 32.3 <i>1</i> | 3/13/2014 | 5.82 | 32.18 | 2.13 |
| 03700090030201 02453089472901 | ST-640 ST-666 | 112UPTC 112PNCLU | 155 45 | 90 350 | 5/27/2009 | 120.75 | 3/12/2014 2/23/2015 | 34.71 17.18 | 120.29 27.82 | -0.46 |
| 01940089453901 | ST-769 | 112PNCLU | 25 | 699 | | | 2/5/2015 | 4.12 | 20.88 | |
| 03013090091301 01450089455501 | ST-809 ST-826 | 112UPTC 112PNCLU | 30 5 | 135 255 | | | 3/12/2014 2/23/2015 | 3.05 0.01 | 26.95 4.99 | |
| 03044090065501 | ST-878 | 112PNCLU | 39 | 110 | 6/3/2009 | 20.00 | 5/23/2014 | 16.50 | 22.50 | 2.50 |
| 03430090050501 03859089532503 | ST-879 ST-882 | 112UPTC 112PNCLU | 90 75 | 95 300 | | | 3/13/2014 2/6/2015 | 11.50 15.48 | 78.50 59.52 | |
| 02214089454501 | ST-918 | 112PNCLU | 32 | 555 | | | 2/26/2015 | 9.49 | 22.51 | |
| 01444089454501 02416090012501 | ST-970 ST-1089 | 112PNCLU 112PNCLU | 5 28 | 730 253 | | | 1/28/2015 3/2/2015 | 6.94 9.75 | -1.94 18.25 | |
| 02530089470201 | ST-5209Z | 112PNCLU | 30 | 332 | | | 1/27/2015 | 4.97 | 25.03 | |
| 03155089524401 02857090030401 | ST-7798Z ST-8802Z | 112PNCLU 112PNCLU | 62 28 | 240 250 | | | 3/2/2015 2/26/2015 | 15.41 15.50 | 46.59 12.50 | |
| 03505090114101 | ST-9226Z | 112UPTC | 100 | 95 | 6/3/2009 | 75.11 | 5/23/2014 | 23.84 | 76.16 | 1.05 |
| 02421090084502 02008090023801 | ST-10934Z ST-11519Z | 112PNCLU 112PNCLU | 5 6 | 420 440 | | | 2/9/2015 2/5/2015 | -1.46 0.98 | 6.46 5.02 | |
| 303630089585401 302802090090301 | ST-11680Z ST-12584Z | 112UPTC 112PNCLU | 172 24 | 354 250 | 6/5/2009 | 12.98 | 2/6/2015 1/27/2015 | 107.70 10.28 | 64.30 13.72 | 0.74 |
| 02438090022602 | ST-13163Z | 112PNCLU | 25 | 240 | | | 2/27/2015 | 24.98 | 0.02 | |
| 03229089523501 03151090085601 | ST-15016Z ST-15846Z | 112PNCLU 112PNCLU | 60 50 | 250 245 | | | 3/6/2015 2/26/2015 | 16.93 18.25 | 43.07 31.75 | |
| 03842090010801 | ST-15848Z | 112PNCLU | 150 | 420 | | | 2/27/2015 | 96.40 | 53.60 | |
| 03112090022501 03211090132701 | ST-17692Z ST-18964Z | 112PNCLU 112PNCLU | 45 52 | 90 140 | 6/3/2009 6/9/2009 | 29.02 40.71 | 1/27/2015 5/23/2014 | 14.56 11.49 | 30.44 40.51 | 1.42 -0.20 |
| 03622089565101 | ST-22003Z | 112PNCLU | 95 | 260 | 6/1/2009 | 70.23 | 5/27/2014 | 24.32 | 70.68 | 0.45 |
| 02102089544901 04010090071201 | ST-22129Z ST-22225Z | 112PNCLU 112UPTC | 25 165 | 560 80 | | | 2/5/2015 2/10/2015 | 17.12 23.55 | 7.88 141.45 | |
| 03005089485801 | ST-22357Z ST-22475Z | 112PNCLU 112PNCLU | 56 129 | 330 440 | 7/1/2009 | 31 | 2/6/2015 2/27/2015 | 20.99 24.35 | 35.01 104.65 | 4.01 |
| 03832090084801 | 51-224/3L | 112FNCLU | 129 | | pahoa Parish | | 212112015 | | 104.03 | |
| 04654090303101 03622090243901 | Ta-330 Ta-360 | 112UPTC 112UPTC | 135 75 | 95 54 | 4/20/2009 | 125.63 | 2/25/2014 4/17/2014 | 9.68 16.37 | 125.32 58.63 | -0.31 |
| 03622090243901 05737090322501 | Ta-360 Ta-362 | 112UPTC 112UPTC | 75 265 | 54 43 | 4/16/2009 | 240.88 | 4/17/2014 4/18/2014 | 23.18 | 58.63 241.82 | 0.94 |
| 03958090193201 03105090252501 | Ta-372 Ta-416 | 112UPTC 112PNCLU | 162 44 | 130 420 | 4/21/2009 | 80.32 | 2/25/2014 3/6/2015 | 83.00 5.30 | 79.00 38.70 | -1.32 |
| 02830090250401 | Ta-481 | 112PNCLU | 26 | 535 | 4/23/2009 | 23.29 | 1/21/2015 | 1.82 | 24.18 | 0.89 |
| 02905090245701 03726090290901 | Ta-504 Ta-529 | 112PNCLU 112PNCLU | 32 77 | 485 53 | 5/26/2009 | 66.22 | 2/23/2015 1/21/2015 | 0.65 11.47 | 31.35 65.53 | -0.69 |
| 03726090290901 04207090303801 | Ta-556 | 112PNCLU 112UPTC | 101 | 135 | 5/26/2009 4/21/2009 | 66.22 84.73 | 2/24/2014 | 17.20 | 83.80 | -0.93 |
| 05204090253501 04023090313901 | Ta-622 Ta-634 | 112UPTC 112PNCLU | 208 93 | 75 50 | 4/15/2009 | 183.19 | 2/27/2014 2/3/2015 | 24.77 14.82 | 183.23 78.18 | 0.04 |
| 03342090300901 | Ta-713 | 112PNCLU | 58 | 90 | | | 3/20/2015 | 6.97 | 51.03 | |
| 03439090333001 04707090173301 | Ta-754 Ta-6551Z | 112PNCLU 112UPTC | 62 206 | 85 93 | 5/27/2009 | 152.11 | 2/3/2015 4/17/2014 | 8.33 53.88 | 53.67 152.12 | 0.01 |
| 04440090232601 | Ta-8818Z | 112UPTC | 200 | 150 | 5/28/2009 | 132.11 | 2/27/2014 | 60.70 | 139.30 | -0.62 |
| 03341090213801 | Ta-9730Z Ta-10243Z | 112PNCLU 112UPTC | 50 76 | 170 210 | 4/21/2009 | 66.19 | 2/23/2015 3/3/2014 | 16.30 14.20 | 33.70 61.80 | -4.39 |
| 03452090190902 | Ta-10255Z | 112PNCLU | 75 | 330 | | | 2/9/2015 | 23.55 | 51.45 | -4.37 |
| 03318090290301 | Ta-10269Z Ta-10999Z | 112UPTC 112UPTC | 55 95 | 60 180 | | | 3/6/2015 2/5/2015 | 0.99 13.94 | 54.01 81.06 | |
| 05401090312301 | Ta-11368Z | 112UPTC | 237 | 100 | 4/20/2009 | 180.19 | 3/3/2014 | 57.90 | 179.10 | -1.09 |
| 04700090322401 03311090290301 | Ta-11554Z Ta-12019Z | 112UPTC 112UPTC | 203 55 | 150 150 | 5/5/2009 | 140.71 | 2/27/2014 3/20/2015 | 62.93 1.78 | 140.07 53.22 | -0.64 |
| | | | | Wash | ington Parish | | | | | |
| 04652089512201 04906090163901 | Wa-13 Wa-76 | 112UPTC 112UPTC | 95 261 | 156 127 | 5/27/2009 4/15/2009 | 87.61 189.36 | 2/27/2014 3/12/2014 | 6.38 72.09 | 88.62 188.91 | 1.01 -0.45 |
| 05405089553501 | Wa-114 | 112UPTC | 260 | 168 | 5/27/2000 | | 3/12/2014 | 49.00 | 211.00 | |
| 04629089590001 05506090004201 | Wa-116 Wa-160 | 112UPTC 112UPTC | 180 330 | 172 80 | 5/27/2009 5/29/2009 | 159.90 280.58 | 2/27/2014 2/27/2014 | 21.03 49.42 | 158.97 280.58 | -0.93 0.00 |
| 04412090002801 | Wa-5097Z | 112UPTC | 200 | 120 | | | 3/13/2014 | 45.69 | 154.31 | |
| 05357090042601 04843089535801 | Wa-5151Z Wa-5252Z | 112UPTC 112UPTC | 260 165 | 75 132 | 4/28/2009 | 220.32 | 3/12/2014 3/12/2014 | 41.05 10.27 | 218.95 154.73 | -1.37 |
| 05855089565901 | Wa-5985Z | 112UPTC | 185 | 95 | 5/29/2009 | 180.97 | 6/20/2014 | 3.75 | 181.25 | 0.28 |
| 05908090140902 05943090111301 | Wa-8410Z Wa-8920Z | 112UPTC 112UPTC | 320 200 | 120 70 | 5/27/2009 6/10/2009 | 233.94 184.38 | 2/27/2014 6/20/2014 | 86.29 12.80 | 233.71 187.20 | -0.23 2.82 |
| 05918090011701 | Wa-8958Z | 112UPTC | 337 | 128 | 4/28/2009 | 266.19 | 5/22/2014 | 68.36 | 268.64 | 2.45 |
| 04614090035901 04655090081101 | Wa-9229Z Wa-9230Z | 112UPTC 112UPTC | 188 134 | 150 150 | 6/10/2009 5/28/2009 | 162.31 127.13 | 5/22/2014 5/22/2014 | 25.75 6.59 | 162.25 127.41 | -0.06 0.28 |
| | | | | West Bat | ton Rouge Pari | sh | | | | |
| 02853091150201 | WBR-146 | 11204BR | 25 | 472 West F | 5/4/2009 eliciana Parish | 26.94 | 1/14/2014 | 1.40 | 23.60 | -3.34 |
| | WE 150 | 112UPTC | 198 | 156 | 4/28/2009 | 95.98 | 2/12/2014 | 101.64 | 96.36 | 0.38 |
| 04844091204101 05016091222001 | WF-158 WF-5339Z | 112UPTC | 165 | 160 | | | 2/18/2014 | 88.38 | 76.62 | |

For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center, Denver, CO 80225, 1-888-ASK-USGS

Digital files available at https://doi.org/10.3133/sim3488 Suggested citation: Frederick, C.P., 2022, Potentiometric surface, 2014–15, and water-level differences, 2009 to 2014-15, in the Chicot equivalent aguifer system in southeastern Louisiana: U.S. Geological Survey Scientific Investigations Map 3488, 2 sheets, https://doi.org/10.3133/sim3488

National Water Information System database, accessed November 30, 2018, at

Scientific Investigations Map 3488 Prepared in cooperation with the Louisiana Department of Natural Resources

Water-Level Differences of the Upland Terrace and Upper Ponchatoula Aquifers and "400-Foot" Sand of the Baton Rouge Area

Temporal differences in water levels in the Upland terrace and upper Ponchatoula aquifers and the "400-foot" sand determined for 56 wells are listed in table 2 and shown on figure 3. Water-level differences were calculated by subtracting the 2009 water-level measurement from the 2014–15 water-level measurement. These differences do not necessarily indicate a trend but show whether water levels have increased or decreased from 2009 to 2014–15. Water-level differences at 73 percent of the wells were within ± 2 ft, indicating minimal change occurred during the period.

Water levels at well Ta-362 (fig. 4A), screened in the Upland terrace aquifer and located in northwestern Tangipahoa Parish (fig. 1), show fluctuations but little net change during 1999–2014. Water levels at well Wa-13 (fig. 4B), screened in the Upland terrace aquifer and located in southeastern Washington Parish (fig. 1), show an increase of less than 1.0 foot per year (ft/yr) for the 1970–99 period, and relatively no change since 1999. No long-term hydrographs were available for wells screened in the upper Ponchatoula aquifer.

The long-term hydrograph for well EB-896 (fig. 4C), screened in the "400-foot" sand located in the northeastern corner of East Baton Rouge Parish away from the industrial corridor along the Mississippi River (fig. 1), shows fluctuations of approximately 3 ft from 1972 to 1997, primarily because of seasonal withdrawals. No measurements were collected during the 1998–2002 period, but the water levels were about 4 to 5 ft lower when measurements resumed in 2003, indicating the effect of increased groundwater withdrawals (fig. 4C). The long-term hydrograph for well EB-155 (fig. 4D), also screened in the "400-foot" sand located in southwestern East Baton Rouge Parish (fig. 1), shows greater seasonal fluctuations when compared to EB-896 (approximately 50–60 ft) from 1963 to 1990, and an upward trend in water levels but minimal net change from 1990 to 2014.

Potentiometric Surface of the "600-Foot" Sand of the Baton Rouge Area

The potentiometric surface of the "600-foot" sand of the Baton Rouge area (fig. 5) was constructed by using the altitude of water levels from 14 wells measured from January 2014 to March 2015 (table 3). Water levels were measured following the same procedure mentioned earlier for wells that were not being pumped at the time of measurement. The altitude of water levels ranged from -47.48 ft below NGVD 29 to 47.33 ft above NGVD 29 in East Baton Rouge Parish. Groundwater movement in the "600-foot" sand is generally toward the south and toward local streams, rivers, and areas of substantial withdrawal. Localized cones of depression in the potentiometric surface are located in southwestern East Baton Rouge Parish (fig. 5).

Water-Level Differences of the "600-Foot" Sand of the Baton Rouge Area

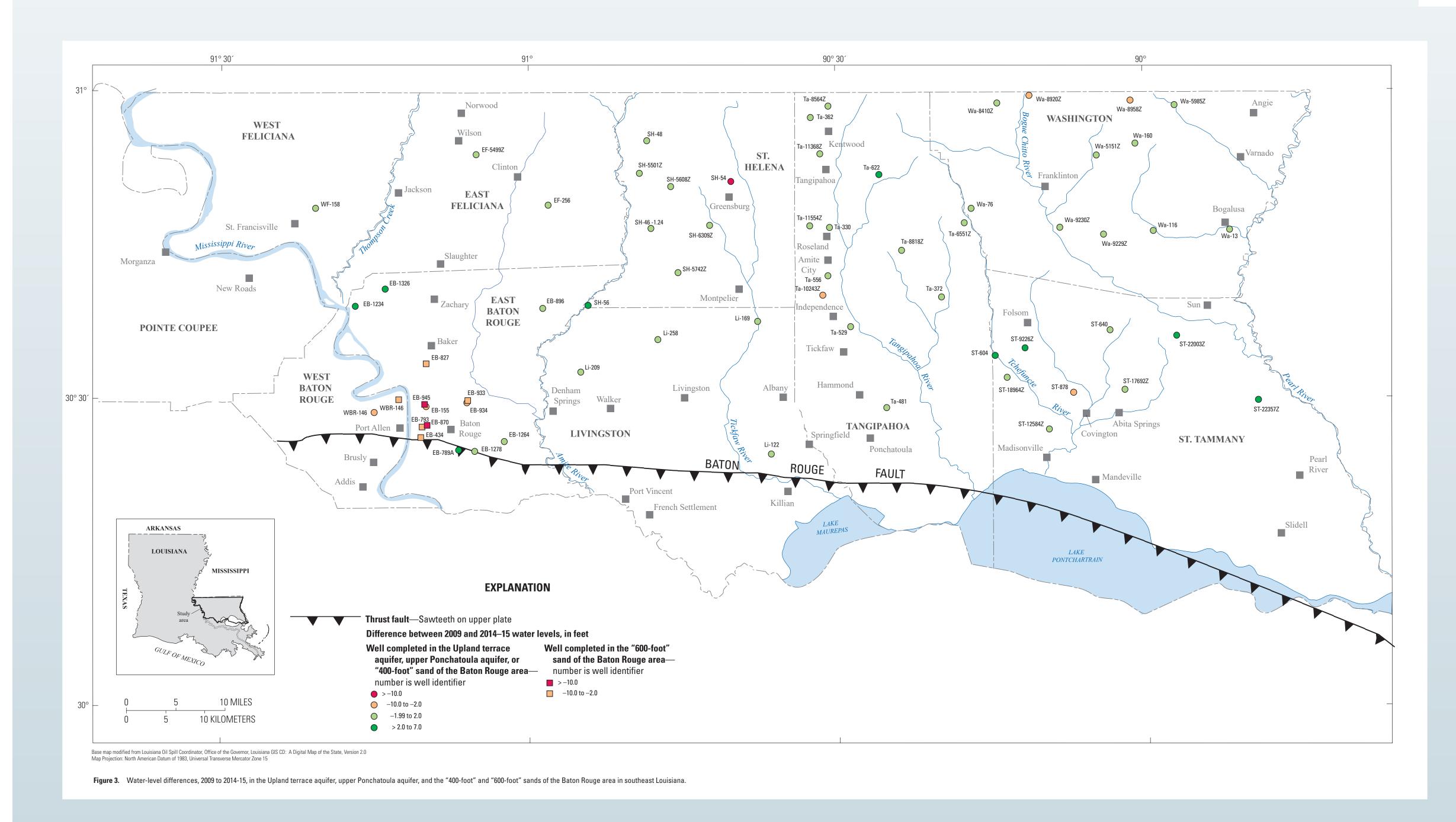
Temporal differences in water levels in the "600-foot" sand determined for seven wells in East Baton Rouge Parish are listed in table 3. Water-level differences were calculated by subtracting the 2009 water-level measurement from the 2015 water-level measurement. These differences do not necessarily indicate a trend but show water levels declined by more than 5 ft from 2009 to 2015 (table 3). Water levels at EB-827 (fig. 6A), located in the central area of the parish, north of areas with substantial withdrawals, declined more than 0.5 ft/yr from 1990 to 2015, while water levels in EB-945 (fig. 6B), located in the southwestern area of the parish, near the cones of depression and areas of substantial withdrawal, declined about 2 ft/yr for the same 1990–2015 period.

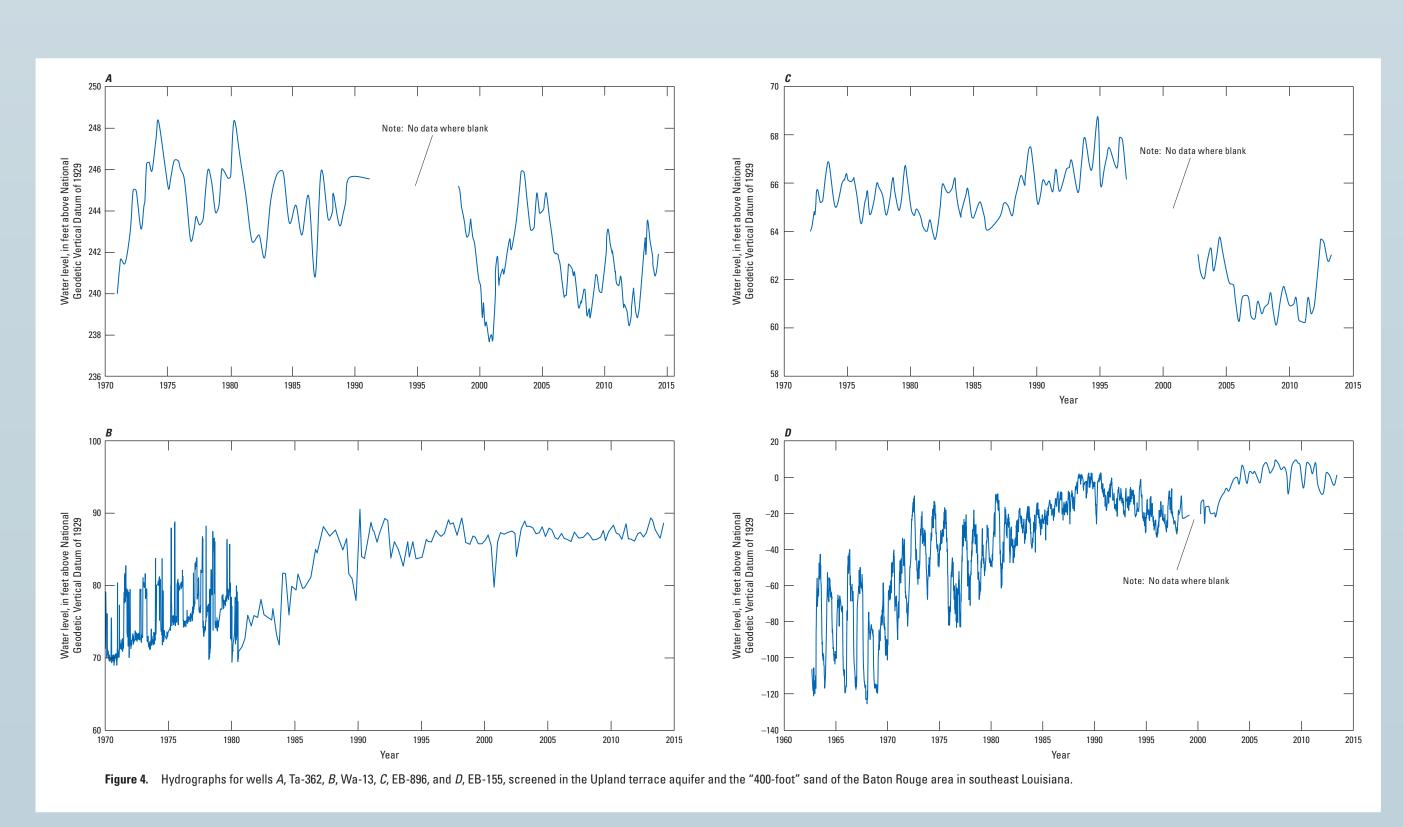
Table 3. Water-level data used to construct map of the potentiometric surface, January 2014 to March 2015, and water-level difference, 2009-15, in the "600-foot" sand of the Baton Rouge area in southeast Louisiana.

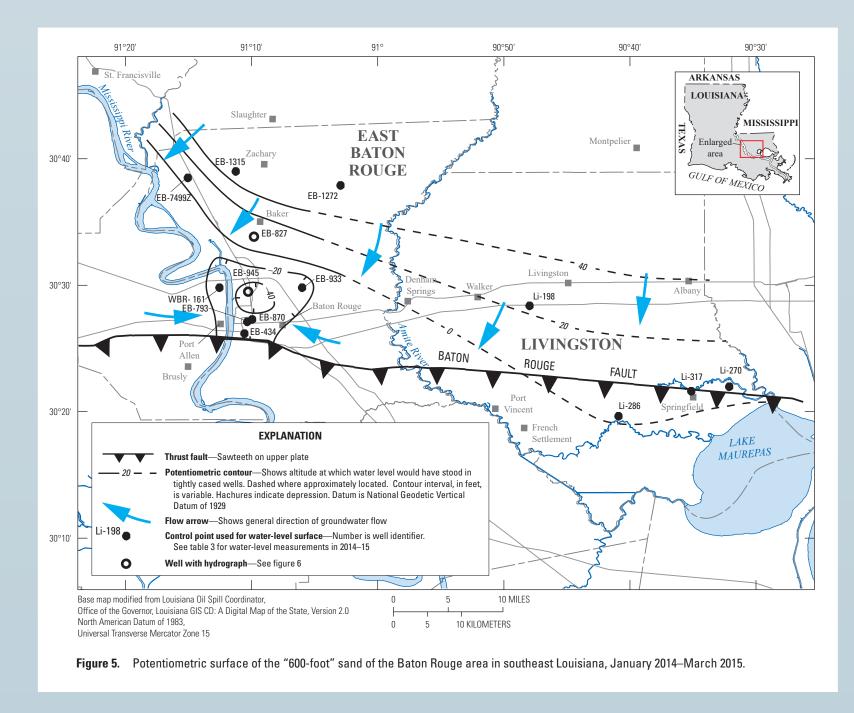
[Dates shown as month, day, year. USGS, U.S. Geological Survey; Aquifer codes: 11206BR, "600-foot" sand; NGVD 29, National Geodetic Vertical Datum of 1929; --, no data]

²Negative (-) numbers indicate a decline in water level from the 2009 measurement to the 2014-15 measurement.

| USGS station number | Well number | Aquifer code | Altitude of land surface (feet above NGVD 29) | Well depth (feet) | Date measured | 2009 water level (feet above or below NGVD 29) ¹ | Date measured | 2014–15 water level (feet below land surface) | 2014–15 water level (feet above or below NGVD 29) ¹ | Difference in water level between 2009 and 2014–15 (feet) ² |
|------------------------|-------------|--------------|--|----------------------|------------------|---|------------------|--|--|--|
| | | | | East Ba | ton Rouge Par | ish | | - | | |
| 02619091104003 | EB-434 | 11206BR | 45 | 611 | 1/6/2009 | -24.21 | 3/12/2015 | 74.91 | -29.91 | -5.70 |
| 02719091103201 | EB-793 | 11206BR | 35 | 687 | 1/23/2009 | -29.41 | 3/12/2015 | 72.78 | -37.48 | -8.07 |
| 03356091095301 | EB-827 | 11206BR | 64 | 370 | 4/22/2009 | 17.34 | 1/7/2015 | 53.84 | 10.12 | -7.22 |
| 02729091100601 | EB-870 | 11206BR | 50 | 692 | 2/10/2009 | -28.67 | 1/6/2015 | 89.25 | -39.25 | -10.58 |
| 02955091060601 | EB-933 | 11206BR | 51 | 603 | 2/5/2009 | -17.52 | 1/7/2015 | 75.26 | -24.26 | -6.74 |
| 02932091101902 | EB-945 | 11206BR | 59 | 654 | 2/19/2009 | -34.35 | 3/6/2015 | 106.48 | -47.48 | -13.13 |
| 03804091031701 | EB-1272 | 11206BR | 90 | 197 | | | 1/14/2014 | 43.70^{1} | 46.30 | |
| 03958091110101 | EB-1315 | 11206BR | 100 | 330 | | | 1/14/2014 | 52.67 | 47.33 | |
| 03830091150201 | EB-7499Z | 11206BR | 88 | 300 | | | 1/12/2015 | 82.58 | 5.42 | |
| | | | | Livir | ngston Parish | | | | | |
| 302822090481401 | Li-198 | 11206BR | 35 | 600 | | | 2/3/2015 | 12.40 | 22.60 | |
| 302203090322001 | Li-270 | 11206BR | 12 | 634 | | | 3/21/2015 | 3.22 | 8.78 | |
| 301946090411401 | Li-286 | 11206BR | 10 | 740 | | | 3/20/2015 | 6.66 | 3.34 | |
| 302131090350401 | Li-317 | 11206BR | 10 | 690 | | | 2/20/2014 | 5.49 | 4.51 | |
| | | | | West Ba | ton Rouge Par | rish | | | | |
| 302958091124802 | WBR-161 | 11206BR | 26 | 650 | 2/17/2009 | -16.77 | 1/30/2015 | 50.28 | -24.28 | -7.51 |







Note: No data where blank **Figure 6.** Hydrographs for wells *A*, EB-827, and *B*, EB-945, screened in the "600-foot" sand of the Baton Rouge

Selected References

Buono, A., 1983, The Southern Hills regional aquifer system of southeastern Louisiana and southwestern Mississippi: U.S. Geological Survey Water-Resources Investigations Report 83–4189, 38 p.

Case, H.L., III, 1979, Ground-water resources of Washington Parish, Louisiana: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report no. 18, 33 p.

Collier, A.L., 2018, Water withdrawals by source and category in Louisiana Parishes, 2014–2015: U.S. Geological Survey data release, https://doi. org/10.5066/F78051VM.

Cunningham, W.L., and Schalk, C.W.,

comps., 2011, Groundwater technical procedures of the U.S. Geological Survey: U.S. Geological Survey Techniques and Methods book 1, chap. A1, 151 p., accessed April 2016 at http://pubs.usgs.gov/tm/1a1/.

Griffith, J.M., 2006, Hydrogeologic maps and sections of the "400-Foot," "600-Foot," and "800-Foot" sands of the Baton Rouge area and adjacent aquifers in East and West Baton Rouge, East and West Feliciana, and Pointe Coupee Parishes, Louisiana: U.S. Geological Survey Scientific Investigations Report 2006–5072, 15 p., 13 pl.

Kuniansky, E.L., 1989, Geohydrology and simulation of ground-water flow in the "400-foot," "600 foot," and adjacent aquifers, Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report no. 49, 90 p.

Kuniansky, E.L., Dial, D.C., and Trudeau, D.A., 1989, Maps of the "400-foot," "600-foot," and adjacent aquifers and confining beds, Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development Water

Resources Technical Report no. 48, 16 p. Lovelace, J.K., and Lovelace, W.M., 1995, Hydrogeologic unit nomenclature and computer codes for aquifers and confining units in Louisiana: Louisiana Department of Transportation and Development Water Resources Special

Report no. 9, 12 p.

Meyer, R.R., and Turcan, A.N., Jr., 1955, Geology and ground-water resources of the Baton Rouge area, Louisiana: U.S. Geological Survey Water-Supply Paper 1296, 138 p.

Louisiana: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report no. 15, 76 p. Prakken, L.B., 2007, Chloride concentrations in the Southern Hills regional aquifer system in Livingston,

southern Tangipahoa, and St. Tammany

Parishes, Louisiana, 2005: Louisiana

Investigations Report 92–4182, 47 p.

Department of Transportation and Development Water Resources Technical Report no. 76, 30 p. Rapp, T.R., 1994, Ground-water resources of southern Tangipahoa Parish and adjacent areas, Louisiana: U.S. Geological Survey Water-Resources

Tomaszewski, D.J., 1988, Ground-water hydrology of Livingston, St. Helena, and parts of Ascension and Tangipahoa Parishes, southeastern Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report no. 43, 54 p.

Tomaszewski, D.J., 1996, Distribution and movement of saltwater in aquifers in the Baton Route area, Louisiana, 1990–1992: Louisiana Department of Transportation and Development Water Resources Technical Report no. 59, 44 p.

> Tomaszewski, D.J., 2011, Water level surface in the Chicot equivalent aquifer system in southeastern Louisiana, 2009: U.S. Geological Survey Scientific Investigations Map 3173, 2 sheets, also available at https://pubs.usgs.gov/

U.S. Geological Survey, 2018, USGS Nyman, D.J., and Fayard, L.D., 1978, water data for the Nation: U.S. Ground-water resources of Tangipahoa Geological Survey National Water and St. Tammany Parishes, southeastern Information System database, accessed November 30, 2018, at https://doi.org/10.5066/F7P55KJN.

Walters, D.J., 1995, Louisiana groundwater map no. 7—Potentiometric surface, 1991, and water-level changes, 1969–91, of the Chicot equivalent aquifer system in southeastern Louisiana: U.S. Geological Survey Water-Resources Investigations Report 94–4202, 2 sheets. Whiteman, C.D., Jr., 1979, Saltwater encroachment in the "600-foot" and "1,500-foot" sands of the Baton Rouge area, Louisiana, 1966–78, including a discussion of saltwater in other sands:

Louisiana Department of Transportation

Works Water Resources Technical Report

and Development, Office of Public

Denver, CO 80225, 1-888-ASK-USGS

https://doi.org/10.5066/F7P55KJN.

For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center,

Collier, A.L., 2018. Water withdrawals by source and category in Louisiana parishes, 2014–2015:

U.S. Geological Survey, 2018, USGS water data for the Nation: U.S. Geological Survey National Water Information System database, accessed November 30, 2018, at

Digital files available at https://doi.org/10.3133/sim3488 Suggested citation: Frederick, C.P., 2022, Potentiometric surface, 2014–15, and water-level differences, 2009 to 2014–15, in the Chicot equivalent aquifer system in southeastern Louisiana: U.S. Geological Survey Scientific Investigations Map 3488, 2 sheets, https://doi.org/10.3133/sim3488 Associated data for this publication:

U.S. Geological Survey data release, https://doi.org/10.5066/F78051VM.