Accessible County Level Water Resource Fact Sheets: Experiences from Louisiana

Louisiana Department of Transportation and Development

United States Geological Survey

Introduction and Project Goal

Me:

- Vincent White
- Project Chief
- Civil engineer, United States Geological Survey, Baton Rouge Office of the Lower Mississippi Gulf Water Science Center

My Goal:

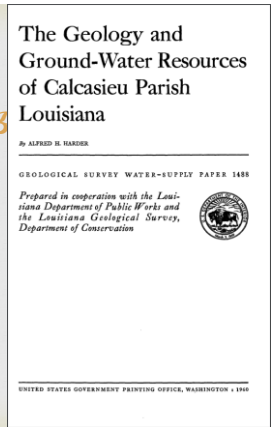
- Provide a summary of the water resources for each of Louisiana's 64 Parishes.

Water Resource Literacy

- There is a clear need for an *increase* in general hydrologic/water resources literacy. Water topics have been a focus of news, policy, and general discussion in the past few years:
- Hurricanes Katrina, Sandy, Harvey, etc.
- California drought
- Flint, Michigan

History

- Water-resource summaries for most of Louisiana's parishes were published during the 1940's to 1970's.
- Updates needed



The Geology and Ground-Water Resources of Calcasieu Parish Louisiana

By ALFRED H. HARDER

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1488

Prepared in cooperation with the Louisiana Department of Public Works and the Louisiana Geological Survey, Department of Conservation

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, 1960

Problem

- Parish (same as a county) boundaries do not necessarily correspond to the study areas for the many reports which are available.
- Basic information for a parish therefore must be gleaned from multiple reports.
- Older reports use different terminology and often are difficult to locate.
- Oftentimes interested parties are not scientists/engineers, and simply don't have the time to synthesize the available literature

Problem

- A summary which is too short is very easy to digest but is not useful because it lacks content
- A summary which is too long can become practically un-usable if the reader does not have enough time to read and digest it

Solution: Brevity and Accessibility

- A concise (generally 6 page, but some 4 page) fact sheet with a broad reference base providing support for in-depth research
- Available in-print and online
- Broad in scope and audience
- Multi-format: text, 4 figures, 4 tables

Project Benefits

- Concise, free, and readily accessible knowledge for anyone taking part in water-resource stewardship and development discussions and decisions at a local level.
- Helps the reader to the see groundwater and surface-water use, quality, and availability as a whole—avoids silo effect
- Very handy to bring to meetings
- Provides multiple references for readers who want more in-depth knowledge
- Advances USGS priorities of continuity in scientific knowledge in that it updates the reports that were completed up to 75 years ago
- Consistent template which allows for inter-parish analysis

Publication Tour

- Groundwater
  - Spatial aquifer descriptions and flow relationships
  - Grain size
  - Water levels, flow direction, recharge
  - Well #, type, depths, yields
  - Basic QW
  - Withdrawals
- Surface-water
  - HUC basin delineations (usually 6 or 8 digit) and major surface water bodies
  - Flow relationships
  - Streamflow data
  - GW-SW interaction, data depending
  - Basic QW
  - Withdrawals

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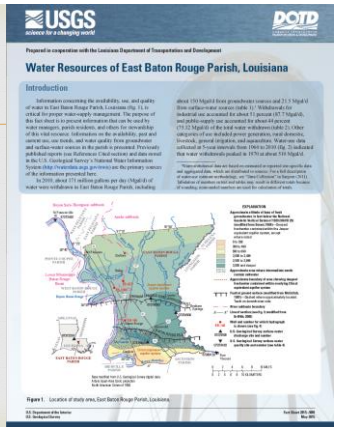
Water Resources of East Baton Rouge Parish, Louisiana

Introduction

Figure 1

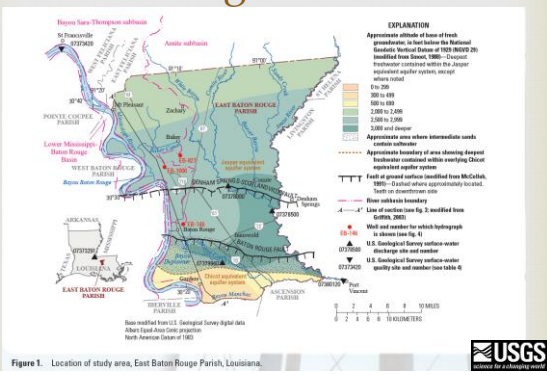

Figure 1. Location of study area, East Baton Rouge Parish, Louisiana.

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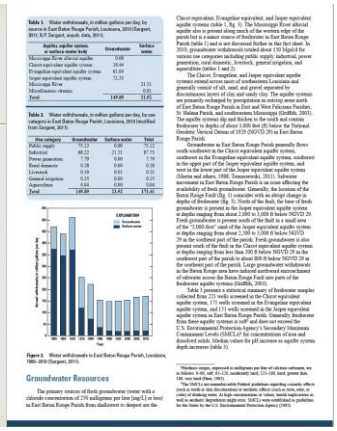
Groundwater Resources

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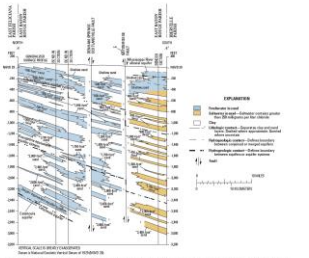

Figure 3. Generalized north-to-south hydrogeologic section through East Baton Rouge Parish, Louisiana (modified from Griffith, 2003). Trace of section shown on figure 1.

The Chicot Equivalent Aquifer System

The primary aquifers composing the Chicot equivalent aquifer system in East Baton Rouge Parish from shallowest to deepest are the shallow, "400-foot," and "600-foot" sands of the Baton Rouge area (Griffith, 2003). The shallow sands of the Baton Rouge area consist of discontinuous sand deposits, which may or may not be hydraulically connected. The "400-foot" and "600-foot" sands underlie the shallow sands or the surficial confining layer and often coalesce into a single layer (fig. 3). The altitude of the base of the Chicot equivalent aquifer system ranges in depth from about 210 ft below NGVD 29 near the north-central parish line to about 950 ft below NGVD 29 near the southern parish line (fig. 3) (Griffith, 2003).

In 2000, withdrawals in the Chicot equivalent aquifer system in East Baton Rouge Parish ranged from about 100 ft above NGVD 29 along the northern parish line to about 3.0 ft below NGVD 29 just north of the Baton Rouge Fault (Tomaszewski, 2011). Water levels in the "400-foot" sand at well EB-827, which is located in west-central East Baton Rouge Parish (fig. 1), fluctuated seasonally about 10 ft and declined about 5 ft between 1981 and 2012 (fig. 4).

In 2014, State well-registration records listed 981 active water wells screened in the Chicot equivalent aquifer system in East Baton Rouge Parish, including 571 domestic, 104 irrigation, 65 public supply, and 41 industrial. Well depths ranged from 100 to 1,200 ft below land surface. Reported yields from these wells screened in the Chicot equivalent aquifer system in East Baton Rouge Parish ranged from 0 to 2,334 gallons per minute (gal/min) (Louisiana Department of Natural Resources, 2014).

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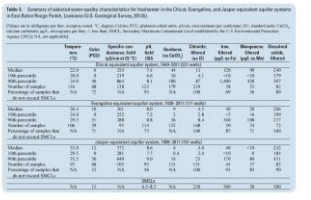

Table 2. Summary of selected water-quality characteristics for freshwater in the Chicot, Evangeline, and Jasper equivalent aquifer systems in East Baton Rouge Parish, Louisiana (U.S. Geological Survey, 2015b).

[Values are in milligrams per liter, except as noted. °C, degrees Celsius; PCU, platinum-cobalt units; µS/cm, microsiemens per centimeter; SU, standard units; CaCO3, 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]

	Temperature, water (°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
Chicot equivalent aquifer system (1880–2011 [107 wells])									
Median	22.0	5	524	7.4	44	17	120	98	340
10th percentile	20.0	0	219	6.6	20	4	<10	<10	179
90th percentile	24.0	40	1,010	8.1	190	83	1,000	520	657
Number of samples	116	68	114	122	116	119	66	65	82
Percentage of samples that do not exceed SMCLs	NA	72	NA	93	NA	100	69	36	89
Evangeline equivalent aquifer system, 1928–2011 (101 wells)									
Median	26.0	5	241	7.2	7	5	40	28	186
10th percentile	23.0	0	212	6.6	5	2.8	<5	<10	160
90th percentile	29.5	35	268	8.0	36	8.4	340	100	217
Number of samples	106	39	93	114	132	168	39	34	72
Percentage of samples that do not exceed SMCLs	NA	75	NA	73	NA	100	87	71	100
Jasper equivalent aquifer system, 1909–2011 (55 wells)									
Median	33.0	12	332	8.6	45	4.8	60	118	242
10th percentile	29.5	0	281	7.7	0.4	2.4	<10	8	183
90th percentile	35.5	40	1,000	9.0	170	7.5	1,000	1,000	1,000
Number of samples	55	8	68	102	95	135	35	37	63
Percentage of samples that do not exceed SMCLs	NA	13	NA	66	NA	100	91	84	90
	NA	11	NA	SMCLs 6.5–8.5	NA	250	300	50	500

The Evangeline Equivalent Aquifer System

The aquifers composing the Evangeline equivalent aquifer system in East Baton Rouge Parish are the "800-foot," "1,000-foot," "1,200-foot," "1,500-foot," and "1,700-foot" sands of the Baton Rouge area (Griffith, 2003; fig. 3). The altitude of the base of the aquifer system ranges from about 800 ft below NGVD 29 near the northern parish line to about 2,400 ft below NGVD 29 near the southern parish line (fig. 3) (Griffith, 2003).

In 2003, water levels in the "1,500-foot" and "1,700-foot" sand at well EB-1146, located in the city of Baton Rouge (fig. 1), were about 50 ft below NGVD 29 in the extreme northeastern corner of the parish to about 140 ft below NGVD 29 in southwestern East Baton Rouge Parish (Perkins, 2006). Water levels in the "1,200-foot" sand at well EB-146, located in the city of Baton Rouge (fig. 1), generally fluctuated from 5 to 10 ft seasonally and declined about 35 ft between 1991 and 2012 (fig. 4).

In 2014, State well-registration records listed 131 active water wells screened in the Evangeline equivalent aquifer system in East Baton Rouge Parish, including 59 public supply, 36 industrial, 32 domestic, 4 irrigation, and 1 power generation. Well depths ranged from 700 to 2,170 ft below land surface. Reported yields from these wells ranged from about 20 to 3,000 gal/min (Louisiana Department of Natural Resources, 2014).

The Jasper Equivalent Aquifer System

The aquifers composing the Jasper equivalent aquifer system in East Baton Rouge Parish are the "2,000-foot," "2,400-foot," and "2,800-foot" sands of the Baton Rouge area (Griffith, 2003; fig. 3). In East Baton Rouge Parish, the Jasper equivalent aquifer system dips and thickens in a southerly direction toward the Gulf of Mexico. The altitude of the base of the aquifer system is not well defined but probably ranges from about 2,500 ft below NGVD 29 near the northwestern parish line to about 3,000 ft below NGVD 29 at the Baton Rouge Fault (fig. 3) (Griffith, 2003).

In 2006, water levels in the Jasper equivalent aquifer system north of the Baton Rouge Fault ranged from about 40 ft above NGVD 29 in the extreme northeastern corner of the parish to about 40 ft below NGVD 29 in the northwestern corner of the parish near the Mississippi River (Griffith, 2006). Water levels in the "2,800-foot" sand at well EB-1048, located in west-central East Baton Rouge Parish (fig. 1), fluctuated less than about 5 ft yearly and declined about 20 ft between 1981 and 2012 (fig. 4).

In 2014, State well-registration records listed 126 active water wells screened in the Jasper equivalent aquifer system in East Baton Rouge Parish, including 65 public supply, 39 industrial, 12 domestic, 7 power generation, and 3 irrigation. Well depths ranged from 1,500 to 2,770 ft below land surface. Reported yields from these wells range from about 3 to 2,500 gal/min (Louisiana Department of Natural Resources, 2014).

Surface-Water Resources

Surface-water resources in East Baton Rouge Parish are found in two regional drainage basins: the Lower Mississippi–Baton Rouge Basin, which runs in a narrow strip along the Mississippi River, and the regional Lake Maurepas Basin. The Lake Maurepas Basin is subdivided into two subbasins in East Baton Rouge Parish: the Bayou Sara-Thompson subbasin and the

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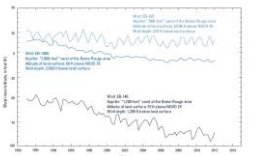

Figure 4. Water levels in well EB-827 screened in the Chicot equivalent aquifer system, well EB-1146 screened in the Jasper equivalent aquifer system, and well EB-146 screened in the Evangeline equivalent aquifer system in East Baton Rouge Parish, Louisiana (see fig. 1 for well locations). U.S. Geological Survey, 2015d. Land surface and water levels are measured in feet (ft) relative to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Amite subbasin (fig. 1). In 2010, about 31.5 Mgal/d of surface water were withdrawn in East Baton Rouge Parish, including about 31.3 Mgal/d from the Mississippi River for industrial use and 0.20 Mgal/d from miscellaneous streams for livestock (tables 1 and 2).

The Lower Mississippi–Baton Rouge Basin drains little land area in the parish because of the presence of levees along the river; however, upstream sources contribute to an average flow of the Mississippi River near Red River Landing (site number 07373291; fig. 1) of about 440,000 ft³/s for the period 1928–76 (Wells, 1980). Analysis of water samples collected between 1978 and 2004 from the Mississippi River near St. Francisville (site number 07373420) (fig. 1) indicated that the water is generally suitable for most uses, although at times the pH and concentrations of chloride, sulfate, and iron. The dissolved solids gas concentration is generally greater than 5 mg/L.

The Bayou Sara–Thompson subbasin is located in the northwestern corner of the parish and is drained by small creeks, bayous, and canals, including Bayou Baton Rouge and Baker Canal. Few discharge data are available for these drainages.

The Amite subbasin drains the majority of the parish and is present in all but the northwestern corner and western edge of the parish. The Amite subbasin includes the Amite and Comite Rivers, White and Beaver Bayous, Sandy and Cypress Creeks, and Bayou Manchac (Griffith, 2003; fig. 1). During 1935–2013, the annual average discharge for the Amite River near Denham Springs (site number 07378500) was 2,000 cubic feet per second (ft³/s). During 1948–2013, the annual average discharge for the Comite River near Comite (site number 07378000) was 479 ft³/s. During 2002–5, the average daily discharge for Dawson Creek at Blairtown Boulevard near Baton Rouge (site number 07379940) was 36 ft³/s (U.S. Geological Survey, 2015a, b). Water samples collected from the Amite River at Port Vincent (site number 07380120) during 1958–98 were found to have dissolved-oxygen concentrations ranging from 1.0 to 13 mg/L, pH from 6.1 to 8.2, and of fecal- and chloride concentrations below 250 mg/L (table 4). A dissolved-oxygen concentration of 5 mg/L is considered the minimum value for a diversified population of fresh, warmwater biota, including sport fish (Louisiana Department of Environmental Quality, 2008).

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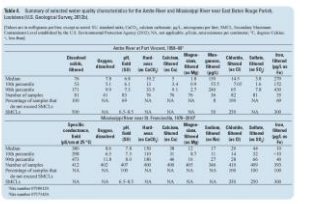

Table 1. Summary of selected water-quality characteristics for the Amite River and Mississippi River near East Baton Rouge Parish, Louisiana (U.S. Geological Survey, 2015a).

[Values are in milligrams per liter, except as noted. SU, standard units; CaCO3, calcium carbonate; µg/L, micrograms per liter; SMCL, Secondary Maximum Contaminant Level established by the U.S. Environmental Protection Agency (2012); NA, not applicable; µS/cm, microsiemens per centimeter; °C, degrees Celsius; <, less than]

Amite River at Port Vincent, 1958–87

	Dissolved solids, filtered	Oxygen, dissolved	pH, field (SU)	Hardness (as $CaCO_3$)	Calcium, filtered (as Ca)	Magnesium, filtered (as Mg)	Dissolved nitrite plus nitrate (as N)	Chloride, filtered (as Cl)	Sulfate, filtered (as SO_4)	Iron, filtered (µg/L as Fe)
Median	96	7.9	6.8	33.7	7.5	3.4	0.5	5.0	5.8	270
10th percentile	70	6.9	6.1	15.5	3.4	2.3	0.01	3.0	1.0	150
90th percentile	151	9.0	7.3	57.7	14.0	5.7	2.0	7.0	7.0	450
Number of samples	81	81	81	76	76	76	34	82	81	35
Percentage of samples that do not exceed SMCLs	100	NA	69	NA	NA	NA	8	100	NA	69
	500	NA	6.5–8.5	NA	NA	NA	10	250	NA	300

Mississippi River near St. Francisville, 1978–2012

	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)	Sulfate, filtered (as SO_4)	Chloride, filtered (as Cl)	Sulfate, filtered (as SO_4)	Iron, filtered (µg/L as Fe)
Median	300	8.9	7.5	130	38	11	43	31	44	110
10th percentile	270	8.3	7.1	120	34	10	37	24	37	70
90th percentile	472	11.8	8.0	180	46	16	57	54	60	440
Number of samples	412	402	407	400	400	400	360	413	405	395
Percentage of samples that do not exceed SMCLs	NA	NA	100	NA	NA	NA	NA	100	100	100
	NA	NA	6.5–8.5	NA	NA	NA	NA	250	250	300

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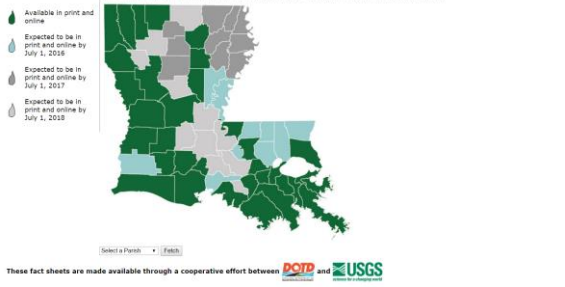

Water Resources of Louisiana Parishes Fact Sheets

These Fact Sheets summarize basic information on the water resources of Louisiana Parishes. Information on groundwater and surface-water availability, quality, development, use, and trends is based on previously published reports. These previously published reports are listed in the References section of each Fact Sheet web page.

Publishing Schedule

- Available in print and online
- Expected to be in print and online by July 1, 2016
- Expected to be in print and online by July 1, 2017
- Expected to be in print and online by July 1, 2018

Select By Parish

Place mouse pointer over parish to see parish name, then click to select, or choose from the drop-down list below.

Select a Parish | Fetch

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Web:

http://la.water.usgs.gov/ParishWaterResources.html

West Feliciana Parish

Abstract

Information concerning the availability, use, and quality of water in West Feliciana Parish, Louisiana, 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 discussed. Previously published reports 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.

Fact Sheet

Water Resources of West Feliciana Parish, Louisiana

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Current Status

- 44 fact sheets published
- 20 fact sheets remaining

- Current production rate is about 7–10 fact sheets (6 page) per year

Challenges

- Explaining the hydrology and water-use for a parish in 2500–2700 words.

- Requires wordsmithing to maximize the publication's value without dumb-down, miscommunication, or losing scope
  - Great experience for improving one's communication skills in general, and especially if you are a professional who attends meetings with non-scientists/non engineers.

- Managing 5 to 10 publications concurrently

Collegial Tidbits

- Organization is key for productivity and stress management

- Personal organization skills and project management software are crucial

  - Organizing from the Inside Out by Julie Morgenstern

  - Microsoft OneNote is an extremely useful free-form journal for tracking daily details
    - Always know where I'm at with each fact sheet even if I haven't touched it in weeks
    - Jot down quick notes from emails which may refer to multiple publications

Observations

- Received positive response to our news release a few years back
- The story showed up on NPR and 5 other Louisiana news sites
- Scientific culture:
  - Maybe recent attempts to reduce funding for scientific agencies are an indication that the scientific community and the wider culture would benefit from increased engagement in the form of fact sheet type publications in print, video, web, etc.

Questions

- Thank you to the Louisiana Department of Transportation and Development for their support

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