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January 29, 2021

Senator Patrick Page Cortez
President of the Senate
P.O. Box 94183
Baton Rouge, Louisiana 70804

RE: SENATE RESOLUTION NO. 171 OF THE 2014 REGULAR SESSION

Dear Mr. President:

The Louisiana State Law Institute respectfully submits its annual report to the legislature relative to developing a comprehensive Water Code.

Sincerely,

Guy Holdridge
Director

GH/pc

Enclosure

Email cc: David R. Poynter Legislative Research Library
drplibrary@legis.la.gov
Secretary of State, Mr. R. Kyle Ardoin
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LOUISIANA STATE LAW INSTITUTE
WATER CODE COMMITTEE

2021 ANNUAL REPORT TO THE LEGISLATURE
IN RESPONSE TO SR NO. 171 OF THE 2014 REGULAR SESSION

Relative to the development of a comprehensive Water Code for Louisiana

Prepared for the
Louisiana Legislature on
January 29, 2021

Baton Rouge, Louisiana

LOUISIANA STATE LAW INSTITUTE
WATER CODE COMMITTEE

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Mark S. Davis, Reporter
Nick Kunkel, Staff Attorney

Regular Session, 2014 **ENROLLED**

SENATE RESOLUTION NO. 171

BY SENATOR CLAITOR

A RESOLUTION

To urge and request the Louisiana State Law Institute to create a Water Code Committee.

WHEREAS, Senate Concurrent Resolution No. 53 of the 2012 Regular Session of the Legislature requested the Louisiana State Law Institute to conduct a study on surface water and groundwater law in Louisiana; and

WHEREAS, on April 4, 2014, the Louisiana State Law Institute submitted its report to the Legislature in response to Senate Concurrent Resolution No. 53; and

WHEREAS, such report discusses at length the issues, problems, and questions arising from the present state of Louisiana law concerning surface water and groundwater, and concludes by stating:

> "The time has come for water law reform in Louisiana. It is recommended that a Louisiana State Law Institute Water Code Committee be created and invested with the responsibility of continuing to study Louisiana's current treatment of running surface water and groundwater, with a view towards the development of a comprehensive Water Code that integrates all of Louisiana's water resources.
>
> The Louisiana State Law Institute recommends that the proposed Water Code Committee be an interdisciplinary committee, composed of academicians, practitioners, scientists with expertise in hydrology, and government representatives with expertise in Louisiana's water resources and the state's existing administrative system of water management.
>
> Current Louisiana law provides insufficient guidance on the rules that govern the nature and scope of riparian and groundwater rights. Louisiana needs a Water Code that integrates all of its water resources, a Water Code that will enable Louisiana to successfully manage and conserve its water resources as it prepares to face the inevitable challenges that lie ahead. Therefore, it is recommended that the legislature implement the foregoing recommendations and that it entrust this important project to the Louisiana State Law Institute."

THEREFORE, BE IT RESOLVED that, in accordance with the above recommendation, the Senate of the Legislature of Louisiana does hereby urge and request the Louisiana State Law Institute to create a Water Code Committee in order to develop proposed legislation establishing a comprehensive Water Code that integrates all of Louisiana's water resources.

BE IT FURTHER RESOLVED that such Water Code Committee shall be an interdisciplinary committee and shall include academicians, practitioners, landowners, scientists with expertise in hydrology, and government representatives with expertise in

Louisiana's water resources and the state's existing administrative system of water management.

BE IT FURTHER RESOLVED that such Water Code Committee shall provide annual reports to the Legislature not later than February first of each year indicating its status in developing a comprehensive Water Code for Louisiana, and including as appropriate, specific recommendations in the form of proposed legislation to achieve establishment of a comprehensive Water Code that integrates all of Louisiana's water resources.

BE IT FURTHER RESOLVED that a copy of this Resolution be transmitted to the director of the Louisiana State Law Institute.

PRESIDENT OF THE SENATE

January 29, 2021

To: Senator Patrick Page Cortez
President of the Senate
P.O. Box 94183
Baton Rouge, Louisiana 70804

2021 ANNUAL REPORT TO THE LOUISIANA LEGISLATURE
IN RESPONSE TO SR NO. 171 OF THE 2014 REGULAR SESSION

Senate Resolution No. 171 of the 2014 Regular Session, attached, urges and requests the Louisiana State Law Institute "to create a Water Code Committee in order to develop proposed legislation establishing a comprehensive Water Code that integrates all of Louisiana's water resources." The Resolution also states that "such Water Code Committee shall be an interdisciplinary committee and shall include academicians, practitioners, landowners, scientists with expertise in hydrology, and government representatives with expertise in Louisiana's water resources and the state's existing administrative system of water management."

In fulfillment of this request, the Law Institute created a Water Code Committee and placed it under the supervision of Reporter Mark S. Davis, Director of the Tulane Institute on Water Resources Law and Policy. Members of the Committee also include professors and other academicians who both teach and study water law, practitioners in the area of water law, government representatives with expertise in Louisiana's water resources and existing system of water management, and others.

Senate Resolution No. 171 also requires the Committee to "provide annual reports to the Legislature not later than February first of each year indicating its status in developing a comprehensive Water Code for Louisiana, and including as appropriate, specific recommendations in the form of proposed legislation to achieve establishment of a comprehensive Water Code that integrates all of Louisiana's water resources." Extensive background research concerning the Committee's charge has been conducted and compiled, and the Committee has met to develop the project and engage in the research done on several key topics. The following summary, prepared by Reporter Mark S. Davis, provided the focus of the Committee's initial meeting:

Background and Vision

Since the creation of the Committee, the importance of Louisiana's water resources—and their stewardship—has only increased. Developing a legal framework for the management of Louisiana's waters would be challenging under any circumstances, but the interconnected nature of water (surface, groundwater, and diffuse waters) and the fact that Louisiana's waters are often shared with other states and the federal government make the task both more pressing and challenging. On top of those factors, rising seas, collapsing coasts, and ever-evolving demands on water resources for energy development, coastal restoration, healthy coastal ecosystems, increasing human consumption, and myriad other uses are forcing Louisiana to reassess its relationship with water and to revisit the legal and policy architecture of water management.

Through the efforts of entities such as the Louisiana Water Resources Commission (LWRC), the Coastal Protection and Restoration Authority, the New Orleans Sewerage and Water Board, the Louisiana Watershed Initiative and the Louisiana State Law Institute (LSLI), great strides have been made in understanding and explaining the vital role that water plays in the ecologic, cultural, and economic vitality of the state and the nation. Bold plans and programs have been developed to sustainably promote that vitality, but those plans and programs all depend on the availability and management of water resources whose legal status is nebulous at best. The need to clarify the legal status of water and its uses has been recognized in recent reports by the LWRC (2012 and 2013) and the Louisiana State Law Institute (LSLI) (2014). Most recently, the Louisiana Legislative Auditor report on Louisiana's Management of Water Resources, February 5, 2020, ("Audit Report") drew attention to the need for a more purposeful, coordinated and effective approach to water management, specifically pointing to the work of this Committee in developing recommendations for a comprehensive set of law and policies to guide the development of a coordinated state water programs, policies and plans. A copy of the Audit Report is attached. The Reporter cooperated with the Legislative Auditor in the preparation of the Audit Report and believes it concisely but powerfully summarizes the importance of water to Louisiana's future and the need for a much more robust approach to managing the state's water resources.

This Committee is charged with developing a model water code for the state of Louisiana that is both grounded in traditional water rights and responsibilities (public and private) and responsive to the evolving dynamics of water supplies and water uses. We will approach water comprehensively, recognizing that groundwater, surface water, and diffuse water are related. Doing this will require not only an appreciation of traditional water law and emerging trends but also a respect for the hydrologic and ecologic aspects of our water resources. For these reasons there must be a multifaceted and multidisciplinary aspect to this Committee's work. In short, the Committee has been asked to develop a water code that is purpose driven, scientifically informed, and legally comprehensive.

Fortunately, the Committee has access to resources and technical expertise in the public, academic, and private sectors that it can draw on over the course of the project to greatly enhance its capacity to carry out its work.

Guiding Principles

Experience teaches that the complex task of developing a water code is much more manageable if it is guided by some core understandings and principles, particularly those which are already features of state or federal law. With that in mind the Committee's work will be informed by these guiding principles:

1. Management of Louisiana's waters is at a point of decision. Only a concerted effort will stem the degradation of Louisiana's coast and position the state as a whole to benefit from its most abundant resource.
2. Appreciation of the increasing dynamism of the hydrologic system must be integral to legal and planning infrastructure.
3. Natural processes must be hewed to as closely as possible, and natural cycles and processes can be maximized to aid operations and maintenance of infrastructure.

4. Limited availability of water must be acknowledged as a potential constraint on system management and rehabilitation.
5. The code will seek to achieve ecosystem sustainability and diversity while providing interchange and linkages within the hydrologic system.
6. Future rising sea levels and climate changes must be acknowledged and incorporated.
7. Displacement and dislocation of resources, infrastructure, and possibly communities may be avoidable under some scenarios. In the course of restoring a sustainable balance to Louisiana, sensitivity must be shown to those who may be adversely affected by the implementation of the code. Careful consideration must be paid to existing water related rights, uses, and duties.
8. The rehabilitation of the Louisiana hydrologic system will be an ongoing and evolving process.
9. Coordination with other states and federal interests is essential to ensure that the code will be most conductive to maximizing effectiveness.

Approaching the Task

As noted in previous reports, the Committee's point of departure was the 2014 report of the LSLI Water Law Committee and the 2012 and 2013 reports of the Louisiana Water Resources Commission (LWRC). The Committee continues to coordinate closely with LWRC's ongoing work to draw from its efforts (such as commissioning a framework for developing a water budget for the state) and to gain perspective from the Commission's diverse membership. The Committee is also endeavoring to coordinate closely with the Coastal Protection and Restoration Authority since the 2017 Master Plan and the 2023 Master Plan that is under development are fundamentally a water management plans with the force of law. To facilitate that coordination, Committee Reporter Mark Davis was appointed to the Coastal Protection and Restoration Authority Master Plan Steering Committee on behalf of the LSLI. In late 2018 he was also appointed to the Governor's Advisory Commission on Coastal Protection, Restoration and Conservation. The Reporter is also a member of the LWRC, which affords a vehicle of coordinating the work of the Committee and the LWRC.

In 2020, the Committee's coordination efforts expanded to include the Governor's Office of Coastal Activities, the Capital Area Ground Water Conservation Commission and the City of Shreveport (Cross Lake) which were getting more involved with water planning and management and whose existing responsibilities and anticipated needs are important grist for the Committee's mill.

The Reporter and his supporting team from the Tulane Institute on Water Resources Law and Policy have met several times with senior staff from the Governor's Office of Coastal Protection and Restoration to discuss water law issues and the Committees progress. We have also endeavored to keep legislative legal counselors abreast of our work including inviting them (and all Committee members, of course) to join in our meetings with water managers in Arkansas (2017) and Mississippi, Minnesota, and Virginia (as discussed in more detail below) as well as with Louisiana's water management agencies. The work described builds on the work described in previous reports. It is Reporter's opinion that the research and contextual work of the Committee is largely complete and that substantive discussions and recommendations will

dominate its future work as it works toward completing its assignment. Since any meaningful recommendations will involve governance and data collection/management responsibilities it will be necessary to coordinate more closely with those governmental entities that already have or that may assume those duties.

Action over the past year.

The past year was a challenging year for the Committee as the COVID-19 crisis restricted its ability to work and meet and a succession of storms disrupted the pace and rhythms of life and work. Despite those complications the Committee's work advanced, focusing on incorporating recent developments in the law and in water management and economics—in Louisiana and in those jurisdictions that Louisiana's law must take cognizance of.

Research and Recent Developments. Over the past year the Reporter and the Committee continued to follow significant developments that could inform or impact the scope and pace of its work. Notable examples of this work include:

- Water Management Resources Research. As noted above and last year's report, our research into how other jurisdictions manage their water resources is largely complete. That work confirmed Louisiana's outlier status in the field with little to no meaningful purpose driven water management, a conclusion affirmed by the Legislative Auditor's Audit Report (attached). As a result, Louisiana's waters are both vulnerable to unwise exploitation and inefficient utilization. Our research has uncovered a trove of examples of that Louisiana might want to emulate as well as a good number of cautionary examples. The most important takeaways from that comparative investigation are the critical importance of treating all naturally occurring water as a resource vital to public welfare and the dependence of good water management on good data about the condition and uses of water. We continue to update that research.

- Lake versus stream—Catahoula Lake. *Crooks v. State of Louisiana* was one of the most important water related cases in recent years and one that served as powerful reminder of how water law and mineral law bear on each other. At the heart of this case, which also involved a number of issues unrelated to water law, were the questions of whether Catahoula Lake is in fact a lake and what rights of public use and ownership pertain to it. The answer—ultimately, that it is not a lake, despite its name—turned on a factual inquiry that highlighted the facts that Louisiana has no clear definition of the term "lake" and that the definition accepted by the court was narrower than would likely have applied within the field of limnology (the science of lakes). For the Committee, this case is a powerful reminder that the use of commonly-used but ill-defined terms in legislation and jurisprudence can confound more than they clarify. Greater clarity (albeit with the acknowledgement that waters and water bodies are dynamic changeable things) is one of the goals of the Committee, especially when dealing with interstate waters, the stewardship of which will benefit from harmonious definitions among the states.

- State Waters and Waters of the United States. The stewardship of Louisiana's surface waters have long been a shared undertaking between the state and the federal government. From a regulatory standpoint, Louisiana has deferred to federal jurisdiction under the Clean Water Act as the foundation for regulating the discharge of pollutants and dredged/fill material. This approach avoided duplication of programs and minimized administrative and financial burden on Louisiana. With the promulgation of a new "Waters of the United States" rule, the federal government is significantly narrowing the scope of Clean Water Act's jurisdiction which will almost certainly mean that some waters that were previously regulated under the province of that federal law will either have less federal protection or require state action. The nature and scope of pollution control law is beyond the charge of this Committee, but the need to have waters that are fit to use and how Louisiana address that need from governance standpoint is very relevant to the Committee's work. This is especially so if Louisiana has to revamp its administrative approach to water stewardship since that could bear on the recommendation options available to this Committee for the administration of a water code.

Coordination. As the research phase of the Committee's work winds down, the process of engaging and coordinating with state, regional and local water management agencies and programs will ramp up. This interaction is vital to in order to maximize synergies and to avoid conflicts.

- Governor's Office of Coastal Activities and the Governor's Chief Resilience Officer. This office is assuming a more important place in the constellation of agencies with a role in water planning and management, especially with the creation of the position of Chief Resilience Officer within GOCA. Over the past year, the Reporter had multiple conversations with this office as it became clearer that the Governor's office will play some role—albeit unclear at present—in future water management. The Committee's work has been shared with the Governor's office so it can benefit from our research and network building. This work will continue in 2021.

- Coastal Protection, Restoration and Conservation Authority. Since the CPRA's Coastal Master Plan is fundamentally a water management plan that has some legal force and effect, it is vital that the Committee and the CPRA be in contact and on the same page. The Reporter has engaged with CPRA and its planning team to identify water resource issues that that need more attention or clarification as it continues to develop the 2023 Coastal Protection and Restoration Master Plan.

- Department of Natural Resources and Office of Conservation. To the extent that Louisiana vests any existing executive branch agencies with surface and groundwater management responsibilities, those agencies are the DNR (surface water) and the Office of Conservation (groundwater). The Committee has worked carefully to coordinate its work the Secretary of DNR and the Commissioner of Conservation. During the past year the Committee had few substantive discussions with DNR and the OC since the bulk state water planning and policy was being shaped elsewhere.

- Louisiana Water Resources Commission. The LWRC is a statutorily chartered body charged with assisting the state, mainly through DNR and the Office of Conservation, in planning for its water resources. During the past year, the LWRC was mostly sidelined by the COVID crisis.

- State Office of Community Development -Louisiana Watershed Initiative. The Office of Community Development is within the Department of Administration. In response to the flooding of the Baton Rouge Area in 2016, the Governor tapped the OCD to lead the newly formed Louisiana Watershed Initiative and charged it with developing regional approaches to flooding. Though the LWI was created without reference to the Committee's work, the Reporter and his team at Tulane have been in increasingly close contact with LWI leaders, especially about possible governance models and opportunities for addressing diffuse/stormwater in the Committee's work. This is evolving work and it points to the value of the Committee engaging with other water related initiatives created by the Legislature and the Governor.

- Attorney General's Office. The evolution of Louisiana water law does not wait on the Committee's work so it has been important to maintain a line of communication with the Louisiana Attorney General's office. That includes but also goes beyond the participation of the AG's office on the Committee. This has helped the Committee to stay abreast of emerging developments and to ensure that the AG is able to take advantage of the work being done by the Committee. The past year saw the definitional issues, like the ones raised in the *Crooks* case (i.e. what is a lake), take on greater importance in ways that could inform the development of recommendations by the Committee.

- City of Shreveport. Cross Lake is an important source of drinking water for Shreveport and an increasingly sought after source of water for fracking in the area. Access to the Lake's waters raise questions of what entities—private, state and local—have a voice in determining who can use water, where and for what purposes. These include the City, the Department of Natural Resources (which has general responsibility for Cooperative Endeavor Agreements for non-riparian water uses), and adjacent landowners. While neither the Reporter nor the Committee have any stake in the ultimate decisions about Cross Lake water, it can serve as a real world/real time classroom for the Committee and stakeholders to learn of the issues that the Committee's work should draw from. The City has reached out to the Reporter in order to help facilitate that.

- Capital Area Ground Water Conservation Commission. The Southern Hills Aquifer serves the Baton Rouge area as its sole source of public and industrial water supply. Stress on that system prompted the state to create the Capital Area Ground Water Conservation Commission, an entity unique in Louisiana in that it is charged with the active management and regulation of the aquifer. This alone makes it a matter of great interest to the Committee, as it sets the current boundaries of ground water regulation under Louisiana law. Though created as a purpose-driven regulatory body, the Commission did not embrace that charge, leading to confusion about mission and continued challenges to the sustainability of the aquifer. The divergent views of the Commission were highlighted in a performance audit by the Legislative Auditor (referenced in the attached Audit Report).

Whether as a result of that audit or not, the Commission named a new director in 2020 and now apparently acknowledges that it has duties and authorities that were not exercised in the past. The Commission will be responding to the audit report, a development to which the Committee is very much looking forward. The Reporter has also initiated direct outreach to the new Commission director to inform him of the Committee's work and interests to open an line of communication.

- City of New Orleans Mayor's Office—Mayor's Urban Water Planning and Management. One of the most dynamic areas of Louisiana water law is municipal water management. The woeful performance of the New Orleans Sewerage and Water Board in managing stormwater and drinking water is spawning a community conversation about water management and governance that the Committee is following and that could have some bearing on its future recommendations.

Outreach. The Committee is committed to transparency in its work. In prior years, the commitment was evidenced by the Reporter's participation in a number of conferences and panels to explain the Committee's charge and work. In 2020, that general public outreach was largely frozen as COVID related restrictions and priorities precluded most meetings and events. That said, as discussed in the section above, the Reporter did actively pursue discussions with key agencies and stakeholders. In 2021, the Committee will resume a more normal approach to its work though still under severe constraints with regard to the sort of open public conversations we would prefer.

Conclusion. The Committee will continue meeting over the course of the next year to continue its process of researching and developing a Louisiana Water Code. As directed, the Committee will continue to provide annual reports to the Law Institute for its review and transmission to the Legislature indicating the status of this project. A final report will be submitted to the Legislature once the Committee has developed a comprehensive Water Code for Louisiana and has received approval of the project from the Council of the Law Institute.

Acknowledgements. The Committee and the Reporter would like to acknowledge and thank the Baton Rouge Area Foundation, the Greater New Orleans Foundation, the McKnight Foundation, the Louisiana Sea Grant Program, Tulane Law School and the Tulane Institute on Water Resources Law and Policy, and the staff of the Louisiana State Law Institute for their assistance. It has made a huge difference.

Respectfully submitted,

Mark S. Davis, Reporter
Water Code Committee
Louisiana State Law Institute

LOUISIANA'S MANAGEMENT OF WATER RESOURCES

PERFORMANCE AUDIT SERVICES
ISSUED FEBRUARY 5, 2020

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LOUISIANA LEGISLATIVE AUDITOR
DARYL G. PURPERA, CPA, CFE

February 5, 2020

The Honorable Patrick Page Cortez,
President of the Senate
The Honorable Clay Schexnayder,
Speaker of the House of Representatives

Dear Senator Cortez and Representative Schexnayder:

This report provides the results of our examination of Louisiana's management of its water resources. The purpose of this audit is to provide information on the management measures the state is taking and whether those efforts are working.

We found some areas where the state could make improvements. Although Louisiana is perceived as "water rich," it faces threats, such as declining water levels, saltwater intrusion, and attempts by other states to use our water. That makes it even more important that water resources be properly managed and a comprehensive statewide management plan be developed.

Specifically, we found Louisiana is experiencing multiple issues related to water because of excessive groundwater withdrawals. In addition, because the sustainability of the state's water resources may be threatened by other states that want to obtain our water, it is important to know how much water Louisiana will need for its own use. For example, in 2011, Texas approached the Sabine River Authority to buy water from Toledo Bend at a rate of $0.28 per thousand gallons for an initial period of 50 years. The sale did not go through, however, because of public concern about the length of the contract and the lack of information on how the purchase would affect water levels.

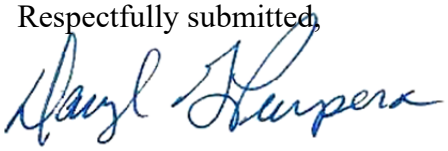
In addition, while Louisiana has taken some steps to mitigate water issues, state and local entities may need to be given more authority to better manage their individual water resources. We found the state has increased the number of groundwater and surface water monitoring sites that measure water levels and chloride concentration in aquifers; and water levels, stream flow, and high water points in surface waters. However, some state and local entities do not have sufficient authority to regulate water use in their areas, and others do not use their authority effectively.

Since 1956, Louisiana has spent at least $5.3 million for a total of 12 studies on water resources and management strategies – many of which recommended the state develop a

comprehensive management plan. However, Louisiana still does not have such a plan. Developing a comprehensive water management plan would help ensure the state's water resources are protected, conserved, and replenished for the health, safety, and welfare of Louisiana citizens.

The report contains our findings, conclusions, and recommendations. I hope this report will benefit you in your legislative decision-making process.

Respectfully submitted,



Daryl G. Purpera, CPA, CFE
Legislative Auditor

DGP/aa

WATERRESOURCES

Louisiana Legislative Auditor

Daryl G. Purpera, CPA, CFE

Louisiana's Management of Water Resources

February 2020

Audit Control # 40190007

Introduction

This audit provides information on Louisiana's management of its water resources. Louisiana's Constitution[1] emphasizes the importance of managing the state's natural resources and requires the Legislature to enact laws to protect, conserve, and replenish the state's water resources for the health, safety, and welfare of the people. A 2016 study conducted by the Water Institute of the Gulf identified numerous aquifers and associated surface water basins that are experiencing water declines in Louisiana.[2]

> "Louisiana's water budget – our total withdrawal and recharge capacities for groundwater and surface water – is not infinite. Just as families, businesses, and governments must act and plan responsibly to ensure that withdrawals do not exceed deposits, so must our state proactively address the sustainability of our aquifers and all water sources. ***Water is not an option for life. As such, we have no choice but to sustain our critical water supply.***"
>
> **Source:** *Managing Louisiana's Groundwater Resources*, 2012

Properly managing water resources has become an important issue as population growth, increased agricultural demand, and shifting weather patterns have led to additional pressure being placed on existing public utilities, thereby increasing the demand on already limited water supplies. The result is that more water is being drawn out of groundwater sources than nature is able to recharge.[3] This has forced some communities to seek additional water sources or institute water conservation measures to meet increasing demands. The U.S. Geological Survey (USGS) has found that, since 1951, groundwater depletion[4] rates have increased 62.6% *nationwide* and increased 578.7% for the Gulf Coastal Plain Regional Aquifer System, which includes Louisiana.[5]

We conducted this audit because multiple studies, which are cited throughout this report, have documented various threats to Louisiana's water resources. These threats include a decline in water levels because of drought or over pumping, which in turn have resulted in low surface water flows, impaired surface water quality, and degraded groundwater quality due to saltwater intrusion in some areas of the state. These studies have also recommended various solutions,

[1] LSA-Const. Art. 9, § 1.
[2] Hemmerling, S.A., Clark, F.R., & Bienn, H.C. *Water Resources Assessment for Sustainability and Energy Management.* The Water Institute of the Gulf, Prepared for the Louisiana Department of Natural Resources and the Coastal Protection and Restoration Authority, (2016).
[3] Recharge is the mechanism for groundwater replenishment.
[4] Groundwater depletion occurs when withdrawals exceed replenishment over extensive areas for prolonged periods of time.
[5] Konikow, L. F. *Groundwater Depletion Rates in the United State (1900-2008)*: USGS Scientific Investigations Report 2013-5079, (2013): 7-8. https://pubs.usgs.gov/sir/2013/5079/SIR2013-5079.pdf

such as the implementation of regional planning processes and the development of a comprehensive statewide management plan, many of which have not been implemented.

Louisiana's water resources include 10 principal surface water basins[6] and 11 aquifers and aquifer systems[7] underlying most areas of the state (See Appendix B and Appendix C for maps depicting these areas). According to the USGS,[8] during calendar year 2015 Louisiana used approximately 8.72 billion gallons per day (bgal/d) of water, including 1.75 bgal/d from groundwater sources and 6.97 bgal/d from surface water sources. Louisiana uses water for drinking water, irrigation, livestock operations, aquaculture, industrial facility operations, and cooling for power generation facilities. Exhibit 1 shows the withdrawal amounts from ground and surface water sources by use in Louisiana in 2015. Appendix E contains USGS parish fact sheets detailing surface and groundwater use.

Exhibit 1
Overall Withdrawals by Category [in million gallons per day (Mgal/d)]
Calendar Year 2015

Water-Use Category	Description	Total Withdrawals	% of Total	% from Surface Water	% from Ground-water
Power Generation	Thermoelectric power-generation purposes such as cooling, sanitation, washing and steam generation.	4,264	48.9%	99.1%	0.9%
Industry	Fabrication, processing, washing, and cooling in industries such as chemical, food, mining, paper and allied products, petroleum refining, and steel.	2,155	24.7%	88.0%	12.0%
Irrigation*	Water application to vegetation, including field crops such as rice, corn, cotton, fruit crops, and nurseries.	1,053	12.1%	31.6%	68.4%
Public Use**	Deliveries by public or private water suppliers for domestic, commercial, industrial, or public water uses and self-supplied water used for personal home use.	753	8.6%	47.1%	52.9%
Aquaculture	Production of organisms that live in water within a confined space under controlled feeding, sanitation, and harvesting procedures, and establishments primarily engaged in fish, crawfish, and alligator farming.	493	5.7%	31.6%	68.4%
Livestock	Livestock production needs of cattle, horses, sheep, swine, poultry, and other animals such as watering, feedlots, and dairy production.	6	0.1%	49.8%	50.2%
Total Withdrawals		**8,724**			

*Irrigation includes withdrawals for both rice and general irrigation.
**Public Use includes withdrawals for public supply and rural domestic.
Source: Prepared by legislative auditor's office using information from USGS.

[6] Areas drained by surface water, such as a lake, river, or stream. Examples include the Sabine River Basin along the state's western border and the Red River Basin in northwest Louisiana.
[7] A geologic formation that stores and/or transmits groundwater, such as in wells and springs. Examples include the Chicot Aquifer System in the southwest part of the state and the Southern Hills Aquifer System in the southeast.
[8] USGS publishes water use data every five years. The most current data can be found in *Water Use in Louisiana, 2015*.

Numerous state agencies, each with their own missions and responsibilities, are responsible for managing water in Louisiana. Exhibit 2 summarizes the seven main state agencies and their primary duties related to water management.

Exhibit 2
State Agencies with Water Management Responsibilities*

The **Department of Natural Resources** oversees groundwater conservation and sustainability; registers wells and groundwater users; and administers surface water cooperative endeavor agreements.

The **Department of Agriculture and Forestry** advises and assists state soil and water conservation districts with implementing conservation activities.

The **Department of Environmental Quality** enforces the Clean Water Act and protects groundwater and surface water from contamination through permitting and monitoring.

The **Department of Wildlife and Fisheries** enforces the Endangered Species Act, which prohibits the use of surface water if the habitat of threatened or endangered species is adversely modified, as well as administers Natural and Scenic River Systems.

The **Department of Transportation and Development** administers construction requirements for surface water impoundments, such as reservoirs, and manages state-owned water control structures.

The **Coastal Protection and Restoration Authority** is responsible for integrating hurricane protection, storm damage reduction, flood control, and associated infrastructure construction and maintenance.

The **Department of Health** enforces the Safe Drinking Water Act and protects groundwater and surface drinking water supplies.

Source: Prepared by legislative auditor's staff using information from the Water Resources Commission's report *Managing Louisiana's Groundwater Resources, 2012*.

*According to the 2012 report *Managing Louisiana's Groundwater Resources*, there are at least 735 other entities with local, municipal, regional, or state authority for specific water resource oversight, including 51 conservation districts, seven recreation districts, seven reservoir districts, eight watershed districts, two waterway districts, two freshwater districts, and 651 municipal/local water districts and systems.

In addition to the state agencies listed in Exhibit 2, the Water Resources Commission[9] and the Water Management Advisory Task Force[10] are responsible for evaluating the state's surface and groundwater resources, including current and projected demands, and identifying incentives for promoting conservation. To conduct this audit, we interviewed stakeholders, researched other states, and reviewed various studies published on water management. The purpose of this audit was:

To provide information on Louisiana's management of its water resources.

Our results are discussed in detail throughout the remainder of the report. Appendix A details our scope and methodology, Appendix B contains a map of Louisiana's primary aquifers and aquifer systems, Appendix C contains a map of Louisiana's primary surface water basins, Appendix D contains summaries of 12 Louisiana water management studies, and Appendix E contains USGS fact sheets detailing surface and groundwater use by parish.

[9] R.S. 38:3097.4
[10] R.S. 38:3097.7

Objective: To provide information on Louisiana's management of its water resources.

Overall, Louisiana must improve its management of water resources throughout the state. Although Louisiana is perceived as a "water rich" state, it faces threats to its water resources, including declining water levels, saltwater intrusion, and attempts from other states to use our water. Therefore, it is important for Louisiana to properly manage its water resources and develop a comprehensive statewide plan to guide these efforts. Specifically, we found the following:

- **Louisiana is experiencing multiple issues related to water, including water level decline and saltwater intrusion due to excessive groundwater withdrawals. In addition, because the future sustainability of Louisiana's water resources may be threatened by other states that seek to obtain our water, it is important that Louisiana know how much water it will need for its own use.** For example, in 2011, a Texas entity approached the Sabine River Authority (SRA) to purchase water from Toledo Bend at a rate of $0.28 per thousand gallons for an initial a period of 50 years. However, according to SRA's board, it suspended out-of-state water sales because of public concern with the length of the contract and the lack of information on how the purchase would affect water levels.

- **Louisiana has taken some steps to mitigate its water issues, but state and local entities may need to be given more authority to better manage their water resources.** For example, the state has increased its groundwater and surface water monitoring sites that measure water levels and chloride concentration in aquifers; and water levels, stream flow, and high-water points in surface waters. However, some state and local entities do not have sufficient authority to regulate water use, and others are not using their authority effectively.

- **Since 1956, Louisiana has spent at least $5.3 million to conduct 12 studies on water resources and management strategies, and many of these recommended that the state develop a comprehensive management plan. However, Louisiana still does not have a comprehensive water management plan.** A comprehensive water management plan would help ensure that the state's water resources are protected, conserved, and replenished for the health, safety, and welfare of Louisiana citizens.

Our results, as well as matters for legislative consideration to improve the state's management of water resources, are summarized on the following pages.

Louisiana is experiencing multiple issues related to water, including water level decline and saltwater intrusion due to excessive groundwater withdrawals. In addition, because the future sustainability of Louisiana's water resources may be threatened by other states that seek to obtain our water, it is important that Louisiana know how much it will need for its own use.

Declining water levels have resulted in water quantity and quality issues in many regions and municipalities across the state. A 2016 study conducted by The Water Institute of the Gulf[11] (The Water Institute) identified numerous aquifers and associated surface water basins that are experiencing water level declines in Louisiana. For example, the study found that groundwater withdrawals in many southwestern parishes threaten existing water wells used by both farmers and residents. Specifically, more than 348 million gallons of water per day are being withdrawn from the Chicot Aquifer than are being replenished, largely because of rice irrigation and industry uses. The high pumping rates have changed the groundwater flow patterns, causing groundwater to flow toward the agricultural and industrial centers and raising concerns among residents about water availability and quality. Additionally, the communities in southwest Louisiana that rely on the Chicot Aquifer do not have available freshwater alternatives readily available.[12] In northern Louisiana, parishes have repeatedly experienced both drought-related and systemic declines in multiple aquifer systems, while some areas in the southeast, such as the Southern Hills' Baton Rouge area, are also facing the prospect of declining supply and saltwater intrusion.[13]

> "If ground water aquifers are carefully developed, they can last indefinitely. If they are overdeveloped, their usefulness may be limited or destroyed."
>
> **Source:** Department of Public Works' 1972 *Comprehensive Water and Related Land Resources Study*

Adding to the problem is the fact that the availability of surface water decreases in areas prone to drought conditions, which increases reliance on groundwater resources. For example, North Louisiana experienced a substantial drought beginning in 2010 that placed extreme stress on groundwater resources in the region, particularly in south Caddo Parish. According to DNR, without enough recharge, and with increased groundwater demand to counter the effects of the drought, water levels inside the Carrizo-Wilcox and Upland Terrace aquifers dropped steeply, and local wells began to run dry in the summer of 2011. Because residents depend on these aquifer systems for domestic and public water supply, the Office of Conservation (OC) declared a groundwater emergency in August 2011 to limit withdrawals. The goal of the declaration was

[11] Hemmerling, S.A., Clark, F.R., & Bienn, H.C. *Water Resources Assessment for Sustainability and Energy Management.* The Water Institute of the Gulf, Prepared for the Louisiana Department of Natural Resources and the Coastal Protection and Restoration Authority, (2016). http://www.dnr.louisiana.gov/assets/OC/env_div/WaterInstituteWaterPlanningReport071516.pdf

[12] According to USGS, many rivers and canals in southwestern Louisiana are routinely used as freshwater sources for agriculture and some of the larger streams could be used for industrial or public supply purposes but would require proper treatment.

[13] Tsai, Frank. *Feasibility Study of Scavenging Approach to Stop Saltwater Toward Water Wells.* Louisiana Water Resources Research Institute, (2012): 2. https://lwrri.lsu.edu/downloads/2011-2012%20FY/Tsai-LWRRI%20FY11-12-report%20_body_104B.pdf.

to protect local sources of drinking water for communities in southern Caddo Parish and protect the Carrizo-Wilcox and Upland Terrace aquifers from potential damage.

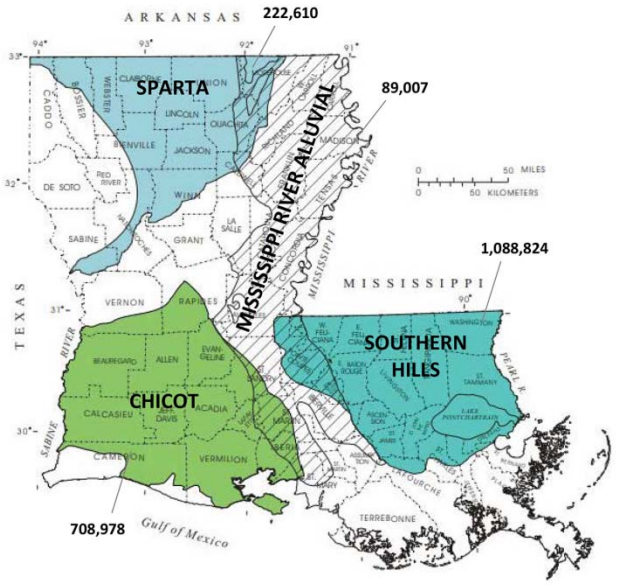
Declines in groundwater levels and excessive withdrawals have caused water quality issues such as saltwater intrusion. Saltwater intrusion occurs when fresh groundwater is mixed with surrounding saltwater either from the sea or from an underlying, interior saline source. While saltwater naturally occurs in many aquifers,[14] groundwater withdrawals affect the location of the saltwater, and over-pumping can cause the saltwater to contaminate the aquifer. It is important to manage saltwater intrusion caused by withdrawals in order to sustain the viability of the aquifer.

Saltwater intrusion is also compromising Louisiana's agriculture industries of rice, corn, and soybeans, causing a potential loss of over $500 million in total output and more than 3,000 jobs over the next 30 years**.** A study conducted by LSU's Agriculture Center found for the Mississippi River Alluvial Aquifer area, agricultural interests could see declines in corn yields of 60% over the next 30 years, and for the Chicot Aquifer, rice yields may drop by 39%, because of increased salinity.

Source: LSU Agriculture Center's *Economic Impact of Groundwater Salinity in Louisiana* study.

Saltwater intrusion affects multiple areas of the state and is not confined to those areas in contact with the Gulf of Mexico. In 1964, the USGS found saltwater encroachment into the Southern Hills Aquifer System in the direction of public and industrial pumping stations in the Baton Rouge area. According to a 2012[15] study by the Louisiana Water Resources Research Institute, excessive groundwater withdrawals have caused some areas of Louisiana freshwater aquifers to become contaminated by saltwater intrusion. In addition to the Southern Hills Aquifer System in the Baton Rouge Capital Area, the other major aquifer systems contaminated by saltwater intrusion in parts of the aquifer include the Chicot Aquifer System, Sparta Aquifer, and Mississippi River Alluvial Aquifer. Exhibit 3 illustrates these major aquifers and aquifer systems with areas affected by saltwater intrusion.

Exhibit 3
Major Aquifers and Aquifer Systems Experiencing Saltwater Intrusion in Parts of the Aquifer and Respective Populations



Source: Prepared by legislative auditor's staff using information obtained from USGS and the Louisiana Water Resources Research Institute.

Increased salinity can affect the water supply used for drinking water, industry, and farming. Without effective management, saltwater intrusion threatens the long-term sustainability of the groundwater resources in

[14] According to USGS, saltwater generally underlies most aquifers in the low depths, found under the "base of fresh water". For Louisiana, our relation/location to the coast also affects the salt in our aquifers.
[15] Tsai, Frank. *Feasibility Study of Scavenging Approach to Stop Saltwater Toward Water Wells*. Louisiana Water Resources Research Institute, (2012): 2. https://lwrri.lsu.edu/downloads/2011-2012%20FY/Tsai-LWRRI%20FY11-12-report%20_body_104B.pdf.

Louisiana, which collectively serve an estimated 2.6 million residents, as well as industry and other sectors. For example, in the southwestern part of the state, the possible increase in saltwater intrusion into the Chicot Aquifer is a concern for residents and farmers in the region. According to The Water Institute, if withdrawals from the Chicot Aquifer System continue at their current rate, the long-term sustainability of the aquifer system may be compromised. This may result in water users having to drill deeper water wells or treat water before use.[16] Furthermore, the communities that rely on this aquifer system do not have reliable freshwater alternatives to groundwater sources readily available.[17]

Because the future sustainability of Louisiana's water resources may be threatened by other states who want to obtain our water, it is important that Louisiana know how much water it will need for its own use. For example, there have been multiple attempts by other states to obtain water from Louisiana. Specifically:

- The droughts in the 1950s prompted Texas to investigate the potential transfer of water into the region from the lower Mississippi River to Texas. The proposed Mississippi River diversion aimed to transfer nearly 4 trillion gallons of water per year to Texas and New Mexico. However, logistical expenses ultimately shelved the project.

- In 2011, a Texas entity approached the Sabine River Authority (SRA) to purchase water from Toledo Bend at a rate of $0.28 per thousand gallons for an initial period of 50 years. However, according to SRA's board, it suspended out-of-state water sales because of public concern over the length of the contract and the lack of information on how the purchase would affect water levels. SRA's board stated it would revisit the request once the state has developed a comprehensive water plan so Louisiana will know how water transfers will affect its existing and future water resources.

Why is it important to protect the water resources in Louisiana?

"Just as oil came to define much of the economic and social development in the twentieth century, water is increasingly seen as the defining resource of the twenty-first century. Whether or not water is 'the new oil,' as some have claimed, it is clear that the availability of dependable supplies of fresh water is already transforming our economic and cultural landscapes. As the state's and the nation's growth, energy, and environmental priorities evolve, water is often the common denominator."

Source: *A Defining Resource: Louisiana's Place in the Emerging Water Economy*

Passed by Act 261 of 2012, state law (R.S. 30:961) now requires legislative approval by the House Committee on Natural Resources and Environment and the Senate Committee on Natural Resources for the transfer of water outside of the boundaries of the state of Louisiana. This requires the committees to consider the impact and decide whether it is detrimental to the environment or the public. Because other states may want to obtain water from Louisiana in the

[16] Hemmerling, Clark, & Bienn, *Water Resources Assessment for Sustainability and Energy Management.* The Water Institute of the Gulf, 2016:42. http://www.dnr.louisiana.gov/assets/OC/env_div/WaterInstituteWaterPlanningReport071516.pdf

[17] According to USGS, many rivers and canals in southwestern Louisiana are routinely used as freshwater sources for agriculture and some of the larger streams could be used for industrial or public supply purposes but would require proper treatment.

future, it is important for Louisiana to know how much water it needs for long-term sustainability so it can, in turn, determine how much water can be made available for purchase. Therefore, the state should have strong processes to manage water and develop a comprehensive statewide management plan, both of which are discussed in the next sections.

Louisiana has taken some steps to mitigate its water issues, but state and local entities may need to be given more authority to better manage their water resources.

Louisiana has taken some steps to mitigate water quantity and quality issues in the state. For example, the state has expanded its water resource monitoring network that it has maintained since the 1940s through a cooperative agreement between the USGS and Louisiana Department of Transportation and Development. The monitoring network includes groundwater and surface water monitoring sites that measure water levels and chloride concentration in aquifers; and water levels, stream flow, and high water points in surface waters. At its peak in 1980, the network included a total of 960 monitoring sites. However, funding constraints led to a decrease in total number of sites, reaching as low as 211 sites by 1997. A 2011 report[18] determined that the state was inadequate in terms of monitoring data, which led to an expansion up to 457 monitoring sites[19] as of 2019.

Data from these monitoring sites helps identify issues and also helps predict future water needs and the sustainability of surface and groundwater across the state. If water usage data is limited, oversight agencies and other stakeholders have less data to use to use in their management activities. The state has also made efforts to divert surface water into areas that rely on aquifers. For example, the state constructed the Sabine River Diversion Canal in 1982 to move more surface water into the area and reduce reliance on the Chicot Aquifer. However, some state and local entities do not have sufficient authority to regulate water use and/or may not be using their authority effectively.

While the Capital Area Groundwater Conservation Commission (CAGWCC) has the authority to regulate water usage from the Southern Hills Aquifer, it has not effectively used its authority to regulate withdrawals. State law[20] created CAGWCC in 1974 as a regional oversight body for part of the Southern Hills Aquifer System to reduce and manage saltwater encroachment and manage groundwater withdrawals to ensure the availability of fresh groundwater in the Greater Baton Rouge area. CAGWCC has the authority to establish groundwater use priorities, limit withdrawals in some areas of the aquifer, permit certain wells, and assess withdrawal fees.

[18] Ecology and Environment, Inc. *Recommendations for a Statewide Ground Water Management Plan.* Prepared for the Louisiana Department of Natural Resources, Office of Conservation, (2011): 16,19. http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/20111206_GWPLAN_FINALTECHAPP.pdf

[19] These sites do not includes additional surface water sites monitored by the USGS using federal funds or funding from other agencies and entities such as the U.S. Army Corps of Engineers and Louisiana Department of Wildlife and Fisheries.

[20] Created by Acts 1974, No. 678 (R.S. 38:3071-3072).

However, our audit on CAGWCC issued in May 2019[21] identified various issues related to CAGWCC's regulation of groundwater. For example, we found that while the Commission has set limits to restrict withdrawals from the 1,500- and 2,000-foot sands, these limits have not reduced the amount of water withdrawn from the aquifer, which is causing saltwater intrusion. In addition, unlike other districts we reviewed,[22] the Commission does not limit withdrawal amounts by well, which would allow the Commission to better manage aquifer usage and give it a mechanism to enforce the limits it does set. For example, if the limit is exceeded within a certain sand, the Commission would not know which user to penalize because the production is not limited by well. Five[23] of the nine districts we reviewed set withdrawal limits on each well to control the amount of groundwater that can be withdrawn from the aquifer on an annual basis.

No other commissions or local entities have been given the authority to regulate groundwater use from other aquifers. State law (R.S. 38:3097.4) grants the Water Resources Commission the authority to direct the Commissioner of Conservation (Commissioner), within DNR, to promulgate rules and regulations for the designation of up to five regional stakeholder bodies of the state based on the location of aquifer systems and water sources of the state. In addition to CAGWCC, the Sparta Groundwater Commission was created in 1999 through Act 1228[24] in response to concerns of increased withdrawals in the north central part of the state and continued uncontrolled use of groundwater from the Sparta Aquifer. However, the Sparta Commission lacks the authority to take actions to manage the aquifer, such as limiting withdrawals.

In addition, the Chicot Aquifer, which had the highest amount of groundwater withdrawals in calendar year 2015, has no regional commission or oversight. As shown in Exhibit 4, approximately 849.90 million gallons of water per day were withdrawn from the Chicot Aquifer, which accounted for 48.5% of the water withdrawn from all groundwater sources in 2015 and more than the combined withdrawals from both the Southern Hills and

Exhibit 4
Withdrawals from Louisiana Aquifers (Mgal/day)
Calendar Year 2015

Aquifer	Total Withdrawals	% Withdrawals
Chicot	849.90	48.5%
Mississippi River Alluvial	384.60	21.9%
Southern Hills	310.84	17.7%
Sparta	60.12	3.4%
Jasper	47.95	2.7%
Evangeline	28.56	1.6%
Upland Terrace	26.87	1.5%
Red River Alluvial	18.30	1.0%
Carrizo-Wilcox	14.97	0.9%
Cockfield	7.32	0.4%
Catahoula	4.06	0.2%
Total Withdrawals	**1,753.49**	**100%**

Source: Prepared by legislative auditor's staff using information obtained from USGS.

[21] Although CAGWCC limits withdrawals, LLA's Performance Audit report issued May 9, 2019 *Regulation of Groundwater Resources - Greater Baton Rouge Area*, found that these limits have not been sufficient at reducing saltwater intrusion.
https://www.lla.la.gov/PublicReports.nsf/782AD0921011AF4E862583F60053DA0D/$FILE/0001CAA9.pdf

[22] We reviewed nine districts including Southwest Florida Management District (Florida), Harris-Galveston Subsidence District (Texas), Yazoo Mississippi Delta Joint Water Management District (Mississippi), Union County Water Conservation Board (Arkansas), Central Colorado Water Conservancy District (Colorado), Upper Trinity Groundwater Conservation District (Texas), Panhandle Groundwater Conservation District (Texas), Edwards Aquifer Authority (Texas), and Barton Springs/Edwards Aquifer District (Texas).

[23] These five include the Southwest Florida Management District (Florida), Harris-Galveston Subsidence District (Texas), Barton Springs/Edwards Aquifer District (Texas), Panhandle Groundwater District (Texas), and Edwards Aquifer Authority (Texas).

[24] R.S. 38:3087.132

Sparta aquifers, which do have some regional oversight. Efforts to develop a conservation district for this aquifer have failed. For example, in 2004, the Chicot Aquifer Stakeholders Group[25] first submitted a request asking the Water Resources Commission and Water Management Advisory Task Force to recognize them as a regional stakeholder body for the Chicot Aquifer. Despite multiple submissions,[26] the Water Resources Commission and Water Management Advisory Task Force never addressed the request for a regional stakeholder body.

DNR has limited authority to regulate the use of groundwater. DNR's Office of Conservation (OC) can restrict the use of groundwater in areas where it has already identified issues. Specifically, state law gives the OC Commissioner the authority to declare the following when addressing groundwater concerns:

- **Area of groundwater concern** when there is evidence an area has been impacted in one or more of the following ways: water level decline, movement of a saltwater front, or subsidence in or from the aquifer caused by overall withdrawals.
- **Critical area of groundwater concern** and limit withdrawals of any or all users in an area if it is determined that sustainability may only be maintained by restricting the amount of withdrawals.
- **Groundwater emergency** if a groundwater source becomes immediately unavailable for use for the near future as a result of a natural force or a man-made act.

Currently, Louisiana does not have any active orders for critical areas of groundwater concern; however, it does have one active order for an area of groundwater concern and one active order for a groundwater emergency as described in Exhibit 5.

[25] The Chicot Aquifer Stakeholders (CASH) Group included water users and scientists who had concerns about the condition and sustainability of the Chicot Aquifer. Their purpose would be to establish a permanent body to study ground water resources in southwestern Louisiana and support and advise the Water Resources Commission in managing the state's water resources.
[26] The most recent submission was at the Water Resources Commission Meeting held on July 31, 2019.

Exhibit 5
Active Orders Declared by Office of Conservation

Area	Declaration Type	Cause	OC Requirements
Areas of the Carrizo-Wilcox and Upland Terrace aquifers in southern Caddo Parish	Groundwater Emergency declared in 2011	Substantial drought beginning in 2010 in north Louisiana placed extreme stress on groundwater resources in the region, particularly in southern Caddo Parish, which caused water levels to drop and local wells to run dry.	Required all persons in the designated areas to reduce the use of groundwater to the "maximum extent possible" and restricted water use for the following: • Watering of lawns and golf courses • Washing of vehicles • Filling of pools • Usage of industrial wells except those used for human consumption.
Areas of the Sparta Aquifer	Area of Groundwater Concern declared in 2005	Excessive water level declines	Required the following remedial actions: • Conduct water conservation education program • Report monthly water usage by owners of non-domestic wells • Pursue alternative sources of potable water.

Source: Prepared by legislative auditor staff using documents obtained from DNR/OC.

State law (R.S. 38:3097.3) also requires that well drillers register new water wells with OC prior to drilling.[27] OC then uses this information to determine the well's impact on the aquifer. If the new well is to be located within a "critical area of groundwater concern" or an area with a "groundwater emergency," the Commissioner may place restrictions on the well, specifying the allowable production, spacing, metering, or well depth so that the withdrawal of groundwater will not have long-term effects on the aquifer. The Commissioner also has the authority to place these same restrictions on new large-volume wells, regardless of their location. Once a well is drilled, OC cannot limit the amount of withdrawals from the well unless the well is in one of the declaration areas mentioned above. Because OC restricts water wells in areas that are already identified as having issues, OC may not be proactive in preventing an area from having future water issues.

Other states have more regional oversight of their water resources, and previous studies have recommended that Louisiana adopt a more regional structure. For example, Texas[28] has 99 groundwater conservation districts that have the authority to manage and regulate water wells, including approving well spacing and limiting withdrawal amounts. Additionally, every five years, each conservation district works with other districts within their area to create a regional water plan. These regional water plans are then submitted to the Texas Water Development Board to be used as the basis of Texas' state water plan. Florida is divided into five water management districts, each responsible for developing water supply plans, and Georgia has 11 water planning regions based on jurisdictional boundaries and sources of water used.

In addition, a 2010 DOTD report, *Louisiana Statewide Perspective on Water Resources,* recommended the state convene regional working groups of water users to identify the issues

[27] Wells must be registered at least 60 days prior to drilling, except for domestic wells, replacement wells, drilling rig supply wells, and drought relief wells, which are to be registered no later than 60 days after completing the well.
[28] *2017 State Water Plan: Water for Texas*. Texas Water Development Board.

unique to their regions and to identify a range of solutions. A 2002 report, *Assistance in Developing the Statewide Water Management Plan*,[29] also recommended that future legislation related to the management of Louisiana's groundwater and surface water resources "should emphasize, among other things, regional planning and management through the use of regional water districts." It recommended the districts include legislatively authorized boards with appointed members representing a cross-section of stakeholders within a region, and that they be responsible for collecting data, reporting, and maintaining records, as well as other activities, including monitoring, compliance, and enforcement.

Act 955 of the 2010 Regular Session created the Surface Water Management Program in DNR to regulate surface water withdrawals through the establishment of *voluntary* cooperative endeavor agreements (CEA) with water users. This program was created after the Louisiana Attorney General's (AG) office issued several opinions in 2010[30] that concluded uncompensated withdrawals would not be allowed under the state constitution[31]. Specifically, Act 955 of the 2010 Regular Legislative Session (R.S. 30:961) directed DNR to serve in a stewardship role in the management, preservation, conservation, and protection of the state's running surface waters. Through DNR's program, a non-riparian[32] person or entity interested in withdrawing running surface water can participate by submitting an application for a CEA, outlining their plan of water use. This application is reviewed by DNR and by relevant stakeholders, such as the Coastal Protection and Restoration Authority (CPRA), the Department of Environmental Quality (DEQ), the Office of Public Health (OPH), and others, to ensure there are no adverse impacts. If approved, applicants enter into a CEA to extract a certain amount of surface water at a fair market value.

Since 2010, the state has entered into 112[33] CEAs that allowed companies to withdraw a total of 3.1 billion gallons in surface water, mostly for oil and gas-related operations such as hydraulic fracturing. These CEAs are for two year terms and resulted in total compensation to the state of $254,473.[34] However, because the Surface Water Management Program does not have the authority to ensure users enter into these agreements, there may be some users who withdraw surface water without compensating the state. After the passage of Act 955 of 2010, in order to determine the fair market value of water, DNR conducted legal research on government entities authorized to sell water.[35] From this research, DNR determined that the Sabine River Authority (SRA) was the only other governmental entity authorized to sell water, and that it sells

[29] C.H. Fenstermaker and Associates, Inc.; LBG-Guyton Associates; Hydro-Environmental Technology, Inc.; and Onebane, Bernard, Torian, Diaz, McNamara & Abell. *Assistance in Developing the Statewide Water Management Plan, Volume I – Identification and Use Assessment of Louisiana Water Resources*. Prepared for the Louisiana Ground Water Management Commission, (2002): 15. http://www.dnr.louisiana.gov/assets/docs/conservation/documents/VolumeItc.pdf

[30] These Louisiana Attorney General Opinions included *No. 08-0176, No. 09-0028, No. 09-0066*, and *No. 09-0291*. Three additional opinions were issued after Act 955 - *No. 10-0173, No. 10-0289*, and *No. 10-0297*.

[31] La. Const. Art. 7, § 14 and La. Civil Code Art. 450.

[32] A riparian owner is an owner whose property borders a stream, river, or lake.

[33] As of September 17, 2019, the state has received a total of 182 applications, of which 112 were executed.

[34] The value of the reported water withdrawn under the in-kind process is an additional $221,665.

[35] According to DNR, they also conducted a survey in 2011 of those involved in water transactions - water users and entities that may buy or sell water - asking about the rate or price per volume of water. DNR determined the results were inconclusive.

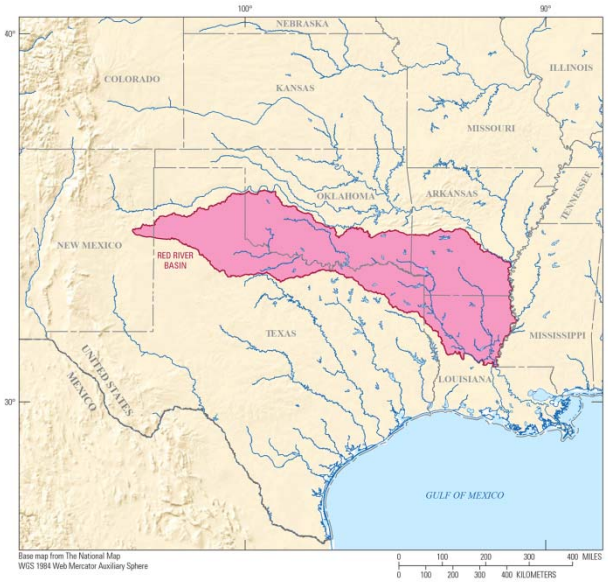
its water for 15 cents per 1,000 gallons.[36] However, DNR does not know whether this represents fair market value and therefore, the SRA may not be receiving appropriate compensation for water transfers.

A 2016 U.S. Environmental Protection Agency study[37] found wide variability in the water market values even among states in the same region. For example, out of the 12 states in the southeast, Louisiana's water is the fourth cheapest. Mississippi, South Carolina, and Virginia all have lower market values than Louisiana. According to the Texas Water Development Board, a number of factors should be considered when determining the price and marketability of water. These factors include the location of the water and whether the water is surface water or groundwater; the anticipated use of the water; the quality and reliability of the water; whether there are alternative sources of water; and other administrative issues. The geographical location of the water is also important, particularly if the water is situated within the jurisdictional boundaries of a river authority or other groundwater conservation district.

To protect its share of surface water flowing across its borders, Louisiana has entered into two interstate compacts. The Sabine River Compact was entered into between Louisiana and Texas in 1953 to provide for equitable apportionment of water between the two states and resolve and prevent disputes over waters of the Sabine River and its tributaries.

Additionally, in 1978, the Red River Compact was signed by Arkansas, Louisiana, Oklahoma, and Texas to resolve and prevent disputes over waters of the Red River Basin that are shared and to assure the member states receive adequate surface flows and releases.

Exhibit 6
Red River Compact Area



Source: USGS

The Red River Compact, as it relates to Louisiana and Arkansas, specifically states that Arkansas is to take steps to regulate the water it diverts into other areas of the state so that an equitable apportionment of the runoff still flows into Louisiana. However, three streams[38] have registered below the threshold outlined in the compact or have registered at zero flow at times from calendar year 2011 through 2018. Although the compact is intended to protect Louisiana's share of these water resources, the water flowing into the state has decreased. This means there is

[36] Act 556 of 2014 later defined fair market value in statute (R.S. 30:961) to be a rate of not more than 15 cents per 1,000 gallons. However, this only applies to those withdrawals from bodies of water managed by DWF and determined to be negatively impacted by invasive aquatic vegetation.
[37] Tetra Tech. *Estimating Monetized Benefits of Groundwater Recharge from Stormwater Retention Practices.* Prepared for United States Environmental Protection Agency, (2016): 57. https://www.epa.gov/sites/production/files/2016-08/documents/gw_recharge_benefits_final_april_2016-508.pdf
[38] Equitable apportionment is measured by minimum flow at the Arkansas-Louisiana state boundary in four specific streams in Louisiana - Ouachita, Bayou Bartholomew, Boeuf River, and Bayou Macon

less surface water available for the northern part of Louisiana, compounding the water issues in an area that also has concerns related to groundwater availability. However, the compact does not include any provisions on how to address noncompliance.

Matter for Legislative Consideration 1: The Legislature may wish to ensure that the statewide water resource monitoring network is continually reviewed and evaluated to determine that oversight entities have the information necessary to properly manage the state's water resources.

Matter for Legislative Consideration 2: The Legislature may wish to consider determining whether broader authority needs to be given to DNR or other state and local entities to restrict water withdrawals on new and existing water wells in order to proactively address water sustainability issues.

Matter for Legislative Consideration 3: The Legislature may wish to consider developing (or direct a person or entity to develop) regional bodies over the state's water resources that are aligned with water location and common water use. If regional bodies are not developed, the Legislature may wish to consider requiring that a regional planning process be used to develop a statewide water management plan.

Matter for Legislative Consideration 4: The Legislature may wish to consider amending R.S. 30:961 to require a person or entity to enter into a cooperative endeavor agreement in order to withdraw running water.

Matter for Legislative Consideration 5: The Legislature may wish to consider directing a person or entity to develop a valuation model for determining the fair market value of Louisiana's water resources and reevaluations over time.

Since 1956, Louisiana has spent at least $5.3 million to conduct 12 studies on water resources and management strategies, and many of these recommended that the state develop a comprehensive management plan. However, Louisiana still does not have a comprehensive water management plan.

Louisiana has spent at least $5.3 million to conduct 12 studies on water management strategies since 1956, many of which have made the same or similar recommendations regarding comprehensive planning and policy related to Louisiana's statewide water resources. In *The Louisiana Water Resources Study Commission's Report to the 1984 Legislature*,[39] the Department of Public Works stated that a "void currently exists with regard to a comprehensive

[39] Due, Dodson, deGravelles, Robinson and Caskey. *The Louisiana Water Resources Study Commission's Report to the 1984 Legislature.* Prepared for the Louisiana Water Resources Study Commission by the Louisiana Department of Transportation and Development, Office of Public Works, (1984): 31.

water policy for Louisiana." Without such a policy, the report concluded, it was impractical to recommend changes in laws and institutions, because it was not clear what the state's goals were for its water resources.

> "It has become clear that a **comprehensive strategy** is needed to address the management of surface water and groundwater resources in Louisiana. Such a strategy should be designed to meet the present and future needs…In particular, a strategy is needed to assure the sustainable use of ground water resources and provided for orderly shifts to alternative water supplies, while preserving and enhancing economic and ecological vitality."
>
> **Source:** *Louisiana Statewide Perspective on Water Resources, 2010*

Louisiana does not have a comprehensive statewide water management plan, which would help ensure that the state's water resources are protected, conserved, and replenished for the health, safety, and welfare of Louisiana citizens. Specifically, a plan would help establish clear authority over water resources and coordination between responsible entities, outline the state's water budget, and address the greatest threats to the state's water resources. Although many of the studies since 1956 recommended that the state develop a statewide water management plan, it still does not have one. For example, a report[40] issued by the Department of Public Works in 1956 on water use in Louisiana recommended that the state develop a statewide water plan. In 1964, the Legislature created a commission to study the water policy of the state and determine what revisions should be considered and submitted to the Legislature.[41] Almost 20 years later, this was brought up again, specifically directing the Office of Public Works to develop a statewide water resource plan to assure the availability, safe use, and wise management of the state's water resources for the short and long term.[42] Exhibit 7 shows these reports and the cost of each. The results of these studies are summarized in Appendix D.

[40] Louisiana Department of Public Works, Louisiana Geological Survey, the United States Geological Survey, and the Committee on Water Use and Conservation. *Water - A Special Report to the Louisiana Legislature: Source, Supply, Use, Development, Needs, Recommendations.* Prepared for the Louisiana Legislature, (1956): 6-7.
[41] Senate Bill No. 166 Act No. 188 (1964)
[42] Senate Bill No. 698 Act No. 625 (1983)

Exhibit 7 Investigative Studies that Resulted in Reports with Recommendations Addressing Comprehensive Water Management for Louisiana		
Year	**Study**	**Cost**
1956	Water – A Special Report to the Louisiana Legislature: Source, Supply, Use, Development, Needs, Recommendations	$40,000
1965-66	The Comprehensive Plan for the State of Louisiana: Water Resources	Could Not Determine
1969-72	Comprehensive Water and Related Land Resources Study for Louisiana	$477,600
1983	Legal and Institutional Analysis of Louisiana's Water Laws with Relationship to the Water Laws of Other States and Federal Government	Could Not Determine
1984	The Louisiana Water Resources Study Commission's Report to the 1984 Legislature	Could Not Determine
2002	Assistance in Developing the Statewide Ground Water Management Plan	$609,744
2010	Louisiana Statewide Perspective on Water Resources	$1,750,000
2011	Recommendations for the Statewide Groundwater Management Plan	$293,820
2012	Managing Louisiana's Groundwater Resources with Supplemental Information on Surface Water Resources: An Interim Report to the Louisiana Legislature	$19,996
2014	Report in Response to SCR No. 53 of the 2012 Regular Session: The Use of Surface Water Versus Groundwater	Could Not Determine
2016	Water Resource Assessment for Sustainability and Energy Management	$220,000
2017	Louisiana Watershed Resiliency Study	$1,930,356
		Total Cost*: $5,341,516

Source: Prepared by legislative auditor's staff using information obtained from the reports above and their associated contracts.
*This total cost does not account for inflation and does not include those reports for which an amount could not be determined due to age of contract or records.

Act No. 446 was passed in 2001[43] and required the Commissioner of Conservation, the Water Resources Commission, and Water Management Advisory Task Force[44] to develop and present a plan by January 2003 for the implementation of a comprehensive water management system. The resulting study, *Assistance in Developing the Statewide Water Management Plan*, provided guidance for the Water Resources Commission[45] and the legislature in the fulfillment of their duties to develop a water management plan. However, according to OC, the development of a plan is contingent on the development of a water code because of concerns that any changes to laws or regulations may end up being negated by the finished code. The water code is currently being developed by the Louisiana State Law Institute (LSLI) with a goal towards creating a model water code that integrates all of Louisiana's surface and groundwater resources, which are inextricably linked.

Five of the seven other Southeastern states we reviewed had a statewide comprehensive water management plan.[46] These plans, at a minimum, outlined the legal authority for the creation of a plan and identified the lead agency responsible for implementing the plan. These plans also included the current and historic usage of water and a comparison with future demands to ensure resources were sustainable. In addition, these plans discussed

[43] Senate Bill No. 965 Act No. 446 (2001)
[44] At the time of passage of Act 446, the Water Resources Commission was named the Ground Water Management Commission and was placed within the office of the governor, while the Water Management Advisory Task Force was named the Ground Water Management Advisory Task Force.
[45] The Commission, initially placed within the office of the governor, was transferred to the office of conservation in 2003 by Act No. 49 which also changed the name to "Water Resources Commission".
[46] Although Alabama and Mississippi do not currently have statewide water plans, Arkansas, Florida, Georgia, Texas, and Virginia do have statewide water plans.

interagency coordination to clarify how entities should communicate and coordinate with one another. Comprehensive water plans allow these states to evaluate their long-term goals and identify potential threats to water resources, as well as establish implementation recommendations to combat the threats. For example, Texas' water plan includes a plan for each regional planning area, water management strategies through 2070, and the water needs for all users. Exhibit 8 outlines the main components in the plans we reviewed and includes examples from Texas' State Water Plan.

Exhibit 8
Main Areas Addressed in Other States' Comprehensive Water Management Plans

Area/Number of States with Area Addressed in Management Plan	Examples of Issues Addressed (Texas' State Water Plan)
Legal Authority: Identifies the specific authority in statute requiring a plan and outlines the specifics required of the plan. (5/5)	Key state water planning statutes and rules are in place to ensure that the Texas Water Development Board (TWDB) is creating and implementing the plan.
Water Budget: Outlines the current and historic usage of water, as well as forecasting the projected use. (4/5)	Outlines the current state of water use in Texas and projects the need of water over the next 50 years.
Lead Agency Identified: Describes the agency tasked with creating and monitoring the plan. (5/5)	Statute identifies the TWDB as the lead agency with responsibility of the Water Plan. The plan also states "The TWDB is the state's primary water supply planning and financing agency."
Interagency Communication: Outlines how the lead agency will work with other agencies that share in water management responsibilities. (5/5)	Clearly outlines the roles of various Texas state agencies and discusses how each fits in the overall water management plan.
Goals and Recommendations: Describes what the state plans to do concerning the biggest threats facing the state's water resources. (5/5)	Outlines the policy recommendations and goals that the plan should achieve and also explains the issues and provides recommendations on what steps could be taken to remedy the concern.
Implementation Plans: Outlines actual steps the state plans to take to carry out the recommendations stated. (5/5)	Outlines an implementation section including practical steps to ensure that current goals are being met and an evaluation of the implementation efforts from the previous plan.

Source: Prepared by legislative auditor's staff using information obtained from the statewide water management plans from Arkansas, Florida, Georgia, Texas, and Virginia.

Matter for Legislative Consideration 6: The Legislature may wish to consider designating a person or entity to develop a comprehensive water resource management plan that ensures water resources are protected, conserved, and replenished for the health, safety, and welfare of the people, as stated in Louisiana's Constitution. The development and implementation of the plan should be appropriately funded and include, at a minimum, the following elements to ensure sustainable water usage:

- Establishment and description of a statewide water vision;
- Identification and directive for the agency that has the lead responsibility for developing and updating the comprehensive plan;
- Identification of collaborative or advisory entities;
- Requirements for interagency coordination;

- A water budget – an evaluation of the state's surface water and groundwater resources including current inventory and usage, projected demands, and potential future deficit areas;
- Identification of water challenges with detailed and actionable strategies to address those challenges;
- Development of a water use conservation program;
- Evaluation of alternatives to groundwater use, such as surface water usage, to include a treatment and transmission system, and reclaimed water;
- Evaluation of alternatives to surface water use, including treatment, transmission systems, and reclamation;
- Incentives for conservation;
- An outline of how alternative technologies can be used;
- Outline of a process for how water transfers will be handled, including the development of a valuation model for determining the fair market value of Louisiana's water over time; and
- Description of how often the water plan will be updated.

APPENDIX A: SCOPE AND METHODOLOGY

We conducted this performance audit under the provisions of Title 24 of the Louisiana Revised Statutes of 1950, as amended. Our review evaluated the management of surface and ground water in the Louisiana and covered the time period beginning in 1956 through the present day. The objective of this review was:

To provide information on Louisiana's management of its water resources.

This audit was not conducted in accordance with generally accepted *Government Auditing Standards* issued by the Comptroller General of the United States; however, we used those standards as a guide and believe the evidence obtained provides a reasonable basis for our findings and conclusions. To answer our objective, we performed the following audit steps:

- Researched and reviewed relevant state statutes and regulations relating to the management of Louisiana's statewide water resources and relevant entities.

- Reviewed the state's regulatory efforts along with policies and procedures on water management from entities, including the Department of Natural Resources, Office of Conservation, Groundwater Management Program; the Department of Natural Resources, Office of Coastal Management, Surface Water Management Program; the Department of Environmental Quality, Office of Environmental Assessment, Water Planning and Assessment Division; the Department of Transportation and Development; the Department of Health, Office of Public Health; the Department of Agriculture and Forestry, Office of Soil and Water Conservation; and the Sabine River Authority.

- Obtained and analyzed water-use and monitoring network data from the United States Geological Survey.

- Researched water plans of seven southeastern states to compare the design and contents to Louisiana's water plan. We focused on the southeastern states listed below because of their geographic proximity and similar or shared water resources.

    1. Alabama: Alabama did not have a statewide water plan as of December 2019.

    2. Arkansas: *Arkansas Water Plan, Update 2014* - For Arkansas' current water plan and all previous updates, see https://arwaterplan.arkansas.gov/.

    3. Florida: *2019 Florida Water Plan* - For Florida's Office of Water Policy's current water plan and district water management plans, see

https://www.arcgis.com/apps/Cascade/index.html?appid=473b768b4af049bf91b2879b83ea961c.

4. Georgia: *Georgia Comprehensive State-wide Water Management Plan* - For information on Georgia's Water Planning, including the state water plan and regional water plans, see https://waterplanning.georgia.gov/state-water-plan.

5. Mississippi: Mississippi does not currently have a statewide water plan; however, the Yazoo Mississippi Delta Joint Water Management District conducts its own water planning. For Yazoo's current water plan, *Water Management Plan*, see http://www.ymd.org/publications.htm.

6. Texas: *Water for Texas, 2017 State Water Plan* - For Texas' current water plan and additional information provides by the Texas Water Development Board, including previous updates, see https://2017.texasstatewaterplan.org/statewide.

7. Virginia: *State Water Resources Plan* - For Virginia's current water plan and other components to the state's water supply planning, see https://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/WaterSupplyPlanning/StateWaterResourcesPlan.aspx.

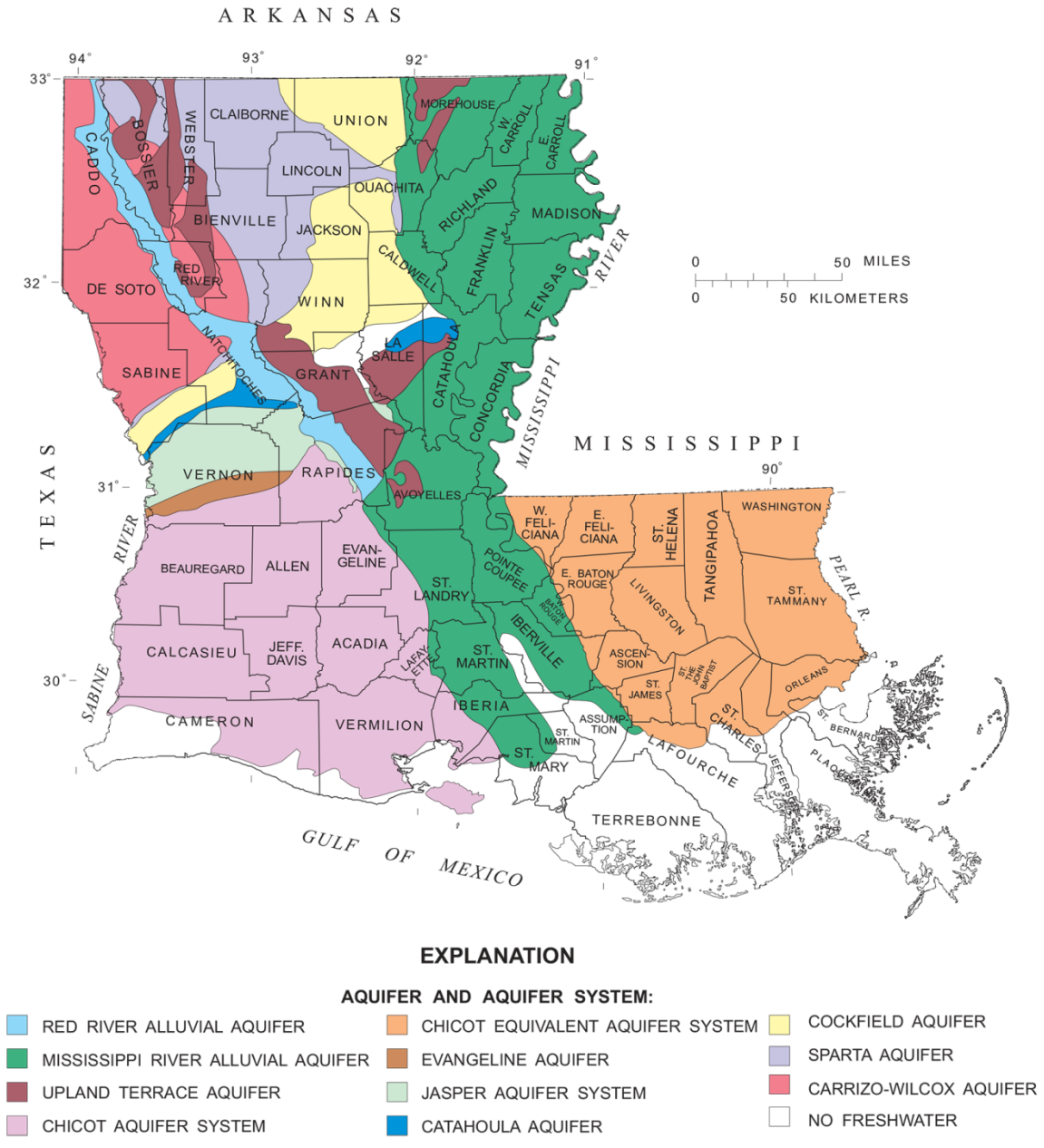
- Obtained and reviewed a range of studies produced from 1956-2017 concerning water resource management in Louisiana (also outlined in Exhibit 7 of the report). This list is not exhaustive of all available reports and studies; however, it is indicative of the many comprehensive reports issued over the time period surveyed.

- Held interviews with water resource stakeholders, including the Tulane Law School, Institute on Water Resources Law and Policy; United States Geological Survey; the Department of Natural Resources, Office of Conservation, Groundwater Management Program; the Department of Natural Resources, Office of Coastal Management, Surface Water Management Program; the Department of Environmental Quality, Office of Environmental Assessment, Water Planning and Assessment Division; the Department of Transportation and Development; the Department of Health, Office of Public Health; the Department of Agriculture and Forestry, Office of Soil and Water Conservation; and the Sabine River Authority.

- Presented our findings and requested and received feedback from United States Geological Survey; the Department of Natural Resources, Office of Conservation, Groundwater Management Program; the Department of Natural Resources, Office of Coastal Management, Surface Water Management Program; the Department of Transportation and Development; and the Tulane Law School, Institute on Water Resources Law and Policy for accuracy and reasonableness.

APPENDIX B: LOUISIANA'S PRIMARY AQUIFERS AND AQUIFER SYSTEMS

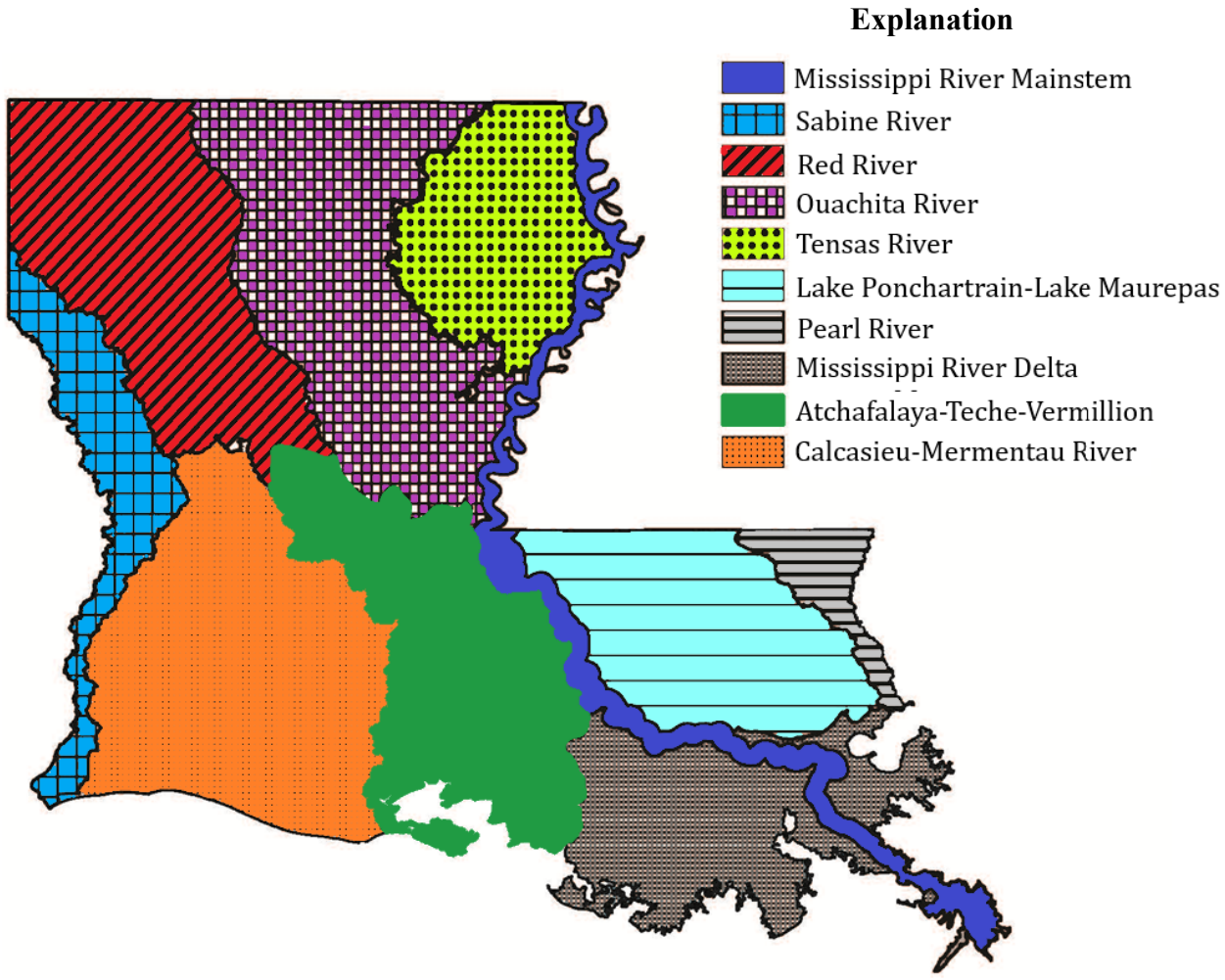
The map below depicts the approximate areal extent of Louisiana's 11 primary freshwater aquifers and aquifer systems, including the Southern Hills Aquifer System, which is made up of three separate subsystems: the Jasper Equivalent, Evangeline Equivalent, and Chicot Equivalent Aquifer Systems (noted only as the Chicot Equivalent Aquifer System in the legend below); Cockfield Aquifer; Evangeline Aquifer; Jasper Aquifer System; Chicot Aquifer System; Upland Terrace Aquifer; Sparta Aquifer; Carrizo-Wilcox Aquifer; Catahoula Aquifer; Mississippi River Alluvial Aquifer and Red River Alluvial Aquifer.



Source: United States Geological Survey

APPENDIX C: LOUISIANA'S PRIMARY SURFACE BASINS

The map below depicts the approximate areal extent of Louisiana's ten primary surface water basins.



Source: United States Geological Survey

APPENDIX D: LOUISIANA WATER MANAGEMENT STUDIES

Investigative Studies that Resulted in Reports with Recommendations Addressing Comprehensive Water Management		
Year	**Study**	**Cost**
2017	*Louisiana Watershed Resiliency Study*	$1,930,356

Summary:

In response to extreme flooding events in 2016, the Federal Emergency Management Agency (FEMA) and the Louisiana Governor's Office of Homeland Security & Emergency Preparedness (GOSHEP) conducted a watershed study of flood impacted areas in 22 watersheds affected by the 2016 events. The study compiled essential data and analysis, identified stakeholders and resources, and lists observations intended to assist the development and implementation of the study's goals over time. The resulting report, *Louisiana Watershed Resiliency Study,* is intended to be used to assist planning, recovery, mitigation, and protection priorities for those watersheds and outlines the following:

- Prioritization of risk reduction and mitigation incentives offered by other government bodies, financial institutions, nonprofits, and others with a vested interest in creating a safer state for residents.
- Water management strategies with the goal of providing policymakers with tools to more efficiently use federal and state funding.

Recommendations:

Although the report states that, "Based on specific guidance provided by the state, recommendations are not included in this study," certain recommendations for a comprehensive watershed study are discussed throughout the report and included the following:

- Develop a complete watershed study that is based in an understanding of the natural processes associated with each water resource as well as its current and potential future conditions. The study should provide planning, policy, improvement, and implementation recommendations for resilience, as the process for ongoing data collection and sharing among stakeholders is a key component of the watershed study process.
- Stakeholders should collect and conduct a detailed analysis of base flow data for individual watersheds.
- Stakeholders should collect information identifying major bridges and culverts, as resizing culverts, or replacing culverts with bridges or other structures with larger spans that allow high flows to pass, is an important watershed restoration and protection strategy.
- The use of online basins is not recommended. Detention basins/stormwater management facilities that are constructed on or adjacent to rivers, streams, or lakes designed to temporarily detain runoff in order to protect against flooding and protect downstream channels from hydro modification are referred to as "online" basins.
- Stakeholders should document a detailed inventory of detention and/or retention basins in their watershed, in addition to other stormwater management facilities.
- Stakeholders should inventory their proposed transportation improvements, as the location of the roadway system may be impacted in various ways such as delayed response time in providing emergency services, impaired access to homes and businesses, lost economic activity, and damage to roadway infrastructure.
- Stakeholders should complete their own inventory of other hydrologic and hydraulic studies to ensure accuracy and completeness.
- Policy changes are needed to reduce current and future flood risk to communities. Additionally, resilience policies are needed to better achieve risk reduction goals across coastal Louisiana. These include comprehensive land-use planning, hazard mitigation planning, improved regulatory tools, improved infrastructure and building standards, and improved capital planning and incentives.

Where to Find Report:

https://femar6.github.io/lawrs/

Federal Emergency Management Agency, Mitigation Branch, Hazard Performance Analysis Group. (2017). *Louisiana Watershed Resiliency Study*. Prepared for the Louisiana Governor's Office of Homeland Security & Emergency Preparedness. Baton Rouge, LA.

2016	*Water Resource Assessment for Sustainability and Energy Management*	$220,000

Summary:

In order to effectively manage Louisiana's water resources, it is necessary to develop an assessment framework that can conjunctively appraise supply and demand in both ground and surface water units across the state. The resulting study and report by the Water Institute of the Gulf, *Water Resource Assessment for Sustainability and Energy Management* discusses the following:

- Managing both resources together, rather than in isolation, allows water managers to use the advantages of both resources for maximum benefit. Interactions of both surface and ground water can affect the supply of both - groundwater contributes a significant amount of water to streams (surface water) as base flow, while surface water contributes to the recharge of an aquifer. When these processes are altered by human activity, climate change, or other mechanism, the distribution and availability of water in the surface and subsurface may be affected.
- Development of a framework and the testing of its application in three regions across Louisiana, selected based on the presence of critical water budget issues.
    - Southwest study area included a portion of the Chicot Aquifer, as well as the Bayou Teche and Vermilion River surface watersheds. A large part of this area is dependent on rice cultivation and aquaculture, two industries that require large amounts of freshwater. Additionally, the study area was within the coastal zone which has the potential to be impacted by shifting salinity zones.
    - Northwest study area included a portion of the Carrizo-Wilcox Aquifer, as well as the Red River. This area is extensively utilized by industry and public water suppliers and is also notable for the development of the Haynesville shale gas over the last decade, an industry that requires large amounts of water.
    - Southeast study area included that portion of the Southern Hills Aquifer System bounded by the Mississippi River on the west and the Tangipahoa River on the east. This area is one of the most urbanized in the state and is home to a number of large, water-reliant industries. Additionally, the Baton Rouge area, in particular uses a great deal of groundwater to provide drinking water to its residents as well as to provide water for the petrochemical plants and oil refineries sited along the Mississippi River.
- This framework presents a conceptual water budget that quantifies the inputs, outputs, water withdrawals, and usage in ground and surface water in hydrologic units across the state. This allows for an appraisal of current and expected future water supply and demand and serve as a planning instrument that can better inform management decisions and minimize the potential impact of future growth on overall water costs, both social and economic.

Recommendations:

- The following components should be included within a water budget framework and considered in future studies:
    - Population growth should be the starting point for any future projections of changing water demand.
    - Energy costs - because the supply and use of water and energy are intricately connected.
    - Effects of seasonality – because not all surface water is available for use at all times.
    - Effects of user distance to surface water bodies – because surface water usability is affected by distance and the cost to convey it over increased distances.
    - Minimum ecological flow required to sustain healthy coastal ecosystems - because the study area watersheds discharge surface water to the coastal zone. Further study is needed to determine the amount of fresh water needed to support this function.
    - Minimum ecological flow required to sustain healthy riparian ecosystems. Further study is needed to determine the amount of fresh water needed to support this function.
- Sustainability should be defined as a balance between use and supply that causes no further impairment to water resources, and maintains or improves the current health of these systems.

Where to Find Report:

http://www.dnr.louisiana.gov/assets/OC/env_div/WaterInstituteWaterPlanningReport071516.pdf

Hemmerling, S.A., Clark, F.R., & Bienn, H.C. (2016). *Water Resources Assessment for Sustainability and Energy Management.* The Water Institute of the Gulf. Prepared for and funded by the Louisiana Department of Natural Resources and the Coastal Protection and Restoration Authority. Baton Rouge, LA.

2014	*Report in Response to SCR No. 53 of the 2012 Regular Session: The Use of Surface Water Versus Groundwater*	Could Not Determine

Summary:

The Louisiana Ground Water Resource Commission in its 2012 report entitled *"An Interim Report to the Louisiana Legislature: Managing Louisiana's Groundwater Resources with Supplemental Information on Surface Water Resources,* recommended that the Legislature "engage legal scholars to research and explore the potential non-compensated consumption of surface water when used as an alternative to groundwater. Senate Concurrent Resolution 53 of the 2012 Regular Session then requested that the Louisiana State Law Institute (LSLI) undertake a study of legal issues surrounding groundwater and surface water law and report on any needs for revision to current law. LSLI created a Water Law Committee to conduct this review which resulted in the report, *Report in Response to SCR No. 53 of the 2012 Regular Session: The Use of Surface Water Versus Groundwater,* and included the following:

- History and background information leading up to SCR 53.
- Louisiana's legal treatment of running surface water and groundwater, including riparian rights in Louisiana and Correlative Rights of Groundwater - Louisiana law recognizes "running surface waters of the state…as public resources, owned by the state, and usually subject to a charge for consumption, with the exceptions of riparian owners and other uses such as agriculture, aquaculture, and municipal purposes. [By contrast,] groundwater, when reduced to possession, is treated as privately owned and free of charge."
- Constitutional Issues including, the Federal Dormant Commerce Clause, the Louisiana Natural Resource Clause, and Louisiana's prohibition against donations of state property.

Recommendations:

- Louisiana groundwater law should be studied, as the redactors of the Mineral Code initially decided to exclude ground and surface water from coverage in the Mineral Code. This included recommendations for the reform of Louisiana's treatment of Riparian Rights and reform of Louisiana's treatment of groundwater.
- The Louisiana State Law Water Code Committee should be created and invested in continuing to study the state's current treatment of running surface water and groundwater, with the intent of adopting comprehensive legislation (Water Code) designed to treat all related problems of water law and integrates all of Louisiana's water resources.

Where to Find Report:

http://www.lsli.org/files/reports/2014/11.%202012%20SCR%2053%20Surface%20Water%20and%20Groundwater%20Report.pdf

Louisiana State Law Institute, Water Law Committee. (2014). *Report in Response to SCR No. 53 of the 2012 Regular Session: The Use of Surface Water Versus Groundwater.* Prepared for the Louisiana Legislature. Baton Rouge, LA.

2012	*An Interim Report to the Louisiana Legislature: Managing Louisiana's Groundwater Resources with Supplemental Information on Surface Water Resources*	$19,996

Summary:

House Concurrent Resolution 1 of 2010 directed the Water Resources Commission was directed to compile information concerning water resources and their governance, including recommendations for enhancing water management. The resulting report, *An Interim Report to the Louisiana Legislature: Managing Louisiana's Groundwater Resources with Supplemental Information on Surface Water Resources*, includes the following:

- A history of groundwater management in Louisiana
- A summary of the current governance system, including a list of stakeholders
- 35 detailed recommendations for groundwater management
- Supplemental water inventory information

Recommendations:

- Improve the current inadequate monitoring network and audit current water users
- Engage in education and public outreach
- Improve governance system, registration of wells and enforcement
- Investigate incentives for groundwater conservation
- Develop a plan to respond to water resource emergencies
- Improve collaboration among agencies and stakeholders

Where to Find Report:

http://www.dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=907

Louisiana Ground Water Resources Commission. (2012). *An Interim Report to the Louisiana Legislature: Managing Louisiana's Groundwater Resources with Supplemental Information on Surface Water Resources.* Prepared for the Louisiana Legislature. Baton Rouge, LA.

2011	*Recommendations for a Statewide Groundwater Management Plan*	$293,820

Summary:
Increases in water demand partly due to part to persistent drought conditions, especially in the northern region of the state, precipitated a renewed public interest in how the state's groundwater and surface water resources are managed. A comprehensive approach is necessary, from updating the water resources baseline conditions to evaluating possible cost-effective water-resource alternatives in order to ensure that water resources are utilized judiciously and in a sustainable manner. This report focuses on the following:

- Conservation and sustainability of groundwater and surface water resources consistent with the State's vision to preserve the quality and sustainability of its groundwater resources.
- Review of the statewide data bases on water uses and current system of water use.
- Statewide groundwater management plan with recommendations for future data use and policy.

Recommendations:

- Develop more stringent and discrete well registration and evaluation processes to ensure that conservation and sustainability of water resources are achieved.
- Educate consumers on methods to conserve water resources and how can they benefit from them and build awareness among all water users regarding the value our water resources.
- Develop surface water programs to engage all stakeholders.
- Create potential incentives that can be made available to water resource users to promote groundwater sustainability.
- Consider initiating discussions on framing and implementing an adequate fee structure for major water users.
- Develop mechanisms assisting state agencies to forecast groundwater and surface water demands for short- and long-term needs, such as coordination and data sharing among monitoring agencies, United States Geological Survey (USGS), Louisiana Department of Natural Resources (LDNR), Louisiana Department of Environmental Quality (LDEQ), and Louisiana Department of Transportation and Development (LDOTD).
- In tandem with the LDNR online information system, develop and implement a geographic information system (GIS)-based database to monitor and adaptively manage the resources.
- Empowerment of the Sparta Groundwater Conservation District with Capital Area Conservation Commission-level Authorities.
- Consider cost-effective alternatives to groundwater from healthy aquifers, using non-potable surface and groundwater for industrial purposes, and innovative funding mechanisms.

Where to Find Report:

For Executive Summary:
http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/20111205_GWPLAN_FINALEXECSUM.pdf
For Technical Report:
http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/20111206_GWPLAN_FINALTECHAPP.pdf

Ecology and Environment, Inc. (2011). *Recommendation for a Statewide Ground Water Management Plan.* Prepared for the Louisiana Department of Natural Resources, Office of Conservation. Baton Rouge, LA.

2010	*Louisiana Statewide Perspective on Water Resources (and Basin Characterization Reports)*	$1,750,000

Summary:

Because a comprehensive strategy is needed to address the management of surface water and groundwater resources in Louisiana, DOTD developed a priority program for proposed state-funded surface water reservoirs that could address current and emerging water resources issues and needs. This study was designed to assist in the Reservoir Priority and Development Program (RPDP) and the resulting report determined that uneven development of surface water and groundwater resources was an issue and so investigated both. The study consists of reports on each of Louisiana's surface water basins, a comprehensive technical report, and an executive summary which outlined the following:

- Summary of water resources in Louisiana for both ground and surface water, including water use information; groundwater aquifer conditions; water resource issues; current and future trends; and management responsibility.
- Individual surface water basins, including the Atchafalaya-Teche-Vermillion, Calcasieu-Mermentau, Lake Ponchartrain-Maurepas, Mississippi River Delta Basin, Ouachita River, Pearl River, Red River, Sabine River, and Tensas River.
- Uncoordinated development of Louisiana's surface water and groundwater resources is expected to negatively affect economic development opportunities in the state.

Recommendations:

- Louisiana should develop a statewide water resources management strategy.
- The Governor should direct water-related state agencies to create a coordinated plan for water resources management.
- Louisiana should provide state-level support for regional water planning.
- Louisiana should require long-range planning for high-volume users.
- Through the RPDP and similar programs, Louisiana should reduce reliance on groundwater.
- Louisiana should review ongoing water monitoring programs and emphasize groundwater monitoring in aquifer management.
- Louisiana should determine sustainable yields of its water resources.
- Louisiana should set statewide priorities through aggregation of regular, regional assessments.

Where to Find Report:

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Public_Works/Dam_Safety/RPDP_Reports/Forms/AllItems.aspx

MWH Americas, Inc. (2010). *Louisiana Statewide Perspective on Water Resources.* Prepared for the Louisiana Department of Transportation and Development, Public Works and Water Resources Division. Baton Rouge, LA.

2002	*Assistance in Developing the Statewide Ground Water Management Plan*	$609,744

Summary:

Act 446 of 2001 created the Ground Water Management Commission and a Ground Water Management Advisory Task Force to advise the Commission. One of the duties of this commission and its advisory groups was to develop and implement a comprehensive statewide water management plan. The resulting report, *Assistance in Developing a Statewide Ground Water Management Plan,* was intended to serve as a road map for developing and implementing water regulations for Louisiana. The framework is represented in three volumes and includes:

- Identification and use assessment of Louisiana water resources.
- Planning and management issues.

Recommendations:

- Address and resolve legal and jurisdictional issues through the creation of a comprehensive water management plan such as adoption of a correlative rights model and ending rule of capture
- Coordinate comprehensive management plans with neighboring states while considering common issues of concern.
- Critical area designations should be made on a case-by-case basis - data and models that support a decision in one case are not sufficient to warrant a similar decision in another.
- A new definition for Critical Ground Water Area should be incorporated into legislation, in addition to three other definitions should which should be included in the final Statewide Water Management Plan - "Potential Critical Ground Water Area," "Ground Water Stress Area," and "Ground Water Emergency." This would create a four-tiered designation system: potential /critical/stress/emergency. The current definition of "sustainability" should be retained.
- Develop management strategies involving efficiency measures and incentives.
- Future legislation should emphasize water conservation, incentives to conserve water, public education, and regional planning and management.
- The goals of the agency that ultimately administers the Statewide Comprehensive Water Management Plan should be: make recommendations for statewide policy, management objectives, and standards for data collection and monitoring activities; provide Critical Ground Water Area determinations and recommendations; set priorities; promote and enhance interagency cooperation; and provide water education and conservation programs.
- Establish an Office of Water Resources (OWR) within DNR and a Louisiana Water Commission (LWC), where the OWR acts as the staff for the LWC.
- All ground water related functions and staff should be transferred from DOTD to DNR.
- Create Regional Water Resource Districts to aid OWR different geographic regions of the state and represent a cross-section of the stakeholders within that region. They should also be responsible for data collection and reporting and for the maintenance of data records, in addition to monitoring, compliance, and enforcement activities.
- Replace the well registration process with a permit system to allow better control over the installation of water wells and ensure the collection of data needed to monitor groundwater conditions. The permit system should also give the ability to allow or deny permission to drill a well in addition to enforcement powers.
- The Governor should authorize the establishment of a Louisiana Drought Management Team, which would be comprised of three committees - the Water Availability and Outlook Committee (WAOC), the Impact Assessment and Response Committee (IARC), and the Interagency Coordinating Committee (ICC)

Where to Find Report:

Volume I – http://www.dnr.louisiana.gov/assets/docs/conservation/documents/VolumeItc.pdf
Volume II – http://www.dnr.louisiana.gov/assets/docs/conservation/documents/VolumeII.pdf
Volume III – http://www.dnr.louisiana.gov/assets/docs/conservation/documents/VolumeIIItc.pdf

C.H. Fenstermaker and Associates, Inc.; LBG-Guyton Associates; Hydro-Environmental Technology, Inc.; and Onebane, Bernard, Torian, Diaz, McNamara & Abell. (2002). *Assistance in Developing the Statewide Water Management Plan.* Prepared for the Louisiana Ground Water Management Commission. Baton Rouge, LA.

1984	*The Louisiana Water Resources Study Commission's Report to the 1984 Legislature*	Could Not Determine

Summary:
Starting in 1964, the Water Resources Study Commission (WRSC) was charged with the responsibility of studying the state's water policy and identifying changes needed in the policy. The WRSC summarized the previously developed information on water resources, water use, and problem areas; and generated additional information on other water concerns. The resulting report, *The Louisiana Water Resources Study Commission's Report to the 1984 Legislature,* presents information on areas of concern by the various water resources interests in Louisiana and provides recommendations for a comprehensive water policy for Louisiana in advance of a comprehensive water law. The report discusses the following:

- The results of efforts made by the Office of Public Works since 1966 to develop a state water plan which is "comprehensive" in nature; where consideration has been given to all key aspects of water resources – supply, quality, recreation, flood mitigation, fish and wildlife, and navigation.
- A void exists in regard to a comprehensive water policy in Louisiana – a state having water-related laws and water-management agencies does not equate to a state having a water policy.
- Louisiana has reached the point where a comprehensive water policy is needed to increase the health, economic, and social usefulness of water to its residents.

Recommendations:
General Water Policy

- Public drinking water supply shall be considered the use of first priority. The quantity and quality of drinking water shall, as a minimum be monitored and protected for the public health and welfare.
- It is recognized that the water resources of Louisiana are an endowment of great significance and shall be used and managed to provide present and future heath, economic, social and quality of life benefits to Louisiana.
- The State shall actively encourage and pursue the wise development of Louisiana's abundant water resources to the full economic development potential of the resource. At the same time, conservation of the state's water resources shall be encouraged and practices that encourage waste shall be eliminated.
- Ground and surface water are part of the same hydrologic cycle and shall be considered together by the various state agencies in planning, management, and laws.
- Quantity and quality of water are interdependent; therefore, agencies shall coordinate with respect to their water resources activities.
- Public education and involvement in water resources matters in Louisiana shall be strengthened.
- Water data collection, storage, and retrieval should be comprehensive and current, and shall be shared by public agencies. The data shall, in addition to existing sources, be made available from a centralized location.

Water Law-Related Policy

- The primary responsibility and authority for protection of ground and surface water shall be vested in the State. The State shall provide adequate and concise water laws to protect the rights of the citizens of Louisiana.
- It is the policy of the State to lessen the effects of severe droughts and other natural and manmade disasters that affect water quantity and/or quality through the development of a contingency plan.
- Through the expression and implementation of the water policies of the State and through formal interagency coordination mechanisms, the water resources agencies of the State shall work together toward common goals with respect to the use and protection of Louisiana's water resources.
- Transport of water between basins or political units shall be regulated by the State.
- The State shall take the necessary measures to ensure that the waters of the State are not diverted to out- of-state users without the permission of the State of Louisiana.

Surface Water Policy

- Municipal and domestic sewage shall be properly treated before entering State waters.
- Non-point sources of pollution shall be managed to the maximum practicable extent.
- Industrial wastewater s shall be properly treated as required before entering state waters.
- Louisiana fisheries are of economic and social value, and the State shall preserve and enhance the water quality for fisheries production.
- The State recognizes the unique nature and importance of the Louisiana coastline and coastal zone to maintaining official state territorial waters, fish and wildlife production, and hurricane protection. It is also recognized that the Louisiana coastal wetlands are dynamic, not static, in nature. The State shall undertake to manage this area in such a way

as to foster conditions that favor the production and use of coastal resources, promote accretion of wetland areas, and inhibit loss of wetlands and coastal barrier features to erosion and reduce saltwater intrusion problems.

- The State recognizes the importance of the Mississippi River as a water supply source, as well as the public concern over the possible adverse health effects of drinking Mississippi River water, and shall conduct the necessary research to assure the quality of treated Mississippi River water.
- The State of Louisiana shall take an active role in protecting and improving the quality of interstate streams in Louisiana through interstate compacts and coordination.
- The State will determine minimum streamflows statewide and adopt measures to minimize reduction below historical low-flows to support in- stream needs such as navigation, recreation, and fish and wildlife.
- An adequate and healthful water supply is essential to the health and economic growth of Louisiana~ and the State shall provide assistance to ensure that water needs are met.
- The State shall adequately monitor water quality at contact water recreation sites to ensure that the public health and safety are protected.
- Protection of the life and property of Louisiana citizens from flooding is crucial to the continued health and development of this state. The State shall ensure that flood control efforts are effective and that the effects of flood control measures on other water needs are minimized.
- Unique and scenic streams of the state shall be preserved and protected in order to provide recreation opportunities for present and future Louisiana residents.
- The State shall ensure that laws governing the construction of reservoirs or diversion facilities adequately protect the water supplies of downstream users and downstream needs.
- The State of Louisiana shall encourage the use of major waterbodies for public recreation.

Groundwater Policy

- It is the policy of the State to protect its abundant and valuable groundwater resources from being wasted via free - flowing wells and from contamination by way of existing and improperly constructed or abandoned wells of all kinds; improper waste disposal; septic tanks; boreholes; and storage of materials.
- The State recognizes that groundwater quantity and quality are affected by out-of-state activities and the State shall work with adjacent states to protect groundwater in common systems.
- The State shall identify and take special measures to ensure that important aquifer outcrop areas are not subject to contamination or alteration that adversely affects recharge.

Where to Find Report:

Louisiana State Library – Louisiana Collection – 333.91

Due, Dodson, deGravelles, Robinson and Caskey. (1984). *The Louisiana Water Resources Study Commission's Report to the 1984 Legislature.* Prepared for the Louisiana Water Resources Study Commission by the Louisiana Department of Transportation and Development, Office of Public Works. Baton Rouge, LA.

1983	*Legal and Institutional Analysis of Louisiana's Water Laws with Relationship to the Water Laws of Other States and Federal Government*	Could Not Determine

Summary:
The Department of Transportation and Development, Office of Public Works commissioned a comprehensive study of Louisiana water law on behalf of the Louisiana Water Resources Study Commission. The Water Resources Study Commission was established in 1964 and charged with the responsibility of studying the state's water policy, identifying any changes needed in this policy, and making recommendations on how to do so. It sought to provide engineers and planners preparing Louisiana's water management and conservation plan with a reliable and authoritative analysis of Louisiana's water laws and institutions which can be used as a guide in the formulation of such a plan. The six-volume series outlined:

- Comprehensive review of the statutes, regulations, and court decisions of the state of Louisiana, several nearby states, and those of the federal government related to water law and water resources;
- Constitutional issues with regard to property owner's rights to use either surface or groundwater;
- Jurisdiction of state agencies over the water resources of the state, their overlap, conflict, or gaps;
- Interstate compacts relating to water diversions or transfers; and
- Water conservation measures.

Recommendations:

- Because existing agencies with jurisdiction over water quality do not appear to have sufficient authority to deal with the problem of water withdrawals or diversion which indirectly affect water quality, if any sort of water use permit system were to be implemented, the need for coordination between these two functions would become more important and would suggest the need of combining water supply and water quality jurisdiction in one department.

Where to Find Report:

Louisiana State University Law Library – Louisiana Collection KFL356 .L44 1983 V.1-5

Due, Dodson, deGravelles, Robinson and Caskey; Professor Klebba, James M.; Professor Schoenbaum, Thomas M.; and Professor Yiannopoulos, A. N. (1983). *Legal and Institutional Analysis of Louisiana's Water Laws with Relationship to the Water Laws of Other States and Federal Government.* (Vols. I-VI). Prepared for the Louisiana Department of Transportation and development, Office of Public Works. Baton Rouge, LA.

1969	*Comprehensive Water and Related Land Resources Study for Louisiana*	$477,600

Summary:

The Federal Water Resources Planning Act of 1965 sponsored a nationwide planning research program that provided assistance to states for comprehensive water and related land resources planning. The Louisiana Department of Public Works was given the responsibility in 1966 of conducting a comprehensive study that would be used to develop a workable plan for determining, and ultimately providing for, the future water needs of the state. This study was conducted through multiple phases and were presented in *Comprehensive Water and Related Land Resources Study for Louisiana,* which presented information on:

- Baseline municipal, agricultural, and industrial water use in Louisiana, 1967.
- Inventory of ground and surface water resources and projected requirements for Louisiana, 1970-2020.
- Study of economic water requirements in Louisiana, 1970-2020.
- Supplemental analysis examining trends in pollution levels of Louisiana streams, 1958-1968.

Recommendations:

- A continuing study of Louisiana's groundwater resources and requirements is necessary to predict changing needs as the resources of the state are developed;
- Improve data collection on existing and future pumpage is necessary to determine geologic information, depth of water levels, and quality of groundwater;
- Present and potential water resource areas should be more thoroughly investigated and possible solutions or alternatives prepared to minimize the problems of each area;
- Improve proper management of aquifers to prevent their destruction through overuse;
- Practical, onsite data collection and a thorough investigative study should be initiated to determine the extent of contamination of groundwater resources from subsurface waste disposal wells and industrial detention pits; and
- Develop a workable state water resource plan, which can only be developed after:
  - Present and future needs are determined and supplies are inventoried,
  - Future deficient areas are determined, and
  - Legal and institutional framework is reviewed.

Where to Find Report:

LSU Libraries – Hill Memorial – Special Collections TD224 .L8 .G82

Gulf South Research Institute, Urban Studies Division. (1969). *Comprehensive Water and Related Land Resources Study.* (GSRI Project No. AS-151, AS-151-05, Supplement). Prepared for the Louisiana Department of Public Works. Baton Rouge, LA

1965	*The Comprehensive Plan for the State of Louisiana: Water Resources*	Could Not Determine

Summary:
As part of a federal comprehensive planning program, Louisiana conducted this study to facilitate comprehensive planning and confront planning problems related to statewide water resources. The report presented information in four volumes on:

- Survey of surface water resources and problems
- Inventory of groundwater resources and problems
- Inventory of water utilization projects
- Uses of surface and groundwater

Recommendations:

- Serious consideration should be given to both the protection and further development of its existing water resources.
- Louisiana should enter into interstate compacts to improve quality of state water resources, especially in both the Ouachita and Red rivers.
- Reverse worsening saltwater intrusion in South Louisiana.
- Look to the Florida Parishes for further ground water development.

Where to Find Report:

LSU Libraries – Hill Memorial – Special Collections – La 711.3 ASS

Associated Louisiana Planning Consultants, Inc. (1965-1966). *The Comprehensive Plan for the State of Louisiana* (Vols. 1-4). Prepared for the Louisiana Department of Public Works. Baton Rouge, LA.

1956	*Water - A Special Report to the Louisiana Legislature: Source, Supply, Use, Development, Needs, Recommendations.*	$40,000

Summary:
Act No. 4 of the Extraordinary Session of 1955 asked the Department of Public Works to conduct a survey of the water resources of the state. The findings and recommendations were presented in *Water - A Special Report to the Louisiana Legislature* which presented information on:

- The amount of usable water in the state - how much water is used, where it is used, and what it is used for.
- Factual water information that may be used in the formulation of a basic water policy for the future, pointing out the need for consideration of controls on the use of water resources, when such controls would be of benefit to the people.
- The occurrence, use, development, investigations and problems of surface and groundwaters on a state-wide basis.

Recommendations:

- Strengthen and increase the existing program for collection of water resources information to learn more accurately just how much and where water is available in Louisiana;
- Begin a systematic program to collect and compile data on water use by large users, including agriculture, industry, municipalities, etc.;
- Investigate reports of local water shortages, study and recommend changes to how these conditions may be improved;
- Using the data collected, study trends of water needs and water availability, in order to predict shortages before they develop so that plans can be made to mitigate the emergencies;
- Inform the public of the limited nature of water resources and their necessary regulation in an equitable way when the demand becomes as great as the supply;
- When future studies indicate it, control water use through legislation

Where to Find Report:

LSU Libraries – Middleton – GB 705 L8A42 c.2

Louisiana Department of Public Works, Louisiana Geological Survey, the United States Geological Survey, and the Committee on Water Use and Conservation. (1956). *Water - A Special Report to the Louisiana Legislature: Source, Supply, Use, Development, Needs, Recommendations.* Prepared for the Louisiana Legislature. Baton Rouge, LA.

APPENDIX E: USGS WATER USE PARISH FACT SHEETS

The U.S. Geological Survey (USGS), in partnership with the Louisiana Department of Transportation and Development (DOTD), has conducted a water-withdrawal and water-use inventory on a five-year basis since 1960, with the most recent inventory report being published for 2015. For the 2015 report and methodology, see hyperlink below. USGS presents the information in many formats to offer a complete description of water use in Louisiana. In the full report, water-withdrawal and water-use data are aggregated by category of use, parish, and water source, in addition to the 13 major aquifers or aquifer systems and 10 surface-water basins. Additionally, the report contains sections on total water withdrawals and trends in water withdrawals and water use in Louisiana as evaluated since 1960.

The following pages present one-page summaries of water-use information compiled by USGS for each of Louisiana's 64 parishes, presented in alphabetical order by parish name. Information provided in these summaries includes:

- Parish population, population served by public supply, per capita withdrawal rate (average daily total amount of all water withdrawn in the parish divided by the total parish population), total irrigated acreage, and amount of hydroelectric instream use in the parish.
- Table of estimated withdrawals by source of water and categories of use.
- Water withdrawals by major public suppliers, and major industrial groups.
- Bar chart presenting water-use trends since 1960 for both ground and surface water.

For the most recent Louisiana water use inventory report discussed above, *Water Use in Louisiana, 2015,* see https://wise.er.usgs.gov/dp/pdfs/WaterUseinLouisiana_2015.pdf.

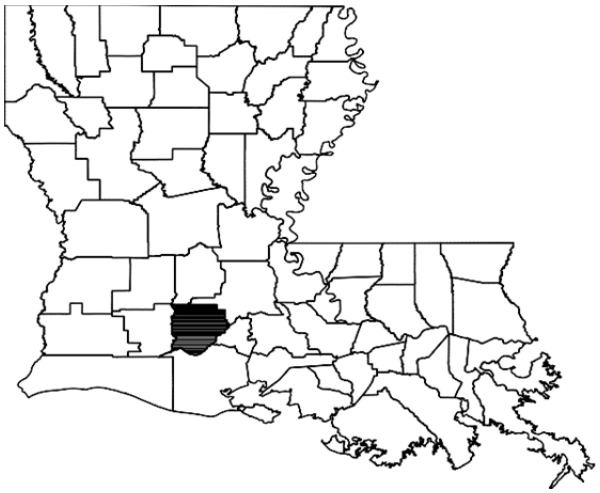
Collier, Angela L and Sargent, B. Pierre. (2018). *Water Use in Louisiana, 2015.* (Water Resources Special Report No. 18). U.S. Geological Survey. Prepared for and Published by the Louisiana Department of Transportation and Development. Baton Rouge, Louisiana.

USGS has also published fact sheets to provide a more in depth overview of the water resources in each parish, including groundwater and surface-water availability, quality, development, use, and trends. These are meant to provide parish officials, local officials, and concerned citizens with information needed to make decisions about current and future development in their parish. For links to individual parish fact sheets, search by parish name here - https://pubs.er.usgs.gov/.

USGS also facilitates a five-year compilation of water-withdrawal and water-use estimates for the whole nation, among different geographic areas, categories of use, and sources over time. For the most recent report, *Estimated Use of Water in the United States in 2015*, see https://doi.org/10.3133/cir1441.

Dieter, C.A., Maupin, M.A., Caldwell, R.R., Harris, M.A., Ivahnenko, T.I., Lovelace, J.K., Barber, N.L., and Linsey, K.S., 2018. *Estimated Use of Water in the United States in 2015*. (U.S. Geological Survey Circular 1441). Reston, Virginia.

Acadia



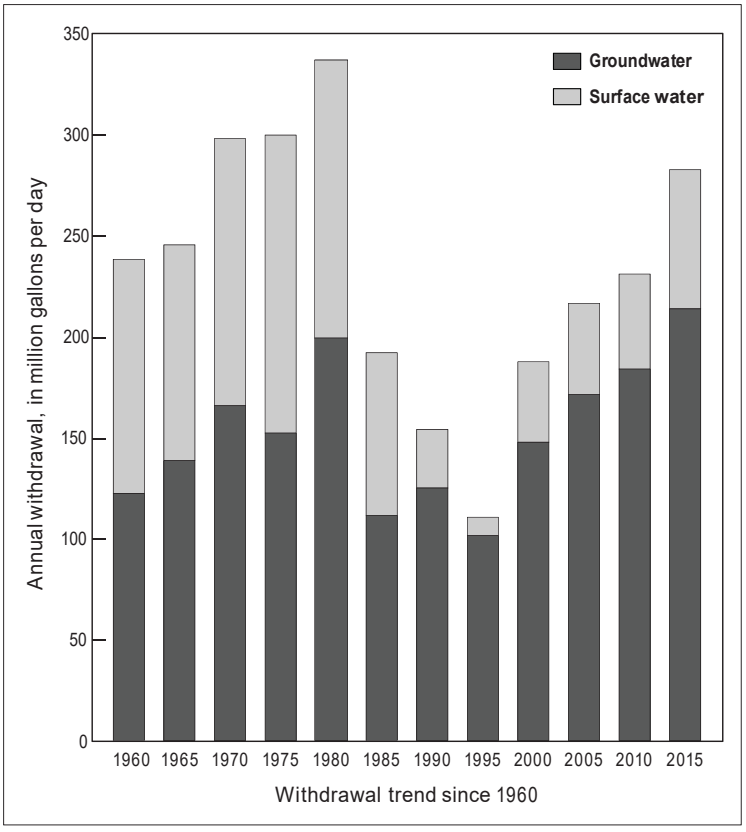
Population: 62,577
Population served by public supply: 47,029
Per capita withdrawals (gal/d): 4,514
Acres irrigated: 85,987
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	5.66		5.66
Industrial	0.58		0.58
Power generation	4.49	3.43	7.92
Rural domestic	1.24		1.24
Livestock	0.11	0.01	0.12
Rice irrigation	112.46	47.65	160.11
General irrigation	1.34	1.34	2.69
Aquaculture	88.52	15.62	104.15
Total	**214.41**	**68.07**	**282.48**

Withdrawals by Major Industrial Group (Mgal/d)

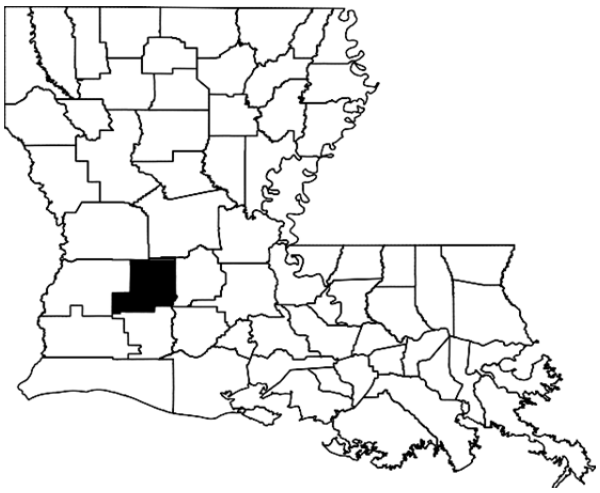
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.57	
35	Industrial machinery	0.01	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Church Point Water System	0.54	
Crowley Water System	1.88	
Egan Water Corp.	0.54	
Egan Water Corp. #2	0.31	
Iota Water System	0.17	
Mire-Branch Water Corp.	0.63	
Morse Water System	0.50	
North of Crowley Water Corp.	0.34	
Rayne Water Supply	0.90	
South Rayne Water Corp.	0.25	

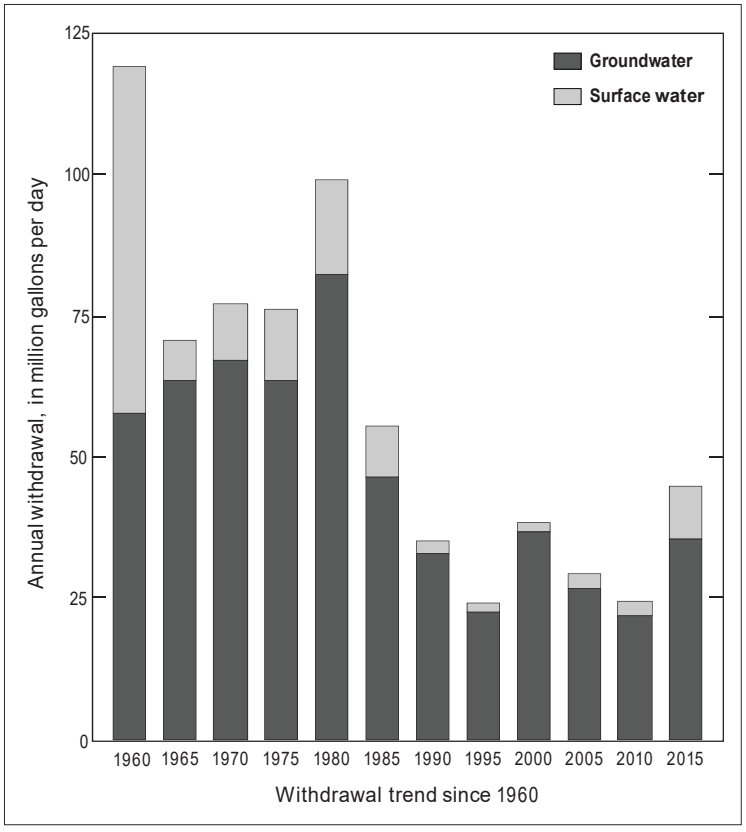
Allen



Population: 25,685
Population served by public supply: 22,502
Per capita withdrawals (gal/d): 1,747
Acres irrigated: 15,816
Hydroelectric power instream use (Mgal/d): 0

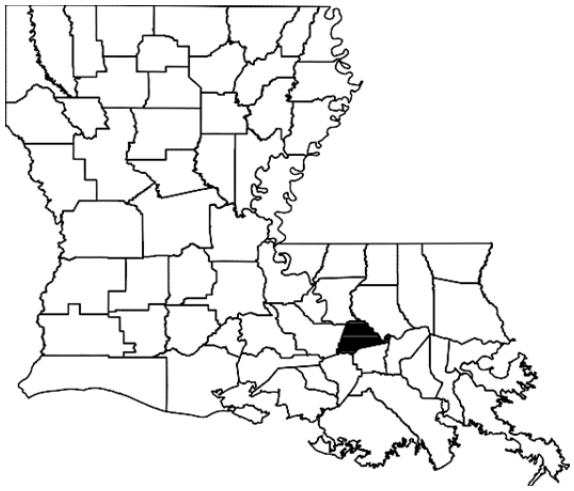
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply			4.24
Industrial	0.33		0.33
Power generation			
Rural domestic	0.25		0.25
Livestock	0.05	0.01	0.07
Rice irrigation	21.87	7.29	29.15
General irrigation	0.50		0.50
Aquaculture	8.27	2.04	10.31
Total	**35.52**	**9.34**	**44.86**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
26	Paper products	0.33	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Allen Parish Water District #1	0.13	
East Allen Water District	0.37	
Elizabeth Water System	0.13	
Northwest Allen Water System	0.07	
Oakdale Water System	1.67	
Oberlin Water System	0.16	
S. W. Allen Water Works District 2	1.24	
South Oakdale Water System	0.20	
West Allen Water District	0.27	

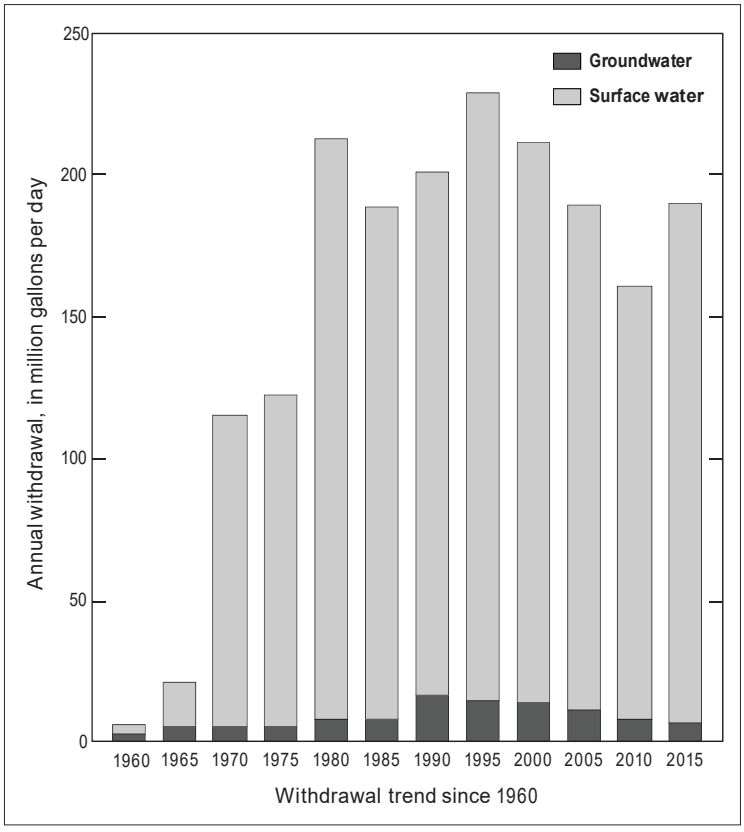
Ascension



Population: 119,455
Population served by public supply: 85,890
Per capita withdrawals (gal/d): 1,581
Acres irrigated: 1,040
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.29	1.37	2.66
Industrial	1.72	181.28	183.01
Power generation			
Rural domestic	2.69		2.69
Livestock	0.07	0.02	0.09
Rice irrigation			
General irrigation	0.45		0.45
Aquaculture			
Total	**6.22**	**182.67**	**188.89**

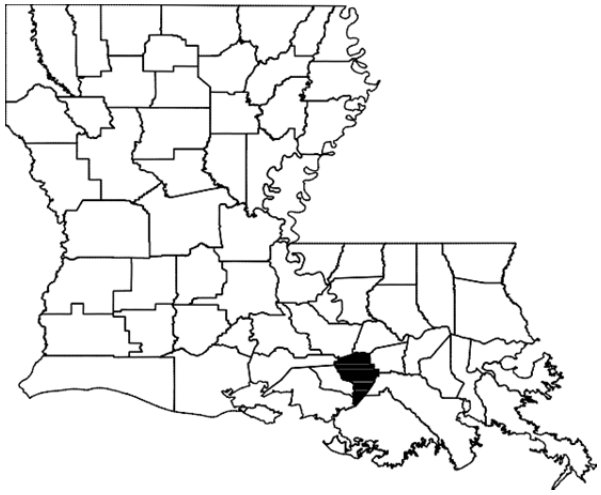
Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
28	Chemicals	1.34	181.28
29	Petroleum refining	0.09	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Gonzales Water System	1.16	
Parish Utilities of Ascension W. S.		1.37

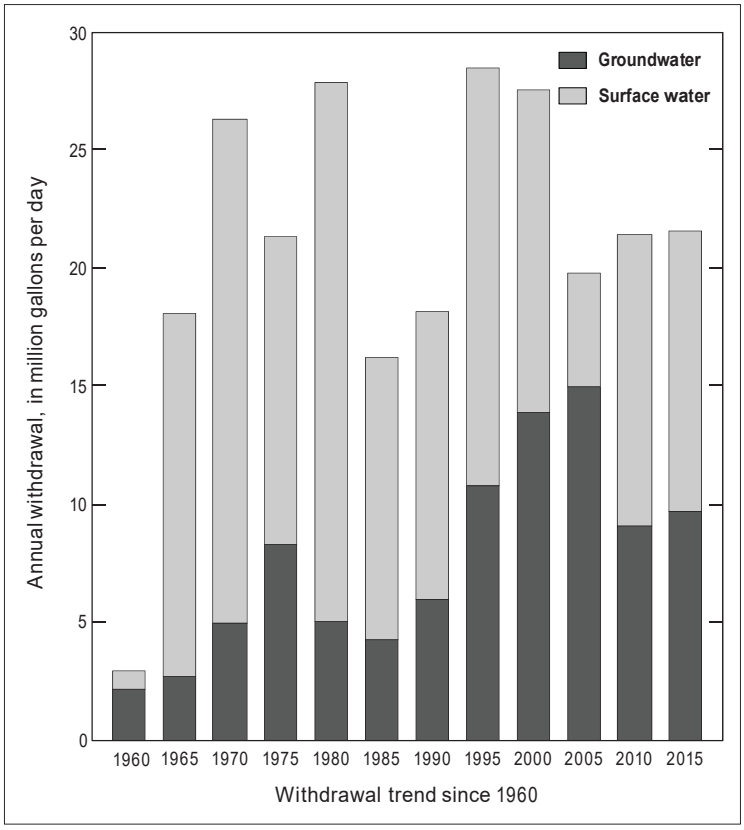
Assumption

Population: 22,842
Population served by public supply: 22,473
Per capita withdrawals (gal/d): 942
Acres irrigated: 1,639
Hydroelectric power instream use (Mgal/d): 0



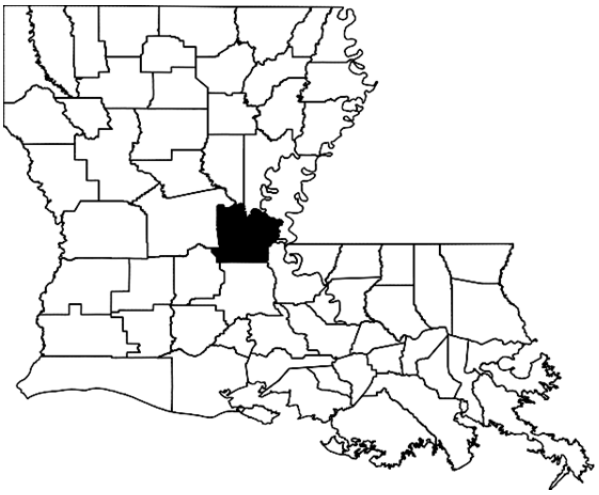
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply		4.19	4.19
Industrial	9.23	6.52	15.75
Power generation			
Rural domestic	0.03		0.03
Livestock		0.01	0.01
Rice irrigation			
General irrigation	0.28	0.42	0.70
Aquaculture	0.17	0.67	0.83
Total	**9.70**	**11.81**	**21.51**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
20	Food products		6.52
28	Chemicals	9.19	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Assumption Parish Waterworks No. 1		4.19

Avoyelles



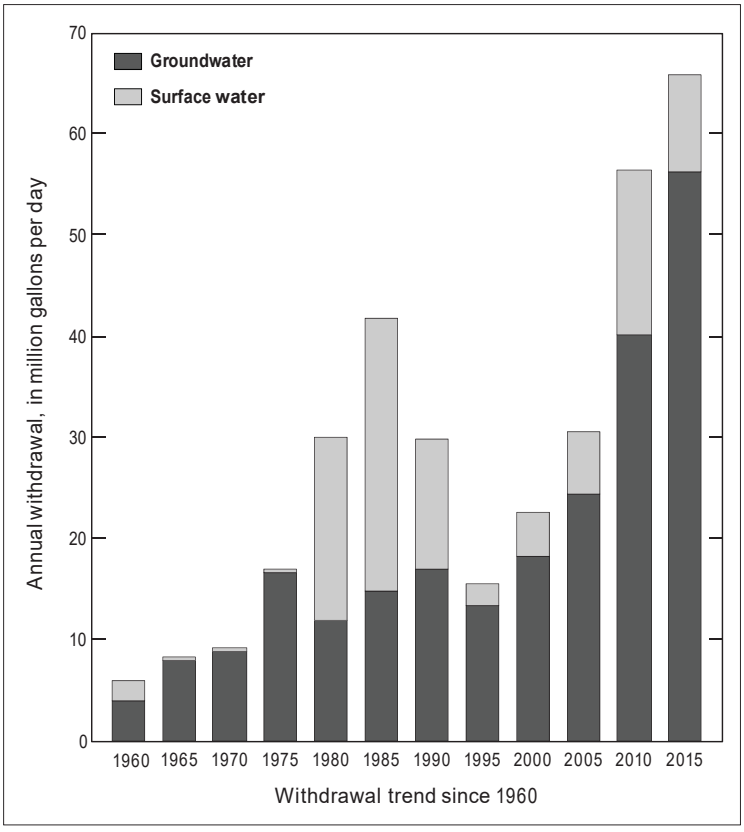
Population: 41,103
Population served by public supply: 38,841
Per capita withdrawals (gal/d): 1,604
Acres irrigated: 38,840
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.05		4.05
Industrial	0.00		0.00
Power generation			
Rural domestic	0.18		0.18
Livestock	0.16		0.16
Rice irrigation	24.89	1.31	26.20
General irrigation	8.59	2.15	10.74
Aquaculture	18.43	6.14	24.58
Total	**56.31**	**9.60**	**65.91**

Withdrawals by Major Industrial Group (Mgal/d)

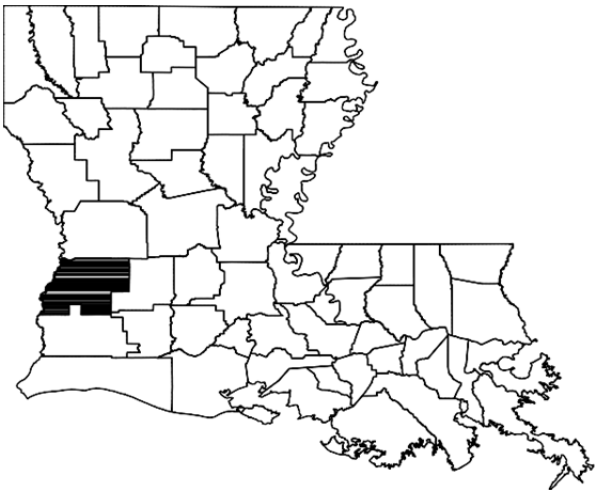
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Avoyelles W. W. Dist. # 1	0.13	
Avoyelles Ward 1 Water System	0.23	
Avoyelles Water Commission	1.10	
Brouillette Water System	0.22	
Cottonport Water System	0.46	
Evergreen Water System	0.14	
Fifth Ward Water System	0.37	
Hessmer Water System	0.28	
Mansura Water System	0.20	
Morrow Water System Inc.	0.13	
Plaucheville Water System	0.26	
Simmesport Water System	0.40	
Southwest Avoyelles W. W.	0.12	

Beauregard



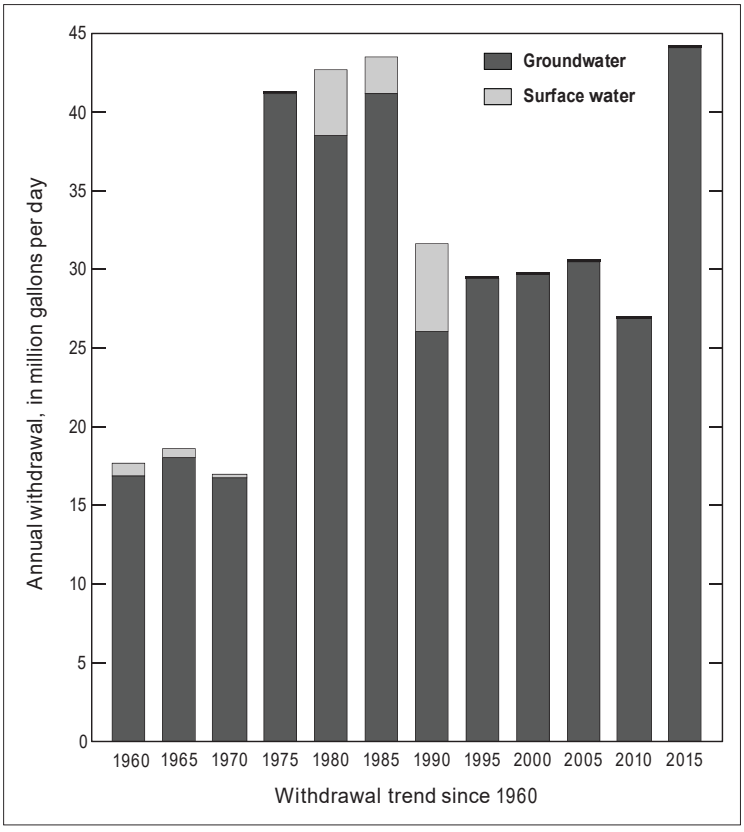
Population: 36,462
Population served by public supply: 26,359
Per capita withdrawals (gal/d): 1,210
Acres irrigated: 2,009
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.42		4.42
Industrial	35.04		35.04
Power generation			
Rural domestic	0.81		0.81
Livestock	0.09	0.06	0.14
Rice irrigation	2.27		2.27
General irrigation	0.32	0.04	0.36
Aquaculture	1.08		1.08
Total	**44.03**	**0.09**	**44.12**

Withdrawals by Major Industrial Group (Mgal/d)

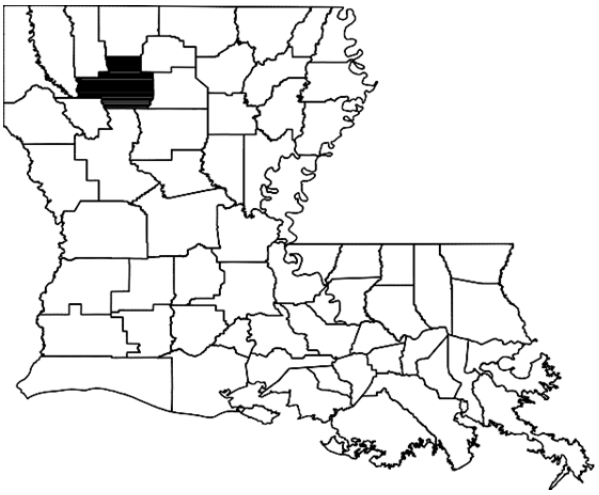
Standard industrial classification		GW	SW
26	Paper products	34.60	
28	Chemicals	0.44	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Beauregard Dist. 2 Ward 5	0.61	
DeRidder Water System	1.57	
Green Acres Water & Sewer	0.08	
Merryville Water System	0.27	
Waterworks District No. 3	1.86	
Waterworks District No. 5	0.03	

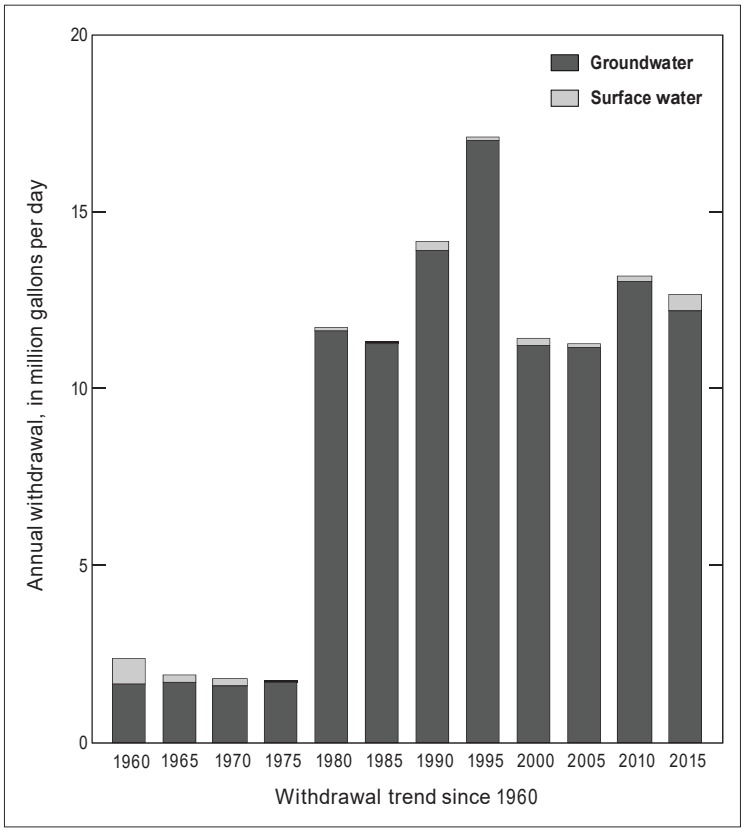
Bienville



Population: 13,786
Population served by public supply: 9,718
Per capita withdrawals (gal/d): 917
Acres irrigated: 359
Hydroelectric power instream use (Mgal/d): 0

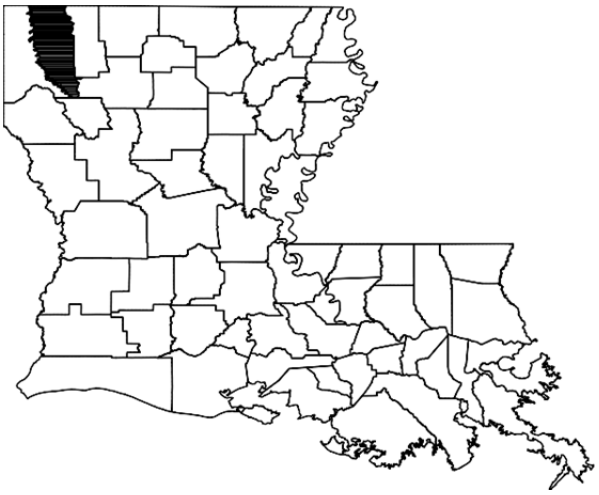
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	2.72		2.72
Industrial	9.13	0.25	9.38
Power generation			
Rural domestic	0.33		0.33
Livestock	0.04	0.02	0.06
Rice irrigation			
General irrigation		0.15	0.15
Aquaculture			
Total	**12.21**	**0.43**	**12.64**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard Industrial classification		GW	SW
13	Oil and gas extraction		0.25
20	Food products	0.05	
26	Paper products	9.08	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Alabama Water System	0.06	
Alberta Water System	0.10	
Arcadia Water System	1.25	
Bienville Water System	0.03	
Bryceland Water System	0.02	
Castor Water System	0.02	
Cypress Water System	0.05	
Friendship Water System	0.05	
Gibsland Water System	0.39	
Jamestown-Fryeburg W. S.	0.04	
Lucky Water System	0.03	
Mill Creek Water System	0.02	
Mt. Calm Water System	0.02	
Mt. Lebanon Water System	0.03	
Mt. Olive Water System	0.08	
Old Saline Comm. Water System	0.04	
Ringgold Water System	0.30	
S. E. Bienville Water System	0.01	
Saline Water System	0.08	
Social Springs Water System	0.03	
Springhill Community Water System	0.02	
Taylor Water System	0.04	

Bossier



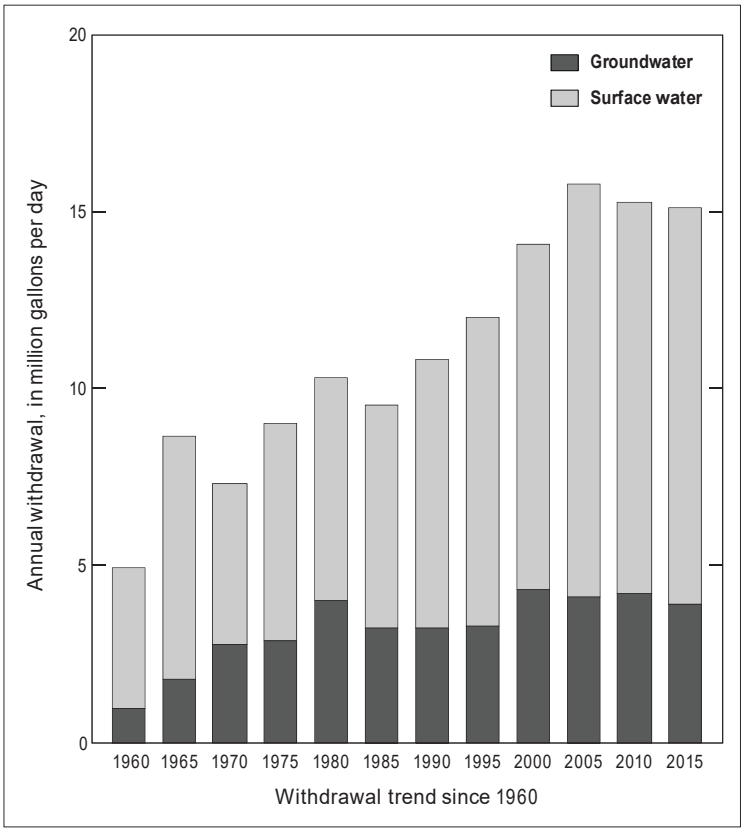
Population: 125,175
Population served by public supply: 111,342
Per capita withdrawals (gal/d): 121
Acres irrigated: 1,478
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	2.42	10.45	12.87
Industrial	0.07	0.25	0.32
Power generation			
Rural domestic	1.11		1.11
Livestock	0.11	0.03	0.14
Rice irrigation			
General irrigation	0.12	0.49	0.62
Aquaculture	0.07		0.07
Total	**3.90**	**11.22**	**15.12**

Withdrawals by Major Industrial Group (Mgal/d)

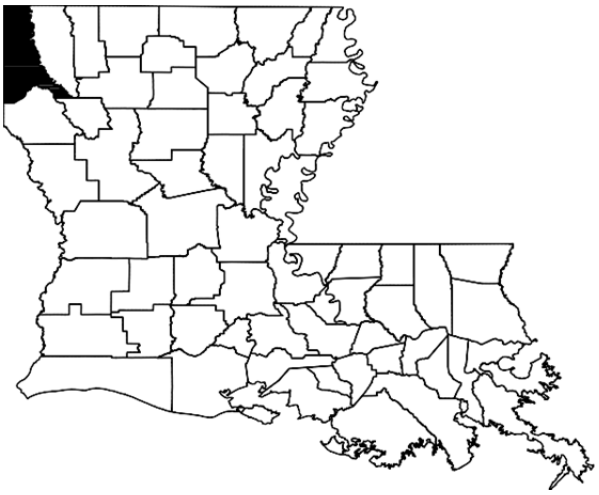
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.03	0.25



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Bellevue Water System	0.15	
Bodcau Water Works, Inc.	0.03	
Bossier City Water System		10.45
Central Bossier Water System	0.19	
Consolidated Water Works Dist. #1	0.24	
Evangeline Oaks Water System	0.01	
Haughton Water System	0.30	
Highland Water Works, LLC	0.09	
Plain Dealing Water System	0.11	
Saint Mary's Water System	0.02	
Sligo Water System, Inc.	0.29	
South Bossier Water System	0.18	
Village Water System	0.77	

Caddo



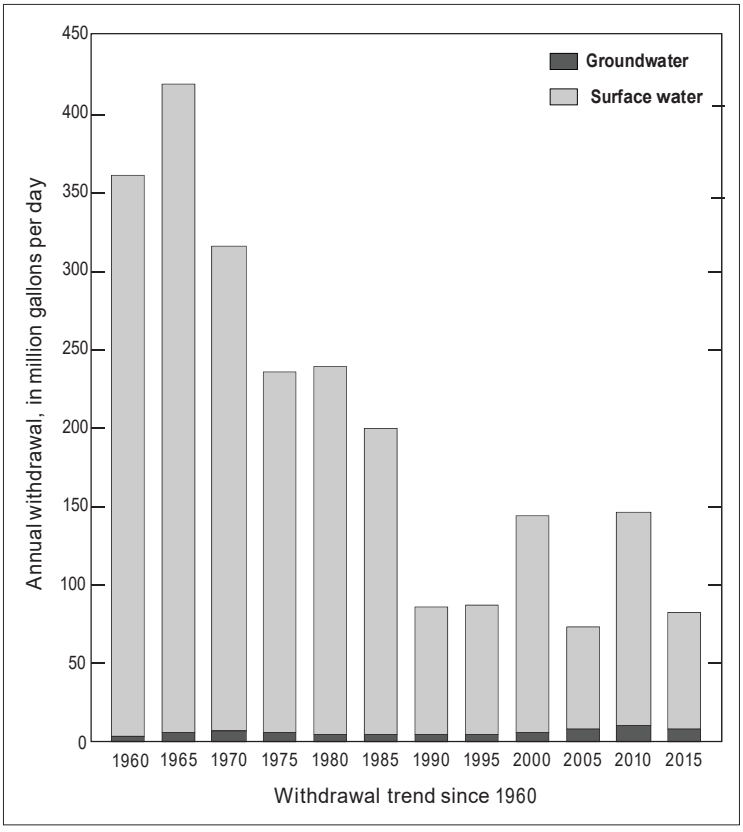
Population: 251,460
Population served by public supply: 233,081
Per capita withdrawals (gal/d): 326
Acres irrigated: 15,361
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.47	41.96	43.43
Industrial	0.03	0.87	0.90
Power generation		30.21	30.21
Rural domestic	1.47		1.47
Livestock	0.04	0.09	0.12
Rice irrigation			
General irrigation	4.57	1.14	5.72
Aquaculture	0.10		0.10
Total	**7.68**	**74.27**	**81.96**

Withdrawals by Major Industrial Group (Mgal/d)

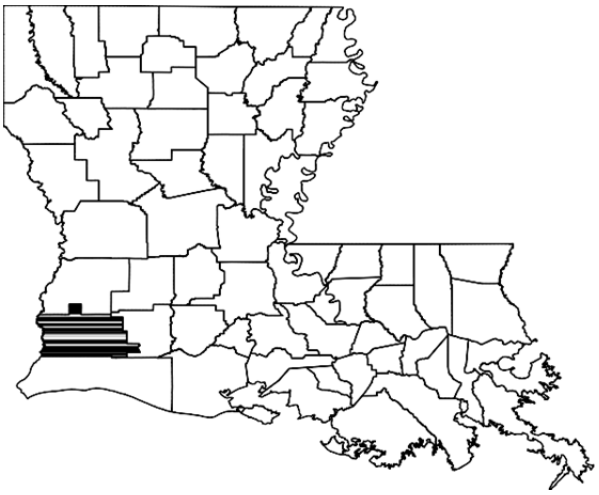
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.03	0.77
29	Petroleum refining		0.10



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Bel-Di-Gil Water System	0.10	
Blanchard Water System		1.11
Caddo Waterworks District #7	0.47	
Deep Woods Utilities	0.07	
Eagle Water Company	0.11	
East Mooringsport Water System		0.02
Evergreen Estates Water System	0.02	
Four Forks Water System	0.04	
Greenwood Water System	0.03	0.47
Hosston Mira Water System	0.04	
Ida Water System	0.01	
Oil City Water Works		0.21
Pine Hills Water Works	0.25	
Rodessa Water System	0.03	
Shreveport Water System		39.80
Vivian Water System		0.36

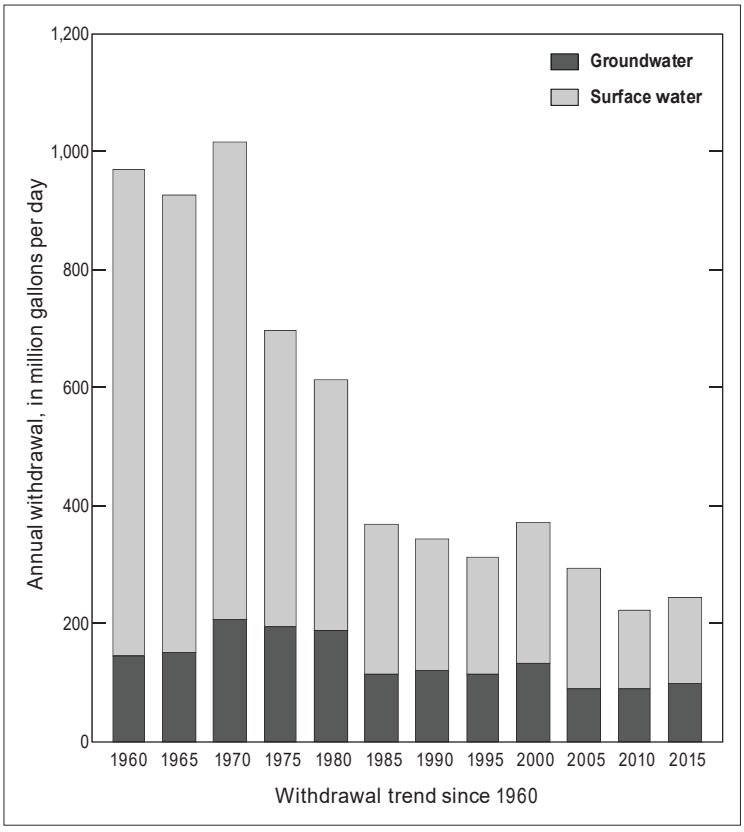
Calcasieu



Population: 192,768
Population served by public supply: 174,221
Per capita withdrawals (gal/d): 1,225
Acres irrigated: 13,942
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	27.67		27.67
Industrial	40.60	129.68	170.28
Power generation	6.62	7.99	14.61
Rural domestic	1.97		1.97
Livestock	0.16	0.23	0.39
Rice irrigation	18.73	6.24	24.97
General irrigation	0.61		0.61
Aquaculture	1.95	1.05	3.00
Total	**98.30**	**145.19**	**243.49**



Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
13	Oil and gas extraction		0.01
24	Lumber	0.10	
28	Chemicals	25.79	111.77
29	Petroleum refining	10.97	17.89
30	Rubber and plastics	1.46	
33	Primary metals	1.81	

Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Calcasieu W. W. District 4	0.47	
Calcasieu W. W. District 5	0.39	
Calcasieu W. W. District 7	0.28	
Calcasieu W. W. District 8	0.80	
Calcasieu W. W. District 9	1.55	
Calcasieu W. W. Dist. 14 of Ward 5	0.19	
County Pines Subdivision W. S.	0.05	
DeQuincy Water System	0.46	
East Park Subdivision	0.01	
Garden Heights Water System	0.05	
Gulf Stream Manor Water System	0.08	
Houston River W. W. District 11	0.49	0.50
Iowa Water System	0.25	
Lake Charles Water System	12.85	
Lake Street Water Company	0.06	
Moss Bluff Water District 1	2.13	
Oak Meadows Water Works	0.03	
Parkspace Water System	0.04	
Quail Ridge Estates Water System	0.06	
Sulphur Water System	5.10	
Utilities Services of Lake Charles	0.01	
Vinton Water System	0.50	
Westlake Water System	1.41	

Caldwell

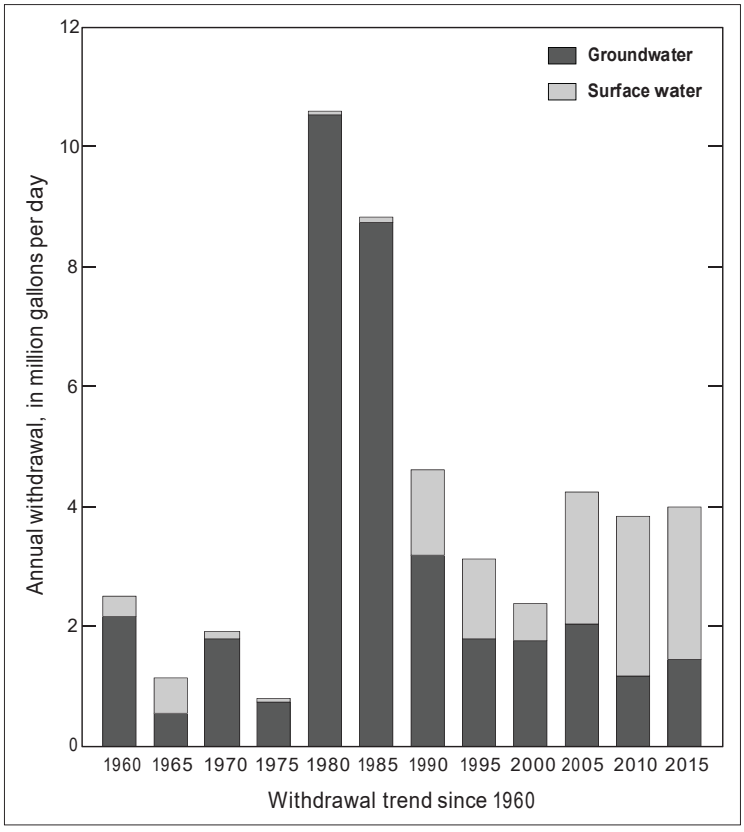
Population: 9,993
Population served by public supply: 9,237
Per capita withdrawals (gal/d): 400
Acres irrigated: 4,943
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.03		1.03
Industrial			
Power generation			
Rural domestic	0.06		0.06
Livestock	0.03	0.03	0.06
Rice irrigation	0.34	0.79	1.13
General irrigation		1.73	1.73
Aquaculture			
Total	**1.45**	**2.55**	**4.00**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Clarks Water System	0.10	
Columbia Heights Water Dist.	0.20	
Columbia Water System	0.08	
Cotton Plant Water System	0.04	
East Columbia Water Dist.	0.18	
Grayson Water System	0.15	
Hebert Water System	0.13	
Kelly Water System	0.07	
Vixen Water System East	0.02	
Wards 4 & 5 Water System	0.07	

Cameron

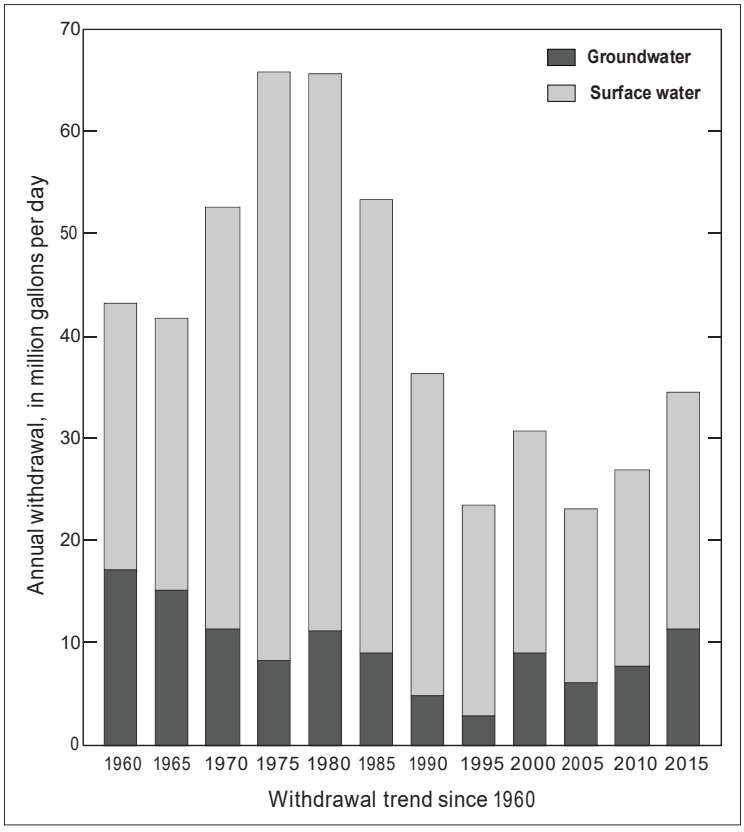
Population: 6,817
Population served by public supply: 5,899
Per capita withdrawals (gal/d): 5,076
Acres irrigated: 11,680
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.50		1.50
Industrial	0.52	8.75	9.27
Power generation			
Rural domestic	0.07		0.07
Livestock	0.04	0.13	0.17
Rice irrigation	9.02	13.52	22.54
General irrigation		0.16	0.16
Aquaculture	0.18	0.71	0.89
Total	**11.33**	**23.27**	**34.60**

Withdrawals by Major Industrial Group (Mgal/d)

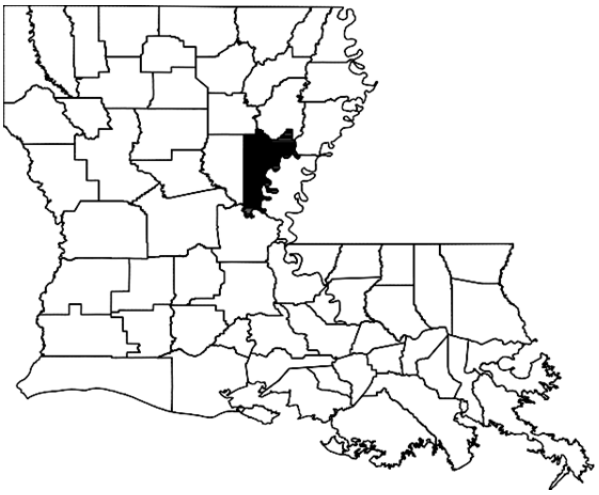
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.10	
29	Petroleum refining		8.75



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Cameron W. W. District 1	0.26	
Cameron W. W. District 2	0.40	
Cameron W. W. District 7	0.07	
Cameron W. W. District 9	0.17	
Cameron W. W. District 10	0.14	
Cameron W. W. District 11	0.46	

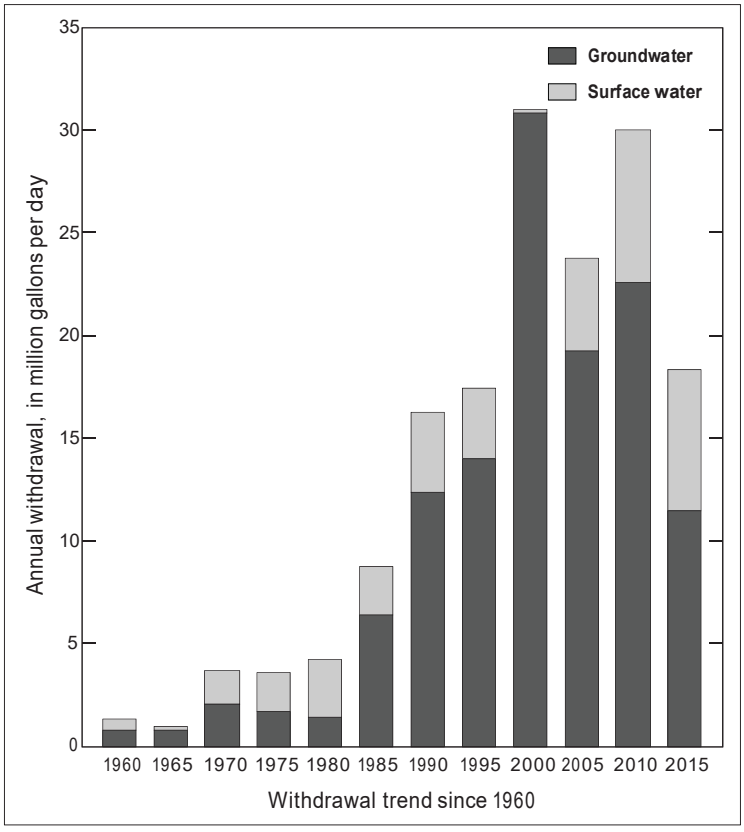
Catahoula



Population: 10,147
Population served by public supply: 8885
Per capita withdrawals (gal/d): 1810
Acres irrigated: 35,512
Hydroelectric power instream use (Mgal/d): 0

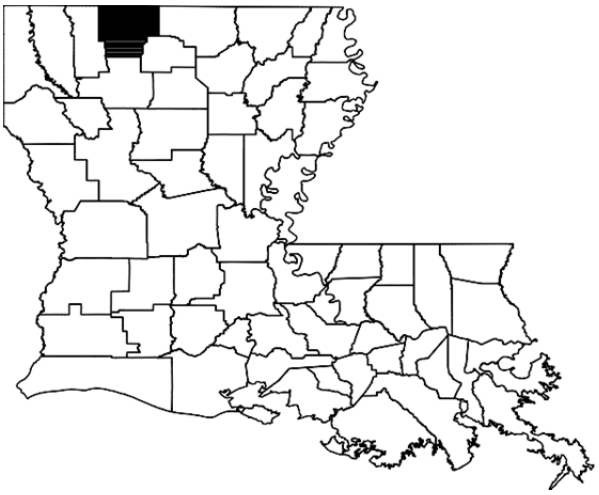
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.17		1.17
Industrial			
Power generation			
Rural domestic	0.10		0.10
Livestock	0.01	0.03	0.04
Rice irrigation	2.63		2.63
General irrigation	6.86	6.86	13.73
Aquaculture	0.70		0.70
Total	**11.47**	**6.89**	**18.36**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Black River Water System	0.16	
Enterprise W. W. Dist. 1	0.09	
Harrisonburg Water System	0.09	
Jonesville Water System	0.25	
Leland Water System	0.05	
Maitland W. W. Dist.	0.04	
Manifest Rhinehart W. S.	0.15	
Sandy Lake Water System	0.22	
Sicily Island Water System	0.06	
Whitehall Water System	0.06	

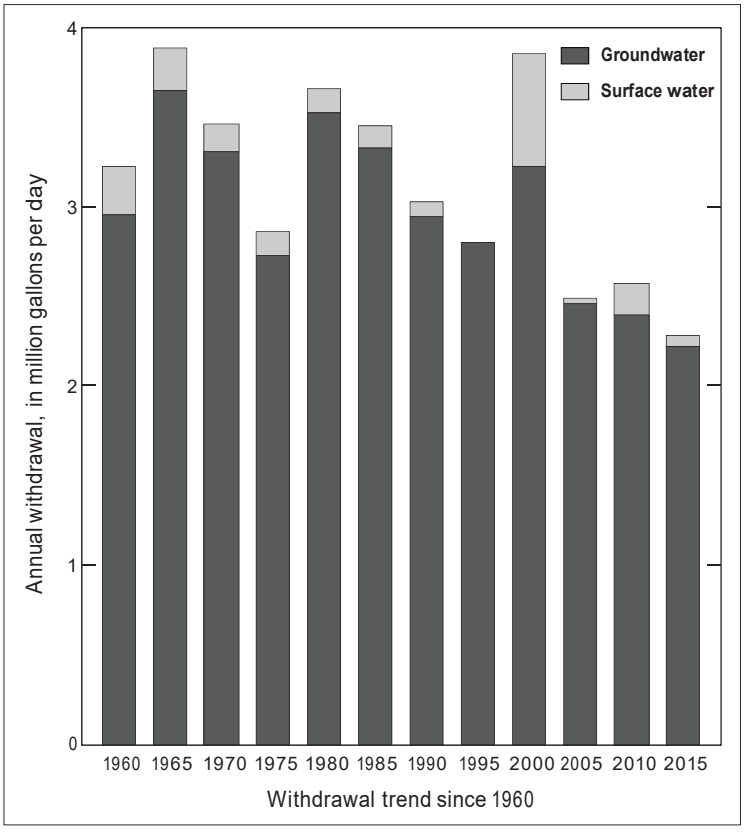
Claiborne



Population: 16,295
Population served by public supply: 14,232
Per capita withdrawals (gal/d): 140
Acres irrigated: 143
Hydroelectric power instream use (Mgal/d): 0

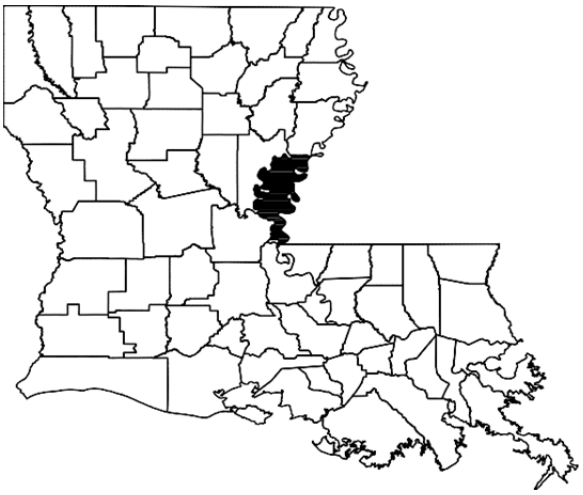
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.96		1.96
Industrial		0.02	0.02
Power generation			
Rural domestic	0.17		0.17
Livestock	0.04	0.04	0.08
Rice irrigation			
General irrigation	0.05		0.05
Aquaculture			
Total	**2.22**	**0.06**	**2.28**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
13	Oil and gas extraction		0.02



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Athens Water System	0.03	
Central Claiborne Water System	0.26	
Claiborne Ward 9 Water System	0.02	
Haynesville Water System	0.45	
Homer Water System	0.63	
Junction City Water System	0.03	
Leatherman Creek Water System	0.02	
Lisbon Water System	0.03	
Middle Fork Water System	0.02	
Norton Shop Water System	0.01	
Pine Hill Water System	0.07	
South Claiborne Water System	0.13	
Summerfield Water System	0.11	

Concordia



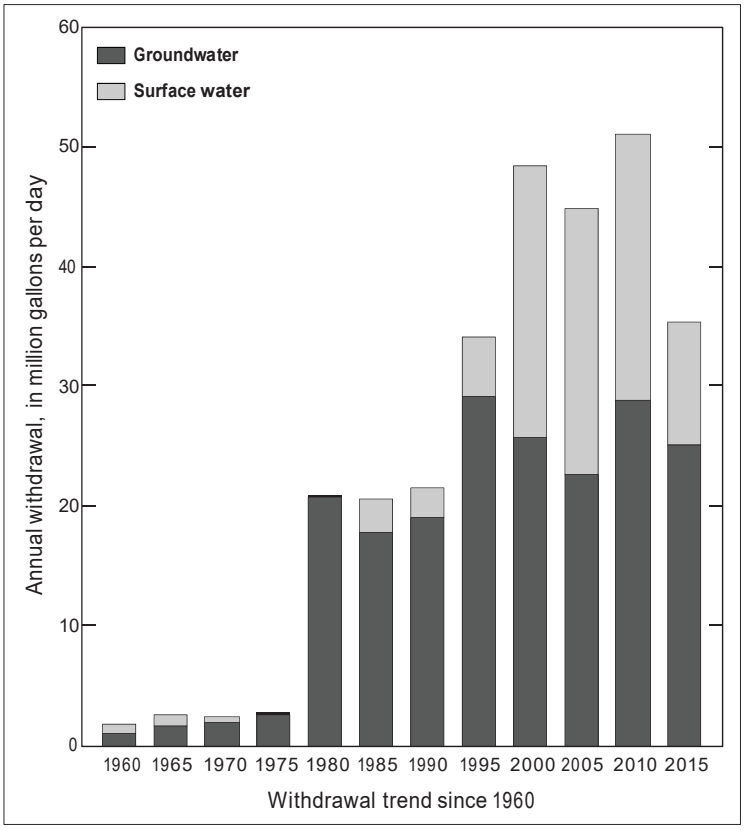
Population: 20,142
Population served by public supply: 19,353
Per capita withdrawals (gal/d): 1,754
Acres irrigated: 42,967
Hydroelectric power instream use (Mgal/d): 61,070

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	2.11	0.52	2.62
Industrial			
Power generation		3.57	3.57
Rural domestic	0.06		0.06
Livestock	0.04	0.01	0.05
Rice irrigation	8.47	4.56	13.02
General irrigation	13.49	1.50	14.99
Aquaculture	0.96	0.05	1.01
Total	**25.13**	**10.20**	**35.33**

Withdrawals by Major Industrial Group (Mgal/d)

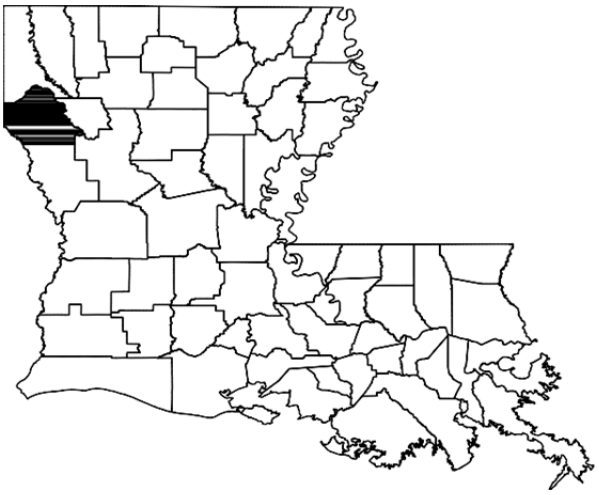
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Clayton Water System	0.10	
Concordia W. W. Dist. 1	0.76	
Ferriday Water System		0.52
Lake St. John Water Dist. No. 1	0.13	
Monterey Rural Water System	0.24	
Ridgecrest Water System	0.08	
Vidalia Water System	0.80	

De Soto



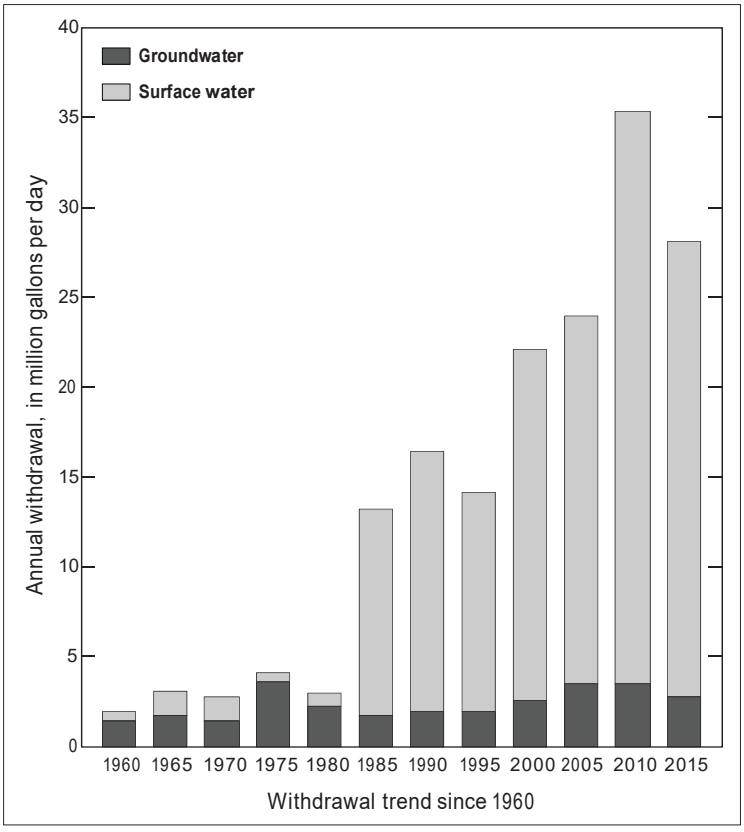
Population: 27,052
Population served by public supply: 19,538
Per capita withdrawals (gal/d): 1,039
Acres irrigated: 277
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.24	1.84	3.07
Industrial	0.76	18.22	18.98
Power generation		5.13	5.13
Rural domestic	0.60		0.60
Livestock	0.14	0.05	0.19
Rice irrigation			
General irrigation	0.01	0.12	0.13
Aquaculture			
Total	**2.75**	**25.35**	**28.10**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
13	Oil and gas extraction	0.19	1.58
26	Paper products	0.57	16.64



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Bayou Pierre Water System	0.10	
De Soto Parish W. W. Dist.No. 1		0.44
East De Soto Water System	0.11	
Grand Cane Water System	0.07	
Keatchie Water System	0.25	
Logansport Water System		0.32
Mansfield Water System		1.07
North De Soto Water System	0.38	
Rambin-Wallace Water System	0.09	
South De Soto Water System	0.04	
South Mansfield Water System	0.20	

East Baton Rouge

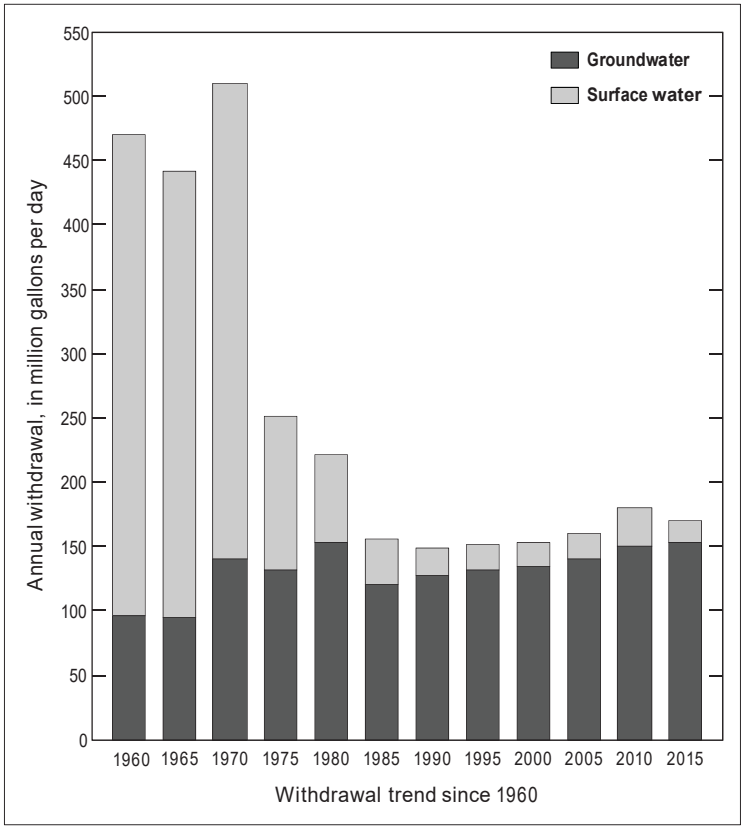
Population: 446,753
Population served by public supply: 443,769
Per capita withdrawals (gal/d): 380
Acres irrigated: 184
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	72.21		72.21
Industrial	72.59	16.68	89.27
Power generation	7.40		7.40
Rural domestic	0.24		0.24
Livestock	0.07	0.01	0.08
Rice irrigation			
General irrigation	0.39		0.39
Aquaculture	0.22		0.22
Total	**153.11**	**16.69**	**169.80**

Withdrawals by Major Industrial Group (Mgal/d)

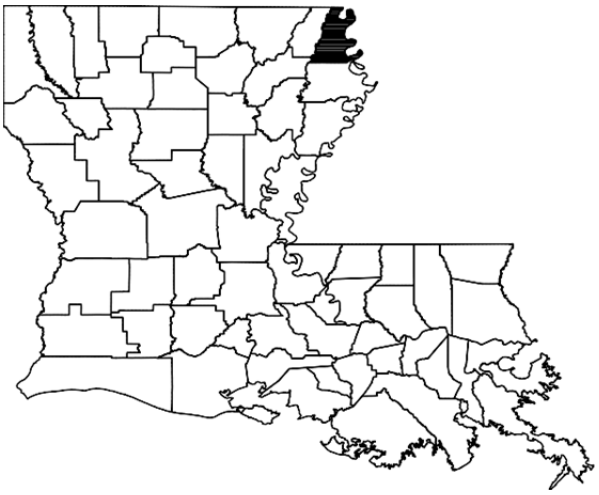
Standard industrial classification		GW	SW
20	Food products	0.46	
26	Paper products	37.58	
28	Chemicals	25.73	
29	Petroleum refining	8.55	16.68
30	Rubber and plastics	0.17	
33	Primary metals	0.07	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Baker Utilities	1.63	
Baton Rouge Water Company	56.25	
Bellingrath Water Company, Inc.	0.46	
Parish Water Company	11.42	
Red Oak Water Company	0.27	
Zachary Water System	2.08	

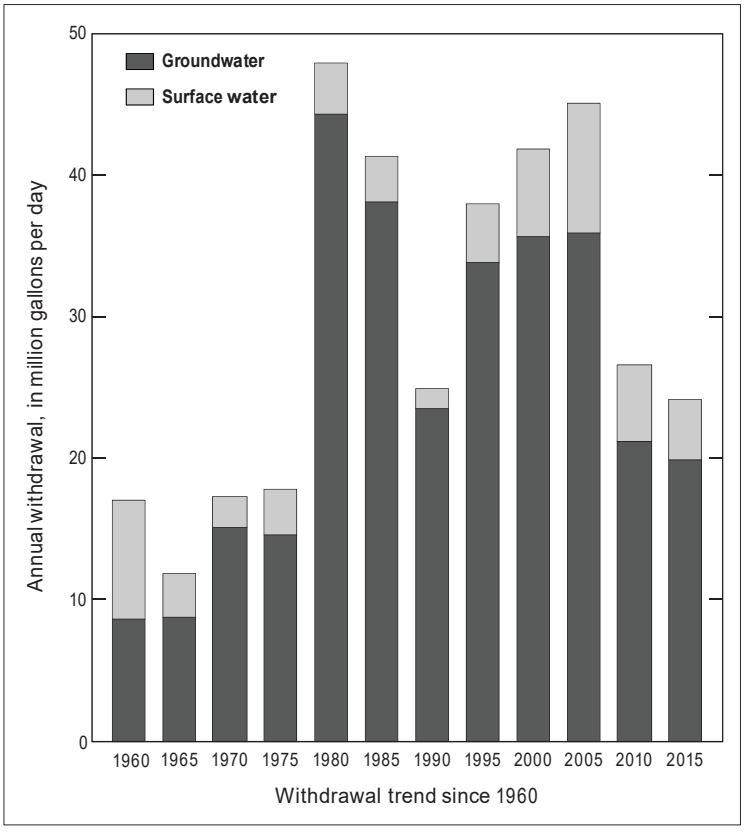
East Carroll



Population: 7,307
Population served by public supply: 7,125
Per capita withdrawals (gal/d): 3,301
Acres irrigated: 48,640
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	0.91		0.91
Industrial			
Power generation			
Rural domestic	0.01		0.01
Livestock	0.00	0.01	0.01
Rice irrigation	3.65	0.41	4.06
General irrigation	15.30	3.82	19.12
Aquaculture			
Total	**19.88**	**4.24**	**24.12**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



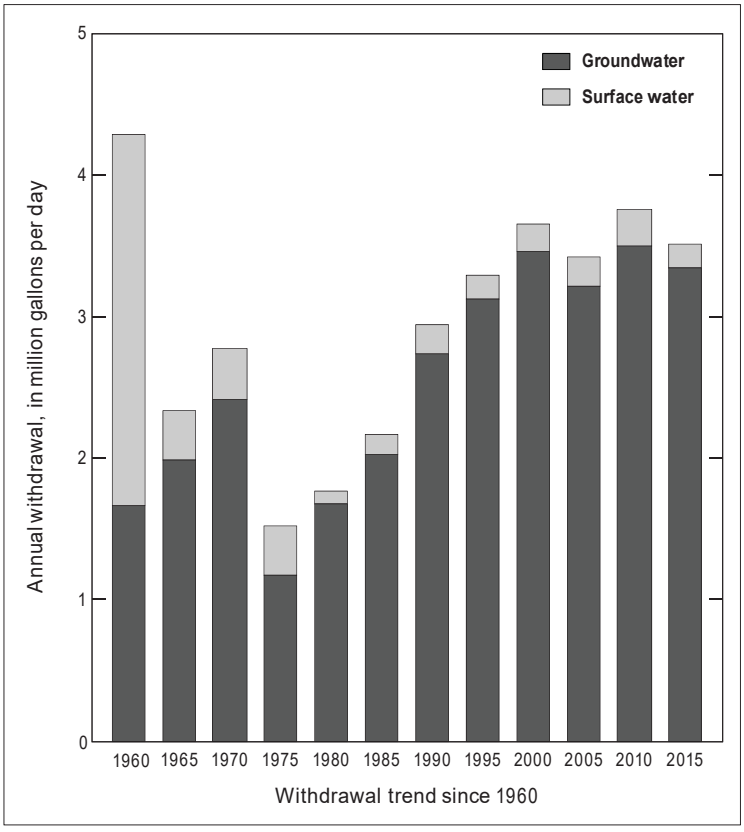
Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Lake Providence Water System	0.91	

East Feliciana

Population: 19,696
Population served by public supply: 16,355
Per capita withdrawals (gal/d): 178
Acres irrigated: 611
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	2.84		2.84
Industrial	0.03		0.03
Power generation			
Rural domestic	0.27		0.27
Livestock	0.01	0.10	0.12
Rice irrigation			
General irrigation	0.19	0.06	0.26
Aquaculture			
Total	**3.34**	**0.17**	**3.51**

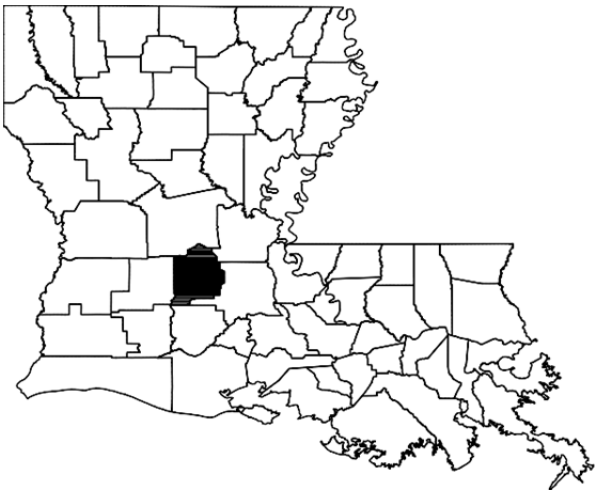
Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Clinton Water System	0.24	
East Feliciana Rural Water System	0.83	
East Feliciana Water District #1	0.07	
East Feliciana Water District #7	0.64	
Jackson Water System	0.17	
Norwood Water System	0.04	
Slaughter Water System	0.16	

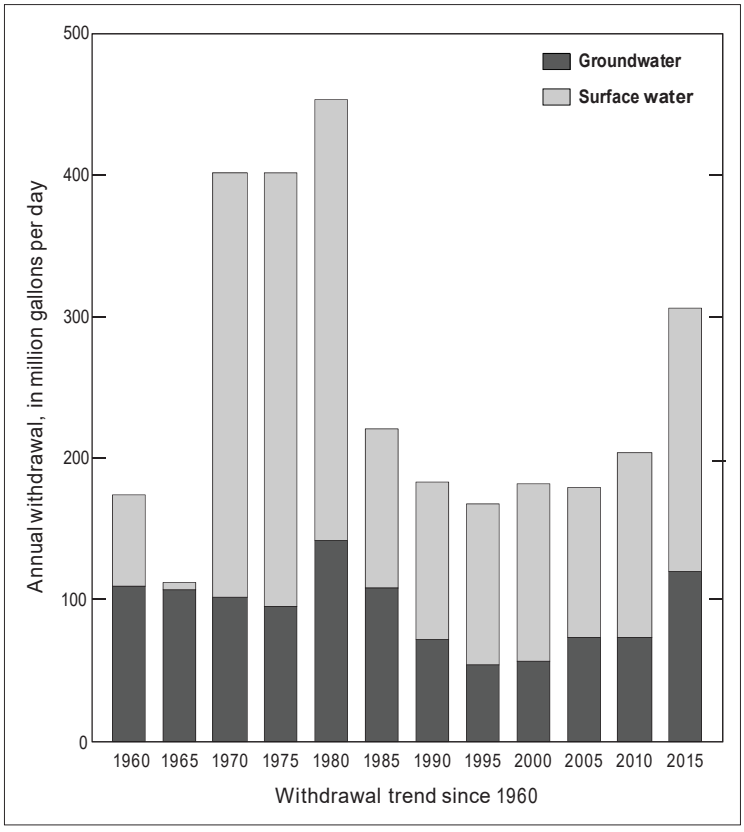
Evangeline

Population: 33,743
Population served by public supply: 29,531
Per capita withdrawals (gal/d): 9,054
Acres irrigated: 49,375
Hydroelectric power instream use (Mgal/d): 0



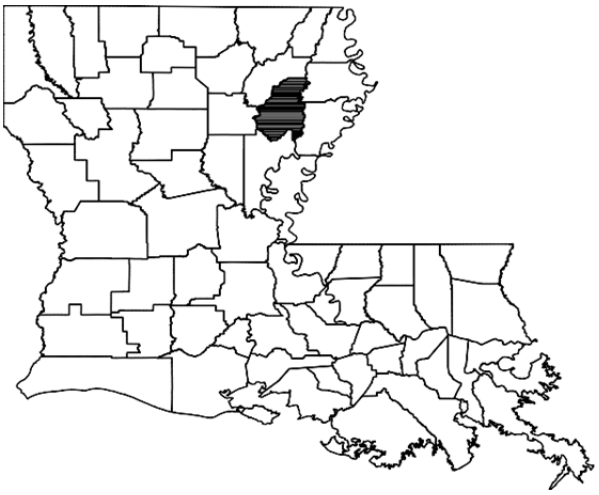
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	6.50		6.50
Industrial	1.95		1.95
Power generation	0.16	170.51	170.67
Rural domestic	0.34		0.34
Livestock	0.12	0.04	0.17
Rice irrigation	74.70	8.30	83.00
General irrigation	2.97	0.33	3.30
Aquaculture	33.64	5.94	39.57
Total	**120.39**	**185.11**	**305.50**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.81	
28	Chemicals	1.09	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Bayou Des Cannes W. S.	0.66	
Chataignier Water System	0.11	
East Side Water System	0.42	
Evangeline Water Dist. 1	0.17	
Mamou Road Water Dist.	0.22	
Mamou Water System	1.12	
Point Blue Water System	0.23	
Reddell-Vidrine Water Dist.	0.18	
Savoy-Swords Water System	0.55	
Te Mamou Water Dist.	0.32	
Turkey Creek Water System	0.33	
Ville Platte Water System	2.13	
Ward 4 Water System	0.05	
Ward 5 W. W. District 1	0.04	

Franklin



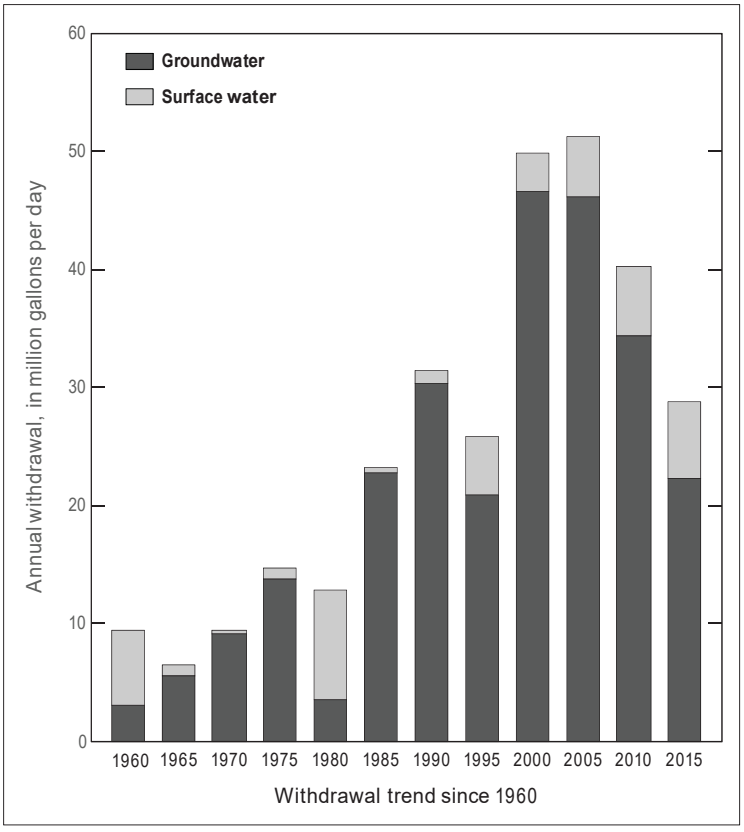
Population: 20,410
Population served by public supply: 12,443
Per capita withdrawals (gal/d): 1,415
Acres irrigated: 54,280
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.13		1.13
Industrial	0.68		0.68
Power generation			
Rural domestic	0.64		0.64
Livestock	0.14		0.14
Rice irrigation	1.15	4.60	5.75
General irrigation	18.12	2.01	20.13
Aquaculture	0.40		0.40
Total	**22.26**	**6.61**	**28.87**

Withdrawals by Major Industrial Group (Mgal/d)

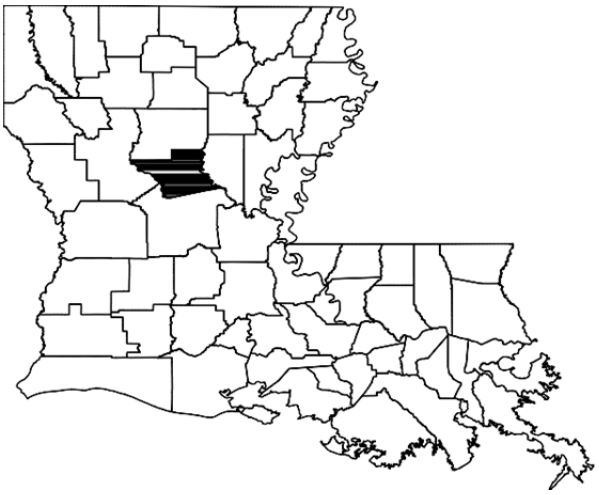
Standard industrial classification		GW	SW
20	Food products	0.15	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
N. Franklin Water Works	0.40	
Turkey Creek Water System	0.28	
West Winnsboro Water System	0.36	
Wisner Water System	0.10	

Grant



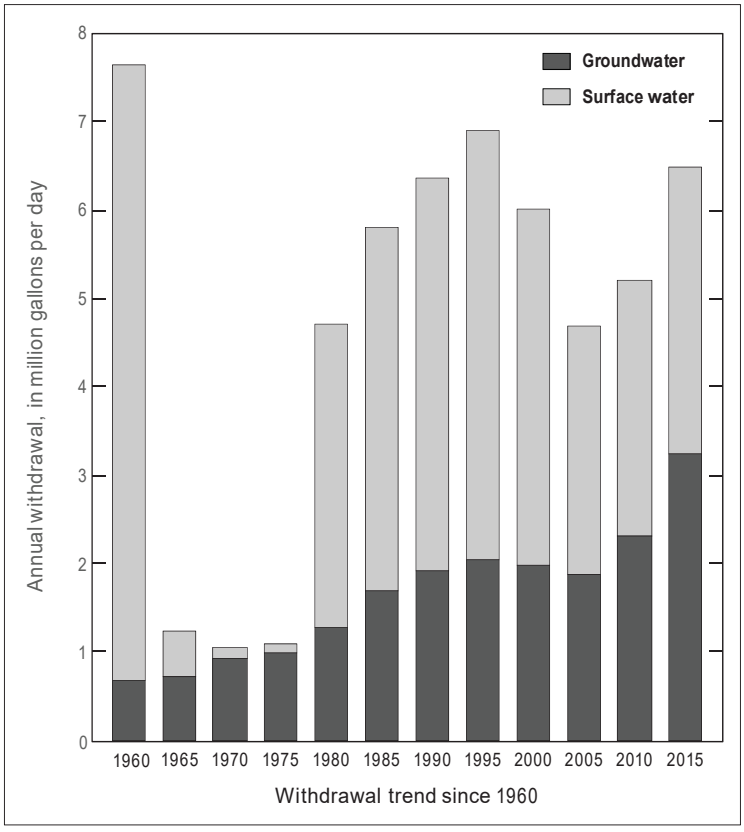
Population: 22,343
Population served by public supply: 19,585
Per capita withdrawals (gal/d): 290
Acres irrigated: 3,829
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	2.91	1.63	4.54
Industrial	0.08		0.08
Power generation			
Rural domestic	0.22		0.22
Livestock	0.02	0.03	0.05
Rice irrigation			
General irrigation		1.60	1.60
Aquaculture			
Total	**3.23**	**3.26**	**6.49**

Withdrawals by Major Industrial Group (Mgal/d)

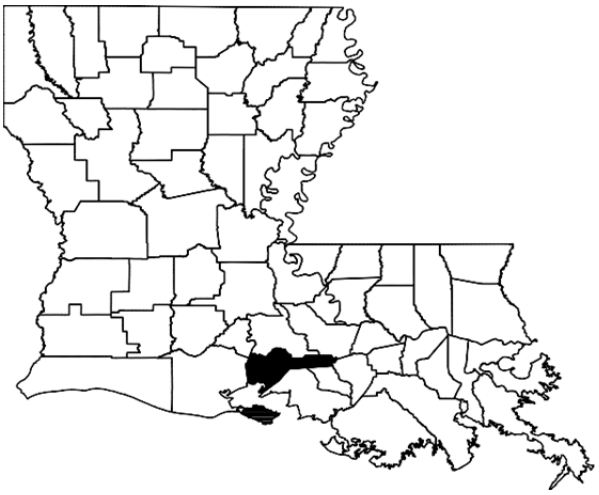
Standard industrial classification		GW	SW
24	Lumber	0.06	
28	Chemicals	0.02	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Central Grant Water System	0.41	
Colfax Water System	0.58	
Dry Prong Water System	0.09	
Grant Zone 2 Water System	0.08	
Jordan Hill\Red Hill W. W.	0.06	
Montgomery Water System	0.14	
Pollock Area Water System	0.28	
Pollock Water System	0.62	
Rapides Parish W. W. Dist. 3		1.63
South Grant Water Corp.	0.37	
Southeast Grant Water System	0.05	
West Grant Water Assoc.	0.23	

Iberia



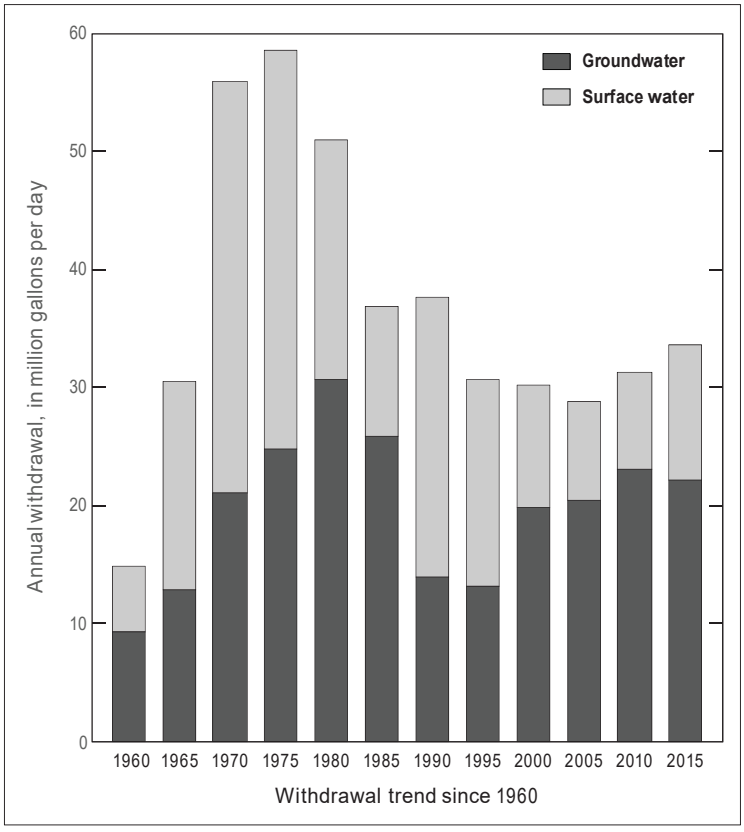
Population: 74,103
Population served by public supply: 61,037
Per capita withdrawals (gal/d): 453
Acres irrigated: 2,384
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	8.62		8.62
Industrial	3.03	7.46	10.50
Power generation			
Rural domestic	1.05		1.05
Livestock	0.04	0.01	0.05
Rice irrigation	0.25	1.85	2.11
General irrigation	0.62		0.62
Aquaculture	8.50	2.12	10.62
Total	**22.11**	**11.45**	**33.56**

Withdrawals by Major Industrial Group (Mgal/d)

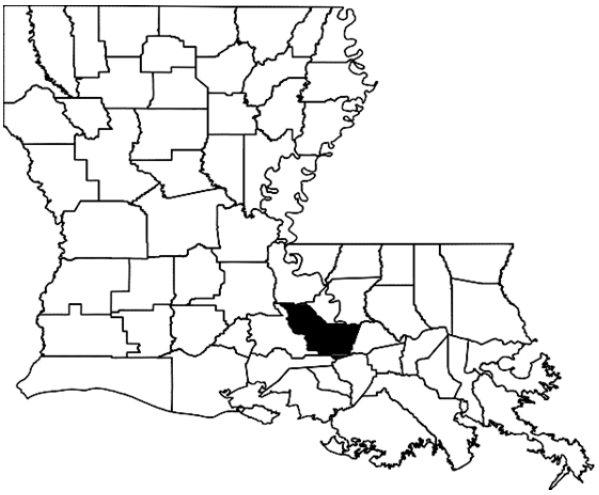
Standard industrial classification		GW	SW
20	Food products	0.93	0.19
28	Chemicals	0.50	7.27
32	Glass, clay, and concrete	0.01	
38	Instrumentation	1.59	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Bayou Teche Water Works	0.76	
Jeanerette Water System	1.25	
Loreauville Water System	0.08	
New Iberia Water System	5.64	
Water Works District #3	0.88	

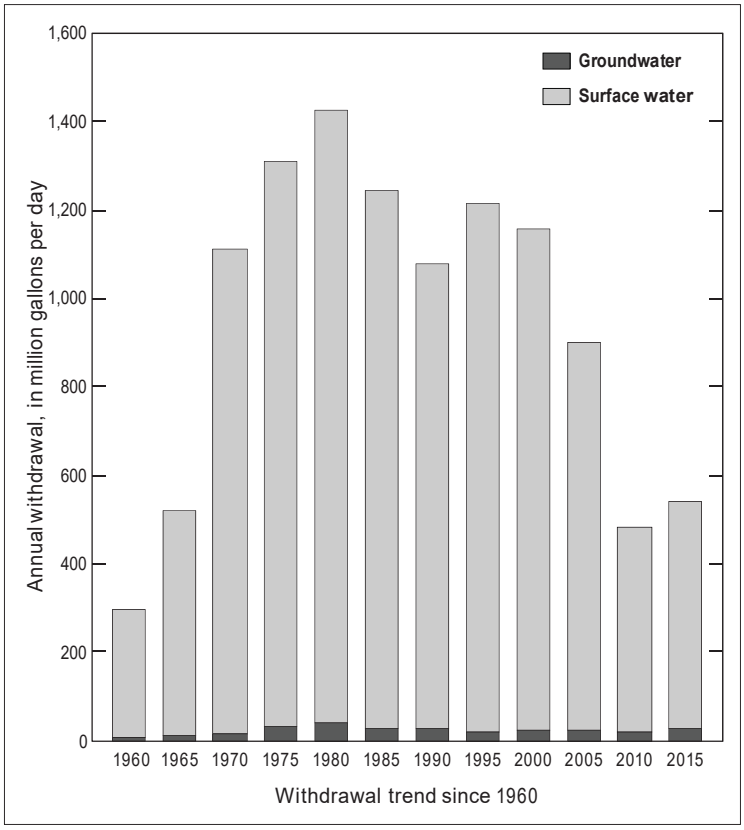
Iberville



Population: 33,095
Population served by public supply: 31,163
Per capita withdrawals (gal/d): 16,362
Acres irrigated: 3,443
Hydroelectric power instream use (Mgal/d): 0

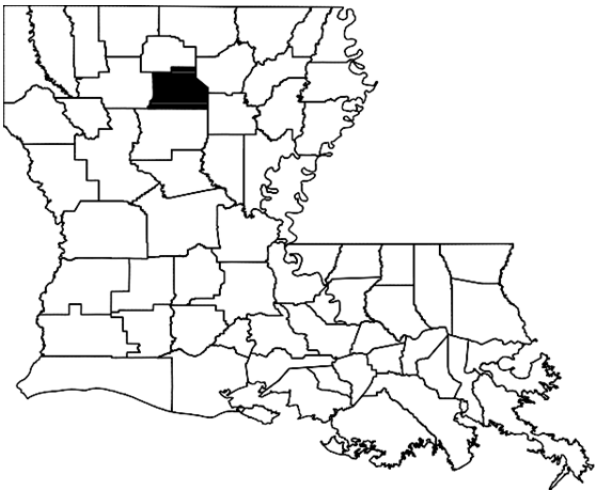
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.38	0.60	1.99
Industrial	24.43	365.83	390.26
Power generation	0.99	138.04	139.02
Rural domestic	0.15		0.15
Livestock	0.04	0.01	0.06
Rice irrigation			
General irrigation	0.89	0.59	1.48
Aquaculture	1.71	6.85	8.56
Total	**29.59**	**511.92**	**541.51**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
13	Oil and gas extraction		0.01
20	Food products	11.61	
28	Chemicals	12.80	365.83
29	Petroleum refining	0.01	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Iberville W. W. Dist. 3	0.39	0.60
Maringouin Water System	0.39	
North Iberville Water System	0.24	
Rosedale Water System	0.06	
White Castle Water System	0.30	

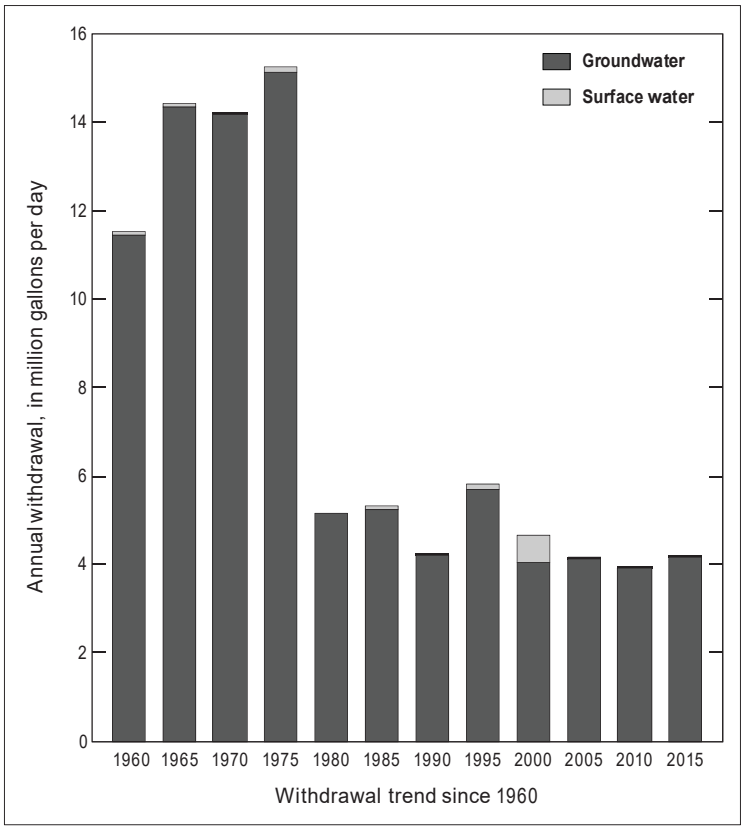
Jackson



Population: 15,858
Population served by public supply: 13,977
Per capita withdrawals (gal/d): 263
Acres irrigated:
Hydroelectric power instream use (Mgal/d): 0

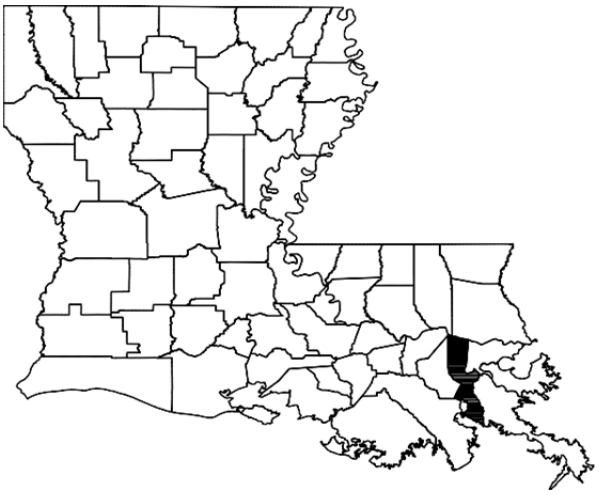
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.73		1.73
Industrial	2.27	0.00	2.27
Power generation			
Rural domestic	0.15		0.15
Livestock	0.00	0.03	0.03
Rice irrigation			
General irrigation			
Aquaculture			
Total	**4.15**	**0.03**	**4.18**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
26	Paper products	2.27	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Bear Creek Water System	0.03	
Chatham Water System	0.06	
East Hodge Water System	0.07	
Eros Community Water System	0.04	
Eros Water System	0.02	
Hodge Water System	0.25	
Jonesboro Water System	0.68	
McDonald Water System	0.12	
New Hope St. Claire W. S.	0.02	
North Hodge Water System	0.03	
Punkin Center Hilltop W. S.	0.14	
Quitman Water System	0.05	
Robinson Chapel Water System	0.01	
Shady Grove Water System	0.01	
Southeast Hodge W. S.	0.01	
Spring Creek Water & Sew.	0.02	
Vixen Water System	0.01	
Walker Community Water System	0.02	
Weston Water System Inc.	0.15	

Jefferson



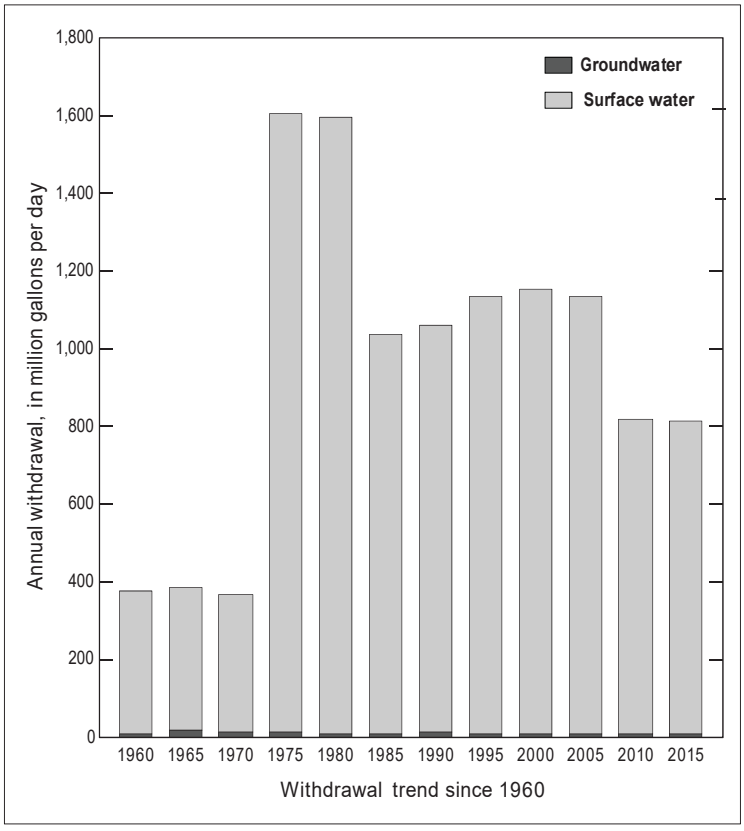
Population: 436,275
Population served by public supply: 435,86
Per capita withdrawals (gal/d): 1,864
Acres irrigated: 0
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply		61.79	61.79
Industrial	1.63	4.83	6.45
Power generation	4.79	739.98	744.77
Rural domestic	0.03		0.03
Livestock		0.04	0.04
Rice irrigation			
General irrigation	0.02	0.01	0.02
Aquaculture			
Total	**6.47**	**806.64**	**813.11**

Withdrawals by Major Industrial Group (Mgal/d)

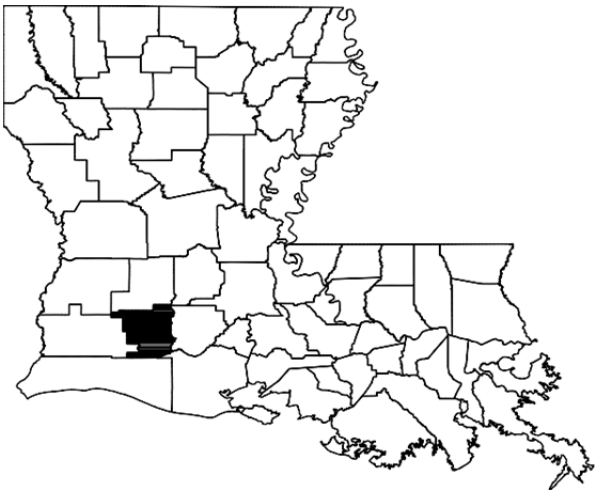
Standard industrial classification		GW	SW
20	Food products	0.21	
28	Chemicals		4.83
37	Transportation equipment	1.41	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
East Jefferson W. W. Dist. No. 1		35.44
Gretna Waterworks		3.09
West Jefferson W. W. Dist. No. 2		22.84
Westwego Water System		0.44

Jefferson Davis



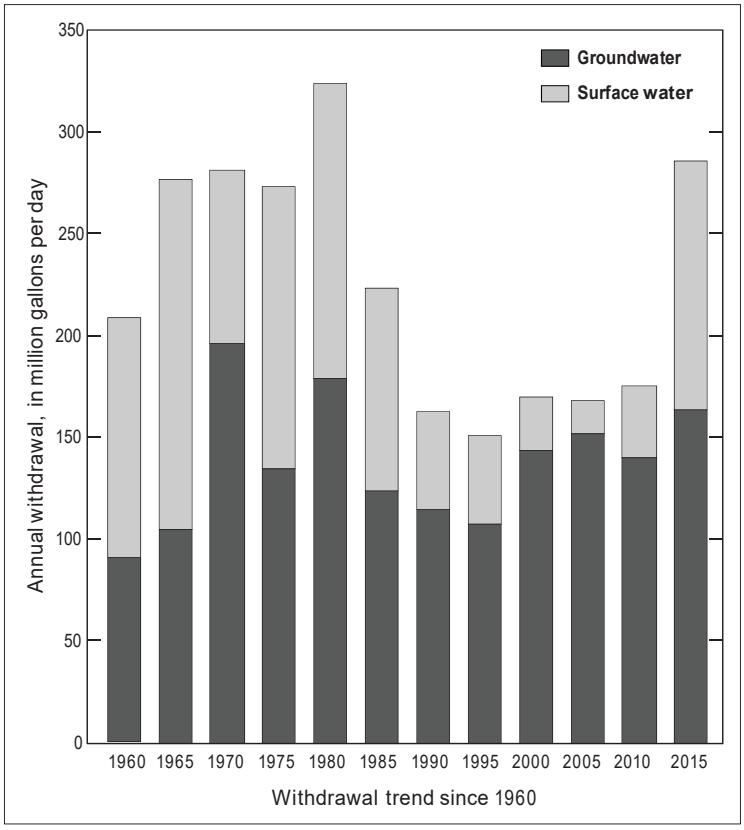
Population: 31,439
Population served by public supply: 26,624
Per capita withdrawals (gal/d): 9,082
Acres irrigated: 81,432
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	3.82		3.82
Industrial			
Power generation			
Rural domestic	0.39		0.39
Livestock	0.02		0.02
Rice irrigation	108.31	46.42	154.72
General irrigation	0.97	0.65	1.62
Aquaculture	49.99	74.98	124.97
Total	**163.50**	**122.05**	**285.54**

Withdrawals by Major Industrial Group (Mgal/d)

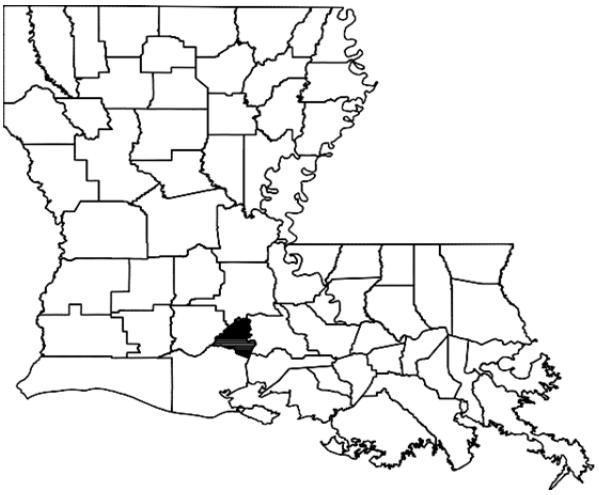
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Fenton Water System	0.03	
Jefferson Davis Central W. W. Dist.	0.46	
Jefferson Davis W. & S. Comm.	0.64	
Jefferson Davis W. W. District 4	0.31	
Jennings Water System	1.62	
Lake Arthur Water System	0.36	
Welsh Water System	0.39	

Lafayette



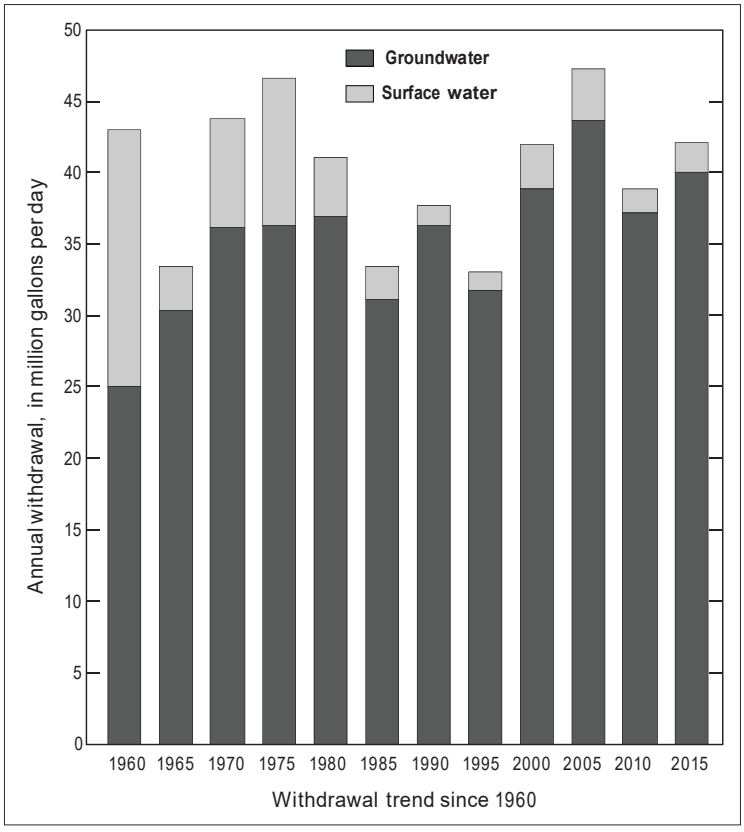
Population: 240,098
Population served by public supply: 206,880
Per capita withdrawals (gal/d): 175
Acres irrigated: 4,119
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	25.44		25.44
Industrial	0.01		0.01
Power generation			
Rural domestic	2.66		2.66
Livestock	0.11		0.11
Rice irrigation	4.94	1.24	6.18
General irrigation	0.37	0.06	0.43
Aquaculture	6.56	0.73	7.29
Total	**40.09**	**2.03**	**42.12**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification	GW	SW

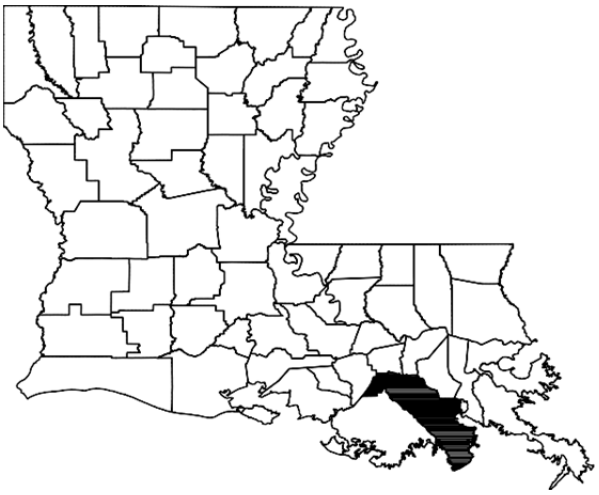


Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Broussard Water System	0.53	
Carencro Water System	0.68	
Duson Water System	0.16	
Lafayette Utilities System	23.34	
Milton Water System, Inc.	0.12	
Shady Oaks Estates Water System	0.02	
Total Environmental Solutions, Inc.	0.32	
Village Quest Subdivision W. S.	0.02	
Youngsville Water System	0.03	

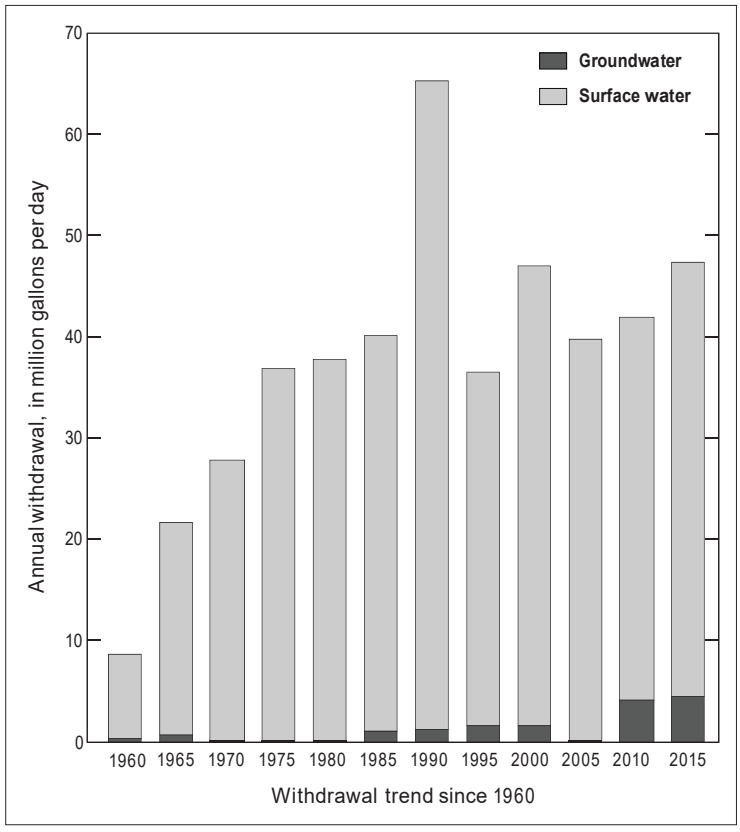
Lafourche

Population: 98,325
Population served by public supply: 98,084
Per capita withdrawals (gal/d): 483
Acres irrigated: 1,344
Hydroelectric power instream use (Mgal/d): 0



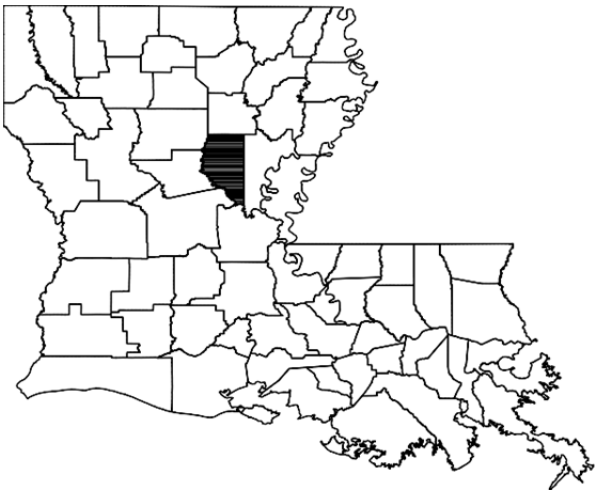
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply		25.66	25.66
Industrial	1.04	3.50	4.54
Power generation			
Rural domestic	0.02		0.02
Livestock	0.06	0.06	0.11
Rice irrigation			
General irrigation		0.58	0.58
Aquaculture	3.31	13.23	16.54
Total	**4.42**	**43.03**	**47.45**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
20	Food products		3.50
28	Chemicals	1.04	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Lafourche Water Dist. No. 1		10.38
Terrebonne W. W. Dist. No. 1		12.37
Thibodaux Water System		2.91

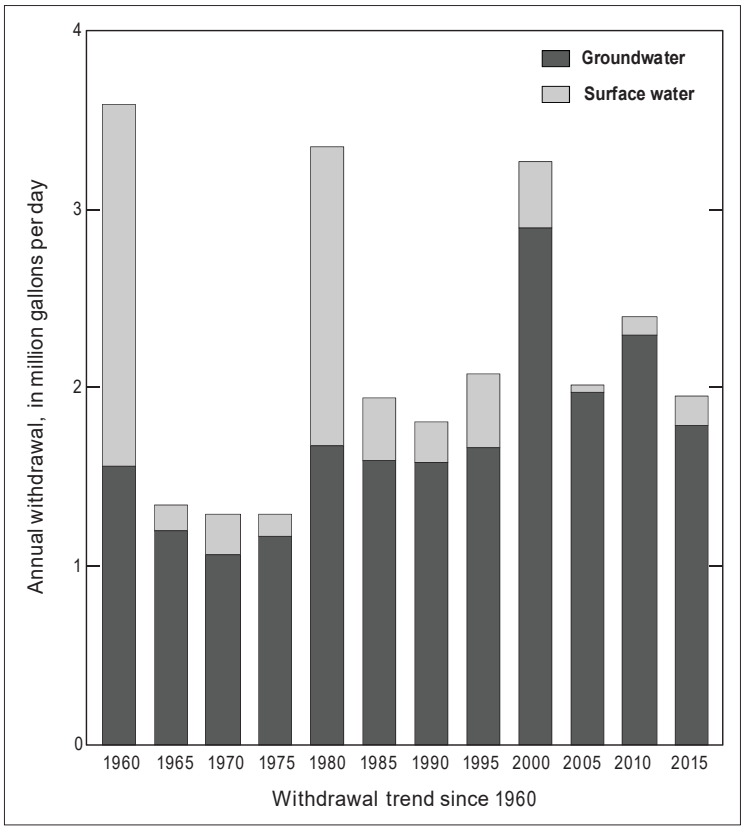
La Salle



Population: 14,974
Population served by public supply: 14,262
Per capita withdrawals (gal/d): 131
Acres irrigated: 360
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.72		1.72
Industrial		0.00	0.00
Power generation			
Rural domestic	0.06		0.06
Livestock	0.00	0.02	0.02
Rice irrigation			
General irrigation		0.15	0.15
Aquaculture			
Total	**1.79**	**0.17**	**1.95**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Belah-Fellowship Water System	0.23	
East Jena Water System	0.11	
Jena Water System	0.52	
La Salle W. W. Dist. 1	0.32	
Nebo Water System	0.06	
Olla Water System	0.20	
Rogers Community Water System	0.02	
Summerville-Rosefield Water	0.08	
Tullos Water System	0.10	
Urania Water System	0.08	

Lincoln

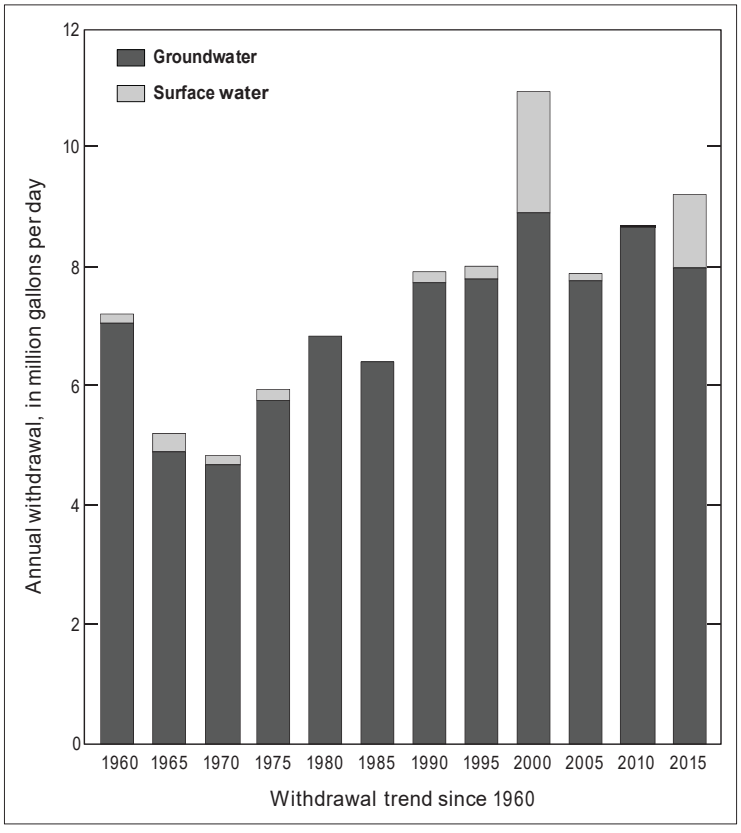
Population: 47,774
Population served by public supply: 45,424
Per capita withdrawals (gal/d): 194
Acres irrigated: 2
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	7.20		7.20
Industrial	0.62	1.17	1.78
Power generation			
Rural domestic	0.19		0.19
Livestock	0.01	0.07	0.08
Rice irrigation			
General irrigation	0.00	0.00	0.00
Aquaculture			
Total	**8.01**	**1.24**	**9.26**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
13	Oil and gas extraction	0.04	1.17
24	Lumber	0.04	
32	Glass, clay, and concrete	0.17	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Choudrant Water System	0.29	
Culbertson Water System	0.27	
Dubach Water System	0.06	
Fellowship Water System	0.05	
Grambling Water System	0.43	
Greater Ward 1 W. W. Dist.	0.51	
Hico Water System	0.11	
Hilly-Greenwood W. S.	0.13	
Lincoln W. W. Dist. 1	0.04	
Lincoln W. W. Dist. 3	0.32	
Mineral Springs Water System	0.09	
Mt. Olive Water Dist.	0.07	
Mt. Zion Water System	0.30	
Ruston Utilities System	4.02	
Simsboro Water System	0.12	
Wesley Chapel Water System	0.36	

Livingston

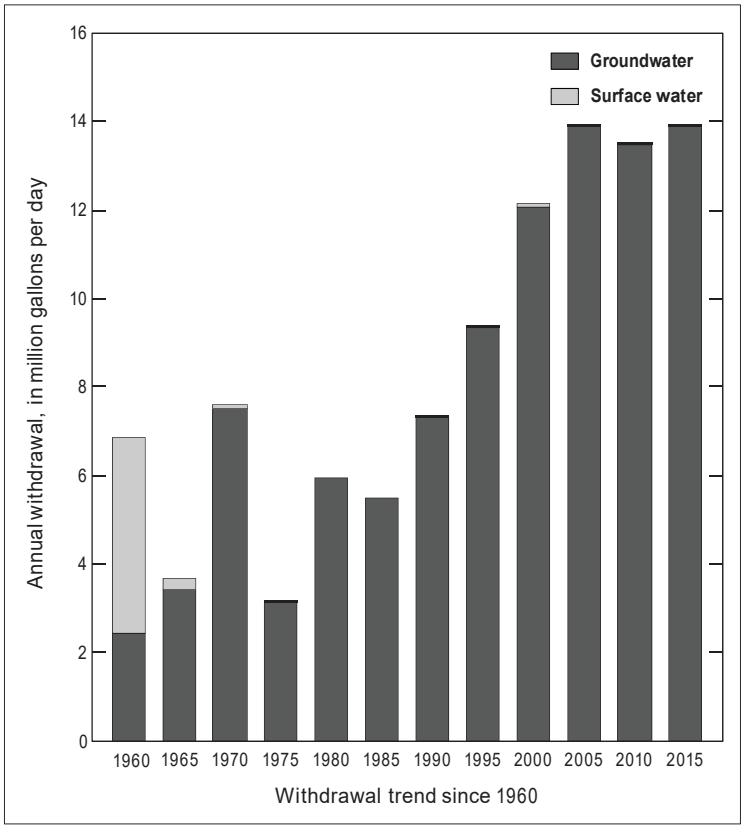
Population: 137,788
Population served by public supply: 112,737
Per capita withdrawals (gal/d): 101
Acres irrigated: 13
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	11.55		11.55
Industrial	0.01		0.01
Power generation			
Rural domestic	2.00		2.00
Livestock	0.06	0.04	0.10
Rice irrigation			
General irrigation	0.01		0.01
Aquaculture	0.26		0.26
Total	**13.89**	**0.04**	**13.93**

Withdrawals by Major Industrial Group (Mgal/d)

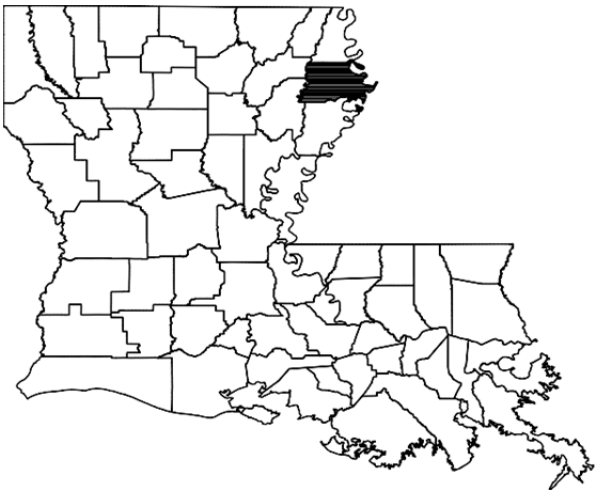
Standard industrial classification		GW	SW
20	Food products	0.01	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Albany Water System	0.44	
Colyell Community Water Assoc.	0.21	
Denham Springs Water Dept.	2.13	
Diversion Water Co.	0.22	
Fourth Ward Water Works	0.27	
French Settlement Water System	0.24	
Head of Island Water System	0.17	
Killian Water System	0.13	
Livingston Water System	0.53	
Port Vincent Water System	0.20	
Springfield Water System	0.14	
Vincent Acres Water Co.	0.01	
Walker Water System	1.48	
Ward 2 Water District	5.31	

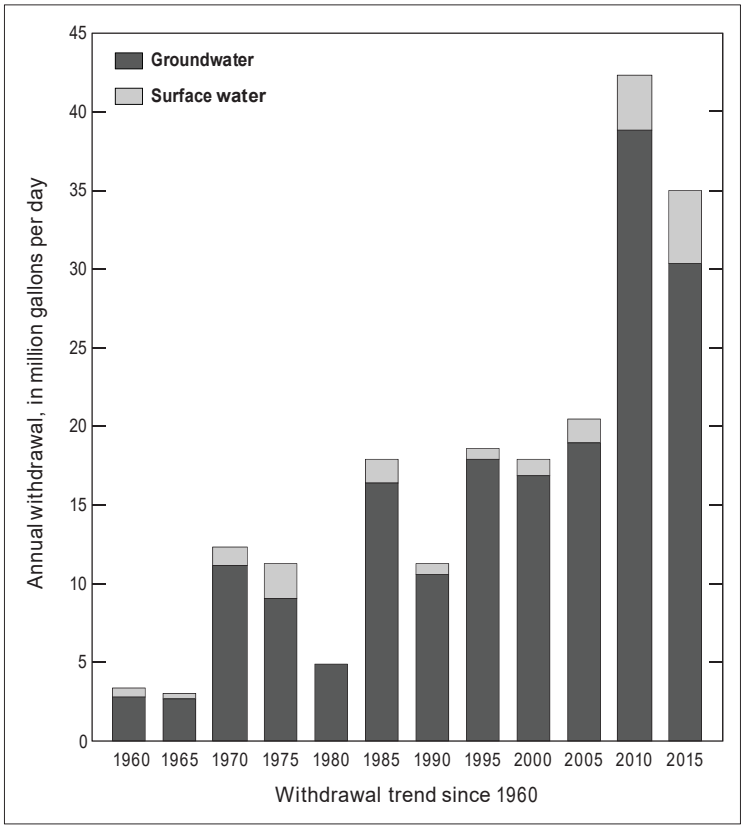
Madison



Population: 11,514
Population served by public supply: 11,275
Per capita withdrawals (gal/d): 3,041
Acres irrigated: 55,780
Hydroelectric power instream use (Mgal/d): 0

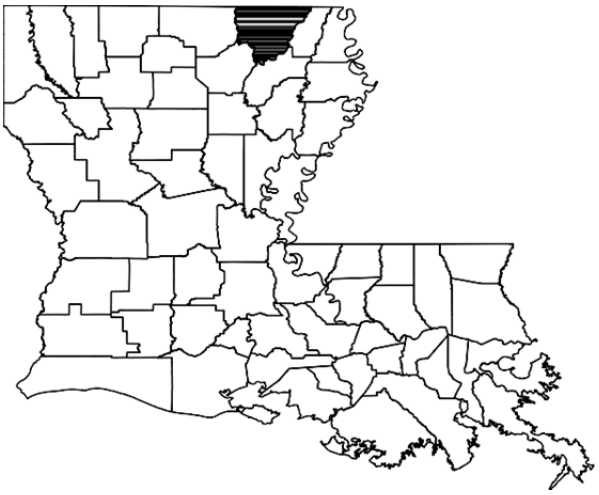
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.65		1.65
Industrial			
Power generation			
Rural domestic	0.02		0.02
Livestock	0.01	0.01	0.02
Rice irrigation	10.33	2.58	12.91
General irrigation	18.05	2.01	20.06
Aquaculture	0.29	0.07	0.36
Total	**30.35**	**4.67**	**35.02**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Tallulah Water Service	1.10	
Walnut Bayou Water Association	0.54	

Morehouse



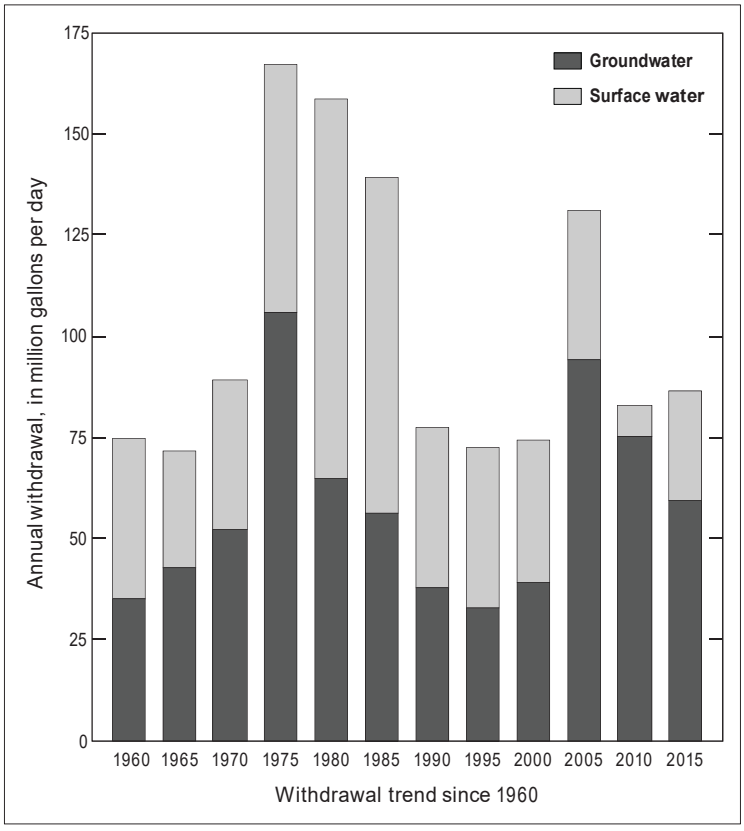
Population: 26,395
Population served by public supply: 24,391
Per capita withdrawals (gal/d): 3,295
Acres irrigated: 82,360
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	3.48		3.48
Industrial	0.04		0.04
Power generation			
Rural domestic	0.16		0.16
Livestock	0.08	0.02	0.09
Rice irrigation	37.71	25.14	62.84
General irrigation	18.32	2.04	20.36
Aquaculture			
Total	**59.78**	**27.19**	**86.97**

Withdrawals by Major Industrial Group (Mgal/d)

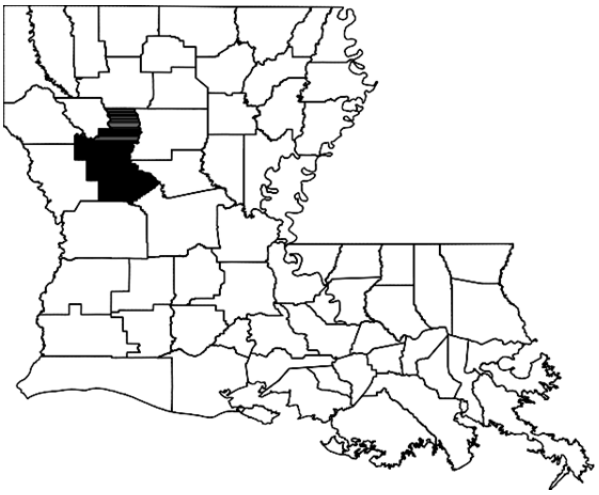
Standard industrial classification		GW	SW
26	Paper products	0.04	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Bayou Bonne Idee Water System	0.11	
Beekman Water System	0.16	
Bonita Water System	0.08	
Collinston Water System	0.06	
Jones McGinty Water System	0.10	
Mer Rouge Water System	0.13	
Morehouse Central Water System	0.05	
Morehouse W. W. District 1	0.09	
Morehouse W. W. District 2	0.32	
Oak Ridge Water System	0.02	
Peoples Water Service Company	2.29	
South Bonne Idee Water System	0.01	
Ward 3 Water System	0.07	

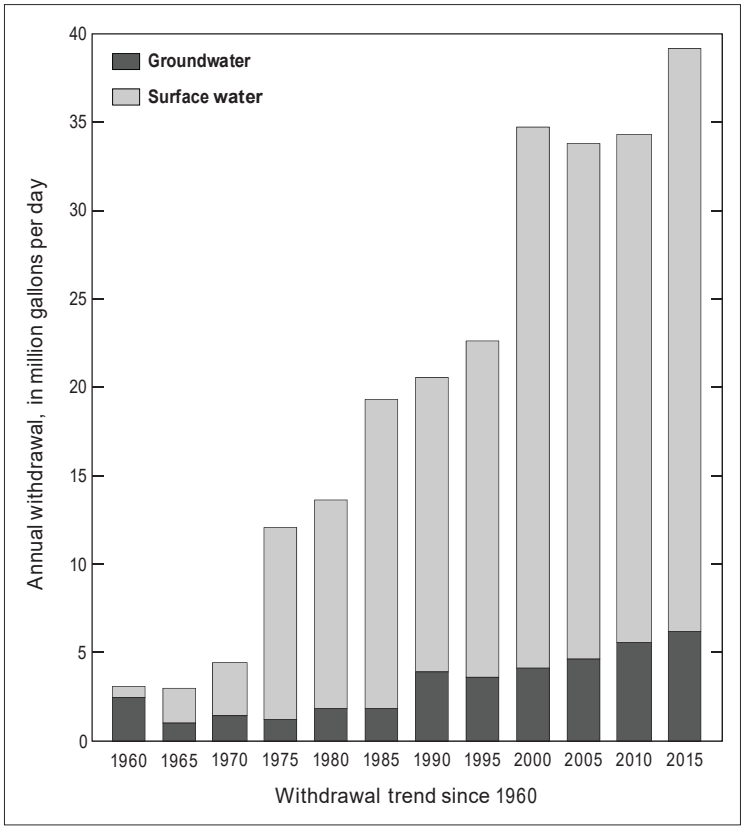
Natchitoches



Population: 39,179
Population served by public supply: 32,795
Per capita withdrawals (gal/d): 1,000
Acres irrigated: 16,816
Hydroelectric power instream use (Mgal/d): 0

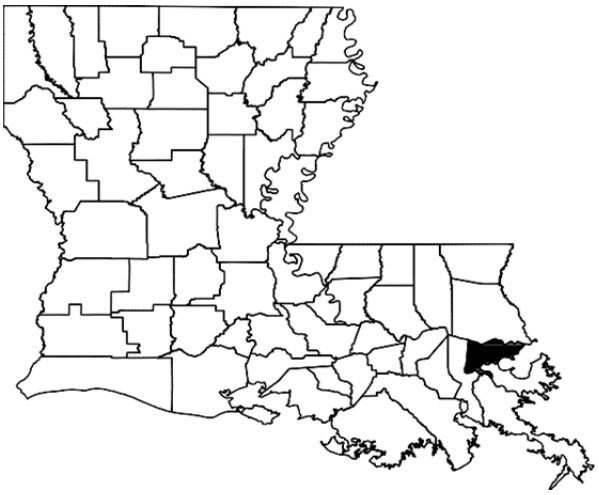
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.30	6.47	7.77
Industrial		14.34	14.34
Power generation			
Rural domestic	0.51		0.51
Livestock	0.05	0.20	0.25
Rice irrigation	0.35	6.59	6.94
General irrigation	1.04	4.18	5.22
Aquaculture	2.92	1.25	4.17
Total	**6.17**	**33.02**	**39.19**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
26	Paper products		14.34



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Bellwood Water System	0.06	
Campti Water System	0.17	
Chee Chee Bay Water System	0.03	
Chestnut-Readhimer Water System	0.03	
Clarence Water System	0.05	
Creston Water System	0.04	
Goldonna Water System	0.04	
Hagewood Water System	0.05	
Natchitoches Utility System		6.44
Natchitoches W. W. District 2	0.43	
Powhatan Water System	0.05	
Provencal Water System	0.22	
Robeline-Marthaville Water System	0.12	
Sandy Point 480 Water System		0.03

Orleans



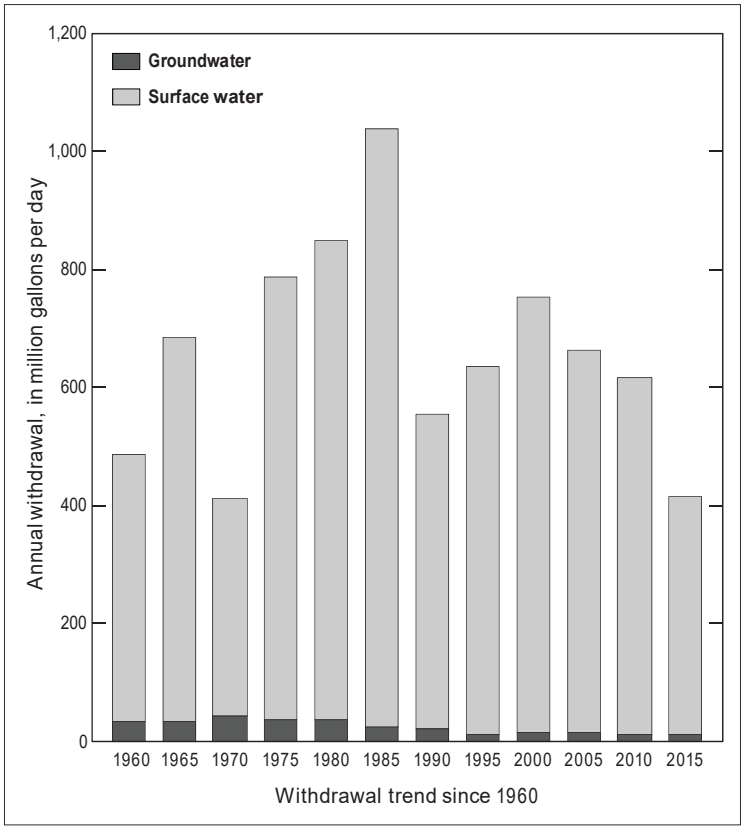
Population: 389,617
Population served by public supply: 387,032
Per capita withdrawals (gal/d): 1,063
Acres irrigated: 0
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply		140.90	140.90
Industrial	0.89		0.89
Power generation	10.87	261.19	272.06
Rural domestic	0.21		0.21
Livestock	0.00	0.01	0.01
Rice irrigation			
General irrigation	0.05		0.05
Aquaculture			
Total	**12.02**	**402.10**	**414.12**

Withdrawals by Major Industrial Group (Mgal/d)

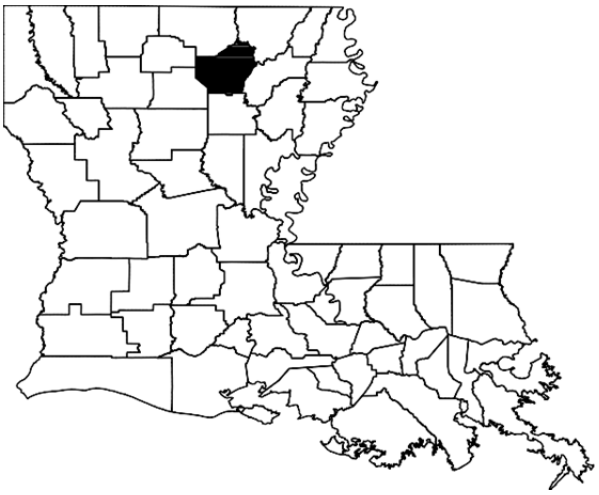
Standard industrial classification		GW	SW
28	Chemicals	0.89	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Sewage & Water Board of New Orleans		140.90

Ouachita



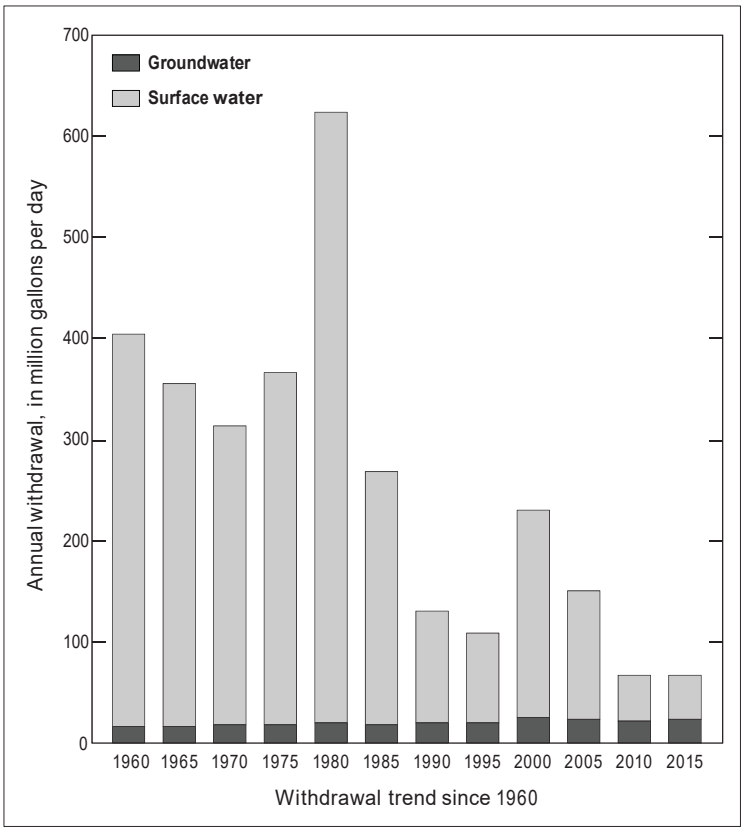
Population: 156,761
Population served by public supply: 151,973
Per capita withdrawals (gal/d): 438
Acres irrigated: 15,559
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	10.02	14.16	24.18
Industrial	8.70	14.39	23.09
Power generation		2.55	2.55
Rural domestic	0.38		0.38
Livestock		0.07	0.07
Rice irrigation	5.28	9.81	15.09
General irrigation	0.32	2.85	3.17
Aquaculture	0.01	0.05	0.06
Total	**24.71**	**43.88**	**68.59**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
26	Paper products	8.70	12.50
28	Chemicals		1.89



Withdrawals by Major Public Supplier (Mgal/d)

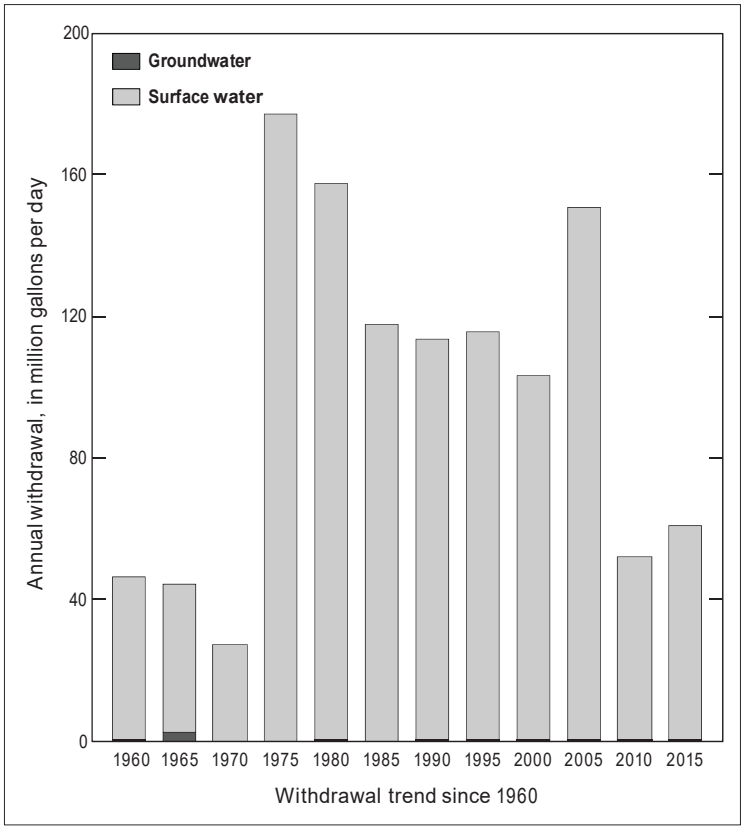
Public Supplier	GW	SW
Cadeville Water District	0.34	
Calhoun Water System, Inc.	0.08	
Charmingdale Subdivision W. S.	0.09	
Cheniere-Drew Water System	1.24	
Frost Town Water System	0.09	
Greater Ouachita Water Company	2.79	
Hickory Bend Water System	0.03	
Hillside Park Subdivision W. S.	0.12	
Indian Village Water System	0.12	
Kiroli - Darbonne Water System	0.39	
LWC Management Company, Inc.	0.51	
McClendon Community Water Well	0.02	
Monroe Water System		14.16
Prairie Road Water System	0.12	
Sikes Water System	0.01	
Southwest Ouachita Waterworks	0.85	
Toney Road Water System	0.01	
West Monroe Water System	3.10	
Western Utilities, Inc.	0.07	

Plaquemines

Population: 23,495
Population served by public supply: 22,881
Per capita withdrawals (gal/d): 2,592
Acres irrigated: 1
Hydroelectric power instream use (Mgal/d): 0

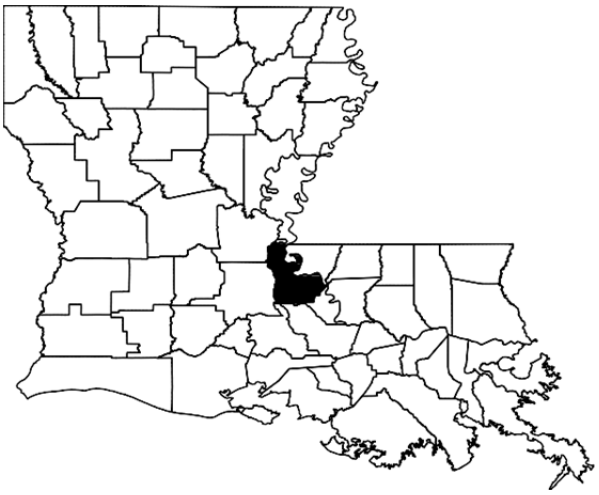
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply		7.14	7.14
Industrial		53.66	53.66
Power generation			
Rural domestic	0.05		0.05
Livestock		0.05	0.05
Rice irrigation			
General irrigation		0.00	0.00
Aquaculture			
Total	**0.05**	**60.86**	**60.91**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
28	Chemicals		20.47
29	Petroleum refining		33.19



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Plaquemines Parish Water Works		7.14

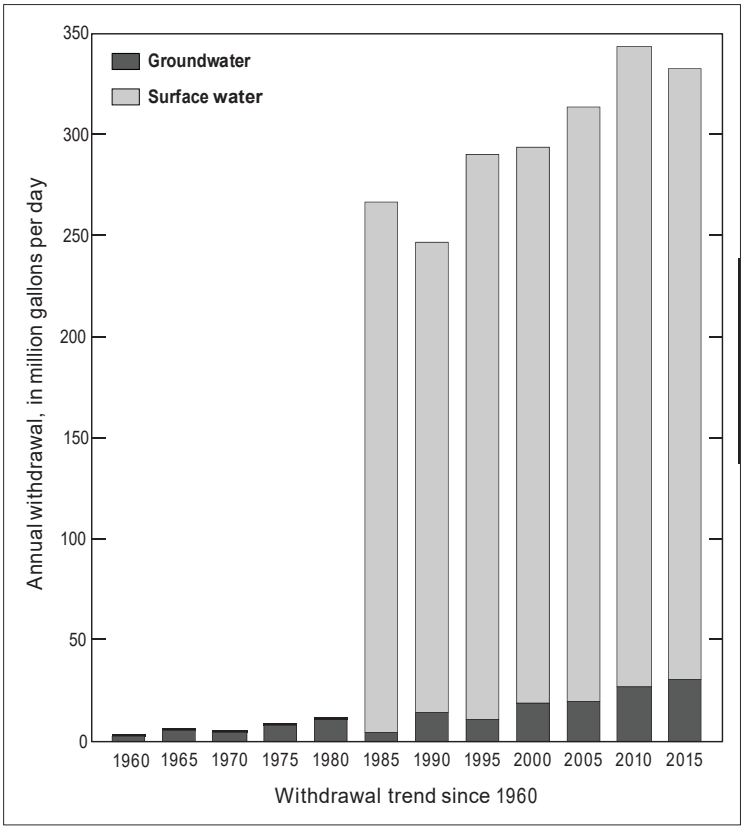
Pointe Coupee



Population: 22,251
Population served by public supply: 19,412
Per capita withdrawals (gal/d): 14,947
Acres irrigated: 24,743
Hydroelectric power instream use (Mgal/d): 0

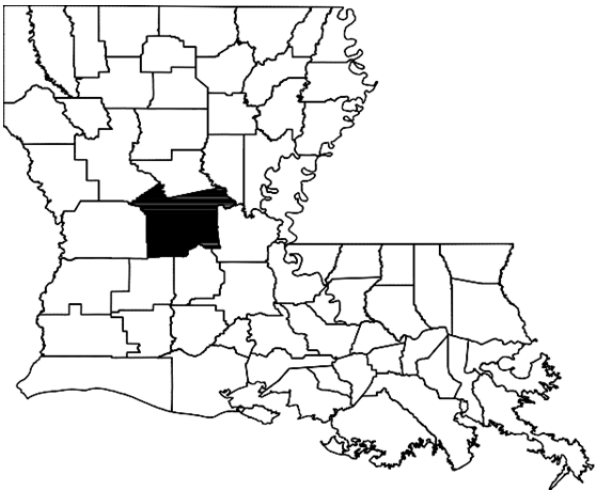
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public Supply	3.54		3.54
Industrial	6.23		6.23
Power Generation	1.30	300.88	302.18
Rural Domestic	0.23		0.23
Livestock	0.06	0.04	0.10
Rice Irrigation	2.78		2.78
General Irrigation	9.59		9.59
Aquaculture	6.35	1.59	7.94
Total	**30.08**	**302.50**	**332.58**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
20	Food products	4.95	
32	Glass, clay, and concrete	1.28	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
False River Water Company	0.38	
Fordoche Water System	0.14	
Innis Water Corporation, Inc.	0.29	
Livonia Water System	0.22	
M & S Water Supply	0.09	
Morganza Water System	0.07	
	1.10	
	0.01	
	0.32	
	0.49	
	0.23	
Torbert-Frisco Water System	0.19	

Rapides



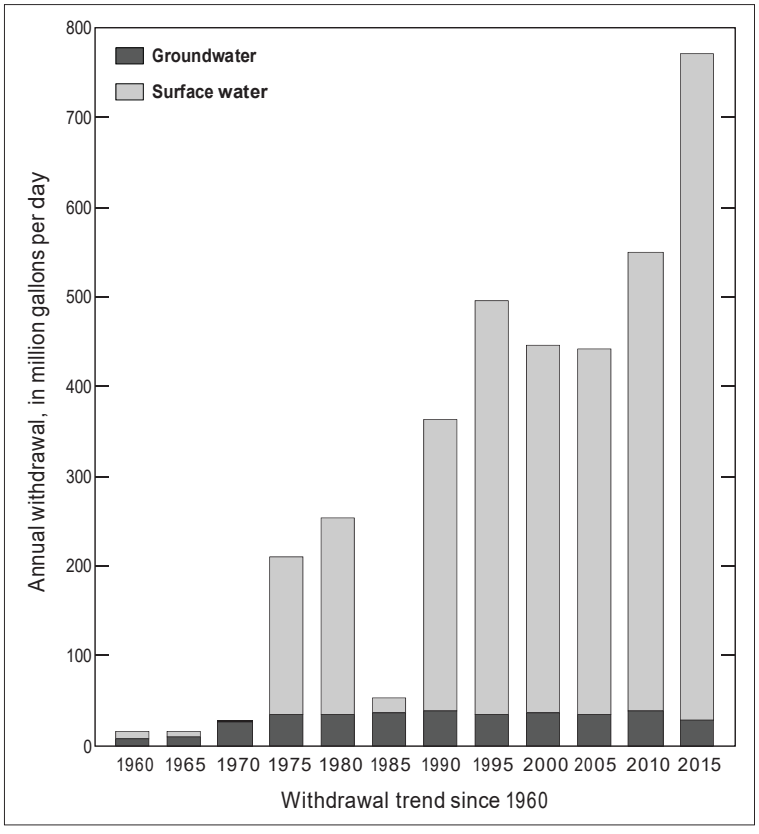
Population: 132,141
Population served by public supply: 126,552
Per capita withdrawals (gal/d): 5,833
Acres irrigated: 19,366
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	19.13		19.13
Industrial	0.00		0.00
Power generation	0.33	726.60	726.93
Rural domestic	0.45		0.45
Livestock	0.04	0.16	0.20
Rice irrigation	1.99	11.28	13.27
General irrigation	2.77	2.57	5.33
Aquaculture	2.82	2.60	5.42
Total	**27.53**	**743.20**	**770.74**

Withdrawals by Major Industrial Group (Mgal/d)

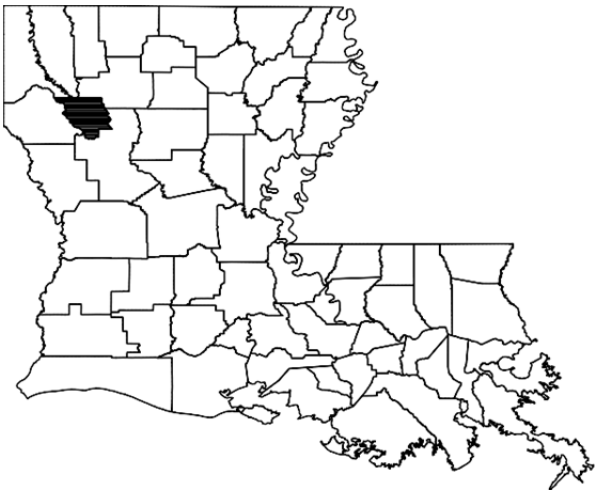
Standard industrial classification		GW	SW
41	Local and suburban transit	0.15	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Alexandria Water System	10.08	
Avoyelles W. W. District #1	0.13	
Boyce Water System	0.17	
Buckeye Water District 50	0.81	
Bunkie Water System	0.60	
Cheneyville Water System	0.11	
Elmer-Melder-Cal Water System	0.32	
Forest Hill Water System	0.36	
Gardner Community Water System	0.25	
Glenmora Town Water System	0.15	
Hammock Water System	0.05	
Hineston Water System	0.06	
Kolin-Ruby-Wise Water District	0.34	
Lecompte Water System	0.14	
Lena Water System	0.19	
McNary Water System	0.04	
Pineville Water System	2.62	
Rapides Island Water Association	0.47	
Rapides Parish W. W. District 3	1.53	
Sieper Area Water System	0.07	
Ward 6 Water Association	0.08	
Woodworth Water System	0.34	

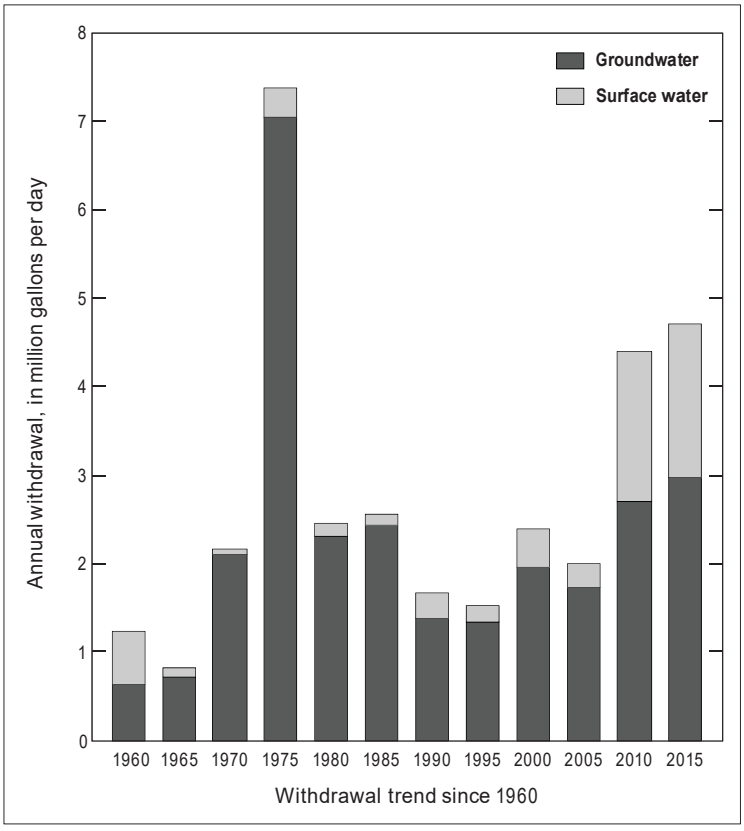
Red River



Population: 8,593
Population served by public supply: 6,083
Per capita withdrawals (gal/d): 548
Acres irrigated: 4,718
Hydroelectric power instream use (Mgal/d): 0

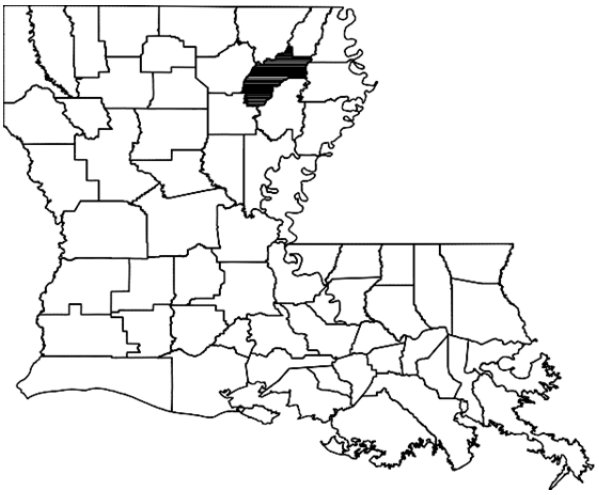
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	0.61	0.41	1.02
Industrial	0.01	0.78	0.80
Power generation			
Rural domestic	0.20		0.20
Livestock	0.08	0.12	0.20
Rice irrigation	0.74	0.08	0.83
General irrigation	1.33	0.33	1.67
Aquaculture			
Total	**2.98**	**1.73**	**4.71**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.01	0.37
28	Chemicals		0.42



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Coushatta Water System	0.29	
East Cross Water System	0.02	
Edgefield Village Water System	0.02	
Fairview Union Water System		0.41
Halfway-Carroll Water System	0.03	
Hall Summit Water System	0.02	
Hickory Grove Water System	0.05	
Martin Water System	0.12	
Social Springs Water System	0.03	

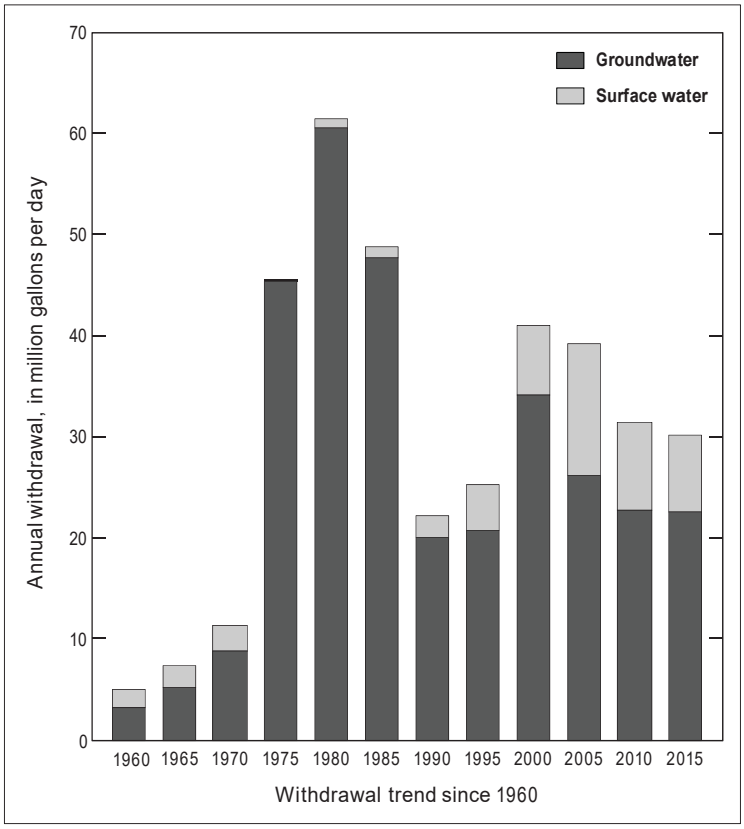
Richland



Population: 20,523
Population served by public supply: 14,634
Per capita withdrawals (gal/d): 1,470
Acres irrigated: 43,249
Hydroelectric power instream use (Mgal/d): 0

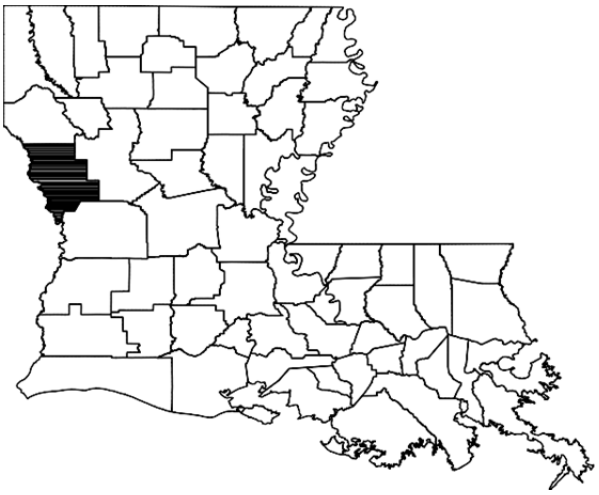
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.45		4.45
Industrial			
Power generation			
Rural domestic	0.47		0.47
Livestock	0.07	0.07	0.13
Rice irrigation	9.89		9.89
General irrigation	7.62	7.62	15.23
Aquaculture			
Total	**22.49**	**7.68**	**30.17**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Archibald Water System	0.33	
Delhi Water System	1.64	
Liddieville Water System	0.11	
Mangham Water System	0.08	
N. Franklin Water Works	0.40	
Rayville Water System	0.48	
River Road Water System	0.30	
Start Water System, Inc.	0.25	
Winnsboro Water System	0.82	

Sabine



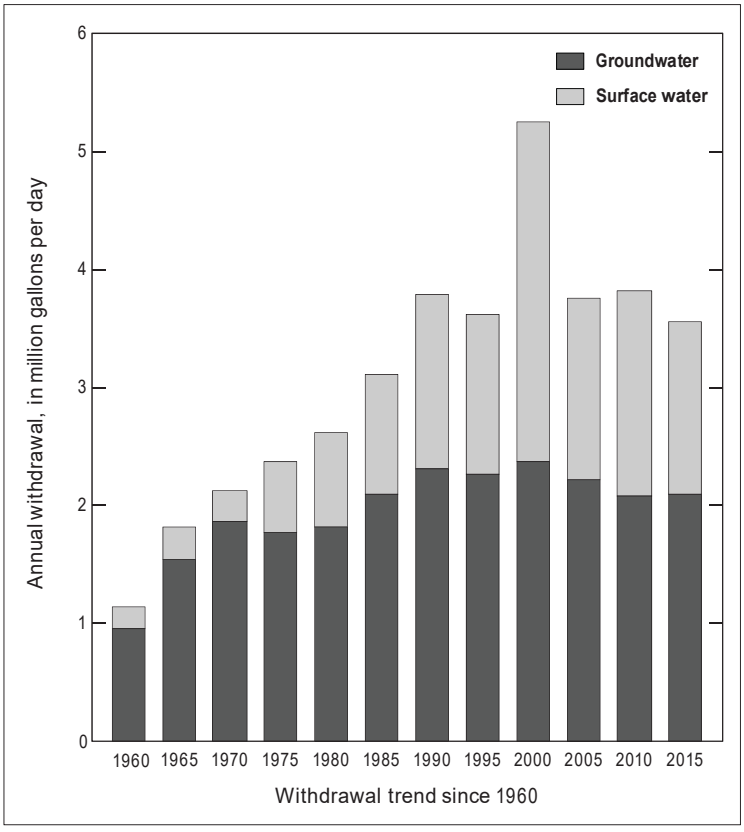
Population: 24,186
Population served by public supply: 11,640
Per capita withdrawals (gal/d): 148
Acres irrigated: 0
Hydroelectric power instream use (Mgal/d): 2,636

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.08	1.26	2.34
Industrial	0.00	0.14	0.14
Power generation			
Rural domestic	1.00		1.00
Livestock	0.01	0.09	0.10
Rice irrigation			
General irrigation		0.00	0.00
Aquaculture			
Total	**2.10**	**1.48**	**3.58**

Withdrawals by Major Industrial Group (Mgal/d)

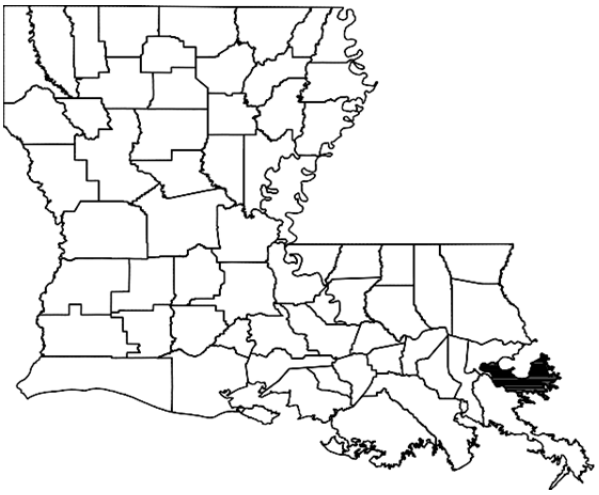
Standard industrial classification		GW	SW
13	Oil and gas extraction		0.08
24	Lumber		0.06



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Belmont Waterworks, Inc.	0.33	
Converse Water System	0.04	
Ebarb W.W. Dist. 1		0.46
Fisher Water Department	0.03	
Many Water System	0.27	0.34
Noble Water System	0.04	
Pendleton Water Assoc.		0.20
Pleasant Hill Water System	0.07	
S. Toledo Bend W. W. Dist.		0.26
Union Springs Water System	0.08	
Zwolle Water Department	0.23	

St. Bernard



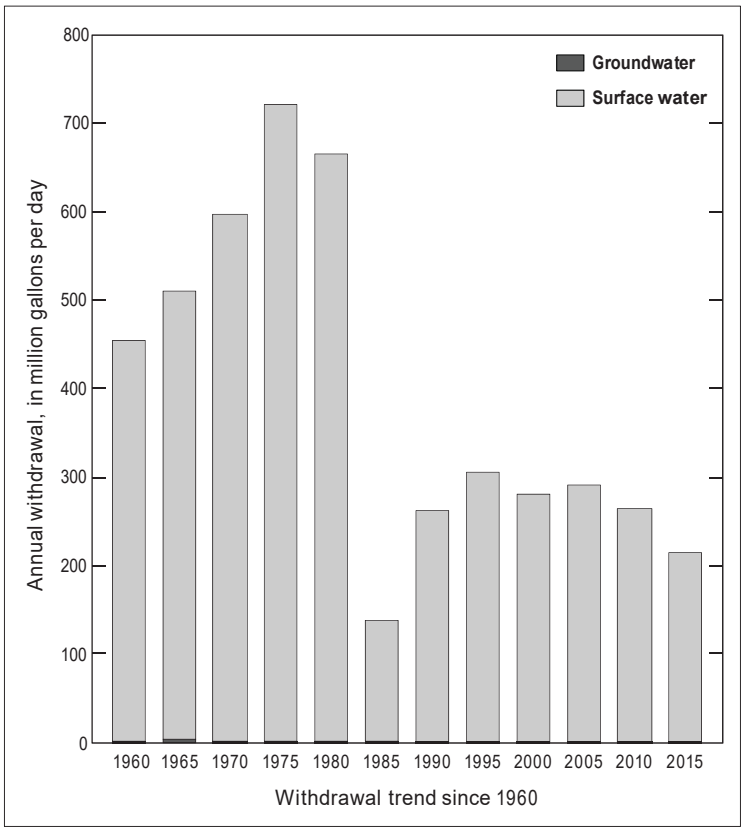
Population: 45,408
Population served by public supply: 45,289
Per capita withdrawals (gal/d): 4,714
Acres irrigated: 0
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply		7.16	7.16
Industrial		206.86	206.86
Power generation			
Rural domestic	0.01		0.01
Livestock	0.02		0.02
Rice irrigation			
General irrigation			
Aquaculture			
Total	**0.02**	**214.03**	**214.05**

Withdrawals by Major Industrial Group (Mgal/d)

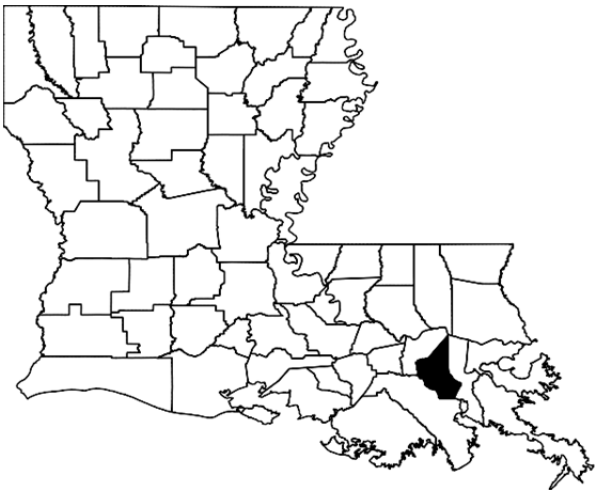
Standard industrial classification		GW	SW
20	Food products		14.07
29	Petroleum refining		192.79



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
St. Bernard Parish Water and Sewerage Commission		7.16

St. Charles



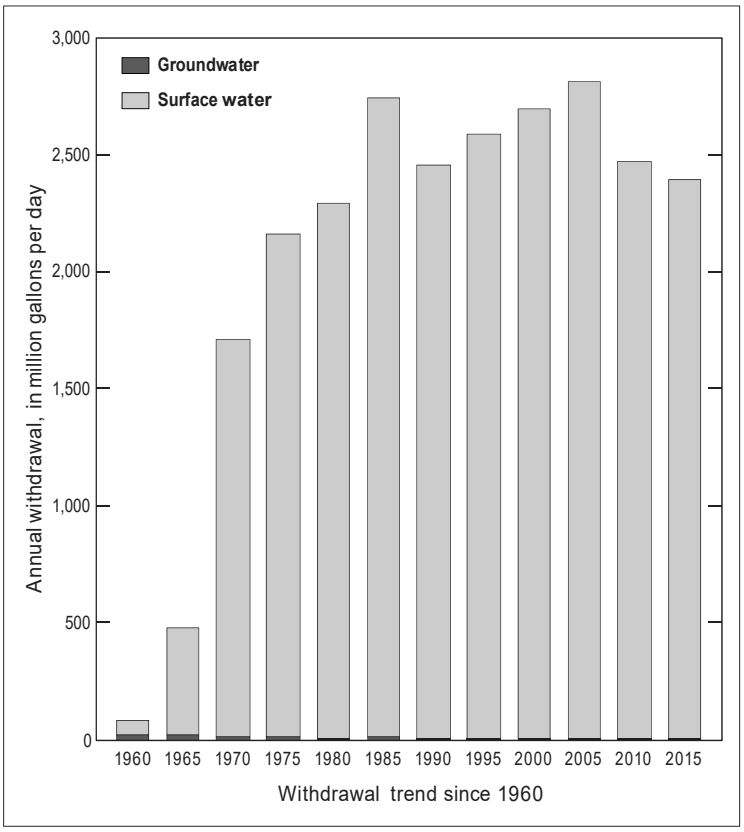
Population: 52,812
Population served by public supply: 52,573
Per capita withdrawals (gal/d): 45,409
Acres irrigated: 120
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply		9.09	9.09
Industrial	1.11	595.19	596.30
Power generation		1,792.66	1,792.66
Rural domestic	0.02		0.02
Livestock	0.00	0.02	0.02
Rice irrigation			
General irrigation	0.03	0.02	0.05
Aquaculture			
Total	**1.17**	**2,396.96**	**2,398.13**

Withdrawals by Major Industrial Group (Mgal/d)

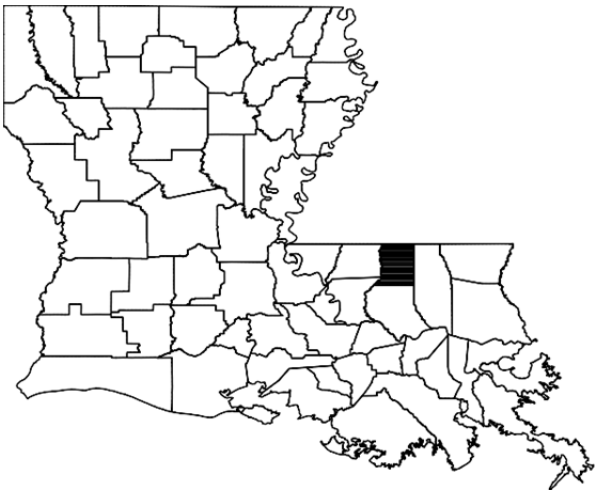
Standard industrial classification		GW	SW
28	Chemicals	0.07	565.96
29	Petroleum refining	1.05	29.23



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
St. Charles Waterworks District 1		4.86
St. Charles Waterworks District 2		4.23

St. Helena



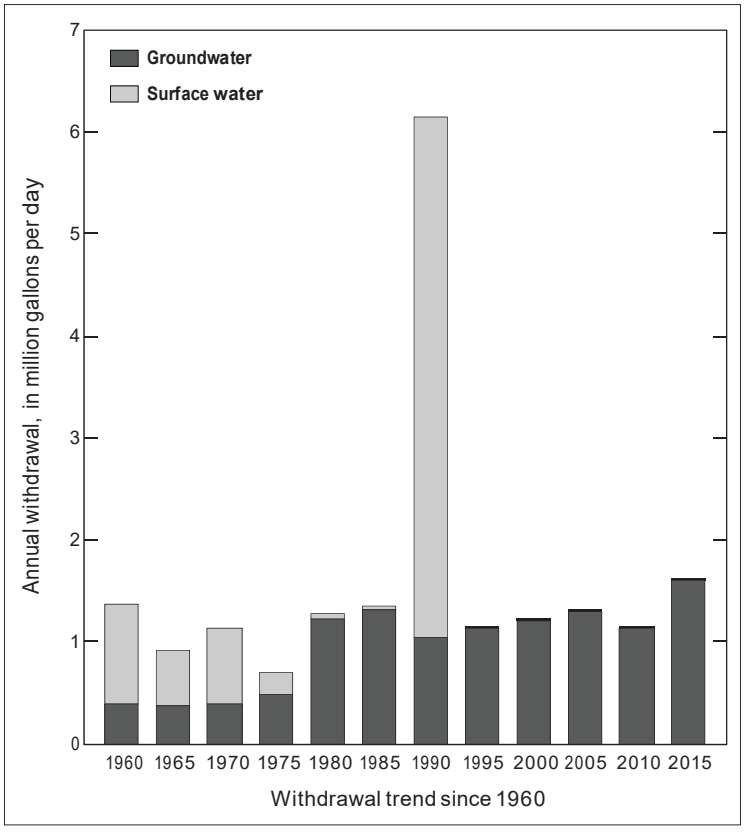
Population: 10,567
Population served by public supply: 4,036
Per capita withdrawals (gal/d): 153
Acres irrigated: 39
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	0.90		0.90
Industrial	0.03		0.03
Power generation			
Rural domestic	0.52		0.52
Livestock	0.13	0.01	0.15
Rice irrigation			
General irrigation	0.02		0.02
Aquaculture			
Total	**1.60**	**0.01**	**1.62**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
20	Food products	0.03	



Withdrawals by Major Public Supplier (Mgal/d)

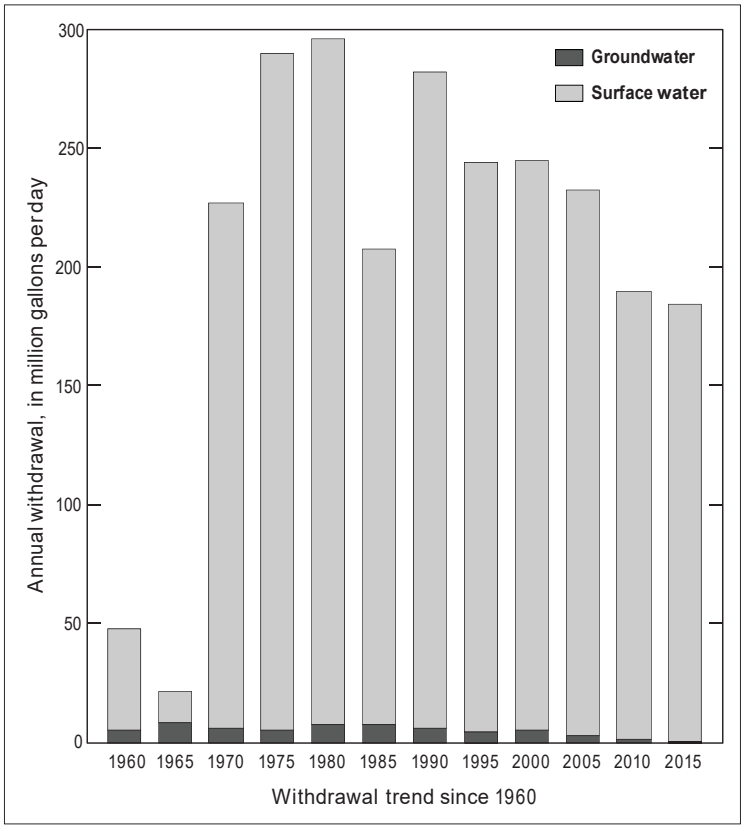
Public Supplier	GW	SW
Greensburg Water System	0.13	
Montpelier Water System	0.02	
Pine Grove W. W. Assoc.	0.01	
St Helena W. W. Dist. 2	0.73	

St. James

Population: 21,567
Population served by public supply: 21,391
Per capita withdrawals (gal/d): 8,536
Acres irrigated: 796
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply		4.00	4.00
Industrial		178.48	178.48
Power generation			
Rural domestic	0.01		0.01
Livestock	0.01		0.01
Rice irrigation			
General irrigation		0.34	0.34
Aquaculture		1.25	1.25
Total	**0.03**	**184.07**	**184.10**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard Industrial classification		GW	SW
20	Food products		1.18
28	Chemicals		170.09
29	Petroleum refining		7.21



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Gramercy Water System		0.64
Lutcher Water System		0.39
St. James Parish Utilities		2.96

St. John the Baptist

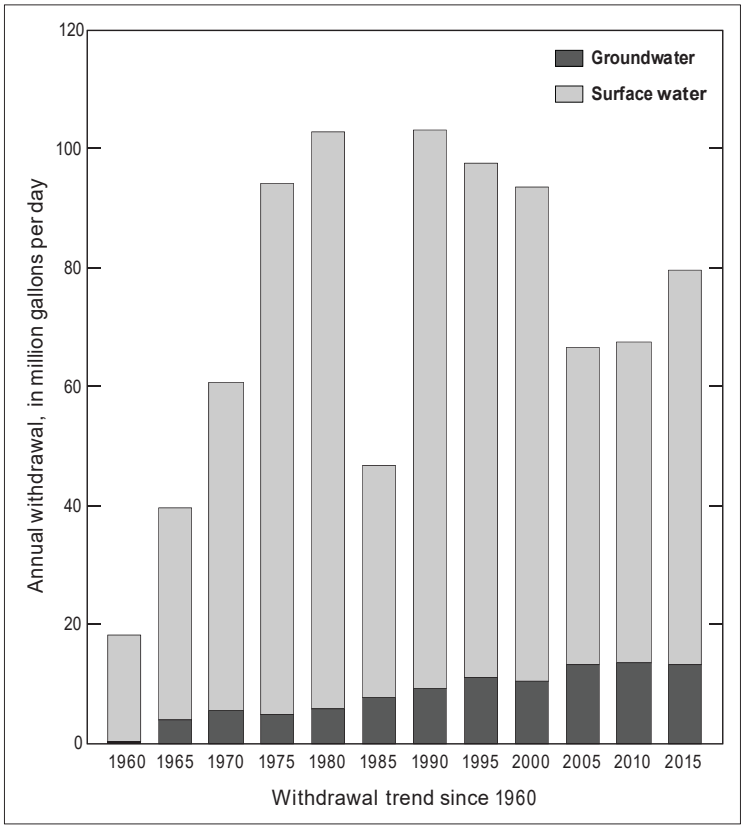
Population: 43,626
Population served by public supply: 42,639
Per capita withdrawals (gal/d): 1,828
Acres irrigated: 367
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.51	2.94	7.46
Industrial	8.65	63.42	72.07
Power generation			
Rural domestic	0.08		0.08
Livestock		0.01	0.01
Rice irrigation			
General irrigation		0.16	0.16
Aquaculture			
Total	**13.24**	**66.53**	**79.77**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
28	Chemicals	8.65	50.91
29	Petroleum refining		11.55
33	Primary metals		0.97



Withdrawals by Major Public Supplier (Mgal/d)

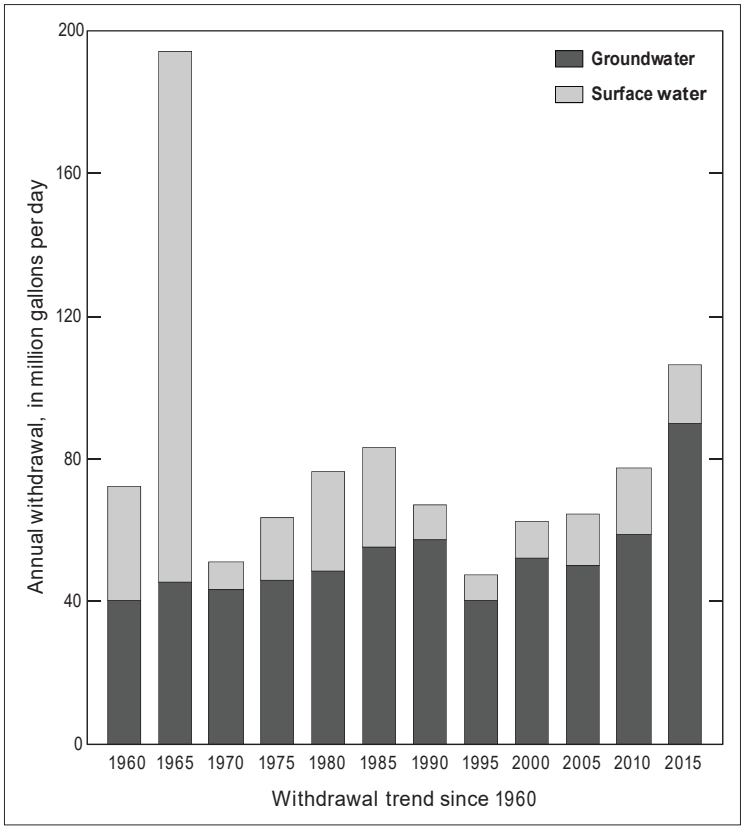
Public Supplier	GW	SW
St. John the Baptist Parish Utilities	4.51	2.94

St. Landry

Population: 83,848
Population served by public supply: 75,753
Per capita withdrawals (gal/d): 1,270
Acres irrigated: 48,674
Hydroelectric power instream use (Mgal/d): 0

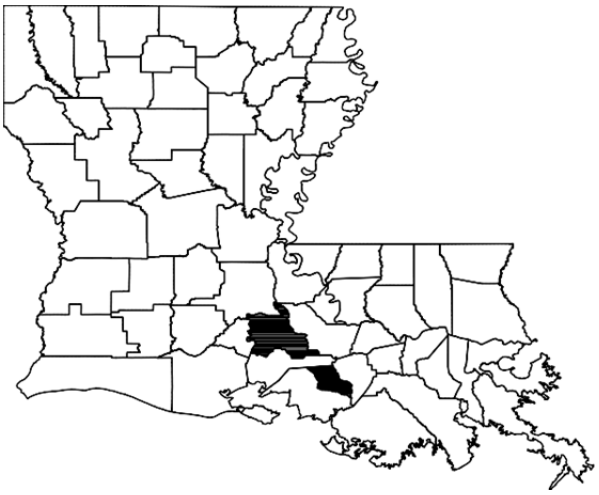
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	10.31		10.31
Industrial	0.99		0.99
Power generation			
Rural domestic	0.65		0.65
Livestock	0.18	0.05	0.23
Rice irrigation	37.96	6.70	44.65
General irrigation	8.87	2.22	11.09
Aquaculture	30.87	7.72	38.58
Total	**89.82**	**16.68**	**106.50**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
20	Food products	0.01	
29	Petroleum refining	0.98	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Arnaudville Water System	0.33	
Cankton Water System	0.16	
Eunice Water System	1.63	
Grand Coteau Water System	0.09	
Grand Prairie Water System	0.06	
Greenbriar-Prairie Basse W. S.	0.09	
Krotz Springs Water Department	0.14	
Lawtell W. W. Dist. 1	0.34	
Leonville Water System	0.59	
Lewisburg-Bellevue W. S.	0.54	
Melville Water System	0.16	
Opelousas Water System	3.99	
Palmetto Water System	0.14	
Plaisance Water System	0.46	
Port Barre Water System	0.41	
Prairie Ronde Water System	0.41	
St. Landry W. W. Dist. No. 2	0.32	
Sunset Water System	0.22	
Washington Water System	0.19	

St. Martin



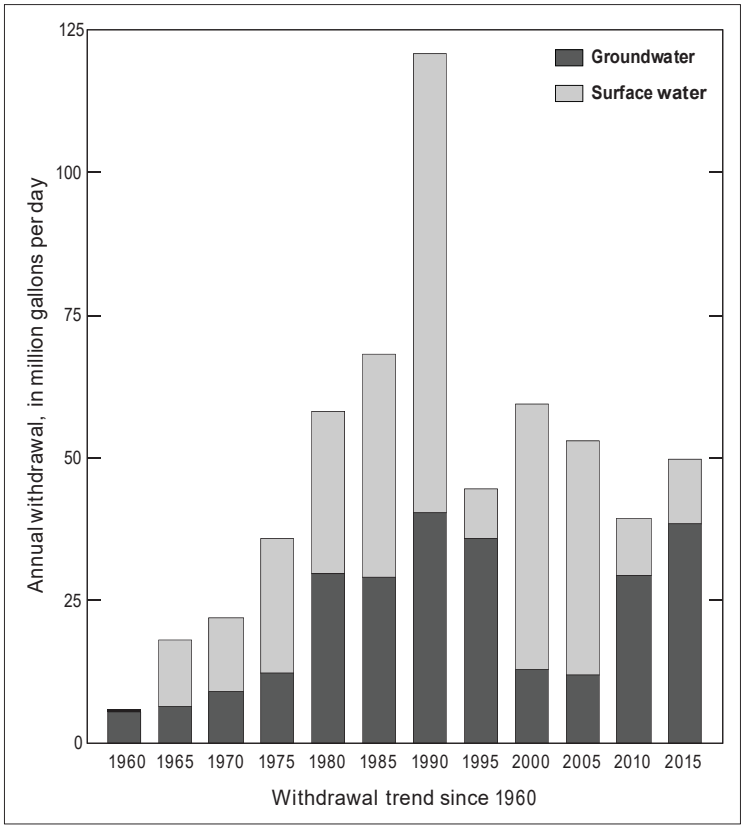
Population: 53,835
Population served by public supply: 43,727
Per capita withdrawals (gal/d): 921
Acres irrigated: 6,411
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.73		4.73
Industrial	0.16		0.16
Power generation			
Rural domestic	0.81		0.81
Livestock	0.03	0.01	0.04
Rice irrigation	0.58	6.69	7.27
General irrigation	0.24	0.95	1.18
Aquaculture	31.87	3.54	35.41
Total	**38.42**	**11.18**	**49.60**

Withdrawals by Major Industrial Group (Mgal/d)

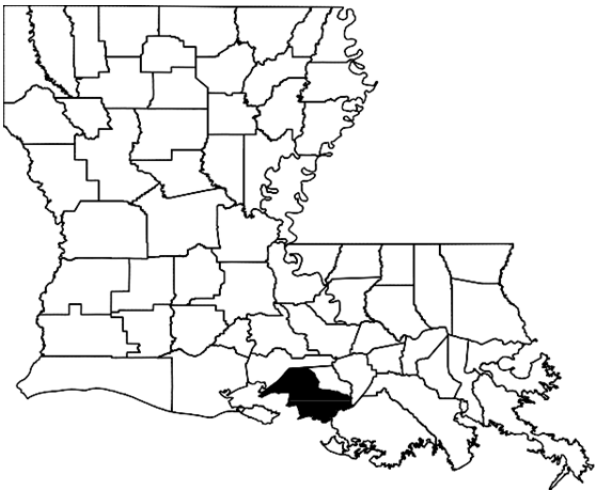
Standard industrial classification		GW	SW
28	Chemicals	0.12	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Breaux Bridge Water System	0.91	
Cecilia Water System	0.72	
Henderson-Nina Water System	0.46	
Parks Village Water System	1.07	
St. Martin Parish W. W. Dist. 3	0.34	
St. Martinville Water System	0.82	
Total Environmental Solutions, Inc.	0.04	
United Water System	0.29	

St. Mary



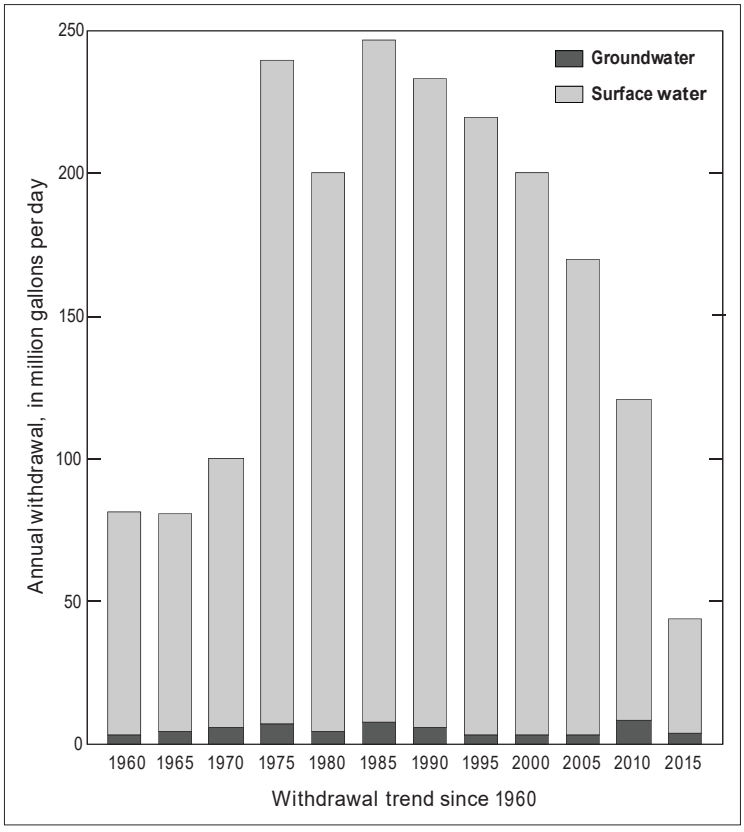
Population: 52,810
Population served by public supply: 51,126
Per capita withdrawals (gal/d): 833
Acres irrigated: 1,268
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	0.45	8.89	9.34
Industrial	2.86	3.64	6.49
Power generation	0.10	26.88	26.98
Rural domestic	0.13		0.13
Livestock		0.02	0.02
Rice irrigation		0.28	0.28
General irrigation	0.05	0.44	0.48
Aquaculture	0.28		0.28
Total	**3.87**	**40.15**	**44.01**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification		GW	SW
20	Food products	0.55	1.69
28	Chemicals	2.30	1.95



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Baldwin Water System	0.29	
Berwick Bayou Vista W. W.		1.14
Franklin Water System		0.97
Glencoe Comm Water System	0.02	
Morgan City Water System		3.43
Patterson Water System		0.45
St. Mary Parish W. W. Dist. 1		0.73
St. Mary Parish W. W. Dist. 4		0.99
St. Mary Parish W. W. Dist. 5		1.18
St. Mary Parish W. W. Dist. 7	0.09	

St. Tammany

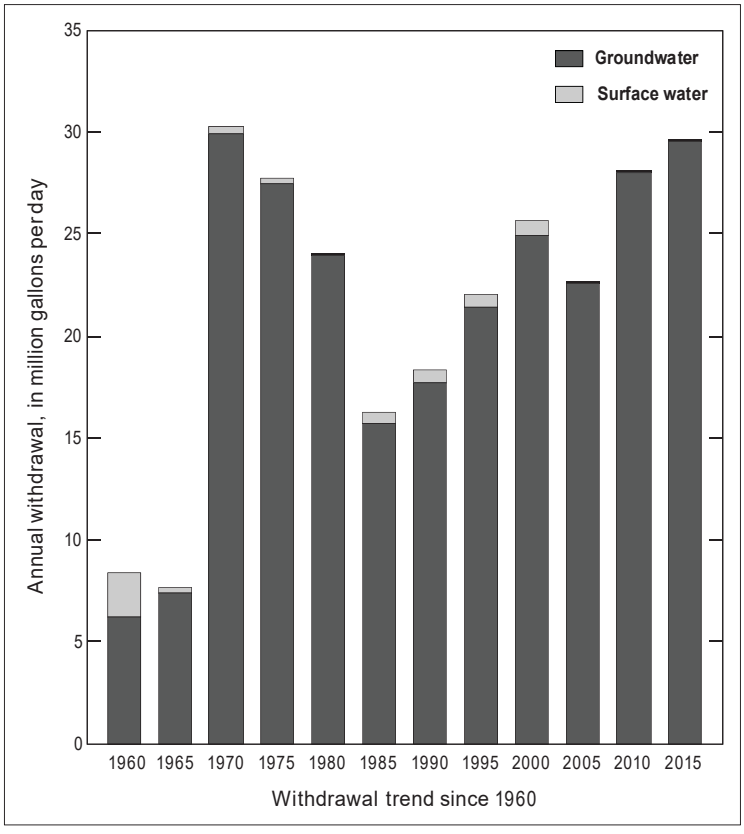
Population: 250,088
Population served by public supply: 184,080
Per capita withdrawals (gal/d): 119
Acres irrigated: 49
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	24.04		24.04
Industrial	0.05	0.08	0.13
Power generation			
Rural domestic	5.28		5.28
Livestock	0.09	0.06	0.15
Rice irrigation			
General irrigation	0.02	0.00	0.03
Aquaculture	0.08		0.08
Total	**29.56**	**0.14**	**29.71**

Withdrawals by Major Industrial Group (Mgal/d)

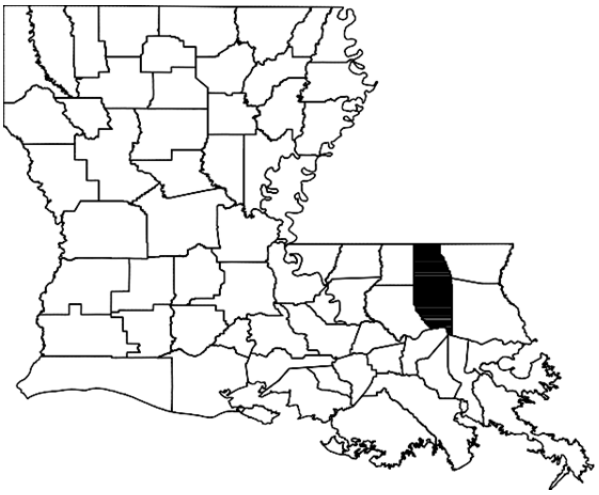
Standard industrial classification		GW	SW
20	Food products	0.03	
35	Industrial machinery	0.02	
37	Transportation equipment	0.01	0.08



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Abita Springs Water System	0.20	
Alton Water System	0.05	
Bayou Liberty Water Co.	0.78	
Beau Chene Subdivision	0.65	
Briarwood Terrace Subdivision	1.46	
Brier Lake Utilities, Inc.	0.05	
Central Park Subdivision	0.02	
Covington Dept. of Public Works	2.21	
Cross Gates Utilities Company	0.98	
Eden Isles Water Supply	0.69	
Faubourg-Coquille Water System	0.76	
Folsom Water System	0.19	
H2O Systems, Inc.	1.37	
Lakeshore Estates	0.18	
Lee Road Water Corporation	0.60	
Lewisburg Estates	0.01	
Madisonville Water System	0.08	
Mandeville Water Supply	3.28	
Pearl River Water System	0.44	
Pineland Park Subdivision	0.28	
Resolve Water System	0.48	
Slidell Water System	4.09	
St. Tammany Water Dist. 2	0.46	
St. Tammany Water Dist. 3	0.21	
Sun Water System	0.04	
Tchefuncte Club Estates	0.19	
The Meadows Water System	0.29	
Utilities Inc. of LA	2.73	

Tangipahoa



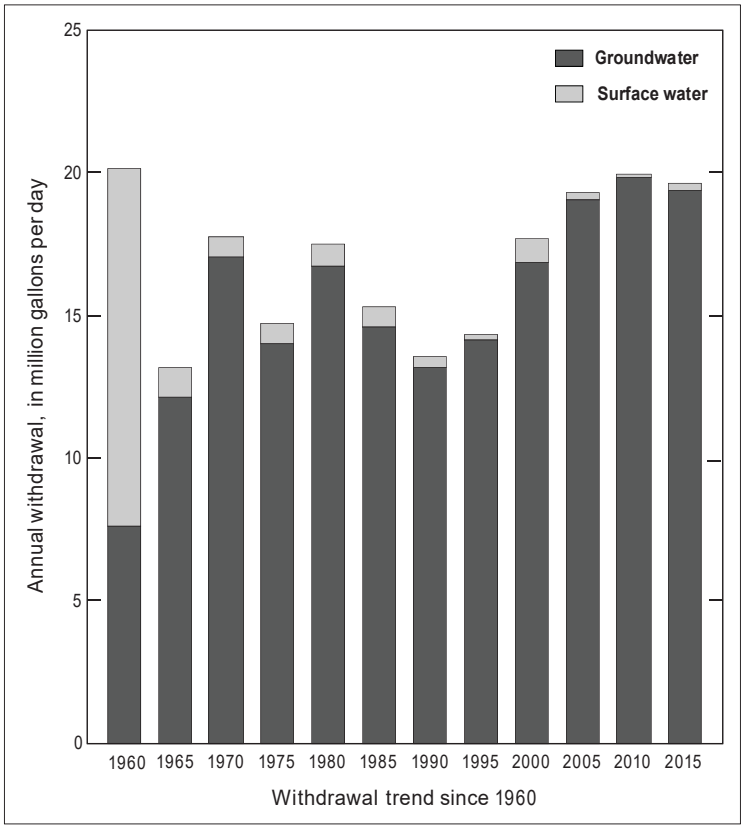
Population: 128,755
Population served by public supply: 92,989
Per capita withdrawals (gal/d): 153
Acres irrigated: 396
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	15.07		15.07
Industrial	1.09	0.08	1.17
Power generation			
Rural domestic	2.86		2.86
Livestock	0.17	0.17	0.33
Rice irrigation			
General irrigation	0.20		0.20
Aquaculture			
Total	**19.39**	**0.24**	**19.64**

Withdrawals by Major Industrial Group (Mgal/d)

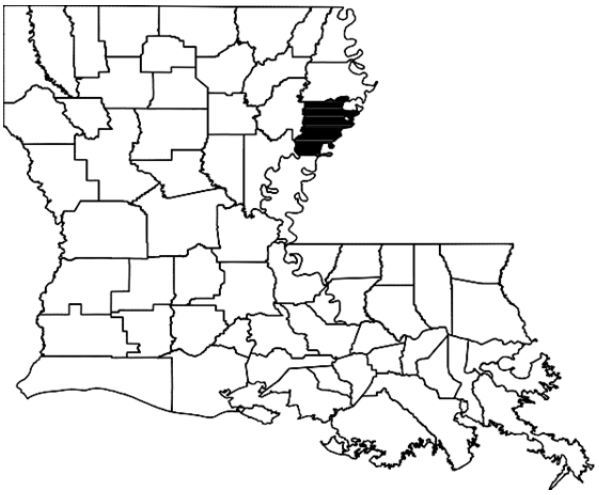
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.01	0.08
20	Food products	0.75	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Amite Water System	1.74	
Eastern Heights W. W.	0.18	
Fluker Water Works	0.03	
Hammond Water System	3.96	
Independence Water System	0.08	
Kentwood Water System	0.33	
Ponchatoula Water System	1.46	
Roseland Water System	0.12	
Springfield Water System	0.83	
Tangipahoa Village W. W.	0.05	
Tangipahoa Water District 2	5.78	
Tickfaw Water System	0.18	
Westview Water Works	0.12	

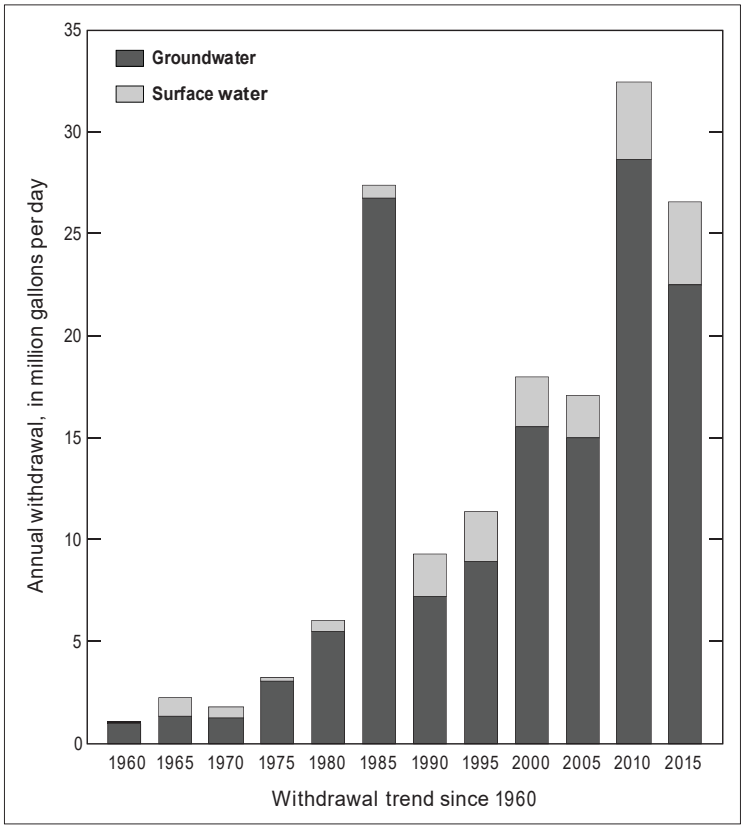
Tensas



Population: 4,740
Population served by public supply: 4,508
Per capita withdrawals (gal/d): 5,600
Acres irrigated: 47,801
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	0.54	0.62	1.16
Industrial			
Power generation			
Rural domestic	0.02		0.02
Livestock	0.00	0.01	0.01
Rice irrigation	5.12	1.71	6.83
General irrigation	15.74	1.75	17.49
Aquaculture	1.04		1.04
Total	**22.47**	**4.08**	**26.54**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Lake Bruin Water System		0.04
Newellton Water System		0.19
St. Joseph Water System	0.54	
Tensas Water Distribution Assoc.		0.38

Terrebonne

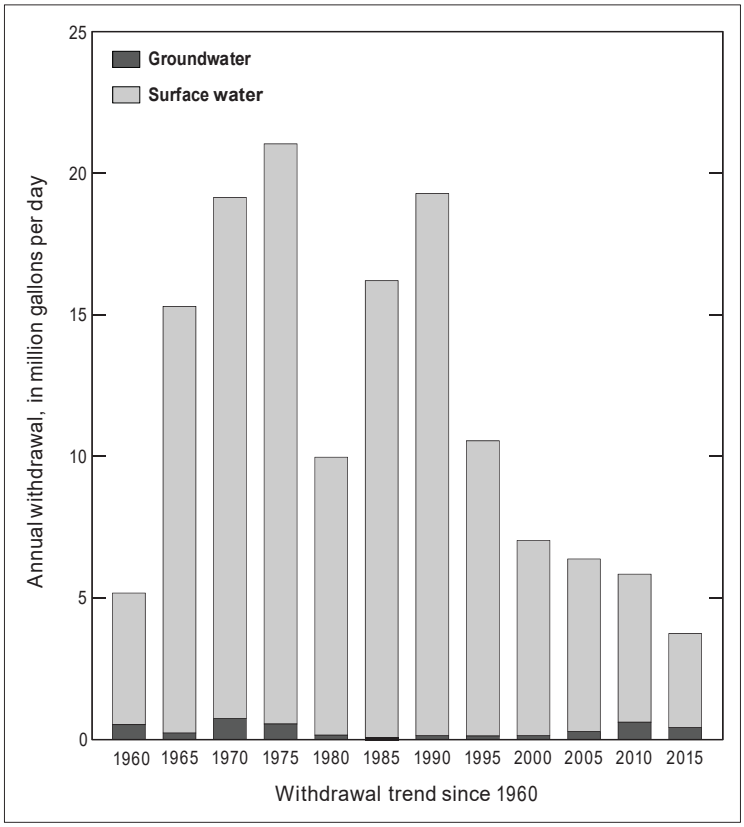
Population: 113,972
Population served by public supply: 113,880
Per capita withdrawals (gal/d): 33
Acres irrigated: 131
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply		1.88	1.88
Industrial			
Power generation			
Rural domestic	0.01		0.01
Livestock	0.02	0.04	0.06
Rice irrigation			
General irrigation	0.06		0.06
Aquaculture	0.35	1.39	1.73
Total	**0.43**	**3.32**	**3.74**

Withdrawals by Major Industrial Group (Mgal/d)

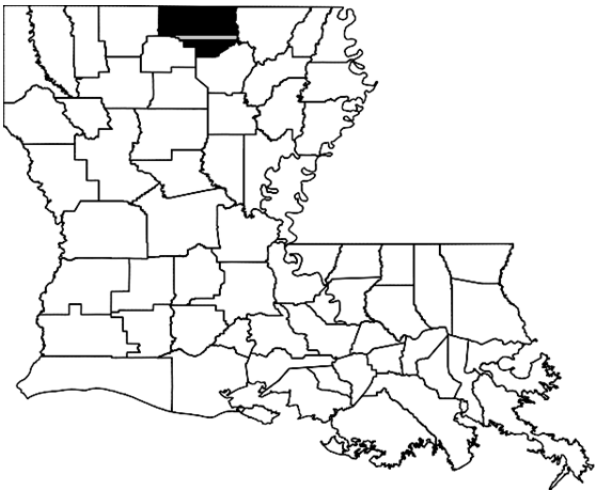
Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Terrebonne Parish Consolidated W.W. Dist. No. 1		1.88

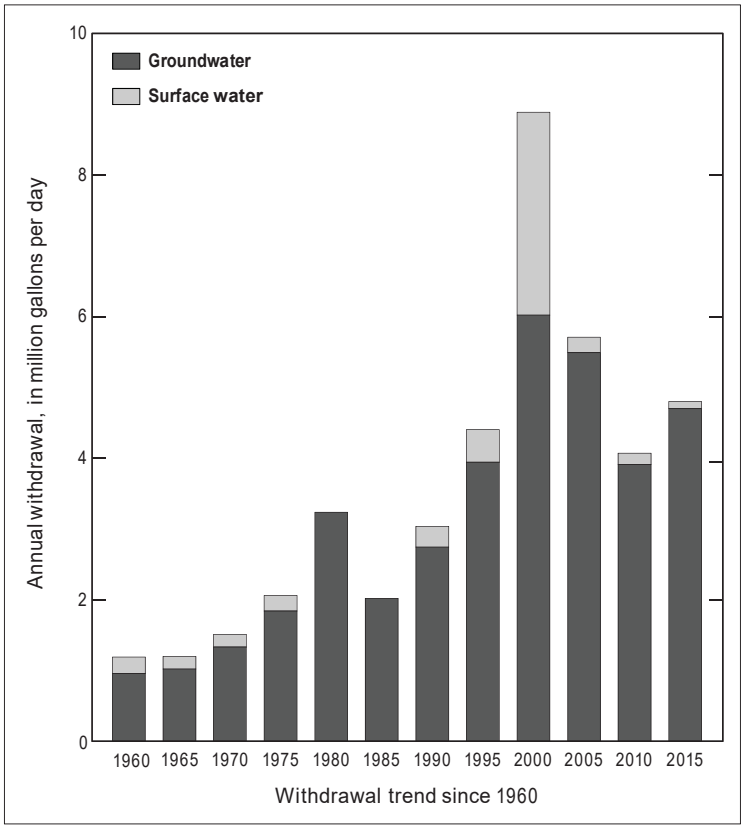
Union



Population: 22,477
Population served by public supply: 20,065
Per capita withdrawals (gal/d): 213
Acres irrigated: 1
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.40		4.40
Industrial	0.09	0.00	0.09
Power generation			
Rural domestic	0.19		0.19
Livestock	0.02	0.10	0.12
Rice irrigation			
General irrigation	0.00	0.00	0.00
Aquaculture			
Total	**4.70**	**0.10**	**4.80**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
20	Food products	0.05	
24	Lumber	0.04	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Bernice Water System	0.31	
Concord Water System	0.02	
Corney Water System	0.01	
Cox Ferry Water System	0.01	
D'arbonne Water System	0.67	
Downsville Water System	0.02	
Farmerville Water System	2.03	
Holmesville Water System	0.21	
Junction City Water System	0.03	
Linville-Haile Water System	0.08	
Litroe Water System	0.02	
Marion Water System	0.06	
Point Wilhite Water System	0.20	
Randolph Water System	0.02	
Rocky Branch W. W. Dist.	0.09	
Salem Water System	0.08	
Sardis Water System	0.09	
Tri-Water System, Inc.	0.12	
Union Waterworks Dist. 1	0.08	
Wards Chapel Water System	0.19	
West Sterlington Water System	0.07	

Vermilion

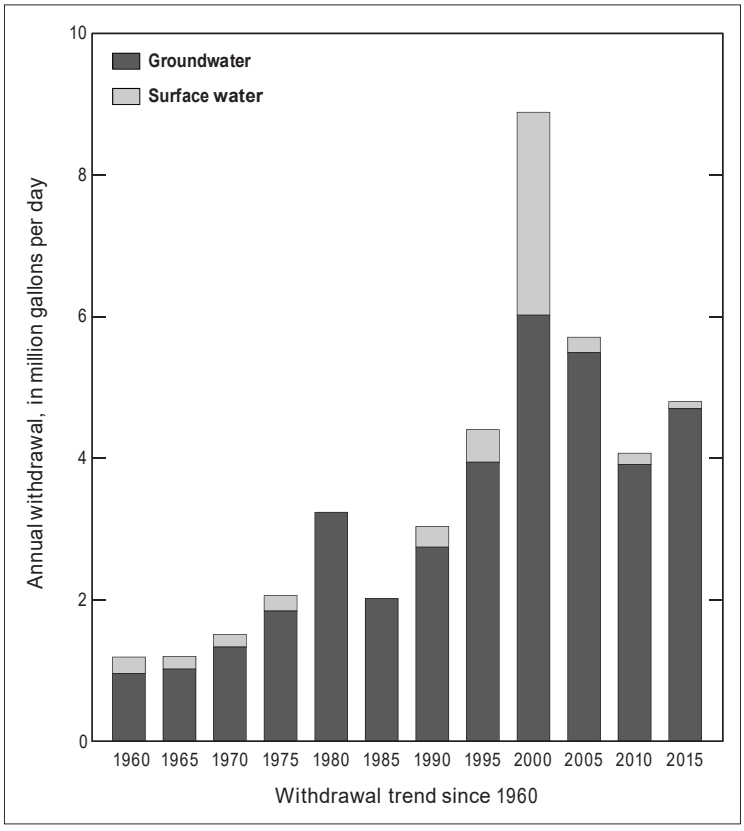
Population: 59,875
Population served by public supply: 32,492
Per capita withdrawals (gal/d): 2,547
Acres irrigated: 52,701
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	7.07		7.07
Industrial	0.84	0.05	0.89
Power generation			
Rural domestic	2.19		2.19
Livestock	0.05	0.21	0.26
Rice irrigation	40.53	60.80	101.33
General irrigation	0.16	0.64	0.80
Aquaculture	33.98	5.97	39.95
Total	**84.82**	**67.67**	**152.49**

Withdrawals by Major Industrial Group (Mgal/d)

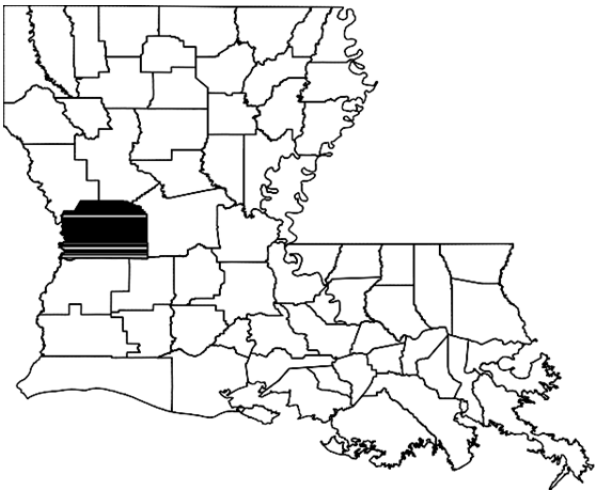
Standard industrial classification		GW	SW
13	Oil and gas extraction	0.06	
20	Food products	0.57	0.05
29	Petroleum refining	0.21	



Withdrawals by Major Public Supplier (Mgal/d)

Public Supplier	GW	SW
Abbeville Water System	2.89	
Delcambre Water System	0.16	
Erath Water System	0.28	
Gueydan Water System	0.32	
Kaplan Water System	0.59	
Magnolia Plantation Water System	0.56	
Maurice Water System	0.14	
Pecan Island Waterworks District No. 3	0.09	
Southeast W. W. Dist. 2	0.62	
Vermilion W. W. Dist. 1	1.42	

Vernon



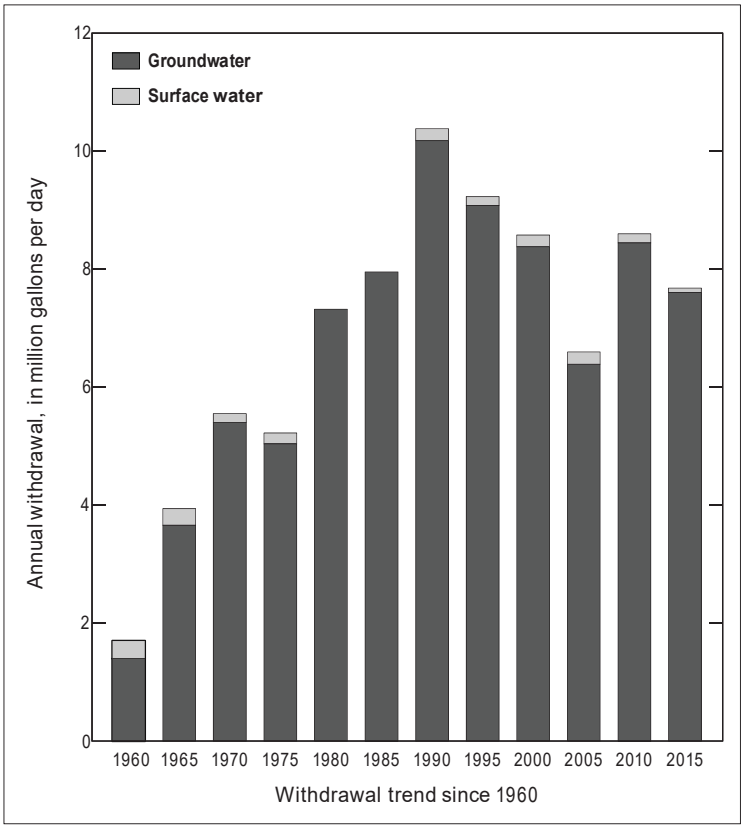
Population: 50,803
Population served by public supply: 35,228
Per capita withdrawals (gal/d): 151
Acres irrigated: 2
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)

	Groundwater (GW)	Surface Water (SW)	Total
Public supply	6.32		6.32
Industrial			
Power generation			
Rural domestic	1.25		1.25
Livestock	0.01	0.08	0.08
Rice irrigation			
General irrigation		0.00	0.00
Aquaculture	0.03		0.03
Total	**7.60**	**0.08**	**7.68**

Withdrawals by Major Industrial Group (Mgal/d)

Standard industrial classification	GW	SW



Withdrawals by Major Public Supplier (Mgal/d)

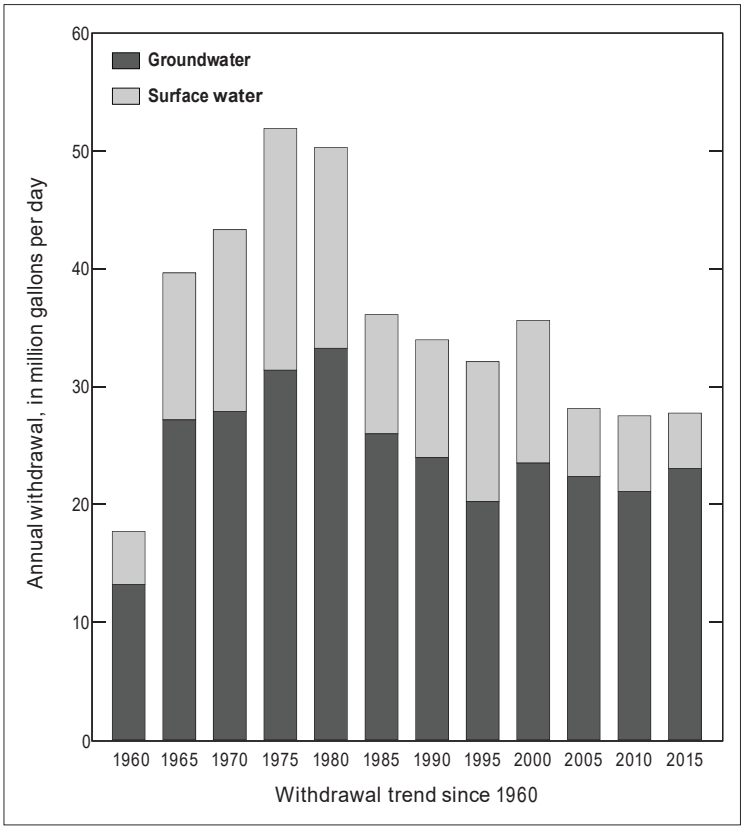
Public Supplier	GW	SW
Anacoco Water System	0.09	
E. Central Vernon Water System	0.53	
Hornbeck Water System	0.17	
Leesville Water System	2.02	
Pitkin Water System	0.05	
Rosepine Water System	0.23	
S. Vernon W. W. Dist. 1	0.26	
Sandy Hill Water & Sewer	0.02	
Simpson Water System	0.14	
Vernon Parish Water & Sewer	0.57	
W. Vernon Parish W. W. Dist.	0.28	

Washington

Population: 46,371
Population served by public supply: 29,392
Per capita withdrawals (gal/d): 598
Acres irrigated: 917
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	4.63		4.63
Industrial	16.63	4.50	21.13
Power generation			
Rural domestic	1.36		1.36
Livestock	0.12	0.12	0.24
Rice irrigation			
General irrigation	0.31	0.08	0.38
Aquaculture			
Total	**23.05**	**4.70**	**27.74**

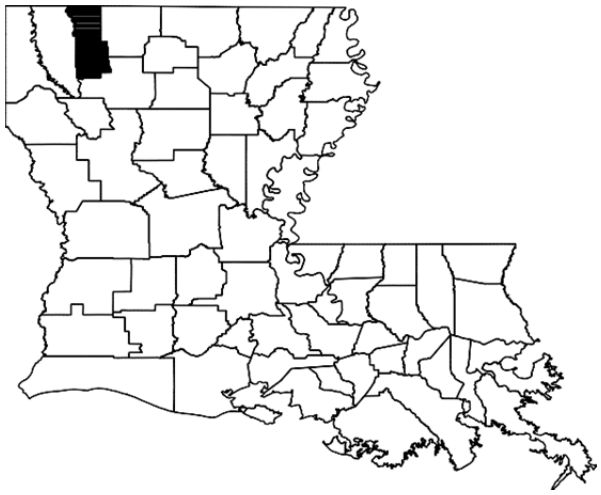
Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
26	Paper products	16.63	4.50



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Angie Water System	0.02	
Bogalusa Rural Water System	0.29	
Bogalusa Water System	2.57	
Franklinton Water System	0.90	
Mt. Hermon Water District	0.21	
Rural Franklinton Water System	0.28	
Util. Inc. of LA North Folsom Hills	0.01	
Varnado W. W. District	0.33	

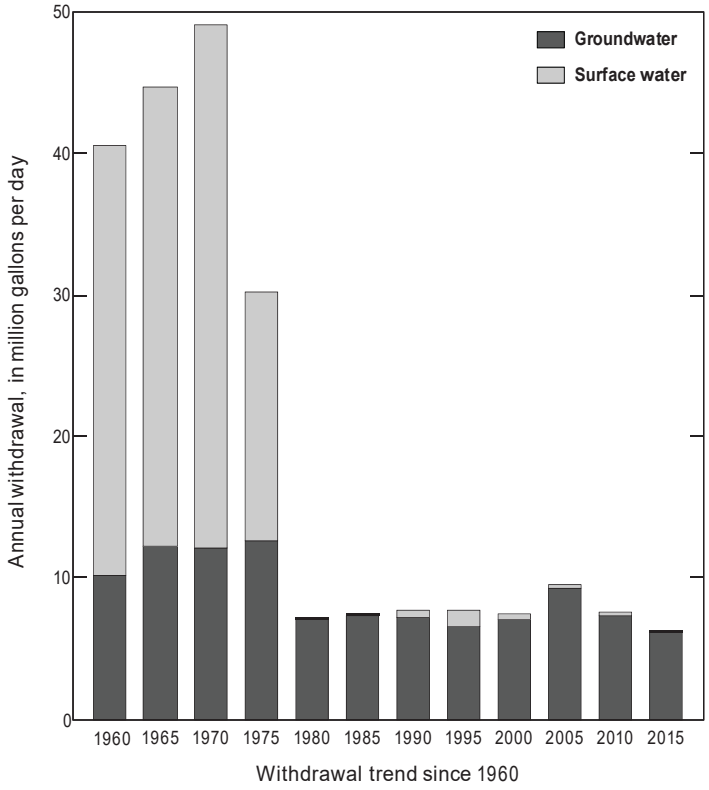
Webster

Population: 40,021
Population served by public supply: 35,509
Per capita withdrawals (gal/d): 156
Acres irrigated: 2
Hydroelectric power instream use (Mgal/d): 0



Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	5.39		5.39
Industrial	0.41	0.02	0.43
Power generation			
Rural domestic	0.36		0.36
Livestock	0.01	0.05	0.06
Rice irrigation			
General irrigation		0.00	0.00
Aquaculture	0.00		0.00
Total	**6.17**	**0.07**	**6.24**

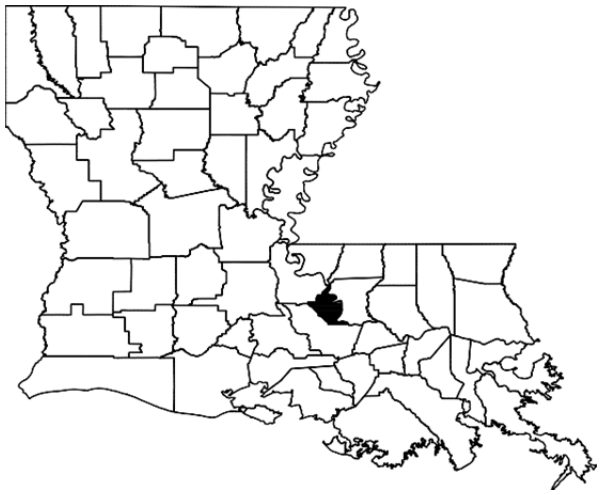
Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
13	Oil and gas extraction		0.02
29	Petroleum refining	0.40	
34	Metal products	0.33	
39	Misc. manufacturing	0.03	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Bistineau Water System	0.07	
Blocker Water Works Corp.	0.07	
Central Water System	0.03	
Cotton Valley Water System	0.13	
Cullen Water System	0.08	
Dixie Inn Water System	0.03	
Dixie Overland Water Works	0.12	
Dorcheat Acres Water System	0.02	
Doyline Water System	0.05	
Dubberly Water System	0.07	
Germantown Water System	0.22	
Gilark Water System	0.06	
Gilgal Water System	0.10	
Heflin Water System	0.01	
Horse Shoe Road Water System	0.02	
Jenkins Comm. Water System	0.04	
Leton Water System	0.05	
McIntyre Water System	0.04	
Midway Water Works	0.04	
Minden Water System	2.04	
Pleasant Valley Water System	0.06	
Salt Works Water System	0.04	
Sarepta Water System	0.10	
Shongaloo Water System	0.08	
Sibley Water System	0.15	
Springhill Water System	1.00	
St. James Water System	0.02	
State Line Water System	0.02	
Thomasville Water System	0.02	
Union Grove Water System	0.03	
Village Water System	0.19	

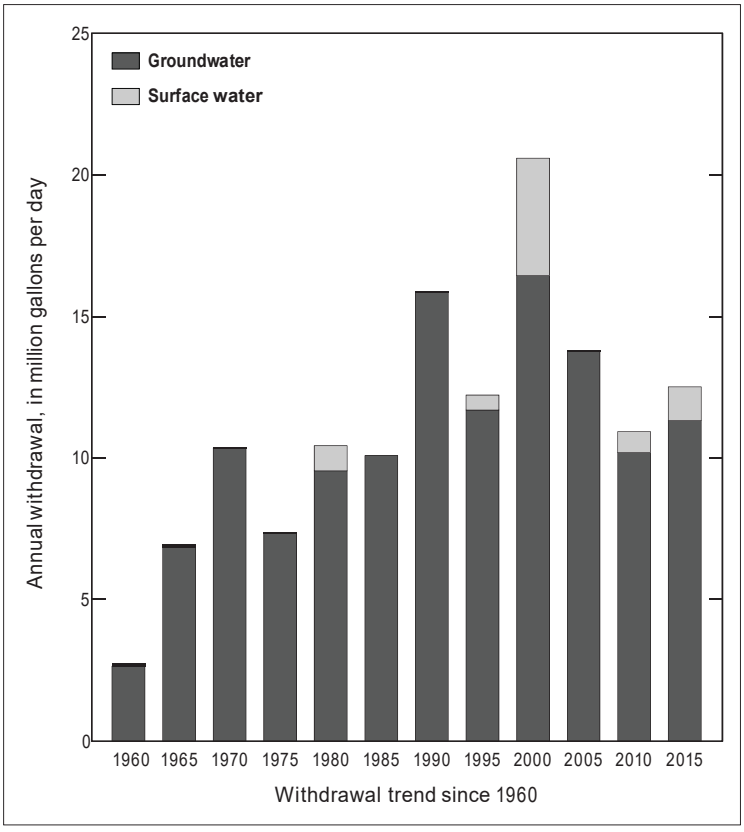
West Baton Rouge

Population: 25,490
Population served by public supply: 25,012
Per capita withdrawals (gal/d): 491
Acres irrigated: 2,784
Hydroelectric power instream use (Mgal/d): 0



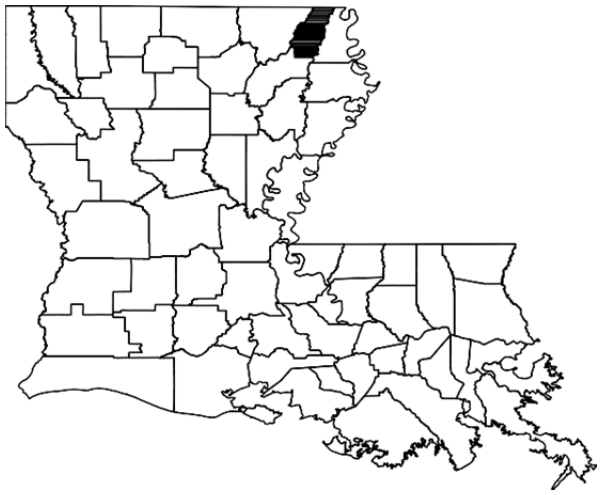
Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	7.21		7.21
Industrial	1.51		1.51
Power generation			
Rural domestic	0.04		0.04
Livestock	0.01	0.00	0.01
Rice irrigation	0.51	0.51	1.01
General irrigation	0.63	0.33	0.96
Aquaculture	1.42	0.35	1.77
Total	**11.32**	**1.19**	**12.51**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
28	Chemicals	1.26	
29	Petroleum refining	0.14	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Plaquemine City Light & Water	1.14	
Port Allen Water System	0.47	
W. Baton Rouge Gas & Water	0.66	
W. Baton Rouge Water Dist. 1	2.64	
W. Baton Rouge Water Dist. 2	1.22	
W. Baton Rouge Water Dist. 4	0.94	
Westport Properties	0.13	

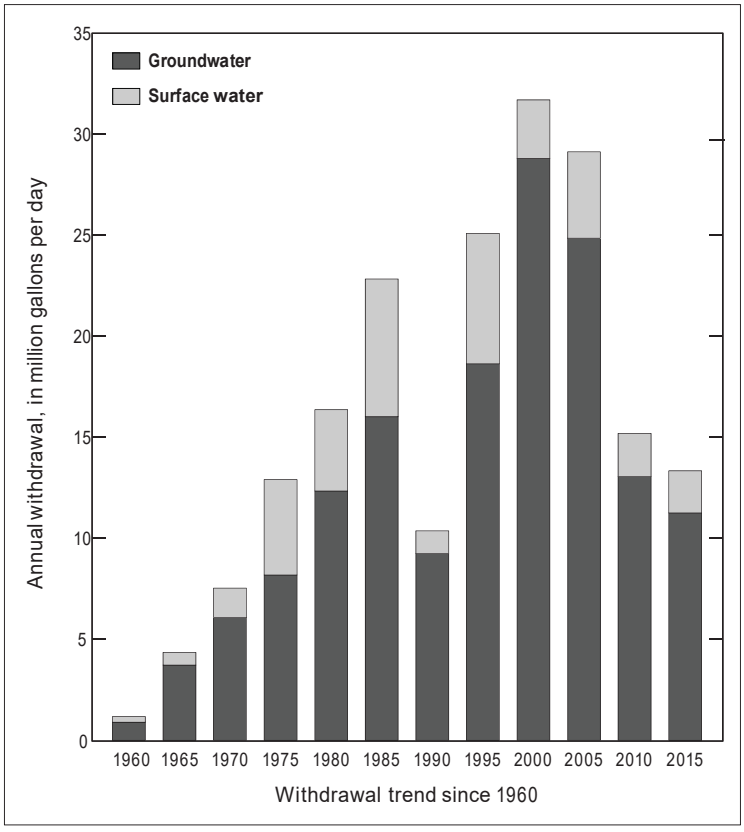
West Carroll



Population: 11,293
Population served by public supply: 10,404
Per capita withdrawals (gal/d): 1,180
Acres irrigated: 23,226
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	1.39		1.39
Industrial			
Power generation			
Rural domestic	0.07		0.07
Livestock	0.04	0.01	0.05
Rice irrigation	2.24	0.75	2.99
General irrigation	7.51	1.32	8.83
Aquaculture			
Total	**11.25**	**2.08**	**13.33**

Withdrawals by Major Industrial Group (Mgal/d)		
Standard industrial classification	GW	SW



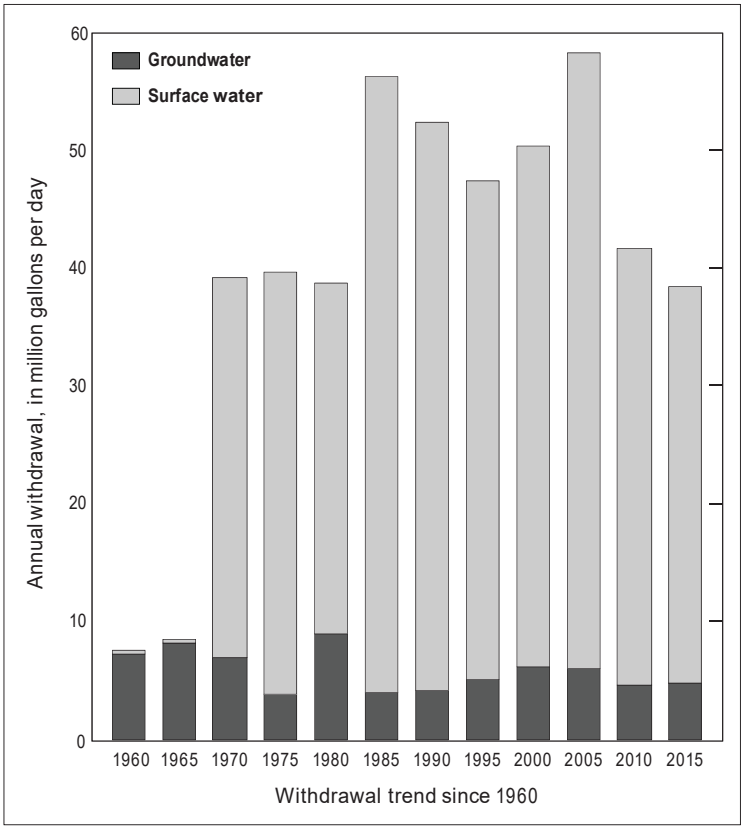
Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Epps Water and Sewer System	0.06	
Fiske Union Water System	0.08	
Forest Water System	0.09	
Goodwill Water System	0.10	
Monticello Water System	0.14	
N-E-W Carroll Water System	0.43	
Oak Grove Water System	0.35	
Pioneer-Darnell Water System	0.14	

West Feliciana

Population: 15,385
Population served by public supply: 14,872
Per capita withdrawals (gal/d): 2,497
Acres irrigated: 635
Hydroelectric power instream use (Mgal/d): 0

Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	3.97		3.97
Industrial	0.80	16.08	16.89
Power generation	0.02	17.14	17.16
Rural domestic	0.04		0.04
Livestock	0.01	0.10	0.10
Rice irrigation			
General irrigation		0.26	0.26
Aquaculture			
Total	**4.84**	**33.58**	**38.42**

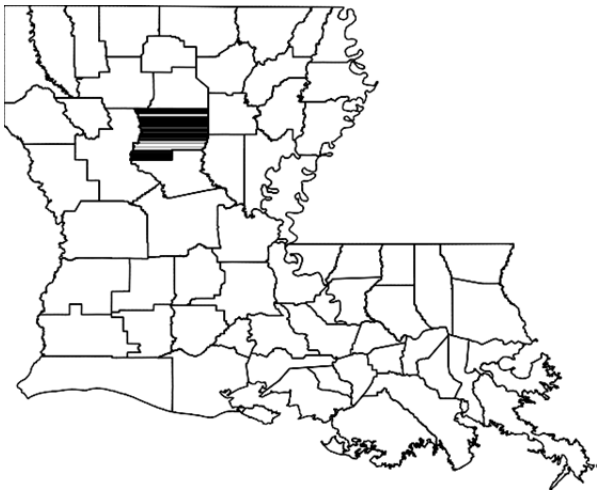
Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
26	Paper products	0.80	16.08



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
St. Francisville Water System	0.59	
W. Feliciana Water District #13	1.08	

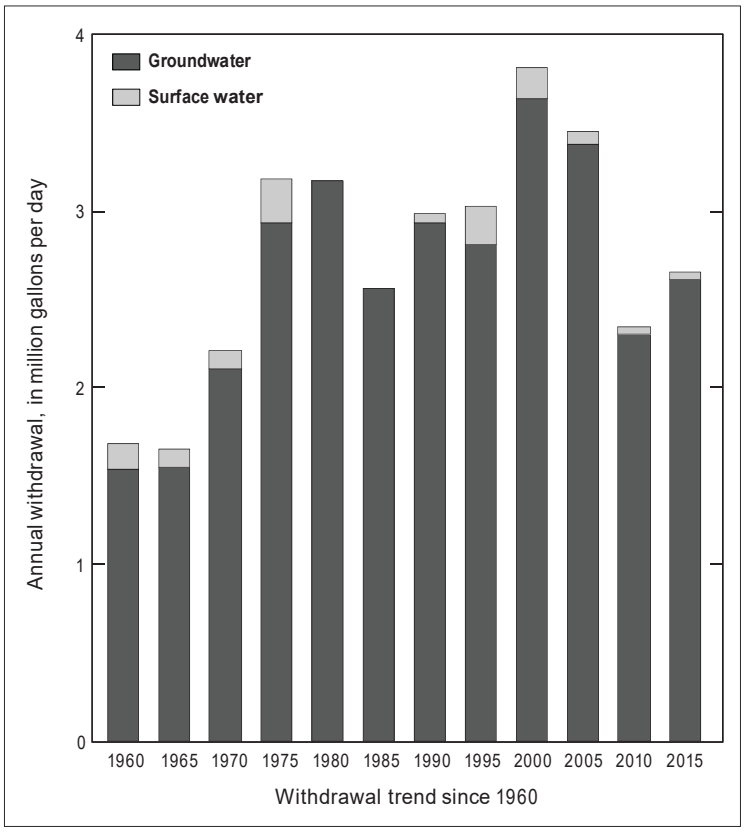
Winn

Population: 14,568
Population served by public supply: 12,050
Per capita withdrawals (gal/d): 182
Acres irrigated: 1
Hydroelectric power instream use (Mgal/d): 0



Withdrawals, in million gallons per day (Mgal/d)			
	Groundwater (GW)	Surface Water (SW)	Total
Public supply	2.01		2.01
Industrial	0.39		0.39
Power generation			
Rural domestic	0.20		0.20
Livestock	0.01	0.04	0.06
Rice irrigation			
General irrigation	0.00	0.00	0.00
Aquaculture			
Total	**2.62**	**0.04**	**2.66**

Withdrawals by Major Industrial Group (Mgal/d)			
Standard industrial classification		GW	SW
24	Lumber	0.28	
28	Chemicals	0.10	



Withdrawals by Major Public Supplier (Mgal/d)		
Public Supplier	GW	SW
Atlanta Water System	0.07	
Backwood Village Water System	0.06	
Calvin Water System	0.03	
Dodson Water System	0.06	
Hwy. 84 West Water System	0.04	
Jordan Hill\Red Hill Waterworks	0.06	
Joyce Water Supply	0.01	
Pleasant Hill-Crossroads W. S.	0.06	
Sikes Water System	0.06	
Tannehill Water System	0.19	
West Winn Water System, Inc.	0.14	
Wheeling Water System, Inc.	0.01	
Winnfield Water System	1.22	