

**LOUISIANA
WATER RESOURCES
COMMISSION**

**UPDATE TO
MARCH 2012 *INTERIM REPORT TO THE
LOUISIANA LEGISLATURE***

JUNE 2013



June 2013

Dear Interested Parties:

On behalf of the Louisiana Water Resources Commission I am pleased to enclose an update to our March 2012 report, entitled *Managing Louisiana's Groundwater Resources: An Interim Report to the Louisiana Legislature*.

Here in the 21st century, we are increasingly living within a "water economy," where responsible management of our water resources is not only smart but also a necessary effort to ensure long-term sustainability.

During the last year, pursuant to legislative authority, our scope of work expanded to include service as an advisory commission for surface water resources in addition to our previously authorized scope as an advisory commission for groundwater resources.

Within this document you will find updated information on current major issues related to the management of Louisiana's water resources, as well as a record of actions executed to meet the recommendations submitted to the Legislature in the above referenced March 2012 report.

I would like to thank the members of the Water Resources Commission as well as the many committed private citizens and public servants who continuously strive for excellence in managing our most vital natural resource.

Sincerely,

A handwritten signature in blue ink, appearing to read 'S. Angelle', with a large, sweeping flourish extending to the right.

Scott A. Angelle

Chairman, Louisiana Water Resources Commission

EXECUTIVE SUMMARY

This update examines current major issues in the management of Louisiana's water resources, as identified by the Louisiana Water Resources Commission (LWRC, formerly the Ground Water Resources Commission) in its March 2012 *Interim Report to the Louisiana Legislature* and further detailed in the Commission's recommendations for legislative and administrative action. Included here is a status report on these major issues (Part I, Items A-M) as well as explanations of specific actions taken on the Commission's recommendations (Part II, Sections 1-10). The goal of this work is to provide a quick, efficient reference to the Legislature and others with an interest in the careful management of Louisiana's water resources.

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LIST OF AGENCY ABBREVIATIONS

CAGWCC – Capital Area Ground Water Conservation Commission

CPRA – Coastal Protection and Restoration Authority of Louisiana

DEQ – Louisiana Department of Environmental Quality

DNR – Louisiana Department of Natural Resources

DNR/OC – Louisiana Department of Natural Resources/Office of Conservation

DNR/OCM – Louisiana Department of Natural Resources/Office of Coastal
Management

DHH/OPH – Louisiana Department of Health and Hospitals/Office of Public Health

EPA – United States Environmental Protection Agency

FERC – Federal Energy Regulatory Commission

LGS – Louisiana Geological Survey

LWRC – Louisiana Water Resources Commission

SRA-LA – Sabine River Authority of Louisiana

USACE – United States Army Corps of Engineers

USGS – United States Geological Survey

PART I: REVIEW OF CURRENT MAJOR ISSUES

A. INADEQUATE MONITORING NETWORK

The lifeblood of any effective water management program lies in the strength of its monitoring regime. From a peak in the early 1980s, Louisiana's ground and surface water monitoring efforts experienced a slow decline, from over 700 test wells and nearly 200 gaging stations to fewer than 200 wells and less than 60 stations in the 2000s.

This decrease in test wells and gaging stations led to a situation where water managers lacked sufficient knowledge about the basic health of the state's water resources. With Louisiana facing strong water demands for public supply, agriculture, and industry—along with an anticipated increase in the requirements for future energy exploration—LWRC wisely highlighted in its *Interim Report* the necessity of a more comprehensive, statewide water monitoring program as an issue requiring serious attention.

In response, the Department of Natural Resources (DNR) utilized an available Federal fund to develop an agreement with the United States Geological Survey (USGS) for a three-year monitoring program that is now underway. This effort will see the establishment of close to 200 new water level monitoring wells across the state (see Fig. 1); some 50 chloride monitoring wells in known or suspected saltwater challenge areas (see Fig. 2); and 100 new water quality test wells.

Further, DNR also has reached an agreement with the Louisiana Geological Survey (LGS) to install 4 to 5 new gaging stations and to update the rating curve of approximately 50 existing gages to perform surface water discharge monitoring. This monitoring will take place in areas of anticipated energy exploration, where the demand for water resources is expected to be heightened in coming years.

The gathered data from these two programs will be invaluable to resource managers, business leaders, and legislators in planning for the future. Its importance cannot be overstated. However, current funding covers only the next three years, a very limited timeframe. In crafting a comprehensive state water management plan that will take Louisiana far into the future, the continuance of a vigorous monitoring program must be a high priority.

The below graphs show the projected expansion of the monitoring program within the DNR/USGS partnership.

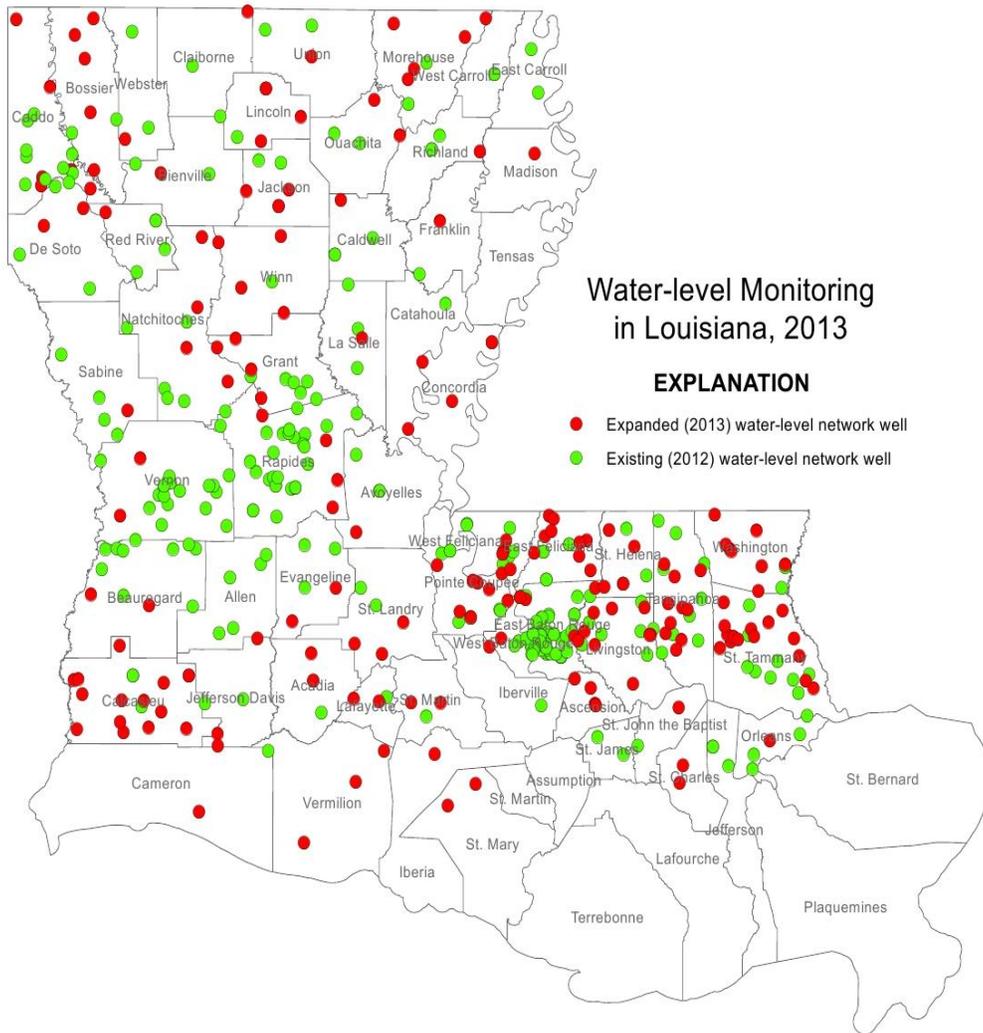


Fig. 1, Showing the existing water-level monitoring well network (green) and the expanded network (red), as of April 2013.

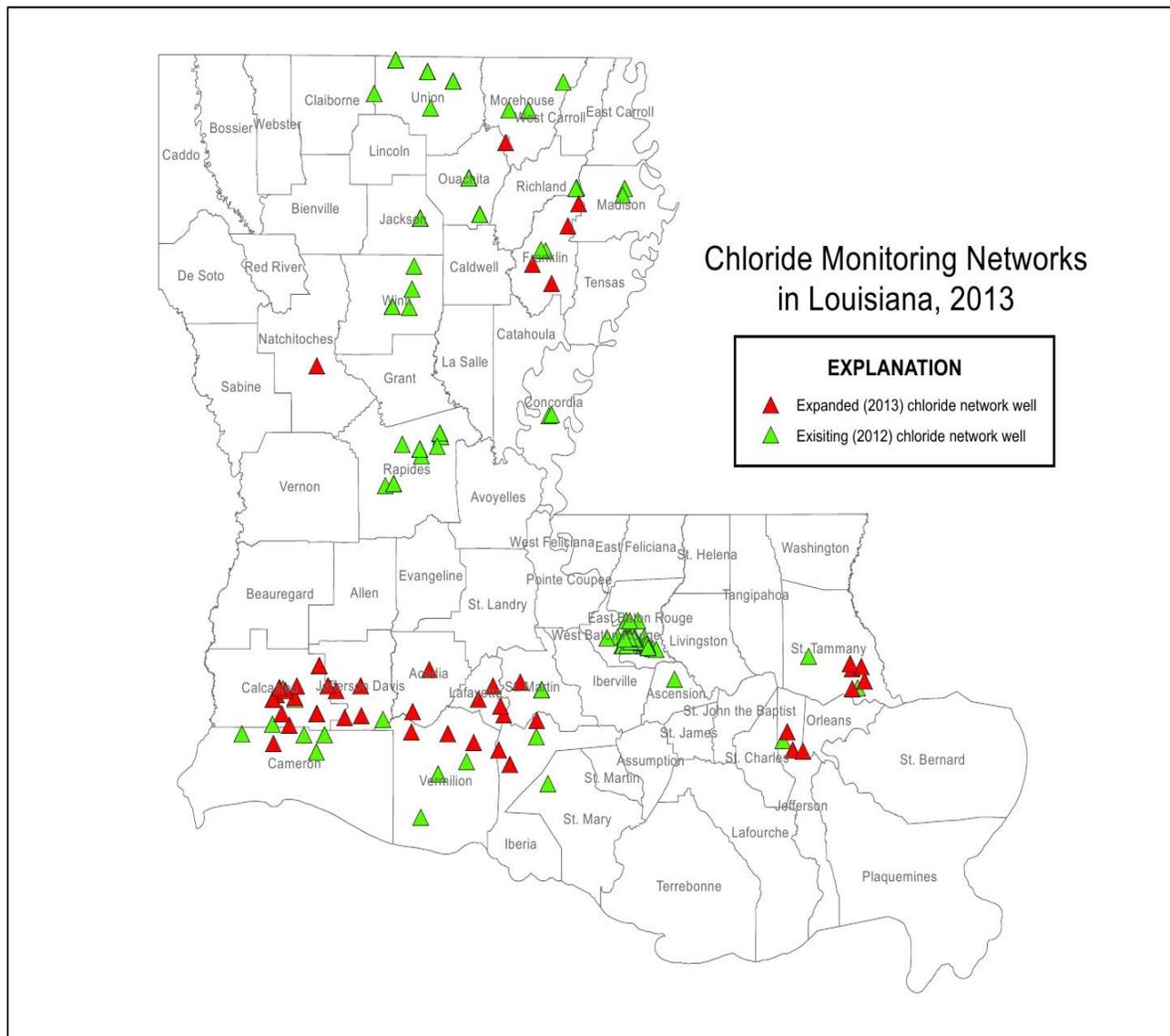


Fig. 2, Showing the existing chloride monitoring well network (green) and the expanded network (red), as of April 2013.

B. COASTAL RESTORATION AND SALTWATER INTRUSION

DNR's Office of Coastal Management (DNR/OCM) actively participated with the Framework Development Team in shaping Louisiana's Comprehensive Master Plan for a Sustainable Coast, which was completed by the Coastal Protection and Restoration Authority of Louisiana (CPRA) in May 2012 and approved by the legislature during the 2012 Regular Session. View the full document on-line at: <http://www.coastalmasterplan.louisiana.gov/2012-master-plan/final-master-plan/>.

Chapter 6 ("Policies & Programs") of the Coast Master Plan contains a review of the importance of sufficient fresh water and sediment to coastal Louisiana's future, and the need for a comprehensive water management plan to meet these needs. The summary passage is worth quoting here in full:

"This plan relies on having enough fresh water and sediment to help rebuild the coast, combat salinity, and enhance habitats. Fresh water is also needed to maintain resources for homes, businesses, large industries such as navigation, and the daily needs of our landscape. Because a reliable supply of fresh water is critically important to Louisiana, a surface and groundwater management plan should be developed to ensure that the state secures the sustainable use of these valuable resources into the future."

Saltwater intrusion, an issue highlighted in the Coast Master Plan, remains a major concern in the coastal parishes. Low flow conditions on the Mississippi and Atchafalaya Rivers in 2012 resulted in saltwater encroachment up the bird-foot delta and within the Atchafalaya Basin through the late spring, summer and fall. On the Mississippi River, the U.S. Army Corps of Engineers (USACE) installed a sill within the channel in order to protect the freshwater intake at Belle Chasse.

The problem abated somewhat late in 2012 as the prevailing drought loosened its grip on the state and beneficial rain flushed saltwater from local rivers and bayous. Recent spring rains now have displaced the saltwater to the farther reaches of the bird-foot delta. This issue, like all other ones in the coastal zone, will require continued monitoring and planned management.

**C. AREAS OF GROUNDWATER CONCERN:
SPARTA AQUIFER SYSTEM**

The Sparta Aquifer system serves public supply and industry in a wide swath of north central Louisiana. The Sparta Ground Water Conservation Commission, created by the Legislature in 1999, continues to be an active champion for this valuable resource and has worked effectively to mobilize economic, political, scientific, and educational resources in the region over the past decade.

Water level measurements within the Sparta are improving (see Fig. 3), but the situation nonetheless requires continued careful management. One important development that is already having a noticeable impact on local conditions came in 2012 with the completion of the City of West Monroe's wastewater reuse facility. The effort was financed by over \$8 million in capital outlay funds, \$4 million in local funds, and nearly \$5 million in Federal stimulus money. Capable of processing up to 10 million gallons of water a day for industrial use, the facility has enabled one of the main drivers in the local economy, Graphic Packaging International, to reduce its groundwater usage from the Sparta Aquifer system by 70%.

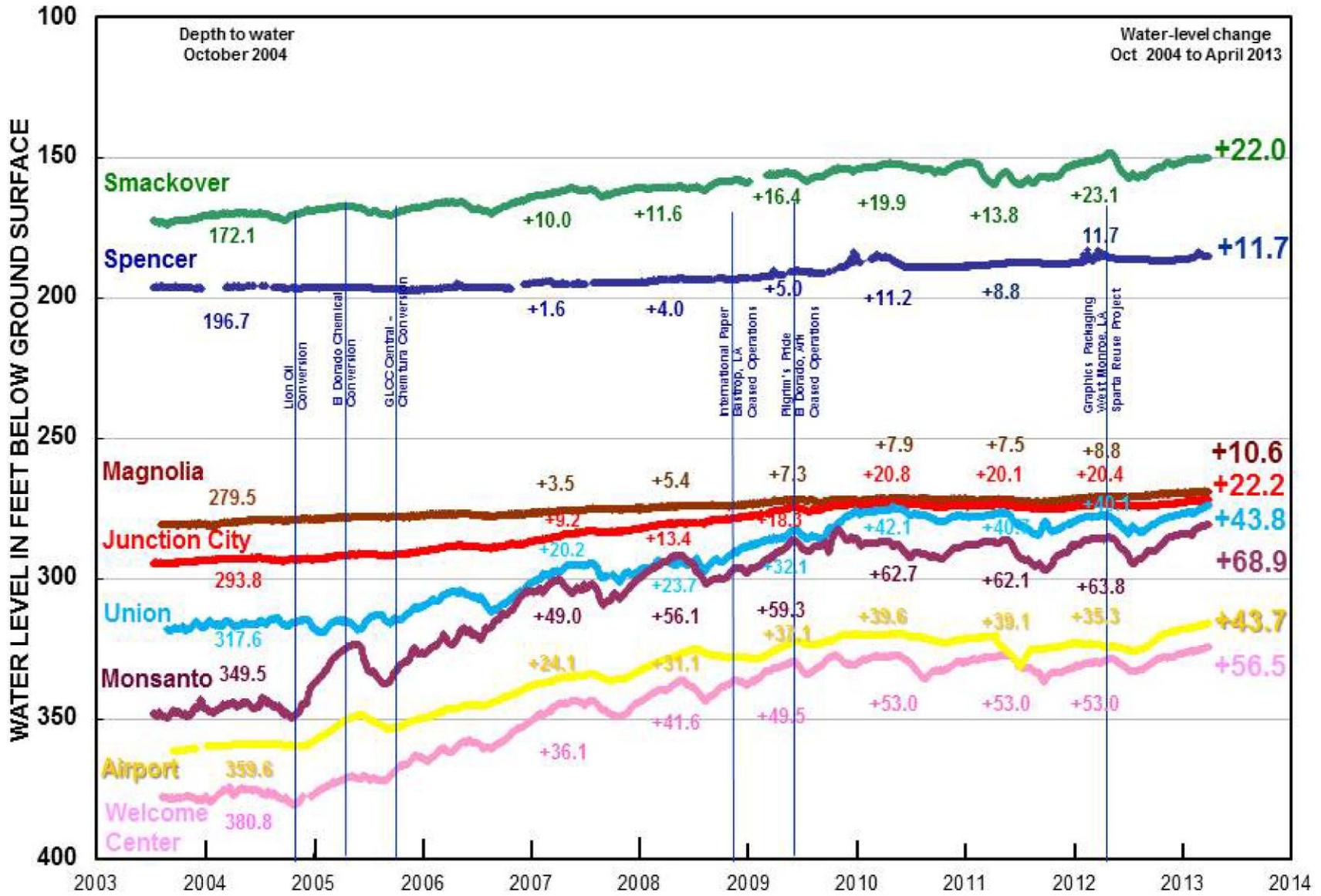
The project so impressed the editors of *American City & County* magazine, a leading resource for municipal government professionals, that they named West Monroe as one of the recipients of their annual Crown Community Awards for innovation at the local level. The article can be viewed on-line at: <http://americancityandcounty.com/administration/crown-communities-awards-2012>. Such recognition is well-deserved and the success of this cooperative effort can serve as a model for future water resource management endeavors here in Louisiana.

“Recent information places the overuse of the Sparta Aquifer at approximately 6.61 million gallons per day, which is significantly less than the 18 million gallons per day reported just a few years ago. This is fantastic news. It means the efforts to save the Sparta are paying off, and we are getting closer to the goal of making sure the Sparta can replenish itself at a reasonable rate.”

– Rick Hohlt
Ruston Daily Leader
11/16/2012



Fig. 3, Showing increased water levels, 2004-2013, in Arkansas USGS monitored wells of the Sparta Aquifer system, including at Spencer (Union Parish) and Junction City (Claiborne Parish). Schrader & Freiwald, 2013.



D. SALTWATER ENCROACHMENT IN CAPITAL AREA AQUIFERS

In response to public concerns about overuse of groundwater and saltwater encroachment into the freshwater aquifers of the Southern Hills Aquifer system, DNR's Office of Conservation (DNR/OC) held a public hearing on this issue in April 2012, the result of which was the issuance in May 2012 of Order No. ENV 2012-GW011 by the Commissioner of Conservation. The Order, along with transcripts of the public hearing, scientific reports, and all other relevant correspondence, media releases, and documents, can be accessed at the Southern Hills update page of the Ground Water Resources Program website: <http://dnr.louisiana.gov/southernhills>.

Order No. ENV 2012-GW011 required high-volume groundwater consumers in a defined area close to the Baton Rouge fault, where the saltwater intrusion is occurring, to report on current, near-term, and long-term groundwater usage estimates, as well as any plans for reduction in use or development of alternative sources. DNR/OC received these estimates in early October 2012; they showed a projected slight increase in groundwater use for public supply, while industrial use remained essentially the same. No plans for groundwater usage reduction were reported.

DNR/OC expected the filing of these reports to coincide with the completion in fall 2012 of a series of aquifer system models being prepared by USGS. However, due to delays in calibrating the models and its rigorous system of outside peer review, USGS will not have final versions of the models ready for public release until the late spring or summer of 2013. USGS did

“A commission charged with managing saltwater intrusion into the aquifer serving Baton Rouge . . . passed a plan Tuesday that calls for a 2 million-gallon-a-day reduction in the pumping of water in industrial areas of East Baton Rouge Parish by 2014 Joey Hebert, the commission’s chairman and an environmental engineer with Georgia-Pacific Corp., said the plan is not the end of the work in the two sands . . . [but] only a first step and that more action could be taken when computer models the commission is paying for through [the] U.S. Geological Survey are completed later this year. Those models will help determine what effect changes in pumping around the parish could have on the saltwater wedge”

– Amy Wold
Baton Rouge Advocate
3/20/2013

preview some of the findings in a public meeting of the Capital Area Ground Water Conservation Commission (CAGWCC) in December 2012, and also previewed these findings with DNR/OC staff in a later meeting. Based upon these findings, the comments of USGS staff at the December 2012 meeting of the Water Resources Commission relative to certain unsustainable conditions, and the mass of scientific evidence already in hand, in January 2013 DNR/OC requested that CAGWCC at its next meeting in March 2013 recognize two unsustainable pumping centers, as previously identified, and begin discussion of appropriate management strategies.

In accordance with this request, at its March 19, 2013, meeting CAGWCC passed resolutions that: 1) supported a Baton Rouge Water Company “scavenger well” to intercept salt water encroaching on its Lula Street public supply wells from the south; 2) capped water withdrawals from the 1,500-foot sands at current rates of production; and 3) reduced by 2 million gallons a day withdrawals from the 2,000-foot aquifer sand in the industrial district—all by a target date of 2014. In addition, CAGWCC voted to sign a Memorandum of Understanding and an Interagency Transfer Agreement with DNR/OC to request management, technical, and public relations assistance on future projects as needed.

DNR/OC is committed to protecting the Southern Hills Aquifer system which supplies all of Baton Rouge’s drinking water and is a major resource for the local economy. In conjunction with CAGWCC, high-volume groundwater users, and other stakeholders, the agency is working towards the development and implementation of long-term solutions to the issues of localized overuse and saltwater encroachment. The end result will be the creation of a plan that guarantees a sustainable water future for the Capital Region.

“An agreement has been finalized between the Capital Area Ground Water Conservation Commission and the Louisiana Office of Conservation to coordinate efforts on meeting goals for maintaining the sustainability of the East Baton Rouge Parish water supply . . . CAGWCC has wider immediate powers as the frontline management authority to take action in its jurisdiction, but the Office of Conservation has a wider range of staff expertise to analyze data and recommend actions for resolving management issues. The new agreement, [Commissioner of Conservation Jim Welsh] says, will help both agencies ‘manage groundwater in the Baton Rouge area and deal with saltwater encroachment.’”

– *B.R. Business Report*
4/12/2013

E. HIGH WATER USE IN SOUTHWEST LOUISIANA

The loosening of drought conditions experienced by the state in 2011 and early 2012, along with extended periods of rain over this past fall and winter, generally have improved the condition of water resources in southwest Louisiana and have pushed saltwater out of surface water bodies (see Item B, above). But recurring seasonal demands in spring and summer, as expected from the historic record of agricultural and public supply water usage, will continue to impact the health and sustainability of these resources in the near-term.

Such seasonal variations must be accounted for in the determination of a long-term management strategy. Demand for fresh ground and surface water in southwest Louisiana has not abated in recent years and is projected to continue its growth trend. The expanded statewide water monitoring network (see Item A, above) will be a useful management tool moving forward, and DNR will continue to monitor this issue closely and take appropriate action as needed. Also of note for southwest Louisiana, as requested by SCR 40 of 2012, CPRA is in the process of compiling a draft report on the feasibility of diverting Atchafalaya River water into the Mermentau Basin as a solution to various water resource issues in the region.

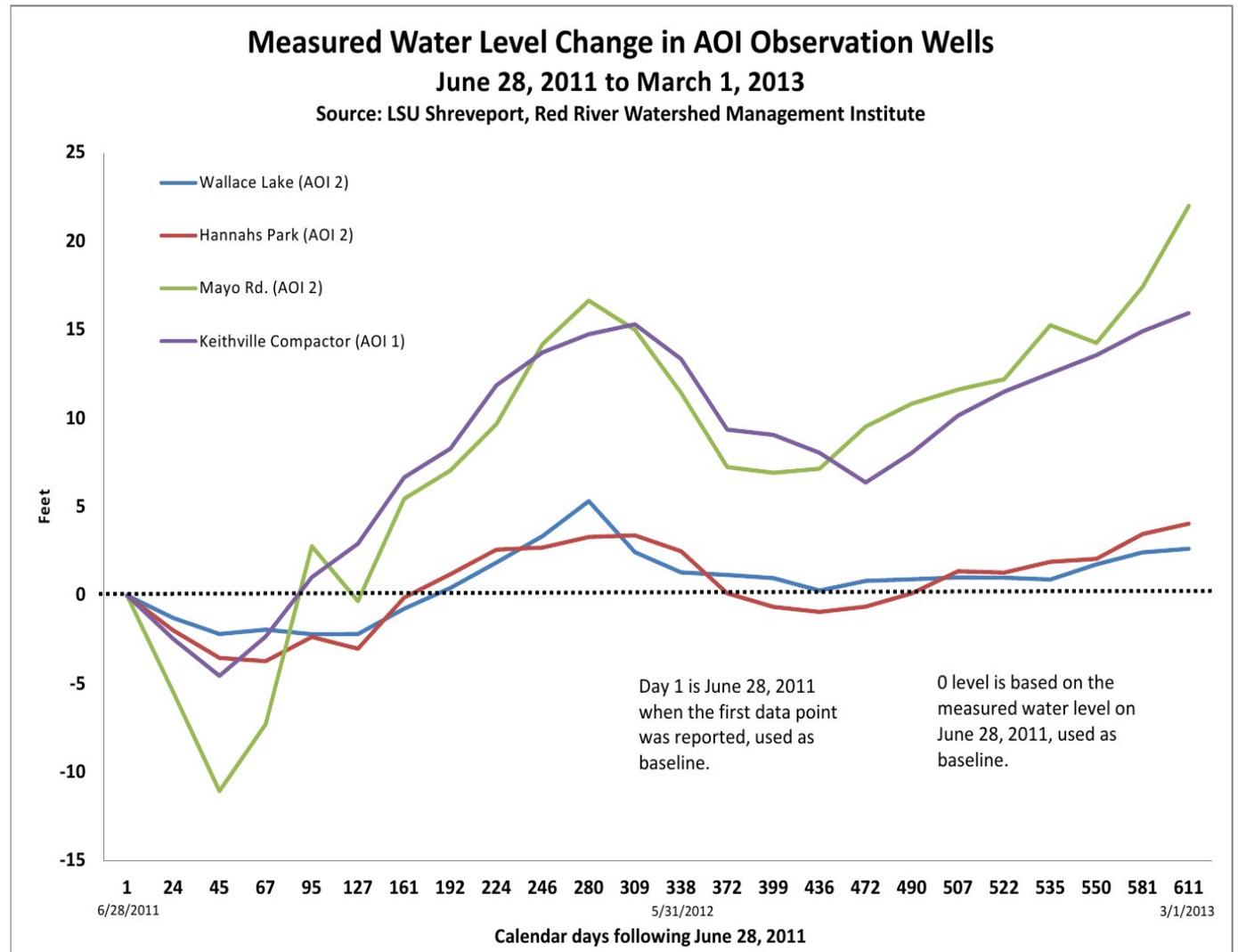
F. TEMPORARY GROUND WATER EMERGENCY: SOUTHERN CADDO PARISH

Rainfall and groundwater levels (see Fig. 4 and Fig. 5) all have improved over the past eight months in the areas of interest in south Caddo Parish where DNR/OC declared a Ground Water Emergency almost two years ago. Based on historic usage patterns, there will be a projected seasonal decline in these levels moving into the summer of 2013, which is typical for aquifers like the Carrizo-Wilcox and Upland Terrace. While overall groundwater recovery trends are positive, the most recent regional climatological assessments still point to the need for the maintenance of the emergency order and its water use restrictions.

DNR/OC staff met with Caddo Parish government officials in March to review the situation and discuss resource management strategies in the area, including a potential public awareness and education campaign. As in the past, all future efforts will be evaluated in close consultation with these officials. Up-to-date reports, releases, and technical data can be accessed at the South Caddo Parish Emergency Ground Water Order update page of the Ground Water Resources Program website: <http://dnr.louisiana.gov/southcaddo>.

The below graphs illustrate the groundwater situation in the south Caddo Parish areas of interest from the beginning of the emergency in summer 2011 during hard drought conditions through the first quarter of 2013.

Fig. 4, Showing water-level measurements in wells monitored by the Red River Watershed Management Institute (LSU-Shreveport), relevant to south Caddo Parish areas of interest, 6/28/2011 through 3/01/2013. Note the seasonal dips (summer) and swells (winter), but also the general improvement trend.



USGS Observed Wells in North Desoto and South Caddo Parish

September 30, 2011 to February 27, 2013

Source: USGS Louisiana Water Science Center

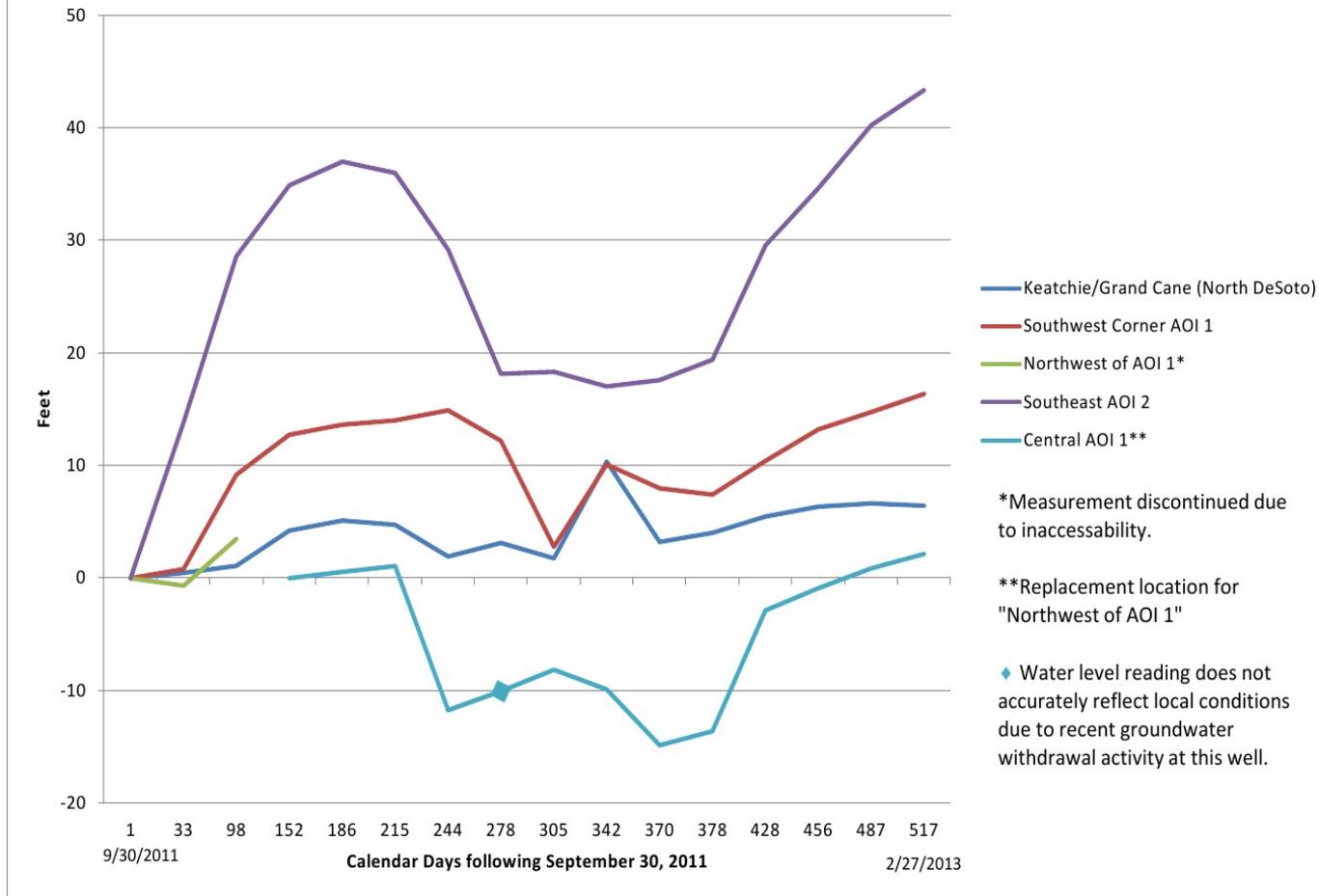


Fig. 5, Showing water-level measurement fluctuations in USGS monitored wells relevant to south Caddo Parish areas of interest, 9/30/2011 through 2/27/2013.

*Measurement discontinued due to inaccessability.

**Replacement location for "Northwest of AOI 1"

◆ Water level reading does not accurately reflect local conditions due to recent groundwater withdrawal activity at this well.

G. OTHER AQUIFER ISSUES

Previous reports have identified specific issues of concern with each of the state's aquifer systems, including water quality, water level declines, overuse, land subsidence, and saltwater intrusion. The return of normal rain patterns over the fall and winter of 2012-2013 have improved overall conditions generally across the state but effective and consistent management remains the long-term goal.

As noted in Items A and E above, the expanded statewide water monitoring network will provide a clearer picture for water resource managers in the future, leading to the creation of stronger management practices across the board. DNR/OC will continue its monitoring regime in conjunction with USGS and will provide timely updates to local and state government officials as warranted.

H. TOLEDO BEND RESERVOIR

The Toledo Bend Reservoir Project, operated under a joint agreement between the Sabine River Authority of Louisiana (SRA-LA) and the Sabine River Authority of Texas, has been providing water resources for agricultural, industrial, power generation, and recreational purposes in western Louisiana since 1969. Further, the Sabine River Diversion Canal (SRD), which was completed in 1981, annually sends about 20 billion gallons of water into southwest Louisiana to lessen dependence on the Chicot Aquifer in that region.

The sale of hydroelectric power has been the main source of revenue for Toledo Bend operations; however, water supply remains a potentially lucrative source of new income, and there is a valuable, marketable interest in Toledo Bend water. SRA-LA has made it a stated goal to replace hydroelectric power with water supply as the primary funding stream for operations by 2018. To this end, SRA-LA opened discussions in 2011 for the out-of-state sale of raw water from Toledo Bend, an effort that was suspended for various reasons in early 2012.

To help clarify future discussions of such sales, the Legislature passed Act 784 in the 2012 session. Prior to this act, SRA-LA was authorized to enter into contracts for the sale, utilization, distribution, or consumption of water outside the boundaries of the state contingent upon the written consent of the governor. Effective August 1, 2012, this new statute retained prior law [R.S. 38:2325(A)(16)] but added a requirement for written concurrence by the Senate Committee on Natural Resources and the House Committee on Natural Resources and Environment.

In addition, Act 784 requires at least two-thirds of the governing authorities of the parishes within the territorial jurisdiction of SRA-LA to concur before the SRA-LA board and director can enter into any contracts or other agreements that provide for the sale, utilization, distribution, or consumption, outside of the boundaries of the state, of the waters over which SRA-LA has jurisdiction or control.

Similar legislative oversight for out-of-state water transfers was added by Act 261 of 2012. However, unlike Act 784, Act 261 was not limited to one area of the state (see Item I, below).

As to current issues and operations, the Sabine River watershed experienced a severe drought in 2010-11, causing a record low elevation in the Toledo Bend Reservoir in November 2011. The watershed recovered sufficiently through 2012, though, enabling SRA-LA to release some 1.2 million acre-feet of water for power generation and sell over 32,000 acre-feet for Louisiana's other water supply needs (see Fig. 6). The vast majority of this amount, almost 28,000 acre-feet, went towards industrial supply, with less than 500 acre-feet going towards hydraulic fracture supply. At the end of the year, Toledo Bend had over 3.7 million acre-feet in reservoir storage.

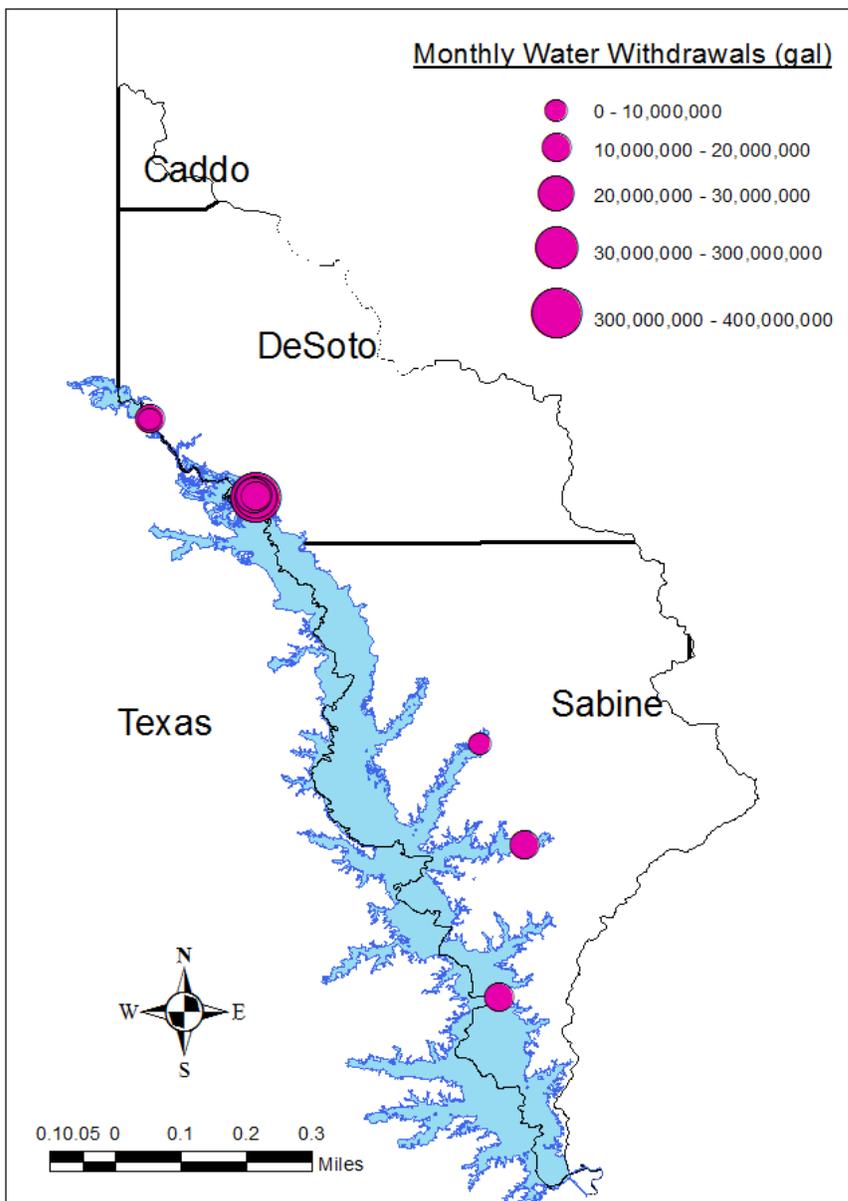


Fig. 6, Showing major water withdrawal locations on the Toledo Bend Reservoir. DNR, 2013.

SRA-LA presently has 11 industrial and 10 agricultural customers on the Sabine River Diversion Canal (SRD) system. Industry consumed more than 59,000 acre-feet of the water sold through the SRD system in 2012, while agriculture took a little more than 1,500 acre-feet. SRA-LA presently has a \$10 million capital improvement project underway to upgrade the SRD system, with an emphasis on reliability.

In an effort to protect the environmental integrity of the streams and tributaries in the Sabine River watershed, SRA-LA implemented in 2012 a permitting program for water withdrawals from these sources that includes minimum flow requirements and a fee of 15-cents per 42-gallon barrel. The fee for water withdrawals from the Toledo Bend Reservoir and the Sabine River proper remains at 15-cents per 1,000 gallons. The goal with this price differential is to encourage water withdrawals directly from the Reservoir itself.

Further regulatory changes will come with the issuance of a new license from the Federal Energy Regulatory Commission (FERC). SRA-LA anticipates issuance of the license in September 2013. The Louisiana Department of Environmental Quality (DEQ) issued its Water Quality Certification in accordance with Section 401 of the Clean Water Act in September 2012, and FERC has engaged an environmental engineering firm to prepare an Environmental Impact Statement for the Toledo Bend Project. The draft report is due in spring 2013 and will be distributed for public review and comment. It will be available on the Toledo Bend website, www.tbpjo.org.

I. ACT 955 OF 2010: PROCEDURE FOR AUTHORIZING WITHDRAWALS FROM RUNNING WATERS OF THE STATE FOR NON-RIPARIAN OWNERS

Act 955 of 2010 (R.S. 30:961-963), otherwise known as the Surface Water Management Act, was amended and reenacted by Act 261 of 2012, and extended in force for another two years through December 31, 2014. In accordance with the new act, the legislature received increased oversight of out-of-state water transfers, while in-state usage requests continue to be reviewed through a multi-agency impact analysis process led by DNR. Overall, the Surface Water Management Act has worked well in terms of regulating large withdrawals of surface water. Since completion of LWRC's *Interim Report* in March 2012, and running through April 2013, DNR has received 26 additional applications for withdrawals and so far has entered into nine cooperative endeavor agreements. Fifteen agreements have received administrative clearance and have been returned to the applicants for signature, while two applications have been withdrawn. The 26 agreements represent a total surface water volume of 1 billion gallons, and include activities such as dust suppression, pipeline work, and petroleum exploration (for drilling and/or hydraulic fracture).

The applications/agreements cover water withdrawal locations (see Fig. 7) in the following water bodies: Alligator Bayou, Bayou Bodcau, Bayou Boeuf Diversion Canal, Bayou Nez Pique, Bayou Pierre, Black Lake Bayou, Blackman Bayou, Boggy Bayou, Brush Bayou (4), Bushneck Creek, Caddo Lake, Calcasieu River, Clemar Creek, Cow Bayou, Gilmer Bayou, Gum Bayou, Houston River, Indian Bayou, Lafargue Canal, Little Indian Bayou, Little River, Loggy Bayou, Mundy Bayou, Red River (2), Sabine River, Smith Creek, Tangipahoa River, Twelve Mile Bayou, Ten Mile Bayou, West Fork Calcasieu, as well as several unnamed canals. In northwest Louisiana, the water withdrawal locations are located in the following parishes (with number of locations): Bossier (2), Caddo (11), DeSoto (5), Red River (2); in north central and northeast Louisiana: Lincoln (1), Richland (1); in central and southwest Louisiana: Rapides (1), Calcasieu (9), Cameron (1), Jefferson-Davis (6); and in southeast Louisiana: Tangipahoa (1).

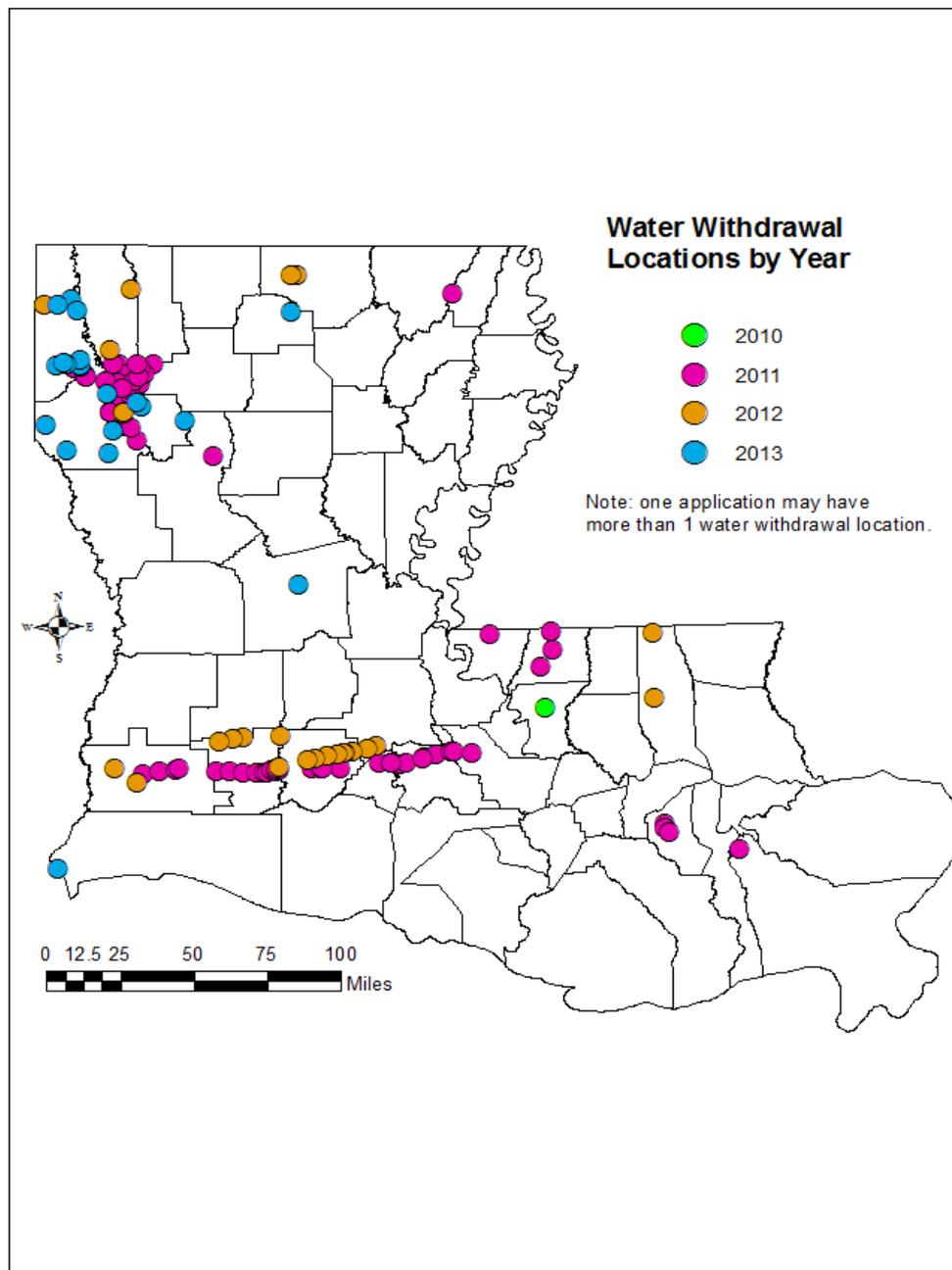


Fig. 7, Showing water withdrawal locations by year, under Surface Water Management Act. DNR, 2013.

J. EMERGING TECHNOLOGIES FOR ENERGY EXPLORATION

The use of hydraulic fracture stimulation technology expanded rapidly in Louisiana during the height of energy exploration activity in the Haynesville Shale from 2008 to 2011. Employed primarily in horizontal well operations, hydraulic fracturing utilizes large quantities of water to release oil and natural gas from previously inaccessible rock or shale formations. From a resource management standpoint, the water use in such horizontal wells is much more significant than that in more traditional vertical wells.

Here in Louisiana, the number of horizontal wells (almost all in the Haynesville Shale) first exceeded the number of vertical wells in the early summer of 2009 (see Fig. 8). Horizontal wells continued to distance vertical wells throughout 2010. Only with the collapse of natural gas commodity prices in 2011 did vertical wells once more become the dominant form of energy exploration in the state. The relatively depressed state of the natural gas market since then has led to an overall decline in Louisiana's average rig counts (see Fig. 9), with a correlative drop in the demand for water resources used in energy exploration.

Still, energy development activity is expected to increase over the next decade and Louisiana has a strong framework in place for handling this industry's water needs. The Surface Water Management Act (Act 955, updated and extended as Act 261, see Item I, above) has proven to be a useful tool in managing water needs for energy exploration. Although strictly voluntary, the program has had a good response from industry and has a record of success in evaluating proposed surface water usage through a collaborative review process.

Administrative and reporting revisions implemented by DNR/OC provide another set of practical management tools moving forward. These include the issuance of water use advisories, timely operator education and outreach efforts, water sourcing requirements for hydraulic fracture operations, and aggressive enforcement of groundwater use notification and sustainability evaluation mandates. These measures proved effective in establishing the necessary control and management of groundwater resources in the peak period of the Haynesville Shale and will serve as a sound and objective means to ensure continued effective management of these resources for future energy development in the state.

The expanded statewide water monitoring network being established through USGS and LGS (see Item A, above) also will secure a baseline of knowledge about groundwater, and even some surface water resources, in targeted energy exploration areas.

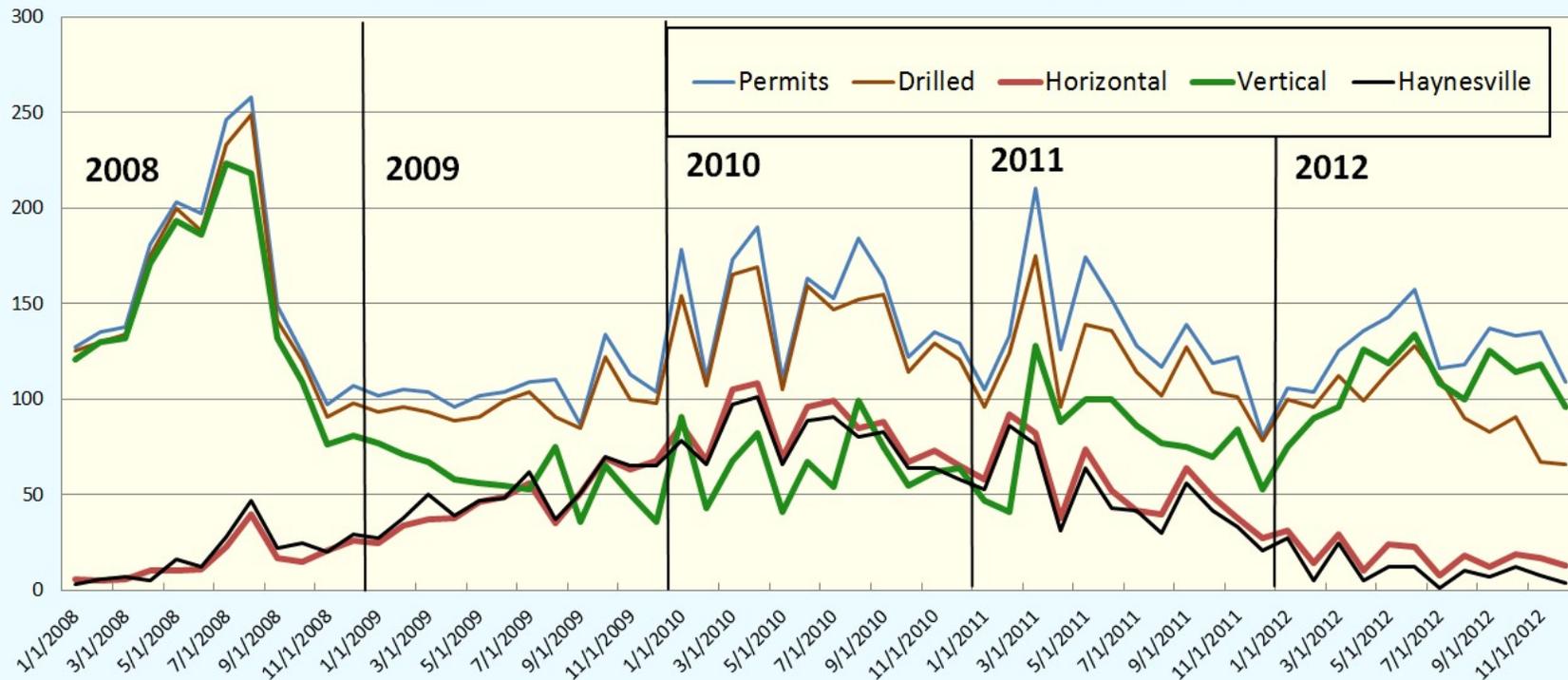
There is work left to do, however. Legislators will need to review the continuation of the Surface Water Management Act, as it expires at the end of calendar year 2014. Likewise, the expanded water monitoring network is a time-limited program. Long-term funding needs to be considered as part of a comprehensive statewide energy development strategy.

Fig. 8, Showing energy exploration activity in Louisiana, 2008-2012. Note the decline in drilled vertical wells (green line) through 2008 and the correlative rise in drilled horizontal wells (hydraulic fracture, red line) through 2009 and 2010. Most of these horizontal wells were drilled in the Haynesville Shale (black line). The major “crossover points” between vertical and horizontal well numbers come in early summer 2009 and in the first quarter of 2011. In between is the Haynesville “boom.” *DNR/OC, 2013.*

Drilled wells (brown line) as a percentage of permitted wells (blue line), by year:

2008	80.2%
2009	85.4%
2010	85.8%
2011	83.2%
2012	77.5%

Permitted, Drilled, Horizontal, Vertical and Haynesville Wells



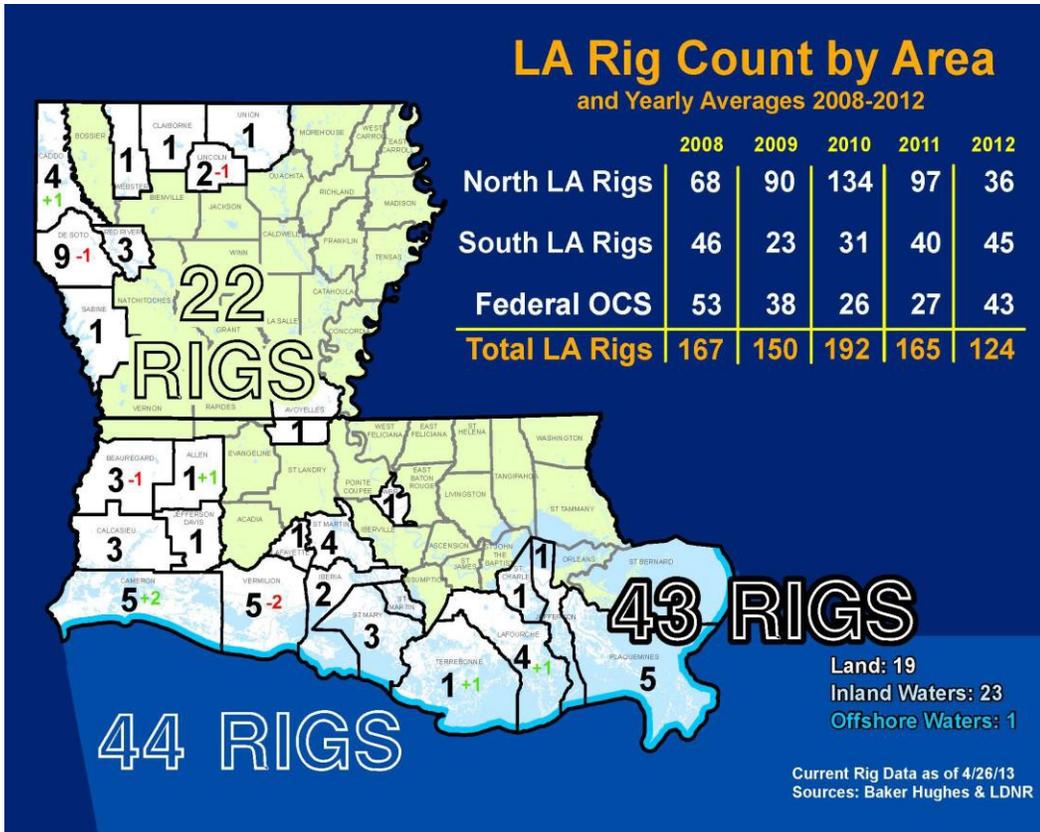


Fig. 9, Showing yearly rig count average, 2008-2012, and current rig count as of April 26, 2013. DNR/OC, 2013.

K. SURFACE WATER QUALITY IMPAIRMENT MANAGEMENT

DEQ remains committed to the sampling, study, and regulation of the state’s surface water resources with regards to their basic health. The ambient water quality monitoring network (AWQMN) remains one of the agency’s major tools for evaluating the status of these resources. The basic framework remains in place, as noted in the 2012 *Interim Report*, and there have been no significant alterations or new regulations promulgated in the past year concerning surface water testing or monitoring. However, the agency is in the process of resuming ultra-clean metals monitoring at selected routine AWQMN sites. This effort will provide another layer of basic analytical data for use in management and policy-making decisions.

Over the past year, DEQ has taken on a leadership role in advancing several new programs, studies, and evaluations, including the development and implementation of a statewide nutrient management strategy and basic research and stressor-response studies that will inform nutrient standards development. In addition, DEQ is conducting research to inform the potential revision of minerals criteria (levels of chlorides, sulfate, and total dissolved solids) in surface water, as well as the potential revision of dissolved oxygen criteria.

Much of the most up-to-date information on DEQ's monitoring efforts can be gleaned from the Water Quality Integrated report. The 2010 report was approved by the U.S. Environmental Protection Agency (EPA) in March 2012. The 2012 report was sent to EPA Region 6 in late January 2013 for review. View the 2010 report at: <http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/WaterQualityInventorySection305b/2010WaterQualityIntegratedReport.aspx>.

L. SAFE DRINKING WATER SUPPLY

The Department of Health and Hospitals' Office of Public Health (DHH/OPH) supervises public water systems in Louisiana by enforcing the Federal Safe Drinking Water Act (SDWA). In the 2012 *Interim Report*, DHH/OPH noted concerns with several surface water public supplies impacted by drought conditions and floodwater, and, in the absence of stable surface sources, whether such issues might force a resort to groundwater alternatives. As both drought and high water conditions have receded, such concerns have lessened. There has been no known or reported impact on state aquifers. Nonetheless, DHH/OPH will continue to monitor the long-term viability of such resources moving forward as part of its overall statutory responsibility to "ensure that water supplied to the public by public water supplies is obtained from safe and sanitary sources and that such sources are properly protected" [R.S. 40:4(8)(a)].

To this end, during calendar year 2012, DHH/OPH continued to pursue its aggressive compliance agenda, inspecting over 400 groundwater systems with almost 1200 combined wells. In all, DHH/OPH collected samples at close to 1700 public supply wells around the state, and tested these samples across 125 distinct chemical and physical analytical parameters. This is part of a comprehensive process that guarantees 100% coverage of the state's 1400 public water systems every three years. In the case of specific violations to maximum allowable contaminant levels (MCLs), as set by EPA, the agency works with public supply providers, and DEQ if necessary, to remedy any issues that prevent the distribution of clean, safe water to the people of the state.

M. CONSERVATION EDUCATION AND PUBLIC OUTREACH

DNR/OC is in the process of developing a robust outreach section that has the flexibility to address both general education and public awareness needs about groundwater in the state. One of the major projects underway at present is the “Water-Wise in BR” campaign. This is an outreach effort aimed at expanding public understanding in East Baton Rouge Parish of the Southern Hills Aquifer system. The Southern Hills system supplies all of the parish’s public supply and also is an important resource for economic development. Order No. ENV 2012-GW011, issued in May 2012 and referenced above in Item D, mandated an aggressive awareness program on the resource. DNR/OC reached out to both the Baton Rouge Area Chamber and the Baton Rouge Area Foundation to help facilitate the campaign.

The first goal for the effort was to determine a baseline of public knowledge. A survey conducted in December 2012 showed major gaps in familiarity with local water resources, particularly with regards to the source of Baton Rouge’s drinking water and challenges to groundwater sustainability. To address these deficiencies, DNR/OC adopted a two-fold approach that stressed: 1) the introduction of water resources curricula into middle and high school science classrooms, and 2) an awareness campaign aimed at the general public.

A teacher workshop held in February 2013 succeeded in bringing together educators from 18 different schools in East Baton Rouge Parish, including public, private, and parochial institutions. The teachers received an introduction to state and local groundwater issues from USGS staff and then participated in three separate curriculum sessions. Field tours to both public supply and industrial facilities rounded out the program. They also received both hard copy and electronic versions of the lesson plans along with a specially designed classroom poster. Additional teacher training opportunities are being planned.

Following the workshop, in March DNR/OC unveiled its interactive “Water-Wise in BR” website (<http://waterwise.dnr.la.gov>) in preparation for National Groundwater Awareness Week (March 10-16). Agency staff secured state and local proclamations from Governor Bobby Jindal and Mayor-President Melvin “Kip” Holden for the week and launched an evolving marketing campaign that has included coverage in the *Baton Rouge Advocate* and targeted advertising buys. In addition, a set of educational exhibits are in development for rotation through the parish library system and other public venues.

DNR/OC staff view the “Water-Wise” program as a good local model that can be expanded into areas around the state lacking in, or in critical need of, such public education and/or awareness efforts. A major goal in the coming year is the evaluation of the overall state of water resources education in Louisiana, with an eye towards developing ways to reach wider numbers of teachers and students with an awareness message on groundwater issues.

PART II: COMMISSION RECOMMENDATIONS AND AGENCY ACTIONS

During the completion of the March 2012 *Interim Report to the Louisiana Legislature*, LWRC identified 10 major water management plan components, with accompanying target goals and recommendations, that required additional review, revision, development or implementation by either the Legislature or one of several state agencies. This section provides an accounting of progress towards each of the listed recommendations.

1. MONITORING

See Item A (“Inadequate Monitoring Network”) in Part I: Review of Current Major Issues

1a. Recommendation for Legislative Action

Appropriate funding as necessary to establish an adequate statewide aquifer monitoring network, as recommended by USGS, including monitoring of domestic wells.

Action - Utilizing Federal funds amounting to almost \$3 million, DNR/OC now has in place an agreement with USGS for a three-year expanded aquifer monitoring program. USGS is establishing some 200 new water level monitoring wells across the state; 50 chloride monitoring wells in known or suspected challenge areas such as southwest Louisiana and Baton Rouge; and 100 new water quality test wells. Work on this project is well underway with the finalization of the well network scheduled for completion by the end of spring 2013.

1b. Recommendation for Legislative Action

Appropriate funding as necessary to establish an adequate statewide surface water availability gauging network in areas where surface water alternatives may be necessary to obtain or maintain groundwater resource sustainability.

Action - At a cost of \$600,000, DNR/OC also has reached an agreement with the LGS to install 4 to 5 new gaging stations and to update the rating curve of approximately 50 existing gages to perform surface water discharge monitoring in areas of potential new energy development, where the demand for water resources will be heightened in coming years.

1c. Recommendation for Administrative Action

Establish, where supported by objective, sound science, periodic groundwater production reporting requirements for non-domestic water well owners in areas within aquifer systems where metrics demonstrate that resource sustainability is not improving.

Action - The new data culled from the expanded monitoring network will provide state agencies with more definitive insight into the health of our state's aquifers. The information will establish a scientific foundation for meeting both Recommendations 1c. and 1d., and will allow water planners more confidence in their management decisions. DNR/OC has a range of different management options available for use, as warranted by specific conditions, and has mandated reporting in the past through the use of emergency orders and declarations. For information on current groundwater situations in the state, consult the Ground Water Resources Program website at: <http://dnr.louisiana.gov/groundwater>.

1d. Recommendation for Administrative Action

As supported by statewide monitoring network improvements, develop and implement an aquifer sustainability grading and prioritization ranking system.

Action - See 1c. A statewide grading or prioritization ranking system will be evaluated once more concrete, scientific evidence is available from the monitoring network.

2. AUDITING (REGULATORY COMPLIANCE AND PROGRAM EFFECTIVENESS)

2a. Recommendation for Administrative Action

Continue to improve aggressive implementation of statewide water well notification compliance audit procedures.

Action - DNR/OC completed a comprehensive statewide water well owner notification compliance audit spanning from January 2009 to December 2010, and then implemented a statewide follow-up audit for the 2011 calendar year by identifying all non-compliant well owners. New water well driller regulations on well owner notification went into effect November 20, 2012, and the agency currently is reassessing auditing procedures to improve implementation and enforcement efficiencies.

2b. Recommendation for Administrative Action

Focus resources on consolidating existing and future water well registration and notification database information under one uniform database system and establish one unique well identifier for each well in the system.

Action - A comprehensive water well registration and notification database remains a work-in-progress. DNR/OC began discussions in the spring of 2012 with DNR Information Technology (DNR/IT) staff to evaluate potential actions towards meeting this recommendation. Development work continues, dependent upon funding and staffing priorities.

3. EDUCATION (RESOURCE CONSERVATION AND REGULATORY COMPLIANCE)

3a. Recommendation for Administrative Action

Through the Louisiana Department of Education, seek to establish a mandatory statewide groundwater and surface water education and water conservation curriculum at elementary and higher grade levels. Partner with the DEQ, through its Drinking Water Protection Program, DWF, DHH, DAF, CPRA, and DOTD to leverage existing conservation and protection education activities currently presented to most grade levels.

Action - The DNR/OC public outreach section is in the process of evaluating statewide programs offered by other agencies, as well as actual curriculum taught in primary and secondary schools in Louisiana. Discussions with Department of Education staff are on-going and premised upon an understanding of the Next Generation Science Standards, promulgated recently at the Federal level. The next goal is to develop a comprehensive survey of state science teachers and their actual level of engagement with ground and surface water curricula in the classroom—what they are teaching currently, why, and at what grade levels.

3b. Recommendation for Administrative Action

Seek to partner with other established web-based education programs, implement improvements to DNR's and DEQ's existing web-based education and outreach efforts, and develop social media opportunities for the same.

Action - The DNR/OC public outreach section continues to evaluate the best and most productive means for cultivating these partnerships.

3c. Recommendation for Administrative Action

Request local governments, where groundwater resources are in demand for public drinking water supplies, to establish groundwater and surface water education and conservation outreach measures.

Action - The DNR/OC public outreach section continues to evaluate individual parish and regional needs based upon available data and requests. At present, DNR/OC staff is working on a public education effort in East Baton Rouge Parish, known as "Water-Wise in BR," which may serve as a model in developing efforts in other areas of the state lacking in such programs.

3d. Recommendation for Administrative Action

Pursue partnerships with each parish to establish a single point of contact to serve as the champion of the respective parish's groundwater and surface water education and conservation efforts in coordination with statewide efforts for the same.

Action - The DNR/OC public outreach section has begun compiling a purely voluntary set of parish contacts, with close to 50% of parishes reporting. Work continues on developing these contacts, with the goal of implementing a comprehensive survey of local needs and issues that will shape the nature of assistance and partnerships moving forward.

4. REGISTRATION (WATER WELL DRILLER AND OWNER/USER RESPONSIBILITIES)

4a. Recommendation for Administrative Action

In an effort to achieve 100 percent compliance with water well registration (notification) and agency evaluation requirements for proposed well installation for non-exempt well use purposes, such as irrigation, public supply, industrial, etc., the agency intends to aggressively pursue amending regulations under groundwater resources management law for water well drillers to ensure that water well pre-installation notification evaluation has been performed and an appropriate agency response has been issued to the well owner prior to engaging in well construction operations.

Action - In April 2012, DNR/OC published in the *State Register* notification of intent to promulgate regulations under Louisiana Administrative Code Titles 43 and 56 to codify and enforce action toward this recommendation. The regulation was promulgated and made effective November 20, 2012.

4b. *Recommendation for Administrative Action*

Focus resources to implement integration of water well driller registration and well owner notification database management systems into one consolidated system, improve SONRIS and GIS output capacity, and develop and implement online document review opportunities for easier access to agency well notification, evaluation and response correspondence.

Action - See 2b. Developmental work continues, dependent upon funding and staffing priorities.

4c. *Recommendation for Administrative Action*

Pursue innovative ideas to encourage well owner registration of any water well still in existence (not plugged and abandoned or destroyed) but previously not required to be registered with the state under Louisiana Administrative Code Title 56.

Action - DNR/OC met with legislative staff on this recommendation. Suggestions requiring additional discussion and possible action include: 1) legislation creating a mandatory disclosure of water well registration and compliance with each real estate transaction (property purchase or transfer), with an accompanying educational program for realtors and other interested parties in this new facet of the law; and 2) legislation creating a limited funding mechanism to provide a water sample testing incentive for unregistered well owners to voluntarily register wells on a first-come, first-served basis until the fund is depleted. Conceptually, the latter program could be set up in coordination with DHH/OPH's already rigorous sampling regime of domestic and community wells. Future legislation might then mandate that all other unregistered wells be registered or plugged and abandoned within a certain timeframe. An aggressive public outreach campaign could be implemented to reach unregistered well owners in largely rural parts of the state.

5. EVALUATION (ASSESSING RESOURCE SUSTAINABILITY)

5a. ***Recommendation for Administrative Action***

Update the water well notification evaluation procedure to clearly document that water level drawdown assessments are performed, taking into account multiple well withdrawal effects within established areas of review, where applicable. View the current evaluation procedure at:
http://dnr.louisiana.gov/assets/OC/env_div/gw_res/forms/201205_GWCHE_CKLIST_READER.pdf.

Action - DNR/OC has completed revising the Water Well Prior Notification Form Evaluation Checklist to include provisions of this recommendation. Use of the revised checklist by technical staff began on June 5, 2012.

5b. ***Recommendation for Administrative Action***

Investigate revising the water well notification form (Form GWR-01) to include identification of and disclosure of efforts to use surface water alternatives for certain well uses (irrigation, public supply, industrial, etc., but excluding domestic use) in certain areas of aquifers such as areas of ground water concern, etc. View Form GWR-01 at:
<http://dnr.louisiana.gov/assets/docs/conservation/documents/GWR-01.pdf>.

Action - Following legal staff review and approval, the agency anticipates completing revision of the form and form instructions for approval and implementation.

5c. ***Recommendation for Administrative Action***

Focus resources to improve and increase the use of USGS observation well and other state agency groundwater level/quality data through the DNR SONRIS and GIS systems.

Action - See 2b and 4b. Developmental work continues, dependent upon funding and staffing priorities.

6. INCENTIVES (RESOURCE CONSERVATION)

6a. *Recommendation for Administrative Action*

Continue to investigate feasible and effective ways to provide incentives such as conservation stewardship recognition plans, etc.

Action - DNR/OC has met with legislative staff on this issue and is investigating the Natural Resources Conservation Service (NRCS) stewardship program for possible developmental and implementation guidance or partnership opportunities.

6b. *Recommendation for Legislative Action*

Evaluate capital outlay policies & procedures to promote beneficial use of alternative water sources where sustainability is challenged.

Action - DNR/OC has met with legislative staff on this issue. One suggestion might be the establishment of a prioritization of alternative water source capital outlay projects, similar to the Port Priority Program and other already established priority/ranking programs in the capital outlay process. See Item C in Part I for a success story.

6c. *Recommendation for Legislative Action*

Evaluate requirements for local governments and water districts' eligibility to participate in the Community Water Enrichment Fund program, including master meter installation, conservation education, public outreach, water production reporting, and unaccounted for water loss abatement.

Action - DNR/OC has met with legislative staff on this issue. Consistent with applicable language and program parameters, and in coordination with the Division of Administration (Office of Community Development) and Legislature, DNR/OC will pursue drafting Louisiana Administrative Code regulations for promulgation consideration.

6d. *Recommendation for Legislative Action*

Evaluate linking tax credit and abatement policy to conservation participation, water loss prevention, and alternative water use.

Action - DNR/OC has met with legislative staff on this issue. Investigation of existing in-state and out-of state tax credits, rebates, and incentives is ongoing; where applicable, new stipulations for tax credit qualification might be mandated to include water conservation, loss prevention and/or alternative use provisions.

6e. Recommendation for Legislative Action

Evaluate fiscal policy to reward high volume groundwater users to switch to surface water, recognizing the public benefits.

Action - DNR/OC has met with legislative staff on this issue and is considering the establishment of an agency evaluation and resource sustainability certification process for business retention, relocation, job creation, and other economic development packages to further incentivize high volume groundwater users to switch to surface water sources. Coordination with the Department of Economic Development will be necessary.

7. ENFORCEMENT (REGULATORY COMPLIANCE)

Recommendation for Administrative Action

Investigate possibilities of implementing progressive enforcement techniques to aid in beneficial projects such as conservation education assistance, etc., similar to DEQ's program.

Action - DNR/OC continues to evaluate several of DEQ's programs for best management practices, including alternative enforcement, such as the EnviroSchool concept. No action is anticipated at this time while review is underway.

8. EMERGENCIES (RESPONSE COORDINATION)

Recommendation for Administrative Action

Investigate the extent to which groundwater emergencies are covered through GOHSEP, consider any additional needs to establish a multi-agency committee for emergencies, and amend or revise the agency's Ground Water Emergency Response Contingency Plan as necessary.

Action - DNR/OC has evaluated this issue with GOHSEP and drafted additional language and stipulations as part of its Ground Water Emergency Response Contingency Plan.

9. COLLABORATION (CONCERTED MULTI-AGENCY RESOURCE MANAGEMENT)

9a. *Recommendation for Administrative Action*

Implement an annual multi-agency stakeholders conference, including legislators, state agencies, federal agencies, local governments, conservation commissions, soil and water districts, academic institutions, non-governmental organizations, trade associations, lake commissions, drillers, agriculture and aquaculture farmers, industry representatives, environmental organizations, power generators, navigation interests, coastal restoration advocates, fisheries interests, oil and gas representatives, tourism industry, economic developers, and other users, all designed to seek best management practices for the sustainability and protection of our water resources.

Action - DNR/OC is planning to develop this conference in conjunction with the LWRC and other agencies.

9b. *Recommendation for Administrative Action*

Require the regional conservation commissions and the soon-to-be-established regional advisory bodies to file annual reports with the Ground Water Commission on the vital statistics and concerns for the groundwater of their region.

Action - Act 790 of the 2012 Legislative Session provided action toward this recommendation.

9c. *Recommendation for Administrative Action*

Engage legal scholars to research and explore the potential non-compensated consumption of surface water when used as an alternative to groundwater.

Action - DNR/OC has met with legislative staff on this issue. The general consensus is that a roundtable discussion with legal scholars be convened with particular reference to SCR 53 of 2012 and the involvement of the Louisiana State Law Institute in similar research and discussions. DNR/OC is planning to facilitate this gathering in conjunction with LWRC.

9d. *Recommendation for Administrative Action*

Engage experts to research and explore the consequences of out-of-state sales of water resources.

Action - Act 261 of the 2012 Legislative Session extended the provisions of Act 955 of 2010, including legislative oversight of out-of-state water sales. Also, in reference to the proposed out-of-state sale of water from the Toledo Bend Reservoir, the Legislature in 2012 passed Act 784. The Act re-authorized SRA-LA to enter into contracts for the sale, utilization, distribution, or consumption of water outside the boundaries of the state contingent upon the written consent of the governor, with the additional requirement of a written concurrence by the Senate Committee on Natural Resources and the House Committee on Natural Resources and Environment. In addition, Act 784 requires at least two-thirds of the governing authorities of the parishes within the territorial jurisdiction of SRA-LA to concur before the SRA-LA board and director can enter into any such contracts.

DNR/OC has met with legislative staff on this issue to discuss adding provisions that might expand the scope of authority of LWRC, to reflect that such requests for water sales may be reviewed by the commission, which will be empowered to act in an advisory capacity to legislative committees, parish governments, and other governmental agencies by reviewing and commenting upon the impact of such sales, both economically and environmentally.

10. GOVERNANCE

10a. *Recommendation for Administrative Action*

Draft and implement regulations for the establishment of a statewide regional network of advisory panels composed of local governments, user groups, and interested stakeholders, all as previously authorized by Act 49 of 2003. In cases where the legislature has already established regional commissions, specifically the Capital Area Ground Water Conservation Commission and the Sparta Aquifer Ground Water Conservation Commission, these entities should concurrently serve as their regional advisory panel.

Action - DNR/OC has drafted regulations to address this recommendation. They are currently under review. The agency is prepared to provide a complete draft of the regulations for comment at such time as this review is complete.

10b. *Recommendation for Legislative Action*

By legislation or resolution, affirm the authority of local governments to adopt ordinances to protect the quality of public groundwater supply wells.

Action - DNR/OC is not aware of any legislative action to address this recommendation during the 2013 legislative session but has requested that DEQ take the lead in coordination with appropriate agency and legislative staff pursuant to any proposed legislative action.

10c. *Recommendation for Administrative Action*

Explore the possibility of drafting new regulations to improve upon recent on-site and off-site E&P waste fluids recovery, remediation, recycling, and reuse regulatory amendments, encouraging greater use of these fluids as an alternative to groundwater and surface water resources in hydraulic fracture stimulation operations.

Action - Based upon responses to an extensive survey of oil and gas shale operators, DNR/OC intends to propose regulatory amendments on this issue. A review of the research and potential changes is underway.

10d. *Recommendation for Administrative Action*

Engage legal scholars to research and explore the potential non-compensated consumption of surface water when used as an alternative to groundwater, and as an aid to economic development, job creation, and job retention.

Action - See 9c. DNR/OC has met with legislative staff on this issue. The general consensus is that a roundtable discussion with legal scholars be convened with particular reference to SCR 53 of 2012 and the involvement of the Louisiana State Law Institute in similar research and discussions. DNR/OC is planning to facilitate this gathering in conjunction with LWRC.

10e. *Recommendation for Administrative Action*

Engage experts to research and explore the consequences of out-of-state sales of water resources.

Action - See 9d. DNR/OC has met with legislative staff on this issue to discuss adding provisions that might expand the scope of authority of LWRC, to reflect that such requests for water sales may be reviewed by the commission, which will be empowered to act in an advisory capacity to legislative committees, parish governments, and other governmental agencies by reviewing and commenting upon the impact of such sales, both economically and environmentally.

10f. *Recommendation for Legislative Action*

Extend the sunset of Act 955 of 2010 through December 2014, continuing state agency oversight and management of surface water resource use under the cooperative endeavor agreement procedure consistent with the Attorney General's surface water use opinions.

Action - Act 261 of the 2012 Legislative Session extended the provisions of Act 955 of 2010.

10g. *Recommendation for Legislative Action*

Add surface water fact-gathering responsibilities, without management or regulatory authority, to the mission of the Ground Water Resources Commission, expanding its membership, and amending its name to the Water Resources Commission.

Action - Act 471 of the 2012 Legislative Session implemented this recommendation.

10h. *Recommendation for Administrative Action*

Investigate possibilities of developing new, or improving upon existing, agency aquifer recharge area protective measures.

Action - DNR/OC has requested DEQ to guide the development of new or additional aquifer recharge protective measures, as they deem necessary.

CONCLUSION

TOWARDS A SUSTAINABLE WATER FUTURE

With continued population and economic growth, Louisiana faces a bright future in the 21st century, yet we must ensure that we face this future with an open, clear mind and an understanding of the many challenges that this growth places upon our environment. The state is privileged to enjoy many natural resources, with water, perhaps, being the greatest of all. Yet for most of our state's history, we have lacked a comprehensive plan for water resource management. The work of the Water Resources Commission is intended to address this deficiency by defining our needs and crafting an inclusive program that will balance the needs of growth with the demands of Mother Nature. We must and will work towards building a sustainable future for our children and grandchildren to inherit.

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