OKLAHOMA
Water News
1st Quarter 2016

Inside

State Aquifers Slow to Recover Despite Historic Rainfall

According to data provided by the OWRB's Groundwater Monitoring and Assessment Program (GMAP), most major Oklahoma aquifers experienced rising water levels during 2015, but despite a year of record rainfall, numerous wells across the state have not yet recovered to pre-drought (early 2010) water levels.

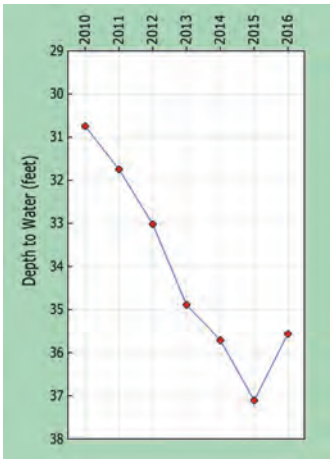
"Historic rainfall during 2015 helped replenish state reservoir levels and restore streamflows," says J.D. Strong, OWRB Executive Director, "but the state's groundwater supply, especially in western Oklahoma, remains low. It will take some time and a lot more rain to recover to pre-drought levels."

Data collected in January 2016 show that 12 major aquifers have not yet recovered from four-plus years of devastating drought (see page 3).

"While rainfall totals for 2015 were incredibly high across most of Oklahoma, the bulk of that rain fell hard and fast within a short period from May through June," says State Climatologist Gary McManus. "In most cases, these rainfall events resulted in large amounts of runoff and could not provide much recharge to aquifers."

Three of the state's largest aquifers, the Ogallala, Garber-Wellington, and Rush Springs, have not yet recovered half of the amounts lost during those years.

(continued on page 2)



OWRB Geologist Byron Waltman measures water level, temperature, and conductivity in a Rush Springs monitoring well in Washita county. The hydrograph shows a steady decline in water level from 2010 to 2015, losing more than 6 feet during that period. The level increased by more than a foot from 2015-2016, which means that in spite of historic rainfall, the well still has about 5 feet to go before reaching its "pre-drought" level. On average, Rush Springs wells lost 6.54 feet during the drought (2010-2015) and gained 2.37 feet last year. Historic water level graphs and information for all major aquifers can be obtained from the OWRB "Groundwater Level Monitoring Wells in Oklahoma" GIS map viewer at www.owrb.ok.gov/maps.

From the Director

The last five months have proven once again Oklahoma's susceptibility to drought and its disparaging impacts. We've quickly jumped from the end of the wettest year on record to the return of drought conditions across more than one-third of the state, and then back to wet conditions in many places. It is a stark reminder that the devastation of Oklahoma's 2010-2015 drought still haunts us, and that our state's precipitation history is littered with similar swings between extremely wet and dry conditions.

The good news is the OWRB and our partners continue to develop water management practices and tools to allow Oklahoma's water users to break that cycle. In fact, I'm pleased to report that state legislation passed this spring will provide additional drought-proofing ammunition through the establishment of aquifer storage and recovery (ASR) projects in Oklahoma.

(continued on page 2)

J. D. Strong, Executive Director
Oklahoma Water Resources Board

Aquifers Slow to Recover (continued)

Even though the Northwest and Central climate regions experienced their second wettest years on record, OWRB data indicate that Ogallala water levels did not increase last year and are now down by more that 9 feet from pre-drought levels. Garber-Wellington levels went down by about 7.5 feet during the drought and were only able to recoup about 3 feet last year.

The Rush Springs aquifer is primarily located in the West-central and Southwest climate regions, both of which received more than 140% of normal rainfall in 2015. Like the other regions, nearly half of that rain came during a brief period between mid-April and late June. After losing about 6.5 feet to the drought, the aquifer recouped about 2.5 feet on average during 2015.

In addition to timing and intensity of rainfall events, OWRB hydrologists point to a large number of factors that have affected aquifer recharge across the state, including temperature, humidity, farming practices that promote or inhibit infiltration, impervious surfaces from urban development, and types of geologic formations that determine how the water moves and is stored in the aquifer.

(continued on page 3)

From the Director (continued)

SB1219, authored by Senator Eddie Fields and Representative John Pfeiffer, authorizes the OWRB and Oklahoma Department of Environmental Quality (ODEQ) to establish a process for citizens or communities to construct ASR projects.

The 2012 Update of the Oklahoma Comprehensive Water Plan includes a feasibility study of potential ASR sites within Oklahoma. However, it is evident that if we are to join several other western states that already employ ASR projects for drought management, it is imperative to invite all stakeholders to get involved through our rulemaking process. During the recent 5-year drought and with the increased focus Water for 2060 has placed on innovative water management, ASR likely will be an important factor in helping us secure water for decades to come in many places throughout Oklahoma.

Speaking of Water for 2060, I'm also proud to report that this important initiative was highlighted in March at the White House Water Summit as a part of World Water Day. I had the honor of attending the White House ceremony, which highlighted Oklahoma's Water for 2060 initiative as one of several unique drought resiliency measures from across the U.S. Our Water for 2060 work was also recently expanded by Governor Fallin to include a new working group to review opportunities and challenges associated with recycling oil and gas produced water for beneficial reuse.

Finally, I'd like to thank and congratulate all the OWRB employees participating in yet another successful Oklahoma City Memorial Marathon. It is a special time of remembrance at the OWRB each April as we honor our two fallen colleagues, and lift up all those who were tragically impacted. I am always proud and astounded by the number of current and former OWRB staffers that participate in the various races each year.

Want to help us cut printing and mailing costs? Sign up to receive your *Oklahoma Water News* via email!

Email GO DIGITAL to pubinfo@owrb.ok.gov and include your name & address. Current and past issues of the *Oklahoma Water News* are also available on the OWRB website at www.owrb.ok.gov/waternews.

The OWRB would like to thank our

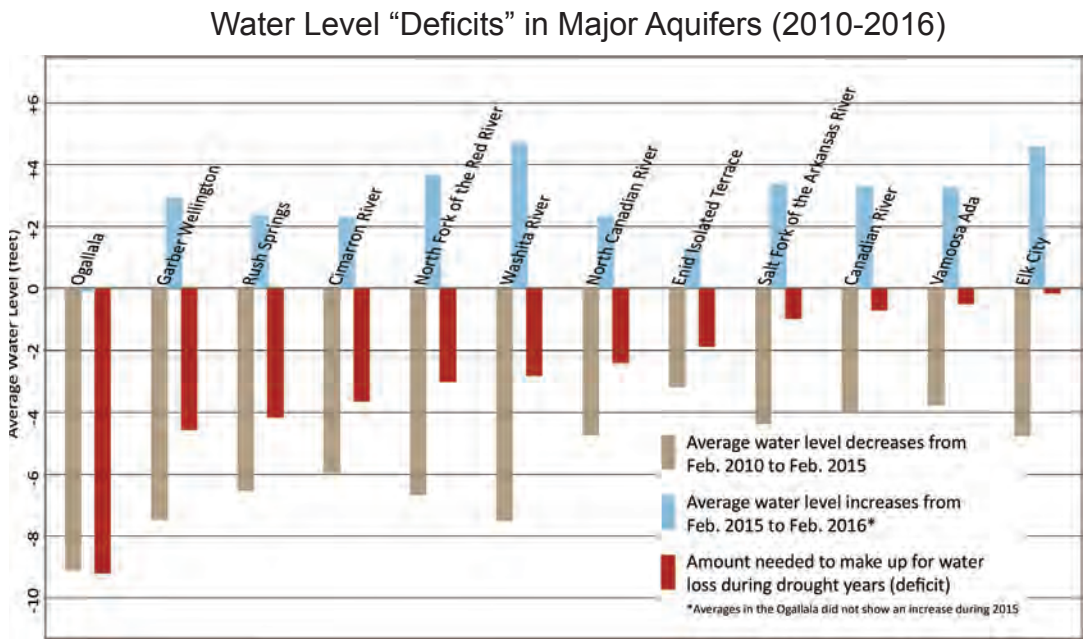
2016 Water Appreciation Day Exhibitors

- Arkansas Grand Regional Authority
- Chickasaw & Choctaw Nations
- Citizens for the Protection of the Arbuckle Simpson Aquifer
- Conservation Coalition of Oklahoma
- Keep Oklahoma Beautiful
- Oklahoma Climatological Survey/Mesonet
- Oklahoma Conservation Commission
- Oklahoma Corporation Commission
- Oklahoma Department of Environmental Quality
- Oklahoma Department of Mines
- Oklahoma Department of Transportation, Waterways
- Oklahoma Geological Survey
- Oklahoma Ground Water Association
- Oklahoma Municipal League
- Oklahoma Rural Water Association
- Oklahoma Scenic Rivers Commission
- Oklahomans for Responsible Water Policy
- OSU Environmental Science Program
- OSU Water Resources Center/Think Water
- OU School of Engineering & Environmental Science
- Southern Climate Impacts Planning Program
- US Bureau of Reclamation
- USGS Water Science Center
- Water4

Aquifers Slow to Recover (continued)

While total precipitation is clearly linked to the rise and fall of water levels in aquifers, aquifer recharge is a dynamic and multifaceted process involving many environmental and human-induced conditions. Recharge may take hours, days, months, or even years, depending on multiple factors.

Recharge may take hours, days, months, or even years, depending on multiple factors.



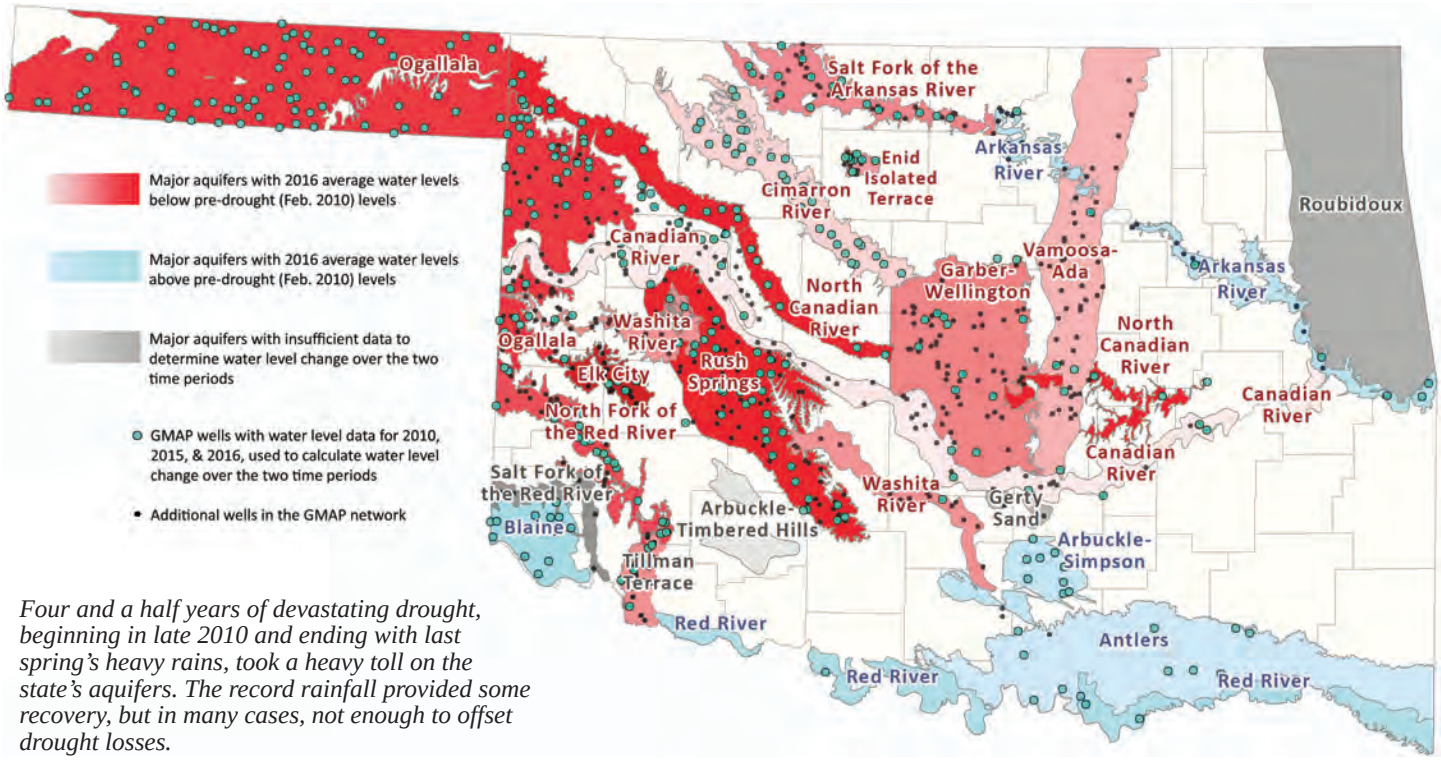
OWRB data indicate that 12 of Oklahoma's major aquifers, including the state's most utilized groundwater sources, are still slowly recovering from drought losses.

To gain a better understanding of how each aquifer experiences recharge, it is critical to have water level data for multiple wells over multiple time periods. As the GMAP team works its way across the state, a vast network of approximately 750 wells is being created for both water level and water quality data collection. A sub-set of network wells will be used for trend monitoring and evaluated multiple times per year. Multiple assessments of water level and chemistry will facilitate recognition of seasonal changes, changes due to climate variability, and/or changes due to usage over time.

To further facilitate this effort, 25 GMAP sites have been equipped with continuous groundwater level recorders (pressure transducers) that collect hourly groundwater level measurements and provide insight into water level fluctuations related to daily, localized factors, including groundwater use and precipitation.

According to Mark Belden, OWRB Geologist and GMAP Coordinator, the bulk of the GMAP groundwater level observation sites monitor groundwater level fluctuations

(continued on page 4)



Four and a half years of devastating drought, beginning in late 2010 and ending with last spring's heavy rains, took a heavy toll on the state's aquifers. The record rainfall provided some recovery, but in many cases, not enough to offset drought losses.

Aquifers Slow to Recover (continued)

during three periods each year— January-February, May-June, and September-October. "This will allow the GMAP team to examine periods within the groundwater hydrologic cycle roughly approximating a period of quiescence, or onset of groundwater discharge and onset of groundwater recharge, respectively," says Belden.

The valuable data provided by GMAP can be used to estimate aquifer storage and groundwater availability while tracking changes over time. For more information on GMAP, visit **www.owrb.ok.gov/GMAP**.

The OWRB is also currently conducting intensive hydrologic investigations on several state aquifers. During each investigation, upper, lower, and lateral boundaries of the aquifer are determined, followed by a characterization of aquifer properties—such as saturated thickness, hydraulic conductivity, transmissivity, specific yield, and storage coefficient—to understand the storage and yield capacity of the basin. Because water levels constantly fluctuate due to short-term and long-term changes in climate, groundwater withdrawals, and land uses, the amount of water entering the basin (recharge) and the amount of water leaving the basin (discharge) are important factors in the evaluation of groundwater availability. The primary goal of these investigations is to provide data and analysis for the determination of how much water can be withdrawn from individual aquifers (groundwater basins). For more information on hydrologic investigations at the OWRB, visit **www.owrb.ok.gov/gwstudies**.

Aquifer Storage and Recovery (ASR) in Oklahoma, SB 1219

Because of declining water levels in the state's aquifers, water users across Oklahoma are considering new ways to supplement supply. According to the Oklahoma Comprehensive Water Plan (OCWP), aquifer storage and recovery (ASR) could be an effective tool for managing future groundwater demand and meeting the state's Water for 2060 goals.

In early April, the Oklahoma state legislature passed SB 1219, which allows water to be stored in an aquifer for use at a later time without counting against the quantity limits established in a groundwater permit.

The bill gives the OWRB authority to promulgate and implement ASR rules, approve site-specific ASR plans, and issue permits for taking and using stored water. For permitting purposes, ASR will be considered a "beneficial use" of water by the OWRB.

Domestic and permitted groundwater use are protected by limits on permitted withdrawals to the amount of ASR water that is accessible. Well spacing rules to prohibit interference with permitted and domestic use are required as well. Groundwater quality will be protected by ODEQ water quality permitting requirements.

The legislation currently awaits approval by the Governor.

Aquifer	Geologic Framework	Sample Size	Change in Water Level			
			2010-2015		2015-2016	
			Mean	Median	Mean	Median
Ogallala	semiconsolidated gravel, sand, silt, clay	116	-9.11	-6.23	-0.09	-0.1
Garber-Wellington	interbedded shale/sandstone	12	-7.48	-7.51	2.92	2.72
Rush Springs	consolidated sandstone & interbedded areas	55	-6.54	-5.86	2.37	1.79
Cimarron River	alluvium and terrace	35	-5.95	-5.77	2.29	2.51
North Fork of the Red River	alluvium and terrace	28	-6.67	-5.95	3.66	3.08
Washita River	alluvium and terrace	3	-7.52	-6.25	4.7	1.16
North Canadian River	alluvium and terrace	24	-4.74	-4.67	2.29	2.51
Enid Isolated Terrace	alluvium and terrace	8	-3.18	-4.07	1.28	1.36
Salt Fork of the Arkansas	alluvium and terrace	17	-4.38	-3.46	3.38	3.77
Canadian River	alluvium and terrace	7	-4.04	-3.19	3.31	3.62
Vamoosa Ada	interbedded sandstone/shale/ conglomerate	4	-3.77	-5.69	3.25	4.09
Elk City	sandstone	6	-4.78	-4.53	4.6	5.02
Antlers	sandstone	8	-1.89	-2.7	2.87	2.82
Red River	alluvium and terrace	4	-2.04	-0.88	4.35	3.99
Arkansas River	alluvium and terrace	6	-0.81	-1.57	4.14	3.94
Arbuckle Simpson	karst, interbedded limestone/ dolomite; sandstone/shale	8	-6.75	-5.61	19.73	21.1
Blaine	karst, interbedded gypsum/ dolomite	13	-6.09	-1.31	29.16	25.43

Major aquifers with water level data for the two time periods. All aquifers had water level declines during the drought (2010-2015), and all but the Ogallala recovered water during 2015-2016. Aquifer recharge can be attributed to a large number of variables, including geologic framework.

According to Chris Neel, OWRB Geologist, karst and alluvial aquifers tend to recover more quickly from drought conditions. "Precipitation can infiltrate into the subsurface with more ease through cracks and fissures in karst aquifers," says Neel. "Although not as responsive, alluvial aquifers can also recover quickly because infiltration rates are fast and the depth to water is typically shallow."

Sandstone aquifers often show the slowest recovery from drought conditions. "In these aquifers, the water table is deeper, the substrate is denser, and infiltration rates are slower," adds Neel.

DID YOU KNOW?

Minor water leaks account for more than

of wasted water each year and are equal to annual household water use in

million homes.

HERE'S HOW WE CAN SAVE MORE THAN ONE TRILLION GALLONS OF WATER IN ONE YEAR:

WaterSense-labeled products are backed by independent, third–party testing and certification, and meet EPA's specifications for water efficiency and performance. When you use these water–saving products in your home or business, you can expect exceptional performance, savings on your water bills, and assurance that you are saving water for future generations.

SHOWERHEADS

If every home in the United States installed WaterSense-labeled showerheads, we could save more than 260 billion gallons of water annually.

TOILETS

If all old, inefficient toilets in the United States were replaced with WaterSense labeled models, we could save 520 billion gallons of water annually.

BATHROOM SINK FAUCETS & ACCESSORIES

If every home in the United States replaced existing bathroom faucets and aerators with WaterSense-labeled models, we could save 64 billion gallons of water across the country annually.

URINALS

Nationwide, if all older, inefficient urinals were replaced, we could save nearly 36 billion gallons annually.

LANDSCAPE IRRIGATION CONTROLS

If every home in the United States with an automatic sprinkler system installed and properly operated a WaterSense-labeled controller, we could save 120 billion gallons of water across the country annually from not overwatering lawns and landscapes.

PRE–RINSE SPRAY VALVES

If all commercial food service establishments in the U.S. installed and used a WaterSense-labeled pre-rinse spray valve, we could save more than 7 billion gallons across the country annually.

FLUSHOMETER-VALVE TOILETS

If commercial facilities nationwide replaced all of their older, inefficient flushometer-valve toilets with WaterSense-labeled models, it could save an estimated 39 billion gallons of water per year.

WATER FOR 2060
EFFICIENCY · CONSERVATION · RECYCLING · REUSE

Garber Begins Work on DWSRF-funded Regionalization Project

In February, the Garber Municipal Authority began construction on a booster pump station and 11.6 miles of water line to connect the system with the Enid Municipal Authority. The project was funded by a $2.1 million Drinking Water State Revolving Fund (DWSRF) loan last December.

The small Garfield county community was in desperate need either to improve water quality through expensive treatment or find another source of supply. Among other issues, the system's water had carbon tetrachloride and nitrates above maximum contaminant levels.

The DWSRF project priority ranking system granted points to the Garber project both for being under consent order for water quality issues and for being an interconnection project, which helps meet Oklahoma's Water for 2060 goals by improving water quality, supply security, and the ability to make system upgrades for better efficiency.

With 100% principal forgiveness, Garber customers will save an estimated $3,225,000, compared to traditional financing.

The DWSRF loan program is administered jointly by the Oklahoma Department of Environmental Quality (ODEQ) and the OWRB with partial funding from the U.S. Environmental Protection Agency (EPA). To date the DWSRF program has awarded 179 loans to Oklahoma communities totaling $1,014,228,300.

For more information on the DWSRF Loan Program, visit **www.owrb.ok.gov/DWSRF**.

Work crew installing water main along East Willow Road to connect the Garber Municipal Authority to the Enid Municipal Authority

Drinking Water State Revolving Fund (DWSRF) Program

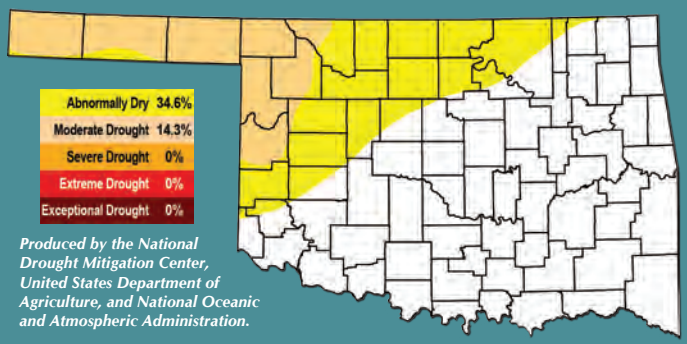
Until 1997, Oklahoma did not have a lower than market rate loan program to assist water systems in complying with the Safe Drinking Water Act (SDWA). The 1996 Amendments to the SWDA allowed the U.S. Environmental Protection Agency (EPA) to make a grant to Oklahoma to fund a Drinking Water State Revolving Fund (DWSRF). The primary purpose of the program is to provide low interest loans and other financial assistance to municipalities and rural water districts for the construction of public water supply projects. The DWSRF is administered cooperatively between the OWRB and Oklahoma Department of Environmental Quality (ODEQ).

Systems eligible for loan money include towns and municipalities with proper legal authority and rural water districts established under Title 82 of the Oklahoma Statutes. Eligible projects include drinking water treatment, new intake/raw water lines, major distribution/storage system rehabilitation, new storage, engineering, and new transmission/distribution systems.

Eligible projects are prioritized using a point ranking system. Points are awarded for the following categories: violations of primary standards (e.g., arsenic, nitrates, or uranium), quantity deficiencies, design deficiencies, vulnerability to pollution, violation of secondary standards (e.g., odor problems or excessive hardness), consolidation, source water protection, compliance orders, affordability of the project, and eligibility for special financing for disadvantaged communities.

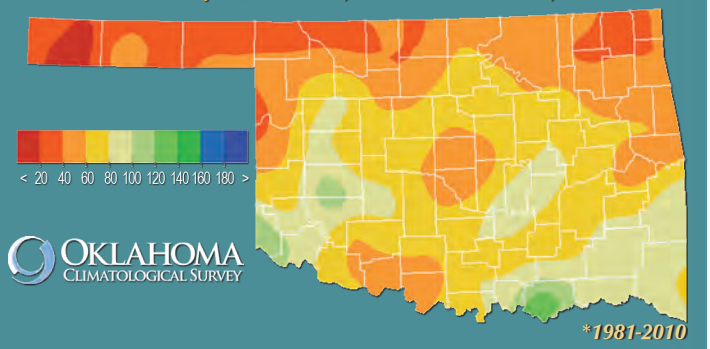
Drought Update

U.S. Drought Monitor
March 22, 2016

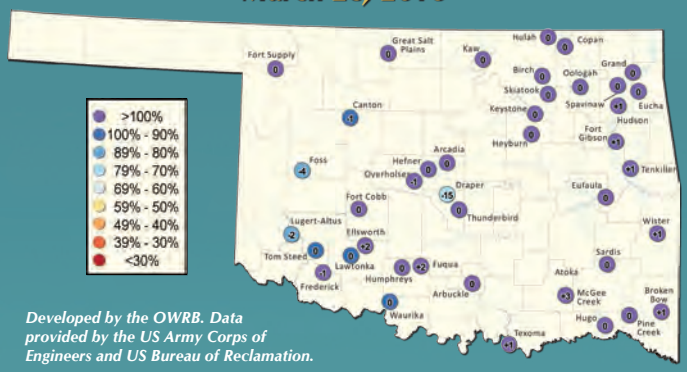


Produced by the National Drought Mitigation Center, United States Department of Agriculture, and National Oceanic and Atmospheric Administration.

Percent of Normal* Precipitation
Last 90 Days (Dec. 30, 2015 - Mar. 28, 2016)

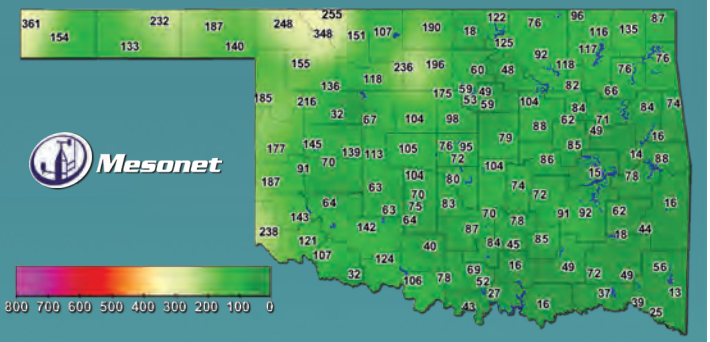


Reservoir Storage
March 28, 2016

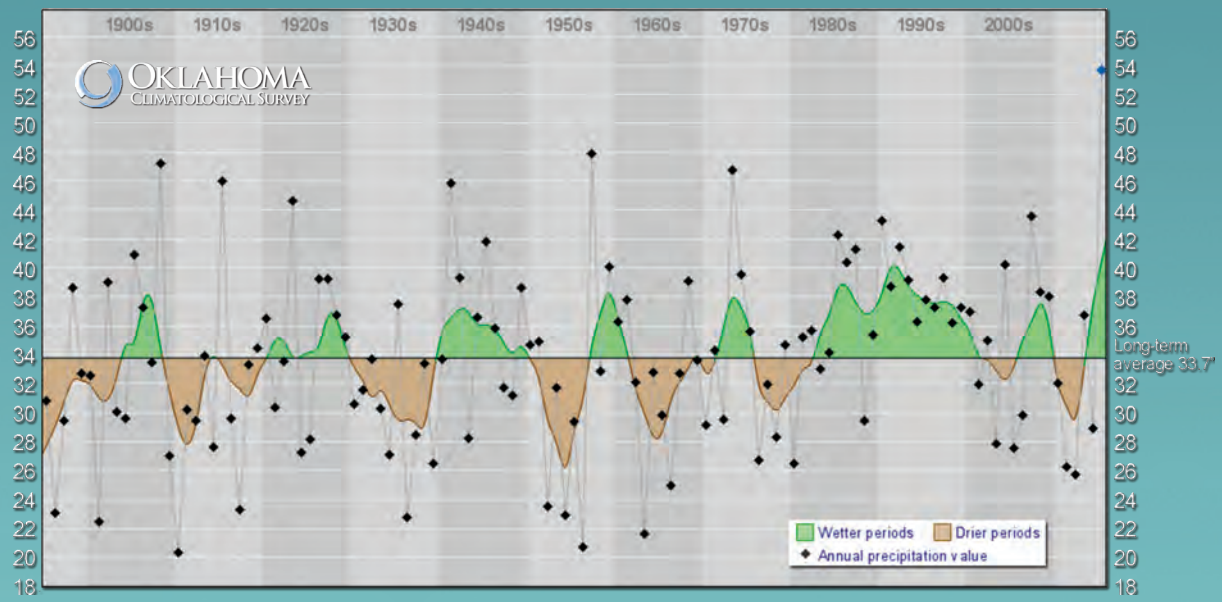


Developed by the OWRB. Data provided by the US Army Corps of Engineers and US Bureau of Reclamation.

Keetch-Byram Drought Index
March 28, 2016



Annual Precipitation History with 5-year Tendencies
Oklahoma Statewide: 1895-2015



Evolution of Oklahoma's precipitation history since the modern record began in 1895. The diamonds represent the average of the measured precipitation for each year. The green-brown trace represents the five-year weighted average of these precipitation values over time. Adding the 2015 record year to the graph (highlighted in blue) brought the long-term average up by 0.1 inch.

For more drought information visit **www.drought.ok.gov**.

Oklahoma Water News
Oklahoma Water Resources Board
3800 N. Classen Blvd.
Oklahoma City, OK 73118

www.owrb.ok.gov

STANDARD PRESORTED
U.S. POSTAGE
PAID
Oklahoma City, OK
Permit No. 310

Protecting and enhancing the quality of life for Oklahomans by managing and improving the state's water resources to ensure clean and reliable water supplies, a strong economy, and a safe and healthy environment.

Financial Assistance Program Update

Loans & Grants Approved as of March 31, 2016

FA Loans—368 totaling $958,885,000
The OWRB's Financial Assistance Program (FAP), created by the State Legislature in 1979, provides loans for water and wastewater system improvements in Oklahoma. The tremendous popularity of the bond loan program is due, in part, to extended payoff periods of up to 30 years at very competitive interest rates.

CWSRF Loans—294 totaling $1,338,731,092
The Clean Water State Revolving Fund (CWSRF) loan program was created in 1988 to provide a renewable financing source for communities to use for their wastewater infrastructure needs. The CWSRF program is Oklahoma's largest self-supporting wastewater financing effort, providing low-interest loans to communities in need.

DWSRF Loans—179 totaling $ 1,014,228,300
The Drinking Water State Revolving Fund (DWSRF) loan program is an initiative of the OWRB and ODEQ to assist municipalities and rural water districts in the construction and improvement of drinking water systems. These projects are often mandated for communities to obtain compliance with increasingly stringent federal standards related to the treatment of drinking water.

REAP Grants—652 totaling $57,713,636
The Rural Economic Action Plan (REAP) Program was created by the State Legislature in 1996. REAP grants, used for water/wastewater system improvements, primarily target rural communities with populations of 7,000 or less, but priority is afforded to those with fewer than 1,750 inhabitants.

Emergency Grants—570 totaling $33,918,163
Emergency grants, limited to $100,000, are awarded to correct situations constituting a threat to life, health, or property and are an indispensable component of the agency's financial assistance strategy.

Drought Response Program Grants—10 totaling $1,543,848
Through the OWRB's Drought Response Program, funding is available for communities in most dire need during state drought emergencies declared by the Governor. A maximum of $300,000 is diverted from existing OWRB Emergency Grant proceeds to fund the Program.

Water for 2060 Grants—4 totaling $1,500,000
Through the Water for 2060 Grant Program, funding is available for municipalities, counties, water/sewer districts and other public entities for projects that highlight the responsible use of water.

Total Loans/Grants Approved: 2,077 totaling $3,406,520,040
Estimated Savings: $1,161,269,483
Applicants eligible for water/wastewater project financial assistance vary according to the specific program's purpose and requirements, but include towns and other municipalities with proper legal authority, various districts established under Title 82 of Oklahoma Statutes (rural water, master/water conservancy, rural sewage, and irrigation districts), counties, public works authorities, and/or school districts. Applications for agency financial assistance programs are evaluated individually by agency staff. Those meeting specific program requirements are recommended by staff for approval at monthly meetings of the nine-member Water Board. ***For more information, call (405) 530-8800 or go to www.owrb.ok.gov/financing.***

OKLAHOMA Water News

1st Quarter, 2016

The Oklahoma Water News *is published quarterly by the Oklahoma Water Resources Board as authorized by J.D. Strong, Executive Director. Eighty-eight hundred copies of this issue have been printed by University Printing Services at an approximate cost of 32 cents each. Copies have been deposited at the Publications Clearinghouse of the Oklahoma Department of Libraries.*

The Water News *is available online at www.owrb.ok.gov. Follow us on twitter @OKWaterBoard for publication notification. If you no longer wish to receive a copy by mail, or have comments or article submissions, please contact Darla Whitley, Editor, at pubinfo@owrb.ok.gov or (405) 530-8800.*

OKLAHOMA
Water News
2nd Quarter 2016

Inside

Planning Software Provides Support for Infrastructure Investment Decisions

The OWRB's Financial Assistance Division has launched the Oklahoma Advantages Assessment and Scoring for Infrastructure Solutions (OASIS) planning tool and is introducing it to Oklahoma communities. The tool was created to quantify the environmental, social, and economic benefits of wastewater infrastructure investment. As information about potential wastewater projects is entered into OASIS, the tool generates customized summaries of the benefits that could be achieved by project implementation. These summaries contain cost-benefit information for a variety of scenarios, providing invaluable assistance to community leaders who are considering multiple options to meet their wastewater system's short and long-term goals.

OWRB staff meet with officials from the City of Altus to explain the benefits of using OASIS, a new planning software designed to provide customized summaries of the environmental, economic, and social benefits associated with wastewater system investments.

Projects that can be analyzed by the OASIS tool include wastewater treatment system upgrades and expansion, stormwater management, and nonpoint source pollution control. These types of projects often involve unseen infrastructure, making it difficult for officials to articulate the importance of investment to constituents. Because of this, OASIS summaries generate text that can easily be understood by the public, highlighting the impacts of the project in key areas such as economic growth, quality of life, sustainability, interest rate savings, property values, reducing health risks, and increasing recreation values, as well as the inflationary cost of delay.

The tool has been under development for the last few years through collaboration with the US Environmental Protection Agency (EPA), the University of Oklahoma (OU), and private cooperators. The project began with an intensive review of existing research to identify multiple economic, environmental, and social benefits that result from wastewater infrastructure investment. Researchers

(continued on page 2)

From the Director

Yet another session of the Oklahoma Legislature is in the books, and it's a perfect time to highlight some of the major legislative developments for water resource management and the OWRB. Those legislative highlights include the extension of the agency's use of Gross Production Tax (GPT) proceeds for critical water planning and monitoring, approval of three OWRB Rule updates related to water quality and financial assistance, approval of legislation to foster aquifer storage and recovery (ASR) efforts in Oklahoma, and a resolution to the Federal government to reform water wasting requirements within its crop insurance program.

J. D. Strong, Executive Director
Oklahoma Water Resources Board

Despite this progress, most of the legislative session focused on keeping state programs afloat in the face of significant revenue failure. Similar to many other agencies, the OWRB experienced both a reduction in our FY

(continued on page 2)

Planning Software (continued)

interviewed local officials from several communities with recently completed projects to collect real-world input on the projects' impacts in a number of areas. Interview topics included job creation, savings in facility operations, support of outdoor recreation, reduction of dangerous algal blooms and protection of wildlife, increased ability to meet present and future capacity needs, and other subjects. The data collected through these interviews were invaluable for the tool's development.

OWRB staff continue to meet with wastewater systems and local officials to demonstrate the free tool and share ways it can benefit systems and communities. The tool is also being refined for dual use as a part of the OWRB's loan application process.

OASIS promotes planning through a holistic approach, encouraging community involvement and creating a livable community through water efficiency, energy efficiency, and the protection of natural resources.

For more information, contact the OWRB's Financial Assistance Division or visit **www.owrb.ok.gov/oasis**.

Current and past issues of the *Oklahoma Water News* are also available on the OWRB website at www.owrb.ok.gov/waternews.

Want to help us cut printing and mailing costs? Sign up to receive your *Oklahoma Water News* via email!

Email GO DIGITAL to pubinfo@owrb.ok.gov and include your name & address.

OWRB Welcomes New Administrative Services Division Chief

In May, the OWRB welcomed Cleve Pierce as the new Administrative Services Division Chief. Pierce will be responsible for coordinating the agency's budget and managing staff involved with purchasing, human resources, geographic information systems, public information, and information technology.

Pierce has worked for the State of Oklahoma since 1999. He formerly served as the director of finance and interim director of administration at the Corporation Commission, budget analyst and auditor at the Department of Tourism, and business manager at the Department of Corrections.

From the Director (continued)

2016 funding, as well as two additional mid-year reductions, resulting in about 12% less funding than we had to work with in FY 2015. Additional budget cuts for FY 2017 will add another 5% to that deficit, making it extremely challenging to maintain our mission to ensure reliable water supplies for Oklahomans facing the droughts to come. Despite this unfortunate reality, each of our agency's divisions have done an admirable job reallocating both staff and resources to make certain that we are accomplishing the OWRB's core missions and critical priorities found in the 2012 Update of the Oklahoma Comprehensive Water Plan (OCWP).

Fortunately, with passage of HB 2623, the OWRB's authorization to use GPT revenues was extended through 2019 by the Legislature and Governor. These GPT funds have been the lynchpin in our ability to implement a multitude of OCWP priority recommendations. Both the Governor and Legislative leadership recognized the importance of continuing this work on vital water infrastructure, critically needed water supply studies, expanded groundwater monitoring, and more.

By session's end, the OWRB also received approval for our proposed updates to Chapters 45, 46, and 50 of our agency Rules. The approved changes include several technical updates to Oklahoma's Water Quality Standards, mostly focused on laying the regulatory groundwork for expanding water reuse projects in the state. The other amendments were administrative updates to the agency's REAP grant program, which provides smaller, rural communities and water districts critical funding for water infrastructure improvements.

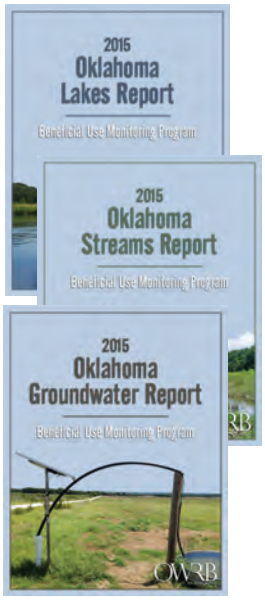
In our last newsletter, I highlighted the passage of SB 1219, which authorizes the OWRB and Oklahoma Department of Environmental Quality (ODEQ) to establish a process for Oklahoma citizens or communities to construct ASR projects. I believe that ASR will be an important factor in helping us secure water and better drought-proof our communities for decades to come. I am happy to report a working group of interested stakeholders will be launched soon to gain valuable input as we build the state's ASR program. Early this summer, several OWRB and ODEQ personnel toured an ASR project operated by Wichita, KS to gather further insight into the size and scope of these projects.

Legislators also showed their support for the recommendations recently released by the state's Water for 2060 Advisory Council by passing Senate Concurrent Resolution 33. Heeding the advice of the Council, SCR 33 urges the Federal government to reform its crop insurance rules and practices that cause producers to waste water on obviously failed crops. As the Council solicited input from Oklahomans on ways to improve water conservation and meet the Water for 2060 goal of consuming no more fresh water in 2060 than was consumed in 2012, agriculture producers frequently cited these Federal crop insurance requirements as a major source of waste.

I'm excited to announce that we have finalized the dates and location for the 37th Annual Governor's Water Conference and Research Symposium. This year's conference will be held October 11-12 at the Embassy Suites Convention Center Hotel in Norman, OK. Already, we are booking an exciting lineup of speakers and looking forward to another great conference with our fellow Oklahomans.

BUMP Reports Provide Water Quality Data for 2015

The Oklahoma Water Resources Board's 2015 Beneficial Use Monitoring Program (BUMP) annual reports of statewide water quality data for lakes, streams, and groundwater are now available online at **www.owrb.ok.gov/BUMP**.



The BUMP Lakes and Streams reports feature summaries of physical, chemical, and biological data obtained through sampling at approximately 130 lakes and 84 stream sites throughout the state, including an assessment of beneficial use impairments or threats for each site. The online version contains summary pages listed by stream site or lake site with links to downloadable data. Agency monitoring staff sample rivers in the network annually and lakes on a three-year rotation.

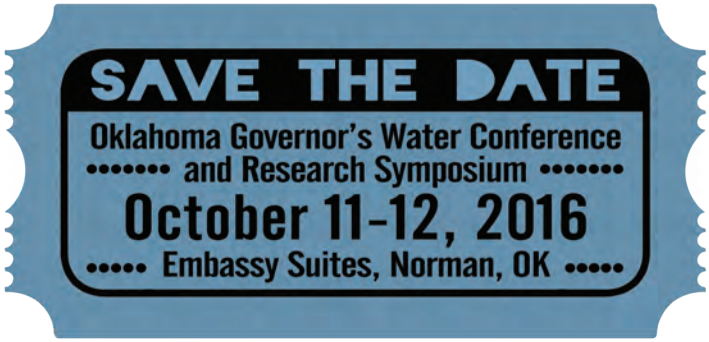
Data gathered in the 2014-2015 sample year indicate that the major water quality concerns of Oklahoma lakes continue to be excess nutrients and turbidity. Data also indicate that 16% of the lakes sampled in 2015 were "hyper-eutrophic," which means they contain an excessive amount of nutrients that could lead to taste and odor problems (see map on page 4). In improving order of quality, about 59% of lakes sampled in 2015 were considered eutrophic, 22% were mesotrophic, and 3% were oligotrophic (waters relatively low in nutrients).

Jet Stine collects a BUMP water sample from Skiatook lake.

The vast majority of streams sampled within the past year were suitable for uses related to public and private water supply. The Fish and Wildlife Propagation beneficial use was mainly affected by high inorganic turbidity and elevated metals levels. Inorganic turbidity is typically caused by sediments from runoff. Bacteria levels were the major concern for recreation that involves primary and secondary body contact with the water. A small number of sampled streams had problems associated with dissolved solids (chlorides and sulfates), which limits their suitability for irrigation.

The Groundwater Report contains summaries of aquifers sampled through the Groundwater Mapping and Assessment

(continued on page 4)



Water Returns to the Beaver River

The Beaver River BUMP site near Beaver, OK, was scheduled for 7 site visits by OWRB staff during 2015. For almost all the visits, the site was either completely dry or had pools of water but no flow. Finally, by the November visit, the river was flowing again.

By May of 2016, scientists were able to collect biological samples, including four fish species (pictured below).

The total number of species and percent of tolerant/intolerant species of both fish and aquatic insects is an important indicator of health of the stream and helps determine if it supports the fish and wildlife propagation beneficial use.

Every two years, support status for all beneficial uses are reviewed for BUMP sites and recommendations are made for the state's 303d list of impaired waters.

During spring and summer sampling in 2015, the Beaver River site at Beaver was either dry (top) or contained isolated pools of water but no flow (middle). By November, the river was flowing again, and by May 2016 (bottom), several fish species had returned.

Four fish species were collected in May of 2016 (shown clockwise from upper left): plains killfish, western mosquito fish, common carp, and green sunfish.

BUMP Reports (continued)

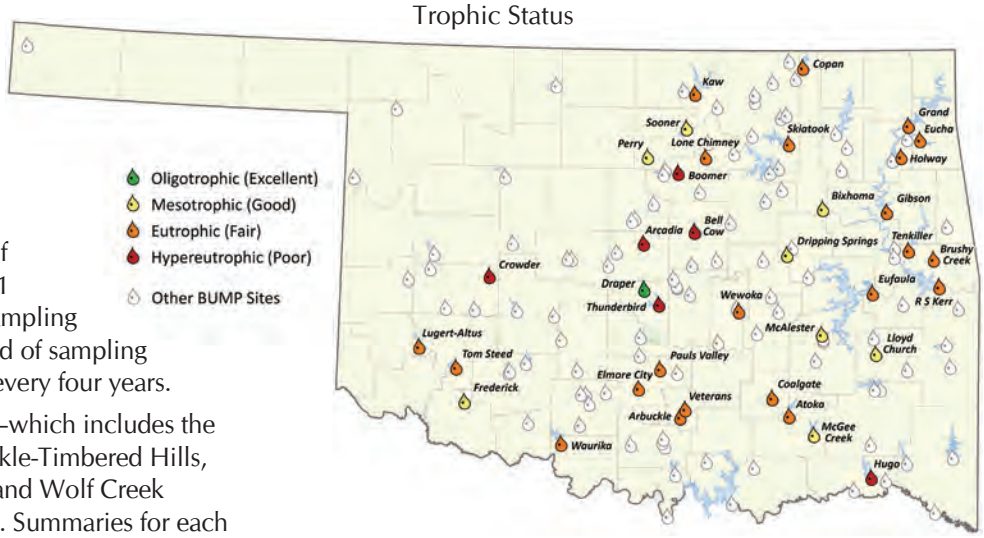
Program (GMAP). The summaries show nutrient, mineral, and metal statistics as well as general parameters, such as depth to water, alkalinity, hardness, and total dissolved solids (TDS). GMAP was established in 2013 as the state's first comprehensive groundwater quality and quantity monitoring program. A network of approximately 750 wells in Oklahoma's 21 major aquifers will be sampled by 2017 sampling 5-6 aquifers each year. After this first round of sampling is complete each aquifer will be sampled every four years.

Data from phase three of GMAP sampling–which includes the Antlers outcrop, Arbuckle-Simpson, Arbuckle-Timbered Hills, Blaine, North Canadian River, Red River, and Wolf Creek aquifers–is highlighted in this year's report. Summaries for each aquifer in the GMAP network give an overview of the aquifer's geology and focus on water quality constituents that are of primary concern. Groundwater level hydrographs show average depth to water over the longest period of record.

Data provided by the program will play an important role managing state water resources. It is estimated that Oklahoma's aquifers store approximately 386 million acre-feet of groundwater, which supplies thousands of municipalities, rural water districts, industrial facilities, and agricultural operations.

Lakes Sampled by BUMP in 2015

Trophic Status



Trophic status of lakes sampled by BUMP in 2015. Trophic status is a measure of biological productivity, a major determinant of water quality. Excessive levels of nutrients can lead to low dissolved oxygen and algal growth, which can cause taste and odor problems.

"Oligotrophic" lakes have low primary productivity and/or low nutrient levels, "mesotrophic" lakes have moderate primary productivity and nutrient levels, "eutrophic" lakes have high primary productivity and nutrient levels, and "hypereutrophic" lakes have excessive primary productivity and nutrient levels.

Status of Water Quality Monitoring in Oklahoma

Water quality monitoring activities are conducted across the state for various reasons, including the identification of pollution sources, regulatory compliance, and determining the effectiveness of Best Management Practices (BMPs).

The OWRB water quality division has developed and published the latest "Status of Water Quality Monitoring in Oklahoma: Surface Water Monitoring Strategy Document (2015-16)." The report provides a synopsis of current statewide water monitoring, including summaries of activities performed by each state and federal monitoring agency. Additionally, the report serves as a tool for the coordination of future monitoring activities by recommending modifications or improvements to water quality monitoring initiatives.

Numerous environmental agencies, including the Oklahoma Conservation Commission, Oklahoma Department of Environmental Quality, and OWRB, now collect water quality data to identify baseline conditions across Oklahoma. However, a lack of historical baseline information still exists for many state waters. This information is absolutely essential for the identification of "abnormal" water quality conditions.

The status report underscores the importance of focusing resources in areas where adverse water quality impacts are greatest or where our most outstanding water resources are threatened. Further improvements to statewide monitoring efforts are emphasized to ensure that the best available data is collected to assist decision makers in managing, protecting, and improving Oklahoma's water resources. The following recommendations were highlighted:

The report underscores the importance of focusing resources in areas where adverse water quality impacts are greatest or where our most outstanding water resources are threatened.

- Monitoring additional Oklahoma rivers and stream segments;
- Expansion of biological monitoring in Oklahoma lakes to enhance use support determinations;
- Development of new Use Support Assessment Protocols (USAP) and refinement of new protocols;
- Expansion of diurnal dissolved oxygen monitoring;
- Expansion of ambient sampling for metals and organics; and
- Enhanced partnerships between state and federal agencies.

The report is available for download at **www.owrb.ok.gov/quality/monitoring/StatusReport.pdf**.

INVESTING IN WATER-SMART LANDSCAPING

Judging by our water use and consumption practices, many Americans take water for granted. More and more individuals are demonstrating their water smarts indoors by retrofitting their homes with WaterSense-labeled products. But outdoors, especially in the summer, the amount of water a household uses can exceed the amount used for all other purposes in an entire year. Gardening and lawn care account for the majority of this seasonal increase. Of the estimated 29 billion gallons of water used daily by households in the U.S. more than 8.5 billion, or 30 percent, is devoted to outdoor water use.

ABOUT 30% OF ALL HOUSEHOLD WATER USE IN THE U.S. OCCURS OUTDOORS.

KEY STEPS FOR SAVING WATER OUTSIDE

TIMING IS EVERYTHING. Know how much water your landscape actually needs before you set your sprinkler. Your local water utility can offer recommendations and best times to water.

LOOK FOR THE LABEL. WaterSense-labeled irrigation controllers use local weather data to water only when needed. If your system uses a clock timer, consider upgrading to this smart technology.

GO WITH A PRO. Contractors certified through a WaterSense-labeled program can audit, install, or maintain your system to ensure water isn't wasted. Ask for credentials!

CONSERVE AND PROTECT. Mulching helps conserve and extend available water, protects the soil from erosion, reduces competition by suppressing weeds, and moderates temperature extremes.

MULCHING BASICS

Mulch is simply a protective layer of a material that is spread on top of the soil. Mulches can either be organic, such as grass clippings, straw, bark chips, and similar materials, or inorganic, such as stones, brick chips, and plastic. Both organic and inorganic mulches have numerous benefits. Understanding when, what type, and how much mulch to spread is critical.

Match plants to mulch type. Some drought-tolerant plants do not tolerate moist soils. Avoid using organic mulching with these plants. Gravel and shell mulches increase heat around plants potentially causing stress conditions. Other common mistakes include applying a mulch layer that is too thick and mounding a mulch "volcano" around shrub and tree trunks. Overmulching with more than about 3 to 4 inches of organic mulch can cause a variety of problems.

PROBLEMS CREATED BY OVERMULCHING

- Overmulching can create an anaerobic (low or no oxygen) environment that allows fungal diseases to develop in plant stems and roots (some are toxic to humans).
- Mulching too early in the spring can create water-logged soils that may kill drought-tolerant plants.
- In the fall, mulch applied too deeply can create a home for rodents which may feed on plant stems and trunks throughout the winter.
- Roots may grow into the mulch and not the soil.
- Slugs and other insects may colonize thick mulch.
- Thick layers of sawdust and grass clippings compact easily and may prevent water from penetrating the soil.

WATER FOR 2060
EFFICIENCY • CONSERVATION • RECYCLING • REUSE

GENERAL RULES OF THUMB FOR APPLYING MULCH

- Do not exceed about 3 inches in depth depending on type (coarse organic mulch can be applied more thickly than fine mulch).
- Avoid compacting fine organic mulches.
- Avoid applying organic mulch too early in the spring or fall.
- Inorganic mulches should be used with appropriate designs such as xeriscape, rock gardens, and Japanese gardens.
- Place mulch a few inches away from the base of plants, not mounded up around it (particularly trees).

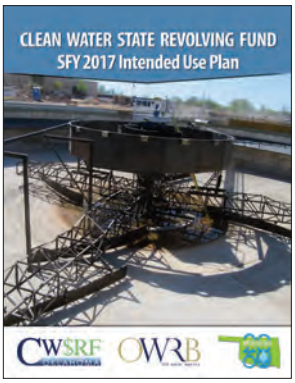
By following some simple rules, mulch can be an effective way to conserve water, add organic matter to the soil, and keep annual weeds from germinating.

Sources: USDA, USEPA

TAKING THE GUESSWORK OUT OF WATERING

WaterSense-labeled irrigation controllers are a type of "smart" irrigation control technology that uses local weather data to determine whether your sprinkler system needs to turn on. With proper installation, programming, and adjustments, these controllers can help consumers save water, time, and money when compared to use of a conventional controller.

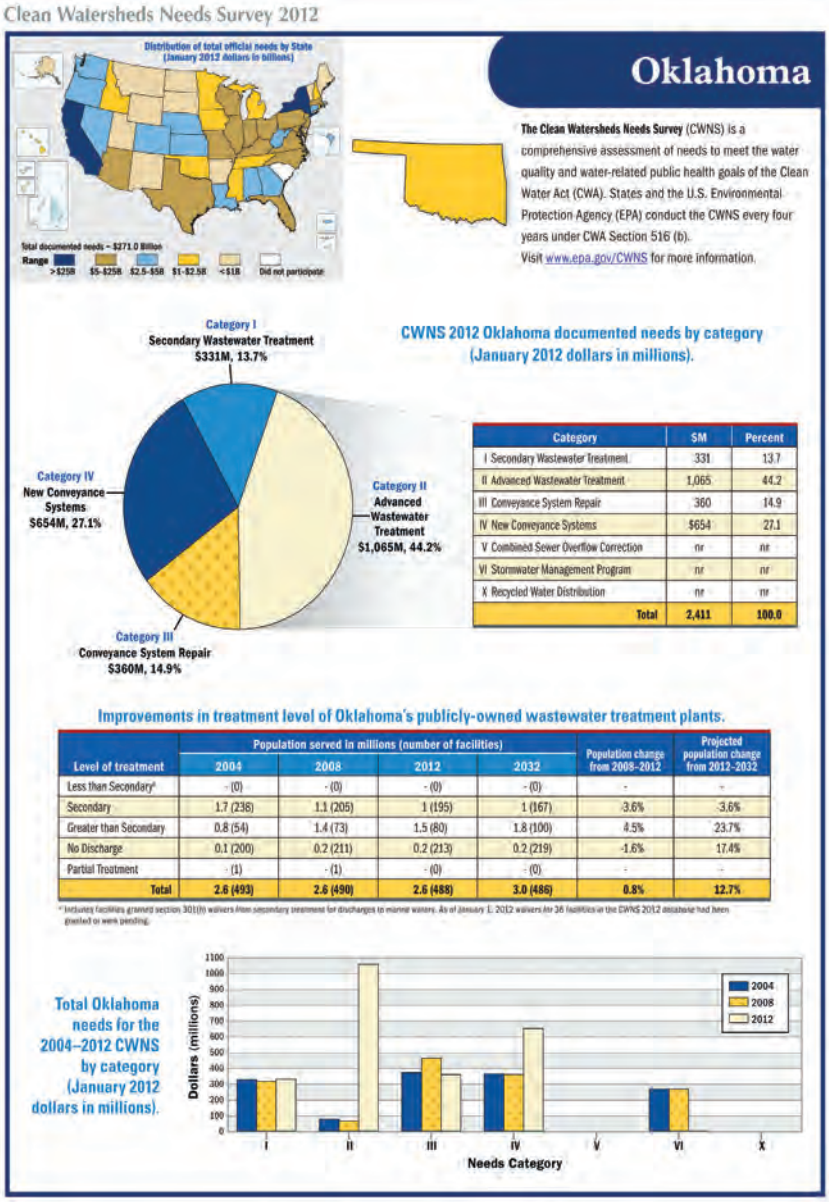
CWSRF Intended Use Plan Now Available Online



The OWRB's Clean Water State Revolving Fund (CWSRF) 2017 Intended Use Plan (IUP) is now available online at **www.owrb.ok.gov/CWSRF**. As administrator of the Clean Water State Revolving Fund, the OWRB develops the IUP annually for the Environmental Protection Agency (EPA) in accordance with requirements of the Clean Water Act. Loans provided by the CWSRF program are used for the construction of wastewater infrastructure improvements, green infrastructure projects, water efficiency projects, non-point source projects, stormwater activities, subsurface remediation, planning and design, refinancing of eligible existing debt, and many other projects.

According to the report, during 2017 the OWRB will continue to play a significant role in helping finance solutions identified in the Water for 2060 Advisory Council's final report for recommendations for encouraging efficient water use across all of Oklahoma's major water use sectors. Additionally, the OWRB will continue to provide public education and outreach to encourage conservation, reuse, sustainability, planning, conservation pricing, consolidation, and system cooperation while accomplishing sound financing and unparalleled environmental protection.

Since 1983, the OWRB has provided approximately 65% of all the financing for Oklahoma's water and wastewater infrastructure needs. To date, the agency has funded over $3.4 billion in projects with its loan and grant programs which in turn have led to savings of over $1 billion for Oklahoma communities and rural districts.



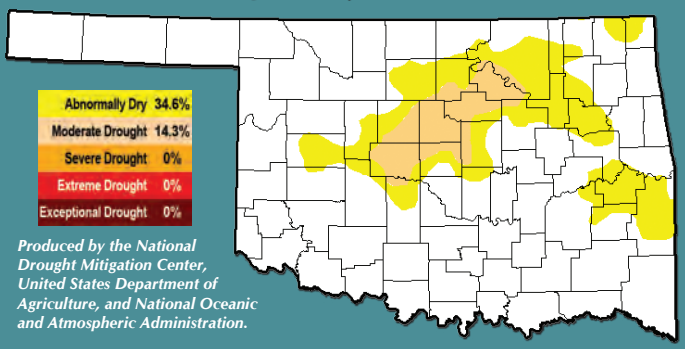
Category	$M	Percent
I Secondary Wastewater Treatment	331	13.7
II Advanced Wastewater Treatment	1,065	44.2
III Conveyance System Repair	360	14.9
IV New Conveyance Systems	$654	27.1
V Combined Sewer Overflow Correction	nr	nr
VI Stormwater Management Program	nr	nr
X Recycled Water Distribution	nr	nr
Total	2,411	100.0

Level of treatment	Population served in millions (number of facilities) 2004	2008	2012	2032	Population change from 2008-2012	Projected population change from 2012-2032
Less than Secondary[a]	- (0)	- (0)	- (0)	- (0)	-	-
Secondary	1.7 (238)	1.1 (205)	1 (195)	1 (167)	-3.6%	-3.6%
Greater than Secondary	0.8 (54)	1.4 (73)	1.5 (80)	1.8 (100)	4.5%	23.7%
No Discharge	0.1 (200)	0.2 (211)	0.2 (213)	0.2 (219)	-1.6%	17.4%
Partial Treatment	- (1)	- (1)	- (0)	- (0)	-	-
Total	2.6 (493)	2.6 (490)	2.6 (488)	3.0 (486)	0.8%	12.7%

The Clean Water Needs Survey (CWNS) of 2012, an assessment of capital investment needed nationwide for publicly-owned wastewater collection and treatment facilities to meet the water quality goals of the Clean Water Act, was finalized in January of 2016, documenting a $2.4 billion need in Oklahoma. The OWRB Financial Assistance team is dedicated to helping communities meet this need, while focusing on new challenges set forth by the state goals of the Water for 2060 Act and the new eligibilities that came out of the Water Resources Reform and Development Act (WRRDA) of 2014.

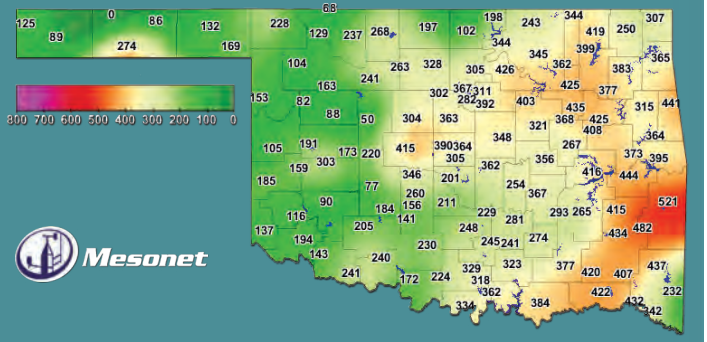
Drought Update

U.S. Drought Monitor
June 28, 2016

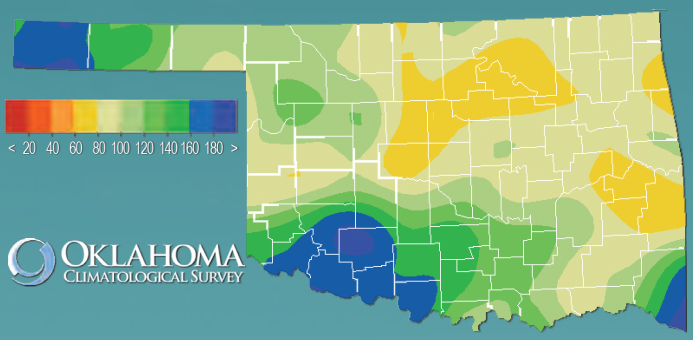


Produced by the National Drought Mitigation Center, United States Department of Agriculture, and National Oceanic and Atmospheric Administration.

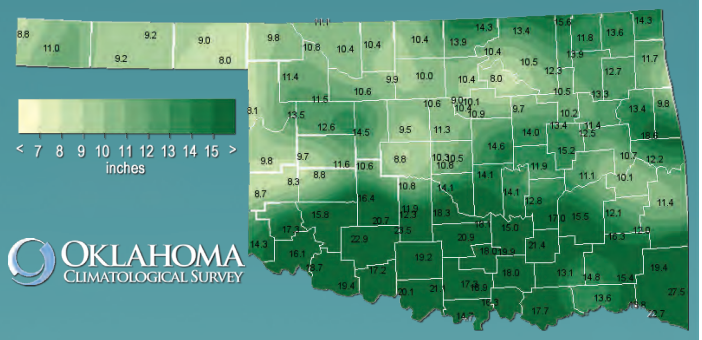
Keetch-Byram Drought Index
June 30, 2016



Percent of Normal* Precipitation
Last 90 Days (Apr. 1, 2016 - Jun. 29, 2016)

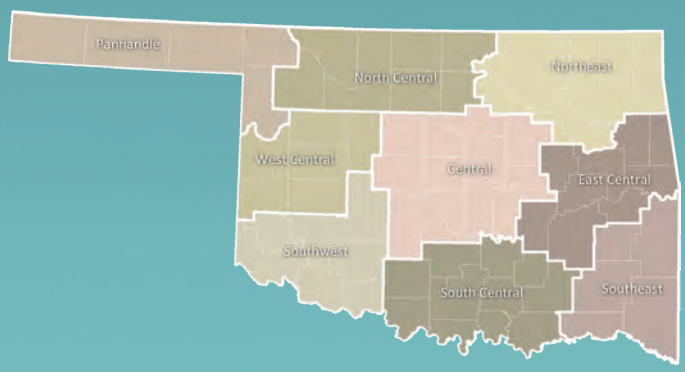


Total Precipitation
Last 90 Days (Apr. 1, 2016 - Jun. 29, 2016)



Rainfall Summaries by Climate Division
Last 90 Days (Apr. 1, 2016 - Jun. 29, 2016)

Climate Division	Total Rainfall	Departure from Normal	Driest on Record	Wettest on Record
Panhandle	9.15"	+1.80"	2.44" (2011)	14.46" (2015)
N. Central	11.15"	-0.45"	4.22" (1933)	27.01" (1957)
Northeast	12.11"	-2.64"	5.65" (1963)	31.13" (1957)
W. Central	10.84"	+0.37"	3.69" (1933)	20.97" (2015)
Central	12.25"	-0.98"	7.14" (1931)	28.79" (1957)
E. Central	13.25"	-1.42"	4.66" (1936)	31.66" (2015)
Southwest	17.21"	+6.32"	3.96" (1998)	25.00" (2015)
S. Central	18.10"	+4.33"	5.11" (1931)	35.21" (2015)
Southeast	16.56"	+1.34"	6.35" (1936)	29.78" (1935)
Statewide	13.32"	+0.85"	6.97" (1998)	25.38" (1957)



Developed by the OWRB. Data provided by the US Army Corps of Engineers and US Bureau of Reclamation.

For more drought information visit **www.drought.ok.gov**.

Oklahoma Water News
Oklahoma Water Resources Board
3800 N. Classen Blvd.
Oklahoma City, OK 73118

www.owrb.ok.gov

STANDARD PRESORTED
U.S. POSTAGE
PAID
Oklahoma City, OK
Permit No. 310

Protecting and enhancing the quality of life for Oklahomans by managing and improving the state's water resources to ensure clean and reliable water supplies, a strong economy, and a safe and healthy environment.

Financial Assistance Program Update

Loans & Grants Approved as of June 30, 2016

FA Loans—368 totaling $958,885,000
The OWRB's Financial Assistance Program (FAP), created by the State Legislature in 1979, provides loans for water and wastewater system improvements in Oklahoma. The tremendous popularity of the bond loan program is due, in part, to extended payoff periods of up to 30 years at very competitive interest rates.

CWSRF Loans—295 totaling $1,345,297,392
The Clean Water State Revolving Fund (CWSRF) loan program was created in 1988 to provide a renewable financing source for communities to use for their wastewater infrastructure needs. The CWSRF program is Oklahoma's largest self-supporting wastewater financing effort, providing low-interest loans to communities in need.

DWSRF Loans—180 totaling $1,044,128,300
The Drinking Water State Revolving Fund (DWSRF) loan program is an initiative of the OWRB and ODEQ to assist municipalities and rural water districts in the construction and improvement of drinking water systems. These projects are often mandated for communities to obtain compliance with increasingly stringent federal standards related to the treatment of drinking water.

REAP Grants—656 totaling $58,043,834
The Rural Economic Action Plan (REAP) Program was created by the State Legislature in 1996. REAP grants, used for water/wastewater system improvements, primarily target rural communities with populations of 7,000 or less, but priority is afforded to those with fewer than 1,750 inhabitants.

Emergency Grants—571 totaling $33,957,413
Emergency grants, limited to $100,000, are awarded to correct situations constituting a threat to life, health, or property and are an indispensable component of the agency's financial assistance strategy.

Drought Relief Program Grants—10 totaling $1,543,848
Through the OWRB's Drought Response Program, funding is available for communities in most dire need during state drought emergencies declared by the Governor. A maximum of $300,000 is diverted from existing OWRB Emergency Grant proceeds to fund the Program.

Water for 2060 Grants—4 totaling $1,500,000
Through the Water for 2060 Grant Program, funding is available for municipalities, counties, water/sewer districts and other public entities for projects that highlight the responsible use of water.

Total Loans/Grants Approved: 2,084 totaling $3,443,489,488
Estimated Savings: $1,172,914,490
Applicants eligible for water/wastewater project financial assistance vary according to the specific program's purpose and requirements, but include towns and other municipalities with proper legal authority, various districts established under Title 82 of Oklahoma Statutes (rural water, master/water conservancy, rural sewage, and irrigation districts), counties, public works authorities, and/or school districts. Applications for agency financial assistance programs are evaluated individually by agency staff. Those meeting specific program requirements are recommended by staff for approval at monthly meetings of the nine-member Water Board. ***For more information, call (405) 530-8800 or go to www.owrb.ok.gov/financing.***

OKLAHOMA Water News

2nd Quarter, 2016

The Oklahoma Water News *is published quarterly by the Oklahoma Water Resources Board as authorized by J.D. Strong, Executive Director. Eighty-eight hundred copies of this issue have been printed by University Printing Services at an approximate cost of 32 cents each. Copies have been deposited at the Publications Clearinghouse of the Oklahoma Department of Libraries.*

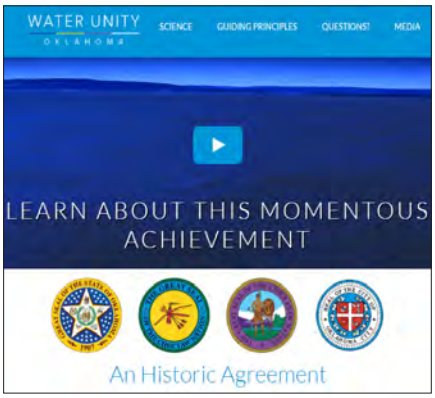
The Water News *is available online at www.owrb.ok.gov. Follow us on twitter @OKWaterBoard for publication notification. If you no longer wish to receive a copy by mail, or have comments or article submissions, please contact Darla Whitley, Editor, at pubinfo@owrb.ok.gov or (405) 530-8800.*

OKLAHOMA
Water News
3rd Quarter 2016

Inside

Historic Water Agreement Reached

On August 11, the Chickasaw and Choctaw Nations, the State of Oklahoma and the City of Oklahoma City announced that they have reached a water rights settlement, which will be presented to Congress for final approval.



For more information, visit www.waterunityok.com.

When finalized, the settlement will resolve long-standing questions over water rights ownership and regulatory authority over the waters of the Choctaw and Chickasaw Nations' historic treaty territories, an area that spans approximately 22 counties in south-central and southeastern Oklahoma. The agreement provides a framework that fosters intergovernmental collaboration on significant water resource concerns within the Settlement Area, while protecting existing water rights and affirming the State's role in water rights permitting and administration. Additionally, the agreement will implement restrictions to allow Oklahoma City's measured use of Sardis Lake for municipal supply purposes while continuing to support regionally critical recreation, fish and wildlife uses.

For decades there has been legal uncertainty in the Settlement Area regarding water rights and regulatory authority arising from unresolved questions of federal law and tribal rights. These uncertainties have contributed to long-running conflicts over Sardis Lake and the Kiamichi Basin in southeastern Oklahoma, resulting in multiple court actions. Once finalized, the settlement will end ongoing litigation including a federal lawsuit the Nations filed against the State of Oklahoma and the City of Oklahoma City with regard to Sardis Lake and other waters of the historic treaty territory and a second lawsuit the State filed to adjudicate water rights in the Kiamichi, the Muddy Boggy, and the Clear Boggy watersheds. By reaching this settlement, the parties avoid decades of litigation and associated expenses and uncertainty for the State, the Nations, Oklahoma City and property owners throughout the Settlement Area.

(continued on page 2)

From the Director

Greek philosopher Heraclitus is credited for saying, "change is the only constant in life." What a brilliantly simple, yet relentlessly true, declaration. And so it is that change comes to the Oklahoma Water Resources Board, just as it has over the 59 years of this agency's existence. In fact, change is the only thing that has allowed the OWRB to remain relevant and successful in serving the great citizens of this state.

J. D. Strong, Executive Director
Oklahoma Water Resources Board

When I joined the OWRB family as a summer "temp" in 1993, I knew this was a special place. Sure, the agency was loaded with highly educated professionals that performed top-notch work in their respective fields, but what I quickly came to realize was the sense of pride everyone took in their work, the strong passion everyone had to serve the public, and the genuine concern everyone had for their co-workers. The OWRB was,

(continued on page 2)

Historic Water Agreement Reached (continued)

Under the terms of the agreement, the Choctaw and Chickasaw Nations may participate in technical evaluations of any proposals to transfer significant amounts of water out of the basins within the Settlement Area. The agreement also formalizes protections for the current and future water needs of communities throughout the region, ensuring adequate water for south-central and southeastern Oklahoma and enhancing stewardship of water resources both for future consumptive use within the region as well as protecting lake levels and stream flows on which the vibrant tourism industry relies.

The agreement achieves the State's goals of affirming the OWRB's role in water rights administration, allowing for an orderly system of water allocation and administration. Additionally, the agreement resolves the outstanding debt associated with Sardis Lake and provides vital water supply to local water users and to Oklahoma City, while at the same time protecting recreational uses...

The agreement also establishes the legal security of Oklahoma City's water supplies and gives it access to water for its future needs. Oklahoma City's releases from Sardis Lake will be governed by a system of restrictions based on the Oklahoma Department of Wildlife Conservation's lake level management plan, which is designed to protect fishing and recreational resources. Oklahoma City will also gain access to the Kiamichi River dependent upon lake level release and minimum stream flow restrictions intended to protect the environment and recreational uses.

The agreement achieves the State's goals of affirming the OWRB's role in water rights administration, allowing for an orderly system of water allocation and administration. Additionally, the agreement resolves the outstanding debt associated with Sardis Lake and provides vital water supply to local water users and to Oklahoma City while protecting recreational uses and the reservoir's trophy bass fishery.

Existing water rights will not be affected by the agreement, and the agreement does not authorize out-of-state use or diversion of water, which remains unlawful absent of State legislative approval. The settlement calls for a commission to evaluate the impacts of future proposals for out-of-state water use or diversion, which would remain subject to State legislative authorization. Should the Oklahoma Legislature ever approve such a proposal, the agreement ensures that any proceeds would be devoted to meeting water and wastewater infrastructure needs, particularly in southeastern and southcentral Oklahoma.

Even though the agreement has been signed by the State, Nations, and Oklahoma City, it also must be approved by federal legislation and executed by the Secretary of the United States Department of the Interior. The parties are now working with the Oklahoma congressional delegation to secure appropriate legislation.

For additional information, visit **www.WaterUnityOK.com**.

From the Director (continued)

and still is, a special place, not just because of its amazing accomplishments, but mostly because of the goodness at its core. If it's possible for an agency to have a big heart, this is it.

Perhaps it was forged from the fire that was the Murrah Building bombing in 1995, which took the lives of two amazing OWRB employees and injured so many others. The OWRB heart could have beat strongly before that, but I definitely took note of it in my second year on the job when this horrific disaster struck. Like all Oklahomans that banded together and demonstrated to the world what became known as the "Oklahoma Standard," OWRB employees rallied around each other to lick their wounds, honor their fallen comrades, and pick each other back up in what I witnessed as a phoenix-like rebirth. It definitely was a time of significant change, yet also a catapult for monumental achievement in the ensuing years.

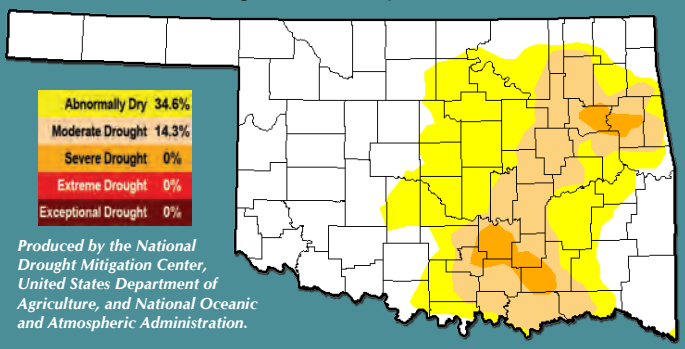
Fast forward to 2010 – the year this once minimum-wage-earning summer "temp" from western Oklahoma had the honor of being hired to serve as OWRB director. At that time, the agency was in the throes of wrapping up what has become a nationally-renowned comprehensive water plan and taking drastic measures to resolve a court judgment to pay debts owed to the Federal government for construction of Sardis Lake. The former ultimately resulted in the 2012 Update of the Oklahoma Comprehensive Water Plan that now serves as a blueprint for securing Oklahoma's water future through at least 2060, and the latter resulted in litigation with the Choctaw Nation, Chickasaw Nation and Oklahoma City. In just six short years, both have resulted in monumental accomplishments and major mile-markers in Oklahoma's water history.

The Water Plan led to landmark legislation and activity beginning in 2012 that not only guides the OWRB's actions today, but also serves as a launching pad for citizens with the pioneering spirit to drought-proof their communities. That year, Oklahoma citizens passed a constitutional amendment that enables the OWRB to continue providing financial assistance for critical water infrastructure for at least the next 50 years. The Legislature also passed the Water for 2060 Act, which established an ambitious goal of consuming no more fresh water in 2060 than was used in 2010, yet placed an emphasis on meeting our young state's growing demands for water through better efforts at conservation, reuse, alternative water sources, and other efficiency measures. The Water Plan also helped spawn a number of regional long-term water planning initiatives, three of which have completed plans today. The list goes on-and-on, but suffice it to say that Oklahoma's water future is on much better footing thanks to the phenomenal Water Plan developed by OWRB's scratch staff, numerous other agency partners, and hundreds of engaged Oklahomans.

(continued on page 4)

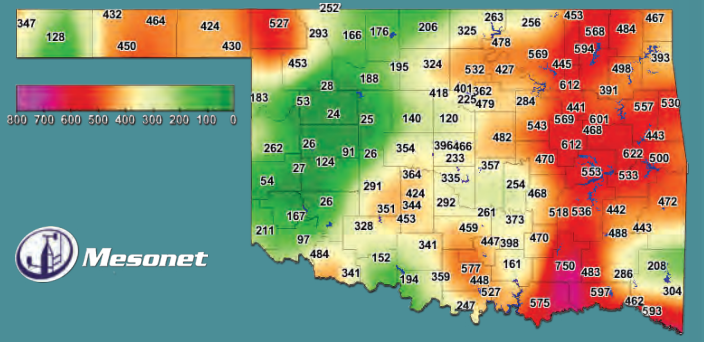
Drought Update

U.S. Drought Monitor
September 27, 2016

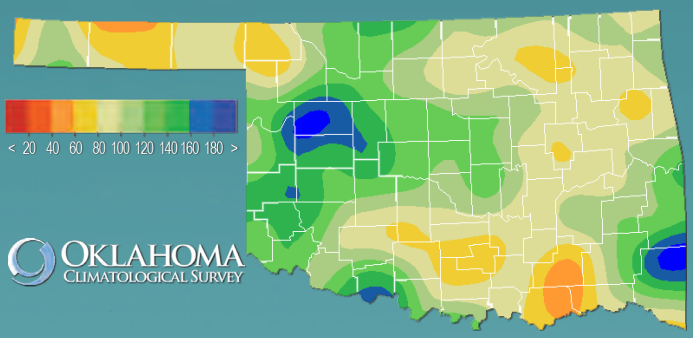


Produced by the National Drought Mitigation Center, United States Department of Agriculture, and National Oceanic and Atmospheric Administration.

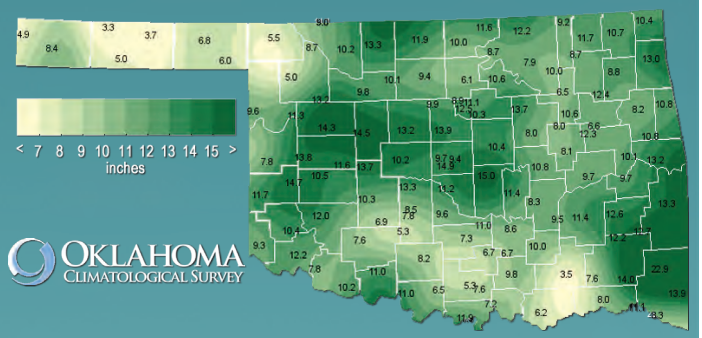
Keetch-Byram Drought Index
September 30, 2016



Percent of Normal* Precipitation
Last 90 Days (Jul. 2, 2016 - Sep. 29, 2016)

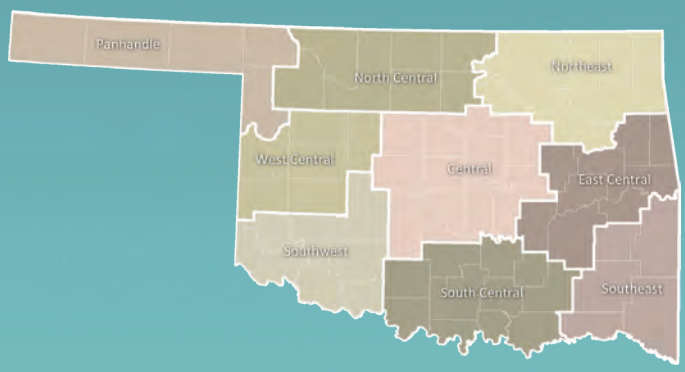


Total Precipitation
Last 90 Days (Jul. 2, 2016 - Sep. 29, 2016)



Rainfall Summaries by Climate Division
Last 90 Days (Jul. 2, 2016 - Sep. 29, 2016)

Climate Division	Total Rainfall	Departure from Normal	Driest on Record	Wettest on Record
Panhandle	5.91"	-0.97"	2.74" (2000)	16.20" (1950)
N. Central	9.87"	+1.17"	2.19" (1984)	17.79" (1996)
Northeast	9.87"	-1.08"	3.85" (1956)	21.35" (1961)
W. Central	12.25"	+4.50"	1.52" (2000)	17.46" (1996)
Central	10.83"	+1.30"	2.86" (1954)	18.66" (1996)
E. Central	10.01"	-0.83"	2.43" (1954)	19.85" (1950)
Southwest	10.13"	+2.24"	1.33" (1954)	18.13" (1996)
S. Central	7.97"	-1.15"	1.90" (1954)	19.35" (1950)
Southeast	12.42"	+1.98"	4.01" (1943)	26.02" (1950)
Statewide	9.80"	+0.65"	2.97" (1954)	17.75" (1996)



Developed by the OWRB. Data provided by the US Army Corps of Engineers and US Bureau of Reclamation.

For more drought information visit **drought.ok.gov**.

Clearly, the OWRB's action in 2010 to transfer water supply in Sardis Lake to Oklahoma City in exchange for them paying off the debt owed and ordered due by a Federal judge launched a conflict with two of our important tribal neighbors, but what ultimately resulted was a prime example of what can be accomplished when we focus on our common interest in a more prosperous Oklahoma. The recently announced Water Settlement between the State, Choctaw Nation, Chickasaw Nation and Oklahoma City is a crown jewel in Oklahoma water achievement, and there is no doubt it will serve our collective citizens well into the future. Balancing the water needs of a bustling Oklahoma City metropolitan area with the future needs of a thriving southeastern Oklahoma, including the water so critical to its unprecedented recreation and fishing opportunities, was not easy. But all parties ultimately realized it was necessary. It was in all of our best interests to strike that delicate balance. The Water Settlement is truly historic, and it will ensure that no region of Oklahoma has to sacrifice its well being for the prosperity of another region. Instead, we will help each other prosper and succeed—a goal to which every Oklahoman should aspire.

It's an understatement to say that there are a lot of amazing OWRB accomplishments left out in the interest of time. Again, what's more important than the accomplishments is the security of knowing that the OWRB passion for serving Oklahoma's citizens and helping them to accomplish their dreams continues to burn strong. It permeates the agency and each of its employees, and no amount of controversy, litigation, budget cuts, or change in leadership can extinguish it. Even though I am jumping to the Oklahoma Department of Wildlife Conservation, I am at peace knowing the OWRB's success was never about me. It has never been about one person. Our fellow Oklahomans are extremely fortunate to have nearly 100 OWRB employees that work fanatically to improve our collective standing and quality of life through sound stewardship of the public's water resources. For this, we can all be thankful and content.

The Water Settlement is truly historic, and it will ensure that no region of Oklahoma has to sacrifice its well being for the prosperity of another region. Instead, we will help each other prosper and succeed—a goal to which every Oklahoman should aspire.

Financial Assistance Program Update

Loans & Grants Approved as of September 30, 2016

FA Loans—368 totaling $958,885,000
The OWRB's Financial Assistance Program (FAP), created by the State Legislature in 1979, provides loans for water and wastewater system improvements in Oklahoma. The tremendous popularity of the bond loan program is due, in part, to extended payoff periods of up to 30 years at very competitive interest rates.

CWSRF Loans—295 totaling $1,346,077,392
The Clean Water State Revolving Fund (CWSRF) loan program was created in 1988 to provide a renewable financing source for communities to use for their wastewater infrastructure needs. The CWSRF program is Oklahoma's largest self-supporting wastewater financing effort, providing low-interest loans to communities in need.

DWSRF Loans—181 totaling $1,046,028,300
The Drinking Water State Revolving Fund (DWSRF) loan program is an initiative of the OWRB and ODEQ to assist municipalities and rural water districts in the construction and improvement of drinking water systems. These projects are often mandated for communities to obtain compliance with increasingly stringent federal standards related to the treatment of drinking water.

REAP Grants—657 totaling $58,128,834
The Rural Economic Action Plan (REAP) Program was created by the State Legislature in 1996. REAP grants, used for water/wastewater system improvements, primarily target rural communities with populations of 7,000 or less, but priority is afforded to those with fewer than 1,750 inhabitants.

Emergency Grants—572 totaling $33,990,132
Emergency grants, limited to $100,000, are awarded to correct situations constituting a threat to life, health, or property and are an indispensable component of the agency's financial assistance strategy.

Drought Relief Program Grants—10 totaling $1,543,848
Through the OWRB's Drought Response Program, funding is available for communities in most dire need during state drought emergencies declared by the Governor. A maximum of $300,000 is diverted from existing OWRB Emergency Grant proceeds to fund the Program.

Water for 2060 Grants—4 totaling $1,500,000
Through the Water for 2060 Grant Program, funding is available for municipalities, counties, water/sewer districts and other public entities for projects that highlight the responsible use of water.

Total Loans/Grants Approved: 2,087 totaling $3,446,153,506 Estimated Savings: $1,173,890,273
Applicants eligible for water/wastewater project financial assistance vary according to the specific program's purpose and requirements, but include towns and other municipalities with proper legal authority, various districts established under Title 82 of Oklahoma Statutes (rural water, master/water conservancy, rural sewage, and irrigation districts), counties, public works authorities, and/or school districts. Applications for agency financial assistance programs are evaluated individually by agency staff. Those meeting specific program requirements are recommended by staff for approval at monthly meetings of the nine-member Water Board. ***For more information, call (405) 530-8800 or go to www.owrb.ok.gov/financing.***

OKLAHOMA Water News

3rd Quarter, 2016

The Oklahoma Water News *is published quarterly by the Oklahoma Water Resources Board as authorized by J.D. Strong, Executive Director.*

The 2016 3rd Quarter issue of the Oklahoma Water News *has been published online at www.owrb.ok.gov. Hard copies are available upon request.*

Follow us on twitter @OKWaterBoard for publication notification. For comments or article submissions, please email Darla Whitley, Editor, at pubinfo@owrb.ok.gov.

Sign up to receive your *Oklahoma Water News* via email!

Email GO DIGITAL to pubinfo@owrb.ok.gov and include your name & address.

Protecting and enhancing the quality of life for Oklahomans by managing and improving the state's water resources to ensure clean and reliable water supplies, a strong economy, and a safe and healthy environment.

OKLAHOMA
Water News
4th Quarter 2016

Inside

Report of OWRB Activities for 2016

Throughout 2016, the OWRB fulfilled its mission of managing, protecting, and improving the state's water resources to ensure clean, safe, and reliable water supplies, a strong economy, and a healthy environment.

Financial Assistance Programs

Since inception, OWRB financial assistance programs have provided funding for 2,103 loans and grants totaling nearly $3.57 billion and saving communities across Oklahoma more than $1.2 billion over traditional financing options. In 2016, the Board approved 18 loans totaling $253,360,000, and 19 grants totaling $1,530,509.

Permitting

During the year, staff issued 97 regular permits and 1,161 provisional temporary permits for 64,848 acre-feet and 97,731 acre-feet, respectively. OWRB staff maintain more than 13,000 permits for approximately 2.7 million acre-feet of surface water and 3.8 million acre-feet of groundwater per year.

Hydrologic Investigations

The OWRB continued multiple hydrologic investigations during 2016. The Rush Springs study, initiated in 2011 in support of the Upper Washita River Basin project, is scheduled to be completed by mid 2017. A 20-year update of the Enid Isolated Terrace study has been completed and will be published in 2017. A 20-year update of the Elk City Sandstone will be completed in late 2017. Investigations of the Cimarron River and Gerty Sand aquifers are also underway.

(continued on page 2)

OWRB Geologist Kyle Spears measures streamflow in Oak Creek near Canute using a FlowTracker instrument as part of the Elk City Sandstone aquifer study. Streamflow measurements are an important component for estimating the amount of baseflow contribution, which can help derive important aquifer properties. The Elk City is one of eleven aquifers currently under investigation by the OWRB.

From the Director

As we reflect on a year marked by progress and change, I am reminded that it is an exhilarating and important time for water management in Oklahoma. The involvement of so many in the water community continues to strengthen policy, scientific understanding, and partnerships in the state. We look forward to continuing to serve and collaborate with you in 2017.

In October, we said farewell to Executive Director J.D. Strong, who accepted the position of Director of the Oklahoma Department of Wildlife Conservation, and I was named Interim Executive Director. On behalf of the Board and staff, I would like to thank J.D. for his leadership and friendship during his time with the OWRB. We wish him well in his new endeavors.

(continued on page 2)

Julie Cunningham, Interim Executive Director Oklahoma Water Resources Board

From the Director (continued)

I appreciate all who attended the 37th Annual Oklahoma Governor's Water Conference & Research Symposium in October. Thanks goes out to OWRB Chairman Linda Lambert and J.D. for serving as hosts, as well as sponsors and our dedicated staff who continue to make this conference the state's premier water policy and research event. I congratulate Water Pioneer Award winners Robert Henry and Governor Frank Keating. I would especially like to thank Governor Mary Fallin and the roundtable representatives from the Choctaw Nation of Oklahoma, Chickasaw Nation, City of Oklahoma City, and State of Oklahoma for their participation in our opening session focused on the historic water right settlement.

In mid-December Congress and the President executed a comprehensive water rights agreement as part of the 2016 Water Resources Development Act. This agreement provides certainty in the management of water resources in the southeast quadrant of the state while reasonably providing an extra level of water security for central Oklahoma. I would like to recognize the contributors for their leadership, working together to craft an agreement that would benefit all parties, and seeing the legislation through as it became law.

Another "monumental" conclusion came in December with the finalization of the joint study between Oklahoma and Arkansas, which affirms, with slight variation, a numeric phosphorus standard for Oklahoma's scenic rivers adopted in 2003 to address water quality degradation. After a series of meetings in 2016 and the release of a 2-year study conducted at more than 30 sites in both states, the committee finalized recommendations, which are expected to end further legal disputes and provide certainty in the requirements of phosphorus reduction.

Significant progress was made on the Water for 2060 and regional water planning front by many groups across the state. In August, I was delighted to join the advisory council for East Central University's new Oka' Institute, which is focused on developing long-term water solutions with an emphasis on sustainability and economic development. We were pleased to participate in numerous water workshops and meetings held by regional and sector groups, universities, and Tribes, including the Beaver-Cache Watershed group, Northwest Water Action Team, Southwest Water Task Force, Central Oklahoma Water Resources Authority, Tulsa Area Water Summit, Oka' Institute, Oklahoma Municipal League, Arbuckle-Simpson Drought Contingency planning group, Arbuckle Lake Watershed planning group, Foss Reservoir Drought Contingency Task Force, and others. The Produced Water Working Group (PWWG) made significant progress on its study to identify spatially proximate sources and beneficial uses of produced water and potential regulatory changes required to allow for the reuse of produced water. NOAA, with other federal and state agencies, finalized the Southern Plains Drought Early Warning System Strategic Plan. OWRB water quality standards staff, along with other agencies, stakeholders, and consulting engineers completed initial rules to establish the regulatory framework necessary to increase our State's water storage capacity through aquifer storage and recovery projects.

As always, a special thanks goes to our staff for their giving and community involvement. Employees surpassed an $8,500 goal to raise nearly $17,000 as "Pacesetters" in this year's United Way Campaign in addition to their Salvation Army campaign through the Angel Tree Gift Program and bell ringing fundraiser.

I am also proud to announce the OWRB was once again named a winner of The Oklahoman's "Top Oklahoma Workplaces Award" in 2016. Thanks to the anonymous input of our employees, we are the only state agency to have received this distinction for four consecutive years.

Finally, I'd like to recognize the contributions of Lenora James and Derek Smithee, who retired in 2016. We truly miss them and thank them both for dedicating their careers to the management and protection of Oklahoma's water resources.

Oklahoma Secretary of Energy and Environment Michael Teague (right), presents Derek Smithee with a special commendation from Governor Fallin recognizing his 33 years of service to the OWRB and State of Oklahoma.

Report of 2016 Activities (continued)

Through contracts with the USGS, the OWRB completed the North Canadian study and is conducting investigations on the Canadian River, North Fork of the Red River, Roubidoux, Salt Fork of the Red River, and Washita River Reach 1 aquifers. The Canadian River and North Fork of the Red River investigations are expected to be completed in 2017.

The OWRB continued its work on the Upper Washita Basin Study, an ongoing project conducted in collaboration with the Bureau of Reclamation, Foss Reservoir Master Conservancy District, and Fort Cobb Master Conservancy District. A Hydrologic Investigation report on the Upper Washita Basin is scheduled for completion in 2017. Progress also continued on the Arkansas River Basin Study.

OWRB staff completed bathymetric surveys on Arbuckle, Elmer Thomas, Hominy Municipal, and John Wells lakes in 2016 and are completing surveys on several other lakes to assess beneficial uses related to dissolved oxygen and to update firm yield estimates on sole source water supplies.

Water Quality Standards

The OWRB continued its joint participation in a study of phosphorus levels in Oklahoma's scenic rivers to determine the total phosphorus threshold response level at which algae production results in undesirable or harmful conditions. After a series of meetings and the release of the final study report, the six-member study committee reached a consensus on recommendations, which will be reviewed by the governors of the respective states.

Proposed amendments to Oklahoma's Water Quality Standards included creation of a new antidegradation classification called Sensitive Water Supply-Reuse (SWS-R), revisions to

Report of 2016 Activities (continued)

the numeric aquatic life criteria for certain priority pollutants listed in Appendix G, revisions to several waterbodies listed in Appendix A and their designated uses, and revisions to Appendix B, Tables 1 and 2. These amendments were approved by the Board and the Governor, and have been forwarded to the USEPA regional offices for final approval. Staff also worked with the Aquifer Storage and Recovery workgroup to revise Oklahoma's groundwater quality standards. The proposed revisions have entered the formal rulemaking phase and will be brought to a formal hearing of the Board in January.

OWRB biologists collect algae and invertebrates at the Great Salt Plains as part of the OWRB's statistical survey monitoring program. The frequency and health of these organisms are important for determining water quality at this site.

Lake Restoration Projects

Staff continued cooperative work with Oklahoma City and the Department of Wildlife Conservation at Lake Stanley Draper to develop beneficial aquatic plant communities and control the invasive plant, *Phragmites*. The purpose of this work is to improve water quality while buffering the spread and intrusion of invasive plants. Staff continued to work cooperatively with the Central Oklahoma Master Conservancy District to monitor and improve water quality in Lake Thunderbird, where an innovative oxygenation system has been installed.

Monitoring Programs

Through the Beneficial Use Monitoring Program (BUMP), sampling was conducted quarterly at 40 lakes across Oklahoma in 2016 (as part of a five-year rotation for 130 lakes).

Staff completed work on the "Development of a Reference Condition Candidate Pool for Oxbows of Oklahoma" project to aid in classifying and understanding Oklahoma oxbow wetlands and identify metrics to establish reference conditions.

BUMP stream sampling was conducted at 84 stations on a 6-week rotation during 2016. The physical, chemical, and biological data collected at BUMP sites are used to identify water quality trends, document impairments to beneficial uses, and identify sources of pollution. Every two years, support status for all beneficial uses are reviewed for BUMP sites and recommendations are made for the state's 303d list of impaired waters.

Sampling has been completed for year four of the Groundwater Monitoring and Assessment Program (GMAP), the OWRB's statewide groundwater quality and quantity monitoring program. Staff visited more than 150 quality monitoring sites and collected water-level measurements from more than 1,000 sites.

Geographic Information Systems (GIS)

OWRB GIS staff worked with the Financial Assistance Division to complete a pilot project to map water, wastewater, storm water, and water reuse infrastructure for small public water and wastewater systems. The data has been incorporated into the OWRB's public water supply systems dataset and map viewer.

Well Driller and Pump Installer Licensing Program

OWRB staff licensed 32 new Well Drilling and Pump Installer firms and 56 new operators in 2016, receiving more than 4,200 well completion, boring, geothermal, and plugging reports for the year. More than 176,000 records in the well log database are available to the public via the OWRB website.

Floodplain Management Program

OWRB staff continue to train and accredit floodplain administrators in Oklahoma's 401 participating National Flood Insurance Program (NFIP) communities. Staff conducted 15 Community Assistance Visits and 50 Community Assistance Contacts in 2016, enrolling three new communities into the NFIP. In November the OWRB named Yohanes Sugeng, P.E., as Oklahoma's new NFIP coordinator.

Dam Safety Program

OWRB staff completed 22 low hazard-potential dam inspections during the year, providing inspection reports with breach inundation maps to dam owners at no cost. Staff conducted several dam safety workshops and helped host a seismicity workshop for Oklahoma infrastructure.

OWRB FY16 Expenditures and FY17 Budget*

Activity Name	FY 16 Expended	FY 17 Budgeted
Administration	$2,192,599	$2,575,635
Water Quality	3,584,089	4,470,272
Financial Assistance	3,007,028	5,236,880
Planning & Management	3,618,230	5,098,972
Information Technology	684,856	964,227
Totals	$13,086,801	$18,345,986
Fund Name		
General Appropriations	$4,777,061	$4,112,002
Drillers & Installers Indemnity Fund	-	50,000
OWRB Revolving Fund	1,948,534	2,928,065
REAP Reallocation	-	400,000
Water Resources Revolving Fund	860,142	1,149,595
Drillers & Installers Regulation Fund	21,338	70,000
Water Infrastructure Development Fund	1,371,767	2,393,341
Federal Funds - OWRB	1,233,222	1,967,818
USGS Cooperative Agreement	312,275	325,175
DW Loan Administration Fund	595,892	2,364,359
CW Loan Administration Fund	1,966,571	2,185,631
CW Loan Fund	-	400,000
Totals	$13,086,801	$18,345,986

**initial*

Oklahoma Water News
Oklahoma Water Resources Board
3800 N. Classen Blvd.
Oklahoma City, OK 73118

www.owrb.ok.gov

STANDARD PRESORTED
U.S. POSTAGE
PAID
Oklahoma City, OK
Permit No. 310

Protecting and enhancing the quality of life for Oklahomans by managing and improving the state's water resources to ensure clean and reliable water supplies, a strong economy, and a safe and healthy environment.

Financial Assistance Program Update

Loans & Grants Approved as of December 21, 2016

FA Loans— 371 totaling $976,650,000
The OWRB's Financial Assistance Program (FAP), created by the State Legislature in 1979, provides loans for water and wastewater system improvements in Oklahoma. The tremendous popularity of the bond loan program is due, in part, to extended payoff periods of up to 30 years at very competitive interest rates.

CWSRF Loans—299 totaling $1,378,502,392
The Clean Water State Revolving Fund (CWSRF) loan program was created in 1988 to provide a renewable financing source for communities to use for their wastewater infrastructure needs. The CWSRF program is Oklahoma's largest self-supporting wastewater financing effort, providing low-interest loans to communities in need.

DWSRF Loans—186 totaling $1,116,183,300
The Drinking Water State Revolving Fund (DWSRF) loan program is an initiative of the OWRB and ODEQ to assist municipalities and rural water districts in the construction and improvement of drinking water systems. These projects are often mandated for communities to obtain compliance with increasingly stringent federal standards related to the treatment of drinking water.

REAP Grants—660 totaling $58,400,353
The Rural Economic Action Plan (REAP) Program was created by the State Legislature in 1996. REAP grants, used for water/wastewater system improvements, primarily target rural communities with populations of 7,000 or less, but priority is afforded to those with fewer than 1,750 inhabitants.

Emergency Grants—573 totaling $34,007,132
Emergency grants, limited to $100,000, are awarded to correct situations constituting a threat to life, health, or property and are an indispensable component of the agency's financial assistance strategy.

Drought Relief Program Grants—10 totaling $1,543,848
Through the OWRB's Drought Response Program, funding is available for communities in most dire need during state drought emergencies declared by the Governor. A maximum of $300,000 is diverted from existing OWRB Emergency Grant proceeds to fund the Program.

Water for 2060 Grants—4 totaling $1,500,000
Through the Water for 2060 Grant Program, funding is available for municipalities, counties, water/sewer districts and other public entities for projects that highlight the responsible use of water.

Total Loans/Grants Approved: 2,103 totaling $3,566,787,025 Estimated Savings: $1,210,513,107
Applicants eligible for water/wastewater project financial assistance vary according to the specific program's purpose and requirements, but include towns and other municipalities with proper legal authority, various districts established under Title 82 of Oklahoma Statutes (rural water, master/water conservancy, rural sewage, and irrigation districts), counties, public works authorities, and/or school districts. Applications for agency financial assistance programs are evaluated individually by agency staff. Those meeting specific program requirements are recommended by staff for approval at monthly meetings of the nine-member Water Board. ***For more information, call (405) 530-8800 or go to www.owrb.ok.gov/financing.***

OKLAHOMA Water News
4th Quarter, 2016

The Oklahoma Water News *is published quarterly by the Oklahoma Water Resources Board as authorized by Julie Cunningham, Interim Executive Director.*

The Water News *is available online at* www.owrb.ok.gov. *Follow us on twitter* @OKWaterBoard *for publication notification. If you no longer wish to receive a copy by mail, or have comments or article submissions, please contact Darla Whitley, Editor, at* pubinfo@owrb.ok.gov *or (405) 530-8800.*