

OKLAHOMA Water News

1st Quarter, 2019

Oklahoma Water Resources Board

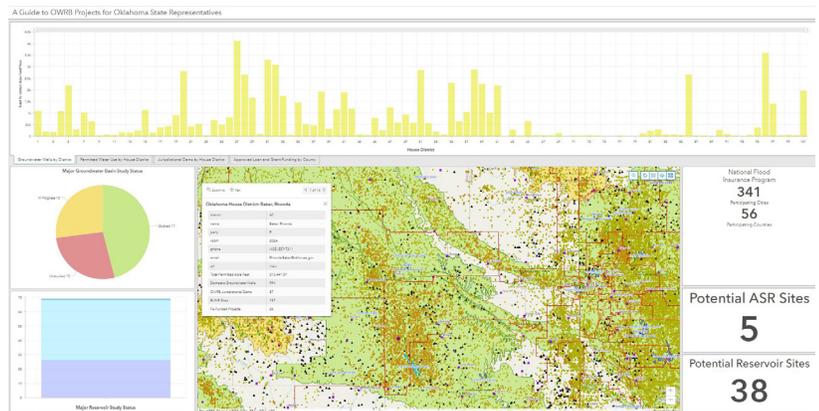
New OWRB Mapping Tool Provides Guide for Legislators

The OWRB has developed a new mapping tool to provide Oklahoma state legislators with an overview of OWRB projects in their districts and statewide. The tool utilizes two dashboards—one focused on Oklahoma House districts and the other on Senate districts.

Both dashboards feature graphs and charts with statewide and local information about OWRB projects with interactive maps that tie into the OWRB's extensive GIS data repository.

The maps contain a number of layers representing current water use permits, jurisdictional dams, groundwater wells from the OWRB well log database, National Flood Insurance Program participation by city and county, major groundwater basin studies and status, major reservoir studies and status, approved loans and grants through the OWRB's financial assistance programs, water quality information, and more. Map symbols can be clicked for detailed information. Map layers can be turned off and on, the background can be changed, and a search function lets users zoom in to a specific district, town, or other area of interest.

The dashboards are part of an ongoing effort of the OWRB to provide user-friendly products to the public and state leadership that will increase access to detailed and current information about water resources and aid in policy development and other decision making.



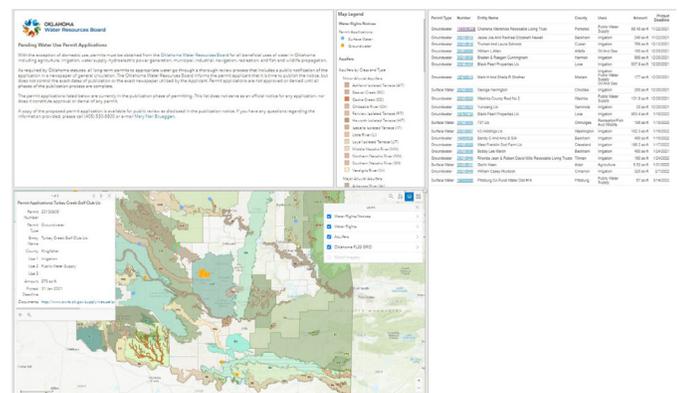
New OWRB dashboards for Oklahoma legislators provide a district-level look at water projects and information.

Pending Water Use Permit Application Status Now Posted on OWRB Website

The OWRB has developed a web page to display water right applications in the publication phase of the permitting process. The new “Pending Water Use Permit Applications” dashboard provides a quick look at these pending applications including location, amount, use, and protest deadline.

With the exception of domestic use, permits must be obtained from the Oklahoma Water Resources Board for all beneficial uses of water in Oklahoma including agriculture, irrigation, water supply, hydroelectric power generation, municipal, industrial, navigation, recreation, and fish and wildlife propagation.

As required by Oklahoma statutes, all long-term permits to appropriate water go through a thorough review process that includes a public notification of the application in a newspaper of general circulation. The Oklahoma Water Resources Board informs the permit applicant that it is time to publish the notice, but does not control the exact dates of publication or the exact newspaper utilized by the Applicant. Permit applications are not approved or denied until all phases of the publication process are complete.



The water permit application status dashboard features an interactive map showing current pending permit applications.

Water Appreciation Day Set for April 17

The 14th annual Oklahoma Water Appreciation Day will be hosted by the Oklahoma Water Resources Board on April 17, 2019, in the State Capitol's 4th floor rotunda.

Water agency and organization displays will be featured from 9 a.m. to 3 p.m. This annual celebration is held to demonstrate the importance of Oklahoma's water resources and provide information on water management, conservation, protection, and educational programs.

Visit www.owrb.ok.gov/waterday/ for more information.



OWRB to host 14th annual Water Appreciation Day on April 17, 2019 at the State Capitol.

Financial Assistance Program Update

Loans and grants approved by the Oklahoma Water Resources Board on January 16, 2019:

- Cameron Public Works Authority—\$79,999 Rural Economic Action Plan (REAP) Grant
- Chattanooga Public Works Authority—\$99,550 REAP Grant
- Enid Municipal Authority—\$52,700,000 Financial Assistance Program (FAP) Loan
- Oklahoma City Water Utilities Trust—\$20,000,000 Drinking Water State Revolving Fund (DWSRF) Loan a \$34,150,000 Clean Water State Revolving Fund (CWSRF) Loan
- Shidler Public Works Authority—\$59,500 REAP Grant

Loans and grants approved by the Oklahoma Water Resources Board on February 19, 2019:

- Crescent Public Works Authority—\$99,999 REAP Grant
- Keyes Utilities Authority—\$100,000 REAP Grant
- Latimer County Rural Water District No. 2—\$79,900 Emergency Grant
- Maysville Municipal Authority—\$99,999 REAP Grant
- Moore Public Works Authority—\$15,000,000 FAP Loan
- Nash Public Works Authority—\$129,948 REAP Grant
- Sayre Public Works Authority—\$823,180 DWSRF Loan
- Tulsa Metropolitan Utility Authority—\$10,626,000 CWSRF Loan
- Wetumka Public Works Authority—\$99,999 REAP Grant

Visit the [OWRB press releases web page](#) for more information.

Loans and grants approved by program as of March 31, 2019

FA Loans—391 totaling \$1,215,385,000

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—335 totaling \$1,648,454,827

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—207 totaling \$1,330,876,980

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—690 totaling \$61,231,044

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.

Drought Response Program Grants—6 totaling \$418,848

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.

Emergency Grants—581 totaling \$34,512,943

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.

Water for 2060 Grants—4 totaling \$1,500,000

Through the Water for 2060 Grant Program, funding was available in 2015 for municipalities, counties, water/sewer districts and other public entities for projects that highlight the responsible use of water.

Emergency Drought Relief Grants—4 totaling \$1,125,000

Through the Emergency Drought Relief Grant Program, funding was provided in 2013 by the Legislature via the Emergency Drought Relief Commission to address severe drought issues in specific Oklahoma counties.

Total Loans/Grants Approved: 2,219 totaling \$4,293,504,642**Estimated Savings: \$1,400,421,382**

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 visit www.owrb.ok.gov/financing.

Oklahoma Water News
1st Quarter, 2019

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Jason Hitch (Chairman), Stephen Allen (Vice Chairman), Robert Stallings (Secretary)

Jennifer Castillo, Charles Darby, Bob Drake, Ford Drummond, Robert L. Melton, Matt Muller

The mission of the OWRB is to protect and enhance 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.

Julie Cunningham, Executive Director

OKLAHOMA Water News

2nd Quarter, 2019

Oklahoma Water Resources Board

2019 Legislative Update

During the 2019 Oklahoma legislative session, a number of bills related to Oklahoma water law and water resource management were considered and approved.

SB568 creates the Phase II Arbuckle-Simpson Hydrology Study Revolving Fund, administered by the Oklahoma Water Resources Board (OWRB). The US Geological Survey, in conjunction with the OWRB, has prepared a scope of work for the study, and the cost will be shared between local, state, tribal, and federal sources.

HB2471 places a moratorium on the issuance of new mining permits by the OWRB, the Oklahoma Department of Environmental Quality, and the Oklahoma Department of Mines in the Arbuckle-Simpson Aquifer area pending completion of the study no later than 2030.

SB998 defines the taking and use of marginal water to be of beneficial use and not waste, within certain limitations and standards. HB3405, approved last year, allows the OWRB to permit the use of marginal water. The OWRB recently amended Chapter 30 to define marginal water as water that has at least 5,000 but less than 10,000 parts per million total dissolved solids. Well construction standards in Chapter 35 were amended to include marginal quality water wells in order to protect fresh water zones. Later this year, the OWRB will promulgate rules in response to SB998 to incentivize the use of marginal water in lieu of fresh water for nondomestic purposes.

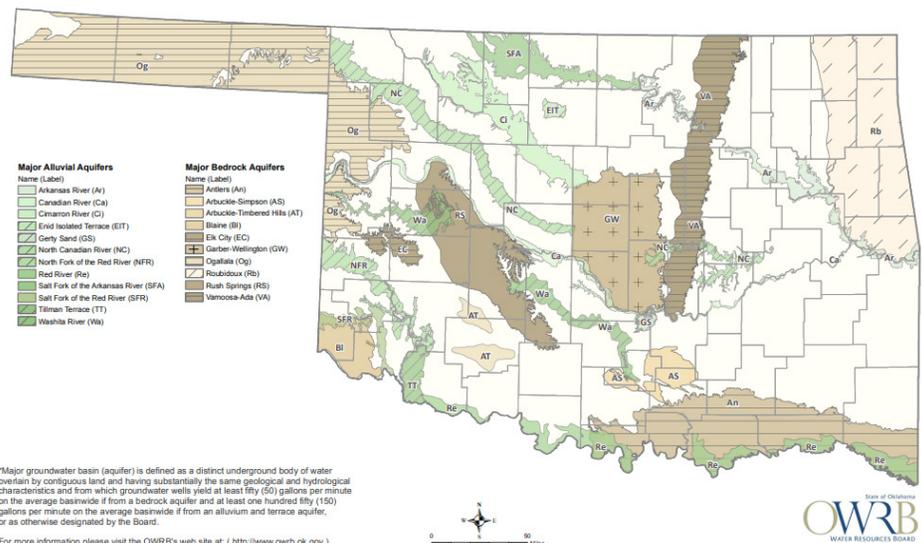
HB2263, or the Groundwater Irrigation District Act, allows ten or more groundwater permit holders in one or more adjacent counties to propose the organization of a groundwater irrigation district. The district board, appointed by the county board of commissioners, will have the authority to seek grant funding for conservation-minded groundwater irrigation equipment, such as subsurface drip lines. The Act also authorizes the OWRB to promulgate rules for such districts.

SB539 extends the OWRB's use of Gross Production Tax revenue through 2022 to fund the continued implementation of the Oklahoma Comprehensive Water Plan (OCWP), as well as related statutorily-mandated hydrologic studies. The OWRB is currently developing the scope of work and partnering with the US Army Corps of Engineers to secure additional funding for the 2023 Update of the OCWP. Hydrologic studies scheduled to be completed by 2022 include the following aquifers:

- Boone/Roubidoux
- Blaine
- Red River A&T
- Salt Fork of the Arkansas A&T
- Arkansas A&T
- Washita A&T Reach 1, 3, and 4
- Ada-Vamoosa
- North Canadian A&T Reach 3a and 3b

HB2474 directs the OWRB to maintain an online list of pending water use permit applications, available here, in addition to the traditional newspaper publication notice required of applicants. As before, the thirty-day protest period begins on the date of the first newspaper publication.

Major Aquifers of Oklahoma



Top 10 State and National Leadership

Oklahoma Governor Kevin Stitt has reached out to state agencies to highlight Oklahoma's programs that lead the nation in customer service, innovation, collaboration, and efficiency. As the state's water agency, the Oklahoma Water Resources Board (OWRB) is a national leader in water infrastructure financing, water use efficiency, oil and gas produced water innovation, floodplain management, fresh water science collaboration, digital transformation, and GIS products.

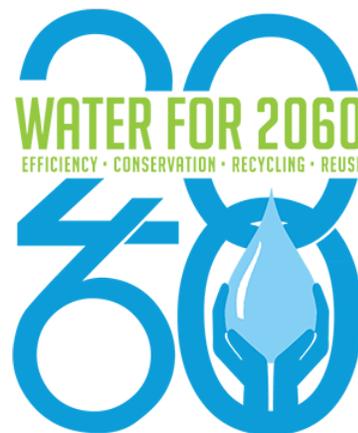
Water Infrastructure Financing

The OWRB's Clean Water State Revolving Fund (SRF) loan program holds a 30% above national average return on federal investment at \$3.4 to \$1, and has maintained its AAA rating since 2001, providing dependable, low-cost financing to water systems statewide. Due to this reputation for customer-focused solutions, the OWRB was selected by the EPA in 2018 to create a template marketing plan for SRF programs across the country.



Water Use Efficiency and Developing New Sources

The recommendations of the Oklahoma Comprehensive Water Plan led Oklahoma to become the first state to adopt a water-neutral use goal with the 2012 Water for 2060 Act, which focuses on growing the economy while encouraging water conservation, efficiency, and reuse. To accomplish these goals, the OWRB and partners are conducting studies on the development of untapped water source types and increasing statewide water storage capacity.



Oil and Gas Produced Water Innovation

The OWRB chairs the Oklahoma Produced Water Working Group that facilitates collaboration with partners in industry, regulatory agencies, academia, and nongovernmental organizations to solve national issues surrounding produced water management and modernize policy to promote water reuse as an alternative to underground disposal wells.

Floodplain Management

The OWRB surpasses standards for delivery of FEMA's National Flood Insurance Program assistance to communities through the agency's floodplain administrator accreditation and continuing education program, which places them far ahead of the curve with the most up-to-date resources for the prevention and mitigation of catastrophic effects of flooding disasters.



The OWRB's Aaron Milligan teaches a continuing education course on floodplain management.

Fresh Water Science Collaboration

The OWRB provides executive leadership and guidance for lake managers and other water quality professionals through the North American Lake Management Society and the National Water Quality Monitoring Council. Due to the OWRB's reputation for providing high-level, long-term water quality and quantity data, the agency was selected by the EPA to train other states on National Aquatics Resource Surveys. In addition, the agency was selected by the Choctaw and Chickasaw nations to provide training and coordinate water quantity and quality monitoring, assessment, and planning activities to ensure the effective utilization of state and tribal nation resources.

Digital Transformation and GIS Products

The OWRB was recently recognized by the EPA as a leader in the development of electronic filing and workflow automation, which expedites loan applications and long-term loan servicing, allows federal auditors remote access to files, and saves taxpayer dollars at the state and national level. The National Rural Water Association recently asked the OWRB to educate state rural water associations and system administrators across the country on the agency's water infrastructure asset management assistance, which provides digital, geo-located asset inventory maps and customizable access used for asset planning and financing analysis.



Water system map created by the OWRB.

Guidance for Flooded Groundwater Wells

According to the Oklahoma Mesonet, May 2019 was the third wettest on record with a statewide average of 10.48 inches of rainfall. As a result, many areas of the state have had to deal with flooding events and the aftermath, which prompted the Governor to declare a State of Emergency for all 77 counties in Oklahoma. An often overlooked hazard of widespread flooding is the danger caused by groundwater wellheads being covered by floodwater.

If a groundwater wellhead is inadequately capped or is damaged during flood event, sediment and debris may enter the well. Floodwater may also carry pathogens from human and animal fecal matter, such as E. coli, that can contaminate a well. The well must be considered unsafe until it has been checked for damage, repaired if necessary, and properly disinfected. It is extremely important not to use the well until lab results are negative for bacterial contamination.

Warning: Flooded wells can be a shock hazard! Do not approach the pump while the wellhead is submerged.

Remediating a Flooded Well

Once the floodwaters have receded and it is safe to approach the wellhead, check the casing material, discharge lines, and cap for cracks, leaks, or other physical damage. Also check that the wellhead is rigid and not wobbly, which could indicate damage to the grout surface seal. If there is any indication of damage, or it is suspected that debris has entered the well, the OWRB recommends that licensed water well contractor be retained for repairs and disinfection.

Flood debris on an observation well.

Once the well has been properly disinfected, the Oklahoma Department of Environmental Quality (ODEQ) State Laboratory should be contacted for a home water well test kit. The ODEQ is offering free testing for flooded wells until August 15, 2019. Again, the well should not be used until a negative bacterial test result indicates successful disinfection of the well.

Know the Flood Risk

In order to protect water wells from the effects of flood waters it is critical that wells meet the minimum construction standards set in [Chapter 35 of the OWRB rules and regulations](#). This includes regulations covering casing size and material, surface seal installation, and the inclusion of a proper sanitary cap. It is also beneficial to avoid constructing wells in areas of a property that are prone to flooding and runoff. Additionally, when licensed water well contractors install a well in an area where flooding is known to occur, the casing must extend 24 inches above the maximum level of such flooding.

It is important to note that wells constructed in a regulated floodplain may constitute "Floodplain Development" and require additional permitting to ensure that the top of the well casing extends high enough to avoid being overtopped by a 100-year flood. A well in a flood-prone area should have additional wellhead protection, such as a sturdy fence, to prevent flood debris from striking the well.

Check the OWRB's [Special Flood Hazard Areas map](#) to see if your well is in a flood-prone area. If your community belongs to the NFIP, you can get detailed flood risk information from your [state-accredited Floodplain Administrator](#).

If you have questions regarding flooded wells, please contact Charlie O'Malley, Well Drilling and Pump Installation Program Coordinator at charles.omalley@owrb.ok.gov or (405) 530-8853.



Flooded observation well



Flood debris on an observation well

Bathymetric Mapping Program Presented to Board

During the June 18 Board meeting, OWRB Environmental Programs Specialist James Decker presented information about the agency's bathymetric mapping program. Through contracts with municipalities and the Oklahoma Department of Environmental Quality (ODEQ), the program utilizes GIS and related technology to provide accurate determinations of current storage capacities of the state's reservoirs. Geographic Positioning System (GPS) and acoustic depth sounding instruments are incorporated into hydrographic survey vessels to collect real-time latitude, longitude, and depth data, which is processed to produce contour maps, tables, and graphs. The bathymetric mapping process has four stages: preplanning, surveying, postprocessing, and reporting.

Preplanning

Before visiting a lake, OWRB staff refer to aerial and lidar imagery to produce a shoreline boundary file of the lake's highest water level. This estimation of the lake's contours is used to plot data collection lines, which determine the course staff will take in the boat.

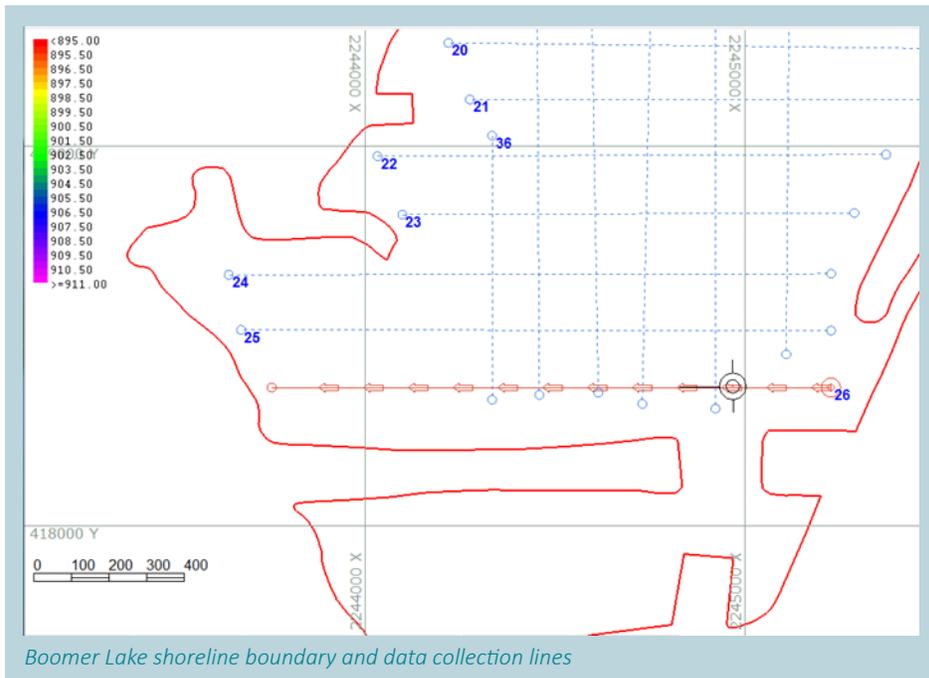
Surveying

The equipment on a hydrographic survey vessel is highly specialized to provide the most accurate data possible. This includes a differential GPS that corrects the boat's position down to the submeter. For reference, the GPS in a smart phone typically has a range of 15-20 meters. The boat is also equipped with a scientific-grade echosounder that records to 2,000 feet below the lake surface and is accurate to within one-tenth of a foot. A RoxAnn Seabed ID uses sound pulses to value the hardness and roughness of the lakebed, and can determine if the boat is above gravel, sand, or mud. The motion referencing unit (MRU) corrects data for the heave, yaw, pitch, and roll of the boat. A profiling sound velocimeter measures the speed of sound through the water column and provides real-time data correction.

To make sure the data collected are accurate, staff perform several quality control measures prior to setting course. The current lake elevation is recorded and serves as the zero-point in reference to the depths that will be collected. Staff also perform a "bar check" by dropping a solid steel bar at the end of a measured cable to the lake bottom to confirm that the echosounder is reading correctly. A latency check ensures that the boat's equipment is reading depth and location at the same time, down to the millisecond. Lastly, dynamic draft is enabled to correct boat depth recordings based on the speed measured by the on-board GPS.

Postprocessing

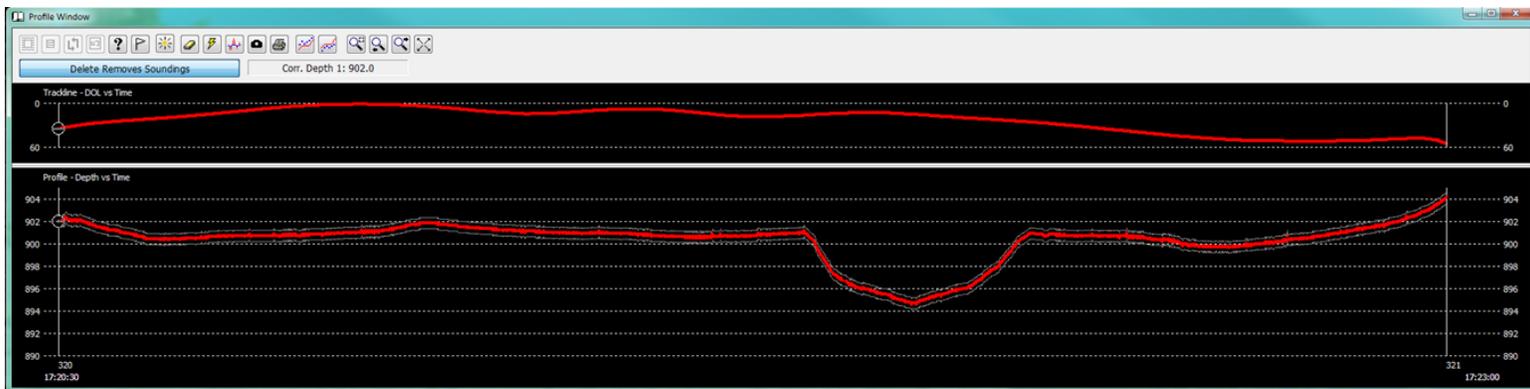
Postprocessing includes cleaning up obvious errors in the data, such as when fish or air bubbles are detected instead of the lake bottom. With about one data point collected every half foot during the surveying stage, it is easy to find these outliers on a profile graph.



Boomer Lake shoreline boundary and data collection lines



Hydrographic survey vessel



Raw data (top) and postprocessed data (bottom). Postprocessing includes cleaning up obvious errors in the data, such as when fish or air bubbles are detected instead of the lake bottom

Reporting

Staff combine the postprocessed data with available lidar and aerial imagery to make contour maps, shaded relief maps, and tables. The data are also used to calculate lake volume and area elevation.

Recent Bathymetric Studies

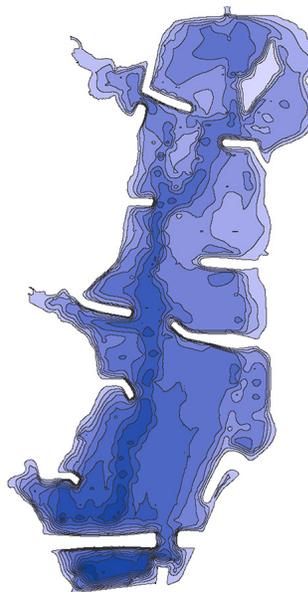
OWRB staff mapped 15 lakes in the last 5 years for the ODEQ’s Dissolved Oxygen (DO) Mitigation Project. Staff also assisted with the Waurika Dredging Project by measuring the pre- and post-dredged volume of sediment. The measurements and figures provided to the Waurika Lake Master Conservancy District and US Army Corps of Engineers were used to calculate the contractor’s payment. Additionally, staff used the RoxAnn and Sidescan units to map recently-dredged boat dock channels as well as the sediment type around the perimeter of Grand Lake for the GRDA’s Shoreline Project.

In total, the OWRB has mapped 48 lakes in the past 10 years. Nineteen additional lakes have bathymetric maps on file that are more than 10 years old, which need to be remapped due to sedimentation.

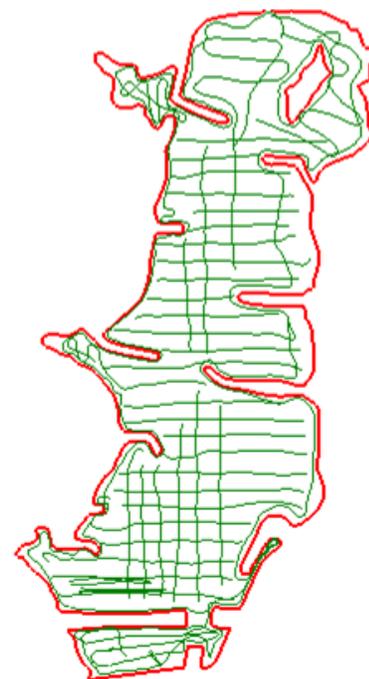
Who uses this data?

Federal and state agencies, municipalities, universities, lake and fishery managers, and citizens use the OWRB’s bathymetric data for assessments, management, research, modeling, and recreation. Additionally, OWRB staff use it in DO assessments, firm yields, indirect potable reuse models, sedimentation analysis, permitting, and publications like Lakes of Oklahoma.

The design life of a lake is 50 years. Yield studies determine how much water a community can use. The value of bathymetric mapping is in comparing new studies to old studies for calculating (instead of estimating) sedimentation rates.



Boomer Lake shaded relief map



Boomer Lake bathymetric survey data in GIS

Obtaining accurate storage volumes for lakes is an integral tool for water resources management. The valuable information that a bathymetric survey produces can be used by State and Federal Agencies for determining TMDLs, dam breach analysis, and watershed monitoring and management; municipalities to help determine the amount of water a lake can yield in the driest of times (reliable yield); fisheries managers to help determine fish stocking quotas, provide an estimate of lake volume for chemical rehabilitation projects and vegetation control, and calculate potential yield of fish; and anglers to find sunken points, drop-offs, mud flats, and other features.

Bathymetric maps and datasets are available on the OWRB's website at www.owrb.ok.gov/bathymetry.

Suzanne Landess Joins Board



Suzanne Landess of Guymon, Oklahoma, was confirmed in April as the newest member of the Oklahoma Water Resources Board. Ms. Landess will represent soil conservation interests. She is the co-owner of a ranch in Texas County and serves on the Texas County Conservation District Board. Ms. Landess represents OWRB Region 1.

Landess replaces Jason Hitch. Her term will expire in May 2026.

Financial Assistance Program Update

Loans and grants approved by the Oklahoma Water Resources Board on April 18, 2019:

- Coalgate Public Works Authority—\$400,000 Clean Water State Revolving Fund (CWSRF) Loan
- Laverne Public Works Authority—\$1,530,000 CWSRF Loan
- Sardis Lake Water Authority—\$45,000 Emergency Grant
- Shawnee Municipal Authority—\$5,745,000 CWSRF Loan

Loans and grants approved by the Oklahoma Water Resources Board on May 21, 2019:

- Broken Arrow Municipal Authority—\$11,415,000 CWSRF Loan
- Central Oklahoma Master Conservancy District—\$11,000,000 DWSRF Loan

Loans and grants approved by the Oklahoma Water Resources Board on June 18, 2019:

- Durant City Utilities Authority—\$4,000,000 CWSRF Loan
- Miami Special Utilities Authority—\$2,050,000 FAP Loan
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- Nicoma Park Development Authority—\$4,715,000 DWSRF Loan
- Owasso Public Works Authority—\$28,170,000 FAP Loan
- Porum Public Works Authority—\$99,999 REAP Grant

Visit the [OWRB press releases web page](#) for more information.

Loans and grants approved by program as of June 30, 2019

FA Loans—393 totaling \$1,245,605,000

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Estimated Savings: \$1,458,866,641

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Julie Cunningham, Executive Director

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3rd Quarter, 2019

Oklahoma Water Resources Board

Water Means Business: 40th Annual Water conference Set for Dec. 4-5

The 40th Annual Oklahoma Governor's Water Conference and Research Symposium is set for December 4-5, 2019, at the Reed Conference Center in Midwest City. This year's conference theme is "Water Means Business," which points to the vital economic role water plays in Oklahoma in both attracting and sustaining businesses from agriculture to energy and industry, as well as growth through the expansion of prolific public water supplies and the supporting infrastructure. The theme also hints at the more severe and unpredictable side of water management, such as planning for the inevitable periods of drought and flooding that are becoming more frequent.

Governor Kevin Stitt will provide the Keynote Address during the luncheon at noon on Dec. 4 and present the Oklahoma Water Pioneer Awards to this year's winners: Tom Buchanan, Ann Keeley, and Arnold Miller. Other featured speakers include Dean Amhaus of The Water Council and Kevin Moran, Senior Director of the Colorado River Program for the Environmental Defense Fund. Breakout sessions will be held on the following topics: The Business Case for Building Resilient Public Water Supply, Fueling Industry and Energy Production, Partners in a Water Secure Future, and Disrupting the Economic Impacts of Flooding. Research Symposium sessions will be held concurrently. A general session will be held at 3:00 p.m. on Dec. 4 on Innovating Oklahoma Agriculture Production. On December 5, the third annual Oklahoma Water for 2060 Excellence Awards will be presented at 8:30 a.m.

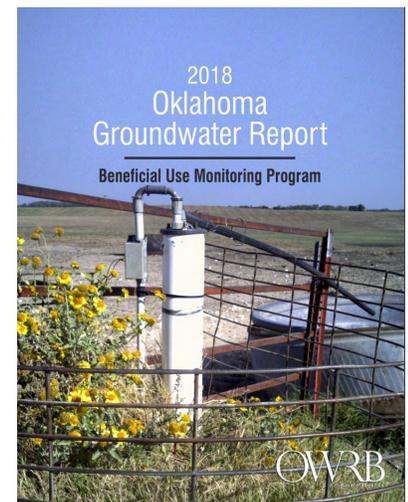


The 2019 Oklahoma Governor's Water Conference and Research Symposium will be held at the Reed Conference Center in Midwest City on Dec. 4-5.

GMAP Initiates Water Quality Trend Network

To continue the OWRB's efforts to characterize groundwater beneficial uses and help promote better groundwater use guidelines for the State of Oklahoma, the Groundwater Monitoring and Assessment Program initiated its water quality trend network in the spring of 2019. This network is intended to document current conditions, document change in condition over time, assess beneficial use capacity, track water availability, monitor change in the aquifer storage over time, and inform decision makers as to the extent and/or limits that groundwater can augment future water supply.

Earlier this year, the GMAP team wrapped up its baseline sampling network in all 22 major aquifers and a few minor aquifers. The GMAP program began in 2013 through funding by the Oklahoma Legislature based on recommendations of the 2012 Update of the Oklahoma Comprehensive Water Plan. These additional monies were utilized to restore funding levels of the Beneficial Use Monitoring Program as well as to implement a new statewide groundwater monitoring program. Baseline sampling focused on concentrations of nutrients, metals, and major ion species. The final baseline network comprised 662 wells in major aquifers with an additional 87 wells in minor aquifers. The OWRB also maintains a statewide groundwater level measurement program comprising around 904 wells measured annually, 290 wells measured seasonally, and 33 continuous water level recorders. More information about GMAP and the new Trend Network can be found in the latest annual report for the program.



2018 Oklahoma Groundwater Report

Strategic Alliance Formalizes Collaboration to Assist Rural Water & Wastewater Systems

On August 22, a Strategic Alliance Agreement was formally signed between the Oklahoma State Secretary of Energy and Environment, Oklahoma Department of Environmental Quality, Oklahoma Water Resources Board, and Oklahoma Rural Water Association, and ratified by Governor Kevin Stitt.

The formal signing took place at the Oklahoma Rural Water Association's fall conference at Sequoyah State Park's Western Hills Lodge. The alliance agreement commits the organizations to work together to help meet the missions of the organizations and to improve the sustainability of Oklahoma rural and small community water and wastewater systems.

It is estimated that more than 1,300 water systems in the state are in need of long range sustainability planning. Some of these systems exceed one hundred years old, and many of the systems are not prepared for the expansion needed to meet growing needs. Without enough potable clean water and wastewater system capacity the economic development of many of these communities will be a risk.



The Strategic Alliance was signed on August 22 by the Oklahoma State Secretary of Energy and Environment, Oklahoma Department of Environmental Quality, Oklahoma Water Resources Board, and Oklahoma Rural Water Association, and was ratified by Governor Kevin Stitt.

Financial Assistance Program Update

Loans and grants approved by the Oklahoma Water Resources Board on August 21, 2019:

- Beckham County RWS & SWMD No. 1—\$100,000 Emergency Grant
- Dewar Public Works Authority—\$209,250 Clean Water State Revolving Fund (CWSRF) Loan
- East Central Oklahoma Water Authority of Webbers Falls—\$1,000,000 Drinking Water State Revolving fund (DWSRF) Loan
- East Central Oklahoma Water Authority of Webbers Falls—\$100,000 Emergency Grant
- Enid Municipal Authority—\$11,000,000 CWSRF Loan
- Hartshorne Public Works Authority—\$580,000 CWSRF Loan
- Waurika Public Works Authority—\$400,000 CWSRF Loan
- Westville Utility Authority—\$37,575 CWSRF Loan

Loans and grants approved by the Oklahoma Water Resources Board on September 17, 2019:

- Bryan County RWS & SWMD No. 2—\$100,000 DWSRF Loan
- Carney Public Utilities Authority—\$505,000 CWSRF Loan
- Haileyville Public Works Authority—\$440,000 CWSRF Loan
- Kingfisher Public Works Authority—\$41,140 Emergency Grant
- Shawnee Municipal Authority—\$37,920,000 CWSRF Loan

Visit the [OWRB press releases web page](#) for more information.

Loans and grants approved by program as of September 30, 2019

FA Loans—393 totaling \$1,244,510,000

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—350 totaling \$1,702,584,001

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—212 totaling \$1,356,899,183

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.

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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.

Drought Response Program Grants—6 totaling \$418,848

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.

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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.

Water for 2060 Grants—4 totaling \$1,500,000

Through the Water for 2060 Grant Program, funding was available in 2015 for municipalities, counties, water/sewer districts and other public entities for projects that highlight the responsible use of water.

Emergency Drought Relief Grants—4 totaling \$1,125,000

Through the Emergency Drought Relief Grant Program, funding was provided in 2013 by the Legislature via the Emergency Drought Relief Commission to address severe drought issues in specific Oklahoma counties.

Total Loans/Grants Approved: 2,254 totaling \$4,404,130,804

Estimated Savings: \$1,471,445,671

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 visit www.owrb.ok.gov/financing.

Oklahoma Water News 3rd Quarter, 2019

Published by the Oklahoma Water Resources Board. For questions or comments, please contact Darla Whitley, Editor, at pubinfo@owrb.ok.gov or (405) 530-8800.



The OWRB defines policy and conducts the state's water business through a nine-member Board appointed by the Governor.

Robert Stallings (Chairman), Stephen Allen (Vice Chairman), Bob Drake (Secretary), Jennifer Castillo, Charles Darby, Ford Drummond, Suzanne Landess, Robert L. Melton, Matt Muller

The mission of the OWRB is to protect and enhance 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.

Julie Cunningham, Executive Director

OKLAHOMA Water News

4th Quarter, 2019

Oklahoma Water Resources Board

2019 Report of OWRB Programs and Initiatives

The OWRB continued its mission during 2019 of managing and improving the Oklahoma's water resources to ensure clean and reliable water supplies, a strong economy, and a safe and healthy environment. The OWRB permits water and provides essential services to support industries in every corner of the state.

Focusing on the theme of "Water Means Business," the 40th annual Oklahoma Governor's Water Conference and Research Symposium was held on December 4-5 in Midwest City. An impressive slate of speakers from the state and national level stressed the importance of Oklahoma's water resources and water infrastructure to the economic prosperity and growth of the state. The event attracted hundreds of water planning officials, industry representatives, state and local officials, and citizens who share a stake in Oklahoma's water resources management, development, and protection.



Governor Kevin Stitt addresses a full house during the 2019 Oklahoma Governor's Water Conference, touting the importance of water to the state's economy.

Oklahoma Comprehensive Water Plan

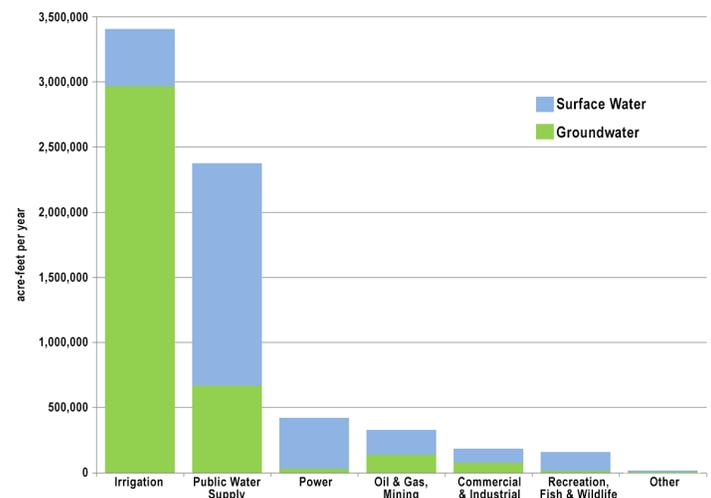
Oklahoma statutes direct the OWRB to forecast long-term water needs through decennial updates to the Oklahoma Comprehensive Water Plan (OCWP) to provide local planners and lawmakers with the data critical for ensuring safe and reliable water for all Oklahomans. In addition to supply/demand studies across 82 basins, the 2012 OCWP Update employed an unprecedented multi-year citizen engagement effort to identify diverse issues and solutions. Eight priority policy recommendations emerged from 83 public meetings across the state resulting in over 2,300 public comments. During 2019, the agency remained committed to furthering implementation of these priority recommendations and began work on the 2025 update, meeting with stakeholders around the state to compile a list of today's most pressing water issues and develop potential strategies and solutions.

Water Rights Administration

The OWRB appropriates fresh water resources as directed by Oklahoma statutes through more than 14,800 active long-term permits for more than 6.89 million acre-feet per year. The OWRB's permitting staff issued 83 groundwater permits in 2019 totaling 26,440 acre-feet, and 47 stream water permits totaling 37,660 acre-feet, along with 1,215 provisional temporary permits totaling 51,100 acre-feet for oil and gas producers and others in need of a temporary source of water. To support water rights administration, the agency conducted surface water allocation modeling and availability analyses, coordinated statewide water use reporting, and responded to public complaints.

Hydrologic Investigations

The OWRB conducts hydrologic investigations as directed by Oklahoma Statutes to determine the amount of fresh groundwater available for appropriation. A priority recommendation of the OCWP focused on addressing the backlog of the required Maximum Annual Yield (MAY) studies and overdue twenty-year updates of the state's groundwater basins. This work is now underway through eight active studies. The Elk City Sandstone, Gerty Sand, Cimarron Alluvium and Terrace, and the Ogallala Roger Mills are in review stages with publication anticipated within



Total Permitted Water by Use in Oklahoma

the upcoming year. The OWRB is actively collecting data on the Ada-Vamoosa, Red River Alluvium and Terrace, Blaine, and the Whitehorse minor aquifers. In addition, five contracts with the USGS to conduct investigations on the Roubidoux, Boone, Salt Fork of the Red River, Washita River Reach 3 & 4, and the Salt Fork of Arkansas River aquifers have been established. An investigation on the Washita River Reach 1 is currently in review through the USGS and the OWRB with an anticipated publication within the next year.

The OWRB continues collaborative work with the US Bureau of Reclamation (USBR), Foss Reservoir Master Conservancy District (MCD), and Fort Cobb MCD on the Upper Washita Basin Study, scheduled for completion in 2021. The OWRB is also collaborating with the USBR, Lugert-Altus Irrigation District (Lugert-Altus Reservoir), and Mountain Park MCD (Tom Steed Reservoir) on the Upper Red River Basin Study, scheduled for completion in 2020. Both studies aim to evaluate various water management options, assess current and future water supply capabilities of reservoirs, and evaluate alternatives to address water supply issues facing the study areas.

The OWRB met with the City of Langston and McAlester Army Ammunition Plant in 2019 to present results of recently completed bathymetric studies to determine how the information could be used for water planning and permitting. Additional yield studies will be completed at Greenleaf Lake in 2020.

Water & Wastewater System Financing

As the State's primary water and wastewater infrastructure financing agency, the OWRB has provided over \$4.4 billion in financing to Oklahoma communities, rural water districts, schools, and other authorities at an estimated savings of \$1.4 billion over conventional bond financing.

The success of the program is due to the continued achievement of AAA bond ratings, an extremely strong loss coverage score, management and oversight of the program, and a long history of borrower repayment.

The programs protect the health and safety of Oklahomans by providing funding to meet the critical need for safe drinking water supplies and adequate wastewater treatment.

In 2019, the OWRB approved 30 loans and 15 grants totaling \$352 million to fund public water/wastewater infrastructure improvements with an estimated savings of \$105.8 million as compared to traditional financing.

In cooperation with the Oklahoma Rural Water Association (ORWA), the OWRB provided 64 training sessions and 103 technical assistance visits to communities during 2019. Additionally, through partnerships with the ORWA and Oklahoma Department of Environmental Quality, the OWRB funded nearly 1600 hours of long range sustainability planning and technical assistance associated with that planning.

Dam Safety

The OWRB ensures the safety of more than 4,700 dams across the state as directed by the Oklahoma Dam Safety Act. Additionally, OWRB staff maintain Oklahoma's portion of the National Inventory of Dams, oversee approval for construction or modification of structures, coordinate breach inundation mapping, inspect low hazard-potential dams, and provide public outreach and training.

In 2019, the OWRB approved 22 applications to construct, repair, or modify dams. The OWRB Dam Safety Program hosted a slope stability workshop in July, which was attended by forty four engineers representing private firms, universities, local, state and federal government agencies. OWRB staff provided dam inspection reports to 17 dam owners for 22 dams.

Floodplain Management

The OWRB acts as the State Floodplain Board and the National Flood Insurance Program (NFIP) coordinating agency as directed by the Oklahoma Floodplain Management Act. The OWRB assists communities in reducing costly flooding risks to life and property by developing flood risk products such as Flood Insurance Rate Maps, and with an education and outreach program which provides information on the NFIP and conducts floodplain management training workshops for local floodplain administrators.

The OWRB worked closely with communities throughout the state in 2019 to identify flood risks and update flood maps through FEMA's Cooperating Technical Partners (CTP) program. Currently six studies involving eight watersheds and 45 miles of stream channel are underway. Through the Community Assistance Program, OWRB staff conducted 15 new Community Assistance Visits (CAVs), 50 Community Assistance Contacts, and provided over 200 general technical assistance requests.

Well Driller & Pump Installer Licensing

The OWRB protects Oklahoma's groundwater from contamination by ensuring the integrity of water well construction through the licensing of well drillers and pump installers as directed by Oklahoma Statutes. Currently there are 376 active well drillers and

pump installers licensed by the OWRB. The OWRB frequently assists drillers with required well log reporting; more than 198,500 well logs are available to the public online.

In 2019, the OWRB cooperated with the Oklahoma Ground Water Association to conduct 5 continuing education training sessions for drillers to meet licensing requirements. The OWRB continues to work with the Well Driller Advisory Council and stakeholders to develop, update, and advance water well drilling rules.

Water Quality Standards, Monitoring, & Lake Restoration

The OWRB is designated by Oklahoma statute as the agency responsible for promulgating Oklahoma's Water Quality Standards (WQS), which have been developed in accordance with the federal Clean Water Act. In 2019, the OWRB continued assisting in the implementation of the WQS in other state agencies, administering the statewide beneficial use monitoring program (BUMP), and administering the statewide program for assessing, monitoring, studying, and restoring Oklahoma lakes. During the year, the OWRB continued monitoring at 40 lakes, 84 stream sites, and more than 1,000 groundwater wells across the state. Additional monitoring projects included bathymetric mapping of lakes across the state and real-time monitoring in the Grand/Neosho River Watershed. The OWRB continued its partnership with the USGS to manage Oklahoma's Cooperative Stream Gaging program; these data are used to meet compliance with four federal interstate stream compact agreements and to guide the management of local and regional public water suppliers, including flood and drought planning, early warnings, and emergency operations.

Water Resource Mapping

The OWRB uses standard and customized GIS applications to create, analyze, and display water-related spatial data and make it available to the public. In 2019, OWRB GIS staff developed online dashboards for permit applications and Financial Assistance loans and grants. In addition to maps, the dashboards include tables, charts and graphs to make it easier to understand the data. The OWRB continued to map water, wastewater, stormwater, and water reuse infrastructure for small public water and wastewater systems, making the data available to the systems on secure map viewers.

Interstate Stream Compacts

The OWRB continued to represent Oklahoma's interests on four separate interstate stream compact commissions regarding all surface waters that flow into or out of the state. The compacts are written agreements among or between Oklahoma's neighboring states that have been approved by the US Congress, enacted in Federal statutes, and enacted in the statutes of each state.

OWRB Modernization and Efficiency Priorities

Document Imaging

Nearly 100% of agency documents have been digitized and stored in an electronic filing system, improving staff productivity by streamlining workflows, and saving money by minimizing equipment needs and office space requirements.

Permitting and Licensing Applications

An online application system allows the OWRB to expedite temporary water use permits for energy production and other short-term uses. Web-based applications are under development that will allow well drillers and pump installers to apply for or renew their licenses and water rights holders to file annual water use reports.

Infrastructure Solutions and Financing Software

The Oklahoma Advantages Assessment and Scoring for Infrastructure Solutions (OASIS) tool helps municipalities plan for future needs and communicate infrastructure investment opportunities to constituents and decision-makers. Infrastructure Financing Software (IFS) tracks the agency's complex funding system, including more than \$4.4 billion in approved projects to date.

GIS-Based Data Collection and Customized Map Viewers

OWRB staff perform investigations more efficiently and accurately with GIS-based applications and tools. Online mapping tools provide customers with mobile-friendly map viewers and downloadable data.

Leveraging Funds

The OWRB leverages federal and local funding partnerships for state programs to continue implementation of the Oklahoma Comprehensive Water Plan recommendations. Funding partners include the USEPA, USGS, USDA NRCS, USBR, USACE, FEMA, Groundwater Protection Council, ODEQ, Oklahoma Conservation Commission, Grand River Dam Authority, multiple Tribal partners, and many others.

Customer Service and Public Outreach

The OWRB conducts numerous focus groups and public meetings through partnerships with public and private interest groups with the goal of improving customer service.

Savings Through Web-Based Training

The OWRB saves money and travel expenses by utilizing free and low-cost online training opportunities. The OWRB now hosts online webinars to educate the public on specific programs, saving additional money on training space rental fees.

OWRB Presents 3rd Annual Water for 2060 Excellence Awards

The OWRB hosted the third annual Oklahoma Water for 2060 Awards Ceremony on December 5 during the Oklahoma Governor's Water Conference. This year's winners included Victor Ranch, Jerod McDaniel, Creek County Rural Water District #2, and the City of Edmond. The award recognizes individuals and entities that make exceptional contributions to the promotion and implementation of water use efficiency and conservation. Kenneth Wagner, Oklahoma Secretary of Energy and Environment, and Julie Cunningham, OWRB Executive Director, presented the awards.

Victor Ranch

The Victor Ranch in Ottawa County is consistently utilized by community and statewide conservation professionals to demonstrate the positive impacts that soil and water conservation can have on an agricultural operation. The GRDA, University of Oklahoma, Oklahoma Association of Conservation Districts, Ottawa County Conservation District, Oklahoma Conservation Commission, USDA- Natural Resources Conservation Service, and Oklahoma Chapter of the Soil and Water Conservation Society have all used Victor Ranch as a training site.

The Victors' many projects include incorporating cover crops to help reduce runoff of sediment and nutrients with the long term expected benefits of reduced need for chemical fertilizers and pesticides. Additionally the Ranch has shifted watering systems from utilizing Little Horse Creek to the installation of fifteen watering tanks. This practice increases infiltration rates, which restores hydrology and reduces the potential for flooding in the basin, while at the same time reducing runoff of nutrients, bacteria, and sediment to Grand Lake. Storing excess rainfall in the soil column also helps maintain vegetation and stream flow during drier periods.

The Victors are in the process of completing a thirty year easement with the GRDA to set aside 178 acres that are part of the Little Horse Creek Watershed, where many of Grand Lake's blue-green algae blooms have appeared to originate. This will be critically important for reducing nutrient pollution to the lake. The Victors' willingness to experiment with new ideas, demonstrate new practices, and advocate for more sustainable management are critical to protecting fresh water resources.

At an early age, Mr. Grant was taught about the importance of being a good steward of the land and water. His grandfather showed him an eroding field with muddy water running off the land, and then showed him the clear water running off a field protected by grass. This was the start of his conservation training, which has been passed on from generation to generation.

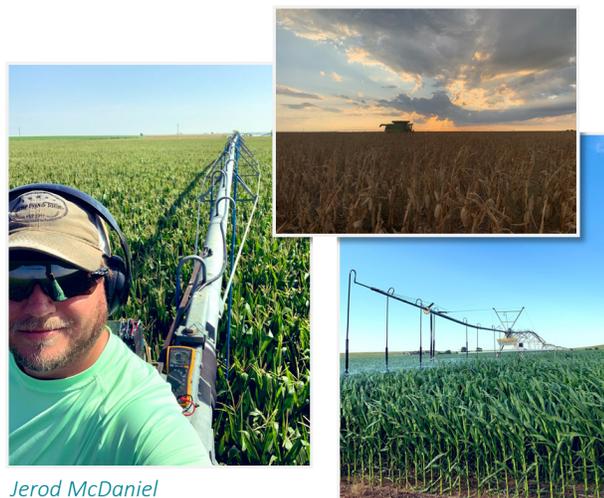
Jerod McDaniel

Jerod McDaniel farms in Texas County. Jerod has studied the effects of low population corn production on his farm for the last four years, converting his corn plant populations from the industry standard to a "flex" corn hybrid. His goal was to obtain a greater yield of grain with fewer plants.

The hybrid yields a bigger ear of corn per plant, which utilizes less water overall for biomass creation and maintenance. Jerod and other participating area growers have been able to show efficiencies of 13



Victor Ranch



Jerod McDaniel

bushels of yield per 1,000 seeds planted, compared with an industry standard of 7-8 bushels of yield per 1,000 seeds planted. By leveraging the untapped efficiencies of the flex hybrid, Jerod's water usage has remained steady or even declined, and he has been able to produce 25-30% more corn. Jerod believes that if more panhandle corn farmers grew the flex hybrid, the viability of the Ogallala aquifer could be extended.

Jerod is interested in developing even more sustainable water saving ideas for the future, and has been able to highlight his experiences to a broader audience using social media. Through his podcast called "Ag Uncensored" and his Twitter feed, Jerod has crowd-tested his low-population flex corn experience and spread his water saving messages to interested followers around the world. From these conversations, many new ideas and experiences are being shared, which could result in fresh water savings throughout and beyond the Oklahoma Panhandle today and well into the future.

Creek County Rural Water District #2

Creek County Rural Water District #2 is a small water system near Jenks that serves around 5,200 connections. In October of 2018, 2019 the system contacted the Oklahoma Department of Environmental Quality to have a water loss audit conducted. The audit indicated an average 16.8% loss with a yearly loss of almost 110 million gallons, valued at nearly \$195,000!

To address the leaks, the system met with the Rural Water Association for technical assistance and training focused on leak detection. Since then, the system has taken an extremely proactive approach to reducing water loss, utilizing multiple tools and methods simultaneously. They have coupled active leak detection with GIS mapping software, which tracks leakage and infrastructure data. They have installed a data logger system with telemetry that provides precise information on distribution system performance and leakage location to the system office and have invested in an advanced ground microphone to locate leaks in the field.

Combining telemetry, remote sensing, and "boots-on-the-ground" leak detection has proven to be a potent combination for reducing water loss--15 major leaks have been pinpointed and repaired so far, with plans made to address the remaining 10. The latest water loss audit showed the system loss had been reduced to around 5.7%, meaning that 25 million gallons of treated, potable water had been saved in five months' time at a cost savings of \$170,000.

According to their partners at the ODEQ, the project's success was primarily due to the staff of the system and their positive attitudes toward addressing loss. Today they regularly conduct their own water loss audits and have a designated staff member for locating and repairing leaks. The system is a prime example of what can be accomplished in a short amount of time through cooperation and collaborative partnerships. The ODEQ and Rural Water Association are to be commended as well for their highly effective water loss audit, leak detection and remediation programs that give systems the training and tools to save millions of gallons of fresh water each year for Oklahoma.

City of Edmond

The City of Edmond's Coffee Creek Water Resource Recovery Facility Administration and Laboratory Building was designed to promote conservation and reuse of water while providing a resource to the community for education. Multiple educational aspects have been incorporated into the design of the innovative 23,000 square foot building to ensure that customers and the general public understand the function, purpose, and importance of the treatment plant, as well as the importance of water conservation and protecting an urban forest and major watershed.

The building has a green roof, native and adapted plantings, a high efficiency irrigation system utilizing harvested water from a cistern, water efficient plumbing fixtures, LED lighting and dark sky compliant light fixtures, EV charging stations, geothermal ground source heat pumps, photovoltaic panels, and super insulated walls and roof, to name a few of its many impressive features.



Addressing leaks in Creek County Rural Water District #2



Coffee Creek Water Resource Recovery Facility Administration and Laboratory Building

By utilizing the rainwater harvesting system, drip irrigation, and natural xeriscaping, the City anticipates saving approximately 47,000 gallons of potable water per year when compared to a traditional spray irrigation design with fescue or Bermuda grass landscaping. The City's ultimate goal was to maximize water reuse to offset potable water demands and help "drought proof" the City's overall water supply.

The facility is available for tours for community organizations and schools. Future plans to enhance the experience include informational videos, an interactive 3D model, and possibly even virtual reality.

The OWRB would like to congratulate all the winners and thank all who participated in this year's Award ceremony.

Buchanan, Keeley, and Miller Named Oklahoma Water Pioneers

The 2019 Oklahoma Water Pioneer Awards were announced during the Oklahoma Governor's Water Conference on Dec. 4. The winners, Tom Buchanan, Ann Keeley, and Arnold Miller, were recognized for careers devoted to developing and preserving the integrity and beauty of our State's water for future generations.



Tom Buchanan has farmed in Jackson County for more than 35 years. He served on the Oklahoma Water Resources Board from 2011-2018, representing irrigation water interests, and served as President of the Oklahoma Farm Bureau from 2013-2017.

Mr. Buchanan has been the general manager of the Lugert-Altus Irrigation District since 2004. The District consists of 47,000 acres with 30 miles of main canals and an additional 300 miles of smaller laterals that connect with each farm. During his tenure, the District survived an historic four-year drought with minimal financial losses.

Mr. Buchanan's leadership has allowed the District to realize a 30% water savings over the years. He supervised the installation and implementation of recovery pits for water reuse as well as the lining of ditches. The District has implemented a number of other technology improvements to minimize water waste, including subsurface drip irrigation, automation of canals, and real time measurements to control water flow. The district is currently pursuing a study on a desalination process to have the capability to increase storage by adding another lake.

Over the years, Mr. Buchanan has worked tirelessly as an advocate for the district with state and federal agencies and policymakers. His service has included expert testimony before the U.S. Senate Environment and Public Works Committee, putting the District on the map as a national leader in irrigation system management.



Dr. Ann Keeley has worked for the US Environmental Protection Agency at its Robert S. Kerr Research Center in Ada since 1998 and was recently named Director of the Groundwater Characterization and Remediation Division. As a research microbiologist, her groundbreaking scientific work with the agency has included extensive research into groundwater contamination and remediation, and her numerous publications and scientific findings are well-respected among water scientists around the world.

Dr. Keeley has provided technical assistance to the EPA's regional offices, headquarters, and many others on the restoration of groundwater and ecosystems at scores of Superfund and Resource Conservation and Recovery Act sites. Today, her Division leads the nation as the EPA's center of expertise for groundwater remediation research.

Along with her scientific contributions, her efforts to promote cooperative research between the EPA and Chickasaw Nation, State of Oklahoma, and East Central University, have been unsurpassed, providing multiple opportunities for high-paying jobs, industry growth, and economic development in the region.

Dr. Keeley was a founding member of the Ada Water Resources Board in 1999 and currently serves as a member of the Oka Institute's Advisory Council and research subcommittee. She has dedicated her career to the advancement of scientific solutions that will allow us to be the best possible stewards of our water resources both today and well into the future.



Arnold Miller provided leadership for the Weatherford Water Department for 48 years. His service as Water and Wastewater Superintendent, which began in 1967, was instrumental to the tremendous growth and economic development of the City and Southwestern Oklahoma State University.

Mr. Miller worked passionately to ensure adequate upgrades to water infrastructure to accommodate residential and industrial growth while operating the department in a conservative financial manner. He is said to have an institutional memory of virtually every water and sewer line in the city.

Mr. Miller is known by all for going above and beyond to ensure the safety and integrity of the City's water supply. He embodies all the attributes of a true public servant, and he has been recognized by multiple organizations for his leadership in water and sewer system planning and management, as well as for his efforts to improve the health and well-being of his employees and the citizens of Weatherford.

Mr. Miller served on the Oklahoma Water and Pollution Control Association as president in 1978 and 2008, receiving the President's Award for Outstanding Service in 2005. He served on the Oklahoma State Department of Health Water and Wastewater Works Advisory Council for seven years. He has been granted Life Time Member status in the American Water Works Association.

Mr. Miller retired in 2008, but continues to be engaged in managing, protecting, and conserving Oklahoma's water resources through consulting work.

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- Geary Utilities Authority—\$100,000 Drinking Water State Revolving Fund (DWSRF) Loan
- Roland Utility Authority—\$740,000 CWSRF Loan
- Wagoner County No. 4— \$14,835,000 CWSRF Loan

Loans and grants approved by the Oklahoma Water Resources Board on December 6, 2019:

- Tahlequah Public Works Authority—\$6,750,000 CWSRF Loan
- Miami Special Utilities Authority—\$2,785,000 DWSRF Loan
- Meeker Public Works Authority—\$78,000 CWSRF Loan
- Elgin Public Works Authority—\$2,400,000 CWSRF Loan
- East Central Oklahoma Water Authority—\$36,130 CWSRF Loan
- Duncan Public Utilities Authority— \$20,446,000 CWSRF Loan
- Collinsville Municipal Authority— \$8,291,000 DWSRF Loan
- Cameron Public Works Authority— \$43,310 CWSRF Loan

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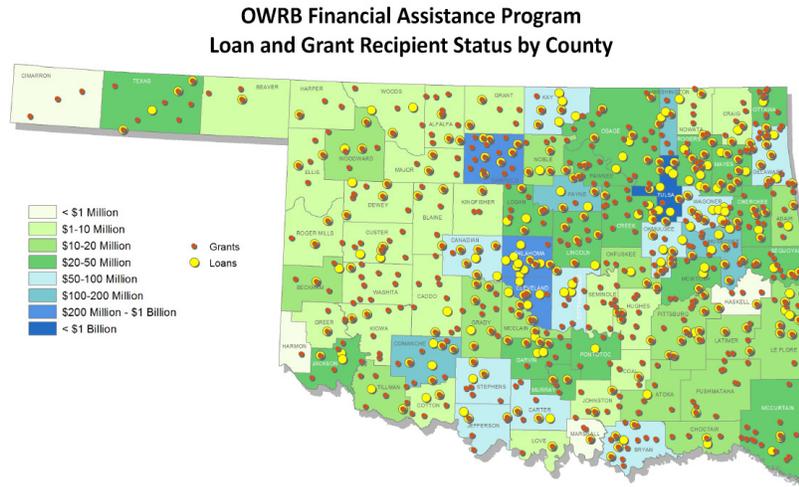
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Total Loans/Grants Approved: 2,266 totaling \$4,472,008,244

Estimated Savings: \$1,491,808,903

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**Oklahoma Water News
4th Quarter, 2019**

Published by the Oklahoma Water Resources Board. For questions or comments, please contact Darla Whitley, Editor, at pubinfo@owrb.ok.gov or (405) 530-8800.



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Julie Cunningham, Executive Director