



# Oklahoma COMPREHENSIVE Water PLAN

## 2007 Status Report

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Now entering its second century of statehood, Oklahoma faces a myriad of water challenges, not the least of which are unavoidable drought cycles. If Oklahoma is to reach its potential for economic growth while securing optimum quality of life for its people, Oklahoma citizens must assume a direct role in shaping policy that guides the management, development, and protection of water resources.

While Oklahoma's current Water Plan, published in 1997, provides an indispensable inventory of the state's water supplies, projects future needs, and offers recommendations to deal with impending water policy questions, state citizens require a more detailed strategy to meet the many new challenges posed by increased usage and competition for available water supplies. With public opinion and legal obligations in mind, policy makers must achieve a balance between economic development on the one hand and recreational and environmental needs on the other.



# Meeting Oklahoma's Future Water Supply Challenges

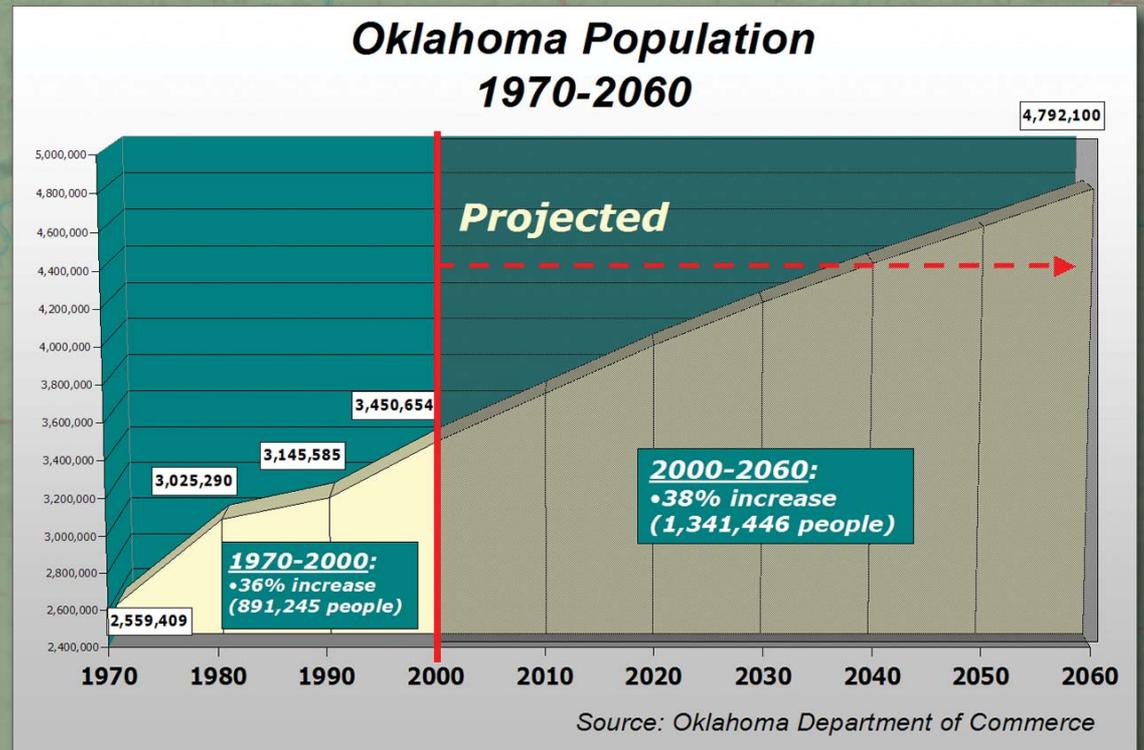
Today, Oklahomans realize that drought is not an anomaly, but a normal climatic variable that is a constant threat to the welfare of state citizens. The recently initiated update of the Oklahoma Comprehensive Water Plan represents a crucial shift in the state's traditional approach to water planning, one that promotes development of system-level plans to prepare for cyclical drought and provide the most water to the most Oklahomans for 50 years or longer. To accomplish this goal, this new, more ambitious, water planning strategy centers on grass-roots implementation of water policy initiatives and projects.

The initial phase of the five-year Water Plan update, mandated last year by the Oklahoma Legislature, will produce projections of water requirements by county and planning region through forecast year 2060 as well as a comprehensive, revised inventory of the state's water supplies. The foundation of the Oklahoma Water Resources Board's innovative water study involves detailed assessments of current water supplies and the treatment plants, pipelines and related facilities that deliver water to various users.

This crucial information will be used to develop local plans aimed at providing dependable and affordable water service to Oklahoma families and thus secure the infrastructure imperative for the state's long-term growth. Identified water management strategies—including development of additional water supplies, regionalization of facilities, infrastructure upgrades, and management options—will be implemented, wherever feasible, to meet the future needs of citizens, industry, recreation, and the environment, even during drought conditions.

## Water Plan Goals

- Provide safe and dependable water supply for all Oklahomans while improving the economy and protecting the environment.
- Provide information so that water providers, policy-makers, and water users can make informed decisions concerning the use and management of Oklahoma's water resources.



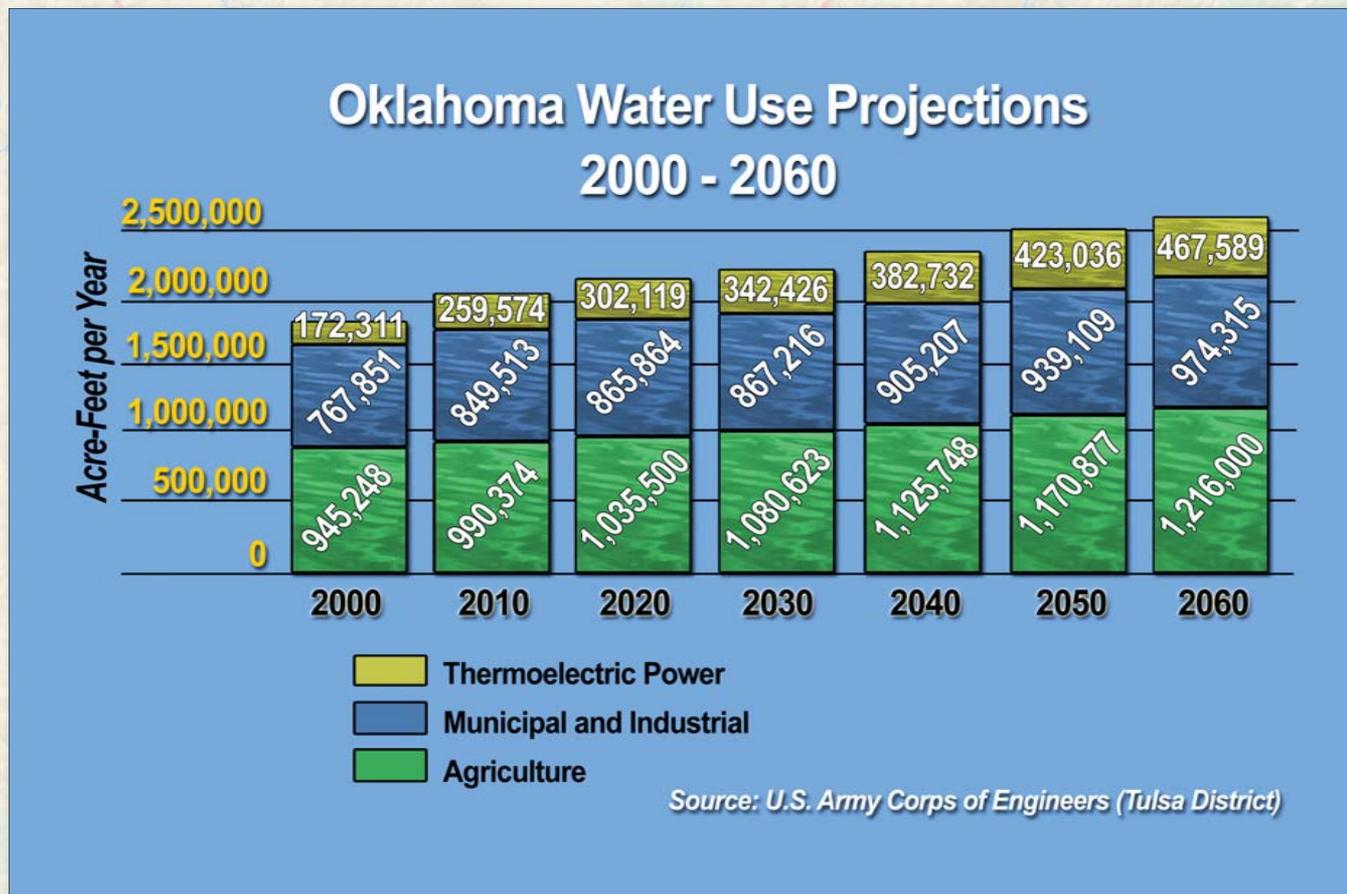
# Public Community Water Supply Assessment

Working with municipal and rural water system representatives, community leaders, the Department of Environmental Quality, and consultant engineers, each of the state's 785 community water systems and appurtenant facilities (representing the water used by at least 94 percent of the state's citizens) will be assessed to determine its condition and required improvements. Sources of supply will be inventoried and reviewed to find out how capable they are of serving both the present and future needs of their customers.

System-level information obtained through the Water Plan's public water supply assessment will allow planners to pinpoint short- and long-term supply and infrastructure needs and potential management opportunities that can be implemented to help meet future public, agricultural,

industrial, recreational, and environmental water needs. OWRB Geographic Information System (GIS) specialists will coordinate the collection of water system information and its integration into a master database that planners can easily map and query. New and updated information will reveal solutions to various roadblocks--now opportunities--to efficient and economical water service, both locally and regionally. Specific project recommendations will be offered that meet the long-range water supply and development needs of each community water system. Ultimately, it is envisioned that every system in Oklahoma will have confidence in its existing water supply for at least the next 50 years or have a viable plan to obtain that supply for their customers.

*The development of strong partnerships between water providers, policy-makers, and citizens is essential, especially to ensure the future viability of systems facing substantial growth and those in most dire need of infrastructure improvements.*

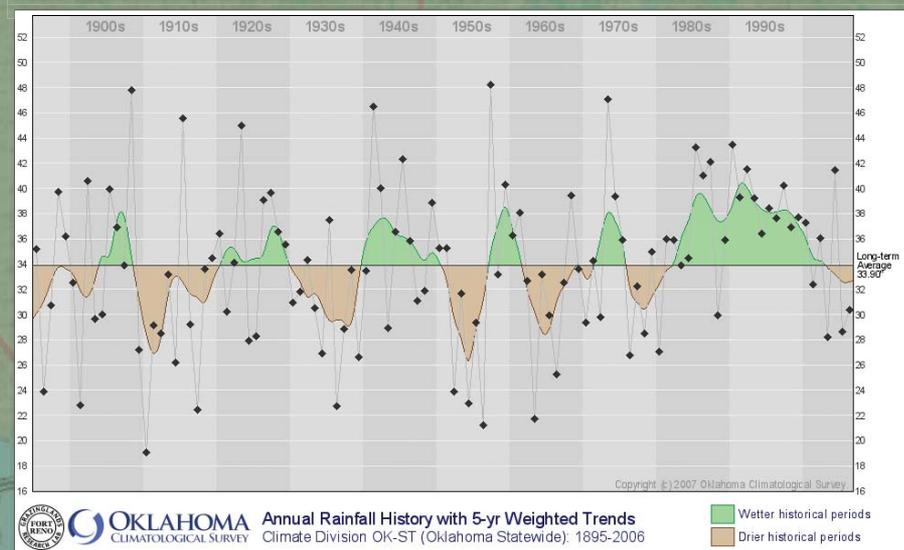
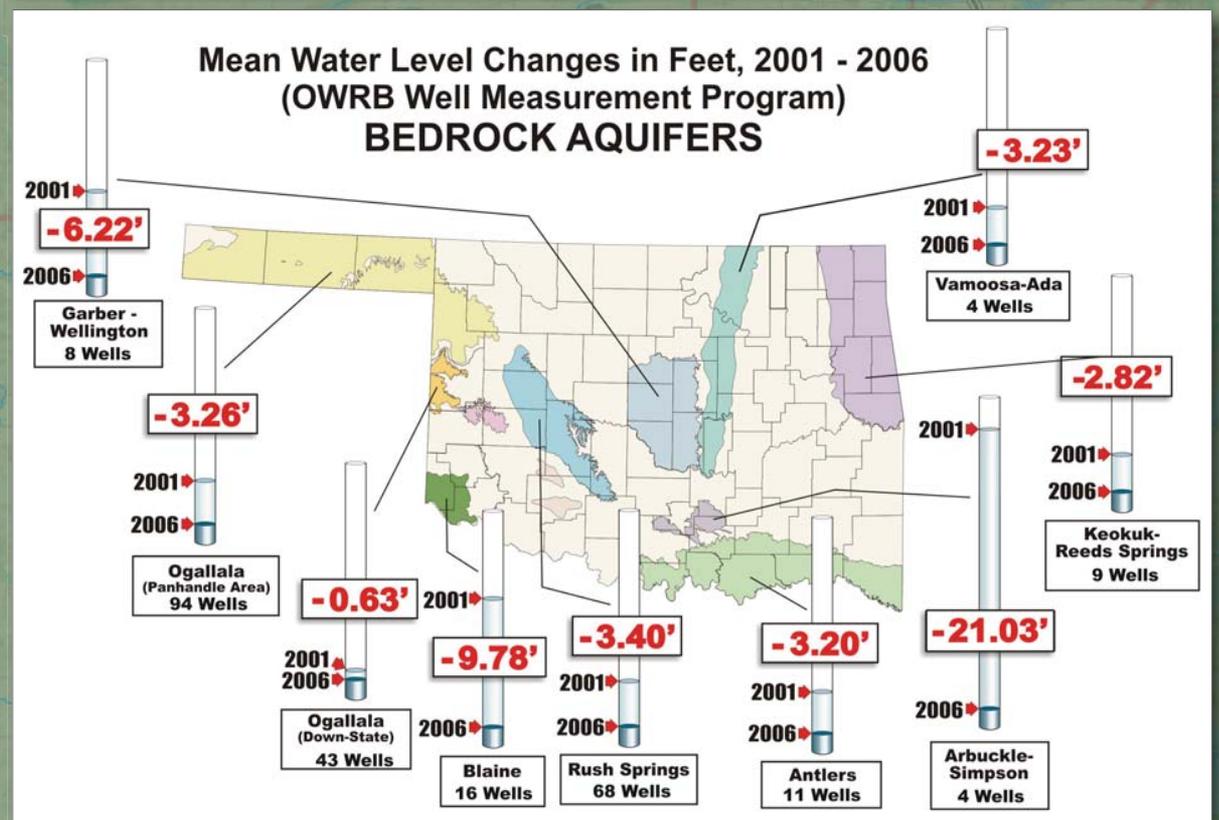
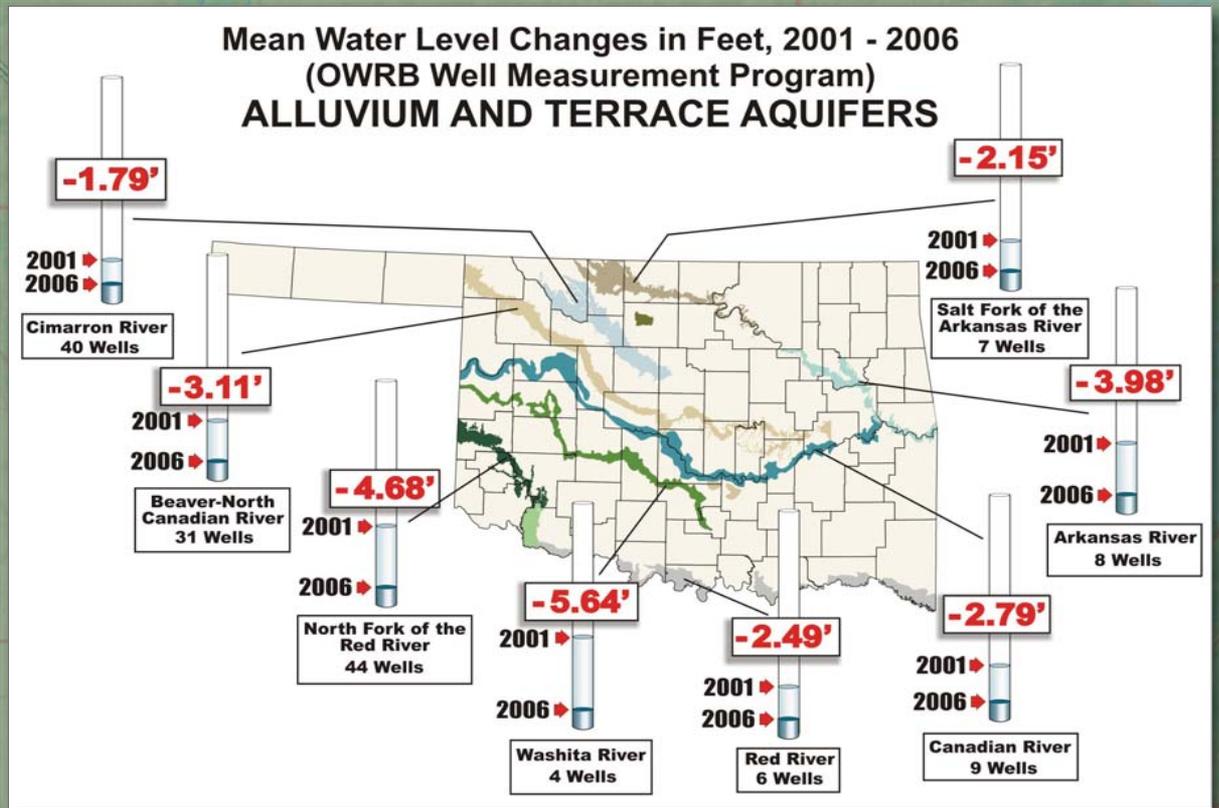


According to water demand projections developed by the U.S. Army Corps of Engineers, by 2060 Oklahomans will require more than 2.6 million acre-feet of water to satisfy agricultural, municipal, industrial, and power needs—up 772,494 acre-feet from the projected demand in 2000. Water required for agriculture should continue to represent the primary use of water, followed by municipal/industrial (combined) and thermoelectric power, which is the fastest growing water use sector. Oklahoma currently supports 48 separate power plants, including 11 specifically for hydroelectric power generation.

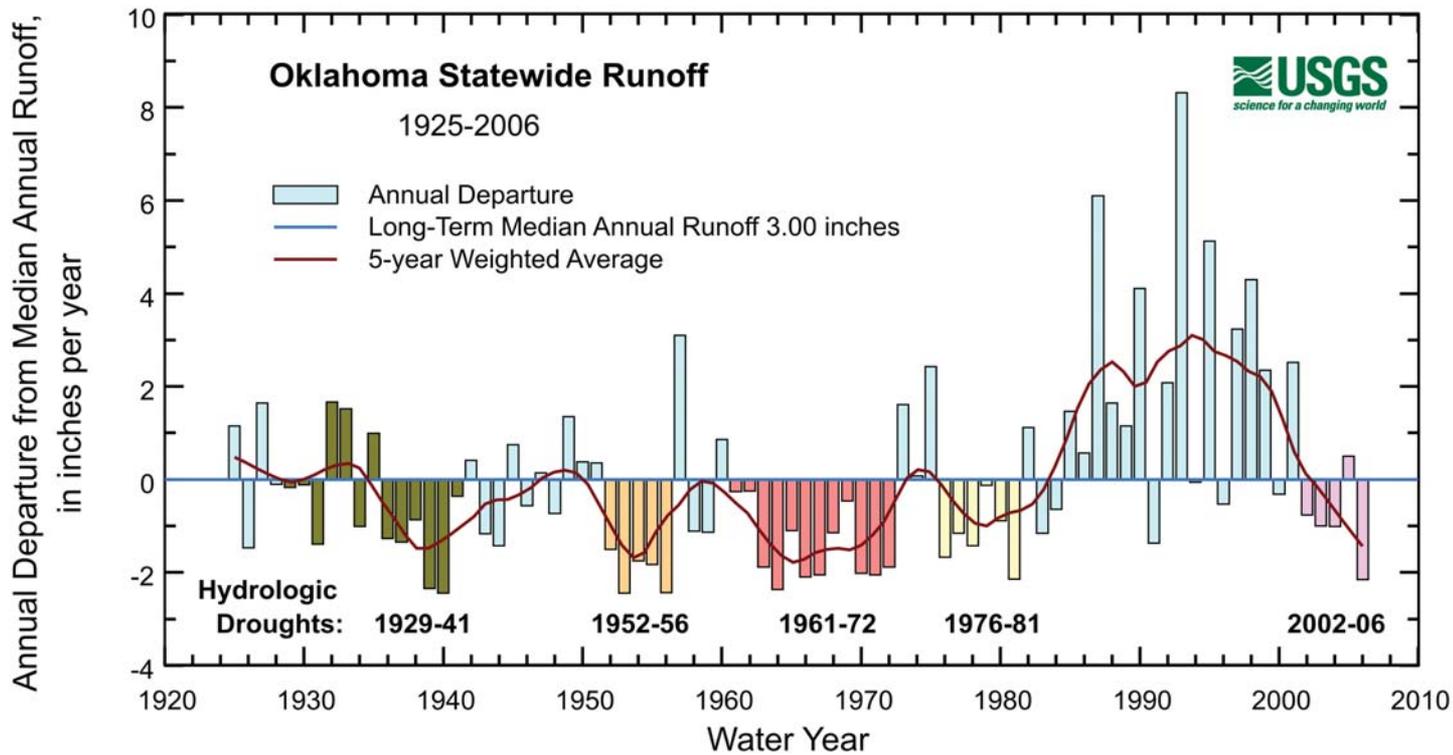
# The Variable Nature of Oklahoma's Water

Data from the OWRB's annual water well measurement program, which includes more than 600 wells located throughout Oklahoma, indicate that average levels in the state's major aquifers have declined in virtually all areas over the past five years. Many factors impact short-and long-term water level fluctuations, including varying precipitation and recharge, pumping rates, and changes in water use and efficiency.

Keeping in mind that especially deeper formations and wells may not reflect these various impacts for a period of months or even years, the ongoing drought in Oklahoma, which climatologists say generally began around 2002 in some areas, is almost certainly a major cause of the recent decline.



Oklahoma's rainfall history reflects alternating wet and dry periods during the last hundred years. The graph indicates a lengthy wet period from the early 1980s through the 1990s, followed by the typical drier period currently being experienced throughout much of the state.



A plot of statewide runoff showing the annual departure of runoff from the statewide median of 3 inches (blue line) and a 5-year weighted average line for Water Years 1925-2006 (red line). Wetter years plot above the median line and drier years plot below the median line.

## Oklahoma Water Quality

According to the most recent Water Quality Assessment Integrated Report, published every two years by the Oklahoma Department of Environmental Quality, 64 lakes in the state and 8,715 miles of rivers and streams are currently reported to be “impaired.” In other words, according to the findings of various local, state, and federal monitoring programs, these waterbodies do not meet existing Oklahoma Water Quality Standards (OWQS), which are maintained by the OWRB. Turbidity, by far, is the number one pollutant of state waters, although factors such as dissolved oxygen and pH and excessive levels of various pollutants, such as phosphorus, also prevent surface waters from attaining beneficial uses prescribed in the OWQS.

Federal Clean Water Act regulations require all states to conduct total maximum daily load (TMDL) studies on waters classified as impaired. These studies determine reductions in pollution loads from both point and nonpoint sources that are required to meet water quality standards.

In addition to providing data to support identification of impaired waters in Oklahoma, information from the OWRB’s Beneficial Use Monitoring Program also contributes to designation of “nutrient limited watersheds” (NLW). NLW waterbodies are determined to contain excessive levels of algae that decreases concentrations of dissolved oxygen in the water, severely threatening aquatic organisms and causing serious odor and related problems. The NLW designation may limit or restrict the land application of poultry, swine, and/or cattle waste within the watershed.

## Nutrient Limited Watersheds



# Groundwater Development

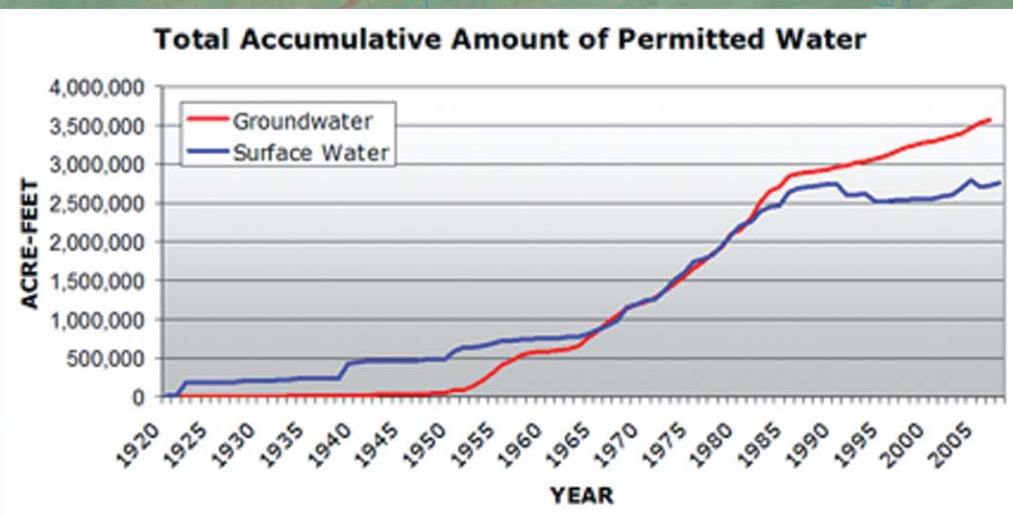
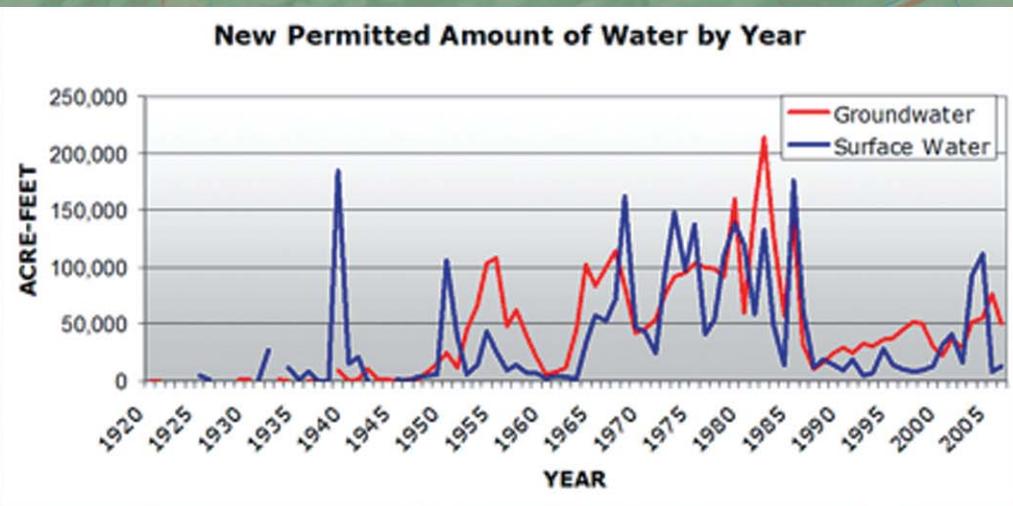
Although its use is subject to reasonable regulation by the OWRB, groundwater in Oklahoma is considered a private property right. Prior to enactment of the Oklahoma Groundwater Law in 1973, the resource was regulated through the prior appropriation system (“first in time, first in right”), much like stream water is regulated today. However, the new law established an allocation system that bases apportionment of groundwater upon the amount of land owned, generally two acre-feet of water per

Active Groundwater Permits Prior to 1973

Active Groundwater Permits, 2007

Reported Wells as of April 2007

69,921 Total Wells  
(49,038 Domestic)



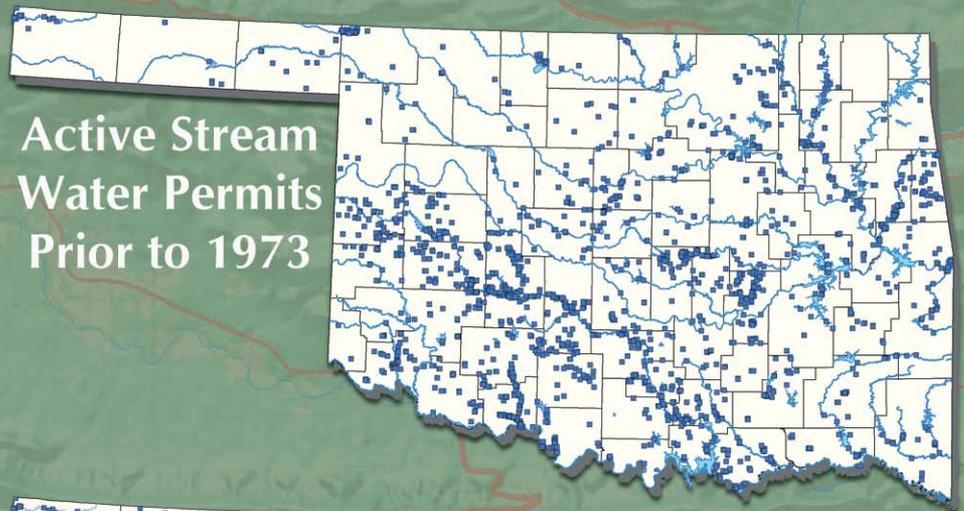
acre of land (slightly more or less in basins where detailed hydrologic surveys have been conducted). This more liberal system promotes development and growth (as reflected by the increase in permitted use from 1972 to today), but does not account for the hydrologic connection between surface and groundwater resources nor the sustainability of Oklahoma’s groundwater supplies.

Since the 1980s, the state has experienced a drastic increase in the total number of wells drilled, especially for unpermitted household use and limited grazing, agriculture, and fire protection purposes. More than 49,000 water wells in Oklahoma—more than 70 percent of all reported wells in the OWRB’s database—are currently utilized solely for domestic use of water (allowing the use of no more than five acre-feet per year, or about 1.6 million gallons) and do not require a groundwater permit. Many of these wells are drilled to accommodate the growing number of rural residents in Oklahoma who lack access to a public water supply system.

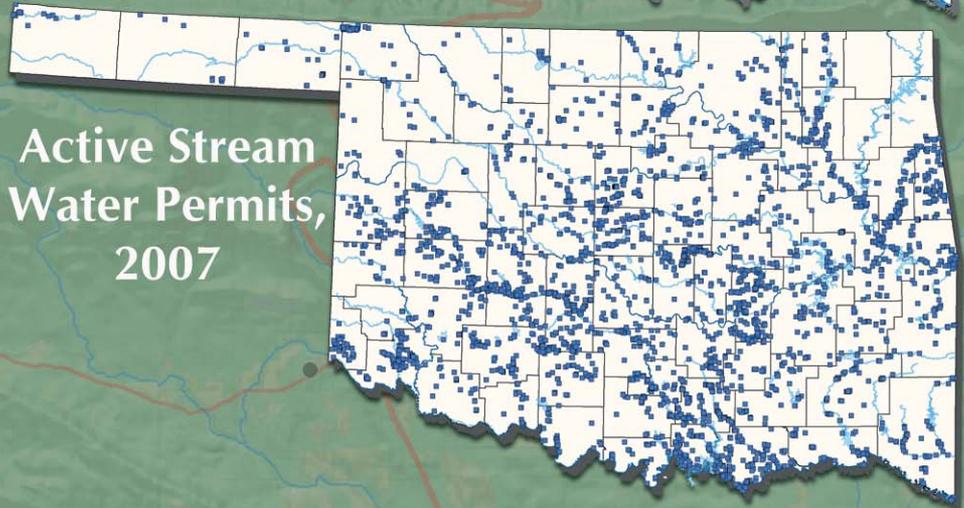
# Surface Water Development

Development of Oklahoma's surface water resources generally peaked during the large reservoir construction boom from about the early 1940s throughout the 1960s when all but a handful of the state's 52 major projects were built. In addition to providing enormously important flood control, hydropower, and related benefits, these lake projects—primarily funded through the U.S. Army Corps of Engineers, Bureau of Reclamation, and other federal agencies—contain the vast majority of Oklahoma's dependable surface water supply. Oklahoma's water users, especially public water supply systems, must rely on lake storage, rather than fluctuating streamflows, for their many needs.

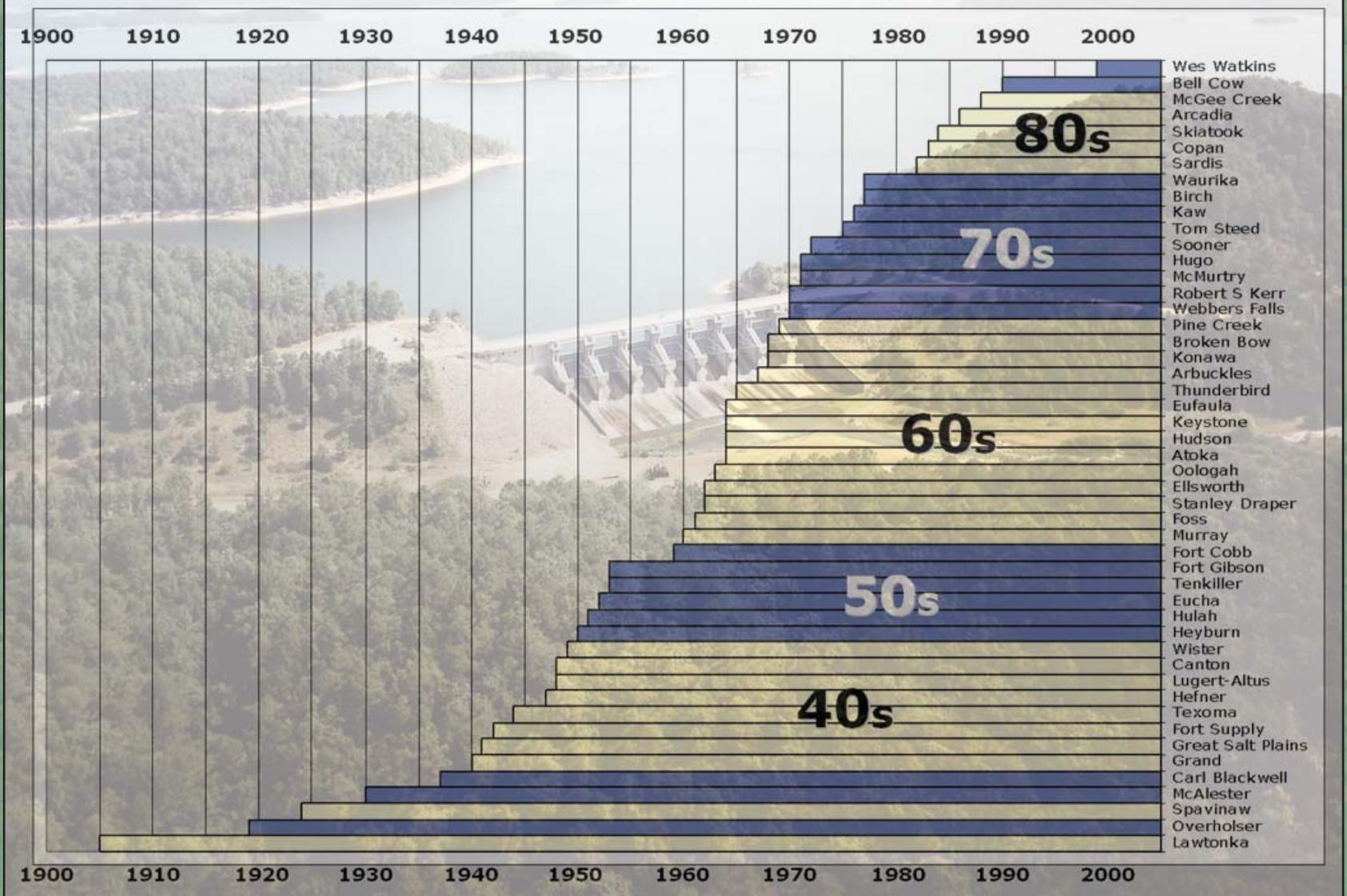
Active Stream Water Permits Prior to 1973



Active Stream Water Permits, 2007



## Oklahoma Water Development—Major Reservoirs



# Public/Stakeholder Participation & Policy Development

Input from the public and various stakeholders--those who comprise Oklahoma's water user community--will be crucial to success and eventual implementation of the state's updated Water Plan. Throughout the five-year planning period, an extensive public participation program will be implemented to make the planning process as transparent and open as possible and create a final product that is not only backed by strong science but truly reflects the views and opinions of Oklahoma citizens.

The OWRB will draw upon the expertise of the Oklahoma Water Resources Research Institute (OWRRI), located at Oklahoma State University, to solicit fair and constructive public input. At its December 2006 meeting, the OWRB approved a contract with OWRRI that establishes the Institute as the primary facilitator of the vital public participation and policy development component of the Water Plan update. This process will also be guided by an advisory board of technical and policy experts. Throughout much of the planning period, the Institute will coordinate individual studies of emerging water issues, such as instream flow protection and the interaction of stream and groundwaters, with results incorporated into the final plan.

The public engagement process will be conducted in five steps over the next four years; every meeting will be professionally facilitated. In April, the first of 42 local input meetings was held in Beaver, Oklahoma. These meetings provide citizens with the opportunity to identify issues they believe should be considered in the new Water Plan, voice concerns about existing and potential water problems, and contribute possible solutions to these issues and problems.

Next year, 11 regional input meetings will be held throughout Oklahoma to categorize and prioritize water issues raised during the initial round of meetings. About 30 individuals from each region who are particularly knowledgeable of water issues across the state will participate in facilitated discussions. Utilizing the refined

water issues, in 2009 the Institute will schedule a series of planning workshops to formulate alternative water resource management strategies. These workshops will be organized around the issues and issue categories that were identified in the input meetings. Each of the 12 anticipated workshops will be repeated to allow water experts to respond to questions raised by the participants. Approximately 20 Oklahomans will be invited to participate in each of the workshops.

During 2010, the Institute will work with the Oklahoma Academy for State Goals to host a 3-day town hall meeting in Norman. Approximately 150 Oklahomans will be invited to consider alternative water resource management strategies formulated during the planning workshops and reach agreement on a series of formal Water Plan recommendations for eventual consideration by the State Legislature and Governor. The "town hall" format is a systematic issue resolution process implemented by the Academy, founded in 1985 as a private nonpartisan organization that identifies critical issues facing Oklahoma's future.

During 2011, the Institute will return to the 11 planning regions to review and discuss the draft Water Plan. Participants will be encouraged to offer suggestions about implementation of the Plan.

A schedule of meetings, supporting background documents, reports, and related information on the Water Plan update are available on the Institute's Web site at [www.okwaterplan.info](http://www.okwaterplan.info). Citizens who are unable to attend a local meeting may also submit their comments and suggestions through the site.



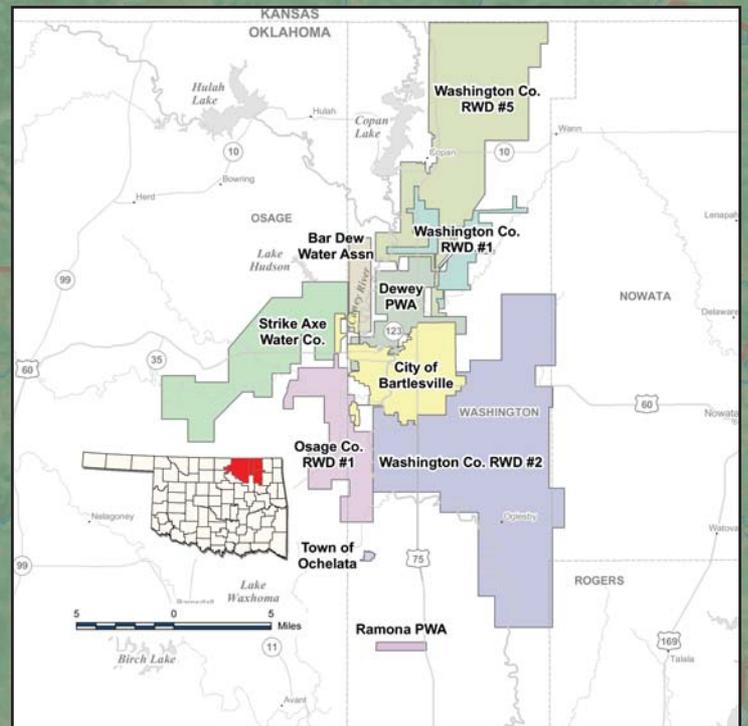
# Bartlesville Sets Standard for Regional Water Suppliers

Regional systems that serve customers from many towns and water districts are often able to provide the most efficient, economical, and reliable water supply. Regionalization helps mask funding constraints. Consolidated systems also stand a greater chance of withstanding drought episodes and periods of increased water demand.

Bartlesville city leaders are quickly establishing the community as a model regional water supplier for northeast Oklahoma. To meet prospective growth in the region, the City's new state-of-the-art drinking water treatment plant—dedicated last September—is designed to meet the projected needs of customers in the surrounding communities of Dewey, Ramona, and Ochelata; five rural water districts; and private water companies in the area. Construction of the new Bartlesville plant was enabled through a \$44.5 million dollar OWRB Drinking Water State Revolving Fund (DWSRF) program loan, which bears a low interest rate of 3% that will save

Bartlesville and its water customers more than \$13 million in project finance costs.

The plant, which currently serves approximately 50,000 water customers, was also designed for easy expansion to address future growth. To supplement existing drinking water supplies at Lakes Hulah and Hudson, the city is currently engaged in a cooperative study with the Corps of Engineers to investigate water supply options to meet Bartlesville's growing needs through the year 2055.



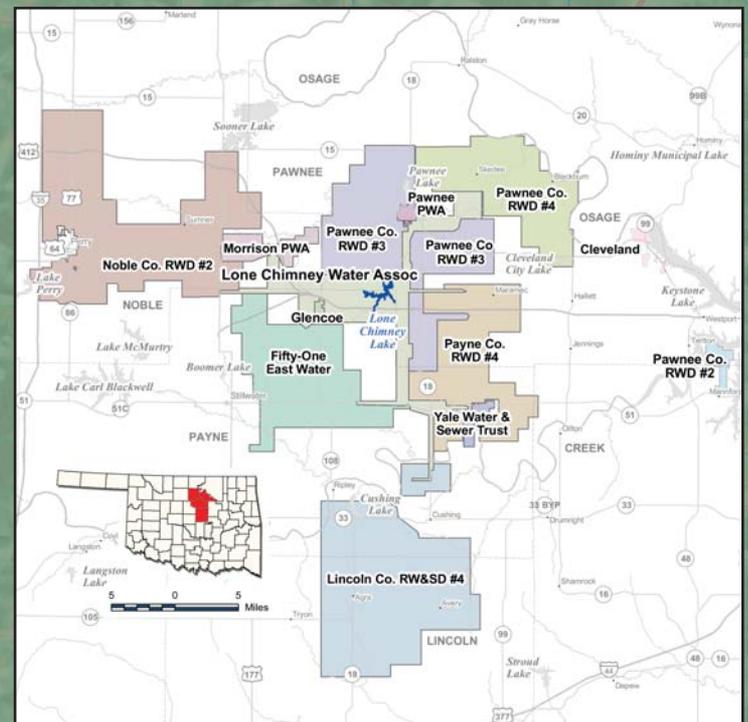
# Drought Invokes Planning Strategies at Lone Chimney

As a direct result of the recent ongoing drought episode, low lake levels have led to severe water shortage emergencies, such as that recently impacting Lone Chimney Lake and the surrounding area. Last November, the lake's level dropped almost 10 feet below normal, severely impeding the intake structure's ability to withdraw water for the everyday needs of 16,000 citizens (including five schools and two hospitals) in the 12 towns and rural districts of four counties. The resulting "drought emergency" declaration made the Lone Chimney Lake Water Association (LCLWA) eligible for a \$100,000 OWRB emergency drought grant, which was used to fund installation of a submersible intake structure that can rise and fall with the water level.

Unfortunately, the new intake will only extend the available water supply for a matter of months, which brings into question the suitability of Lone Chimney Lake as the sole long-term water source for the region. To solve this problem, LCLWA officials are seeking to construct a 12-inch water line that would tap into the existing line connecting

Stillwater to Kaw Lake, about 15 miles away. This proposed project is typical of long-range water supply projects envisioned as part of the update of the Oklahoma Comprehensive Water Plan, due for completion in 2011.

The Plan seeks to establish sources of water that satisfy local growth and water requirements for at least 50 years. More specifically, the final Water Plan will identify required water supply projects (particularly in priority/problem areas), develop feasible engineering plans, and establish a funding mechanism to implement them.



# Administration of Oklahoma's Surface and Groundwater Rights

All uses of surface and groundwater in Oklahoma for other than domestic/household purposes must be permitted by the OWRB.

**Groundwater** use is a legal property right tied to ownership of the land. Applicants must satisfy four legal requirements in order to obtain a groundwater use permit:

- the applicant owns or leases the land from which the water will be withdrawn;
- the dedicated land overlies a groundwater basin;
- the water will be put to a beneficial use; and
- waste of the water will not occur.

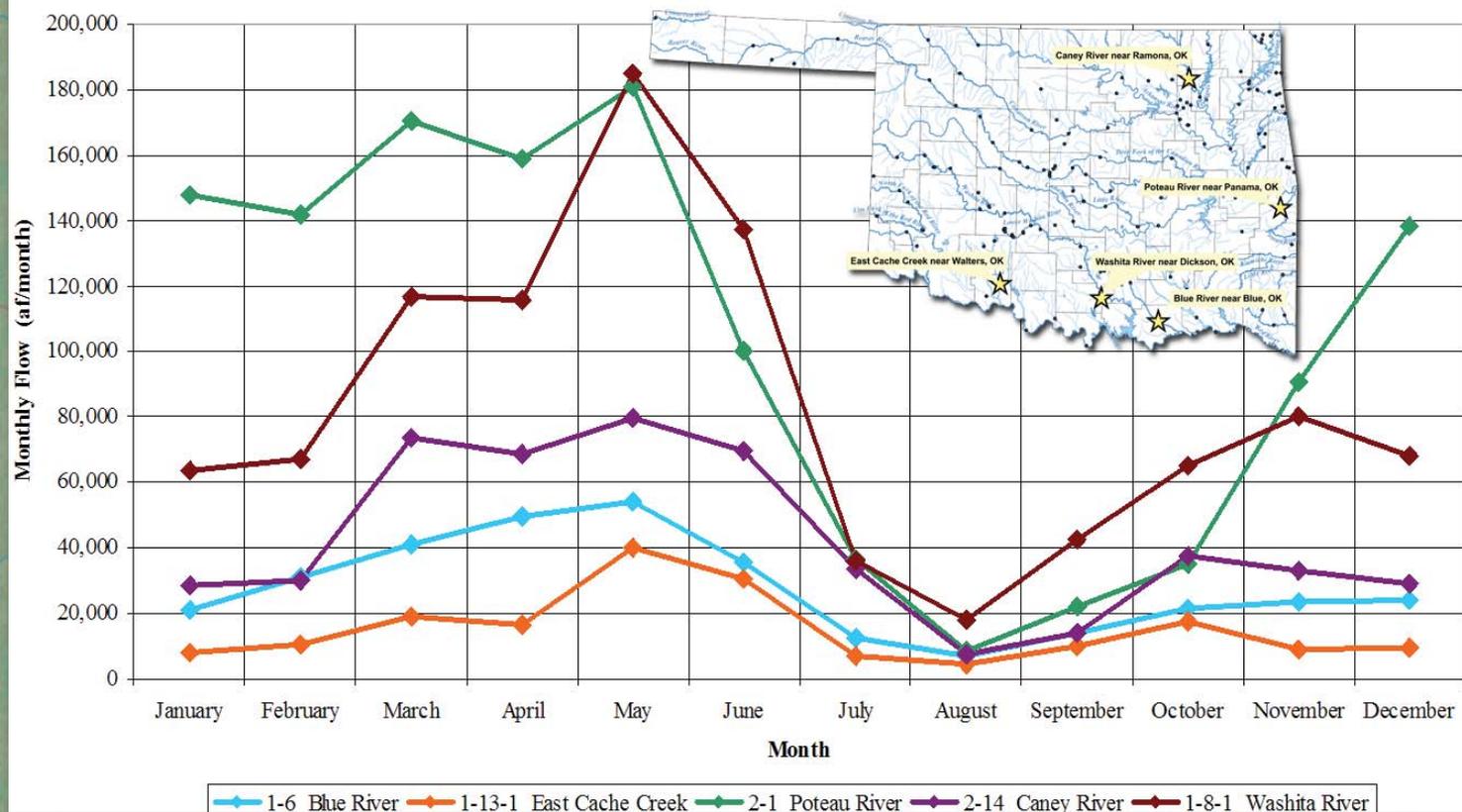
**Surface water** is publicly owned. Before permitting its use, the Board must determine that:

- unappropriated water is available in the amount applied for;
- the applicant has a present or future need for the water;
- the applicant intends to put the water to a beneficial use;
- the proposed use would not interfere with domestic/existing appropriative uses; and
- if use of the water is to occur outside the stream system of origin, it would not interfere with existing or proposed beneficial uses within the stream system.



Surface water law dictates that if there is not enough water to satisfy all uses of a river, creek, lake or pond, the permit filing data determines who gets the water—"first in time, first in right." Beneficial use is required to establish and maintain the water right. If the water is not used at least once during any consecutive seven-year period, the right of the unused amount is lost. Although water appropriations are predicated on the annual use of water, frequently the most urgent need for irrigation, municipal supply, or other uses occurs during a brief summer period and time of meager streamflow (see below).

**Mean Monthly Streamflows (Period of Record)  
Selected Major River Basins in Oklahoma**



# Plan Implementation

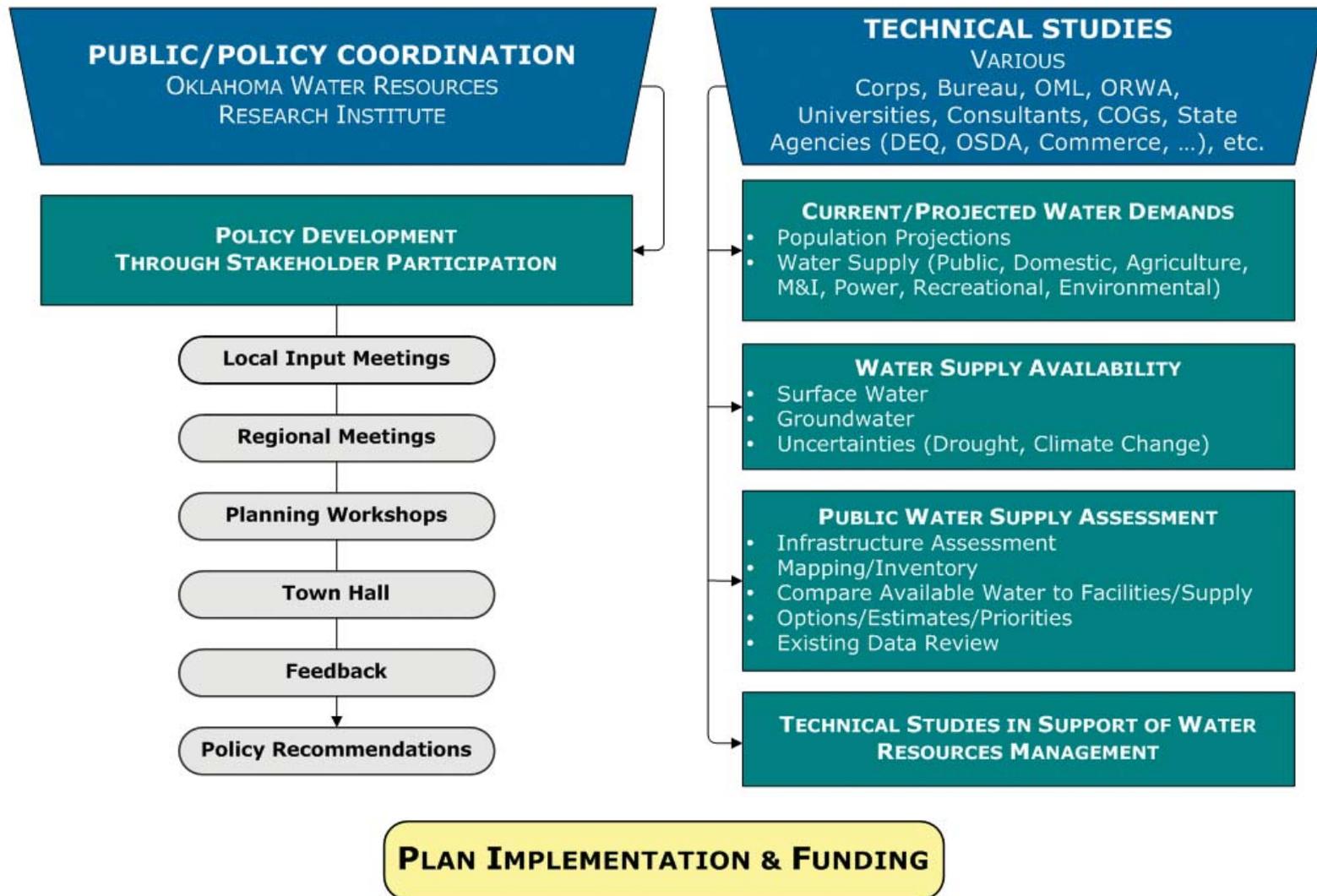
Data gathered during the Water Plan update's Public Community Water Supply Assessment, coupled with new water use projections for Oklahoma, will undoubtedly reveal many projects to greatly enhance the overall efficiency of water supply treatment, distribution, and management. However, only wide-scale implementation of plans and tools derived from the final Water Plan will separate the document from its more policy-oriented predecessors.

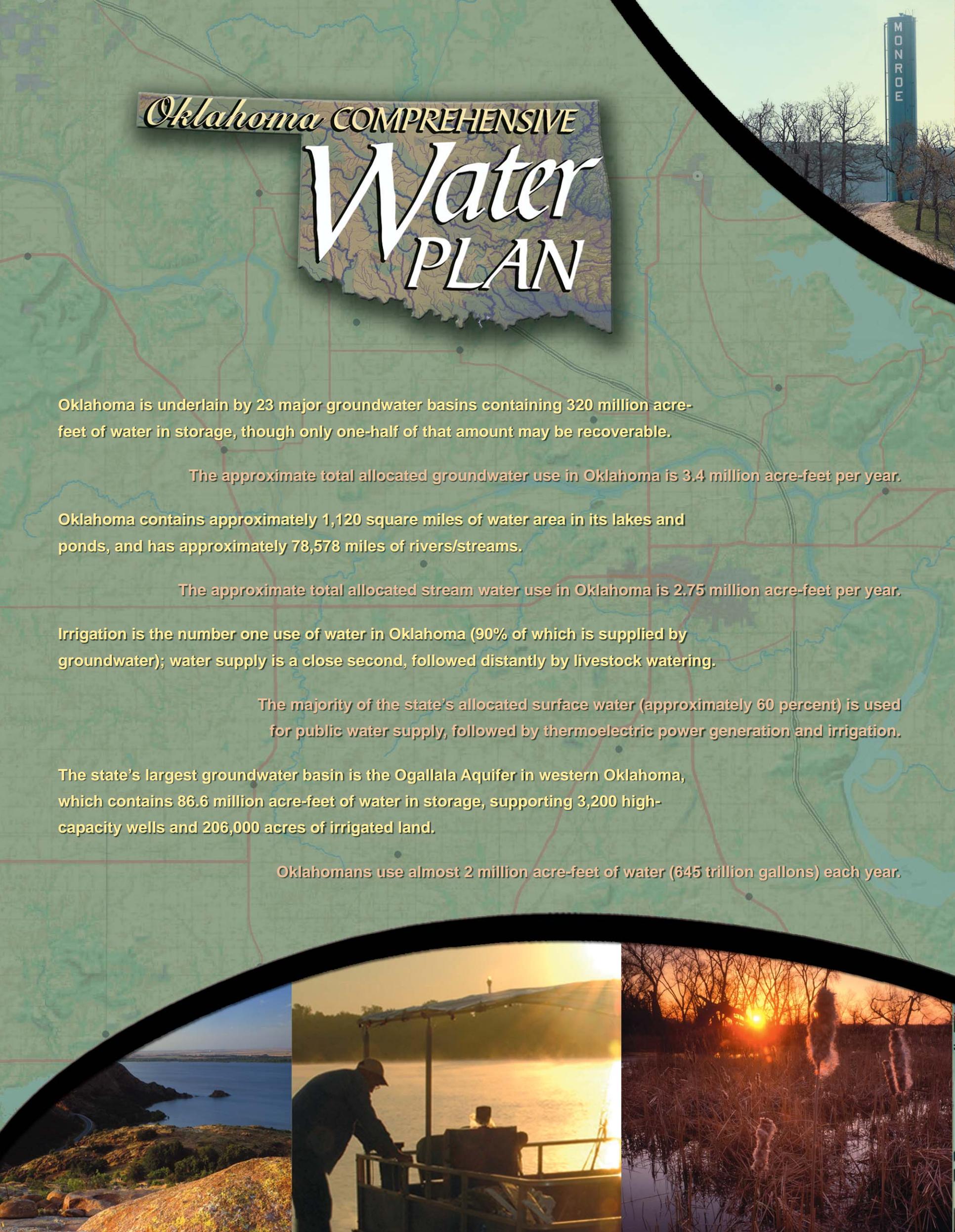
Loan and grant offerings provided through the OWRB's Financial Assistance Program will provide a much-needed springboard for widespread project construction. To encourage the implementation of required water

infrastructure improvements in Oklahoma, projects directly included in the Water Plan or inspired by its data and concepts will receive particular attention for FAP funding.

Through the update of Oklahoma's Water Plan, the Water Resources Board and its partners are working to assemble the information necessary for water providers, policy-makers, and citizens to make informed and intelligent decisions that will impact the state for centuries to come. We encourage all Oklahomans to join us for the next five years as we take state water planning to another level, from appraisal of our precious surface and groundwater resources to execution of the projects and policies that are necessary to secure a bright water future for Oklahoma.

## Oklahoma Comprehensive Water Plan Process





# Oklahoma *COMPREHENSIVE* Water PLAN



Oklahoma is underlain by 23 major groundwater basins containing 320 million acre-feet of water in storage, though only one-half of that amount may be recoverable.

The approximate total allocated groundwater use in Oklahoma is 3.4 million acre-feet per year.

Oklahoma contains approximately 1,120 square miles of water area in its lakes and ponds, and has approximately 78,578 miles of rivers/streams.

The approximate total allocated stream water use in Oklahoma is 2.75 million acre-feet per year.

Irrigation is the number one use of water in Oklahoma (90% of which is supplied by groundwater); water supply is a close second, followed distantly by livestock watering.

The majority of the state's allocated surface water (approximately 60 percent) is used for public water supply, followed by thermoelectric power generation and irrigation.

The state's largest groundwater basin is the Ogallala Aquifer in western Oklahoma, which contains 86.6 million acre-feet of water in storage, supporting 3,200 high-capacity wells and 206,000 acres of irrigated land.

Oklahomans use almost 2 million acre-feet of water (645 trillion gallons) each year.

