



# Ozark Plateau Aquifer Newsletter

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## Ozark Groundwater Model Results

The Ozark Plateau aquifer system groundwater-flow model developed by the U.S. Geological Survey for an area covering 7,340 square miles for parts of Arkansas, Kansas, Missouri and Oklahoma is complete. This article summarizes the model results and includes information from the final model report released by the U.S. Geological Survey. The model characterizes groundwater flow within the Ozark Plateaus aquifer system and assesses the effect that increased water use may have on the long-term availability of groundwater.

The Ozark aquifer is recharged from runoff and river infiltration in outcrop areas where permeable parts of the aquifer outcrop, generally east of the model area, and from downward flow through the overlying confining unit. All municipal and industrial wells, and some residential wells, in the model area are open to the Ozark aquifer, which is 250 feet to more than 1,000 feet beneath the land surface. A confining unit varying in thickness from 0 to about 100 feet overlies the Ozark aquifer and generally impedes groundwater flow between the Springfield Plateau aquifer and the Ozark aquifer in most places. The Springfield Plateau aquifer yields sufficient water for residential use and was used as a source of water to many older domestic wells. Large mined zones contained within the Springfield Plateau aquifer were represented in the model as extensive voids with larger hydraulic conductivity than the adjacent non-mined zones.

Water use data were compiled for the period from 1950 to 2006. In 2006, total water use from the Ozark aquifer for Missouri was 8,531,520 ft<sup>3</sup>/day (87 percent of the total water use for the model area), with Kansas at 727,452 ft<sup>3</sup>/day (7 percent of total), and Oklahoma at 551,408 ft<sup>3</sup>/day (6 percent of total). Groundwater flow within the model occurs generally from the highlands of the Springfield Plateau in the southwest Missouri toward the west, with localized flow occurring toward rivers and five pumping centers near Joplin, Carthage and Noel, Missouri; Pittsburg, Kansas; and Miami, Oklahoma.

Hypothetical scenarios involving various increases in groundwater pumping rates in the Ozark aquifer were analyzed with the groundwater model to assess possible changes in the flow system to the year 2057. Pumping rates were increased between 0 and 4 percent per year starting with the 2006 rates for all wells in the model. Sustained pumping at 2006 rates was feasible at the five pumping centers until 2057. Model cells in four of the pumping centers go dry (Carthage, Joplin and Noel, Missouri, and Miami, Oklahoma) in the increased pumping hypothetical scenarios, one as early as 2029 (Carthage, Missouri; 4 percent increase in pumping per year). Even under a 1 percent increase in pumping per year, model cells at Carthage and Noel, Missouri, go dry by years 2037 and 2057, respectively, indicating that pumping at 2006 rates is the maximum rate that can be pumped without model cells in those pumping centers going dry. The occurrence of dry cells indicates that pumping is not sustainable at those rates.

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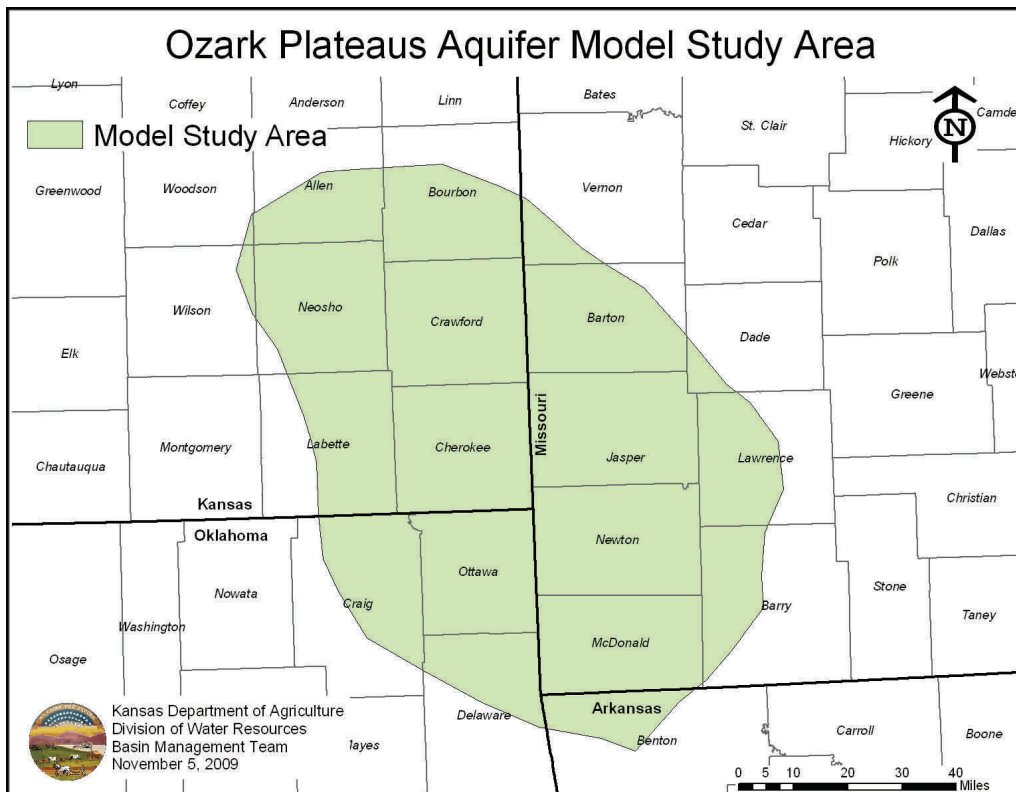
*Pumping rates were increased between 0 and 4 percent per year starting with the 2006 rates for all wells in the model. Sustained pumping at 2006 rates was feasible at the five pumping centers until 2057.*

## Ozark Model Results (continued)

Groundwater pumping causes substantial reductions in water in storage and induces flow through the Ozark confining unit for all hypothetical scenarios evaluated. Although flow from the Ozark confining unit is substantial, it is not uniformly distributed, and it varies spatially based on the vertical hydraulic conductivity and gradient and the Ozark confining unit thickness. The largest component of flow into Kansas comes from downward flow from the overlying Ozark confining unit, and varies from 21 percent to 41 percent of the total flow into Kansas in the different scenarios. As pumping in Kansas increases, the amount of water released from storage increases and is consistent with the increased size in cones of depression in Kansas. The largest component of flow out of Kansas occurs as pumping from wells, which range from 39 percent to 61 percent for all the scenarios. The second largest flow component out of Kansas is flow from Kansas to Missouri. This flow rate, which ranges from 30 percent to 43 percent of the total flow out of Kansas, is induced by pumping that occurs in Missouri. Net flow (the difference between flow into and flow out) in 2057 from Kansas to Missouri ranges from 74,044 ft<sup>3</sup>/day for 2006 pumping rates to 625,319 ft<sup>3</sup>/day for a 4 percent increase in pumping per year.

*The second largest flow component out of Kansas is flow from Kansas to Missouri. This flow rate, which ranges from 30 percent to 43 percent of the total flow out of Kansas, is induced by pumping that occurs in Missouri.*

For more information on the Ozark Plateau aquifers and the groundwater model, including the groundwater model final report, visit our website at [www.ksda.gov/subbasin/content/297](http://www.ksda.gov/subbasin/content/297).



### Goal

Manage the Ozark Plateau aquifer system and its surface water sources in southeast Kansas for long-term sustainability, to meet current and long-term growth demands, provide good quality water and to meet minimum desirable streamflow.

## Meetings for Input on Ozark Plateau Aquifer Management

*The first meeting will be at  
1p.m.,*

*Monday,*

*November 9, 2009,*

*at the*

*Cherokee County Courthouse,*

*110 W Maple Street,*

*Columbus.*

*Discussion will focus on  
water quantity issues related  
to the aquifers.*

*The public is welcome  
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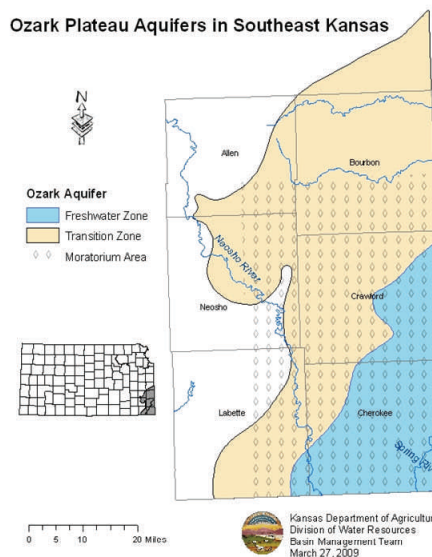
The Kansas Department of Agriculture's Division of Water Resources will conduct two informational meetings in southeast Kansas to inform stakeholders about water quantity and water quality issues of the Ozark and Springfield Plateau aquifers so that stakeholders may provide comment regarding future management of the aquifers.

The first meeting will be at 1 p.m., Monday, November 9, 2009, at the Cherokee County Courthouse in Columbus. The meeting will be in the ground floor conference room of the courthouse located at 110 W Maple Street. Discussion will focus on water quantity issues related to the aquifers. Other anticipated topics include fundamentals of the Kansas Water Appropriation Act, current management of the aquifers, model and report results, and other data available. A second meeting that will be scheduled in early December will focus on water quality issues of the aquifers. Chief Engineer David Barfield is expected to attend the meetings, present information and take questions.

These meetings are intended as a forum for public comment in the water management policy process of the Ozark and Springfield Plateau aquifers. Current regulation requires the chief engineer to address management of these aquifers by December 31, 2010. To meet that deadline, any regulations must be promulgated and in the state review process by May 1, 2010.

The Neosho River Basin Advisory Committee is forming an Ozark subcommittee made up of stakeholders with water rights in the affected area of southeast Kansas and representing different use types. The subcommittee will attend the meetings and provide recommendations on aquifer management to the chief engineer.

The public is welcome to attend the meetings and to provide input. For more information on the Ozark Plateau aquifers and upcoming meetings, please visit our website at [www.ksda.gov/subbasin/content/297/cid/1474](http://www.ksda.gov/subbasin/content/297/cid/1474).



## Update on Tri-State Water Resource Coalition Activities

At a July 7, 2009, news conference in Monett, Missouri, the Tri-State Water Resource Coalition unveiled a feasibility study conducted by Freese and Nichols regarding the potential for obtaining water supply in the tri-state area of Oklahoma, Missouri and Kansas from new reservoirs. New reservoir construction is being evaluated as an alternative if reallocation of existing water supplies is not approved.

During the meeting, Harold McCoy, a coalition representative, gave a history of the Tri-State Water Resource Coalition and then provided comments on the group's behalf. McCoy indicated that the coalition would prefer to obtain the future supply needed from existing reservoirs and that they sent letters to the U.S. Army Corps of Engineers requesting that the Corps consider reallocating the water supply from Table Rock Lake and Stockton Lake so that a portion could be used by coalition members. The time frame for a response to the letter is five to seven years. In that time, the coalition contracted with Freese and Nichols to conduct the feasibility study regarding constructing new reservoirs to meet the projected need of the members in the event that reallocation is not approved by the federal government.



Ozark Aquifer system Kansas, Oklahoma, Missouri and Arkansas.

John Rutledge of Freese and Nichols presented information on the feasibility and options of new reservoirs and possible reservoir sites by cost, based on a preliminary, basic assessment of projected need to 2050, estimated water availability, geologic considerations, and site suitability. Freese and Nichols identified 14 possible sites, four sites off-channel, with the potential to serve all coalition members from one large site or to break the members up into areas identified as east and west and serve them from multiple reservoirs by area.

For a one-site option, a James River site was identified as being the best option, but its cost of approximately \$635 million made it considerably higher than going with smaller, multiple reservoirs. The best sites for a multiple-reservoir plan for western coalition members were identified as either Indian Creek at \$197 million dollars or a Shoal Creek reservoir at about \$202 million. The best option for a reservoir to serve eastern Missouri coalition members was identified as an off-channel on Crane Creek, which would cost about \$179 million.

The Freese and Nichols study concludes that a single reservoir is not feasible for the Tri-State Water Resource Coalition and that multiple reservoirs would be the most viable alternative to existing reservoirs. Freese and Nichols identified that the time frame of a new reservoir was conservatively 15 to 20 years for planning, development and permitting. The study recommends a more detailed follow-up study that looks more closely at each site to determine whether there are any issues that would make a site unviable and explores existing reservoirs that may provide potential options. Recommendations also include looking at regional versus individual projects by area.

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## Division of Water Resources Publishes Newsletter

DWR Currents is an electronic newsletter that is distributed quarterly and focuses on providing information related to Kansas' water resources. You can subscribe to receive the newsletter by email, or you can view current and past newsletters online at [www.ksda.gov/dwr/](http://www.ksda.gov/dwr/).

**The Ozark Plateau Aquifer Newsletter** is a biannual publication of news and information pertinent. It is sent by email, or it can be viewed online. To receive the newsletter, or to view it online, visit [www.ksda.gov/subbasin/mailing\\_list/id/75](http://www.ksda.gov/subbasin/mailing_list/id/75).

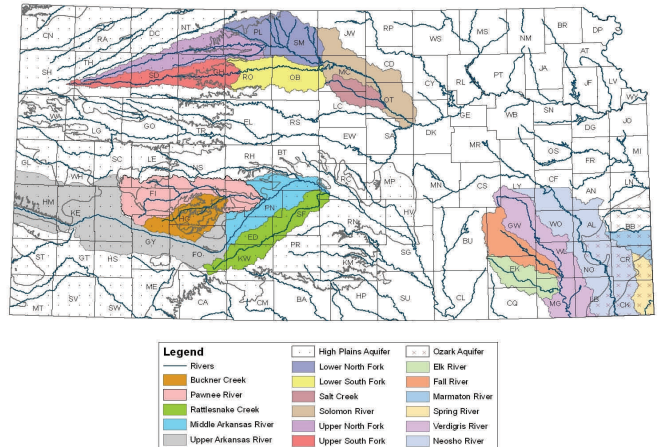
Contact us at (785) 296-3717.

## Basin Management Team

### Mission Statement

*To analyze aquifers and stream systems in targeted areas and collaborate with stakeholders to develop and assess water resource management tools and strategies to protect water rights and improve water resource sustainability.*

Visit [www.ksda.gov/subbasin/](http://www.ksda.gov/subbasin/) to learn more.



Basin Management Team project areas.