Rush Springs Aquifer of Oklahoma

Hydrologic Study Newsletter — October 2012

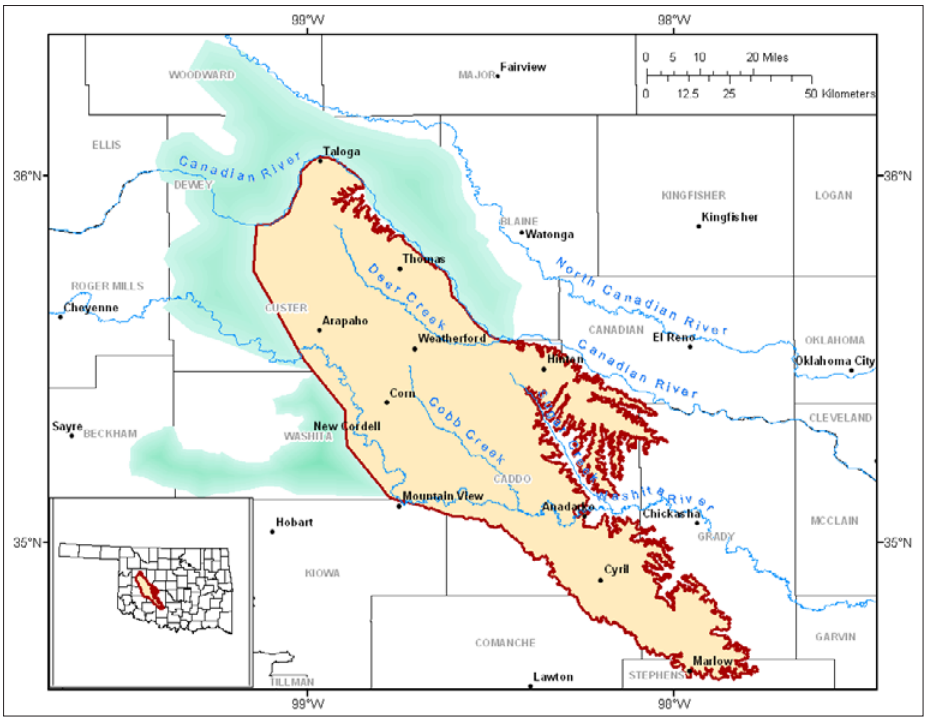
Oklahoma Water Resources Board

The Aquifer

The Rush Springs aquifer underlies approximately 2,400 square miles in west central Oklahoma, including large portions of Caddo, Custer, Washita, and Grady counties. It is the second most developed aquifer in the state after the Ogallala. Caddo County is ranked fourth statewide in the amount of permitted groundwater per county.

OWRB geologists search for wells suitable for installing groundwater-level recorders.

The predominant geologic formation in the Rush Springs aquifer is the Permian-age Rush Springs Formation. The formation is described as an orange-brown, cross-bedded, fine-grained sandstone with some dolomite and gypsum beds, ranging in thickness from 186 to 300 feet. The Rush Springs is underlain by the Marlow Formation, and the western portion is capped and confined by the Cloud Chief Formation.



Existing extent of the Rush Springs aquifer shown outlined in red. The area shaded in green may be added to the aquifer boundary based on findings of the investigation.

Surface Water

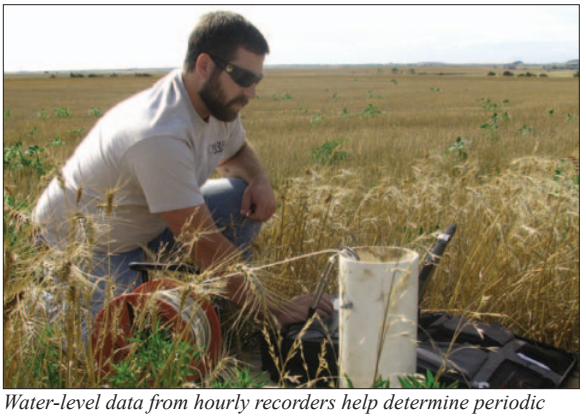
Major streams with headwaters in the aquifer area include Cobb Creek, Sugar Creek, and Deer Creek; Cobb Creek is impounded by Fort Cobb Reservoir. The Washita River flows across the aquifer and gains significant flow from perennial streams, such as Cobb and Sugar Creeks. The Canadian River forms the northern extent of the aquifer and gains flow from streams, such as Deer

(continued on back)

Rush Springs outcrop along a small creek near Weatherford, OK.

Study Objectives

1. Redefine aquifer boundaries.
2. Characterize the aquifer
   - Water-level measurements & continuous groundwater recorders,
   - Stream discharge measurements,
   - Water quality data collection,
   - Water budget (groundwater use, precipitation, and evapotranspiration) determination.
3. Update aquifer maps (aquifer thickness, saturated thickness, and potentiometric map).
4. Develop a groundwater flow model to test management scenarios.
5. Develop a surface water rights allocation model.
6. Determine maximum annual yield (MAY) and Equal proportionate share (EPS).



Water-level data from hourly recorders help determine periodic influences on the aquifer.

Creek. However, there are significant portions of the Rush Springs Sandstone between the Canadian and North Canadian Rivers, which are anticipated to be included in the future delineation of the aquifer. The hydrologic connection of this area and the aquifer south of the Canadian River is not well understood.

Cobb Creek near Colony, OK.

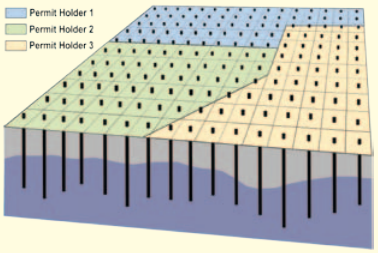
Maximum Annual Yield

The "maximum annual yield" of a groundwater basin (or subbasin) is a term used to describe the amount of fresh groundwater that can be produced while allowing a minimum 20-year life of the basin. After the hydrologic investigation is complete, the OWRB will make a tentative determination of the maximum annual yield of the basin. Copies of the results of the investigation will be made available for the public and hearings will be scheduled so that citizens can present evidence in support or opposition to the evidence presented by the OWRB. When the hearings are completed, the OWRB will make its final maximum annual yield determination by issuing a "final order" containing findings of fact and conclusions of law. At this time, based on the newly calculated equal proportionate share, a regular permit will be issued to each holder of a temporary permit.

1 Hydrologic Investigation → 2 Tentative Determination → 3 Public Hearing(s) → 4 Final Order (Final Determination)

Equal Proportionate Share

When a maximum annual yield has been determined, the OWRB is required by law to distribute the maximum annual yield equally across the basin or subbasin. "Equal proportionate part or share" is defined as the maximum annual yield of water from a groundwater basin or subbasin that is allocated to each acre of land overlying the basin or subbasin. In other words, it is the portion of the maximum annual yield that is equal to the portion of the land overlying the fresh groundwater basin or subbasin that is owned or leased by an applicant for a regular permit.



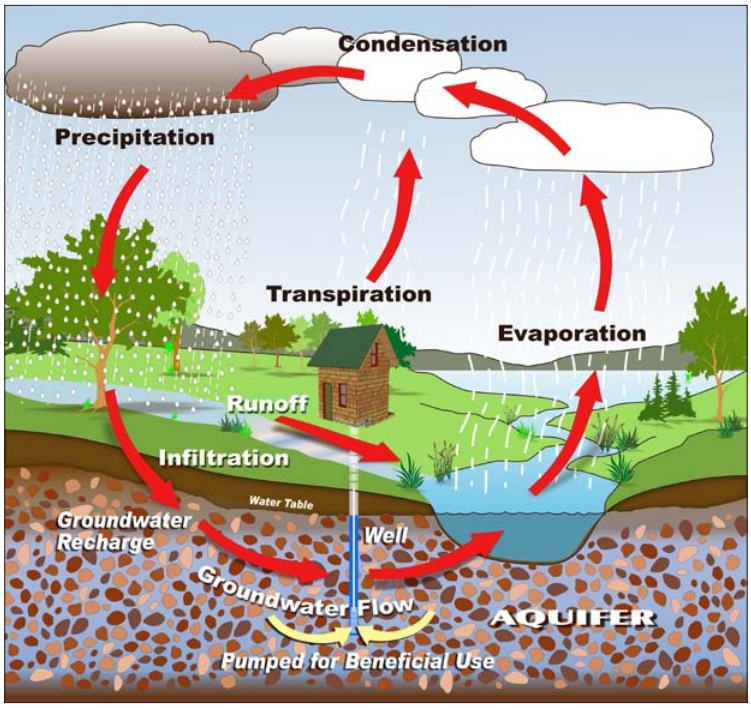
The Study

The study objectives are: 1) determine aquifer recharge based on climate history, 2) delineate the western extent of the aquifer and include the Rush Springs Sandstone north of the Canadian River, 3) update aquifer maps, and 4) incorporate permitted groundwater withdrawals to develop a better understanding of groundwater use. Water levels will be measured from groundwater wells across the aquifer to help determine the direction of flow. Streamflow discharge measurements will be collected to understand discharge of groundwater from the aquifer.

Crop irrigation from the Rush Springs aquifer.

Once the study is completed the OWRB can determine a maximum annual yield and equal proportionate share for the aquifer. The OWRB can assist local groups in determining the most feasible water supply alternatives to meet area needs. The study is scheduled to be completed by the end of 2014.

The Water Cycle



Oklahoma Water Resources Board
Planning and Management Division
3800 N. Classen, Blvd., OKC, OK 73118
(405) 530-8800
www.owrb.ok.gov

Project Coordinator: Chris Neel