

November 2015

The Arkansas portion of the Beaver Reservoir watershed is located in northwest Arkansas and includes communities in Benton, Boone, Carroll, Crawford, Franklin, Johnson, Madison, Newton, and Washington counties. The watershed includes areas of southern Missouri.

A “watershed” is an area of land where all of the water that drains from it goes to the same place, so rainwater or snowmelt in this watershed eventually drains to a common location.

Referred to sometimes as the Upper White River Watershed, the Beaver Reservoir Watershed spans 2,219 square miles and is predominantly comprised of forest, including a national forest.¹ This watershed includes Beaver Lake, the region’s source of drinking water and a popular recreation spot for fishing, boating and swimming. At the start of the decade, more than 176,000 people lived in the watershed, and the population is expected to continue growing.²

Nonpoint Source Pollution

Water pollution that comes from multiple sources spread over an area, such as runoff from parking lots, agricultural fields, residential lawns, home gardens, construction, mining and logging, is known as nonpoint source pollution. As runoff moves across the landscape, it carries natural and manmade substances that can accumulate in waterways and make them uninhabitable for aquatic species or unusable by people. Potential pollutants include bacteria, nutrients, sediment, hazardous substances and trash.³ Given the number of potential sources and variation in their potential contributions, these pollutants are not easily traced back to their source.

Nonpoint Source Pollution in the Beaver Reservoir/Upper White River Watershed



Beaver Reservoir/Upper White River Watershed

Data source: GeoStor. Map created March 2011.

Major streams: Brush Creek, Clear Creek, Dry Creek, Dry Fork Creek, Holman Creek, Indian Creek, Keels Creek, Kings River, Lollar Creek, Long Creek, Mill Creek, Osage Creek, Piney Creek, Richland Creek, Terrapin Creek, War Eagle Creek, White River, Yocum Creek

The population of Benton and Washington counties grew 44.3 percent and 28.8 percent, respectively, from 2000-2010.⁴

This fact sheet is intended to provide a better understanding of the Beaver Reservoir Watershed and its place on the state’s priority list of 10 watersheds impacted by nonpoint source pollution.

Beaver Reservoir Watershed Water Quality Issues

Past water quality monitoring by Arkansas environmental officials shows that portions of the watershed have distinct pollution concerns.⁵ Total suspended solids, silt, turbidity, a lack of oxygen, and nutrients have all been identified as issues in this watershed.

¹Land Use in the Beaver Reservoir Watershed, 2006. Center for Advanced Technologies (CAST). Information available at http://arkansaswater.org/index.php?option=com_content&task=view&id=121&Item.

²BAEG, 2011. County-Wise Population Data. Biological and Agricultural Engineering Department, University of Arkansas Division of Agriculture: Little Rock, Arkansas. See the Nonpoint Source Pollution Management Plan at <http://www.uaex.uada.edu/environment-nature/water/quality/NPSPollutionMgmt-Revised2015.pdf>.

³Learn more about these categories in the Arkansas Watershed Steward Handbook at <http://www.uaex.uada.edu/environment-nature/water/docs/ag1290.pdf>.

⁴UALR, 2011. Percent Change in Total Population. GIS Applications Laboratory, University of Arkansas at Little Rock. Available at <http://argis.uarl.edu>.

⁵Learn more about water quality at <http://www.uaex.uada.edu/publications/pdf/FSA-9528.pdf>

The region's historical use of animal manure as a fertilizer has contributed to the state designating the region including this watershed as a "nutrient surplus area." There are regulations on applying poultry litter or commercial fertilizer products to land in the area.⁶

Nitrogen and phosphorus are essential nutrients that support the growth of algae and plants. Nutrients can threaten water quality when people do not follow best management practices, such as applying the right amount of phosphorus as a fertilizer or using grassy buffers to prevent it from entering runoff water or nearby waterways. Phosphorus can also enter waterways as part of discharge from water treatment plants, which are regulated by the state and have permits that allow specific amounts of nutrients to be discharged.

Turbidity is a measure of the clarity of water and is often the result of excess silt or sediment entering a stream. High turbidity levels mean the water is murky from a variety of materials, such as soil particles, algae, microbes and other substances. Turbidity can affect aquatic life in waterways. Total dissolved solids can originate from natural geological sources such as dissolving rocks.

There are wastewater treatment plants that discharge in this watershed. However, phosphorous levels in the Kings River and Osage Creek have decreased significantly in recent years. In this watershed, the majority of

phosphorus entering waterways comes from nonpoint sources, including runoff from farms and urban developments. The rapid population growth and increased construction in Benton and Washington counties over the past two decades could contribute to the concern for nonpoint source pollution.⁸

Despite new development, unpaved roads continue to be a source of excessive sediment in area waters, as well as streambank erosion. Sections of the White River downstream of West Fork have been found to not support some species of aquatic life because of excessive sediment and high turbidity, or cloudy water. In the past, the middle fork of the White River and the river itself have had oxygen levels too low to support some species.

These concerns and its border state status led to the Beaver Reservoir Watershed being designated as a priority by the Arkansas Natural Resources Commission in the state's 2011-2016 Nonpoint Source Pollution Management Plan.⁹

Stakeholder Priorities

To encourage continued public input, the University of Arkansas Division of Agriculture's Public Policy Center facilitated a water quality stakeholder forum for the Beaver Reservoir Watershed in August 2015. Unlike many of Arkansas' watersheds, the Beaver Reservoir Watershed has a history of active watershed groups working to restore waterways or prevent further pollution.

Forum participants identified funding as their watershed's priority concern, saying that more money is necessary to meet the needs already identified by stakeholder groups. Participants also expressed two other priorities – continued focus on educating the public about nonpoint source pollution and sediment reduction by way of erosion control and streambank stabilization.

People who live, work or recreate in this watershed are encouraged to consider community priorities when addressing water pollution. The public is also welcome to attend an annual stakeholder meeting where priority watersheds and nonpoint source pollution are discussed. For more information about nonpoint source pollution and its impact on the Beaver Reservoir Watershed, contact the Cooperative Extension Service, Arkansas Natural Resources Commission or the Arkansas Department of Environmental Quality. The Arkansas Watershed Steward Handbook is also a good source of information about basic water quality concerns and how the public can get engaged in addressing water pollution.¹⁰

Arkansas' Priority Watershed List for Nonpoint Source Pollution

Arkansas has used a watershed-based approach to nonpoint source pollution management, allowing the public to guide planning to address water quality concerns. The Arkansas Natural Resources Commission, or ANRC, administers the Nonpoint Source Pollution Management Program. The program exists to reduce water pollution through the funding of watershed planning and restoration activities, adoption of voluntary best management practices and the development of technologies that assist in water pollution reduction in Arkansas. Based on public input and the use of a qualitative risk assessment matrix, ANRC has designated 10 priority watersheds as needing the greatest attention. The risk matrix⁷ identified the following priority watersheds for 2011-2016: Bayou Bartholomew, Beaver Reservoir, Cache River, Illinois River, L'Anguille River, Lake Conway-Point Remove, Lower Ouachita-Smackover, Poteau River, Strawberry River and Upper Saline.

⁶ Learn more about nutrient surplus areas at <http://anrc.ark.org/divisions/conservation/nutrient-management-program/nutrition-management-planning>

⁷ Learn more about the qualitative risk assessment tool at <http://www.uaex.uada.edu/publications/pdf/FSPPC116.pdf>.

⁸ Brion, G.; Brye, K. R.; Haggard, B. E.; West, C.; Brahana, J. V. (2011). Land-use Effects on Water Quality of a First-Order Stream in the Ozark Highlands, Mid-Southern United States. *River Res. Appl.* 27(6), 772-790.

⁹ The Nonpoint Source Pollution Management Plan is available at <http://www.uaex.uada.edu/environment-nature/water/quality/NPSPollution-Mgmt-Revised2015.pdf>.

¹⁰ The Arkansas Watershed Steward Handbook is available at <http://www.uaex.uada.edu/environment-nature/water/docs/ag1290.pdf>.

This fact sheet is one in a series of 10 fact sheets on nonpoint source pollution in priority watersheds.

Authors: **AMANDA PHILYAW PEREZ, MPH**, program associate, and **KRISTIN HIGGINS**, program associate, and **MICHAEL FREYALDENHOVEN**, program technician, Public Policy Center, University of Arkansas Division of Agriculture, Little Rock.

The University of Arkansas Division of Agriculture's Public Policy Center provides timely, credible, unbiased research, analyses and education on current and emerging public issues.