

Water Resources of Beaver Lake

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Location

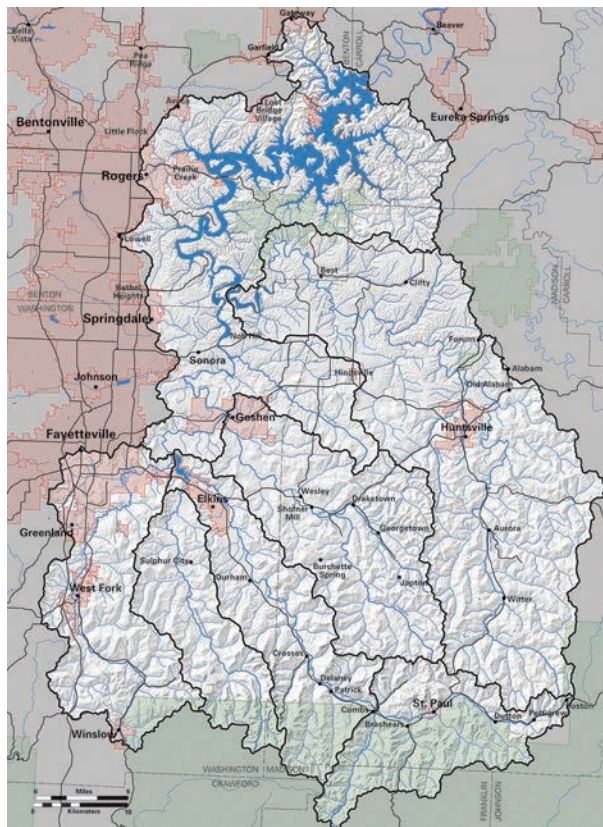
Beaver Lake is a manmade reservoir located in Northwest Arkansas. The lake has more than 487 miles of shoreline, and its surface covers 31,710 acres. Beaver Lake is the first (most upstream) in a series of three U.S. Army Corps of Engineers reservoirs on the White River in Arkansas and Missouri. The Beaver Lake/White River headwaters originate in the Boston Mountains south-southeast of Fayetteville near the community of Boston and flow north-northeast into Beaver Lake before discharge from Beaver Dam into the backwaters of Table Rock Lake near Eureka Springs, Arkansas. The lake

itself lies within Benton, Washington and Carroll counties. The full Beaver Lake watershed extends into three more counties, with the largest portion in Madison County and extends into small portions of Franklin and Crawford counties as well. The watershed encompasses 766,026 acres – almost 1,200 square miles. As one of the fastest economic and population growth regions in the state and nation, Beaver Lake is crucial to meeting Northwest Arkansas’s increasing demands for abundant high-quality water.

History

In May 1927, over 14 percent of Arkansas was under water due to flooding. In 1928, Congress delegated the U.S. Army Corps of Engineers to develop a plan to control the Mississippi River. The Corps began a study of the White River basin the next year. The Flood Control Act of 1938 authorized construction of dams in the White River basin at the discretion of the Corps for flood control. In 1954, the proposed Beaver Dam, then located at Beaver, Arkansas (hence the name), was authorized; however, it very quickly looked like Beaver Dam would not become a reality because the benefits versus costs were not favorable.

Looking ahead, Northwest Arkansas residents saw a need to establish a long-term, dependable drinking water supply for the region. The Beaver Dam Association requested that Congress add municipal and industrial water supply to the authorized purposes of Corps reservoirs. Congress passed the Water Supply Act of 1957 that would allow these uses for the lake to be determined in uses versus costs ratio.



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With the benefit-to-cost ratio now favorable, Beaver Dam was to be built. Because geologic conditions at Beaver, Arkansas, were not favorable for construction, the dam site was moved about 6 miles upstream near the town of Busch, Arkansas, but the name Beaver was retained. Construction of Beaver Dam began in 1959 and was completed in May 1965. At a cost of \$60 million, the dam project included a powerhouse with two 56-MKW hydroelectric power generators. More than 1.7 million cubic yards of earth were moved, and 780 thousand cubic yards of concrete were poured. The multipurpose project provides **flood** control, hydroelectric generation, drinking water supply (the three designated uses of the lake) along with recreation to Northwest Arkansas.

After adding water supply to the purposes for the dam, the water suppliers helped contribute funds to construct the dam. The drinking water suppliers continue to contribute yearly along with the U.S. Army Corps of Engineers and Southwestern Power Administration to the annual maintenance and operation of the dam.

Flood Control

The primary reason for constructing Beaver Dam was to provide flood control. The U.S. Army Corps of Engineers is completely responsible for flood control of the reservoir. The conservation pool, which is the normal or target level, is between 1,077 and 1,121.43 feet above sea level. Typically, excess rainfall and runoff are captured in the flood pool to prevent flooding downstream. The lake may rise into the flood pool, which is 1,120.43 to 1,130 feet. Water in the flood pool is then released over time through hydroelectric power generation, opening the flood gates or through the emergency spillway to return. This returns the lake level to the top of the conservation pool. The release of waters from the flood pool of Beaver Lake is dependent upon the ability of downstream reservoirs to receive the water.

Hydroelectric Power Generation

By law, the electricity generated at Beaver Lake is sold to rural electric cooperatives, municipal utilities and military installations. Southwestern Power Administration (SWPA), a Department of Energy agency, markets power to approximately 100 power utilities in Arkansas, Kansas, Missouri, Oklahoma, Texas and Louisiana. Nearly 7 million people and businesses receive power from these utilities.

Two generating units each produced 56,000 kilowatts of power in 2015. The actual generation at Beaver Dam was over 185,264 megawatt-hours, bringing in roughly \$9.14 million to the U.S. Treasury. Hydroelectric power is very economical and environmentally sound. According to SWPA, the energy marketed by the entire Southwestern Power Administration in an average year saves the American people the equivalent of 9.5 million barrels of oil, 2.9 million tons of coal or 47.5 billion cubic feet of natural gas. This cost-based energy also prevents

the emission of greenhouse gases equivalent to 4.6 million tons of carbon dioxide, 13.9 thousand tons of sulfur dioxide and 5.8 thousand tons of nitrogen oxides (<http://www.swpa.gov/environment.aspx>).

Water Supply

Beaver Lake is the primary source of fresh water for most of Northwest Arkansas. The Beaver Water District, the Carroll-Boone Regional Water District, the Madison County Regional Water District and the Benton/Washington Regional Public Water Authority all use Beaver Lake as their source of water. Beaver Lake now provides water to one of every seven Arkansans.

Beaver Water District is the largest of the four water suppliers. With a current maximum production capacity of cleaning 140 million gallons of water per day (MGD), Beaver Water District also has a long-term plan of 220 MGD. The district is a wholesale provider of drinking water selling to four customer cities – Fayetteville, Springdale, Rogers and Bentonville – that in turn provide water to more than 320,000 people. Since the 1990s, the demand on Beaver Lake as a public water supply source has increased dramatically. The long-term planning of Beaver Water District will continue to benefit the expected population growth of the area.

Recreational Uses

The lake hosts a variety of recreational activities, such as boating, fishing, camping, waterskiing and picnicking, and is vital to the tourism industry of Northwest Arkansas. It is important to note that while recreation is allowed on the lake, it was not one of the recognized cost benefits that allowed construction of the dam.

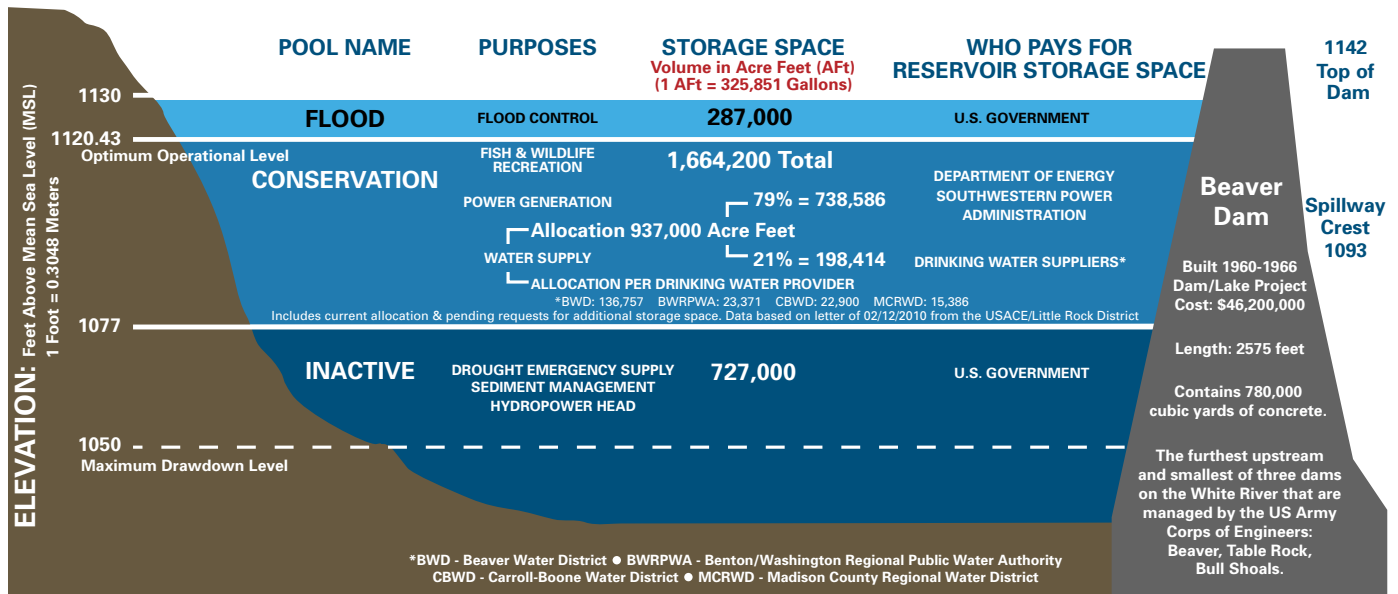
Each year thousands of people take to the shores and waters of the lake to pursue the many species of fish that thrive in it, including bream, crappie, large-mouth bass, catfish, white bass and the king of the lake, the striped bass (commonly called strippers).

The lake is also a key draw in the area for other water sports. In 2015 alone, more than 2 million people used Beaver Lake for recreation. Thousands of pleasure boaters, water skiers and personal watercraft owners took advantage of the lake. There are also 11 Army Corps of Engineers parks along the lake's shores for people to enjoy. With 673 overnight campsites available, visitors will find everything from tents to motor-home sites around the lake. Many parks also have day-use facilities. In addition, seven commercial marinas operate along the lake providing fuel and supplies.

Recreation makes a significant contribution to the area's economy. In 2015 camping and day-use fees generated more than \$1 million in revenue. It is estimated that the economic benefits of Beaver Lake include over \$30 million in visitor spending within 30 miles of the lake.

BEAVER LAKE

A MULTIPURPOSE RESERVOIR ON THE WHITE RIVER CONSTRUCTED AND MANAGED BY THE U.S. ARMY CORPS OF ENGINEERS (USACE)



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Protecting Beaver Lake for Future Generations

In our society, water quality must be considered from many different points of view. For example, water that may be fine for swimming may not be desirable for showering, or water that can be consumed by livestock may not be safe for humans to drink. Beaver Lake provides fresh water to meet many different needs.

The water quality in Beaver Lake is good; however, there are always yearly fluctuations in the quality of the lake's waters. Heavy rains will cause large amounts of soil to increase turbidity (muddy look) of the lake. Individual swimming areas have been temporarily closed on occasion due to excessive bacteria levels usually caused by polluted runoff and animal waste. Nutrients like fertilizers and manure also promote increased algae growth, which in turn causes taste and odor issues to the public drinking water supply.

There are two types of water pollution – point source and nonpoint source. Point source pollution can be attributed to a specific source such as a factory or wastewater treatment plant. Point sources of pollution are typically under governmental control or regulation. Nonpoint source pollution cannot be attributed to any one specific, identifiable source, and the most significant reduction in this type of pollution is by responsible stewardship of individuals. Nonpoint source pollution is caused by contaminants that are spread across the landscape and delivered to water bodies through runoff from storm events. Polluted runoff can come from many different land surfaces including agriculture or farming operations, soil erosion/runoff from construction sites, poorly maintained septic systems, improper use of fertilizers and pesticides on lawns, oil- and chemical-laced

impervious surfaces like highways and parking lots and uncollected pet or animal waste along trails, homes and farms – just to name a few.

Beaver watershed land use is dominated by forest and agricultural lands, especially in the north and east parts of the watershed. However, as the population of the area has grown, the watershed has undergone rapid changes in land use, beginning with the conversion of forested land to pastures and agricultural land to urban areas. This is most apparent in the southwest area and along the western edge of the watershed boundaries, and it is forecasted to continue. It is estimated that low density residential development will cover 18 percent of the watershed by 2055. That development will come at the loss of forest and pasture lands.

Without proper educational efforts, planning and development, these changes could result in potential contamination of our streams and lake. Primary sources of contamination include agricultural runoff, unpaved roads, urban stormwater runoff, septic systems and waste water treatment, streambank erosion and land clearing operation needs for new construction. As the population increases, the potential for pollution increases as well.

Activities within the watershed impact the quality of the lake. This must be considered as the population within the watershed grows and the use of the reservoir increases. We must monitor the water quality of streams and lakes to ensure that alterations in land use and development do not adversely impact this precious resource and impair any of the intended uses.

The waters of Beaver Lake must be protected and preserved if we are going to maintain the quality of life that exists today. In 2012 the U.S. Environmental Protection Agency agreed to the watershed protection strategy put forth by the Beaver Watershed

Alliance for the Beaver Lake watershed. If this is to be accomplished, everyone including farmers, landowners, industry leaders, volunteer organizations and government officials, will need to work together. The University of Arkansas System Division of Agriculture Cooperative Extension Service partners with many organizations (U.S. Army Corps of Engineers, Arkansas Game and Fish Commission, Arkansas Department of Health, Beaver Water District, the Beaver Watershed Alliance and others) to promote good stewardship practices to help protect the lake and promote research on the water quality of this essential resource.

With nonpoint sources of pollution being the largest threat to the Beaver Lake watershed, the actions of individuals can make a difference. To better protect our area's water supply, please consider the following options for pollution prevention and runoff control.

- ❶ **Be water wise...conserve!** Eliminate habits that waste water and create runoff. Install drip irrigation to water outdoor plants in the morning or evening only. Use rain barrels. Plant drought tolerant native plants when possible. Educate yourself on ways water can be conserved around the house.
- ❷ **Properly design, install and maintain your septic system.** Septic systems should be pumped every three to five years as solids accumulate. Improperly maintained systems can cause ground and surface water contamination.
- ❸ **Properly maintain your automobiles, boats and other equipment.** If you change your own oil, take used oil to a recycling center. If your car or truck leaks oil or antifreeze, you should fix the problem. Fluids from leaking automobiles are washed from pavement or concrete when it rains. Leaking gas or oil from boats can pollute lake waters.
- ❹ **Soil test lawns, gardens and pastures.** Applying excessive amounts of fertilizers or animal manures can lead to nutrient runoff into area streams and lakes. Soil test results provide a complete soil nutrient profile with recommendations for fertilizer applications. Following soil test guidelines will save you money while maximizing lawn, garden, and pasture growth and prevent runoff of fertilizer into streams, rivers and lakes.
- ❺ **Dispose of household hazardous wastes properly.** Many household hazardous waste collection sites are located in Northwest Arkansas.

Very small amounts of some chemicals can pollute large amounts of waters and even kill fish.

- ❻ **Recycle.** Recycling can significantly reduce the load placed on area landfills, which in turn can decrease the potential for water pollution. Recycling also decreases the amount of water that is required for manufacturing new products.
- ❼ **Limit livestock access to streams and rivers.** Livestock entering and leaving streams can weaken the banks, causing soil erosion and increasing the sediment load on lakes. In addition, allowing livestock to wade in streams increases the risk of bacterial contamination of the water due to discharge of fecal matter.
- ❽ **Limit the amount of runoff caused by your residence.** Turn downspouts onto grassy surfaces instead of pavement. Reduce impervious surface area by installing pavers/stepping stones. Use mulch to cover bare soils. Consider installing a rain garden to capture runoff and recharge the groundwater supplies.
- ❾ **Take a stand.** Don't wait until area streams or rivers turn green with algae or become contaminated with toxic chemicals. Don't wait for other people to take up the cause of protecting your water. Get involved and encourage others to get involved in community efforts to protect our water resources. Actively participate in educational programs that will improve your knowledge about water quality.

Summary

As population grows, potential for contamination of an area's water supply also grows. The old saying, "An ounce of prevention is worth a pound of cure," is especially true when it comes to protecting our water resources, which include Beaver Lake. As water quality in the lake decreases, the costs associated with making it fit for drinking increase. It makes good sense to do everything we can to protect our water resources and not wait until a problem exists before doing something about it. Beaver Lake has met the water needs of Northwest Arkansas for over 50 years. Residents of Northwest Arkansas need to act now if the lake is to continue to serve future generations.

For more information concerning water pollution and ways you can conserve and protect our water resources, contact your local Cooperative Extension Service office or visit us on the web at www.uaex.uada.edu.

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