Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Kansas

Watershed Management Improves Lake Water Quality

Waterbody Improved

Excessive nutrients from agricultural fields and residential activity resulted in eutrophication of Banner Creek Reservoir. The Kansas Department of Health and Environment (KDHE) added the reservoir to the state's 2002 Clean Water Act (CWA) section 303(d) list of impaired waters. In conjunction with local, state and federal agencies, the Jackson County Conservation District used education and information efforts and cost share incentives to promote management practices to reduce loading of bacteria, nutrients and sediment. Subsequent monitoring in 2003 and 2007 indicated that phosphorus and chlorophyll in the lake had declined to acceptable levels, allowing KDHE to remove the lake from Kansas' 2008 303(d) list of impaired waters.

Problem

Banner Creek Reservoir in northeast Kansas was constructed as a multipurpose, small lake serving as the water supply for the city of Holton and rural Jackson County. Banner Creek Reservoir encompasses 535 acres and was built during 1994–1997 to supply water to Holton and Jackson County, as well as to provide recreation opportunities for northeast Kansas. The 12,000-acre watershed draining to the reservoir is 88 percent grass and woodland with the balance being chiefly cropland. Livestock production, principally cattle, is prevalent over a third of the watershed.

Sampling in 1998 and 1999 indicated that chlorophyll and phosphorus levels were above the state guidelines for Kansas water supply reservoirs—12 parts per billion (ppb) for chlorophyll *a* and 22 ppb for phosphorus. Algae blooms, induced by excessive nutrients such as phosphorus from agricultural and residential lands, impair water supply with taste and odor problems, degrade aquatic life integrity and hamper recreation use on the lake. Kansas added the lake to its 2002 CWA section 303(d) list because of the 1998–1999 conditions.

Project Highlights

As part of its small lake program, Jackson County Conservation District developed and implemented a nonpoint source management plan for the Banner Creek watershed. The Conservation District promoted a diverse suite of practices applied in the watershed from 1997 to 2007, relying on an aggressive education and information program to increase awareness of the impacts of agricultural and residential activity on the quality of the lake. Failing septic systems were repaired or replaced above the lake, and livestock access to the streams flowing to the reservoir was managed by providing alternative water supplies (ponds and tanks) (Figure 1), cross-fencing (Figure 2), and a portable windbreak to provide loafing areas for cattle away from riparian areas.

Figure 1. Cattle at feeder bale in the foreground and an alternative water supply pond in the background.

Figure 2. Snow-covered alternative water source pond and perimeter fencing in a tributary to Banner Creek Reservoir.

Landowners developed nutrient management plans for 132 acres of grazing land and 37 acres of cropland, and converted 36 acres of cropland to native grass. They restored additional acres of brome grassland through reseeding. Using CWA section 319 funds, the project partners hired a water quality coordinator to promote agricultural producers' participation in the available cost-share programs.

Results

Lake sampling in 2003 and 2007 showed lower chlorophyll levels. Average chlorophyll *a* concentrations were below 12 ppb and near the newly proposed water quality standard of 10 ppb. Phosphorus levels in the lake also declined, lending confidence that the initial watershed management efforts are reducing the phosphorus loadings that affect the trophic state of the lake. The 2003–2007 average total phosphorus concentration of 22 ppb lies below suggested guideline of 25–30 ppb for lakes in the Western Corn Belt ecoregion (Figure 3). Consequently, KDHE removed Banner Creek Reservoir from the 2008 CWA section 303(d) list, offsetting the need to develop a nutrient total maximum daily load for the lake and its watershed.

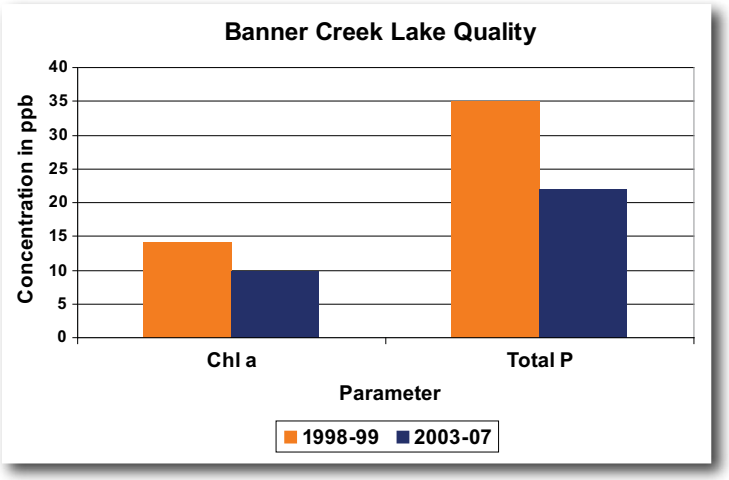

Figure 3. Chlorophyll and phosphorus levels before and after watershed management.

Partners and Funding

The Jackson County Conservation District partnered with the U.S. Department of Agriculture's (USDA's) Natural Resources Conservation Service, KDHE, U.S Environmental Protection Agency, Public Wholesale Water Supply District #18, Northeast Kansas Environmental Services and Kansas State University, State Conservation Commission, Kansas Corporation Commission, the city of Holton, Jackson County Commissioners, and Glacial Hills Resource Conservation and Development Program to develop and implement this watershed management plan. An initial CWA section 319 program grant of $102,145 supported the water quality coordinator position and outreach programs and demonstration projects, such as the portable windbreak.

A subsequent CWA section 319 grant of $48,362 further supported watershed plan implementation efforts. These funds were matched with county in-kind funds and cost-share funds from the Kansas Water Plan Fund, totaling more than $155,000. Additionally, USDA's Environmental Quality Incentive Program funded implementation of best management practices. Because only a fraction of the watershed has been treated and the lake is on the threshold between good quality and deterioration, ongoing implementation will continue in order to maintain the integrity of the lake. Five-year projections of implementation costs totaling $584,000 are needed to further reduce nutrient and sediment loads.

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