Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Nebraska

Land Treatment and Education Efforts Result in Lower Atrazine Concentrations

Waterbody Improved

High concentrations of atrazine measured in the primary inflow to Recharge Lake caused the Nebraska Department of Environmental Quality (NEDEQ) to list the reservoir on the state's 1994 Clean Water Act (CWA) section 303(d) list of impaired waters. The Upper Big Blue Natural Resources District (UBBNRD) initiated a project to provide farmers with technical assistance on herbicide application and help them to implement a series of agricultural best management practices (BMPs). Those changes resulted in significantly reduced concentrations of atrazine, prompting NEDEQ to remove the atrazine impairment for Recharge Lake from the 2010 CWA section 303(d) list.

Problem

Recharge Lake is a 55-acre reservoir in Nebraska's Big Blue River Basin (Figure 1). The lake was constructed in 1990 as part of a five-year groundwater recharge study in Nebraska's Bruce L. Anderson Recreation Area. The lake now provides water-based recreational opportunities.

Recharge Lake's 8,200-acre watershed supports mainly corn, grain sorghum, and soybean fields. Farmers use herbicides containing atrazine as the primary form of chemical control for weeds in corn and grain sorghum. An extensive amount of information and data was collected from two parallel studies coordinated by the University of Nebraska Cooperative Extension in the early 1990s. Part of the gathered information indicates that 100 percent of the corn and grain sorghum acres received applications of atrazine—or atrazine in combination with another herbicide. The studies show that farmers applied approximately 8,813 pounds of active ingredient to crops in the watershed in 1992.

In the spring of 1992, high concentrations of atrazine were measured in the primary inflow to Recharge Lake. Follow-up monitoring conducted in the reservoir during 1992 documented atrazine concentrations as high as 93 micrograms per liter (µg/L)—well above Nebraska's chronic atrazine standard of 1.0 µg/L in effect at the time. The chronic atrazine standard changed to 12.0 µg/L in 2000. On the basis of those data, Nebraska added Recharge Lake to its 1994 CWA section 303(d) list for impairment to the aquatic life designated use because of atrazine levels. Recharge Lake remained on the impaired list for atrazine during the 1996, 1998, 2006 and 2008 assessment cycles. In 2006 NEDEQ added nutrients to the list of impairments, which carried over to the proposed 2010 CWA section 303(d) list. NEDEQ will also list Recharge Lake for mercury in fish tissue on the 2010 303(d) list.

Figure 1. Nebraska's Recharge Lake supports recreational uses.

Project Highlights

In 1994 UBBNRD initiated a CWA section 319 project in the Recharge Lake watershed to work with farmers to address atrazine concerns. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service identified 393 acres of highly erodible cropland that it considered to be the most critical areas for contributing excessive atrazine. By March of 1995, farmers had enrolled 257 acres of the critical area in USDA programs. Farmers also enrolled another 4,204 acres outside the critical area in USDA programs. Agriculture BMPs implemented in those areas include nutrient and pesticide management, proper management of animal waste, conservation cover crops and rotation, and efficient management of irrigation water. As part of the assistance provided through the CWA section 319 grant, agricultural technical staff worked one-on-one with all farm operators in the watershed to provide information and recommend practices that would reduce surface runoff of pesticides and other pollutants.

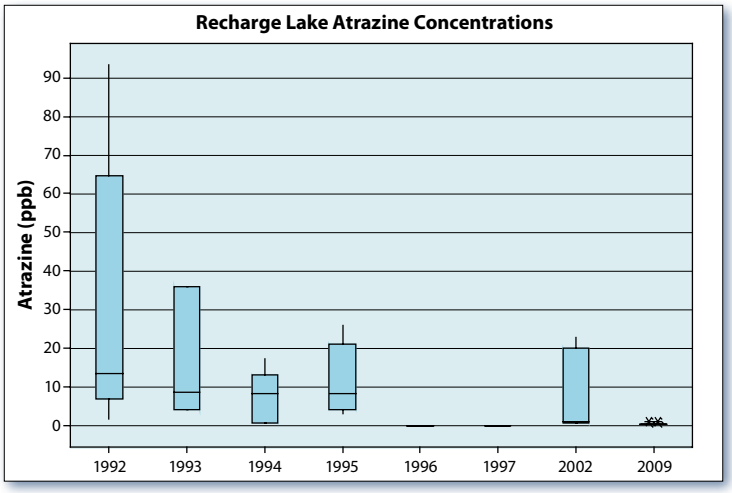

Figure 2. Atrazine concentrations fell over time. Boxplots indicate the interquartile range (25th–75th percentile), median and outliers of the date in each of the two periods. Pre-project data consist of years 1992 through 1993, while post-project data range from 1994 through 2009.

Results

Follow-up monitoring indicates that the amount of atrazine applied in the watershed decreased to 4,780 pounds, a reduction of 45 percent. From 1995 through 2009, only 4 of 42 samples (10 percent) collected exceeded the chronic criteria (12.0 µg/L). In 2009 none of the 22 samples exceeded the criteria (Figure 2). The maximum concentration detected was 1.15 µg/L. As a result, NEDEQ removed Recharge Lake's atrazine impairment from the state's 2010 CWA section 303(d) list. While atrazine's use has decreased in many Nebraska watersheds since the early 1990s, the adoption of land management practices and the delivery of educational programs have further reduced concentrations of atrazine in runoff.

Partners and Funding

Several partners were involved in the overall project. The UBBNRD sponsored the project, contributing $78,456 along with $46,666 in CWA section 319 funding for technical assistance to operators and water quality monitoring. The USDA provided $124,774 for technical assistance and cost share/incentives to operators wanting to adopt land management practices. The University of Nebraska Cooperative Extension conducted pre- and post-project landowner/operator surveys. Ciba-Geigy also provided funding support.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA EPA 841-F-10-001K
May 2010

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