



## Cottonwood Creek Watershed: Project Is a Success in the Works

Lake LaMoure, constructed in 1973, is a 500-acre reservoir on Cottonwood Creek in southeastern North Dakota. The reservoir's watershed encompasses some 107,000 acres, and agricultural production (crops and livestock) is the primary land use in the watershed. Swimming, boating, and fishing are the main recreational uses of the reservoir. Local residents, however, were becoming increasingly concerned about the deteriorating recreational opportunities at the lake. Of particular concern were the frequent algae blooms in mid- to late summer and a fish community dominated by rough fish such as carp and bullheads.

The LaMoure County Soil Conservation District (SCD) initiated an assessment of the Lake LaMoure watershed in 1995 to evaluate the relationship between land management and degrading water quality. Assessment activities included measuring water quality and quantity in the creek and lake and taking an inventory of current land use practices in the watershed. The SCD was able to determine that the recreational use impairments in Lake LaMoure were primarily associated with nonpoint source pollutants from agricultural lands, including nutrients (nitrogen and phosphorus) and suspended solids. Potential pollutant sources included excessively tilled croplands, overgrazed rangeland, and livestock winter feeding areas. Resuspended sediments and nutrients resulting from an excessive carp population were a possible factor contributing to the declining recreational use of the reservoir.

### Improving agricultural land management practices in the watershed

As a result of the assessment, the SCD identified targeted conservation planning assistance along with voluntary implementation of best management practices (BMPs). This approach was initiated in 1996 with the development of a watershed project implementation plan (PIP) that identified beneficial use improvement and pollutant reduction goals, specific activities for accomplishing the goals, and a process for evaluating progress. EPA granted the Cottonwood Creek Watershed PIP section 319 funding approval in January 1997 (\$301,071), and the project was initiated in March 1997. Subsequent section 319 funding (\$617,249) was also awarded to the project in 1999 to support expanded efforts.

The primary goal of the Cottonwood Creek watershed project is to improve the fishery and recreational use of Lake LaMoure by improving agricultural land management practices in the watershed. Land use improvement objectives include installing 12 livestock waste management facilities and implementing conservation plans on more than 50 percent of the acreage in the watershed. Target concentrations by the end of the project include a mean annual phosphorus concentration of 0.20 mg/L at the inlet and fecal coliform bacteria concentrations that remain below 200 colonies/100 mL.

### Early success beyond expectations

During the first 3 years, the project focused on the promotion and installation of BMPs that reduce nutrient inputs and maintain crop residue cover on croplands after spring seeding. Particular emphasis was placed on the promotion of annual soil testing and the use of no-till or minimum tillage equipment. Through these efforts, the project has exceeded the SCD's original expectations and is already well on the way to achieving its land management goals.

As of October 2000, conservation plans were being implemented on about one-fourth of the agricultural lands in the watershed. The main practice scheduled under these conservation plans is conservation tillage, which calls for maintaining more than 30 percent crop residue cover on croplands after spring seeding. Nutrient and pesticide management practices are also being implemented concurrently on many of the conservation acres to reduce chemical inputs. The factors with the most influence on the widespread adoption of conservation tillage, nutrient management, and other BMPs are a high level of producer participation, an expanded educational effort, and targeted one-on-one planning assistance delivered by skilled project staff.

# COTTONWOOD CREEK

Total conservation tillage acres and other BMPs applied in the watershed, to date, are as follows:

Conservation tillage	16,948.6 acres	Although the SCD continues to strive toward improved management on more than 50 percent of the cropland acres, they have also recently begun to direct more assistance and attention toward livestock management to reduce water quality concerns (fecal coliform concentrations) associated with livestock manure. To date, the efforts have resulted in the installation of two livestock manure management facilities and the preliminary development of several grazing plans.
Nutrient management	9,413.6 acres	
Integrated crop management	2,717.0 acres	
Crop residue use	2,246.2 acres	
Cross fencing/planned grazing	220.0 acres	
Hayland planting	874.9 acres	
Tree planting (Not included in acreage total)	960.0 linear feet	
Pesticide Management	2,454.2 acres	
<b>Total Acres Affected</b>	<b>34,874.5 acres</b>	

In addition, project staff are working with six other producers interested in installing manure management facilities in 2001. When these systems are installed, the project will be more than halfway to its goal of installing 12 manure management facilities after just 2 years of active implementation. Project progress and BMP benefits are being evaluated through water quality monitoring at three sites on the creek. Data collected at these sites include stream stage and discharge, and pollutant concentrations. The water quality variables being monitored are nutrients (nitrogen and phosphorus), total suspended solids, and fecal coliform bacteria. Baseline data collected from 1995 to 1998 and water quality monitoring have been used to define baseline conditions and reflect water quality conditions before project implementation. Water quality data collected after 1999 will be used to document the cumulative benefits of BMPs applied in the watershed because 1999 was the first year with a significant number of BMPs. Although the project has realized quick progress toward its land management goals, the nature of the applied practices and size of the watershed make it very difficult to accurately measure the water quality benefits associated with the practices over the short term. However, a preliminary review of water quality data collected since 1997 does indicate that water quality conditions are beginning to improve at some sampling sites in the watershed. The most notable water quality trend has been detected at the monitoring site for the headwaters watershed. Although fluctuations in the concentrations are still within the range of natural variability, it appears that the project is having a positive effect on total ammonia and nitrogen concentrations in the upper portion of the watershed. However, examination of other water quality variables, such as fecal coliform bacteria, shows mixed results. Consequently, an accurate evaluation of the Cottonwood Creek project after just 2 years of "targeted implementation" cannot be based on measured water quality trends.

A more accurate indicator during this early stage of the project is an evaluation of the number of BMPs applied in the watershed. Based on this information, the Cottonwood Creek project is achieving land management improvements in the watershed and can truly be recognized as a "success in the works." Over the long term, as BMPs mature and additional practices are installed, the water quality benefits of these land use changes will be tracked through ongoing monitoring efforts and the data will be used to confirm and quantify the anticipated success of the Cottonwood Creek project.

## Primary Sources of Pollution:

- agriculture (grazing and croplands)

## Primary NPS Pollutants:

- nutrients (nitrogen and phosphorus)
- suspended solids and fecal coliform bacteria

## Project Activities:

- waste management facilities, grazing practices, conservation plans, low/no-till equipment)

## Results:

- agricultural practices implemented on more than 34,000 acres
- positive trends in total ammonia and nitrogen concentrations

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