Lime Creek Watershed Project

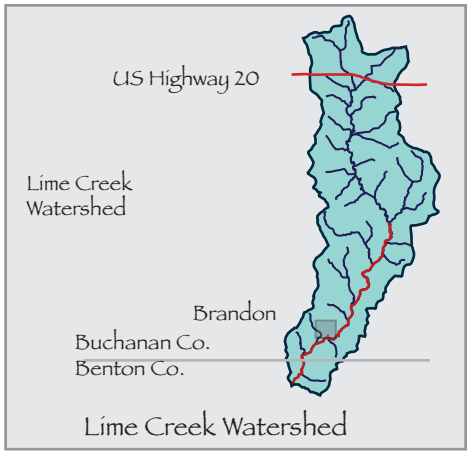
About Lime Creek

Lime Creek is a 27,039 acre sub-watershed of the Cedar River in western Buchanan County with its outflow in northwest Benton County approximately 25 miles from Cedar Rapids.

The lower one-half of the 16 mile stream is on the final 2004 Iowa list of Section 303(d) Impaired Waters. The cause/stressor is identified as biological, potentially flow alteration, habitat modification, nutrients and/or siltation.

A TMDL has not been completed for Lime Creek; however, a completed TMDL for the Cedar River includes a goal of 35 percent reduction of nitrate to 9.5 mg/L due to the classification as a drinking water supply resource for the people of Cedar Rapids.

Recognizing Lime Creek as a contributor of nitrate to the Cedar River, the Lime Creek watershed council adopted a goal of reducing both nitrate and phosphorus by 35 percent.



History, mission and Targeted activities

Beginnings

Lime Creek is one of two subwatershed projects in the larger Cedar River watershed in eastern Iowa where producers have used a community-based approach, computer modeling and science to help improve their farm management.

Along with Coldwater-Palmer watershed, located to the northwest in Butler and Floyd counties, Lime Creek project used the Hewitt Creek model to involve watershed residents in a long list of management practices aimed at improving water quality.

One impetus to local action came from Iowa Department of Natural Resources listing of Section 303(d) of impaired waterways.

The lower one-half of Lime Creek was on the final 2004 list of 303(d) impaired waters and when the Lime Creek watershed council, composed of residents and landowners in the watershed, organized in 2006 it adopted a goal of reducing both nitrate and phosphorus by 35 percent. The council held meetings about six times a year to review budgets, set goals, evaluate progress and establish incentives for cooperators.

Richard Sloan of Rowley was among the first landowners to become involved.

"I received a letter from the Buchanan County Extension inviting me to attend an organzational meeting for a new watershed group."

Lime Creek's watershed improvement project was initiated with a $90,000, three-year grant from the Iowa Corn Growers Association.

At early meetings landowners found out the 'why' behind project formation as well as the purpose of the ICGA funding.

"I learned some of the fundamentals of the performance-based incentives model which would be tried," said Sloan.

When the group was formed, Sloan, who has had a "long-term interest in farming while protecting the environment," was elected president.

Watershed council leaders used a performance-based approach to achieve nutrient reduction goals and promote broad participation and increased implementation of nonpoint source management strategies in Lime Creek. The program also included a short list of best management practice incentives such as grassed waterways, spring nitrogen application and soil testing.

In this program, cooperators were paid incentives for sustainable stewardship and bonus rewards for improving environmental performance. The goal was to accomplish improved performance while improving net farm income.

The Lime Creek council, organized as an Iowa non-profit corporation, applied for an Iowa Watershed Improvement Board (WIRB) grant in 2006.

Program participation

The three-year grant (2007-2009) allowed the council to expand watershed participation by 12 new cooperators in 2007. In all, cooperators have enrolled 10,653 crop acres in the program.

Forty-five percent of watershed residents took part in the program, with 23 cooperators completing Phosphorus Index (PI) and Soil Conditioning Index (SCI) calculations for 12,068 acres. The two indices along with the cornstalk nitrate

Bioreactor demonstration

In a specialized area of nutrient management, a denitrifying bioreactor demonstration was installed in the north end of the watershed, on the farm of Kenneth Pint, in November 2006. The bioreactor site receives tile-line water from about 100 acres of corn-bean rotation, mostly flat land that is characteristic of the area. Explained simply, the bioreactor filters nitrates from the water using hardwood chips in a subsurface mass. Starting in 2007, water samples were monitored regularly and initial 2007 results were promising with 90 percent nitrate removal; however, drainage problems affected bioreactor efficiency in subsequent years. Monitoring continued through 2010.

test (CNT) are tools used by cooperators to evaluate conservation and nutrient management performance. The average Phosphorus Index, 0.88 (very low) and Soil Conditioning Index, 0.56 (on a scale of –1 to +1.1), along with the water monitoring data were used to set project priorities. Performance is high because 48 percent of participating farms use no-till planting for at least one crop in their rotation.

Project cooperators improved SCI scores 200 percent when no-till planting soybeans on environmentally sensitive fields. During the course of the project, participants reduced sediment delivery to Lime Creek by 959 tons per year and P delivery by 1,246 pounds per year through installing and improving waterways, planting vegetative filters and reducing tillage.

Three-quarters of the cooperators enrolled in the cornstalk nitrate testing program. Jesup High School FFA members collected samples, estimated yield and reported results to cooperators. Annual cornstalk nitrate test results and corn yields were variable but the process allowed cooperators to evaluate their nitrogen applications for the first time. In 2008, the average N nitrate of 24 samples (7 farms) was 2,876 ppm.

"What I learned from the indexes," said Sloan, "was a field by field analysis of how my crop rotations, fertilizations and tillage plans affect my farm's surface water pollution potential and how I could farm to build up organic matter in my soil to improve my farm's long term productivity."

"After a year or two, I sat down and mapped out a three-year rotation plan on one farm and a five-year plan on the other to help me in applying fertilizer and tillage at the opportune times...."

What was learned, what next?

WIRB funding for Lime Creek watershed ran out at the end of 2009, but the watershed council continues its efforts as well as the incentive program, using remaining Corn Growers funding. In the fall of 2010, the project conducted cornstalk nitrate testing for participating cooperators, again with Jesup FFA members gathering the samples.

What was accomplished during the three-year project? In addition to his personal experience, Richard Sloan believes one lesson was that "...farmers shared experiences with no-till, waterways, contours, buffer strips and berms to control erosion on our soils and nitrogen application practices to increase efficiency, reduce costs and reduce nitrogen leaching out of the root zone."

"This discussion among farm neighbors in the watershed may have been the most valuable long-term outcome of our group forming."

Other efforts are also underway in the Cedar River watershed. Richard Sloan is involved in the Cedar River coalition, a group of residents and agency personnel looking at future activities in the watershed. There is also a group conducting an overview of Iowa/Cedar River basin, and Lime Creek may become one of the focal watersheds.

Water monitoring

Prior to the formation of the watershed council, from 2000 through 2005, Coe College conducted water monitoring of Lime Creek revealed total nitrogen and phosphorus levels above average for Cedar River tributaries. A goal of the Lime Creek water quality improvement project was to actively address nitrogen and phosphorus management in the watershed. A portion of the Iowa Corn Growers funding was used to monitor stream segments within the watershed.

Long-term monitoring of Lime Creek and six other tributaries of the Cedar River shows a promising trend in water quality improvement. Since 2006, average nitrate concentration is 19 percent lower in Lime Creek when compared to the four years prior to organization of the Lime Creek watershed council. Water monitoring by Coe College since 2000 consistently showed Lime Creek to be the highest contributor of nitrate with concentrations greater than 14 ppm NO_3-N in two of six years prior to council formation. However, during the most recent two years nitrate concentrations have fallen to less than 10 ppm NO_3-N. Dr. Martin St. Clair wrote in a 2008 report to Iowa DNR, "In a somewhat encouraging development the average concentration of nitrate in Lime dropped below 10 mg NO_3-N/L and it remains third [among the seven tributaries] after having the highest average for five of the previous six summers."

Lime Creek season average nitrate concentrations:

Year	Nitrate (ppm)
2000	13.14
2001	14.59
2002	11.99
2003	11.14
2004	14.18
2005	12.26
2006	10.21
2007	10.15
2008	9.87
2009	9.89
2010	12.10

Coe College students Zachary Hayes, Alyssa Qualls and Adam Becker take water samples from Finley Creek, a tributary of Lime Creek, near Brandon. (2010)

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