



NONPOINT SOURCE SUCCESS STORY

Iowa

Watershed Work Restored Native Freshwater Mussels in Lime Creek

Waterbody Improved

With increasing amounts of soil washing in, Lime Creek was struggling to support the native freshwater mussels living in its waters, landing a portion of it on Iowa's impaired waters list in 2002. But this wasn't an overnight change; studies showed the mussel population declined between 1984 and 1998 largely due to extra sediment and nutrients washing into the stream from row-cropped fields in the watershed. In response, local farmers formed the Lime Creek Watershed Council. The group encouraged better farmland management practices to reduce erosion, which helped improve mussel habitat in the creek. A recent Iowa Department of Natural Resources (DNR) mussel survey showed the population had rebounded enough in one segment of Lime Creek for it to be removed from the Clean Water Act (CWA) section 303(d) list (the state's list of impaired waters) in 2014.

Problem

Lime Creek drains a long, narrow area of land (27,039 acres)—much of it planted in corn and soybeans—in eastern Iowa (Figure 1). Smallmouth bass anglers and visitors to the Lime Creek park area near Brandon, managed by the Buchanan County Conservation Board, regularly make visits to this stretch of stream, now featured on the state's list of Outstanding Iowa Waters. However, this tributary to the Cedar River hasn't been without its problems.

A 1984 freshwater mussel survey found nine species of mussels, but by 1998, a follow-up survey found no live mussels. As a result, the lower segment of Lime Creek landed on Iowa's impaired waters list in 2002 for failing to meet its designated use of supporting aquatic life. In addition, monitoring by Coe College between 2002 and 2005 showed that nitrate concentrations in Lime Creek were the highest of seven nearby tributaries of the Cedar River, which serves as a drinking water source for the city of Cedar Rapids, 25 miles downstream.

In July 2008, more than 2,700 fish were found dead in Lime Creek. Because the fish kill was reported more than 48 hours after it occurred and it happened during high flow conditions, the cause of the kill was never determined. One month later, the stream was sampled as part of Iowa's stream reference network, and the fish had recovered enough that the stream's Fish Index of Biotic Integrity score passed.

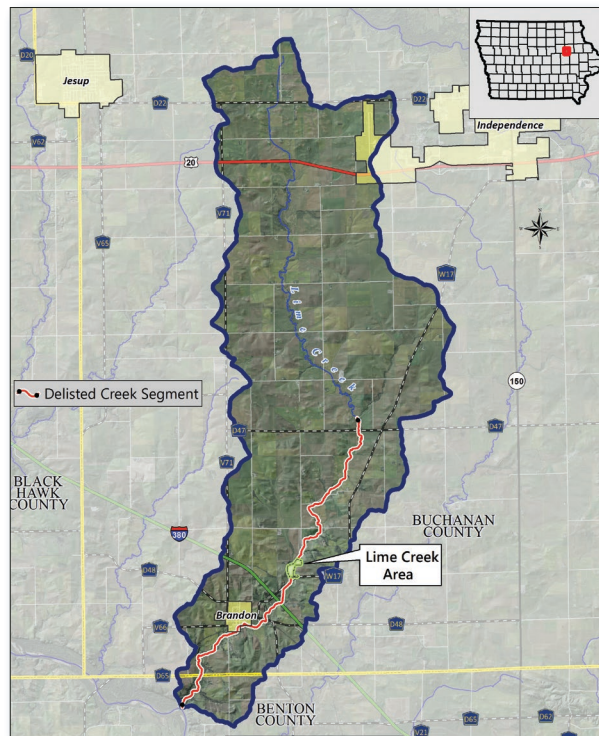


Figure 1. The Lime Creek watershed is in eastern Iowa.

Story Highlights

The effort to reclaim Lime Creek took some muscle and effort from the community. Farmers, livestock producers and other residents of Lime Creek came together over concerns about the creek's water quality

J. Kurth, Iowa DNR



Figure 2. Lime Creek, seen here at the Benton County/Buchanan County line, in 2007 (left) and 2018 (right), offers improved native mussel habitat.

and high nitrate levels downstream in Cedar Rapids. Forming the Lime Creek Watershed Council, the group kicked off on-farm conservation efforts in 2006 with initial funding from the Iowa Corn Growers Association (ICGA). A year later, the council, with assistance from Iowa State University (ISU) Extension and Outreach, applied for and received funding from the Iowa Watershed Improvement Review Board (WIRB) and partner organizations to put more on-farm conservation practices into use. Facilitated by Extension staff and supported by the U.S. Department of Agriculture's Natural Resources Conservation Service, the project developed a performance-based incentive program to fund farming practices that reduce nutrients and sediment reaching Lime Creek.

Almost half of rural watershed residents participated in the project, enrolling in the incentive program to make changes on their land (Figure 2). Many producers reduced tillage and adjusted crop rotations to increase crop residue, while others looked at changes to nutrient application or installed grassed waterways or a bioreactor to reduce nutrients washing off the land. Project activities have continued voluntarily through the Lime Creek Watershed Council.

Results

Thanks to conservation practices adopted by farmers and landowners, the amount of sediment reaching the creek dropped by about 959 tons each year (enough to fill 64 dump trucks) and reduced phosphorus levels by about 1,462 pounds per year. In addition, water monitoring showed that average nitrate-nitrogen (NO₃-N) concentrations in Lime Creek dropped 19 percent.

Reducing the sediment washing into Lime Creek improved the creek's native mussel habitat. The Iowa DNR's statewide mussel survey, funded by a U.S.

N. Geels, Iowa DNR



Figure 3. Lime Creek watershed farmer and conservation leader Dick Sloan (middle) stands in a field of cereal rye he grows for cover crop seed.

Environmental Protection Agency (EPA) CWA section 319 grant, showed that the number of mussel species in Lime Creek had rebounded from zero in 1998 to six in 2011. Three of the species found are listed by Iowa as threatened: ellipse (*Venusaconcha ellipsiformis*), cylindrical papershell (*Anodontooides ferussacianus*) and creeper (*Strophitus undulatus*). As a result, Iowa removed one segment of Lime Creek from the state's list of impaired waters in 2014.

Lime Creek was placed on the list of Outstanding Iowa Waters as an outstanding state resource in 2010 due to its exceptional ecological significance. As a reference site for ecosystems in the region, Lime Creek consistently scores very well on studies that look at the diversity and health of animals and plants that live in the water (other than mussels), such as crayfish, snails, dragonflies and other aquatic insects. The mussels that live there won't survive just anywhere, either—the ellipse mussel and its fish hosts are both very sensitive to habitat disturbance and water quality declines—their survival depends upon the cleaner water now found in Lime Creek (Figure 3).

Partners and Funding

Partners providing funding and technical assistance to the Lime Creek Project included the Iowa WIRB (\$202,710), ICGA (\$90,000), Cedar River Monitoring Coalition (\$32,800), ISU (\$28,241), Lime Creek Watershed Council (\$7,950), NRCS (\$4,280), Buchanan County Extension (\$375), and project cooperators (\$72,049). Project funding totaled \$438,405. The Iowa DNR statewide mussel survey was funded by a \$253,060 EPA CWA section 319 grant.



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