NONPOINT SOURCE SUCCESS STORY

Iowa

Reducing Erosion Helped Restore Native Freshwater Mussels in Buffalo Creek

Waterbodies Improved

Populations of native freshwater mussels, which are indicators of biological health in streams, declined in Buffalo Creek between 1984 and 1998 due primarily to soil erosion and sediment delivery from row cropping practices. As a result, five segments of Buffalo Creek were listed on Iowa's Clean Water Act (CWA) section 303(d) list of impaired waters by 2008 due to impairments of the creek's aquatic life (biological) designated use. Support provided through the Upper and Middle Buffalo Creek Watershed Projects assisted farmers with the installation of practices that reduced sediment loading to the creek and improved the habitat for mussels. After a 2013 mussel survey showed mussel populations had rebounded, the aquatic life impairments were removed from the state's list of impaired waters for five segments of Buffalo Creek in 2014.

Problem

Buffalo Creek, a major tributary of the Wapsipinicon River, drains a long, narrow, 146,906-acre watershed in eastern Iowa (Figure 1). The predominant land use in the watershed is corn and soybean production. The creek is used for recreation by paddlers and anglers.

A freshwater mussel survey done in the creek in 1984 showed a relatively healthy total population and species richness of freshwater mussels. A follow-up survey done in 1998 showed that both the total mussel populations and species richness had declined by more than 50 percent, which triggered impairments in the creek's aquatic life designated use (Figure 2). As a result, five segments of Buffalo Creek were placed on Iowa's impaired water's list by 2008.

A land use assessment conducted by the Upper Buffalo Creek Project showed a pre-project estimated sediment delivery of 21,680 tons per year to the creek in the upper portion of the watershed. Heavy sediment loading to the creek reduced the habitat for native freshwater mussels and was a primary cause for the low numbers of mussel species found in 1998.

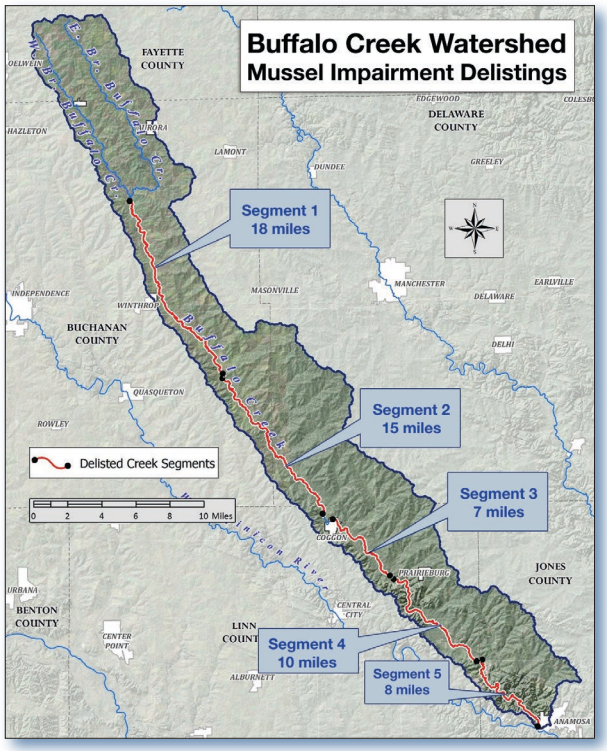

Figure 1. Five impaired segments in eastern Iowa's Buffalo Creek watershed have been restored.

Project Highlights

In 2010–2014, the Upper Buffalo Creek Water Quality Project, administered by the Buchanan Soil and Water Conservation District (SWCD) in Independence, implemented conservation practices to reduce sediment delivery in the upper portion of the watershed. It was funded primarily by Iowa's Watershed Improvement Review Board (WIRB), and by programs administered by the Iowa Department of Agriculture

Figure 2. Biologists conduct DNR mussel survey.

and Land Stewardship (IDALS) and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA). The project employed a full-time watershed project coordinator to help landowners implement practices in the watershed. Next, the Middle Buffalo Creek Project, funded primarily by WIRB and IDALS, installed conservation practices in the middle portion of Buffalo Creek downstream for approximately one additional year.

Through the Upper Buffalo Creek Project, landowners and farm operators installed 93 conservation practices, including 68 grass waterways that addressed much of the ephemeral gully erosion sediment delivery to the creek. Three of the waterways included rock check outlet structures, which prevented classic gully sediment delivery. Other practices implemented included cover crops, critical planting areas, filter strips, quail buffers with native plantings, contour buffers, and an upgraded animal waste storage facility. An additional 12 conservation practices were completed through the Middle Buffalo Creek Project.

Table 1. Native mussel species found in Buffalo Creek* before (1984, 1998, 2008) and after (2012–2013) restoration.

Creek Segment		County	# of Live Mussel Species Found			
Segment	ADB Code**		1984	1998	2008	2012–2013
1	IA 01-WPS-0130_2	Buchanan	7	2	1	5
2	IA 01-WPS-0130_1	Buchanan, Delaware, Linn	13	0	0	11
3	IA 01-WPS-0110_3	Linn	10	3	2	9
4	IA 01-WPS-0110_2	Linn	16	12	Not Sampled	11
5	IA 01-WPS-0110_1	Jones	11	4	Not Sampled	7

* At study sites in five segments of Buffalo Creek
** Iowa Assessment Database Code

Results

Practices implemented through the Upper Buffalo Creek Project reduced sediment delivered to Buffalo Creek by an estimated 4,417 tons per year (a 20 percent reduction), which is equal to 316 dump truck loads of sediment per year. Phosphorus levels were reduced by an estimated 5,742 pounds per year. Sediment and phosphorus load reduction estimates were based on USDA NRCS Revised Universal Soil Loss Equation calculations.

The reduced sediment delivery improved the creek substrate (material on the creek bottom) and improved the habitat for native mussels. The Iowa Department of Natural Resources' (DNR's) Statewide Mussel Survey, funded by a U.S. Environmental Protection Agency (EPA) CWA section 319 grant, showed that the total mussel population and number of mussel species had rebounded significantly in Buffalo Creek (Table 1) by 2013. Of the live mussel species found in the survey, four are on Iowa's list of threatened animal species: cylindrical papershell, creek heelsplitter, creeper, and ellipse. Many of the mussels found were fairly young (less than five years old), suggesting that conditions might have improved in the stream for mussels. As a result, five segments of Buffalo Creek, representing 58 miles of its 59-mile length, were removed from Iowa's impaired waters list in 2014 (see Figure 1).

Partners and Funding

Partners providing funding and technical assistance for the Upper Buffalo Creek Project included the Buchanan SWCD, WIRB ($370,722), IDALS ($1,643), NRCS Environmental Quality Incentive Program (EQIP) ($32,485), NRCS non-EQIP ($20,250), FSA Conservation Reserve Program ($41,474), IJOBS (Iowa stimulus funding) ($11,760), and private landowners ($323,605). Project funding sources totaled $801,939. The Iowa DNR statewide mussel survey was funded by an EPA CWA section 319 grant.

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