



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Missouri

## Using a Diverse Watershed Approach Reduces Sedimentation

### Waterbody Improved

Past channelization of streams and eroding agricultural areas contributed sediment to the North Fabius River. Fisheries data indicated that the high sediment levels impaired the river's warm-water aquatic life designated use. As a result, in 1998 the Missouri Department of Natural Resources (MDNR) added an 82-mile segment of the river to the Clean Water Act (CWA) section 303(d) list of impaired waters for sediment. MDNR worked with state and local partners to install best management practice (BMPs) that reduced sedimentation. Water quality improved, prompting MDNR to remove the 82-mile segment of the North Fabius River from the state's list of impaired waters in 2008.

### Problem

The long, narrow, 940-square-mile North Fabius River watershed includes 2,290 miles of streams that drain portions of nine counties in southeastern Iowa and northeastern Missouri (Figure 1). The North Fabius River originates in southeast Iowa's Appanoose County and flows southeastward into Missouri, eventually merging with the South Fabius River in northeastern Marion County to form the Fabius River. The Fabius River then flows only 3.5 miles before it empties into the Mississippi River. Agriculture is the dominant land use; 32 percent of land is in cultivated crops and 44 percent in pastureland.

Eroding agricultural land is a major source of the sediment in the North Fabius River watershed. Farmers sometimes plant row crops directly next to the edge of stream banks and drainage channels. This practice eliminates riparian vegetation, allowing stream banks to erode. Furthermore, the loss of riparian shade leads to higher summer water temperatures and loss of habitat. The past channelization of larger northern Missouri streams, such as those in the North Fabius watershed, also causes sedimentation problems.

A change in the historical distribution in fish populations in the North Fabius River led MDNR to conclude that the sediment load in the river was impairing aquatic habitat. Few sediment data were available to directly document sediment impacts on the North Fabius River, so MDNR staff members, in consultation with the U.S. Environmental Protection Agency (EPA), used their best professional judgment based on general fisheries data and the negative effects of sediment on fish. Based on these concerns, MDNR added an 82-mile segment of the North Fabius River to the CWA section 303(d) list of impaired waters in 1998.

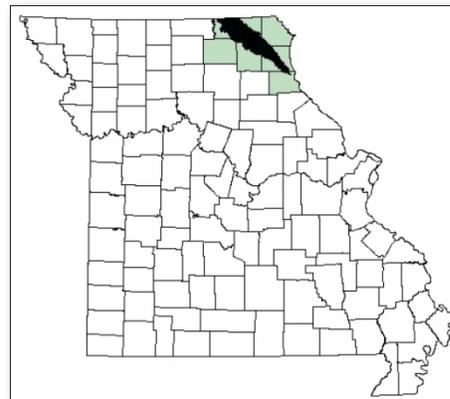


Figure 1. The North Fabius River watershed is in northeastern Missouri.

### Project Highlights

Watershed partners have conducted numerous efforts to reduce sedimentation in the watershed. In 2004 the Schuyler and Scotland Soil and Water Conservation Districts (SWCDs) each began a seven-year, \$750,000 Agricultural Nonpoint Source Special Area Land Treatment (AgNPS SALT) project in the South, Middle and North Forks of the North Fabius River to implement agricultural BMPs. From 2003 through 2008, the MDNR Soil and Water Conservation Program funneled more than \$3.9 million toward supporting the SWCDs' efforts to help landowners install about 743 practices in the watershed.

With funding support from two CWA section 319 projects, the Schuyler and Scotland SWCDs have been working to improve watershed planning, educate stakeholders and implement BMPs to help improve water quality. In April 2007 the SWCDs and their partners began developing an EPA nine-element watershed management plan for the Middle Fabius and North Fabius rivers. The partners also launched a North Fabius Watershed Improvement Project to educate landowners and encourage implementation of BMPs. Project partners hosted numerous field days/demonstrations and

workshops for landowners, developed and distributed almost 8,000 brochures and newsletters, and aired 12 public service announcements.

The watershed improvement project also benefited from the efforts of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) to help landowners implement BMPs through the Environmental Quality Incentives Program (EQIP). During the project period, NRCS provided technical assistance and/or funding for more than 1,900 water quality-related practices on over 31,600 acres using EQIP.

Through these many different programs, landowners have implemented numerous BMPs, including terraces (Figure 2), filter strips, grassed waterways, riparian buffers, shoreline protection, critical area planting, grade stabilization structures and nutrient management plans. These practices have treated more than 10,400 acres and prevented approximately 488,000 tons of soil from entering the North Fabius River.

Photo by Charlie Rahm, NRCS



Figure 2. A terrace system protects a field from erosion.

## Results

In 2006 MDNR selected 16 sites for water quality sampling and biological assessment. MDNR analyzed water quality samples for temperature, dissolved oxygen, specific conductance, pH, chloride, total phosphorus, ammonia nitrogen, nitrate, nitrite, total nitrogen and turbidity. For the biological assessment of stream health, MDNR used the Semi-quantitative Macroinvertebrate Stream Bioassessment Project procedure. The procedure relies on four metrics: taxa richness (TR), biotic index

(BI), Shannon Diversity Index (SDI), and total number of taxa found from the orders Ephemeroptera, Plecoptera, and Trichoptera (EPTT). Calculating these metrics provides a Multimetric Macroinvertebrate Stream Condition Index (MSCI) score. MSCI sustainability scores of 16 to 20 are considered fully sustaining aquatic life.

The 2006 samples showed that all the assessed North Fabius River sites achieved a MSCI score of *fully sustaining* (see Table 1). On the basis of these results, MDNR removed the North Fabius River from the state's list of impaired waters in 2008.

**Table 1. Metric values and stream condition indices, Spring 2006 sampling season**

Station	TR	EPTT	BI	SDI	MSCI	Sustainability
2	64	11	6.51	2.52	20	Full
3	70	13	6.55	2.8	20	Full
4	59	16	6.00	2.48	20	Full
5	64	19	5.98	2.79	20	Full
6 (a)	69	19	6.43	2.54	20	Full
6 (b)*	63	15	6.28	2.70	20	Full
7	67	13	6.74	2.92	20	Full
8	64	10	6.85	2.92	20	Full
9 (a)	62	7	6.71	3.17	18	Full
9 (b)*	68	10	7.09	2.92	20	Full
10	63	11	6.77	2.89	20	Full
11	71	10	7.06	2.83	20	Full
12	73	13	6.82	3.29	20	Full
13	70	14	6.96	3.14	20	Full
14	62	14	6.91	2.73	20	Full
15	73	13	7.06	2.71	20	Full
16	60	11	7.04	2.29	20	Full

\* Duplicates

## Partners and Funding

Watershed partners included the Schuyler and Scotland SWCDs, NRCS, University of Missouri-Columbia Extension, Missouri Stream Team, Missouri Department of Conservation and MDNR. The MDNR Soil and Water Conservation Program provided more than \$3.9 million to the SWCDs to install BMPs. The Schuyler and Scotland SWCDs each conducted a \$750,000 AgNPS SALT project. Funding for these restoration efforts included a U.S. Environmental Protection Agency (EPA) education grant of \$5,000 and a total of \$410,000 in EPA CWA section 319 funding.



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