



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Vermont

Improved Agricultural Management Restores Stone Bridge Brook

Waterbody Improved

Nutrient and sediment runoff from agricultural sources degraded the biological community in Vermont's Stone Bridge Brook. As a result, Vermont placed a 2.0-mile segment of the stream on its 1998 Clean Water Act (CWA) section 303(d) list for aquatic life use impairments due to agricultural impacts. Water quality improved after farmers implemented a variety of agricultural best management practices (BMPs). Data collected in 2011 showed that Stone Bridge Brook complied with state water quality standards, prompting the Vermont Department of Environmental Conservation (VTDEC) to remove it from the CWA section 303(d) list of impaired waters in 2012.

Problem

Stone Bridge Brook (Figure 1), a 6-mile-long stream in northwestern Vermont, flows through the towns of Georgia and Milton and drains into Lake Champlain south of St. Albans Bay. VTDEC classifies the stream as a Class B water—a water that fully supports aquatic biota and wildlife, high-quality aquatic habitat, good aesthetic value, swimming and recreation, irrigation and agricultural uses, and public water supply uses with filtration and disinfection.

VTDEC first assessed Stone Bridge Brook, just above its confluence with Lake Champlain, in 1997. VTDEC monitored macroinvertebrates in the stream and assessed the biological integrity using a series of eight biometrics, including the EPT (short for the order names Ephemeroptera, Plecoptera and Trichoptera) index—a measure of the number and types of pollution-sensitive aquatic insects inhabiting a waterbody. Streams showing high EPT richness (i.e., a high number of EPT taxa in a sample) are less likely to be polluted than streams showing low EPT richness in the same geographic region.

In addition, VTDEC used the Vermont Biotic Index (BI), which measures the proportion of organic pollution-intolerant species to tolerant species in a community (range: 0 to 10, where 0 = excellent and 10 = poor). Among other measures, VTDEC also assessed the abundance of a variety of pollution-tolerant macroinvertebrates, including the filamentous algae shredder Diptera (*Cricotopus* spp.) and the filter feeding Trichoptera



Figure 1. Stone Bridge Brook flows through northwestern Vermont.

(*Hydropsyche betteni*). The presence of such nutrient and sediment-tolerant macroinvertebrate species can indicate poor water quality in streams.

Biological monitoring in 1997 found that the lowest stream reach, which is 2.0 miles long, did not fully meet Vermont's Class B water quality standards for aquatic life. The segment had low EPT values as well as modestly elevated BI values, among other indicators. These findings put the segment in noncompliance with Vermont Class B water quality standards for aquatic life support. The state suspected that nutrient and sediment runoff from agricultural sources in the watershed contributed to the aquatic life impairments. Vermont placed this segment of the stream on its CWA section 303(d) list of impaired waters in 1998.

Project Highlights

The Vermont Agency of Agriculture, Food and Markets (AAFM) and the VTDEC worked with farmers in the watershed to address nonpoint source pollution from agricultural areas. As a result of this collaboration, farmers implemented a variety of agricultural BMPs between 2010 and 2011, including one roof runoff/clean water diversion, one silage leachate collection and treatment system, planting of more than 300 acres of winter cover crops and use of no-till planting to reduce sediment runoff from agricultural fields. Additionally, farmers developed and implemented nutrient management plans covering 700 acres. Combined, these actions helped to substantially reduce sediment and nutrient loading to Stone Bridge Brook.

Results

Data show that water quality has improved as a result of the implemented BMPs. Biomonitoring data from Stone Bridge Brook showed substantial increases in EPT richness along with some modest decreases in Vermont BI scores between the late 1990s and 2009–2011 (Table 1). The data also show a substantial drop in the percent “shred herb,” the percent of algae-shredding organisms that thrive in nutrient-rich conditions. A decrease in the percent “shred herb” is a good indication that

filamentous algae have decreased as a food source at the site. Although the 2009 EPT improvements appear to pre-date much of the agricultural BMP work in the watershed, the dramatic reduction in algae-shredding organisms between 2009 and 2011 suggests that the waste management system improvements and enhanced field practices in 2010 and early 2011 may have significantly improved water quality. Stone Bridge Brook earned a rating of “very good” and “very good–good” in 2009 and 2011, respectively, indicating that the stream complies with Vermont’s water quality standards. As a result, VTDEC removed a 2.0-mile segment of Stone Bridge Brook from the CWA section 303(d) list of impaired waters in 2012. The stream is scheduled for further biomonitoring in 2016.

Partners and Funding

The Vermont AAFM served as a key partner in this effort, providing \$102,977 in cost-share assistance for agricultural field BMP implementation and improvements to waste management systems. Several farm producers and two local conservation districts also contributed to this work. VTDEC conducted the biological and water quality monitoring using approximately \$4,000 in CWA section 319 funds. In addition, approximately \$1,500 in CWA section 319 funds supported the BMP design engineering work conducted by the Vermont AAFM.

Table 1. Stone Bridge Brook Biomonitoring Results^a (1997–2011)

Sampling Site	Date	Assessment Rating	EPT Index Score	BI (Biotic Index)	Percent Shred Herb ^b
Mile 0.2	10/8/1997	Fair	12.0	4.74	6.7
	10/12/1999	Good–Fair	14.5	4.20	4.3
	9/29/2004	Good–Fair	14.0	4.15	6.9
	10/9/2009	Very Good	21.0	4.02	7.0
	9/22/2011	Very Good–Good	24.0	4.43	0.6
Warm Water Moderate Gradient Class B Guideline			≥ 16	≤ 5.40	≤ 5

^a Bold values indicate noncompliance.

^b “Percent Shred Herb” refers to the percentage of filamentous algae shredders in the community.



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