



Section 319 NONPOINT SOURCE PROGRAM SUCCESS STORY

New Hampshire Stakeholders Cooperate to Stabilize River and Restore Habitat

Waterbody Improved

Extensive sand and gravel extractions during a major interstate highway construction project in the late 1970s led to channel instability and habitat problems in an eight-mile segment of New Hampshire's Pemigewasset River. As a result, the New Hampshire Department of Environmental Services (NHDES) classified this segment of the river as impaired by a non-pollutant in the 2004 Clean Water Act (CWA) section 305(b) report. In 2003 stakeholders launched a geomorphology-based project that restored the stream channel and improved habitat. Therefore, NHDES will not classify this river segment as impaired for aquatic life use by flow regime alterations in the state's 2012 CWA section 305(b) report.

Problem

The Pemigewasset River (Figure 1) originates in central New Hampshire's Franconia Notch State Park and flows south through the White Mountains until it merges with the Winnipesaukee River. In the late 1970s, sand and gravel were excavated from the river's active floodplain and used in constructing Interstate 93 near Woodstock, New Hampshire. The extraction created a 30-acre pit area and a large pond with depths up to 30 feet. The removal of floodplain materials caused the river to jump its bank (a process known as an avulsion) during a period of heavy rain when the river flow accessed the damaged floodplain. The river's new course flowed through unconsolidated materials and the pond.

After the avulsion, this reach of the Pemigewasset River became excessively wide and shallow. It continued to have channel instability issues, including continuous bank erosion, channel widening, formation of multiple channels and degradation of the cold-water fishery. The integrity and habitat of the pond were also compromised as high river flows continued filling it with sediment. Surveys of channel dimensions at six cross sections indicated that the channel characteristics were such that the river could not effectively transport the watershed's flow and sediment volumes. Therefore, the reach was assessed as non-supporting of aquatic life use due to streambank destabilization, and NHDES classified this segment of the Pemigewasset River as impaired by a non-pollutant (Category 4C) in the 2004 CWA section 305(b) report.



Figure 1. A porous rock weir helps to stabilize the restored section of the Pemigewasset River.

Project Highlights

In 2003 the Pemigewasset Chapter of Trout Unlimited received a \$14,038 CWA section 319 grant and began restoration planning. In 2006 the Chapter received a second CWA section 319 grant of \$315,000 to finalize the construction design, obtain permits and complete the restoration on a 2,200-foot reach of the Pemigewasset River. The geomorphology-based project reconnected the river to its original channel, reduced the impacts associated with floodplain land loss, enhanced the in-stream and off-river fisheries and waterfowl habitat, and restored the impacted river reach to a stable condition.



Figure 2. Construction contractors and the project's fluvial geomorphologist used heavy equipment to construct in-stream features.

bushes in the new riparian areas. Project partners created in-stream habitat by shaping the channel and adding features such as pools, glides and riffles. These features not only provided immediate habitat benefits but also support diverse recreational opportunities that had been absent from this reach since the avulsion occurred. Anglers, boaters and swimmers now enjoy whitewater, swimming holes and improved fishing opportunities along this restored reach of river.

Results

Members of Trout Unlimited, with technical assistance from the project's consulting team, monitor channel cross-section dimensions (cross-sectional area, bankfull width, and bankfull depth) as the prime indices of channel stability. To assess the stability of the restored stream reach to determine whether it supports the designated use for aquatic life, DES reviewed geomorphic survey data collected in 2011. Analysis confirms that, despite significant destruction of transplanted riparian vegetation by beavers and record flood flows experienced in the fall of 2011, the geomorphic indices in the project area continue to remain within acceptable ranges and are considered stable (Figure 3). The stream reach now provides physical conditions supportive of the aquatic life designated use. On the basis of these data, NHDES will not classify the river segment as impaired for aquatic life use by flow regime alterations in the state's 2012 CWA section 305(b) report. Pemigewasset River assessment unit NHRIV700010203-01 remains on the CWA section 303(d) list of impaired waters due to aluminum, pH and mercury.

Project partners corrected the channel's alignment, elevations, and dimensions by using large boulders to construct more than a mile of cross-vanes and rock vanes, adding targeted streambank toe protection, and creating more than 900 linear feet of floodplain stabilization structures (Figure 2). Project partners planted more than 150 mature willow clumps and more than 50 trees ranging from one to five inches in diameter. They also planted wetland grasses, plants and

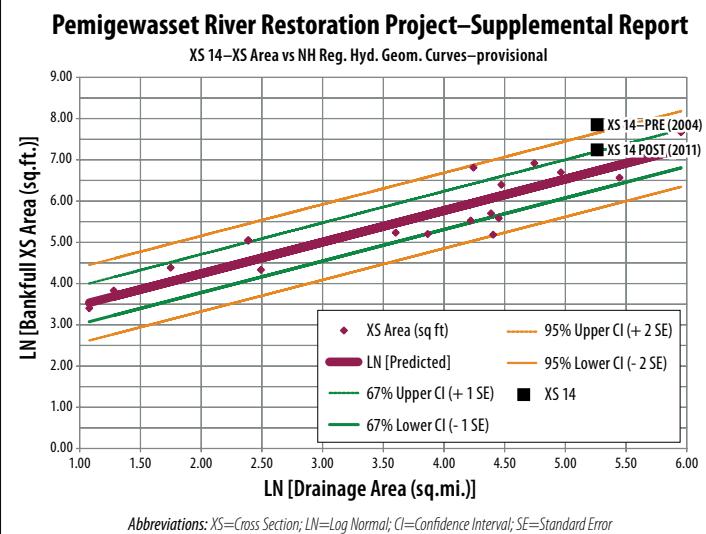


Figure 3. A regional hydrologic geometry curve shows how pre-project (2004) and post-project (2011) stream channel measurements for cross section 14 (black squares) compare to predicted stable channel condition dimensions (includes area between the upper and lower confidence intervals). Data show that the restored segment falls within the upper confidence interval, indicating that it maintains stable channel dimensions. Similar graphs were analyzed for multiple cross sections and stability indicator metrics.

Partners and Funding

Numerous partners cooperated on the project, including Trout Unlimited, New Hampshire Fish and Game Department, Horizons Engineering, the Chase family, NHDES and the U.S. Environmental Protection Agency (EPA). EPA CWA section 319 funds provided \$14,038 for the initial study and \$315,000 to administer, plan, document and implement the restoration. Trout Unlimited provided project coordination in close cooperation with NHDES staff. Additional grant funding was provided by The New Hampshire Conservation Committee (\$47,500) and the Davis Conservation Foundation (\$10,000). The New Hampshire Fish and Game Department contributed \$52,000, as well as additional technical support, and an abutting landowner donated \$260,000 worth of materials such as gravel, cobble, wetland grasses, bushes and trees.



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