



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Pennsylvania

Local Conservation Group Leads Efforts to Neutralize Acid Mine Drainage and Restore Fishery

Waterbodies Improved

Acid mine drainage (AMD) from abandoned coal mines impaired the aquatic life designated use in the Johnson Run watershed. As a result, the Pennsylvania Department of Environmental Protection (DEP) placed the main branch of Johnson Run and more than 17 miles of contributing tributaries on the state's 2004 Clean Water Act (CWA) section 303(d) list of impaired waters because of low pH and elevated manganese levels. Treating AMD and surface runoff from mining waste piles significantly improved water quality in much of the watershed and restored the aquatic life designated use. Consequently, DEP intends to remove eleven segments within the Johnson Run watershed (the main branch and 14.9 miles of tributaries) from the 2012 CWA section 303(d) list of impaired waters.

Problem

Johnson Run is a headwater stream in the Ohio River watershed (Figure 1). It originates in northern Elk County in northwestern Pennsylvania and flows into the East Branch of the Clarion River downstream of East Branch Dam. This area has been subject to strip mining and deep mining for coal since the late 1800s, although there are currently no active mines in the watershed. Discharges from old deep mines are the most significant source of AMD to Johnson Run, followed by runoff from unreclaimed surface mining activities. Discharges from these sources have caused pH and metal levels in the waterbody to exceed water quality standards. As a result, the Pennsylvania DEP placed numerous segments within the Johnson Run watershed on the state's 2004 CWA section 303(d) list of impaired waters because of low pH and high levels of manganese. To meet the state's standards, the pH must stay above 6.0 standard units and manganese concentrations (total 30-day mean) may not exceed 1.00 milligrams per liter (mg/L).

Project Highlights

In the late 1990s, a local watershed group formed to improve water quality in East Branch Lake and its surrounding waters, including Johnson Run. The group, known as the Elk County Fishermen, implemented a number of projects to clean up AMD,

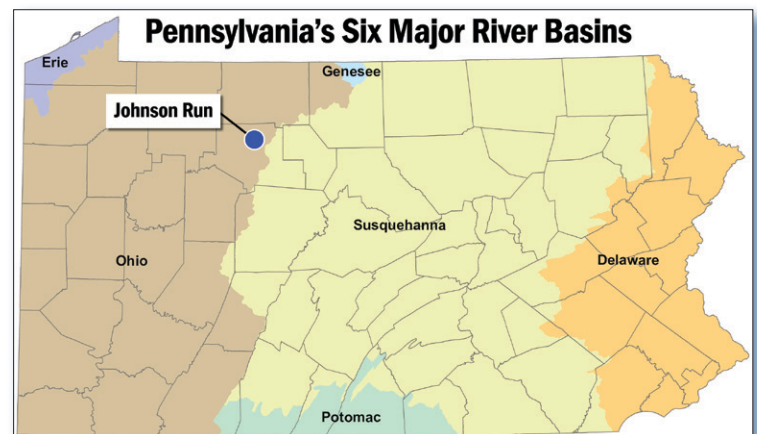


Figure 1. Johnson Run is in the Ohio River watershed.

concentrating their efforts on East Branch Lake tributaries and Johnson Run. In 2002 an environmental consulting firm (Hedin Environmental) developed a restoration plan for East Branch Lake and Johnson Run. The plan outlined the steps necessary to restore the impaired waterbodies and bring back healthy fish populations.

In 2002 project partners installed a passive treatment system on a Johnson Run tributary to treat flow from an abandoned deep mine that generates the watershed's primary source of AMD. The treatment system, which consists of vertical flow ponds, limestone-lined channels, flush ponds, holding



Figure 2. Restoration efforts have improved water quality in Johnson Run (looking downstream, above the confluence with East Branch Clarion River).

tanks and wetlands, collects and treats two separate discharges from the abandoned deep mine.

In 2003 another method of treatment was implemented to treat surface sources of AMD. Runoff from pyritic spoil piles (mine waste with high levels of pyrite, a rock composed of iron and sulfur) and surface mines contributed to water quality degradation in Johnson Run. To address these surface sources, project partners mixed alkaline residuals (limestone and paper fines) from the Weyerhaeuser paper mill's wastewater treatment plant with the pyritic spoil piles to neutralize the pH. The partners then applied a thick layer of residuals and seeds to the surface of the piles. The layer supported the growth of dense vegetation, which has helped to prevent pollution by reducing oxygen and water infiltration, both precursors to acid formation.

Results

Adding the upstream passive treatment system on the abandoned deep mine and treating the surface runoff from pyritic spoil piles significantly improved water quality in the watershed (Figure 2).



Figure 3. Pennsylvania DEP staff members conduct biological sampling to measure fish populations in summer 2010.

Data collected at the mouth of Johnson Run show a rise in pH, from an average of 5.2 standard units in 1998 to 7.3 standard units in 2007. In addition, the data show that average 30-day manganese concentration declined to 0.08 mg/L. Both parameters now meet water quality standards.

The treatment systems remain in place and continue to improve water quality. The data from biological monitoring conducted in 2010 (Figure 3) show that a healthy fish population has been restored and Johnson Run now supports its aquatic life designated use. Based on these water quality improvements, DEP intends to remove 11 segments of Johnson Run (including the main branch and more than 14.9 miles of tributaries) from the state's CWA section 303(d) list of impaired waters in 2012.

Partners and Funding

The Elk County Fishermen and the North Central Pennsylvania Regional Planning and Development Commission used \$407,000 in Growing Greener and Watershed Restoration and Partnership Act funds to build the passive treatment system.



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