NONPOINT SOURCE SUCCESS STORY

Pennsylvania

Acid Mine Drainage Reduction Efforts Restore Tomhicken Creek

Waterbody Improved

Abandoned mine drainage (AMD) discharge in 3.5 miles of Tomhicken Creek, a tributary of Catawissa Creek, created toxic conditions for fish and macroinvertebrate, which prompted the Pennsylvania Department of Environmental Protection (PADEP) to add Tomhicken Creek to the state's 1996 Clean Water Act (CWA) section 303(d) list of impaired waters for aquatic life. In 2003 and 2005, PADEP approved a total maximum daily load (TMDL) of runoff and finalized the Catawissa Creek Watershed Implementation Plan (WIP). The TMDL assessment targeted load reduction goals for acidity, iron and aluminum. Tomhicken Creek partners installed two passive treatment systems, significantly reducing metals and acidity levels and raising the pH and alkalinity of the creek. Approximately 3.5 miles of Tomhicken Creek improved and now meet water quality standards; in 2018, PADEP delisted Tomhicken Creek as an impaired waterbody.

Problem

Catawissa Creek, a 41.8-mile-long tributary of the Susquehanna River, starts in Luzerne County and flows through northern Schuylkill County. It is part of the Greater Hazelton region of Pennsylvania. The 153-square-mile Catawissa Creek watershed is primarily forested with very little development or agriculture. Tomhicken Creek, a tributary of Catawissa Creek, is approximately 11 miles long (Figure 1).

Coal mining was the primary industry in the eastern Catawissa Creek watershed from the mid-1800s to the early 1970s. Large land tracts of the watershed's eastern portion are unreclaimed strip pits and subsidence areas from abandoned underground mine workings. Pollution in Catawissa Creek and its tributary, Tomhicken Creek, is primarily caused by AMD from five deep mine tunnels in the watershed. Pollution levels from AMD endangered the fish population and other aquatic life. In 1996, PADEP added 3.5 stream miles of Tomhicken Creek to CWA's section 303(d) list of impaired waters for aquatic life. A TMDL was approved in 2003, and the Catawissa Creek WIP was completed in 2005. The WIP identified AMD-related load reductions for acidity, iron and aluminum that were needed to meet water quality objectives.

This project focused on two AMD discharges that were contributing high pollutant loads to Tomhicken Creek. The first AMD discharge (Oneida #1) drains

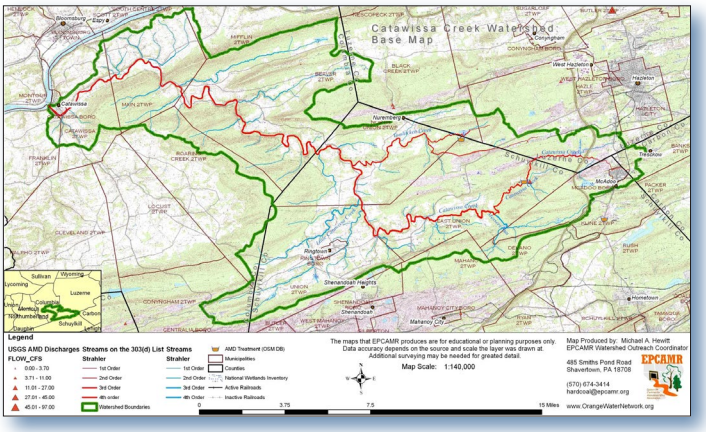

Figure 1. Tomhicken Creek is in the Catawissa Creek watershed in east-central Pennsylvania.

the North Green Mountain Coal Basin into Sugarloaf Creek, a tributary to Tomhicken Creek, between the Lake Susquehanna and Lake Choctaw impoundments. Before construction of the Oneida #1 treatment system at this site, monitoring data showed low pH (3.6– 4.2), no alkalinity, high acidity levels of 40–50 milligrams per liter (mg/L) and aluminum levels of 1.4–4.9 mg/L. The second AMD discharge (Oneida #3) drains the South Green Mountain Coal Basin and emptied directly into Tomhicken Creek. This was the largest source of AMD discharge to the creek. Before construction of the Oneida #3 treatment system at this site, monitoring data showed low pH (3.9–4.7), net acidity of 15 mg/L, and elevated iron (2 mg/L) and total manganese (0.5 mg/L).

Figure 2. The Oneida #1 treatment system discharges through oxic limestone drains into a settling pond.

Figure 3. The Oneida #3 treatment system discharges through a limestone channel into a settling pond.

Story Highlights

The Pennsylvania Fish and Boating Commission conducted several surveys of the main stem of Catawissa Creek, including its Tomhicken Creek tributary, and found that by reducing AMD pollution through mine reclamation projects, Tomhicken Creek could provide substantial coldwater recreational fisheries. In 2001, the Schuylkill Conservation District, Catawissa Creek Restoration Association (CCRA), Eastern Pennsylvania Coalition for Abandoned Mine Reclamation (EPCAMR) and other partners installed two passive treatment systems (Oneida #1 and #3) in the headwaters of Catawissa Creek.

Oneida #1, a passive treatment system consisting of a series of three buried limestone cells, effectively neutralizes AMD pollution entering Sugarloaf Creek, a tributary to Tomhicken Creek. Water flows through an oxic limestone drain in the treatment system that neutralizes the acidity and raises pH and alkalinity levels. A final polishing pond and Lake Choctaw serve as oxidation/precipitation basins that remove any remaining aluminum from the water (Figure 2).

In 2009, project partners installed Oneida #3, which consisted of one in-flow style concrete tank filled with limestone and settling ponds for treating discharged mine water (Figure 3). The treatment system increases pH levels of tunnel discharge and reduces metals and acidity loading to Tomhicken Creek.

Results

PADEP documented water quality improvement in Tomhicken Creek after installing the Oneida #1 and Oneida #3 passive treatment systems. The treatment systems effectively neutralize AMD pollution, increasing the creek's pH and alkalinity levels. After treatment, the creek averages a pH of 6.5 and alkalinity of 9–26 mg/L; iron and acidity levels were reduced to zero. Lake Choctaw monitoring data shows very good water quality with high pH, high alkalinity, and no acidity or aluminum. Lake Choctaw, once acidified and devoid of fish, now supports a stocked fish population. During a 2016 sampling survey, data showed Index of Biotic Integrity scores of 62.9 at station D-TC02 and 69.8 at station D-TC03, which indicated no AMD impact.

Partners and Funding

Project success is a result of partnerships between CCRA, Schuylkill Conservation District, Columbia Conservation District, EPCAMR, Pennsylvania Department of Conservation and Natural Resources, U.S. Environmental Protection Agency (EPA), PADEP Pottsville District Mining Office, and PADEP Watershed Support Section. Approximately $1,300,000 were awarded through EPA's CWA section 319 grant program. An additional $100,000 came from the following sources: PADEP's Growing Greener grants program, the U.S. Office of Surface Mining and the Natural Resources Conservation Service.

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