

for Laurel Run, where AMD and acid deposition impacts have led to several biological studies of the stream. Information and data from past and present scientific studies can be obtained by contacting Powdermill Nature Reserve.

#### **PA Fish and Boat Commission (PAFBC)**

The PAFBC conducted a fish survey of White Oak Run and Laurel Run in July 1989 in order to document social, physical, chemical, and biological data.

During the study on White Oak Run, PAFBC found a heavily eroded stream with water quality conducive to a cold-water fish community. Fish shocking produced brown trout, white suckers, mottled sculpin, bluegill, red side dace, creek chubs, and black nose dace. All brown trout collected were young-of-year. There is no conclusion mentioned as to why this occurred. PAFBC indicated that the presence of warm-water fishes was due to migration of fish from adjacent farm ponds. PAFBC water quality measurements for the 1989 study were as follows: pH = 7.3, Alkalinity = 33 mg/L, Hardness = 60 mg/L, and Temperature = 21.6 (C).

During fish shocking on Laurel Run, no fish were found, but crayfish were present. The PAFBC speculated that the absence of fish was due to acidic water quality conditions produced by acid deposition. PAFBC water quality measurements for the 1989 study were as follows: pH = 6.1, Alkalinity = 1 mg/L, Hardness = 23 mg/L, and Temperature = 18 (C). There was no mention of AMD in the report.

#### **Office of Surface Mining (OSM)**

The Office of Surface Mining surveyed AMD in Laurel Run, reporting their results to the Loyalhanna Watershed Association (LWA) in 1995. OSM listed three AMD sources: two seeps at the headwaters and a discharge from the Friedline Mine, an abandoned house coal mine. The upper seeps were low in pH and flow.

#### **DEP Bureau of Abandoned Mine Reclamation (BAMR) Pyrolusite Bed**

A pyrolusite treatment system was installed to treat one of the Laurel Run headwater seeps in 1997. The system consists of a limestone-filled bed, where the limestone is inoculated with aerobic microorganisms provided under a contract with Allegheny Mineral Abatement. The beds are preceded by small aerobic wetlands to provide nutrients for the microorganisms and to provide some initial treatment of the water. The seep at the Laurel Run headwaters is a 30-gallon per minute (gpm) discharge with low iron and aluminum concentrations and moderate acidity and manganese levels. Water quality data is available at the LWA Offices.

#### **DEP Bureau of Abandoned Mine Reclamation (BAMR) Steel Slag Bed**

In 2004, BAMR constructed an alkalinity-producing steel slag bed at the Friedline Mine. The purpose of the steel slag bed is to generate additional alkalinity for the treatment system following flow through both SAPS. Water is captured from Laurel Run upstream of Friedline Mine, piped through the steel slag and mixed with the effluent from the second SAPS within the treatment system. Water quality data is available at the LWA Office.

#### **Loyalhanna Watershed Association (LWA)**

In 1997, a passive treatment system was constructed to treat the discharge seeping from the abandoned Friedline Mine. The Successive Alkalinity Producing System (SAPS, settling ponds, and wetlands that were constructed, work to neutralize the acid and cause the precipitation of iron and