Case Study 2: Operation and Maintenance of Passive Treatment Systems at Coal Mines in Pennsylvania

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Amy Wolf will discuss passive treatment system O&M on a statewide and watershed scale, highlighting the Twomile Run watershed in Kettle Creek, Pennsylvania, where multiple passive systems have been installed. Treatment has led to recovery of a cold water fishery. Trout Unlimited has implemented and partially funded a long-term O&M plan in the watershed.

Bob Hedin will present two systems installed at bituminous coal mines in southwestern Pennsylvania. The Marchand system treats a large iron-contaminated deep mine discharge in southwestern PA. The system was installed in 2006 and consists of a series of six oxidation/settling ponds followed by a large constructed wetland. The system has continuously discharged water with neutral pH and 90-95% decreased Fe concentrations. Over time the ponds fill with iron sludge which must be removed to maintain treatment effectiveness. In 2012 eight hundred tons of iron oxide sludge were removed from three ponds. The sludge has been passively dewatered and dried and is currently being processed into an iron oxide product suitable for use as pigment or reactive media.

The Anna S system treats two flows of highly acidic water flowing from abandoned underground mines. Two treatment systems were constructed in 2004 that contain vertical flow ponds constructed with limestone and alkaline organic substrate. As water flows through the ponds, treatment is obtained by creating reducing conditions that promote limestone dissolution and microbial activity. The vertical flow ponds are followed by constructed aerobic wetlands that polish the water and provide ecological benefits. The treatment systems are an integral part of a watershed restoration plan that has restored 11 miles of native trout fishery. In 2014 and 2016 the organic substrates were replaced. The design and performance of both systems will be presented with an emphasis on the maintenance requirements that must be implemented to sustain water treatment benefits.