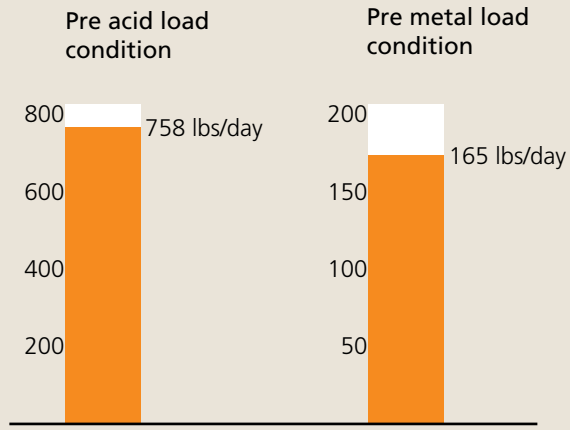
Project Status: Complete 4/1/2004 ODNR Project Number: AT-Wl-05

Pre-construction

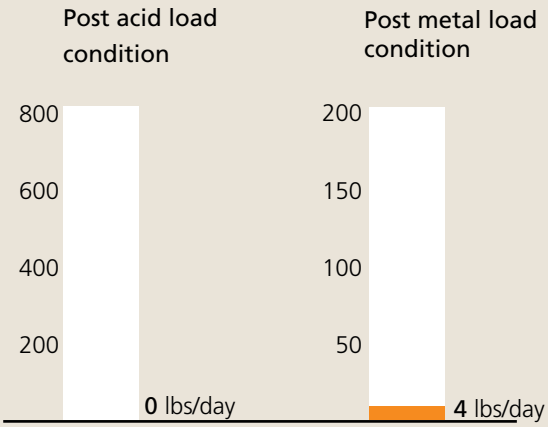
Carbondale East Seep, Photo by Brett Laverty



Data derived using the Mean Annual Load Method (Stoertz, 2004).

Post-construction

Carbondale II Project Doser, Photo by JT Kneen



Data derived using the Mean Annual Load Method (Stoertz, 2004).

Carbondale II Wetland is located in Section 30 of Waterloo Township in Athens County and lies within the 14-digit HUC unit #05090101030010. The site is seven acres and located in the subwatershed Hewett Fork of Raccoon Creek Watershed. The design was completed by ATC Associates for $48,023. The treatment approach for this site was to install an Aqua-fix lime-dosing unit. The major considerations in this design were the metal precipitates discharge into Hewett Fork because of the limited space for storage ponds on site. The goal of the design was to reduce 100 percent of the acid load discharging from the Carbondale mine seeps. The project goal was met by 100 precent. One problem encountered at this site was the dosing material performance. Initially lime kiln dust was used, but the material bridges in the dosing unit. The material was switched to calcium oxide, a more expensive material but greater neutralizing potential. Therefore the doser now has the ability to over-treat and neutralize acid mine drainage from downstream sources. Construction was complete April 1, 2004, by Law General Contracting for a cost of $389,637. The major responsibility of the construction company was to remove existing metal retention wetlands and install the doser and a concrete mixing channel. The funding source for the project design was ODNR-DMRM, and for construction the sources were ODNR-DMRM, OEPA, and OSM-ACSI. Figures 3 and 4 (shown on page 3) estimate approximately 758 lbs/day of acid were reduced from entering into Hewett Fork as a result of this AMD reclamation project. In addition to 100 precent of the acid load reduction there is an addition of approximately 186 lbs/day of alkalinity to Hewett Fork both as dissolved and solid unused calcium oxide. Dissolved metal load reduction occurring at this site was approximately 161 lbs/day. The metals precipitate as a result of the high pH water and become part of the substrate in the receiving stream.

Water quality report

Water quality data was collected at the project discharge as well as multiple stations pre- and post-construction. The graphs below show changes in pH (Figure 1) and acidity (Figure 2) along the mainstem of the receiving stream upstream and downstream of the project discharge as a result of the AMD reclamation project.

Figure 1. Pre and Post pH

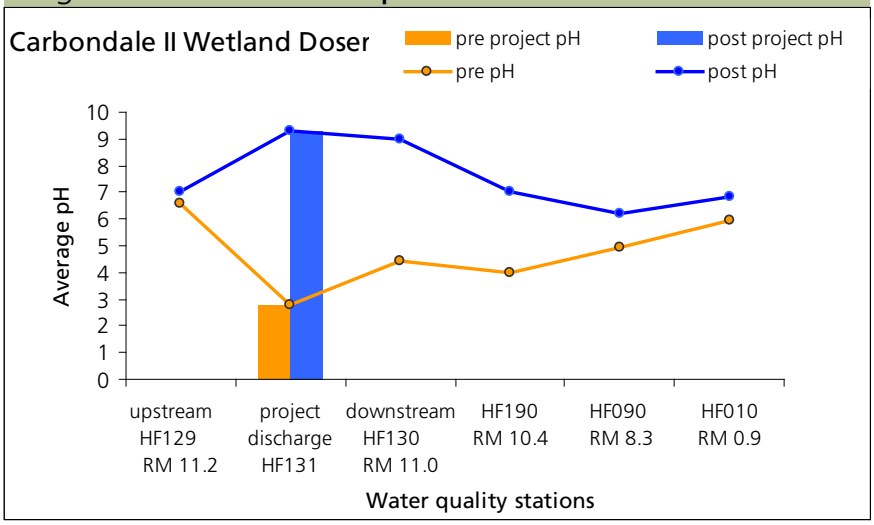
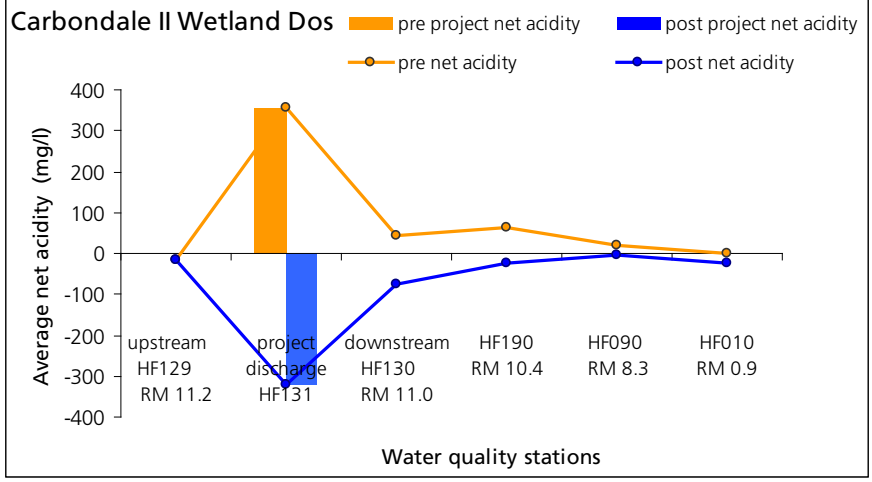


Figure 2. Pre and Post Acidity



As a result of the Carbondale II Wetland Doser project, the pH and net acidity has improved downstream of the reclamation site for 11 miles. Pre-construction data showed, pH in the range of 2.8 – 5.9 downstream of the project. However, after installation of the Carbondale II Wetland Doser, post-construction data shows pH in the range of 6.2 – 9.3 downstream of the project discharge. The net acidity concentrations decreased, showing net alkaline conditions continuing for 11 miles downstream to station HF010.

Water Quality – load reductions

Using the Mean Annual Load Method (Stoertz, 2004) acid and metal load reduction occurring at this project were plotted and shown in Figure 3 and 4. Acidity, iron, aluminum and discharge were measured pre- and post-construction at the project discharge from 6/1/1996 to 5/1/2003 for pre-construction and from 6/1/2004 to 6/30/2007 for post-construction.

Figure 3. Acid Load Reduction

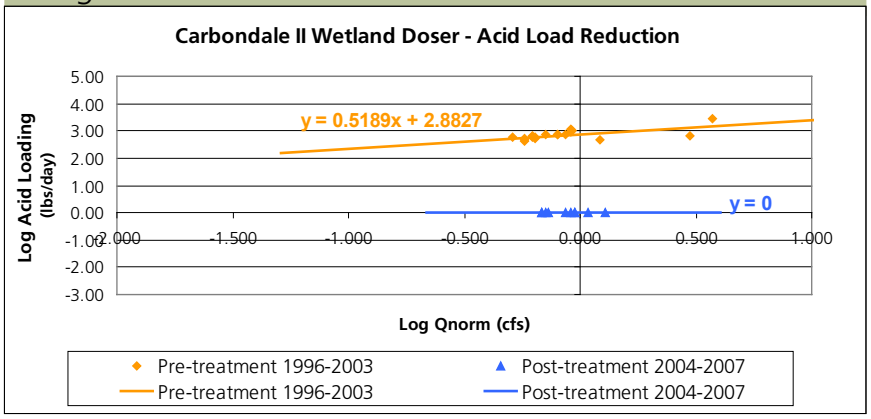
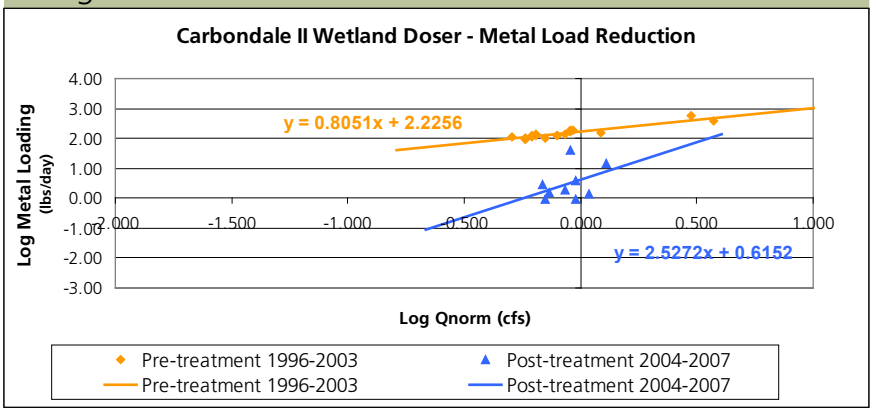


Figure 4. Metal Load Reduction



Average discharge measurements were used to calculate load reductions using the Mean Annual Load Method (Stoertz, 2004) instead of deriving the mean annual discharge from the drainage area because the discharge from the Carbondale II Wetland site is controlled primarily by deep mine drainage and not surface drainage.

Stoertz, Mary W. and Douglas H. Green, 2004. Mean Annual Acidity Load: A Performance Measure to Evaluate Acid Mine Drainage Remediation. Ohio Department of Natural Resources Conservation and Restoration Innovations 2004 Applied Research Conference at Ohio University.