

B&N Coal, Inc., West Fork Surface Coal Remining Project

Remining Information Series

Duck Creek Watershed

One of the watersheds most severely impacted by unreclaimed mining in the state of Ohio is Duck Creek. Soon after the federal Surface Mining and Reclamation Act was passed in 1977, a report was completed of Ohio watersheds ranking each based on mining impact severity. The East and Middle Forks of Duck Creek were ranked as No. 1 in severity based on acid loading and the West Fork Duck Creek was ranked eighth among watersheds in Ohio.

Duck Creek is a tributary to the Ohio River. Its headwater origins begin in Guernsey, Noble, and Monroe counties flowing south through Noble and Washington counties where it discharges to the Ohio River at Marietta. Duck Creek and its three major branches are 383 miles in length with a watershed area of 287 miles. Abandoned mine land (AML) impacts to Duck Creek and its three major tributaries include:

- 16,561+ acres of terrestrial habitat affected by abandoned mine lands
- 239 miles of highwalls, many with adjacent pit ponds
- 67 miles of named stream (17%) affected by acid mine drainage
- 141 miles of stream (37%) affected by physical impacts

The Remining of Duck Creek

Since 1972, many reclamation projects have been completed within the Duck Creek watershed. To date, approximately:

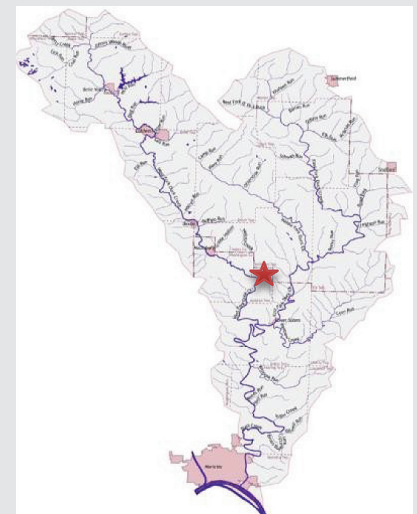
- 895 acres have been reclaimed with 553 acres attributed to remining and 342 acres attributed to the AML program administered by Ohio Department of Natural Resources - Division of Mineral Resource Management
- 40 miles of highwall reclamation attributed to remining (none are attributed to the AML program)
- Water quality improvements have been documented with substantial reductions in acid loading

In 2002, the Ohio EPA completed a watershed study for Duck Creek. It was found that water quality within the watershed had improved considerably over the water quality documented by earlier studies.

- 100% of the West Fork met its designated aquatic life use of warm water habitat
- 94% of the East Fork met its designated aquatic life use of warm water habitat
- 50% of the Duck Creek met its designated use of warm water habitat

The West Fork of Duck Creek witnessed the most dramatic improvement. B&N Coal Inc., a coal mining company that operates within Noble County, conducted many of the remining projects completed within the West Fork watershed. Since 1973, B&N has completed 18 projects within the West Fork of Duck Creek watershed and currently has one active permit.

Although vast improvements in water quality have been documented within Duck Creek many of its headwater streams are still severely impacted by abandoned mine lands. Work must continue through remining to improve these resources, an example of which is B&N's West Fork Project.



The Watershed of Duck Creek drainage map is shown above with a star showing the location of the West Fork project.

B&N Coal, Inc., West Fork Surface Coal Remining Project

Remining Information Series

Case Study: B&N Coal, Inc. West Fork Project

Site Conditions: It has been established that the West Fork project was originally mined beginning in 1949 with mining continuing through 1965. Both surface and underground mining of the Meigs creek (#9) coal was conducted. Surface disturbances include 296 acres of unreclaimed spoil and gob, 5.9 miles of highwalls, and 8.3 acres of pit ponds.



Exposed spoils are poorly vegetated and highly erosive.



Erosion in spoil forms headwater of stream.

The grey, toxic, acid-forming spoils that cover the pit floor are highly erosive, contributing to erosion gullies. Vegetation is sparse due to the toxic nature of the spoils. Water that comes into contact with the spoil becomes acidic, forming acid mine drainage (AMD). AMD from the unreclaimed mine areas forms the headwaters of the streams that flow from the project area. During remining, exposed coal auger areas are removed; the highwalls and pits are backfilled and the spoils are graded, topsoiled, and revegetated. Through remining and reclamation of the AML, water quality on site and off site is improved.

Water Quality Impacts: The majority of the pit ponds and seeps within the project area are acidic with pH values less than 4.0. S.U. is common. The severe acidity is due to exposure of water to acidic spoils, the exposed coal seam, auger holes, and deep mine voids. Auger holes and deep mine voids worsen AMD formation resulting in highly acidic pit ponds.



An auger hole is exposed along the highwall.



Poor water quality exhibited by orange staining.

The AMD formed within the West Fork Project provides the headwater source for the streams flowing from the project area. It is estimated that approximately 6.5 miles of unnamed primary headwater tributary streams are impacted by acid mine drainage originating in the West Fork project area. The headwater tributaries downstream of the project exhibit the orange staining indicative of acid mine drainage and are filled with sediment, which degrades aquatic habitat.

B&N Coal, Inc., West Fork Surface Coal Remining Project

Remining Information Series



Headwater stream affected by acid mine drainage.



Poor water quality exhibited by orange staining.

Permitting: The original West Fork surface coal remining permit was approved in 2004 and the adjacent area remining permit was approved in 2012. Total permit area is 452 acres. The West Fork project meets the definition of “Lands Eligible for Remining” qualifying it for a US Army Corps of Engineers Nationwide Permit 49 for surface coal remining and an Ohio EPA modified effluent dischargers permit for the constructed sediment ponds.

Mining Plan: The mine plan for the West Fork of Duck Creek implemented remining Best Management Practices (BMPs) to mitigate AML impacts. The implementation of these BMPs has resulted in improved terrestrial and aquatic habitat and improved water quality. BMPs conducted for this project include:

- ✓ Operational BMPs
 - Removal of remaining coal reserves
 - Removal and sealing of auger holes
- ✓ Hydrologic, Erosion and Sediment Control BMP's
 - Pit pond removal
 - Regrading spoils to approximate original contour
 - Topsoils and revegetation
 - Drainage system reconstruction
 - Permanent ponds
- ✓ Geochemical BMP
 - Application of highly alkaline top soil for neutralization

Remining Progress: To date, approximately 100 acres of the project are completely remined and reclaimed and 39 acres have been remined and are under various stages of reclamation. Four permanent ponds have been constructed for the original permit and eight temporary ponds are planned for the adjacent area.



Fork reclamation.



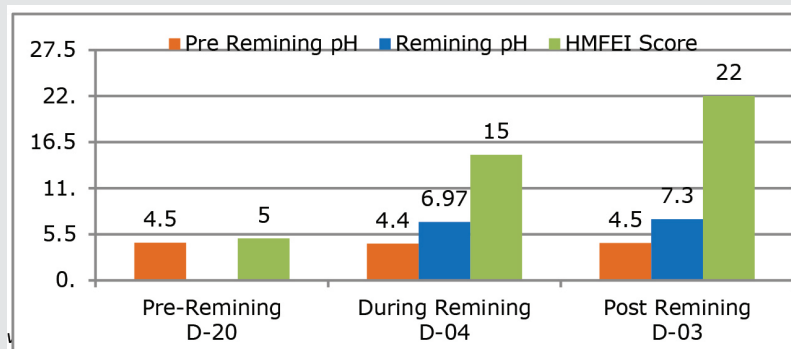
Permanent pond 002.

B&N Coal, Inc., West Fork Surface Coal Remining Project

Remining Information Series

Permanent ponds constructed as sediment control for the remining project, like Pond 002 shown above, provide water quality improvement within weeks of construction. Over the long-term, ponds increase aquatic resource diversity on site and function as finishing ponds, adding to improved water quality upon completion of the remining project.

Water Quality Improvement: With the reclamation of the headwater of one watershed complete and the partial completion of a second, water quality improvement is observed. A total of 4.1 miles of stream have pH values greater than 7.0 S.U. and reduced concentrations of minerals, such as iron, manganese, and aluminum. Biological attributes are improving in the streams as demonstrated by HMFEI biological assessment scores greater in those watersheds where reclamation is complete or in progress.



Water quality improvements are demonstrated by the increase in pH and the increase in the HMFEI biological assessment.

Monitored stream segment D-20 has an extremely poor habitat and the remining pH averages 4.5 S.U. The stream is stained orange by AMD and sediment impacts habitat quality. The remining project has not moved into this watershed. The HMFEI score of 5 reflects the poor quality of the stream. Monitored stream segment D-04 is downstream of permanent pond 004. Active mining was taking place in the watershed during the HMFEI biological assessment. The average during remining pH at this study segment is 6.97 S.U. and sediment is being flushed from the stream. The HMFEI biological assessment score is 15, demonstrating that the stream is in the process of recovery. The HMFEI score is anticipated to continue to improve with the completion of the remining project.



Monitoring Station D-20 not remined.



Monitoring Station D-04.



Monitoring Station D-03.

The monitored stream segment D-03 is downstream of permanent ponds 001 and 002. Mining has been completed in this watershed with the majority of the watershed under reclamation. The stream is in recovery. The average pH at this site is 7.3 S.U. and sediment has been flushed from the system. The HMFEI biological assessment score is 22 reflecting the improvement in water quality. It is anticipated that the biological community will continue to improve with time.