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# Beaver Run Priority Watershed Report 2004 Update

## **Introduction**

This is the fourth annual update to the Beaver Run Watershed Report, developed by the Knox District Mining Office to update the restoration and monitoring activities occurring in the Beaver Run Watershed during 2004.

The Beaver Run Watershed is located in Beaver, Rose and Oliver Townships, Jefferson County and is approximately 10 square miles in area and is designated as High Quality Cold Water Fishery upstream of the Route 36 crossing. The major source of acid mine drainage in the watershed is abandoned Brookville deep mine discharges approximately one mile downstream of Route 36. [Beaver Run Watershed Map](#)

Restoration efforts in the watershed have progressed through a land reclamation project funded through Growing Greener and monitoring of the water quality of Beaver Run. Future restoration activities will focus on the performance of the Conifer West ALD and East Wetland systems, completion of the land reclamation at the Conifer II site, possible remediation of the Conifer North (BRD09) and BRD07 discharges and continued water quality monitoring by the Knox DMO staff.

## **Activities** (January 1, 2004 – December 31, 2004)

### **Conifer II Mine Reclamation**

The Jefferson County Conservation District was awarded \$204,000 Growing Greener Grant to backfill 1300 lineal feet of abandoned highwall and 20 acres of abandoned mine land (PA 1308). This project will also replace a stream channel of an unnamed tributary to Beaver Run that was interrupted by the surface mining operation conducted on the Brookville coal seam in the 1950s. The tributary presently flows into the abandoned pit and recharges the Conifer deep mine pool that produces acid mine drainage discharges at BRD06R and BRD01A. The Pennsylvania Association of Conservation Districts, Inc. (PACD) completed the engineering designs in 2004. A conservation easement was obtained for the 21.5-acre parcel of land, which is part of the Conifer West site, however the landowner of the adjacent 7.5-acre portion decided not to have his property reclaimed. The boundaries of the project were revised and a bid package was put together and distributed to several contactors. Strishock Coal Company was awarded the contract to perform the reclamation and will begin work in spring of 2005.

### **Conifer West**

The Conifer West treatment system, consisting of an ALD and two wetlands, was constructed during the summer of 1998 and retrofitted during the fall of 2000 due to the plugging of the limestone in the ALD around the influent manifold. Several months after the retrofit was completed, iron was once again being retained in the ALD. The system was flushed several times in between February 2002 and the summer of 2003, however, the treatment efficiency of the ALD was still being compromised by the continued accumulation of iron and aluminum solids. A full-scale retrofit was completed during the summer of 2003, including the removal of 2,000 tons of spoiled limestone from the ALD, replacing the first 60 feet of limestone with 1,400 cubic yards of organic matter, and replacing the next 50-60 feet of limestone with 800 tons of R3 limestone rip-rap and a under-drain flushing system. The remaining 130 feet of the limestone in the ALD was not replaced. Initial sampling results indicated that less iron is being retained in the ALD. The system is flushed monthly to remove aluminum and iron precipitates (by Knox DMO staff). Recent inspections have indicated limited success of the 2003 retrofit. It appears that the limestone is armored and the compost clogged with metals. Untreated water is bypassing the system through the flow control box. Thereby, less alkalinity is being generated to neutralize the BRD01A discharge routed into the final wetland and the final discharge from (W2) is now net acidic with an average pH of 3.1 and average 17.1 mg/l iron, 6.0 mg/l manganese and 22.4 mg/l aluminum. Monitoring and flushing will continue on a monthly basis through 2005.

### **Conifer East**

An alkaline-amended wetland was constructed during the spring of 2001 to treat three discharges east of the Conifer West treatment system. Muskrat damage caused subsidence on the berm of the wetland and reinforcement was completed in 2003. Since implemented, the passive treatment efficiency has been acceptable - eliminating 69 mg/L of acidity, generating alkalinity in excess of 91 mg/L, and removing metals from the discharges. Monitoring data collected in 2004 indicates decreasing alkalinity and increasing acidity and manganese and aluminum levels at (EW). Unusually high flows in 2004 may be responsible. The wetland will continue to be monitored on a monthly basis through 2005.

### **Conifer North (BRD09 and BRD07)**

No further progress has been made as to possible remediation of the Conifer North (BRD09 and BRD07) discharges.

### **Mining Activities**

No surface mine permits were issued in the watershed during the reporting period. It is estimated that 95% of the mineable coal reserves in the Beaver Run watershed have been depleted.

**Water Quality Indicators**

Key stream monitoring points being evaluated for this year's update include:

- BR02 Beaver Run upstream of Conifer Bridge.
- BR04 Beaver Run at LR3007 (below Conifer site).
- BR05 Mouth of Beaver Run (at Heathville Bridge LR3007)

BR02 – water quality in Beaver Run below the Conifer ALD and Wetland continues to show a high pH and net alkaline conditions. In 2004, iron and aluminum levels were slightly elevated due to the plugging of the ALD, allowing untreated water to bypass the system through the flow control device. The Conifer East Wetland discharge (EW) is also contributing slightly to the elevated in-stream aluminum concentrations at this point. BR04 – Beaver Run upstream from the LR3007 bridge has an average pH of 7.0 and is net alkaline. Levels of both iron and manganese have decreased at BR04 but still show signs of being impacted by the BRD09 and BRD07 discharges with an average iron concentration of 1.6 mg/l.

– Water quality at the mouth of Beaver Run has shown improvement since the construction of the Conifer West ALD and East Wetland. pH and alkalinity have increased while iron concentrations have decreased.

The Conifer West and Conifer East projects were designed to reduce approximately 32% of the Iron loading and 70% of the Aluminum loading contributed by the BRD01, BRD03, BRD04, BRD05 and BRD08 discharges. Downstream from the Conifer sites, the BRD09 and BRD07 discharges are contributing approximately 57% of the Iron loading to Beaver Run. Several low flow seeps (BRD02A, BRD02B and BRD02C) were collectively determined to contribute to 10% of the iron loading and 29% of the aluminum loading into Beaver Run (Table 1)

	Monitoring Point	Iron lbs/day	Aluminum lbs/day	Iron Loading	Aluminum Loading
<b>Conifer (Treated Discharges)</b>	BRD01	28.6	11	32%	70%
	BRD03	13.2	6.6		
	BRD04	0.22	1.8		
	BRD05	0.22	0.22		
	BRD06	1.1	0.88		
<b>Artesian Flow</b>	BRD09	57.2	0	42%	0%
<b>Instream Bedrock Fractures</b>	BRD07	20.5	0.1	15%	0.30%
<b>Low Flow Seeps</b>	BRD02A	3.1	4.8	10%	29%
	BRD02B	3.7	3.7		
	BRD02C	5.1	0.22		
	BRD08	2	0		
<b>Total Loading</b>		134.94	29.32		
<b>BR Downstream from Discharges</b>	BR04	145.2	34		

For a complete listing of water quality:

[Link to Monitoring Point Descriptions and Water Quality Data.](#)

## **TMDL**

The Total Maximum Daily Load (TMDL) report for the Beaver Run watershed was completed in November 2000 and approved in April 2003. The TMDL the impairments noted on the 1996 Pennsylvania 303(d) list, required under the Clean Water Act. All impairments in the Beaver Run Watershed resulted from abandoned mine and abandoned oil and gas well acidic discharges. The TMDL addresses the three primary metals associated with acid mine drainage, iron, manganese and aluminum.

TMDLs include calculations of the loadings, for each metal of concern listed and acidity, that can safely be put into the streams and meet the state water quality criteria. The Beaver Run TMDL, when implemented, is expected to achieve the water quality standards. Restoration efforts conducted in the watershed continue to focus on improving water quality and address the reduction of metal and acidity loads.

If additional mining is pursued within Beaver Run Watershed, the mining company will be required to meet the percent reductions noted in the TMDL document for discharges from the mine site.

## **Future Activities**

Conifer II reclamation project will be implemented in 2004 by the Jefferson CCD.

The Knox DMO will continue to monitor the water quality at the treatment sites and throughout the Beaver Run watershed. Monthly flushing of the Conifer West ALD and monitoring of the Conifer East Wetland will continue on a monthly basis.

The Knox DMO Beaver Run Priority Watershed Team will continue to meet quarterly to monitor treatment system performance, assist with planning, monitoring, project development activities, and provide technical assistance to the Redbank Creek Watershed Trust Steering Committee. Team members are: Sherry Carlin, Ely Heferle, Lew Kiehl, Joe Ferrara, Ruth Taylor, Tim Gillen, Mark Odenthal and Jon Smoyer.