Aaron Run Watershed AMD Remediation Project
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OSM 2014 Appalachian Regional Award

Maryland Abandoned Mine Lands Division

Presenter: Constance A. Loucks
Western Maryland Potomac River View Shed
Aaron Run Watershed

North Branch Potomac River Subwatershed

Tributary above the confluence of Savage River and the North Branch Potomac River.

Drains approximately 2,270 acres (3.5 square miles) of Garrett County, Maryland.
Aaron Run - A Savage River Tributary

- Savage River, a highly valued recreational trout stream.
- Conservation Priority
- A reference site
Valued Resource Protection

• Premier Native Brook Trout Stream

• Tributary to the North Branch Potomac River – American Heritage River
Savage River
Savage River Fishery

The Savage River wild brown and brook trout population combined with stellar hatches attract anglers from all over the east coast. It's absolutely as good a trout river as you'll find anywhere.

- www.orvis.com -
North Branch Potomac
North Branch Potomac River

The upper river is a freestone stream that runs through some beautiful country.

I challenge anybody to find more breath taking scenery.

- www.orvis.com -
Aaron Run – Land Use

• Heavily forested with some small cattle farming and single dwelling homes.

• Coal mining is the only industrial activity to have occurred in the watershed.
Aaron Run Watershed
Mining in Aaron Run Watershed

- Mining in Aaron Run watershed began in the 1930’s.
- Small abandoned underground and surface mine operations.
- Active underground mine and surface mines.
Mining in Aaron Run Watershed

Past deep mining activity was estimated to extend over 102 acres of the watershed.

Several abandoned mine sites left unreclaimed prior to 1977.
Acid Mine Drainage (AMD) Impacts

- Aaron Run is highly impacted by AMD and the watershed is listed on Maryland’s 1998-303(d) list of Water Quality Limited Segments (WQLSs) for pH.
- MDE/BOM applied for grants through EPA’s 319 program.
Abandoned Mine Drainage in Aarons Run
Aarons Run Impairments

pH and Biological 303 (d) listed

Fish and Benthic
Background Studies

• Data consistently indicated that Aaron Run was severely degraded by AMD from numerous pre-law underground and surface coalmines.

• Low pH was consistent with low Benthic Index of Biological Integrity (BIBI) scores and low fish abundance and diversity.
Aarons Run Projects Map with Impairments and Mine Locations
Project Goals

- Acid mine drainage remediation
- Restoration of native trout populations in Aaron Run.
- Recovery of an impaired trout fishery reach in Savage River and North Branch Potomac.
- Delisting from 303(d) list
AMD Stream Restoration Project – Surface Mine Discharges

- pH: 3.0
- Flow: L-25; H-60 gpm
- Iron: 3.52 mg/l
- Aluminum: 10.82 mg/l
- Acidity: 105.0 mg/l
AMD Stream Restoration Project

- Two additional discharges on adjacent property.
- Owner did not want treatment systems built on his property.
- Discharges were diverted.
- All discharges were treated to the one location.
<table>
<thead>
<tr>
<th>AMD Stream Restoration Project - Diverted Carder 1 &amp; 2 Seeps</th>
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<tbody>
<tr>
<td>• pH: 2.8</td>
</tr>
<tr>
<td>• Flow: L-9; H-40 gpm</td>
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<tr>
<td>• Iron: 13.32 mg/l</td>
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<tr>
<td>• Aluminum: 16.49 mg/l</td>
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<tr>
<td>• Manganese: 28.83 mg/l</td>
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<tr>
<td>• Acidity: 182.6 mg/l</td>
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<tr>
<td>• pH, 2.9</td>
</tr>
<tr>
<td>• Flow: L-7; H-12 gpm</td>
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<tr>
<td>• Iron: 7.69</td>
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<tr>
<td>• Aluminum: 17.06 mg/l</td>
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<tr>
<td>• Manganese: 1.60 mg/l</td>
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<tr>
<td>• Acidity: 175.5 mg/l</td>
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AMD Stream Restoration Project

- Completed: May 2011
- Construction Cost: $541,050
- Funding sources: EPA 319, OSM Title IV; OSM Watershed Cooperative Grant, U.S. Fish and Wildlife.
AMD Stream Restoration Project

Installed Treatment Systems

2 SAPS, Oxidizing Pond

CaCO3 Boxholm Doser

Wetlands creation
First SAPS on Upper Bench  
Construction November 2010
Second SAPS on Bench July 2013
Oxidizing Pond on Bench
Post Construction September 2013
AMD Stream – Limestone Leachbed
View of Limestone Leachbed and Wetlands July 2014
Owens North

- pH: 3.0
- Flow: L - 3; H - 12 gpm
- Iron: 149.94 mg/l
- Aluminum: 51.65 mg/l
- Manganese: 9.71 mg/l
- Acidity: 731.1 mg/l
- Alkalinity: 0.0 mg/l
Owens North

Installed Treatment Systems

- Steel Slag Bed Fed From Upstream Aarons Run
- Automatic Flushing
- Completed October 2009
- Construction Cost: $182,670
- Funding sources: EPA 319; OSM WSCOOP
Owens North AMD Seep Discharge October 2004
Owens North Construction of AMD Sump October 2009
Owens North AMD Sump October 2010
Planting the Rain Garden at Owens North October 2010
Owens North Steel Slag System July 2014
Owens South
Owens South AMD Seeps
Pre-Construction October 2004
Owens South

- pH: 2.6
- Flow: L- 10; H -90 gpm
- Iron: 106.75 mg/l
- Aluminum: 38.34 mg/l
- Manganese: 3.86 mg/l
- Acidity: 613.3 mg/l
Downstream of Owens South
Owens South

Large Concrete APS, Oxidizing Pond
Rain Garden and Settling Pond
Completed: April 2009
Construction cost: $427,500
Funding sources: EPA 319; OSM WSCOOOP
Owens Pond
Owens South Pond and Leach Ditch July 2014
Electro-shocking for Native Fish for Recolonization of Aaron Run
Restocking Aarons Run September 2012
Restocking was Successful with Young-of-the-Year – MDNR Fisheries Statement 2013
Questions??