On the Road to Recovery – Raccoon Creek Success Stories

November 15th, 2012
WMAO 2012 Fall Conference
100 Years of Watershed Events

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Raccoon Creek Watershed Coordinator
Surface Mining Control & Reclamation Act of 1977 (SMCRA)

watershed event most pivotal to my work today

- Primary federal law regulating environmental effects of coal mining in the U.S.
- Two programs: one regulates active mines, the second reclaims abandoned mine lands (AML).
- AML fund was created to pay for reclamation. A tax of $0.31/ton of coal from surface mines, $0.13/ton of coal from underground mines.
Raccoon Creek Watershed

- 683.5 square miles
- 112 miles long
- Flows through 6 southeast Ohio Counties
  - Hocking (headwaters)
  - Vinton (headwaters)
  - Athens
  - Meigs
  - Jackson
  - Gallia (mouth)
Watershed Features

EXPLORE RACCOON CREEK!

- 75% forested (<25% suitable for agriculture)
- Largest town (Wellston) has a population of less than 6000 people…very rural!

EXCELLENT RECREATIONAL OPPORTUNITIES!

- 60,000 acres of public land
- Canoeing and kayaking
- Hunting and fishing
- Bird watching and wildlife viewing
- Mushroom hunting
- Hiking and camping
HISTORIC COAL MINING

- Acid Mine Drainage (AMD)
- Sedimentation
- Erosion
- Lack of species diversity
- 190 stream miles affected by AMD
History of the Partnership

HOW IT ALL STARTED...

- **1980s** – Raccoon Creek Improvement Committee formed in Gallia County. A few concerned citizens joined together to solve the water quality issues....very quickly realized they were in over their heads!

- **Early 1990s** – RCIC invited citizens from all 6 counties to join them...still too much work to be done!

- **Late 1990s** – Formed Raccoon Creek Watershed Partnership, a loosely based partnership of citizens and agency personnel to address technical issues in the watershed.

- **2007** – Raccoon Creek Partnership 501 (c)3 was formed.

Our partners include agencies, organizations, communities, and individuals with a shared mission:

“to work toward conservation, stewardship, and restoration of the watershed for a healthier stream and community.”
A TRUE Partnership

Who is RCP?

Watershed Residents, Landowners, Concerned Citizens

Local coal companies

RC&D Districts

6 County SWCDs

NRCS

Hocking College

U.S. Department of the Interior, Office of Surface Mining

SOIL & WATER CONSERVATION

OHIO UNIVERSITY

OHIO DIVISION OF WILDLIFE

RURAL ACTION

USA Forest Service

Raccoon Creek

Raccoon Creek Partnership

Ohio & EPA

American Ag

6 County SWCDs
What Have We Accomplished?

SO...WHAT DO OUR PARTNERS DO?!

- Fund watershed staff
- Secure funding for AMD treatment & reclamation
- Opened an aquatic education center
- Water trail designation (pending)
- Outreach and education
Committee within the Raccoon Creek Partnership

- Public floats
- Recreation
- Establishment of State Water Trail (pending)
- Creation, printing, distribution of Water Trail Map (pending)
“Basecamp” for RCP meetings and events

- Located on Waterloo Wildlife Area (public) near New Marshfield, OH
- Past DOW research lab (squirrel, turkey, grouse, deer)
- Hewett Fork (doser trib) runs through the area
- RCP leases from DOW for $1/year since 2008
- Home of day camps, summer camps, trainings, workshops, meetings...

Waterloo Aquatic Education Center (WAEC),
Mission Statement:

“to create aquatic science educational opportunities for nurturing an appreciation for our local landscape, to promote conservation of our natural resources and to halt watershed degradation with the involvement of our community”
**Our Focus:** AMD / AML Reclamation & Treatment

**Past and Current Projects**

- 1st reclamation project (Buckeye Furnace) in 1998
- Over $10 million (AML fund, 319 grants, OSM Watershed Cooperative Agreement Program grants)
- 14 reclamation and treatment projects complete
  - Active treatment (doser)
  - Passive treatment (steel slag beds, limestone leach beds, SAPS, wetlands, limestone channels...)
- Reclamation / Source Control
Projects located in the most impacted watershed areas: Headwaters & Little Raccoon Creek
Carbondale II Wetland is located in Section 30 of Waterloo Township in Athens County and lies within the 14-digit HUC unit 030800101000010. The site is situated on the subwatershed Hewett Fork of Raccoon Creek Watershed. The majority of AMD in Hewett Fork originates from abandoned underground coal mines near Carbondale. ODNR-DWMF installed a passive wetland treatment system to reduce the acid and metal load from two mine portals in this area in the mid 1990's. This wetland was effective at reducing metal and acid loads but was not efficient enough to produce improvements in Hewett Fork. The Carbondale Doser was implemented as Phase II at the site to remediate the entire acid load from the mine discharge in 2004. 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. 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 one with 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...
Chemical sampling locations:
upstream & downstream of projects, & along mainstem

- Used to determine project locations and priorities and to modify/improve future project designs.
- 346 chemical samples in 2011
  - Field measurements
  - Laboratory samples
  - Discharge measurements
Macroinvertebrate sampling to determine biological recovery downstream of projects

- 28 MAIS sites in 2012
  - Dip net sample in all habitat (20)
  - Kick net sample in riffles (3)
  - Count, ID, and generate score (0-18)
Fish sampling, in addition to macros, to determine biological recovery downstream of projects.

- 14 fish sites in 2012
- 8 wading (long-line) sites – 200 m
- 6 boat sites – 500 m
- QHEI (Qual Habitat Eval Index) at each site
On the Road to Recovery…

- 15 years
- $10 million dollars
- 14 reclamation and treatment projects (with more on the way)
- Monitoring, monitoring, and more monitoring (~400 chemical, 28 MAIS, 14 IBI/ QHEI)
- Countless partners, staff, volunteers, students….

Is it Working???
You're sayin' there's fish in Raccoon Creek?!
Water Quality Improvements

- RC mainstem and LRC set as goal for recovery
- 42 stream miles now meet water quality standards for Warm Water Habitat designation (trying to raise that number!)
- Projects have resulted in acid load reduction (2011 NPS report) of 5,414 lb/ day and metal load reduction of 1,052 lb/ day
- Seeing biological recovery downstream of projects
- Consistent net alkaline conditions near the mouth of Raccoon Creek
pH targets of monitored stream miles 2001 - 2011

pH change through the watershed, baseline - 2010 (blue is good!)

Good News!
Net alkalinity Raccoon Creek Headwaters

Sample Date

Net Alkalinity mg/L

-30  -20  -10    0    10    20    30    40    50


- Linear (net alkalinity)

- net alkalinity

Doser & Hope Clay

Harble Griffith & Orland

EB I

EB II

EB III
Biological Recovery Downstream of Remediation Projects

Raccoon Creek Headwaters
- East Branch Phase I, II, III
- Carbondale Doser
- Hope Clay Reclamation
- West Branch (Harble Griffith & Orland Gob Pile) – finished summer 2012

Raccoon Creek Middle Basin
- Pierce Run – under construction

Little Raccoon Creek
- Mulga Run
- SR 124 Seeps
- Buckeye Furnace & Buffer Run
- Flint Run & Lake Milton
- Middleton Run

- 24 miles recovered
- 18 miles recovered
Original goal – minimize the acid load reaching Raccoon Creek from HF

- 2005 – 24 miles
- 2010 – 18 miles

4 miles now meeting or partially meeting WWH criteria
Average fish per site increased from 82 in the 1990s to 208 in the 2000s!
Average fish per site increased from 20 in the 1980s (some sites had zero fish) to 96 in the 2000s!
Raccoon Creek at Rio Grande (downstream of Little Raccoon Creek Confluence)

- 1994 - 17 species
- 2012 - 30 species!!

**Biological Recovery In Raccoon Creek**

<table>
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<tr>
<th>Group</th>
<th>1994 # species</th>
<th>1994 # individuals</th>
<th>2012 # species</th>
<th>2012 # individuals</th>
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<tr>
<td>suckers</td>
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<td>3</td>
<td>5</td>
<td>7</td>
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<tr>
<td>sunfish and bass</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>8</td>
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<tr>
<td>darters</td>
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<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>minnows and shiners</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>17</td>
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<tr>
<td>total species/individuals</td>
<td></td>
<td></td>
<td>30</td>
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WHAT'S COMING UP?

Hello Little Raccoon Creek!

- Lake Morrow – Phase I (2013)
  - Flint Run, Jackson County
  - Remove spoil dam from lake, determine possible AMD sources

- Flint Run Wetland Berms (2013)
  - Flint Run, Jackson County
  - Install / enhance wetland berms to increase retention time of water and precipitate more metals before entering Flint Run

- Middleton Run Reclaim (2013-2014)
  - Jackson County
  - Phased project: reclamation and treatment
  - Currently conducting pre-construction sampling
“Wild rivers are earth's renegades, defying gravity, dancing to their own tunes, resisting the authority of humans, always chipping away & eventually always winning.”

~ Richard Bangs, River Gods

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