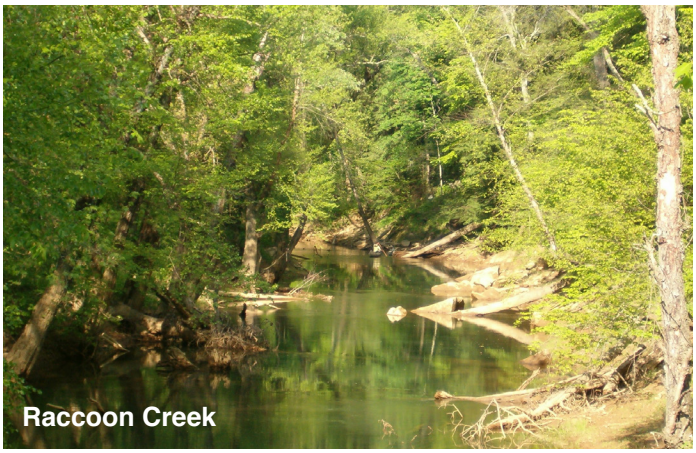
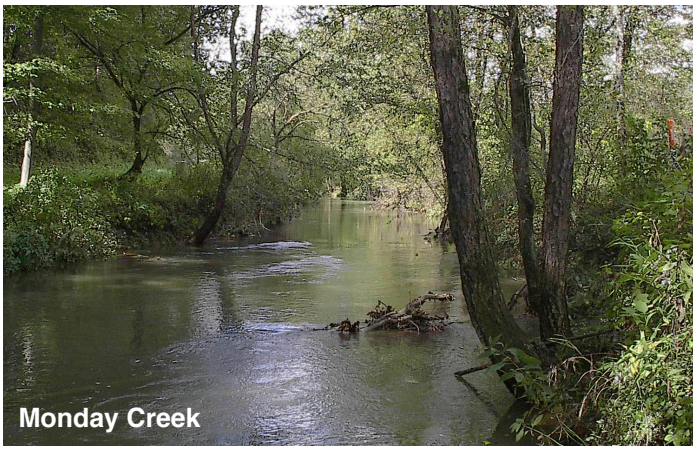
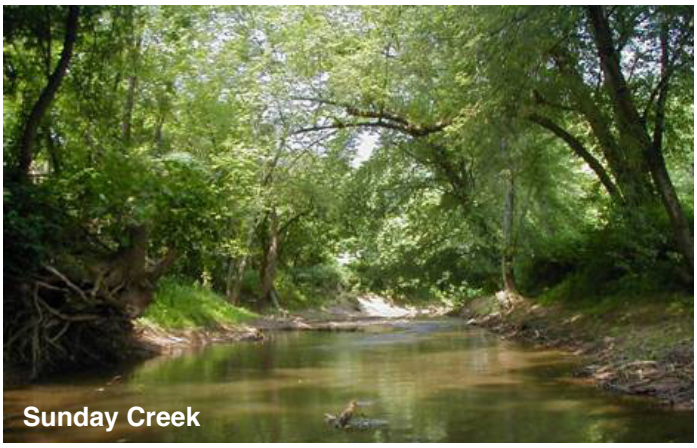
2011 Stream Health Report

Generated by Non-Point Source Monitoring System
www.watersheddata.com


Huff Run


Raccoon Creek


Monday Creek


Sunday Creek

To track the overall health of Raccoon Creek, Monday Creek, Sunday Creek, and Huff Run, the watersheds where acid mine drainage reclamation is active, chemical data were collected annually since 2005. Biological data are collected annually for family–level macroinvertebates (MAIS) and every 3-5 years for fish (IBI). Baseline conditions were established during the time period of 1997-2001 with historic data. In 2005, 175 stream miles were evaluated and compared to the baseline data for IBI. Comparing the same stream segments from baseline to 2005, from a biologists' perspective, (these changes are not official use attainment status changes made by the Ohio EPA) 23.3 stream miles improved to suggest WWH use attainment. During 2010 fish and macroinvertebate data suggest a total of 47 miles of stream meet the use attainment for WWH, with 51 stream miles evaluated for both family-level macroinvertebrates (MAIS) and fish (IBI). Individually, over 158 miles were evaluated for MAIS and 54 miles for IBI. This data was collected to compare these indices to the biological health targets of 12 for MAIS and IBI scores of 44/40 for wadable/boatable streams. Stream miles that improved in biological health from baseline 2005 are shown in Figure 2. Figures 3 and 4 show 18.4 miles were improved in the Raccoon Creek watershed and 5.3 miles improved in West Branch of Sunday Creek from 2005 to 2010.

Other significant incremental water changes are also tracked and described in this report; for example, acid and metal loading reductions, pH and acidity improvements, and increases in number of fish and diversity. These incremental changes may not allow a stream segment to change use attainment status, but they do track progress toward the overarching goal and therefore have been tracked at the acid mine drainage project level reports and at the watershed level reports.

Another measure of success is to look at the fish community changes over time in a watershed (Figure 5 & 6). These statistical changes show improving fish communities in Raccoon and Little Raccoon Creeks.

2011 Stream Health Report

Generated by Non-Point Source Monitoring System
www.watersheddata.com

Figure 2: Biological health improvements in Raccoon Creek from baseline (1997) to 2005.

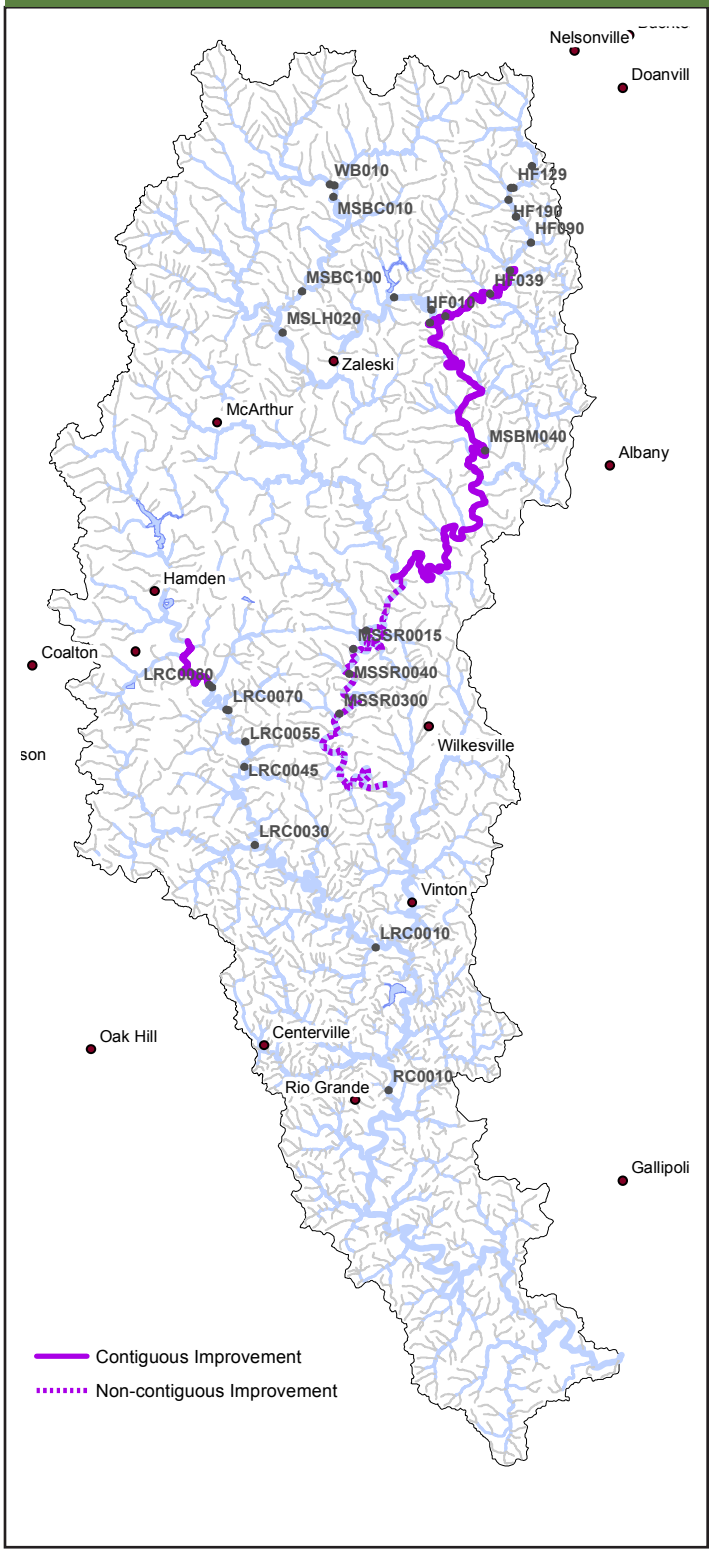


Figure 3: Biological health improvements in Raccoon Creek from 2005 to 2010.

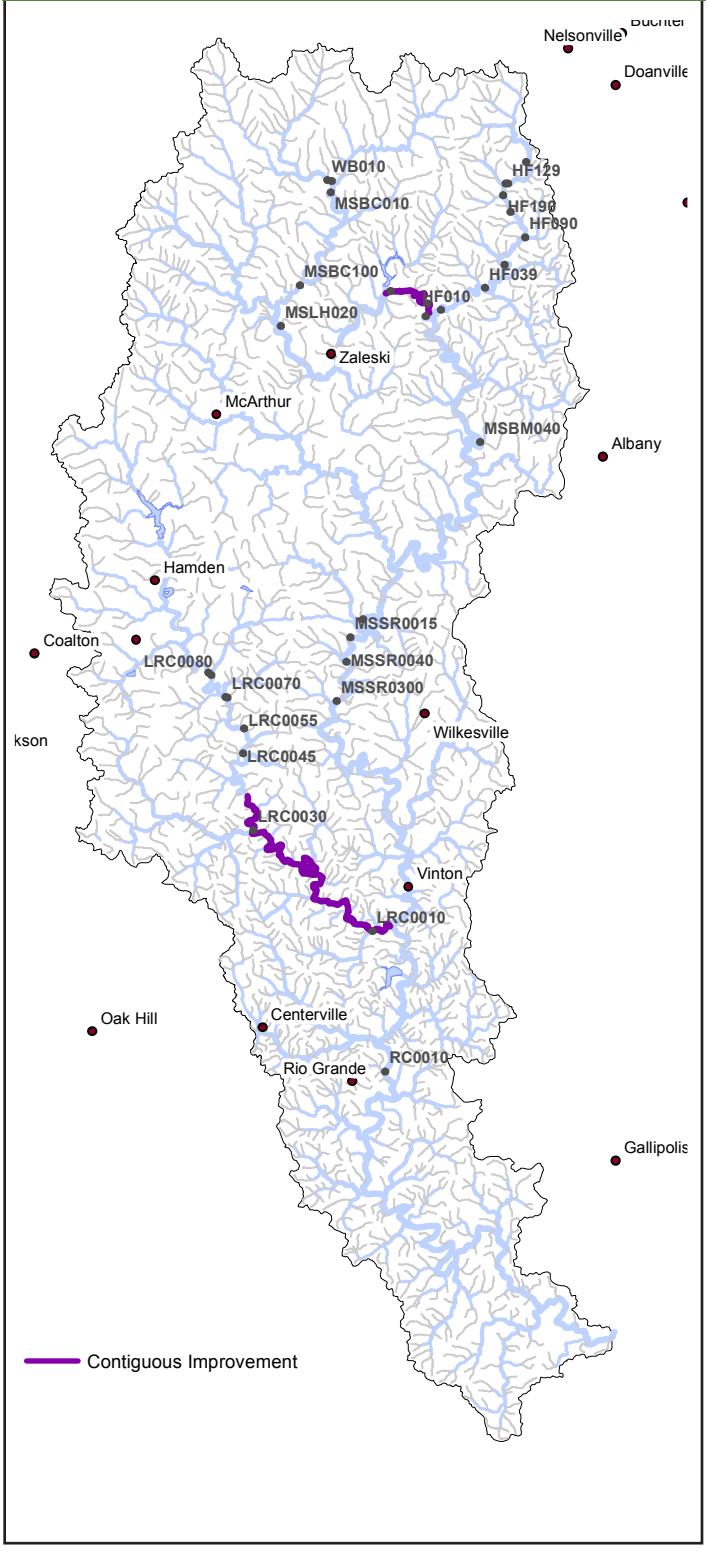
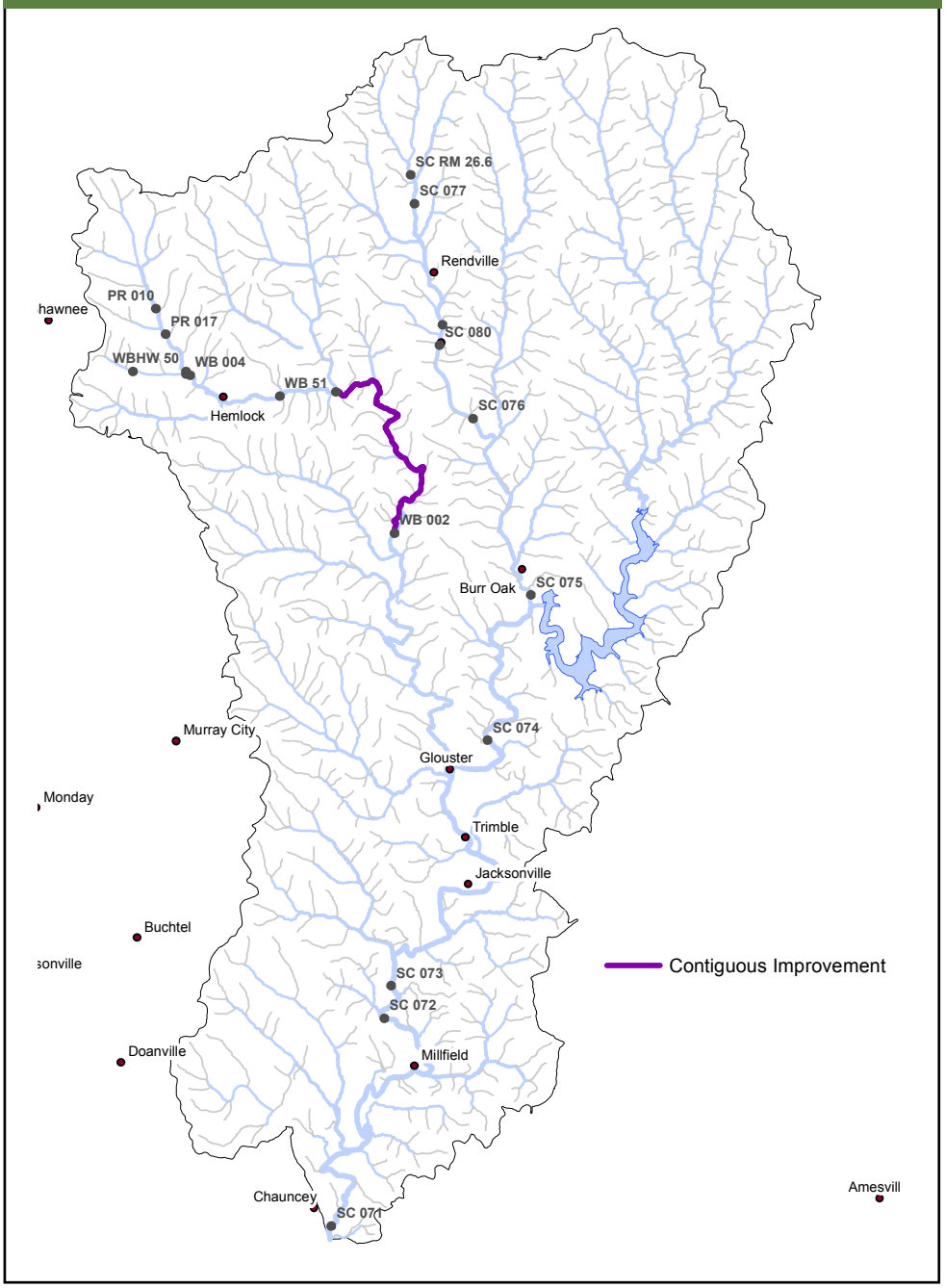


Figure 4: Biological health improvement in Sunday Creek West Branch from 2005 to 2010.



Upper Raccoon Creek (Figure 5):

- 1980's: no data collected
- 1990's: 25 species, 59% tolerant fish, 26% moderately sensitive fish, 2 darter species (2.5%), 1 bass species (5.4%), 82 fish average per sample.
- 2000's: 30 species, 28% tolerant fish, 30% moderately sensitive fish, 4 darter species (6.3%), 3 bass species, (7.5%), 208 fish average per sample.

Little Raccoon Creek (Mulga Run to the mouth) (Figure 6):

- 1980's: 13 species, 92% tolerant fish, 3% moderately sensitive fish, 0 darter species, 1 bass species (1.8%), 20 fish average per sample. Some samples had no fish present.
- 1990's: 26 species, 63% tolerant fish, 17% moderately sensitive fish, 3 darter species (4.7%), 3 bass species (7.1%), 111 fish average per sample.
- 2000's: 41 species, 43% tolerant fish, 30% moderately sensitive fish, 5 darter species (7.4%), 3 bass species, (10.7%), 96 fish average per sample. 1 intolerant species (Rosyface Shiner) was present.

In both figures 5 and 6, in the headwaters of Raccoon Creek and Little Raccoon Creek from the 1980s/1990s to the 2000s total number of species increased but specifically the moderately sensitive fish have increased while the percentage of tolerant fish decrease. Also the number of predatory species (i.e. bass and darters) increased. These data suggest the combined efforts of Ohio EPA, ODNR, Raccoon Creek Partnership (RCP) and other watershed partners have made a positive difference in this watershed.

Figure 5: Raccoon Creek Headwaters Fish Community Recovery 1990s to 2000s

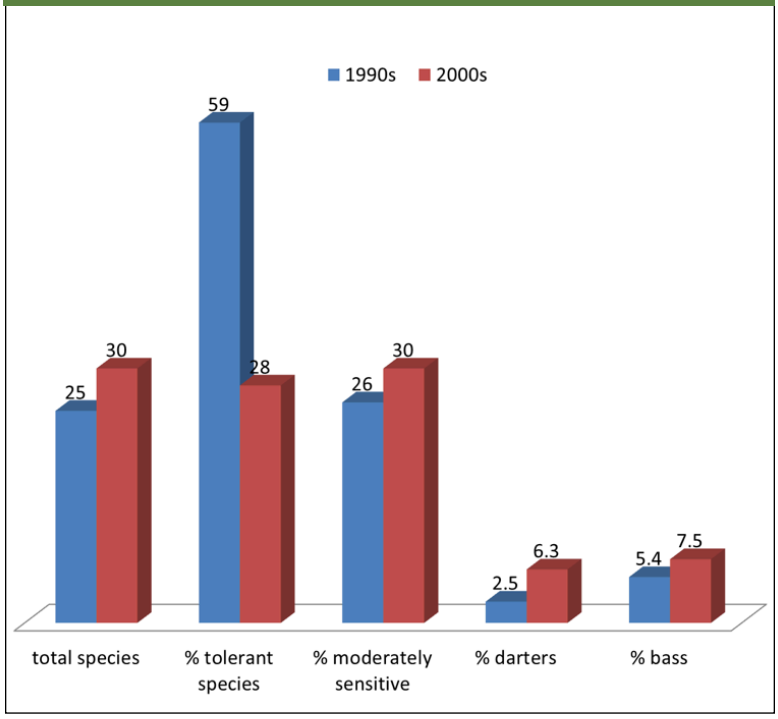
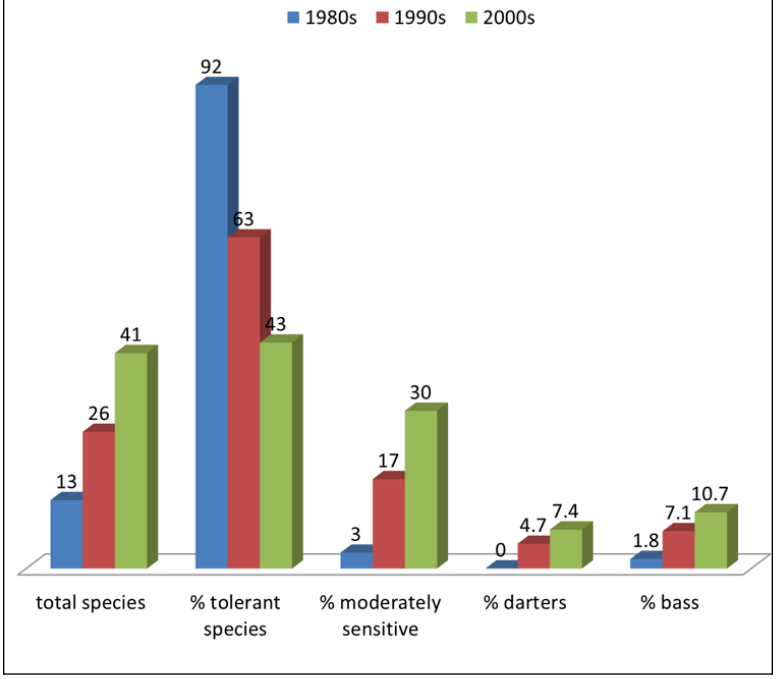


Figure 6: Little Raccoon Creek fish Community Recovery 1980s, 1990s, and 2000s.



2011 Stream Health Report

Generated by Non-Point Source Monitoring System
www.watersheddata.com

Table 1. Summary of the NPS targets for each of the four watersheds evaluated in 2005 to 2009: Raccoon Creek, Monday Creek, Sunday Creek, and Huff Run.

Watershed	Total number of completed projects	Total costs	Total acid load reduction lbs/day	Total stream miles improved in 2005/2010 to meet IBI & MAIS Biological stream health targets	Goal of number of stream miles to meet WWH Full attainment by 2010	Stream miles that met the pH target	Total stream miles monitored
Raccoon Creek	14	$9,710,495	5,414 *	23.3/18.42 (41.7)	57	103	117
Monday Creek	13 (plus 5 subsidence projects, costs are not included)	$5,871,172	3,877	0/0	25	21	38
Sunday Creek	8 (4 of 8 are subsidence projects)	$1,965,706	18	0/5.26 (5.26)	18	34	37
Huff Run	12	$4,678,279	965	0/0	3	10	10
Total	47	$22,225,651	10,274	23.3/23.7 (47.0)	103	168	202

**Salem Rd/Middleton Project evaluated at the site MiR0021 only, as of 2010, no 2011 data were collected*

Reductions

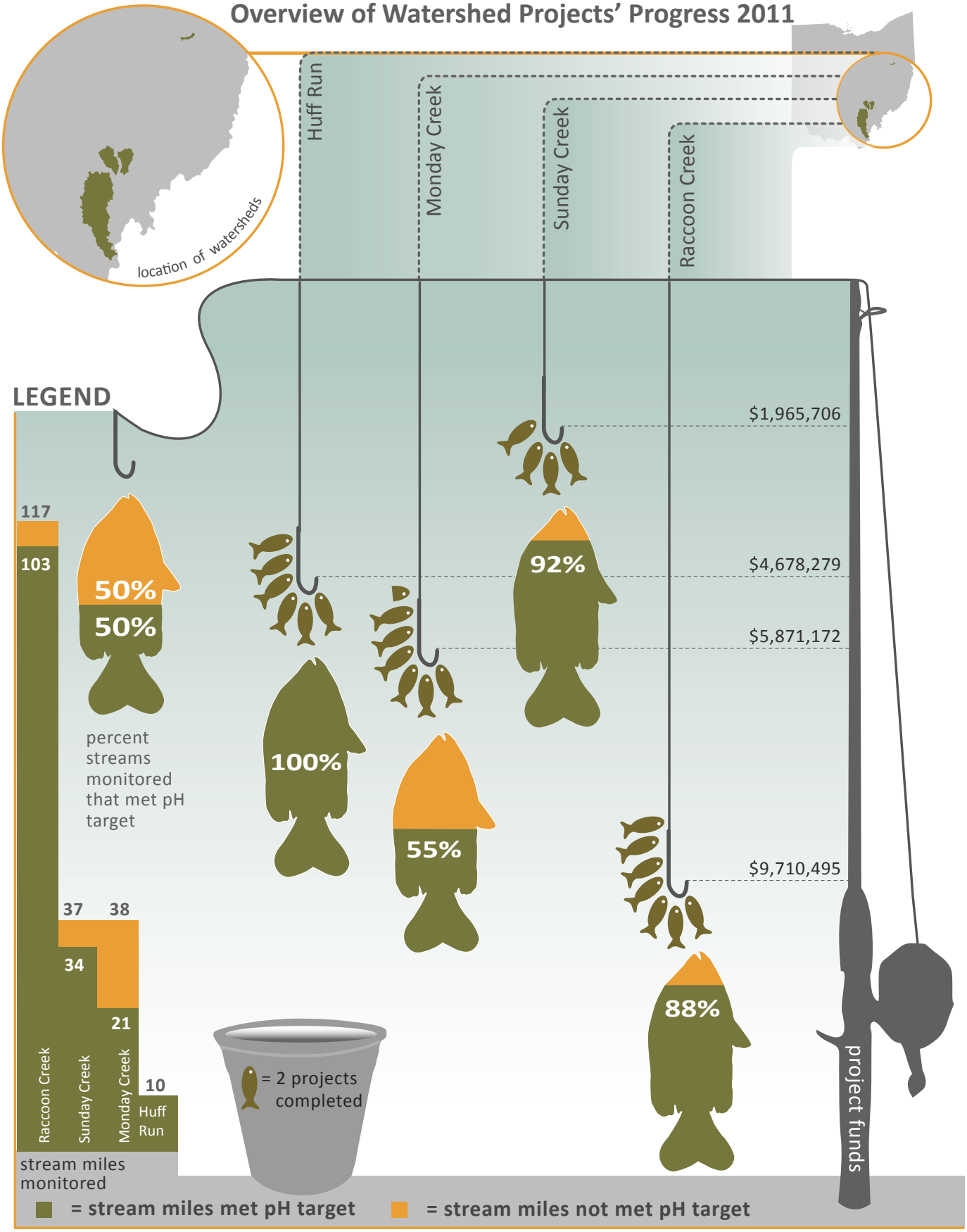
Total acid load reductions = 10,274 lbs/day

Costs

Total reclamation costs = $22,225,651

2011 Stream Health Report

Generated by Non-Point Source Monitoring System
www.watersheddata.com

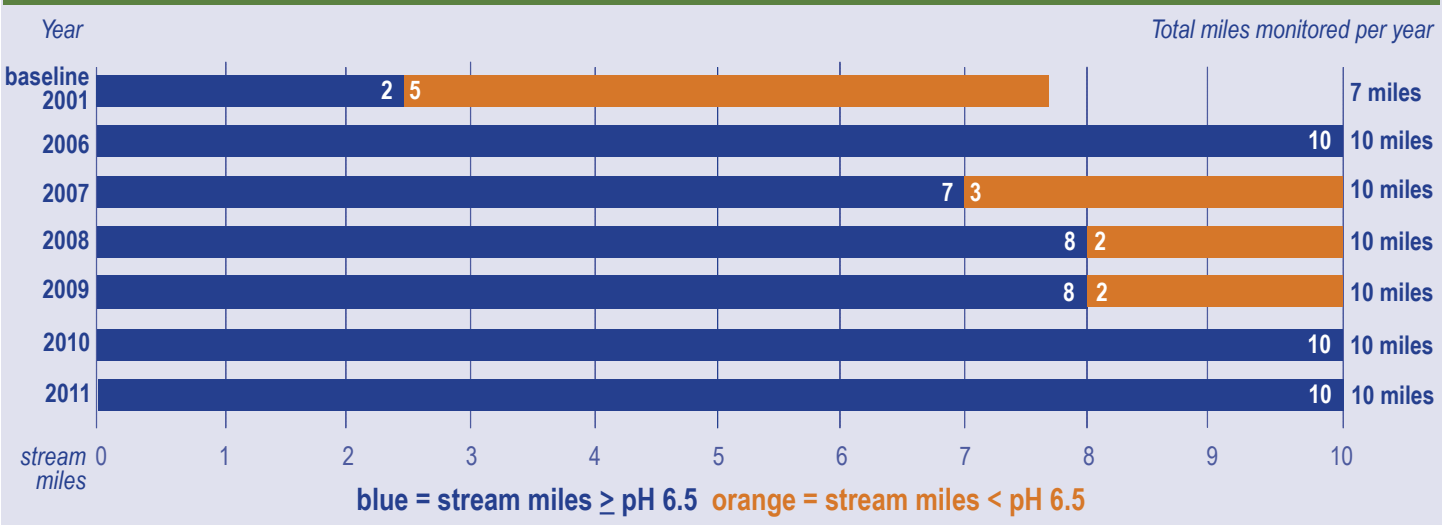


2011 Stream Health Report

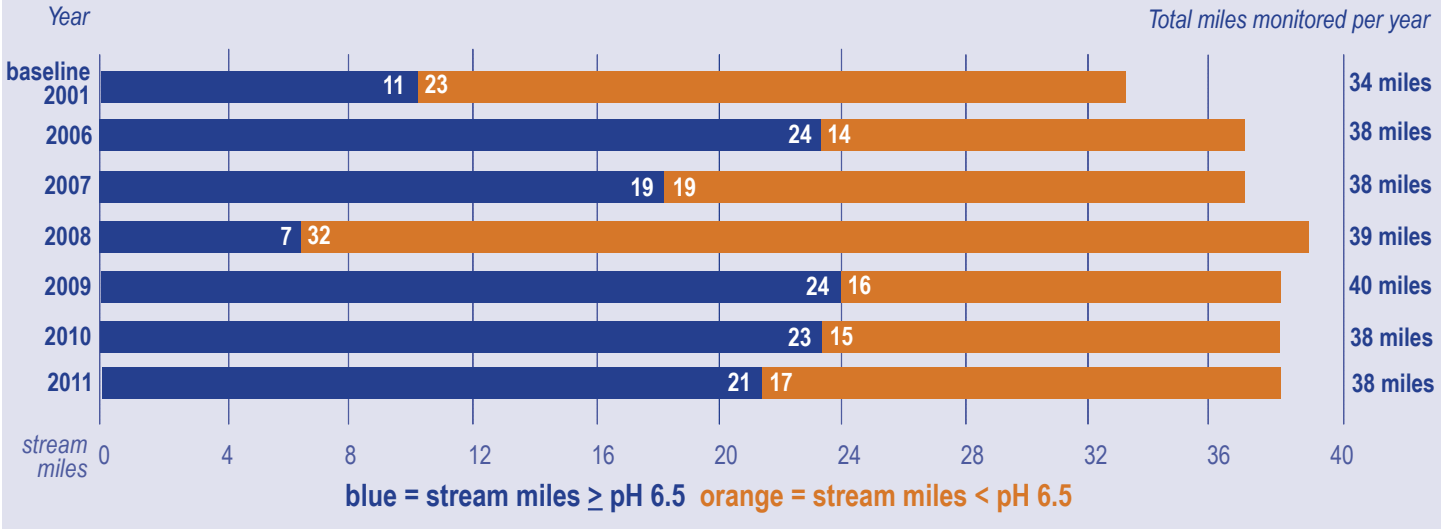
Generated by Non-Point Source Monitoring System
www.watersheddata.com

Over the past four years pH has been monitored along the mainstem of each of the four watersheds. The following four figures show a total number of stream miles that meet the pH target of 6.5 and the total number of stream miles monitored each year. Collectively, pH values showed 159 miles of stream met the pH 6.5 water quality target in 2006, 114 miles in 2007, 130 miles in 2008, 162 miles in 2009, 169 miles in 2010, and 168 miles in 2011. These variations in pH can be attributed to the changes in the environment due to: reclamation efforts, seasonal changes, and hydrologic conditions.

Huff Run total stream miles monitored for pH through time



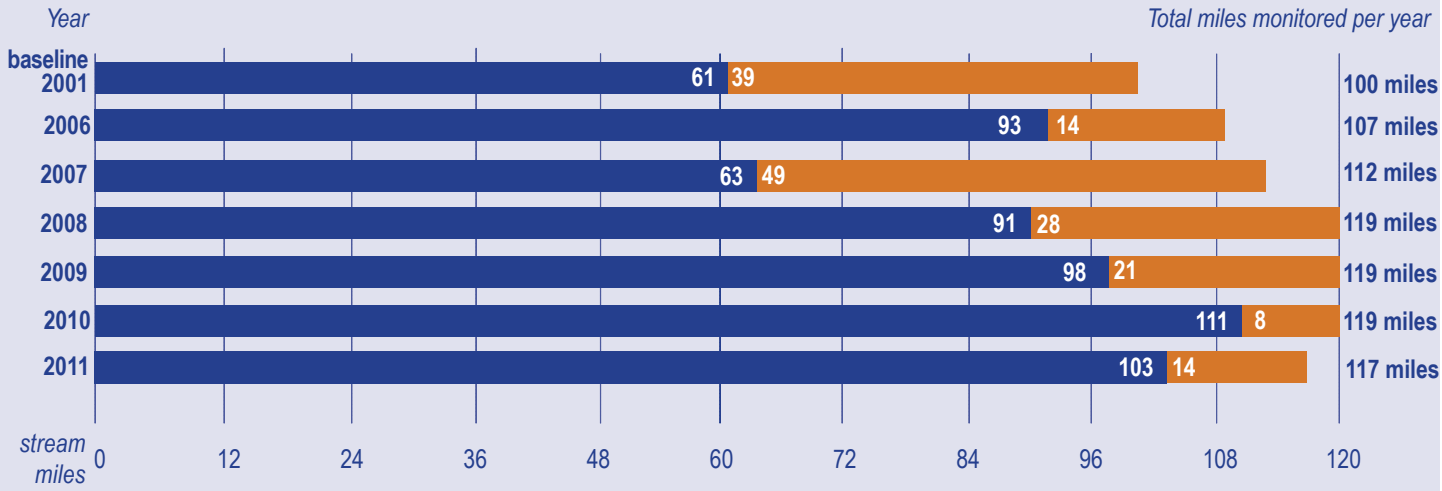
Monday Creek total stream miles monitored for pH through time



2011 Stream Health Report

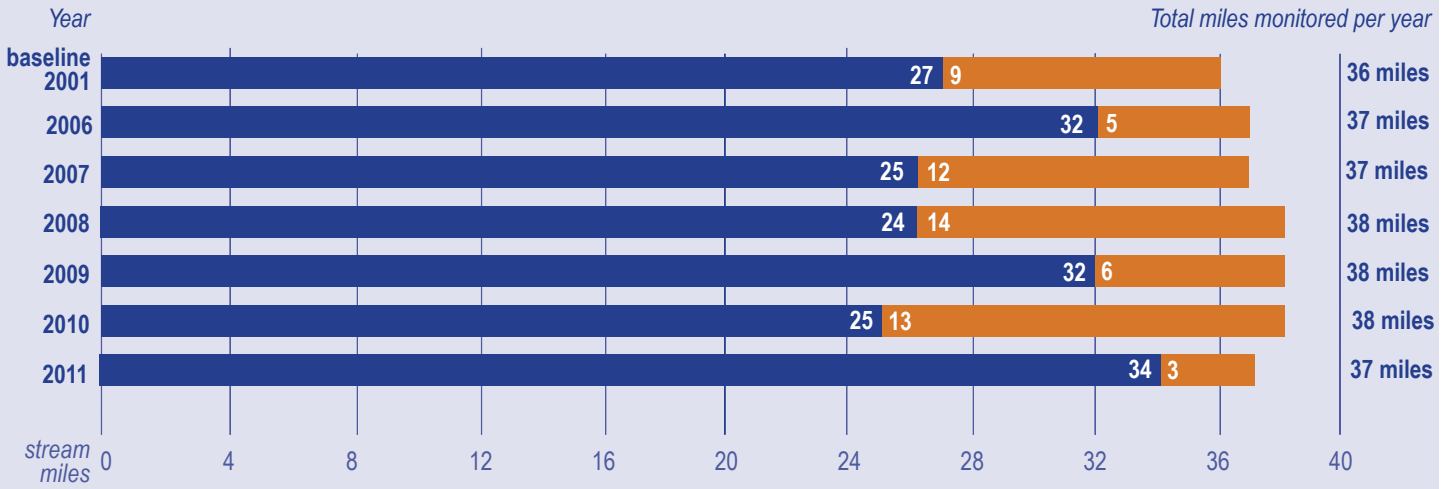
Generated by Non-Point Source Monitoring System
www.watersheddata.com

Raccoon Creek total stream miles monitored for pH through time



blue = stream miles ≥ pH 6.5 orange = stream miles < pH 6.5

Sunday Creek total stream miles monitored for pH through time



blue = stream miles ≥ pH 6.5 orange = stream miles < pH 6.5

Abandoned Mine Drainage Abatement and Treatment (AMDAT) Plans

The Ohio Department of Natural Resources Division of Mineral Resources Management (MRM) AMD program is evaluating the degree and impact of AMD on streams and rivers in the coal bearing region of Ohio. This region falls within the Western Allegheny Plateau (WAP) eco-region, which covers most of unglaciated Appalachian Ohio. The ultimate goal of this undertaking is to better understand the extent of the AMD problem in Ohio, develop restoration plans (AMDATs) where applicable, and to implement AMD remediation or treatment projects where streams or rivers can be expected to improve to meet state biological water quality standards. A committee of ODNR-DMRM staff has developed a four phase process to accomplish this task.

The first phase is to determine if AMD is present in watersheds that are potentially impaired by abandoned coal mines based on previous water quality data or MRM staff recommendations (Map 1 tan areas and Appendix 1). The second phase involves a more detailed investigation of those streams where AMD was documented in the first phase to determine the degree and extent of impact on water quality and on the aquatic biology (fish and macroinvertebrates). The third phase consists of developing a priority-ranking scheme and schedule for AMDAT development for watersheds impaired by AMD. This step involves determining which watersheds/streams are most likely to recover biologically if AMD abatement and treatment is initiated. The fourth and final phase is to develop AMDAT plans for priority watersheds determined in phase III. The AMDAT plan will identify and outline projects, develop a restoration strategy, and determine a cost estimate for implementation. Once an AMDAT is developed for a particular watershed, it will become eligible for AMD program funds to implement the plan. However, development of an AMDAT does not guarantee funding for implementation projects (Kinney et al. 2010).

- Twelve Acid Mine Drainage Abatement and Treatment (AMDAT) plans have been completed (Map 1): Huff Run, Moxahala Creek, Sunday Creek, Monday Creek, Federal Creek, Raccoon Creek Headwaters, Middle Basin Raccoon Creek, Little Raccoon Creek, Leading Creek, Robinson Run, Yellow Creek, and Upper Rush Creek.

Three new AMDAT watersheds currently under investigation include a tributary to the Muskingum River, Brush Creek in Muskingum County, a tributary to the Tuscarawas River, Mud Run in Tuscarawas County, and Fall Run, a tributary to Wheeling Creek in Belmont County. Updates to existing AMDAT plans are being conducted in Huff Run, Sunday Creek, and Little Raccoon Creek.

Watersheds With Active AMD Reclamation

As of 2011, the following nine watersheds are implementing reclamation actions endorsed in their AMDAT plan: Little Raccoon Creek, Headwaters of Raccoon Creek, Middle Basin of Raccoon Creek, Monday Creek, Sunday Creek, Huff Run, Leading Creek, Moxahala and Yellow Creek.

This report and website (www.watersheddata.com) were created in 2005 to provide ODNR-DMRM, watershed groups, watershed professionals, Ohio EPA, USEPA and all of Ohio's citizens an annual report of the reclamation efforts resulting in water quality and biological changes in Ohio's streams due to abandoned mine reclamation. This report is available on the website under the reports tab and updated annually.

2011 Stream Health Report

Generated by Non-Point Source Monitoring System
www.watersheddata.com

Map 1. Results of Acid Mine Drainage (AMD) Primary Watershed Assessment