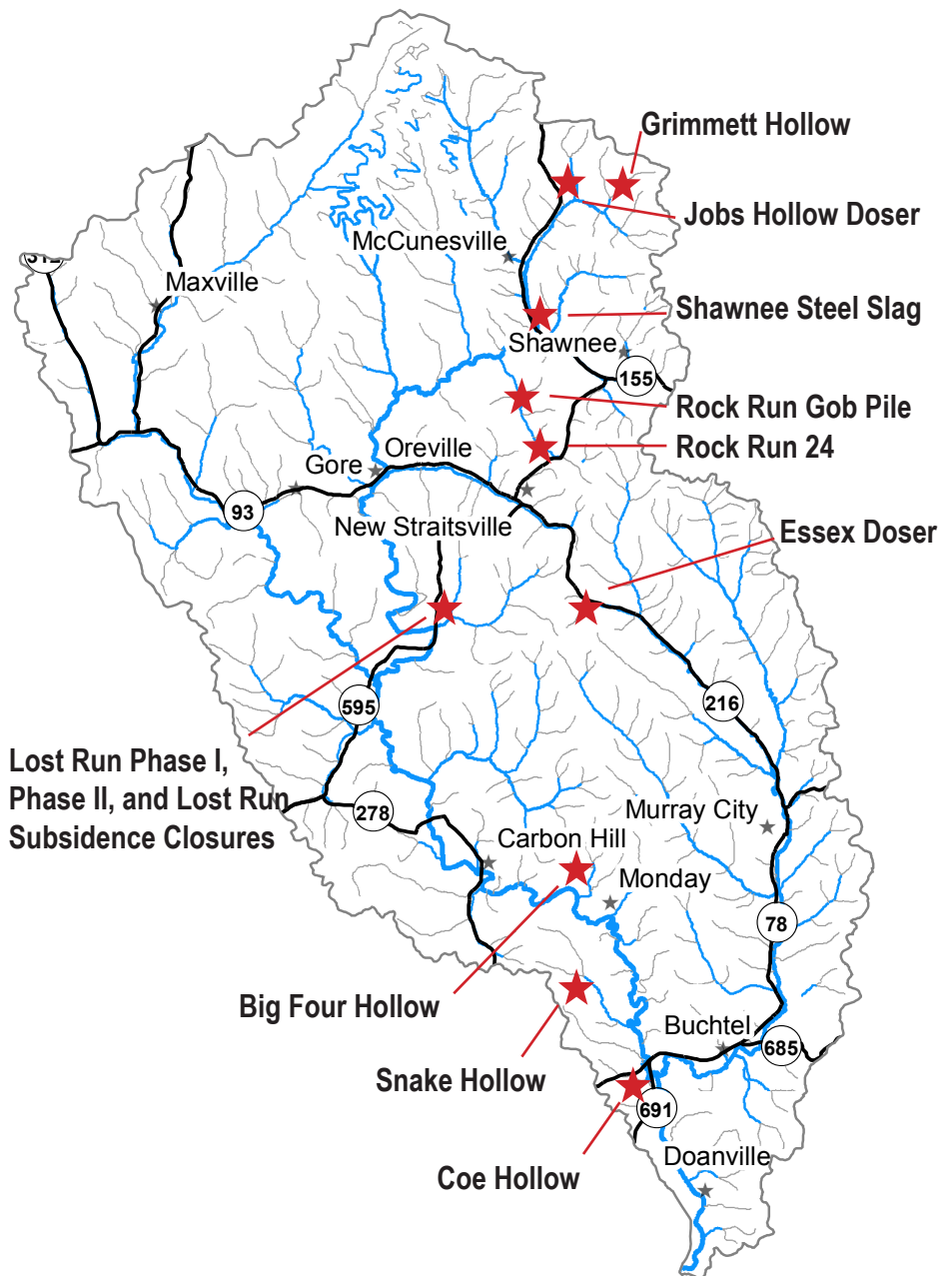


2011 NPS Report - Monday Creek Watershed

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- Monday Creek, located in the Appalachian Region of southeastern Ohio, is a 27-mile long tributary of the Hocking River, the latter which flows directly into the Ohio River. The Monday Creek Watershed drains a 116 square-mile area, with streams winding through portions of Athens, Hocking, and Perry Counties.
- Monday Creek Restoration Project is a program of Rural Action, Inc., a non-profit group working to revitalize Appalachian Ohio. Our project is a collaborative partnership of officials and residents of the Monday Creek watershed, along with more than 20 other organizations and state and federal agencies. Our shared goal is to restore the watershed for the benefit of local communities. Large portions of Monday Creek and its tributaries are dead due to acid mine drainage (AMD) left behind by a century of coal mining.
- Since 1994, our partnership has worked together to identify water quality problems, conduct field research and site characterization, and prioritize and plan ongoing restoration activities.
- In 1997-1998, we identified issues to be addressed for the long-term improvement of the watershed, and to the benefit of local communities. These issues, along with goals, objectives, action strategies, and progress indicators are discussed in detail in the Monday Creek Comprehensive Management Plan.
- To learn more about the Monday Creek Restoration Project, visit our website at www.mondaycreek.org or call 740-394-2047



363,425,000 gallons of stream water per year eliminated from entering into the deep mines as the result of conducting seven stream capture closure projects in Monday creek



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Reductions

Total acid load reduction = 3,877 lbs/day

Total metal load reduction = 597 lbs/day

*Data derived using the Mean Annual Load
Method (Stoertz, 2004).*

Costs

Design \$359,519 (excluding Snake Hollow)

Construction \$5,511,654

Total costs through 2011 = \$5,871,172

Monday Creek Stream Capture Projects

Project status: Six subsidence closures projects were completed from 1995-2010

Project Name	Year project complete	Acres Captured	Agencies funding	Estimated gallons/yr of water diverted from entering the deep mine
Majestic Mine	1999	100	ODNR-DMRM	36,860,000
Salem Hollow	2000	60	ODNR-DMRM	22,116,000
Murray City	2004	5	ODNR-DMRM	1,843,000
Goose Run	1995	506	ODNR-DMRM	186,512,000
Snow Fork	1999	140	ODNR-DMRM	51,604,000
Lost Run	2007	100	USFS	35,000,000
Coe Hollow	2010	80	USFS	29,490,000

Seven stream captures located in the Monday Creek Watershed were closed and completed from 1995 to 2010. A total of 991 acres surface drainage area drained year round into the deep mines and as a result of closing these subsidence holes. Using the equation for annual average discharge where 1 sq. mile = 1 cfs (USGS 2001), approximately 363,425,000 gallons per year were diverted from entering into the deep mine thus abating the generating of acid mine drainage.

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TIMELINE OF THE MONDAY CREEK WATERSHED PROJECT MILESTONES & AMD PROJECTS

1994

- Formation of Monday Creek Restoration Project (MCRP)

1995

- First stream water quality study on Monday Creek (USFS, CURSML, and USGS)
- OSM awarded MCRP with an Appalachian Clean Stream Initiative (ACSI) grant for Rock Run

1996

- Ohio EPA awarded MCRP with a 319 grant for Rock Run

1997

- “Monday Creek Watershed Acid Mine Drainage Abatement and Treatment Plan I” published
- Ohio EPA awarded Ohio University with a 319 grant to treat mine drainage at Rock Run, Brush Fork and seal a subsidence on Goose Run and at Majestic Mine site
- Monday Creek video “Silent Waters: The Story of Monday Creek” produced

1998

- Grant from CURSML for capping Jobs 13 gob pile
- Streambank stabilization and riparian tree planting at Carbon Hill, Brush Fork, and Goose Run
- MCRP logo designed

1999

- First Management Plan, “A Comprehensive Plan for the Monday Creek Watershed,” published
- MCRP Office opened in New Straitsville
- OSM awarded MCRP with an ACSI grant for Jobs Hollow doser, Snake Hollow, and Salem Hollow
- ODOT awarded MCRP with mitigation funds for reclamation in Big Four Hollow
- “Monday Creek Watershed Acid Mine Drainage Abatement and Treatment Plan II” published
- OSM awarded MCRP a Cooperative Agreement for treatment at Rock Run 24
- Greenway Feasibility Study published

2000

- Ohio EPA awarded MCRP with a 319 grant for work at Jobs Hollow (Grimmett Site) and Monkey Hollow
- MCRP received first Watershed Coordinator Grant, for 6 years

2001

- Wayne National Forest closed subsidences at Orbiston North, Long Hollow, and Essex Mine

2002

- U.S. Forest Service funding received for reclamation at Snake Hollow
- U.S. Forest Service closed a small subsidence in Sycamore Hollow near New Straitsville

continued on next page

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TIMELINE OF THE MONDAY CREEK WATERSHED PROJECT MILESTONES & AMD PROJECTS

2003

- Jobs 13 gob pile capping completed
- Video about Monday Creek entitled "Cool Waters" released

2004

- Volunteers planted nearly 7,000 Pine on Sunday Creek Coal Company land
- Jobs active alkaline doser installed
- U.S. Forest Service constructed a series of limestone leach beds and channels in Snake Hollow
- Ohio EPA awarded MCRP with a 319 grant for work at Lost Run

2005

- U.S. Army Corps of Engineers Civil Works Review Board approved the Monday Creek Feasibility Study for a favorable Chief of Engineers' Report and inclusion in Water Resources Development Act of 2005 (WRDA '05)

2006

- Acid Mine Drainage Abatement and Treatment (AMDAT) Plan III approved
- Essex Doser (319 grant) operational
- U.S. Forest Service constructed open limestone channels, closed subsidence and established positive drainage at New Straitsville North area, Monkey Hollow, Goose Run, and Elm Rock area
- MCRP Watershed Management Plan fully endorsed by the Ohio DNR and Ohio EPA
- Lost Run Phase I reclamation and OEPA 319 grant completed

2007

- Ohio EPA awarded MCRP a 319 grant for construction of a steel slag leach bed at Shawnee
- U.S. Forest Service completed restoration near State Route 216 and Snake Hollow
- Water Resources Development Act of 2007 approved, Congress authorized \$21 million for ecological restoration of Monday Creek

2008

- U.S. Forest Service completed reclamation in Valley Junk area at Coal Dale, and near State Route 216
- ODOT mitigation funds of \$200,000 secured for work at Lost Run Phase II

2009

- ODOT mitigation funds in place for work in Big Four Hollow and at Rock Run
- U.S. Forest Service completed reclamation work along State Route 278, New Straitsville South area, Lost Run headwaters, Brush Fork, and Coe Hollow.
- Ohio DNR completed phase II of Shawnee steel slag bed

2010

- U.S. Forest Service closed subsidences along Snow Fork, Rock Run, and New Straitsville South
- Portable doser and subsidence channels installed at Brush Fork (MCRP and USFS)
- Two vernal pools established at the Trimble Township Land Lab through an OEEF grant
- Bacteria sampling throughout Monday Creek watershed

2011

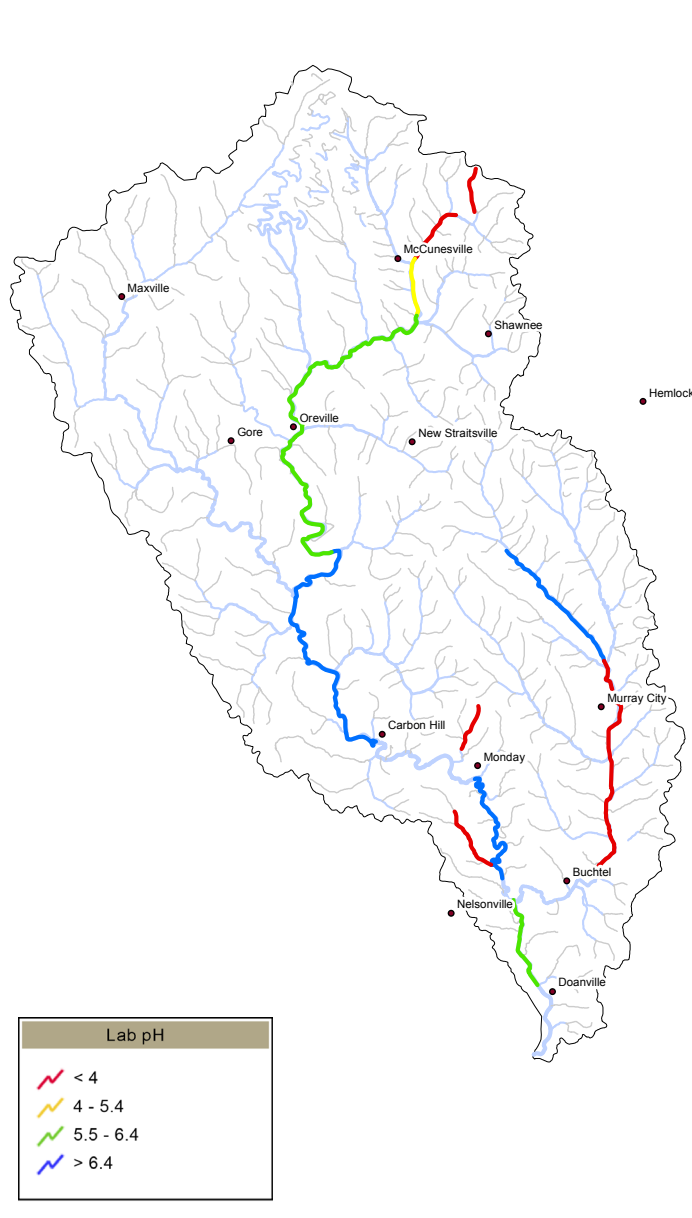
- U.S. Forest Service closed subsidences in the Cawthorn area
- Ohio DNR conducted reclamation and needed maintenance at Rock Run
- U.S. Forest Service and ODNR completed reclamation in Sand Run
- Ohio DNR completed construction to minimize sediment transport at Big Four Hollow

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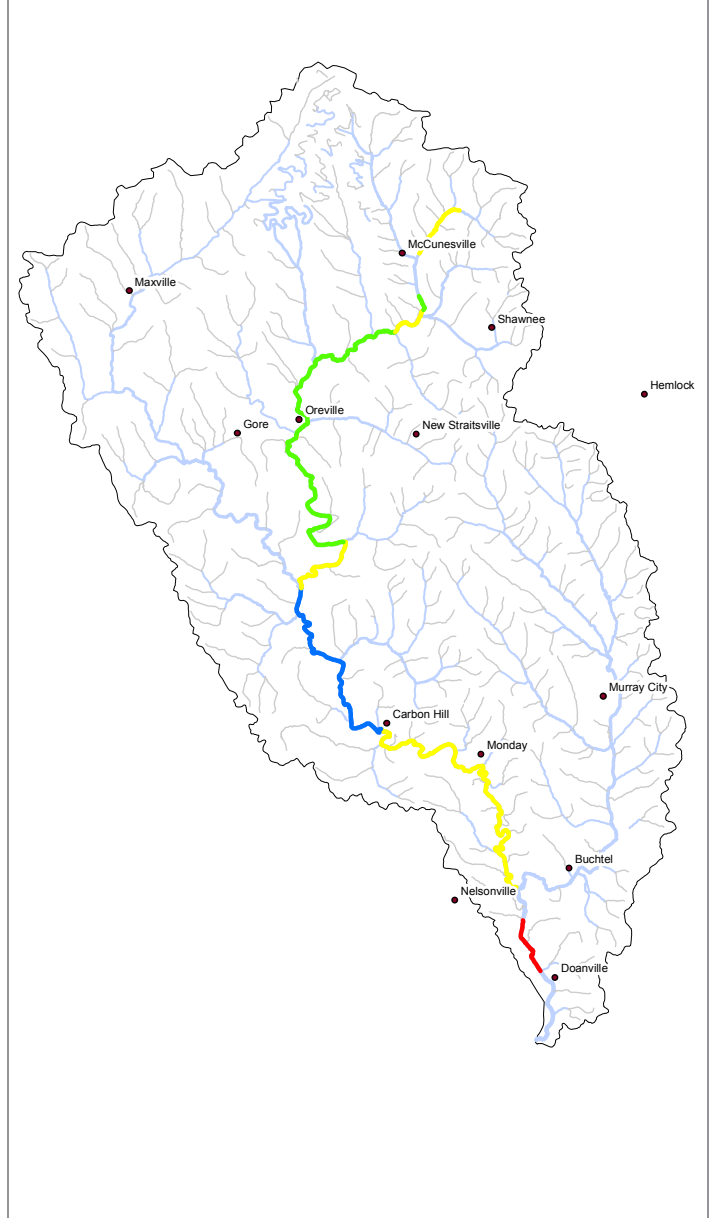
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Chemical Water Quality

Monday Creek baseline pH



Monday Creek 2011 pH



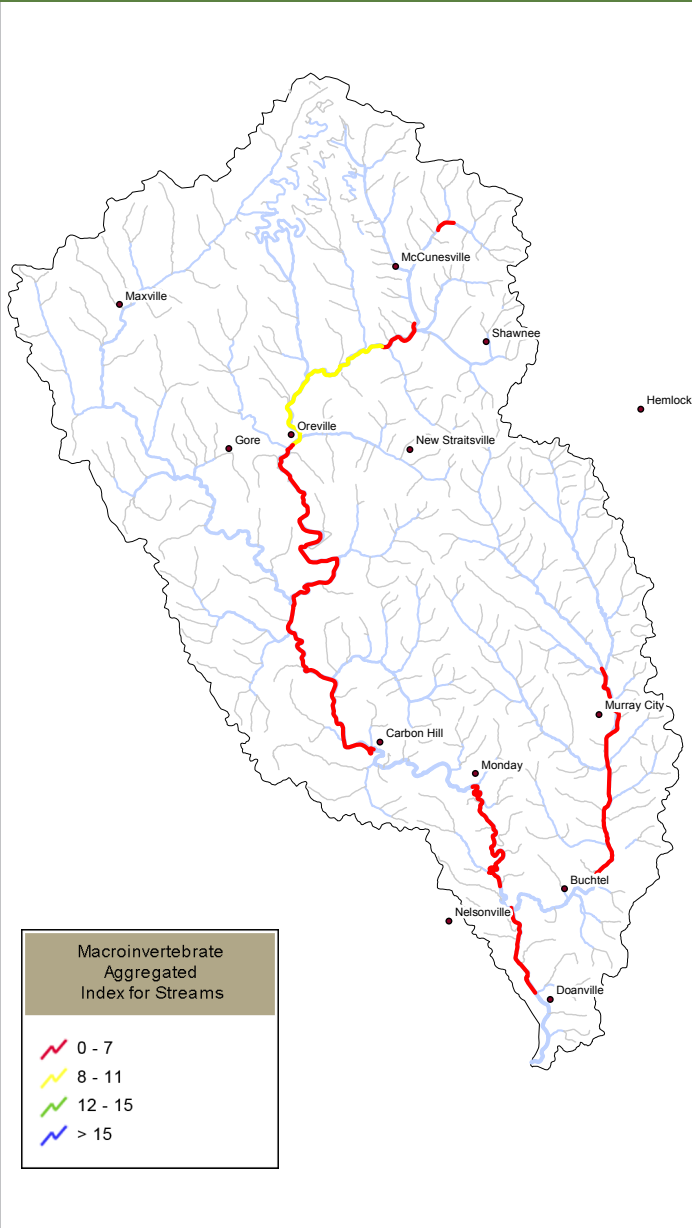
In Monday Creek pH values have improved throughout the watershed from baseline conditions (2001) to 2011. From 2006 (32%) to 2011(60%) there has been a 28% increase in the number of stream miles that meet the pH target of 6.5.

2011 NPS Report - Monday Creek Watershed

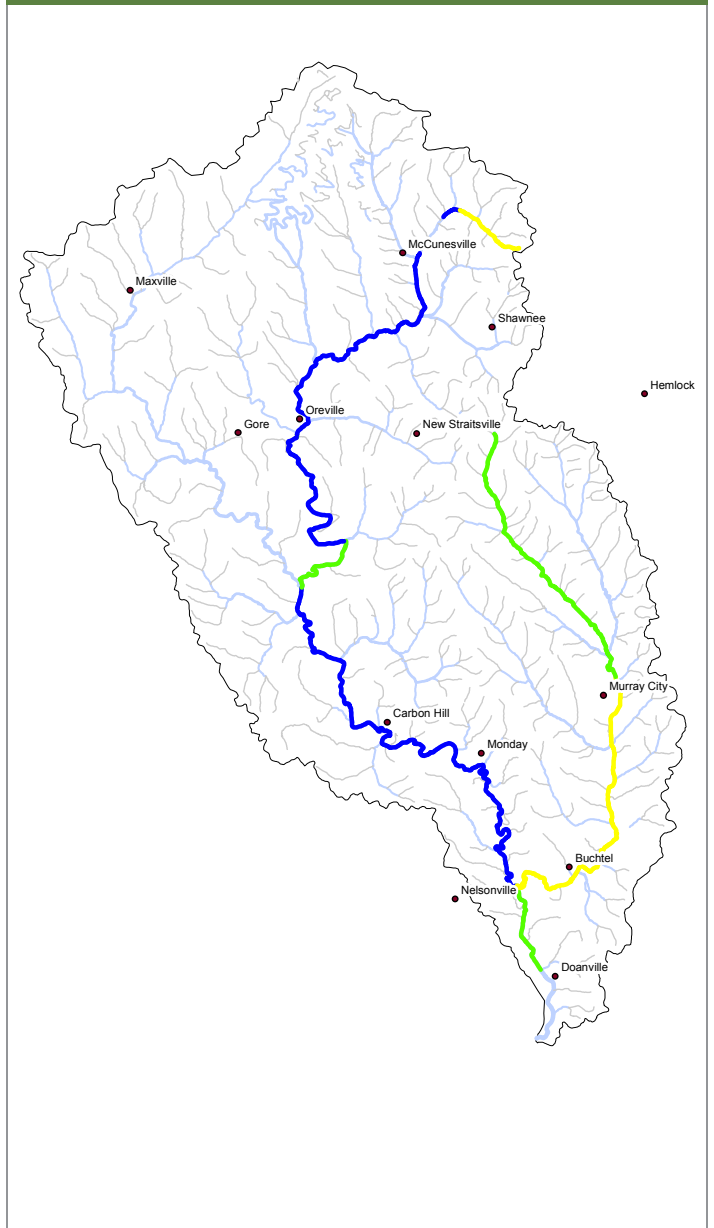
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Biological Water Quality

Monday Creek baseline MAIS



Monday Creek 2011 MAIS



MAIS samples were collected throughout Monday Creek at established annual monitoring stations from 2001 through 2011.

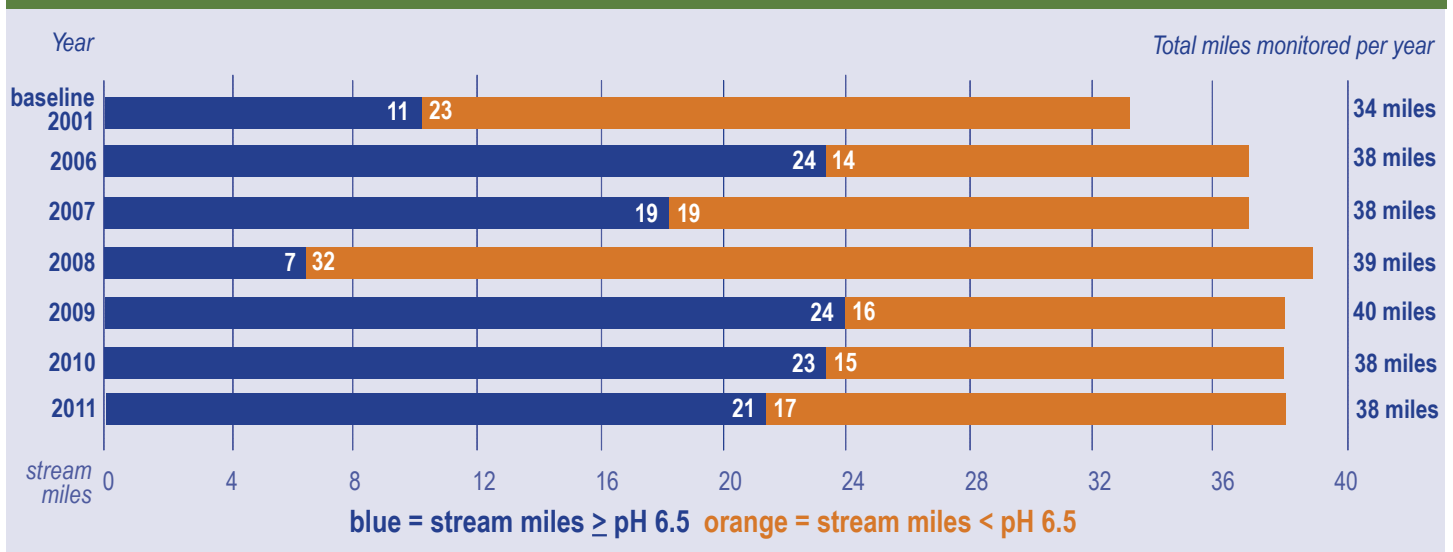
2011 NPS Report - Monday Creek Watershed

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Chemical Water Quality

There are approximately 38 stream miles monitored each year along the mainstem of Monday Creek and major tributary Snow Fork. A restoration target for pH is 6.5. Since 2007 there have been increases and decreases in the number of stream miles that meet this target. In 2007, 19 stream miles of the 38 monitored met the pH target of 6.5. However in 2008 only 7 miles of the 39 miles monitored met this target. In 2009 and 2010 data shows an increase again with approximately 24 of the 39 miles monitored meeting the pH target. In 2011, the site near Lost Run MC00500 dropped below the pH target with an average pH value of 6.24 (figure A).

Figure A. Monday Creek pH



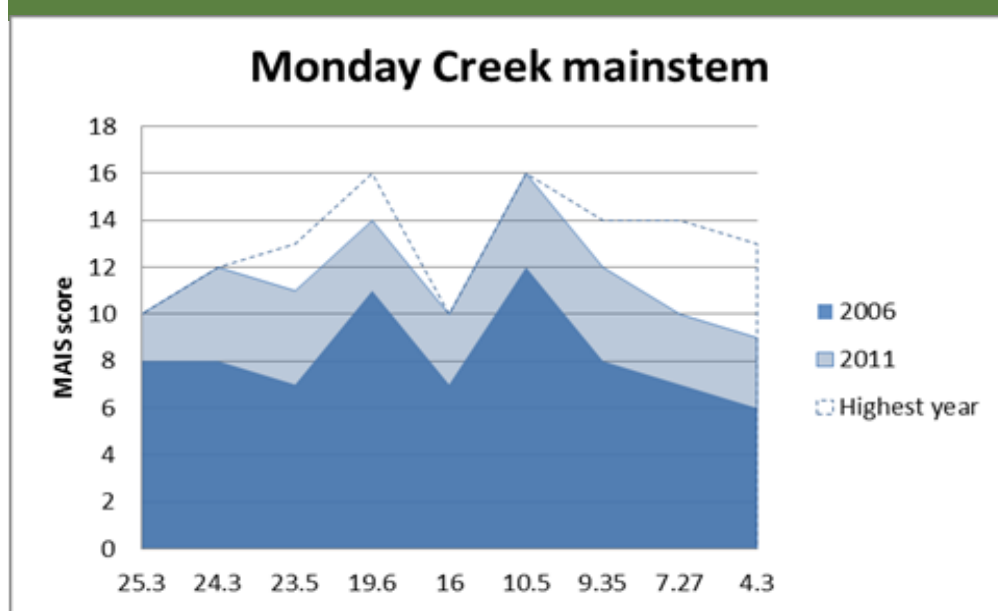
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Biological Water Quality

The majority of the long-term monitoring sites along the Monday Creek mainstem have shown steady improvements in biological quality over the last ten years (Figure B). By 2010, nine of thirteen sites had shown statistically significant ($P < 0.05$) or somewhat significant ($P < 0.10$) improvement over the previous seven to ten years. Although most sites did not achieve the high scores attained in 2010, the overall trends of improvement were sustained in 2011. Site JH00500 monitored for ten years showed modest but significant improvement for the first time. The site which has declined in quality since 2005 JH00902 is located immediately downstream the Jobs Hollow doser and is not expected to support high quality biological life, as it is located in the designated 'impacted zone' or 'mixing zone'. Two sections, between RM 24.3 and 19.6, and from 10.5 downstream, show potential for continued improvement, based on the highest year scores.

Figure B. Area of Degradation



The blue dashed line identifies the highest MAIS score ever achieved at that site throughout the monitoring time period.

Figure C. Monday Creek MAIS Regressions

RM	2001	2002	2003	2005	2006	2007	2008	2009	2010	2011	Linear trends	P-value	Yrs.
JH00902				8	6	6	4	4	4	4	declined	0.009	7
JH00500	4	6	4	7	6	5	4	7	8	9	improved	0.037	10
25.3				7	8	7	4	9	6	10	no change	0.553	7
24.3				6	8	12	12	11	11	12	improved	0.051	7
23.5	5	3	1	11	7	9	12	7	13	11	improved	0.011	10
19.6	8	9	10	13	11	12	12	13	16	14	improved	0.0004	10
16	2	6	6		12	11	10	10	10		improved	0.047	5
10.5	5	10	13	13	12	14		12	16	16	improved	0.005	10
9.4					8	9	10	9	14	12	improved	0.052	6
7.3				8	7	7	8	10	14	10	some improvement	0.070	7
4.3	2	6	2	8	6	9	7	4	13	9	improved	0.032	10
SY00080				9	4	13	6	7	8		no change	0.880	7
SYRM0.1				6	3	5	8	10	10		improved	0.008	7