West Virginia

Nonpoint Source Program

Annual Report

2015

PARTNERSHIPS

In addition to partners listed others include local landowners, Public Service Districts, other sections of WVDEP such as Mining, Watershed Assessment, EE, Oil & Gas, Stormwater etc., Conservation Districts, multiple Watershed groups, and many more…

West Virginia Department of Environmental Protection

Nonpoint Source Program Annual Report
February 2016

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West Virginia's Nonpoint Source Program is funded by a Clean Water Act Section 319 Grant administered by the U.S. Environmental Protection Agency.

Report prepared by
Timothy Craddock, NPS Program Coordinator

Acknowledgements - The NPS Program would like to acknowledge the efforts of all staff, partners and other stakeholders that contributed information in this report and those who have played roles in NPS projects and outreach activities. The names and organizations are too numerous to mention but if you would like to know more about organizations in your area contact the NPS Program Coordinator by Email at: timothy.d.craddock@wv.gov

Cover: An AMD Treatment System in the Lambert Run watershed; photo by Tim Craddock

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Introduction

This report provides summaries of activities associated with nonpoint program and watershed project funds for fiscal year 2015. It will highlight the activities completed this past year with nonpoint program funds, and provide an overview of select watershed projects. Program data such as watershed project load reductions, best management practices (BMPs) implemented, and project status will be provided in the appendices. The stories added to EPA's Success Story website in 2015 are also included.

Executive Summary

During the past year the WV Nonpoint Source (NPS) Program managed 102 projects. The project categories and numbers are provided in Table 1.

Table 1. Project categories and totals

Nonpoint	16
Nonpoint - AGOs	35
Watershed	42
State funded - SRF	9
Total	**102**

Of the 102 projects 39 have been completed including 100% from fiscal year (FY) 2011 and 52% from FY 2012. Several others were completed in FY 2013 and 2014. These projects are funded by § 319 grants provided by US Environmental Protection Agency (EPA) Region III. A 40% match is required for all § 319 projects. This match is provided by partner and state contributions. The state funded projects are funded by WV Department of Environmental Protection's (WVDEP) Mining Section using stream restoration funds (SRF). Typically SRF projects are implemented in mining impacted watersheds. See appendix 1 for more information on project status.

The 319 grant guidance released in 2014 requires a 50/50 funding split between nonpoint funds and watershed project funds. West Virginia's split is 41.1 nonpoint and 60.1 watershed.

Nonpoint	Watershed	Fiscal Year
44.2%	55.8%	2011
43.6%	62.1%	2012
37.0%	63.0%	2013
42.7%	57.3%	2014
37.9%	62.1%	2015
41.1%	**60.1%**	**Average**

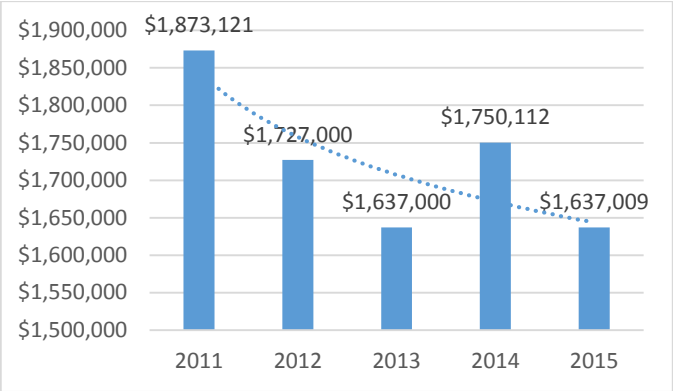
The funds in the nonpoint category are used primarily for program activities. These funds support our staff who are absolutely necessary and essential to our restoration efforts. The nonpoint funds also support additional grant opportunities (AGOs), which focus on a wide variety on nonpoint related issues. AGOs support watershed monitoring, outreach and education, planning and demonstration projects and more. Examples include:

West Virginia's NPS Program does not function without US EPA Region III grants, staff to implement these grants and local stakeholder involvement. The cost to implement watershed plans and their watershed projects is significant. The average grant award for the past several years is 1.7 million but the trend is downward (Figure 1). The Federal Government has been cutting the budgets of many environmental programs and § 319 is no exception.

The demand for project and planning funding is high. Every year we struggle to meet the cost ceiling of the grant award. There is much more work to do than there is money to pay for it. Considering that all NPS work is voluntary the demand and interest in watershed protection and restoration is impressive.

In 2015 the projects and activities that ended totaled $3,262,299 in nonpoint and watershed funds. This does not include the 40% match requirement. See Appendix 1 for additional financial details.

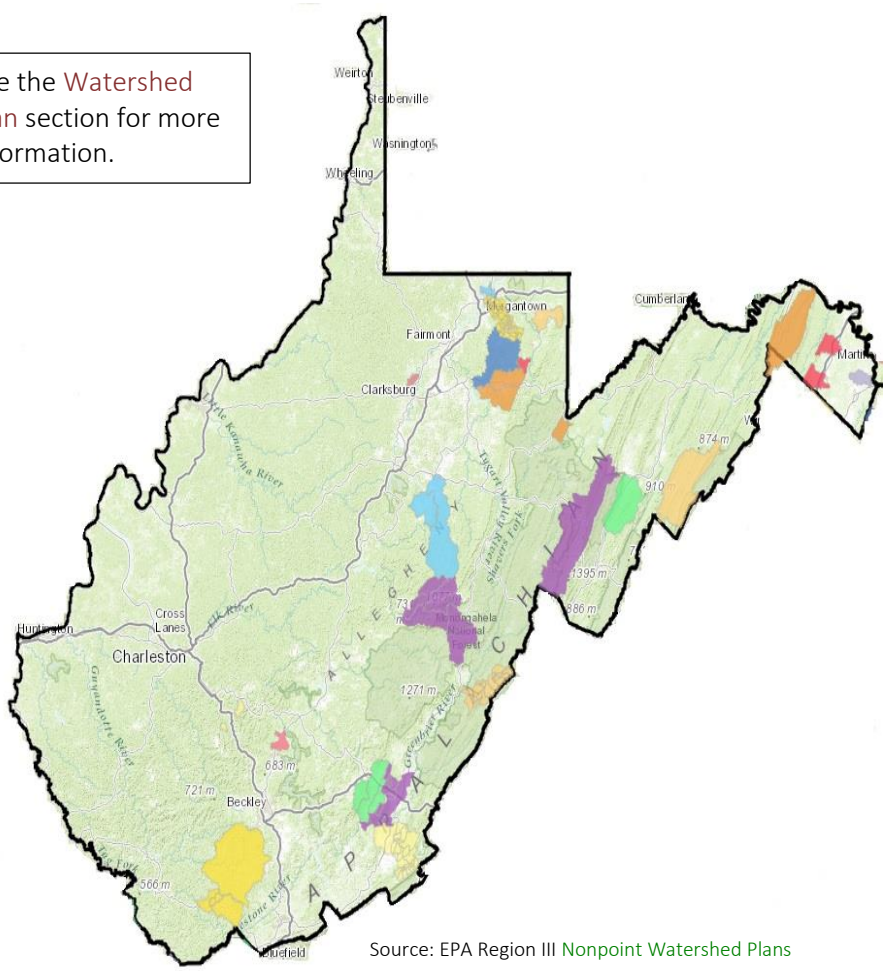
Figure 1. § 319 grants 2011-2015



The watershed project funds support protection and restoration in our priority areas. Our priorities are determined by the list of impaired streams (303(d) list), Total Maximum Daily Load (TMDLs) reports and local stakeholder support. Using information from the TMDL, as well as additional monitoring watershed plans (WPs) are created. WPs provide a road-map for restoring watersheds impaired by NPS pollution or protecting those of high quality that may be threatened. WV has 30 WPs, some of the larger plans such as the Lower Cheat are being revised; their focus will be smaller HUC12 size watersheds within the larger basin. Others are in various stages of implementation. The map in Figure 2 shows most of the WP boundaries in WV. Note: Not all of the plans are shown on the map.

Figure 2. West Virginia watershed plan map

See the Watershed Plan section for more information.

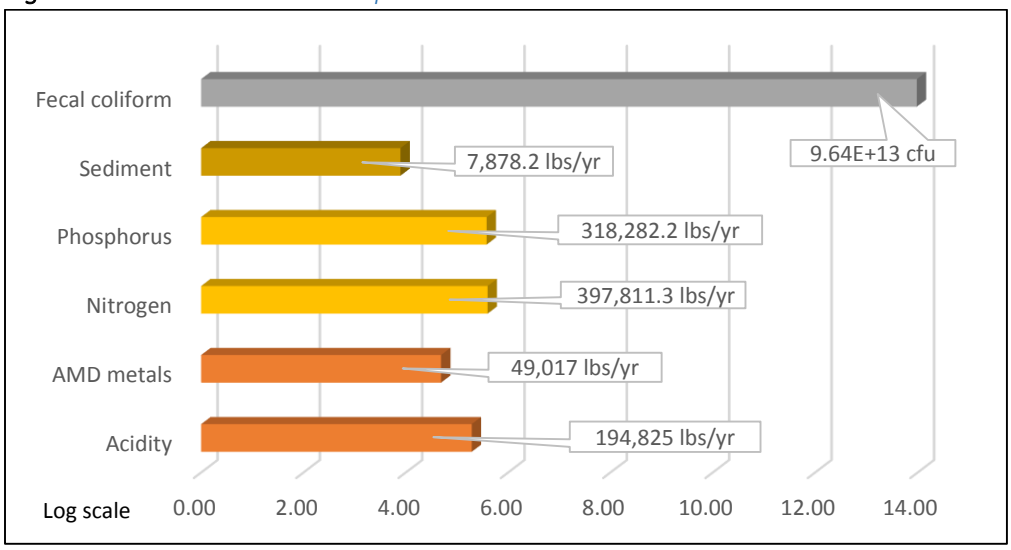


Source: EPA Region III Nonpoint Watershed Plans

Pollutant reduction is the major impetuous of our projects. These are implemented by a wide variety of partner agencies, non-government organizations (NGOs), local community stakeholders, volunteer watershed groups (WGs) and many others.

Projects completed in 2015 include fourteen (14) watershed, multiple statewide projects and a variety of AGO projects. As a result we achieved the pollutant reductions show in Figure 3.

Figure 3. Pollution reductions reported in 2015



In order to compare pollutant reductions the numbers in Figure 3 were converted to a log scale. Doing so provides a better picture of how the reduction quantities relate to each other. It is obvious from Figure 3 that most of the reductions in 2015 were from fecal coliform.

Pollution can only be reduced by implementing best management practices (BMPs). The types, number and size of the BMP varies based upon the project. In 2015 our partners installed a wide variety of BMPs to reduce abandoned mine drainage (AMD), agricultural pollution, stormwater, sediment and erosion control for business and construction, and work on stream channels and streambanks. Table 2 provides an overview of the BMPs implemented in 2015. See Appendix 2 and 3 for more information.

Table 2. BMPs implementation in 2015

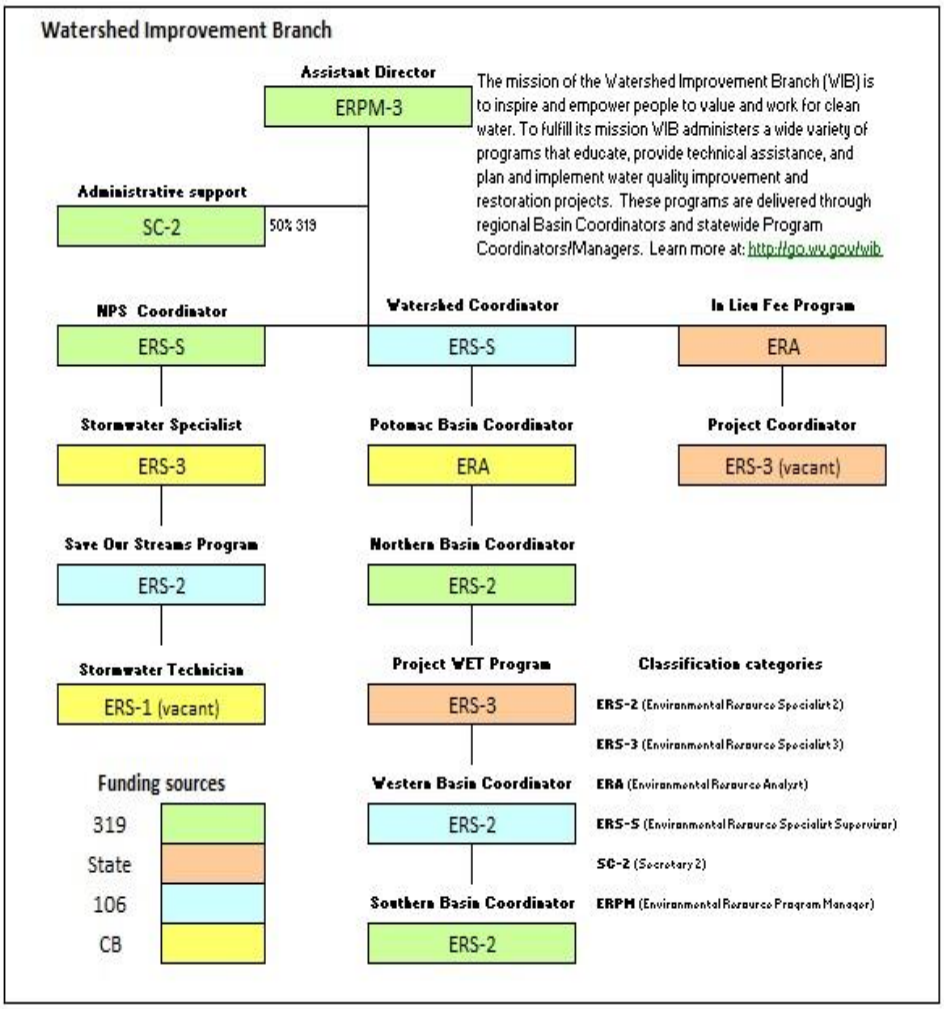
BMPs	quantity	units
Alternate water sources	40	---
AMD treatment systems	7	---
AMD wetlands/ponds	158,307	square feet
Buffers	39.7	acres
Fencing	120,361	feet
Heavy use protection	23	---
Grazing systems	3,127.3	acres
Nutrient management	6,153.6	acres
Sediment/erosion control	34.5	acres
Septics	50	---
Stream restoration	1,405	feet
Streambank protection	1,328	feet
Tree planting	4	acres

Agricultural BMPs were the most prominent. There focus was fecal coliform, and to a lesser extent nutrients, and sediment.

Nonpoint grant activities

As the lead agency the WV Department of Environmental Protection (WVDEP), Division of Water and Waste Management's (DWWM) Nonpoint Source (NPS) Program manages and coordinates the statewide NPS Program activities. They are guided by adherence to the stated goals, objectives and schedules included in the NPS Program's Management Plan and Annual workplan (Table 3). The administration and coordination involves a concentrated effort on the part of the lead agency and its partner agencies, as well as volunteer watershed associations, colleges and universities and a variety of other stakeholders.

Figure 4. WIB organizational chart and funding sources



In July 2015 WVDEP's NPS Program changed its name to better reflect what it's all about. The program is now called the Watershed Improvement Branch (WIB). The mission of the WIB is to inspire and empower the people of West Virginia to value and work for clean water. The WIB serves as a liaison be-tween other state and federal agencies, non-government entities and citizen volunteers in the promotion and implementation of effective BMPs to help protect and restore watersheds. The WIB administers programs and funding to educate the public, provides assistance in planning and implementing water quality protection initiatives and offers guidance and support with stream protection and restoration projects.

Figure 5. Rain barrel workshop in the Western Basin

"*Our purpose – to protect and restore West Virginia's watersheds, which are invaluable natural resources – remains the same*," said Teresa Koon, assistant DWWM director and manager of the program. "However, we wanted a name that better describes what we do and encompasses all of our work, not just the nonpoint source component."

WIB's primary goal focuses on planning, development and implementation of comprehensive watershed restoration projects to remove streams from the state's 303(d) list. The difficulty in coordinating a stakeholder driven process to implement voluntary compliance aimed at achieving mandatory water quality objectives is a special challenge. The development of realistic watershed plans, effective project proposals, and the implementation of these projects is time consuming. The process requires a great effort and resources from all partners and stakeholders.

Staff positions are VITAL to our programs. The activities of Basin Coordinators (BCs) and our supporting programs are keys to the long-term success of WIB. These dedicated individuals are active in all aspects of the program from project planning and implementation, to outreach and education. They help stakeholder groups organize and sustain their efforts and support all state and federal agency partners by providing advice in their areas of expertise. See Appendix 5 for more information.

The programs within WIB include: WV Save Our Streams (SOS) provides volunteer stream monitoring, outreach and NPS monitoring support; WV Stream Partners (SP) Program provides grant money to support the efforts of local watershed groups; the Chesapeake Bay (CB) Program involves the implementation of the state's watershed implementation plan and other Bay efforts; Project WET provides water education and professional-development for teachers and non-formal educators, and others; and the In Lieu Fee (ILF) Program is our stream and wetland mitigation process that helps to repair impacts to wetlands and streams.

Social media activities help to educate and increase our outreach efforts. WVDEP uses Twitter, YouTube and Facebook to update the public, provide opportunities to get involved and announce a wide variety of events. In 2015 our Facebook page had 290 Likes and added 2,190 more Friends.

Table 3. NPS Program 2015 annual goals

Nonpoint Program Goals	Complete		Comments
	Yes	No	
1. Provide leadership in managing the NPS Program	X		On-going
2. Represent the DWWM in multi-agency and stakeholder organizations.	X		On-going
3. Project management of all incremental projects; includes tasks such as technical guidance, support, oversight and compliance management.	X		On-going
4. Coordinate and oversee NPS Program grant projects in non-priority watersheds (AGOs).	X		A wide variety of demo and other projects
5. Participate and coordinate in the development of workplans and grant proposals in priority watersheds.	X		On-going
6. Maximize the use of all funds to achieve water quality standards in NPS impaired streams.	X		On-going
7. Establish a targeted monitoring approach for NPS Program projects including baseline, pre and post project to better evaluate the effectiveness of BMPs. Work with WAB and local partners to coordinate monitoring efforts.		X	Monitoring strategies are on-going. QAPPs, funding is a challenge
8. Participate in and coordinate with the WV Watershed Network.	X		Watershed celebrations
9. Coordinate with appropriate agencies, watershed groups and Public Service Districts to address failing on-site wastewater systems.	X		On-going there are multiple septic projects
10. Coordinate with project teams to propose additional funding opportunities and activities in order to conduct streambank projects in priority watersheds.		X	WVCA has completed work with statewide funds
11. Participate in the Cheat and Monongahela River TMDL implementation plans.	X		On-going
12. Develop guidelines for an urban runoff management program.		X	Develop in coordination with MS4 and stormwater
13. Coordinate with WVCA and NRCS to implement CREP/EQIP programs in priority watersheds.	X		On-going via agricultural projects
14. Provide conservation education and information to educators, youth and the general public.	X		On-going via outreach programs and BCs
15. Increase capacity for watershed associations to actively participate in and provide leadership for NPS watershed projects.	X		Watershed Pilot Program

WV Conservation Agency

Figure 6. WVCA CS teaches raingardens 101

WV Conservation Agency (WVCA) is our state agricultural partner and one of the few agencies we have funded consistently using a portion of our nonpoint grant funds. Their contributions are significant.

In 2015 using Nonpoint funds and state money they completed 33 projects that reduced nutrients by 409,919 lbs/year and sediment by 1,171 tons/year (Table 3).

WVCA also contributes to our watershed restoration efforts by managing multiple watershed projects mainly in the Potomac Direct Drains and Greenbrier basins. The local conservation specialist (CS) acts as the project manager and that leadership is the

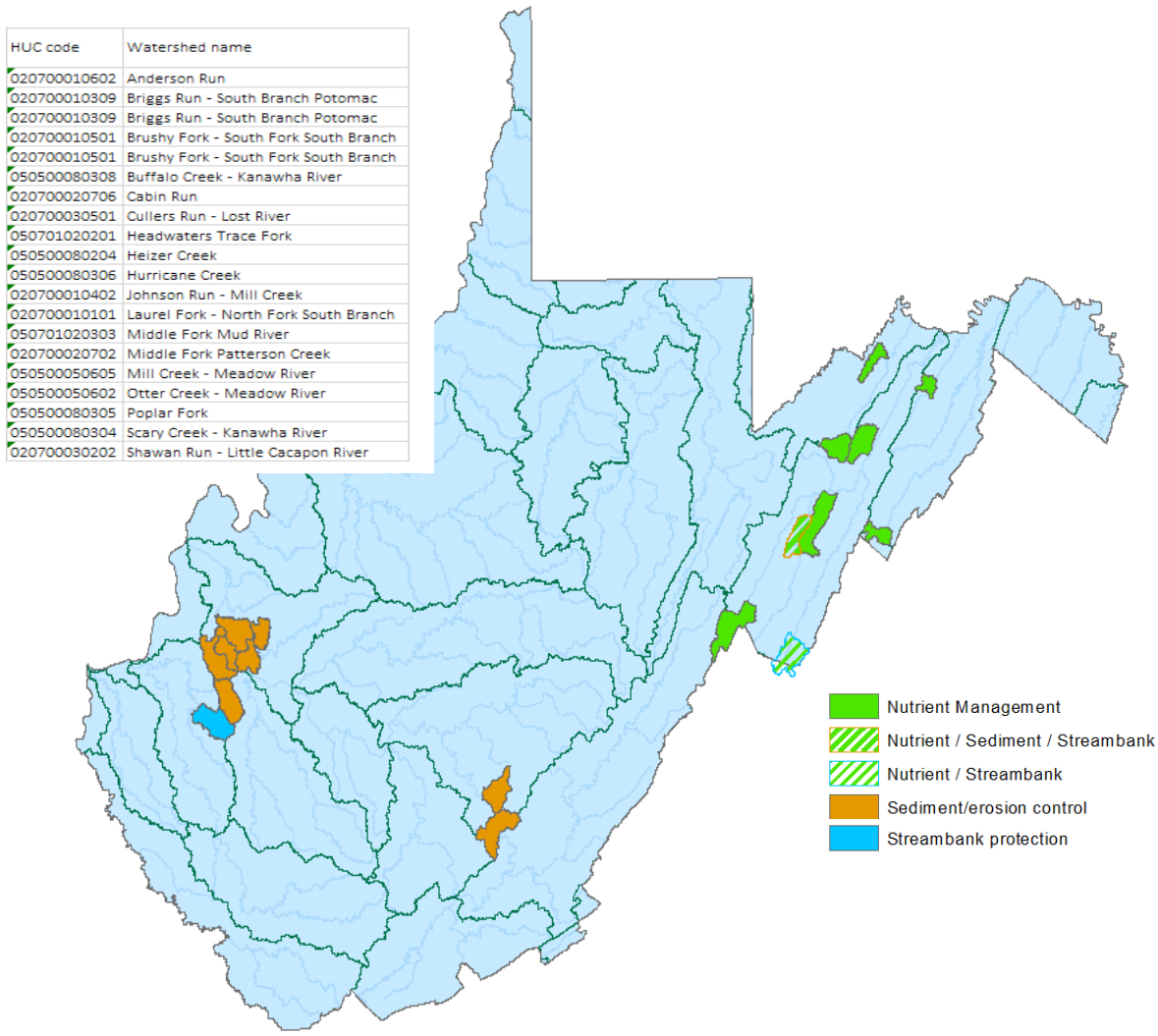
key to the success of these efforts. Currently WVCA manages five active watershed projects, (six were completed this past year). The focus is bacteria reductions through septic programs, agricultural and stormwater BMPs.

Table 4. WVCA NP funded statewide projects

Type	Quantity	Unit	Total	Pollutant	Reduction	Unit
Nutrient management	4,118.3	acres	15	Nitrogen	237,367	lbs/year
Sediment/Erosion control	25.1	acres	15	Phosphorous	172,551.7	lbs/year
Streambank protection	601	feet	3	Sediment	1,171	tons/year

The statewide projects were implemented in 18 different HUC12 basins (Figure 4). Note: In several of these, multiple types of projects were completed.

Figure 7. WVCA statewide project implementation (HUC12 basins)



Map is courtesy of John Wirts, DEPs Watershed Assessment Branch (WAB) Program Manager

NPS Management plan update

Clean Water Act § 319 guidelines require that all State NPS Programs revise their management plans (MP). WV's NPS revised MP was approved in September of 2014, one of the first to be approved in the Mid-Atlantic region. The MP includes short-term (annual) and long-term (5-10-15 years), objectives, and strategies to protect and restore water quality, strengthen partnerships, and establish a balanced approach that emphasizes statewide and watershed restoration opportunities. Table 5 shows the pollution reduction progress after only one-year. Already nutrients and sediment exceed our 5-year targets. This is largely due to WVCA's statewide programs.

Table 5. Long-term pollutant reduction progress

Pollutant	Unit	2015 data	Projected load reductions targets			Progress %
			5-year	10-year	15-year	
Acidity	tons/yr	97.4	300	600	900	32.5
Aluminum	lbs/yr	16,681	37,800	75,600	113,400	44.3
Iron	lbs/yr	32,336	95,200	190,400	285,600	34
Manganese[1]	lbs/yr	-	7,000	14,000	21,000	0
Total metals	lbs/yr	49,017	140,000	280,000	420,000	35
Nitrogen	lbs/yr	397,811	280,000	560,000	840,000	142
Phosphorus	lbs/yr	381,282	220,000	440,000	660,000	173.3
Total Nutrients	lbs/yr	779,093	500,000	1,000,000	1,500,000	155.8
Sediment	tons/yr	7,878	6,000	12,000	18,000	131.3
Fecal Coliform	cfu	9.64E+13	1.70E+15	3.30E+15	5.00E+15	5.7

1) Note: According to 6.2.d of 47CSR2 (Requirements Governing Water Quality Standards) the Manganese criteria shall only apply within 5-miles immediately upstream of known water supplies used for human consumption. In many cases this rule eliminates the need for Manganese reductions because there are no public or private water supplies within 5-miles of NPS projects.

Watershed Pilot Program

The intent of the Watershed Pilot Program (WPP) is to assist watershed groups (WGs) in managing watershed projects and improving sustainability in priority areas. In order to be considered for funding WG's completed an application and met specified criteria. The funding is only available to WGs that do not have funds to support positions related to watershed project management, planning and restoration. The NPS Coordinator developed and manages the WPP. Monthly calls are held to discuss progress, provide training and discuss other issues associated with implementing § 319 watershed projects.

In summer of 2015 the WV NPS Program awarded a total of **$90,000 in state funds** to WGs in three priority areas. The organizations chosen were Coal River Group (CRG), Morris Creek Watershed Association (MCWA) and Piney Creek Watershed Association (PCWA).

1. CRG quickly filled the position and the person familiarized himself with the activities of the CRG and began outreach in areas associated with the Lower Coal River watershed plan and the FY 2016 Browns Creek septic project. He has also completed several workshops focusing on wastewater and has established relationships with affected residents and County Sanitarians.

2. PCWA had a person for a short period but unfortunately was not able to maintain the position. They are currently and aggressively soliciting candidates. They are focused on local colleges and previous natural resource interns, and are using social media outlets to advertise. PCWA is working on the massive Piney Creek watershed plan, and has a § 319 project that was funded in 2015. The group also submitted a proposal for the 2016 grant. Their focus is metal, sediment and bacteria remediation.
3. MCWA has not filled their position. However, MCWA has established relationships with City and County officials, and have arranged office space and a benefit package. They are currently interviewing possible candidates, several of which have been employed by WVDEP. MCWA is working on the revised Morris Creek watershed plan, and has a § 319 project that was approved in 2015. Their focus is acid mine drainage (AMD) remediation.

Chesapeake Bay Program

Table 6. WV's pollutant reduction goals for the Chesapeake Bay

Pollutant	Category	Baseline	Progress	Targets	
			2015	2015	2017
Nitrogen	Agriculture	1,330	1,208	1,240	1,215
	Urban runoff	400	436	395	390
	Wastewater + CSO	131	126	126	124
	Septic	85	78	90	90
	Forest+	785	773	785	785
	All sources	**2,731**	**2,615**	**2,636**	**2,600**
Phosphorus	Agriculture	278	216	244	232
	Urban runoff	58	36	47	43
	Wastewater + CSO	55	26	39	34
	Forest+	59	59	62	62
	All sources	**450**	**336**	**390**	**370**
Sediment	Agriculture	134,000	103,725	113,500	107,000
	Urban runoff	52,500	28,005	40,500	36,500
	Wastewater + CSO	400	333	700	800
	Forest+	36,000	35,322	51,500	56,500
	All sources	**222,900**	**167,384**	**206,500**	**201,000**

Note: all units are tons/year

Table 6 summarizes point and nonpoint loads delivered to the Chesapeake Bay from West Virginia's portion of the watershed. The progress as of June 2015 indicates that West Virginia is on track to meet its 2017 targets.

In 2015 a comprehensive land use assessment revealed that agricultural dominated the acres used for urban development that occurred between 2011 and 2015. In combination with cleaning up previously abandoned construction sites, the nutrient and sediment loads decreased from urban development. Unfortunately, changes in loads from land use changes are not reflected in the sector specific loads delivered to the bay.

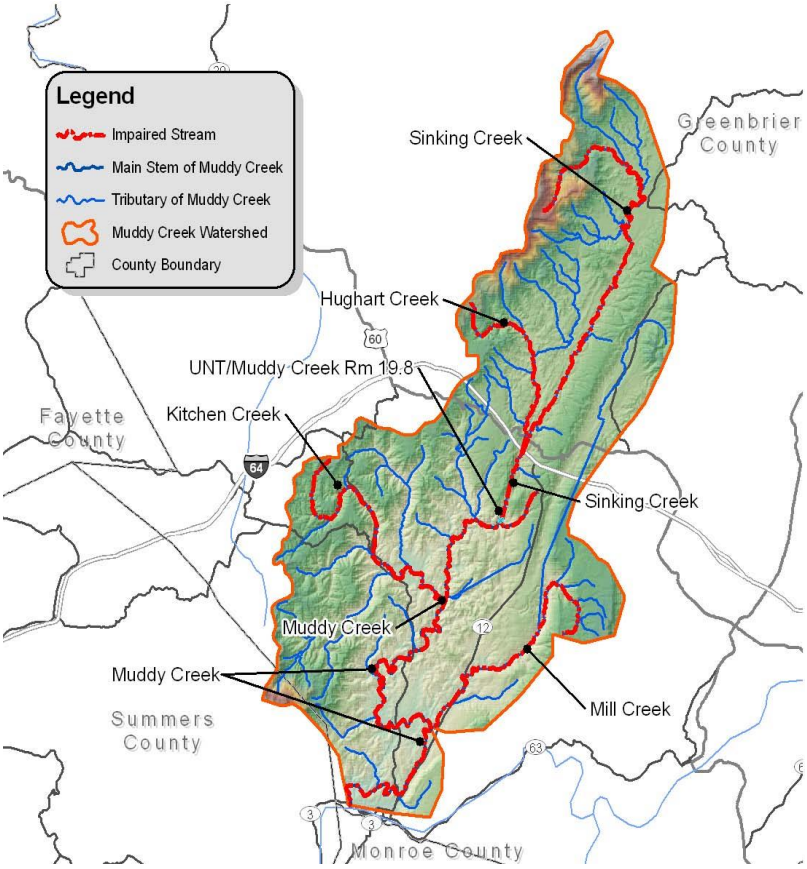
WV's Chesapeake Bay Tributary Teams continues to achieve programmatic milestones that may result in further nutrient and sediment reductions from urban sources. WIB Program staff and partners have developed watershed plans for **seven priority watersheds** within West Virginia's eight-county Chesapeake Bay region. Where local watershed plans and Chesapeake Bay Program priorities overlap, West Virginia is achieving the greatest efficiency of technical and financial resources.

Watershed project highlights

Multiple projects (but not all) completed in 2015 will be highlighted in this section.

Muddy Creek of Greenbrier

Figure 8. Muddy Creek of Greenbrier watershed



The Muddy Creek watershed covers approximately 79,000 acres and includes the communities of Williamsburg, Blue Sulphur Springs, and Alderson. The watershed has an average elevation of about 2,250 feet with a few steep headwater streams. Muddy Creek itself is a meandering, slow-moving stream, averaging 25 feet of elevation change per mile. The land use is approximately two-thirds forest and one-third pasture and grassland, with other land uses taking up less than one percent of the area.

Problem

TMDLs were calculated for the Muddy Creek watershed as part of a broader TMDL report for the Greenbrier River (Tetra Tech 2008). Together, failing septic systems, straight pipes, and residential runoff account for about 2% of the total baseline fecal coliform load in the Muddy Creek watershed. The other 98% of fecal coliform is attributed to agriculture in the watershed. US EPA approved the Muddy Creek watershed plan in 2009. The first Muddy Creek project was funded in 2011 and completed in September 2015.

Project highlights

The project focused predominantly on removing livestock away from any direct waterway access. Exclusion fencing has been installed along waterways, which in return created buffer areas to absorb run-off from nearby fields. Alternative watering systems have also been installed to allow livestock cleaner and fresher water. Many of the watering systems installed are being powered by alternative power sources such as solar. Pasture division fence, grazing plans, and nutrient management plans were also implemented on many of the farms. Failing septic systems, completely and intermittently, made up the remainder of the work. Practices installed to date are 19 alternative water sources, 24,027 feet of

exclusion and pasture division fencing, 230 feet of streambank stabilization, 50 septic systems pumped and 23 septic systems replaced or repaired.

Figure 9. Alternate water sources and divisional fencing used to rotate the cattle between pastures were two of the most important and most popular BMPs.

Results

Approximately 650 animal units (AU) were impacted thru agricultural practices decreasing the fecal coliform load by 5.66E+12 cfu/year. Septic system improvements will decrease the fecal coliform load by 3.42E+12 cfu/year. Although pollution reduction is the focus, a better educated and involved local community is what will sustain the efforts. Outreach and education occurred throughout the life of the project and included several community meetings, WVU Extension Service training, mailing efforts to watershed residents, local school involvement and updates in the local newspapers.

Funding and Partners

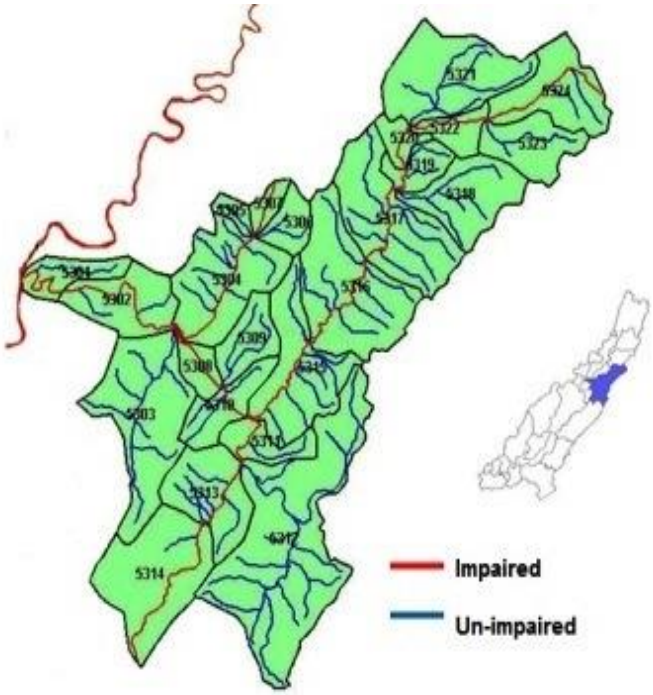
The involvement of local stakeholders and other partners were keys to the project's success. WVCA was the sub-grantee and the lead for the project. WVCA's local CS is responsible for project management and implementation. Friends of the Lower Greenbrier River helped with land owner's solicitation, performed monitoring and provided classroom activities in the local schools that focused on the project. WVU Extension Service provided workshops on septic maintenance and helped facilitate community meetings. The Greenbrier Valley Conservation District was the local fiscal agent.

A total of $244,160 funding from § 319 paid for a large percentage of the BMPs and contributed to monitoring. State funds of $84,068 provide match and paid for a portion of BMP implementation and outreach. Local landowners contributed $78,707, which was also match and paid for equipment and supplies. This project was over-budget but luckily change orders from other projects in the same year provided available funds to finish.

Knapp Creek

Knapp Creek is a 26.3 mile stream located entirely within Pocahontas County, West Virginia. The watershed encompasses approximately 176 square miles. Its headwaters originate in the mountains that form the West Virginia/Virginia boundary north of the town of Frost. The other towns within the watershed are Minnehaha Springs, Huntersville and Marlinton at the confluence of Knapp Creek and the Greenbrier River. Land use is predominantly in agricultural production and forestry.

Figure 10. Knapp Creek subwatersheds



Problem

Knapp Creek was listed on WV's 303(d) list for fecal coliform in 2006. The 2008 TMDL and the 2013 watershed plan (WP) called for fecal coliform to be reduced by 48% from agriculture and failing septic systems. Through recent surveys, it is speculated that this area is home to over 2,000 head of livestock annually, and is one of the most heavily agricultural areas in Pocahontas County.

Knapp Creek drew attention long before the TMDL and WP. In 2000 the Natural Resource Conservation Service (NRCS) proposed a natural stream restoration project plan for the entire watershed, the first in WV. The first project from the plan was implemented in 2004 and two others in 2011. However, lack of funding has slowed the progress of additional restoration efforts.

Project highlights

New life was generated when NRCS announced the National Water Quality Initiative (NWQI). WV NRCS, WVCA, and WVDEP's NPS Program discussed possible candidates and selected Knapp Creek to receive NWQI funding. Multiple years of NWQI funding, as well as § 319 funds resulted in 13,042 feet of stream restoration with 35 ft wide buffers, multiple armored stream crossings, 33 acers of grass and forest buffers and 12 septic repairs. NWQI funded BMPs include 5,200 feet of streambank repair, two stream crossings, 900 feet of fencing and three acres of tree planting.

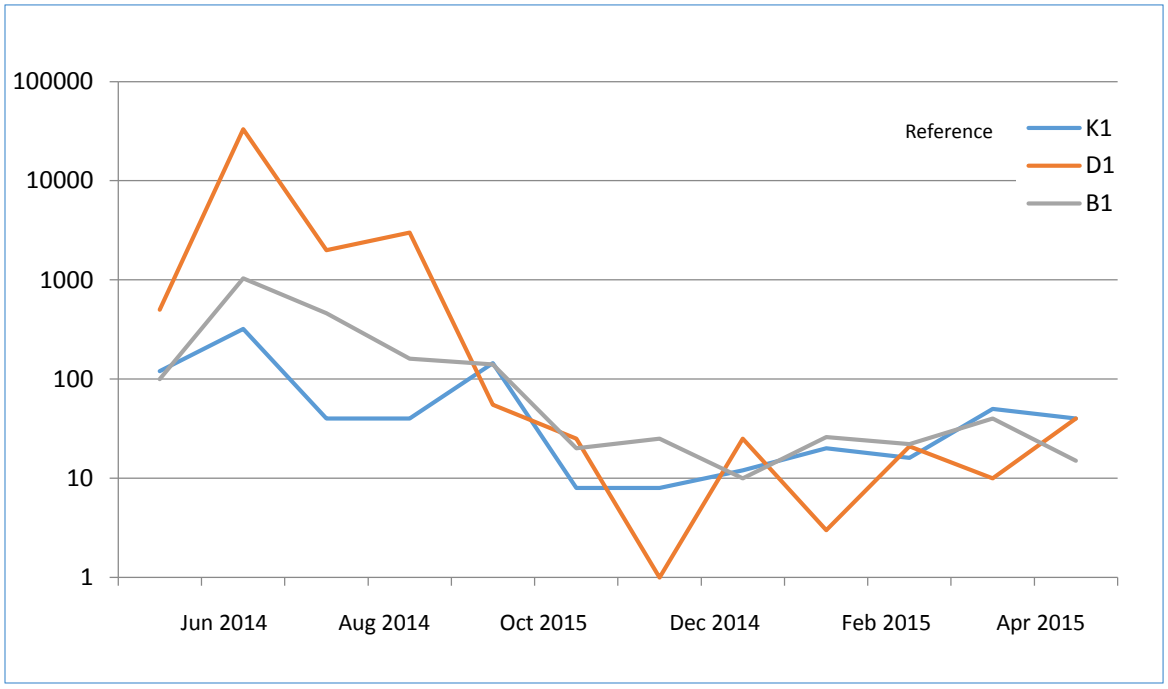
Results

The results are mixed and somewhat disappointing thus far. A 2013 § 319 funded monitoring project showed fluctuation in fecal coliform concentrations with summer numbers from 1,000 – 10,000 in portions of the watershed, and even the reference site violated water quality standards for fecal coliform, although much lower than most of the watershed. Figure 1 shows the fecal concentrations at three

different stations in the watershed. Initial baseline monitoring focused above and below tributaries and mainstem locations. The next steps are to locate additional sampling sites closer to projects (edge of field).

Biological monitoring paints a slightly different picture, with most of the watershed producing good index scores, and slight improvements at the stream restoration sites. The WP calls for additional agricultural projects and septic repairs but as time passes and the BMPs installed begin to mature (especially the buffers) we believe improvements will be more noticeable. Thus far fecal coliform has been reduced by 3.79E+12 cfu/year.

Figure 11. Knapp Creek baseline fecal monitoring



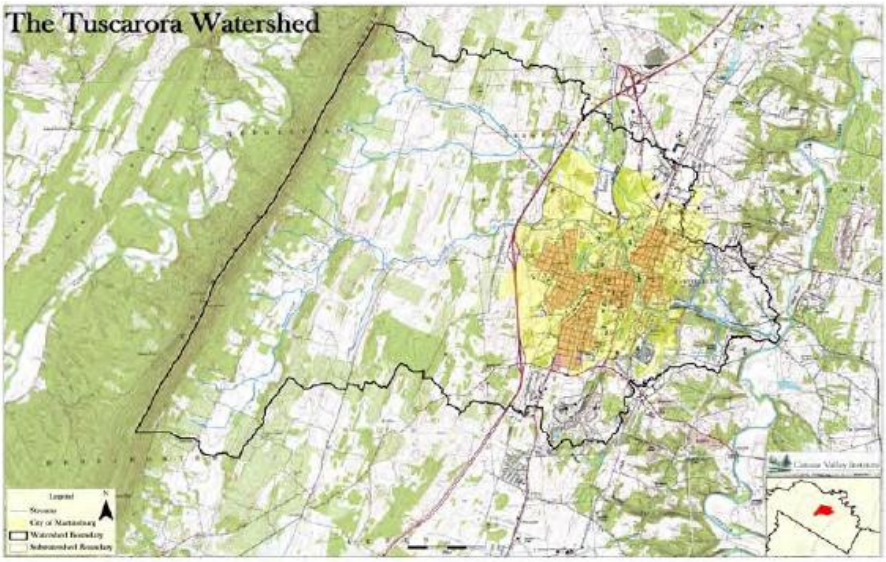
Funding and Partners

Thus far the restoration efforts in the watershed have been agency driven. Leading the way is NRCS using NWQI funds, and two state agencies WVDEP and WVCA using § 319, state and local funds. Recently other stakeholders have shown interest including the town of Marlinton, Pocahontas County Health Dept. and the Pocahontas County Water Resource Task Force. As the efforts to improve the watershed continue these local stakeholders will play a greater role.

WVDEP awarded a total of $272,662 in § 319 funds to WVCA for work in the Knapp Creek watershed. Approximately $10,000 was used for WP development, $100,000 for monitoring support and the remainder for project implementation. State and local contributions total $82,253. About 50% of the total has been spent. NRCS has reimbursed landowners $447,792 from NWQI funding.

Tuscarora Creek

Figure 12. Tuscarora Creek watershed



Tuscarora Creek drains approximately 26 square miles, and is approximately 11.7 miles long. Its major tributary, Dry Run, is 5 miles long. Tuscarora Creek flows into the Opequon Creek, which is part of the Potomac River watershed. The entire Tuscarora Creek watershed is within Berkeley County in the Eastern Panhandle of West Virginia.

Problem

Tuscarora Creek and its major tributary, Dry Run, were listed on the 303(d) list as impaired for biological criteria and fecal coliform bacteria. The 2008 TMDL for Selected Streams in the Potomac Direct Drains addressed these impairments for Tuscarora Creek and Dry Run. The impairments impact stream biology due to organic enrichment and sedimentation. The Tuscarora watershed plan was approved by EPA in 2012, and the first watershed project began in about the same time frame.

Project highlight

Figure 13. Shown here are the risers of the De-nitrifying system installed at Poor House Farms. Tuscarora Creek can be seen in the background.

Fecal coliform from septic systems were addressed through incentive programs for pumping, replacement or repair. Homeowners were targeted through a variety of outreach efforts. Flyers were distributed to schools, county offices and other businesses. Regular news articles were written and published in the Martinsburg Journal. Personnel from Canaan Valley Institute (CVI), Opequon Project Team (OPT) and WVDEP's Potomac BC gave multiple radio interviews encouraging participation. Even though outreach efforts were significant, the response from homeowners has been slow.

However, progress from other efforts were better. A Norweco Singular Denitrifying System was installed at Poor House Farm Park near the headwaters of Tuscarora Creek.

The system replaced the traditional failing system, improving bacteria reduction and adding nitrogen removal capability. This will help WV's Potomac Tributary Strategy reach its goal of installing 100 denitrifying systems in West Virginia's eight-county region that drain to the Chesapeake Bay. Other programs/efforts also contributed. WV Division of Forestry (WVDOF) completed multiple tree planting and buffer enhancements throughout the watershed. The effort was funded by the CommuniTree Program and Chesapeake Bay grants. The design of a 448 feet natural stream restoration project was completed by CVI.

Results

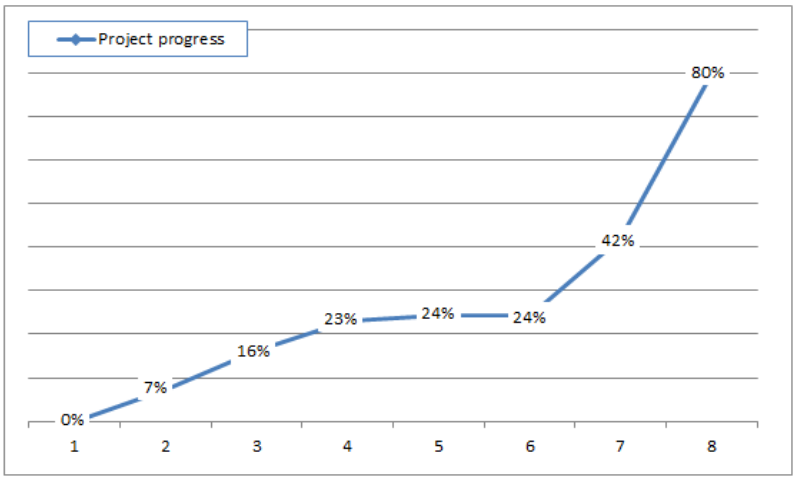
During the grant period, 13 septic systems were pumped and three failing systems were replaced or repaired accounting for a fecal coliform reduction of 1.88E+13 cfu/year. A review of the bids showed that original estimates of $7,000/repair were low. Average cost were closer to $11,000. The 50% cost share rate was not sufficient enough to encourage homeowners to sign-up. Those few who participated took advantage of the low interest rates provided by WVDEP's Clean Water State Revolving Loan (CWSRL) Program to pay remaining costs. We are hopeful that future efforts will provide funds adjusted to the higher rates, and are optimistic that participation will improve.

Funding and Partners

Volunteers and multiple partners were involved in the implementation of the project. In addition to the implementation above, volunteers from OPT, the city and local schools completed a streambank assessment of Dry Run. The multiple teams documented erosion and other problems, which will provide the groundwork for future projects in Dry Run portion of the watershed. Regular project team meetings occurred throughout the life of the project and will continue on a regular basis. A second Tuscarora Creek watershed project was funded in fiscal year 2015.

Figure 14. Tuscarora Creek project progress tracking

Tuscarora milestones	FY12-1	FY12-2	FY13-1	FY13-2	FY14-1	FY14-2	FY15-1	FY15-2	Remaining
Septic repair (6)	0	16%	16%	16%	16%	16%	50%	50%	50%
Septic pumping (8)	0	0%	10%	10%	10%	10%	40%	50%	50%
Volunteer streambank assessment	0	10%	10%	20%	10%	10%	10%	100%	0%
NSD design	0	10%	25%	50%	65%	65%	90%	100%	0%
1 De-nitification system	0	0%	20%	20%	20%	20%	20%	100%	0%
Project progress	0%	7%	16%	23%	24%	24%	42%	80%	-



All of the § 319 funds requested for the 2011 Tuscarora watershed project were not spent. $43,911 was spent which is 80% of the funding request, $37,776 in match was spent. Other funding sources that contributed included CB grants and the WVDOF Communi-Tree Program totaling about $35,000.

See more about efforts in the Potomac in the watershed plans section.

Lambert Run Site 7

Figure 15. Lambert Run confluence with the West Fork

Lambert Run is a 4.4 mile long stream located northwest of Clarksburg in Harrison County, West Virginia. Abandoned coal mining operations dating back to the 1900s occurred throughout the length of Lambert Run. These abandoned mine sites produce both acid and alkaline mine drainage.

Problem

Acidity to a lesser extent, and metal sources of impairment caused the degradation of Lambert Run and its inclusion on the state's 303(d) list in 1996. In 2002 WVDEP completed a TMDL for the West Fork watershed, which included Lamberts Run. The TMDL identified metals and pH as the impairments, and established the necessary load reductions for the metals: Aluminum (Al) 81%, Iron (Fe) 97% and Manganese (Mg) 99%. Since 2003 after the watershed plan was completed and approved, nearly two million dollars in funding has been secured for projects in the watershed. Several of the major contributors of mine drainage have been remediated and the mainstem of Lambert Run is showing improved water quality. However, Site 7 is one of the largest sources in the watershed, estimated to contribute > 166,000 lbs/year of metals pollution.

Project highlights

Figure 16. Aeration weir at Site 7 in wetland cell #1

The project consisted of a combination of passive treatment technologies. The main treatment method for the passive treatment system at Site 7 is five aerobic wetland cells. Discharge from the impoundment makes its way over an in-channel aeration weir and is then culverted into wetland #1. Wetland #1 has three large aeration weirs to encourage oxidation of the metals. The water then makes its way through four more wetland cells with aeration drops at various locations. After the fifth and final wetland, the water then discharges into Lambert Run. Total wetland area is approximately four acres. In addition, baffles have been installed in the existing impoundment to increase retention time and encourage oxidation.

Results

Figure 17. View of the wetland treatment cells taken during the 2015 EPA tour

Table 6 is recent data from the impoundment discharge at Site 7 (inflow). National Mine Land Reclamation Center (NMLRC) and Guardians of the West Fork (GWF) have yet to collect data from the outfall of the passive system. Initial visual results indicate that the system is working as intended. However, performance cannot be fully quantified until after next growing season when the wetlands have had ample growing time. The system is expected to reduce iron by 132,832 lbs/year and aluminum by 416 lbs/year.

Table 7. Recent influent data at Lambert Run Site 7

Date	Site Name	pH* Lab	Alk mg/L	Acd mg/L	D.Al mg/L	D.Fe mg/L	D.Mn mg/L	Discharge gal/min	tons per year			
									D. Fe	D. Al	D. Mn	Acidity
9/16/2015	Site 7 (In)	6.56	116.83	54.97	0.005	24.03	2.28	994	52.5488	0.010934	4.985904	120.2084

Partners and funding

The Lambert Run Site 7 AMD treatment system was completed in September 2015 through the cooperative efforts of WVDEP; the watershed group, GWF) and NMLRC at West Virginia University. NMLRC also worked with the GWF to obtain funds from the Office of Surface Mining's (OSM) Watershed Cooperative Agreement Program (WCAP). WCAP funds and WVDEP's stream restoration funds (SRF) covered construction costs and match. Table 2 provides a breakdown of the final costs.

Table 8. Lambert Run Site 7 final costs

Funding	Award	Spent	Balance
§ 319	$384,933	$384,376	-
SRF	$200,000	$200,000	-
WCAP	$56,622	$56,622	-
Total	$641,555	$640,998	$577

Success Stories

§ 319 NPS Success Stories highlight waterbodies identified by states as being primarily nonpoint source-impaired and having achieved water quality improvements. States are required to submit at least one story within a fiscal year. There are three categories of Success Stories: 1) fully or partially restored, 2) progress towards water quality goals, and 3) ecological restoration. In 2015 two West Virginia stories were published on EPA's Success Story website. These are provided on the next four pages.

NONPOINT SOURCE SUCCESS STORY

West Virginia

Controlling Contaminant Sources and Restricting Livestock Access to the Riparian Corridor Improves Water Quality and Aquatic Habitat in Kitchen Creek

Waterbody Improved

Waste from agricultural production and the presence of livestock in riparian areas degraded water quality in Kitchen Creek. As a result, the stream was placed on the 2006 Clean Water Act (CWA) section 303(d) list as impaired for fecal coliform. The West Virginia Conservation Agency (WVCA) developed and implemented a watershed-based plan to address the problem through practices such as limiting livestock access to the stream and constructing waste storage facilities. Water quality has generally improved in response to this restoration work; bacteria levels have decreased and habitat conditions have improved.

Problem

Kitchen Creek is in the Gap Mills area of Monroe County in southeastern West Virginia. It flows along the northeast foot of Peters Mountain from the continental divide, and travels southwest to Second Creek. Second Creek flows northwest to the Greenbrier River. Kitchen Creek is a 5.5-mile-long stream that flows into Second Creek at Gap Mills (Figure 1). The Kitchen Creek watershed consists mostly of grassland pasture used for beef cattle and dairy operations.

West Virginia's fecal coliform (FC) bacteria standard states that water samples are not to exceed 200 colonies (col) per 100 milliliters (mL) as a monthly mean, based on at least five samples per month. In addition, no more than 10 percent of all samples taken during the month may exceed 400 col/100 mL. Data collected in 2004 and 2005 failed these criteria, causing Kitchen Creek (segment WVKNG-23-G) to be placed on the 2006 CWA section 303(d) list for FC bacteria. A total maximum daily load (TMDL) was developed for the Greenbrier River in 2008, which included Kitchen Creek and Second Creek. The TMDL analysis revealed that the use of the stream for agricultural purposes was the root of the bacteria contamination. At one time there were three dairies and two large beef feedlot with very little, if any, waste storage, and much of that waste was able to enter the stream (Figure 2).

Other farms in the area allowed unrestricted grazing of beef cattle along the riparian areas, while also over-applying liquid and solid manure, poultry litter, and fertilizer to pasture and cropland. In addition, the karst geology of the area might have led to a slow release of bacteria into the stream from underground sources.

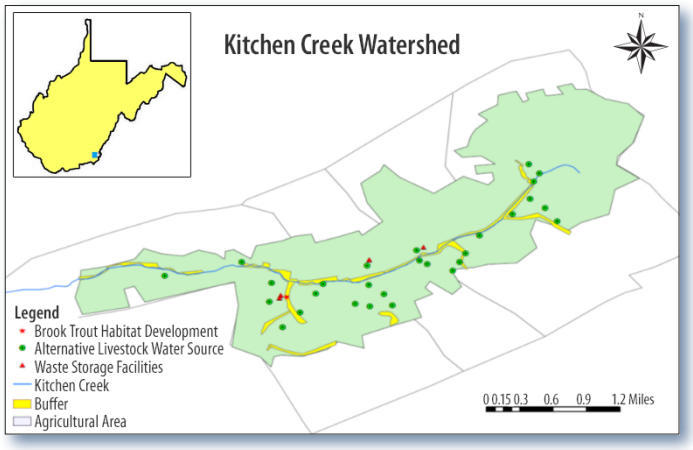


Figure 1. Kitchen Creek watershed and BMP locations.

Project Highlights

The key best management practices (BMPs) implemented to address the FC bacteria contamination included installing alternative water systems, limiting livestock access to the riparian area, and building waste storage facilities. The majority of these practices were implemented from 2009 to 2014 as part of the Second Creek watershed-based plan (see Figure 1 for BMP implementation locations).

The 11 alternative watering systems were vital to restricting livestock access to the riparian pasture. These systems provided cleaner and fresher water for livestock while grazing, and also allowed farmers to implement rotational grazing systems to decrease bacteria-laden runoff. Some of the alternative water sources also used renewable energy such as wind and solar power for pumping.

Figure 2. Before project implementation, this section of stream flowed through the middle of a beef feedlot.

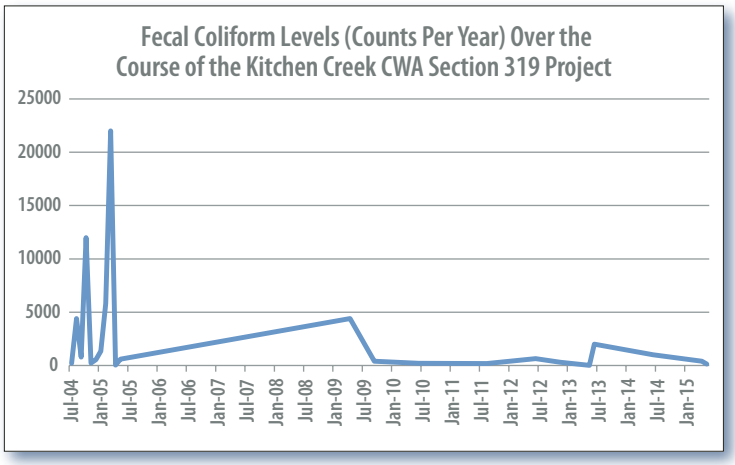


Figure 3. FC bacteria levels in Kitchen Creek generally declined after 2009, thanks to project implementation.

More than 100 acres of riparian area and more than 6 miles of stream were developed into buffers once the alternative water sources were in place. These riparian areas are mostly grass buffers; farmers allow livestock to graze on a limited basis in accordance with a rotational grazing plan that is designed to meet or exceed the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) standards for riparian grazing. Allowing livestock to graze the buffers facilitates the plants' ability to uptake nutrients. These buffers and grazing management plans have reduced the overall time livestock can access the stream from 5 percent to 0.12 percent.

Finally, three waste storage facilities were constructed or repaired to stop the direct flow of manure to the stream. The nutrients from these waste storage facilities were then used in nutrient management plans for additional forage production, further reducing the need for riparian pasture and improving water quality.

Results

FC bacteria levels have dramatically decreased as a result of the restoration work in Kitchen Creek (Figure 3). Unexplained spikes in bacteria levels shown in recent monitoring data might be linked to above-average precipitation and legacy sources of livestock waste in the karst system that will take a significant amount of time to flush out completely. WVCA will conduct further sampling along Kitchen Creek to confirm that FC levels continue to improve as a result of better land management.

Wildlife habitat has also improved due to the restoration work. A fish population evaluation conducted one year after brook trout reintroduction to the stream in 2013 showed that the trout population reestablished itself. In addition, the fish surveys indicated a change in the primary nongame fish population from dace to sculpin, an indicator of high-quality water. Terrestrial species, including river otters, bald eagles, golden eagles, golden winged warblers and bobwhite quail, were also spotted in the area after Kitchen Creek water quality began improving (even though the creek does not yet meet state standards).

Partners and Funding

Many project partners were involved in the Kitchen Creek improvement project. WVCA was the primary lead for this project, while the Greenbrier Valley Conservation District served as the local funds holder. NRCS provided engineering and plant materials support. The U.S. Fish and Wildlife Service's White Sulfur Springs National Fish Hatchery and Partners for Fish and Wildlife Program provided support for implementing BMPs and establishing brook trout. Trout Unlimited was closely involved with fence construction on most of the projects.

Federal funding ($556,560 total) was provided by the CWA section 319 program. State funds included $120,811 from the WVCA; additional state funds were provided in the form of staff time and resources. Participating farmers and landowners contributed over $100,000 of their personal funds, time, labor and other resources to assure this project's success.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

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Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
West Virginia

Treating Acid Mine Drainage Allows Aquatic Life to Rebound in Kanes Creek

Waterbody Improved

Acid mine drainage (AMD) from mines in West Virginia's sulfur-rich Upper Freeport Coal Seam polluted Kanes Creek. The West Virginia Department of Environmental Protection (WVDEP) added the 4.3-mile-long stream to its Clean Water Act (CWA) section 303(d) list of impaired waters in 1998. Project partners have installed passive and active AMD treatment systems that have reduced metals and acidity loadings into Kanes Creek, allowing benthic macroinvertebrate and fish communities to increase in the lower reaches of the creek. A 7.2-acre impoundment upstream is meeting water quality standards and will be ready for volunteer or stocked fish communities after a few more projects solidify water quality gains.

Problem

Kanes Creek is a tributary to Deckers Creek, which is a tributary to the Monongahela River. Kanes Creek is a 4.3-mile stream that flows into Deckers Creek in Reedsville, West Virginia. Deckers Creek flows into the Monongahela River in Morgantown, West Virginia (Figure 1).

The Upper Freeport Coal Seam is rich in sulfur, and it generates sulfuric acid when exposed to air and water. Before 1977, no regulations were in place restricting the discharge of AMD from mines. Many of those mines were abandoned before the Surface Mining Control and Reclamation Act (SMCRA) went into effect, and continue to discharge polluted water to this day. Kanes Creek received AMD from 10 abandoned mine sites, leading to high metal concentrations and acidity. WVDEP's Watershed Assessment Branch (WAB) and Friends of Deckers Creek (FODC) collected data from 1994 to 1996 that led to the 1998 CWA section 303(d) listings for iron, manganese, pH and biological impairments of Kanes Creek.

Project Highlights

In 1997 and 2003, the WVDEP reclaimed abandoned mine lands as part of the SMCRA funded-effort to reduce problems from abandoned coal mines. In 2002 the U.S. Environmental Protection Agency (EPA) completed a total maximum daily load (TMDL) for the Monongahela River watershed, which includes Kanes and Deckers creeks. From 2003 to 2006 a permitted mine adjusted its operation to better capture AMD surging from the mine. In 2005 a nonprofit organization, Friends of Deckers Creek (FODC), completed a watershed-based plan that served as a road map to eliminating all impairments from mine drainage in the Kanes Creek and Deckers Creek watersheds. In 2008, 2010, 2011 and 2013 FODC completed acid mine drainage treatment projects in the Kanes Creek watershed with sulfate-reducing bioreactors, water-powered lime dosing devices, limestone leachbeds and an anaerobic vertical flow wetland (see Figure 1 for project locations). One more project using a limestone leachbed and an anaerobic vertical flow wetland is in development.

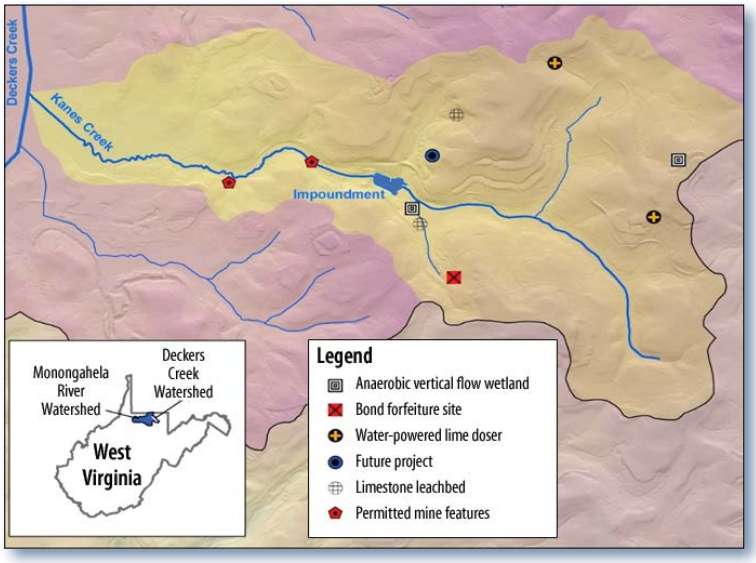

Figure 1. The Kanes Creek watershed is in northern West Virginia.

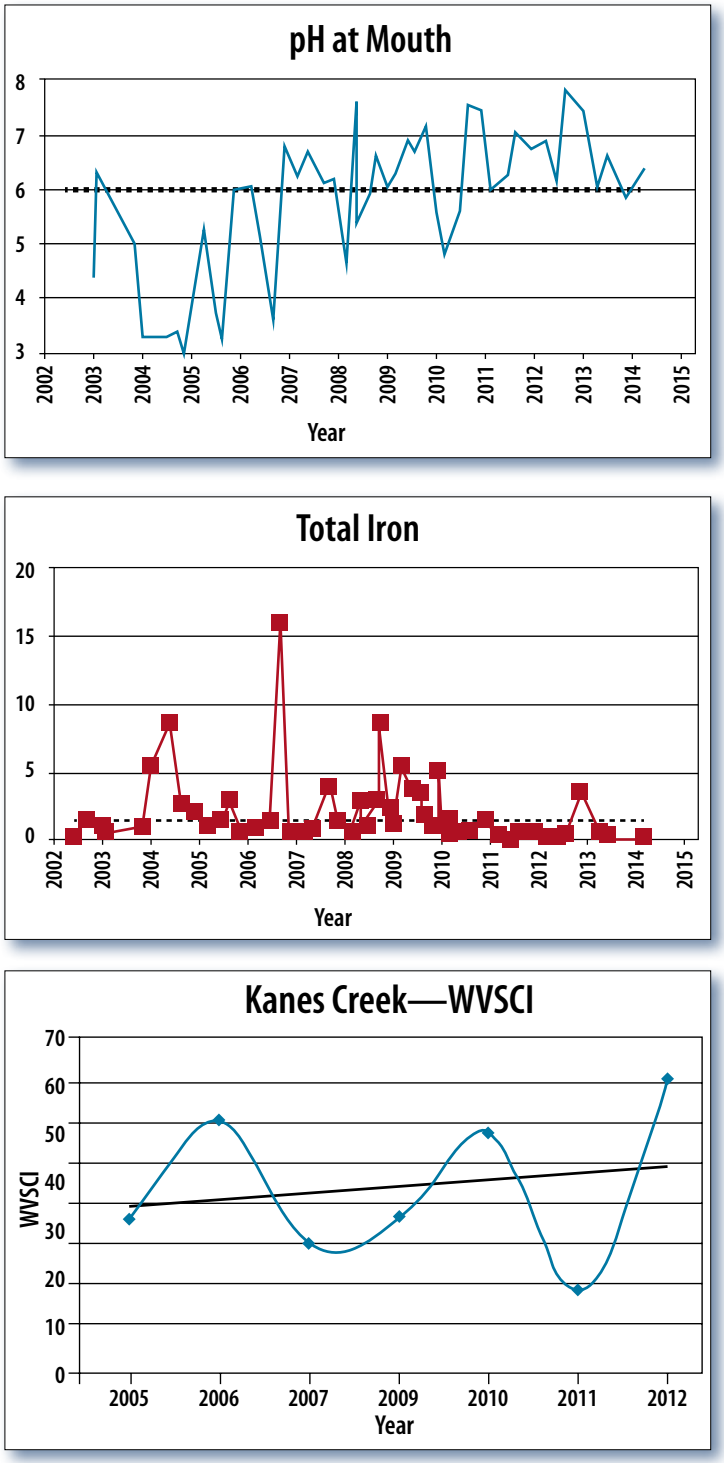

Figure 2. Trends in pH (top), iron (middle) and the WVSCI (bottom) index over time show improvements. Dotted lines in the pH (6) and iron (1.5 mg/L) plots indicate state criteria for those parameters.

Results

The lowest reach of Kanes Creek has met water quality standards for AMD parameters, including pH and total iron, more than 90 percent of the time since April 2010 (Figure 2). An impoundment 2.5 miles from the mouth had a pH level near 4.0 when Kanes Creek was placed on the CWA section 303(d) list in 1998; since 2010, this site has met pH standards in excess of 6.0 approximately 20 percent of the time.

Recent fish surveys have found creek chub, yellow bullhead catfish and green sunfish in sections of the stream where no fish were found before 2006. Benthic macroinvertebrate sampling yielded six individuals per square meter in 2003. Similar sampling in 2012 yielded 275 organisms per square meter. Total taxa, which is the total number of families, improved 58.8 percent from 2007 to 2012.

The West Virginia Stream Condition Index (WVSCI) is a family-level index for biological integrity for benthics that incorporate six different metrics. WVSCI scores in Kanes Creek have fluctuated over the years but the trend shows an overall improvement. The 2012 scores are only slightly below the threshold for biological impairment.

Lastly, although AMD has a major impact on Kane Creek, other factors such as changes in habitat and hydrologic conditions also have greatly influenced the benthic communities. With additional evaluation of existing water quality data and potentially more sampling, West Virginia hopes for Kanes Creek to be delisted in the near future.

Partners and Funding

WVDEP conducted its projects with support ($1.8 million) from the U.S. Office of Surface Mining (OSM) and the Natural Resources Conservation Service. FODC conducted its projects with support from CWA section 319 funds ($613,000), OSM's Watershed Cooperative Agreement Program ($463,000) and an EPA Brownfield Assessment Grant ($74,000).

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-15-001LL
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Watershed plans

This section will provide a summary of select watershed plans, primarily those aligned with the watershed project highlight section and success stories. Table 8 shows the current list of watershed plans.

Table 9. WV Watershed plans; those indicated will be highlighted in this report

HUC8 watersheds	Plan name	Status	Date	Pollutants
Cacapon	Lost River	Active	2006	B, S
Cheat	Lower Cheat (R)	Active	2005	M, P
	North Fork Blackwater (R)	Not-active	2005	M, P
Coal	Lower Coal River	New	2014	B, S
Elk	Upper Elk (Protection)	Active	2012	NA
Greenbrier	Knapp Creek	Active	2013	B, S
	Milligan Creek	Active	2014	B, S
	Muddy Creek	Active	2009	B, S
	Second Creek	Active	2008	B
Gauley	Upper Meadow River	Active	2014	B, M
Upper Guyandotte	Upper Guyandotte	Active	2006	B, M
James	Potts Creek	Active	2012	B
Upper Kanawha	Cane Fork	Not-active	2011	M, P
	Morris Creek	Active	2013	M, P, S
Monongahela	Deckers Creek	Active	2015	B, M, P
	West Run	Active	2008	M, P
Lower New	Piney Creek	Active	2012	B, M, P
	Wolf Creek (R)	Active	2009	M, P, B
Potomac Direct Drains	Back Creek (Protection)	Active	2014	NA
	Elks Run	Active	2013	B, S
	Mill Creek (Opequon)	Active	2008	B, S
	Sleepy Creek	Active	2008	B
	Tuscarora Creek	Active	2011	B, S
South Branch Potomac	Mill Creek (South Branch)	Active	2007	B, S
Tug Fork	North Fork Elkhorn	Active	2007	B, M
Tygart Valley	Roaring Creek	Active	2012	M, P
	Sandy Creek	Not active	2012	M, P
	Three Forks Creek	Not-active	2005	M, P
	Upper Buckhannon	Active	2006	M, P, B
West Fork	Little Tenmile/Jones Creek	New	2015	M, B, S
	Lamberts Run	Active	2004	M, P
NPS Pollutants: (B) Bacteria, (M) Metals, (P) pH, (S) Sediment, (NA) None, (R) revisions occurring				

Knapp Creek Watershed Plan

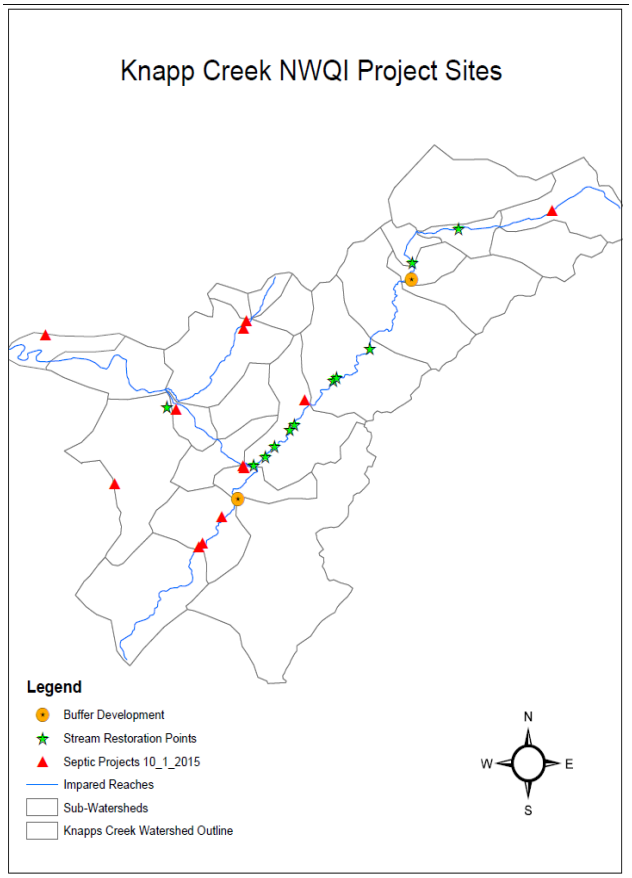
Introduction

Knapp Creek is a 26.3 mile stream located entirely within Pocahontas County, West Virginia. The watershed encompasses approximately 176 square miles. Its headwaters originate in the mountains that form the West Virginia/Virginia boundary north of the town of Frost. The other towns within the watershed are Minnehaha Springs, Huntersville and Marlinton at the confluence of Knapp Creek and the Greenbrier River. The focus of this 2013 watershed plan is the reduction of fecal coliform and sediment using a variety of agricultural BMPs, septic programs and natural stream restoration.

The Knapp Creek watershed plan calls for a reduction of 4.12E+13 cfu/year assuming the City of Marlinton is able to upgrade the sewage treatment plant and eliminate combined sewage overflow (CSO) discharge. The plan recommends upgrades and/or repairs to faulty septic systems and the elimination of cattle access to the stream. Additionally sediment will be reduced using natural stream restoration techniques and grass/forest buffers.

Project highlights

Figure 18. Knapp Creek project sites



One § 319 watershed project was completed in 2012. A second 2013 project is on schedule. Additional BMP implementation was provided by NRCS through NWQI funding in 2012 and 2013. The following BMPs were installed in 2015.

FY	BMP	Quantity	unit
2012	Exclusion fence	3,030.0	ft
2012	Stream restoration	957.0	ft
2013	Alternate water source	1.0	unit
2013	Heavy use protection	1.0	unit
2013	Septic - new	2.0	unit
2013	Streambank protection	365.0	ft
2013	Streambank protection	275.0	ft

NWQI funded BMPs include 5,200 feet of streambank repair, two stream crossings, 900 feet of fencing and three acres of tree planting.

Results

Since the BMPs are relatively new, except for a few of the earlier stream restoration projects, pollutant reductions are not significant. We anticipate that as the BMPs mature, hydrology will be restored and bacteria concentrations will respond due to decreased cattle access. WVCA estimates that fecal coliform has been reduced by 3.79E+12 cfu/year.

Funding

Figure 19. NRCS stream restoration project

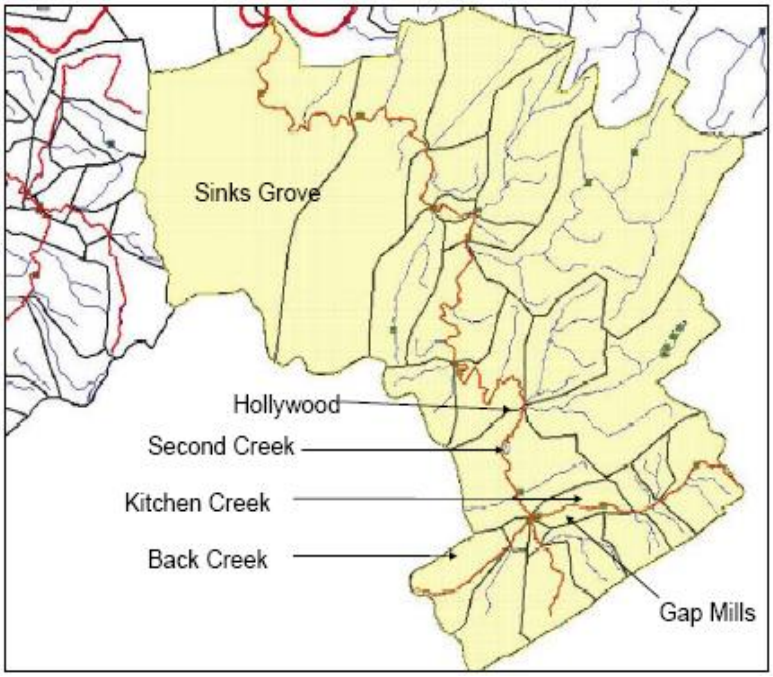
The § 319 watershed project completed in 2012 cost $171,812 including match. The 2013 project is on schedule with $162,622 § 319 and $107,334 match funding in place. NWQI funding of $447,792 provided additional BMP implementation.

This photo shows a completed project. Existing trees on the left were kept intact. Cross vanes and other structures enables sediment transport and on the right fencing keeps livestock out and the visible tree guards protects tree plantings from deer.

Second Creek Watershed Plan

Introduction

Figure 20. Location of impaired streams - Second Creek watershed



Second Creek is a sub-watershed of the Greenbrier River watershed. It is located in the southern portion of the Greenbrier River watershed in the counties of Monroe (89%) and Greenbrier (11%). The drainage area is approximately 124 square miles, 79,346 acres. According to the Greenbrier River Watershed TMDL, impaired streams in the Second Creek sub-watershed demonstrate the highest levels of fecal coliform than any other within the Greenbrier watershed.

The focus of the 2008 Second Creek watershed plan is the remediation of fecal coliform focusing primarily on agricultural BMPs that limit cattle access, filter run-off and provide alternate water/locations for the cattle. The Second Creek watershed plan calls for fecal coliform reduction of 3.00E+14 from agricultural lands and 8.17E+12 from failing septic systems.

Project highlights

A total of four projects have been completed and a fifth is currently underway. A sixth proposal is approved and expected to start in the summer of 2016. The WVCA CS specialist in the Greenbrier District has been the lead project manager for all projects. Thus far the focus is on agricultural BMPs in Kitchen Creek (3 projects complete), Back Creek (one project complete), and two (still active) are focused in the lower portions of Second Creek, specifically in the karst areas.

The BMPs implemented in Kitchen Creek include approximately 100 acres of nutrient management and grazing plans, 104 acres of riparian buffers, 16 stream crossings, 14 alternate water sources and 12,489 feet of exclusion and divisional fencing. In other portions of the watershed BMPs include six alternate water sources, 379 acres of grazing plans, one stream crossing, one heavy use protection area and 6,893 feet of fencing.

Results

Table 10. Load reductions from the Second Creek watershed plan

Project	Year	Load Reductions		
		Fecal (cfu/year)	Nutrients (lbs/year)	Sediment (tons/year)
Kitchen Creek	2009	2.10E+12	2,152	15.4
Kitchen Creek II	2011	6.01E+13	-	-
Kitchen Creek III	2012	1.98E+12	-	-
Back Creek	2010	4.78E+13	-	-
Second Creek Karst	2013	5.32E+12	39,154	-
Totals for watershed		**1.17E+14**	**41,306**	**15.4**

Landowners in Kitchen Creek have responded to the assistance provided by WVCA, and have embraced the recommended BMPs (Figure 21). In this small watershed 104 acres of riparian area (> 6 miles of stream) have been developed into buffers. These buffers and grazing management plans have reduced the overall time livestock are exposed to the stream from 5% to 0.12%.

Figure 21. Kitchen Creek farms with BMP implementation

Fecal coliform has been reduced but the more surprising improvements are occurring to the physical conditions and habitat adjacent to the stream. Brook trout fingerlings were introduced and after two years they have survived and show greater than average growth rates. Fish surveys have indicated a change in the overall non-game population from primarily dace to sculpin, an indicator of high quality water. Other terrestrial species including river otters, bald eagles, golden eagles, golden winged warblers, and bobwhite quail have been

observed in the area, which shows the benefit to improvement of the water quality. Other landowners in Back Creek and portions of Second Creek have been slower to sign-up. However, optimism remains high as many are talking about the success of Kitchen Creek.

Funding

Thus far $425,426 in § 319 funds, and $363,639 in state contributions have been spent since Second Creek watershed plan approval.

Table 11. Second Creek watershed plan spending

§ 319 Requested	§ 319 Spent	State Funds
$108,523	$108,523	$72,350
$49,520	$49,520	$33,014
$70,517	$24,795	$16,390
$120,500	$93,959	$34,062
$100,000	$46,269	$23,601
$130,000	$130,000	$115,626
$182,000	$102,360	$68,596
$115,428	-	-
$876,488	**$425,426**	**$363,639**

Implementing a Bacteria Watershed Plan

Introduction

Instead of focusing on a specific watershed plan, this section provides a summary of several plans, all located within the Potomac Direct Drains HUC8 basin. All of these plans focus on fecal coliform reductions and thus far have had varying levels of success. We explore the possible reasons in this section. Table 11 provides a list of the watershed plans and Figure 23 shows their boundaries. Canaan Valley Institute (CVI) is the local project manager for Tuscarora and Mill Creek, WVCA is the local project manager for Sleepy Creek and Elk Run.

Table 12. Bacteria watershed plans in the Potomac Direct Drains

Watershed plan	Year approved
Sleepy Creek	2008
Mill Creek Opequon	2008
Tuscarora Creek	2011
Elk Run	2013

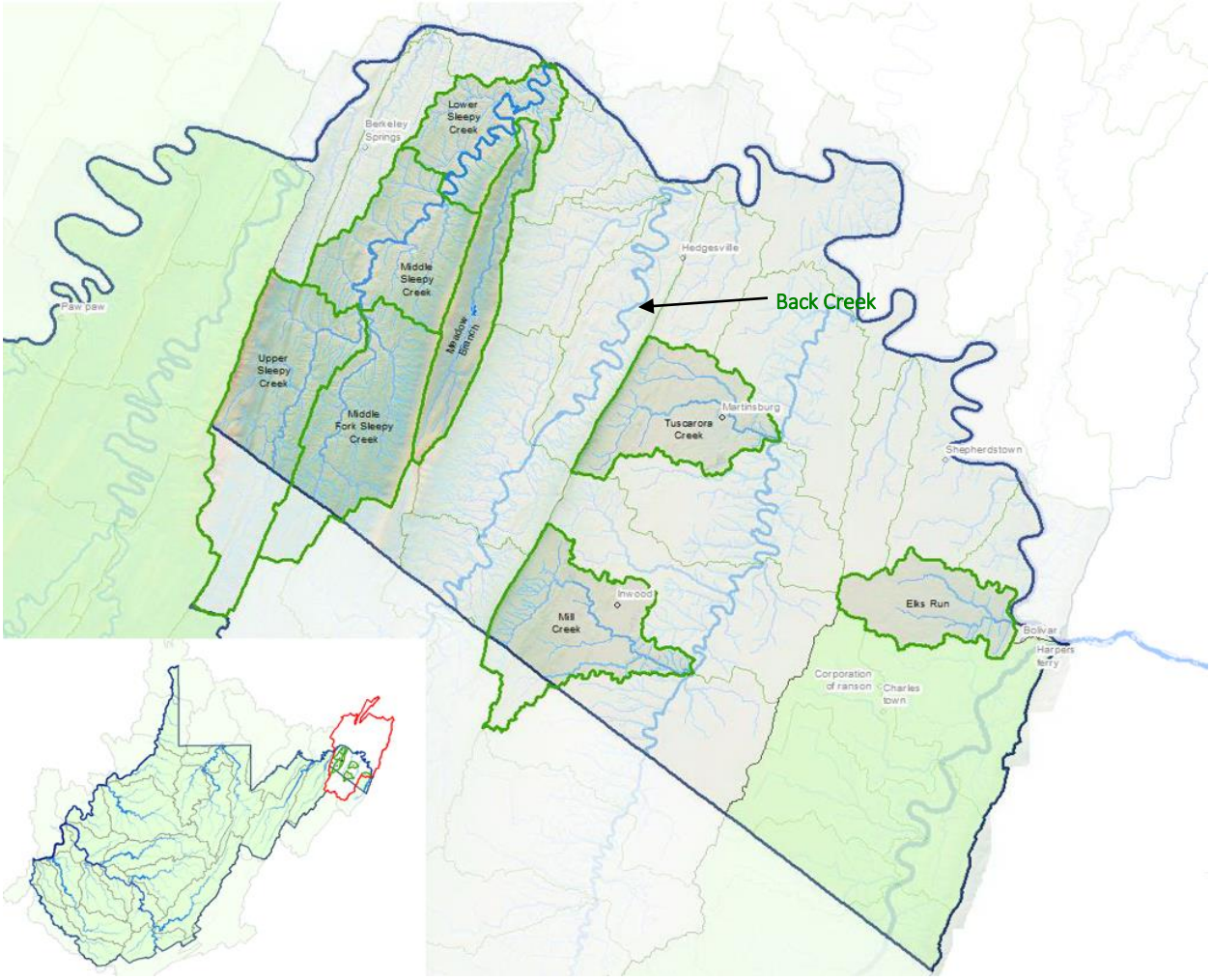
Not listed in the table above, or shown on the map is the Back Creek watershed protection plan (WPP), which was approved in 2014. Back Creek is a large watershed (its headwaters are in VA) west of Sleepy Creek.

Project highlights

A successful bacteria project is one that meets the project's goals and objectives, and in the end results in a reduction of fecal coliform in the target stream. Sounds easy enough, but project managers in the Potomac have found mixed results. Most of the impetus has been placed on septic system repair, replacement or pumping since the TMDLs show failing septic systems as the most significant source. Some of the tools used to target residents are brochures/flyers, newspaper articles, radio and TV interviews, workshops, booths fairs and festivals and more (Figure 24). These tools are not randomly distributed. A concerted effort by local project teams (PTs), made-up mostly of volunteers and agency representatives, decide what outreach tools may work best, and where and how they should be distributed. There are active PTs in Sleepy Creek, Tuscarora Creek and Elk Run.

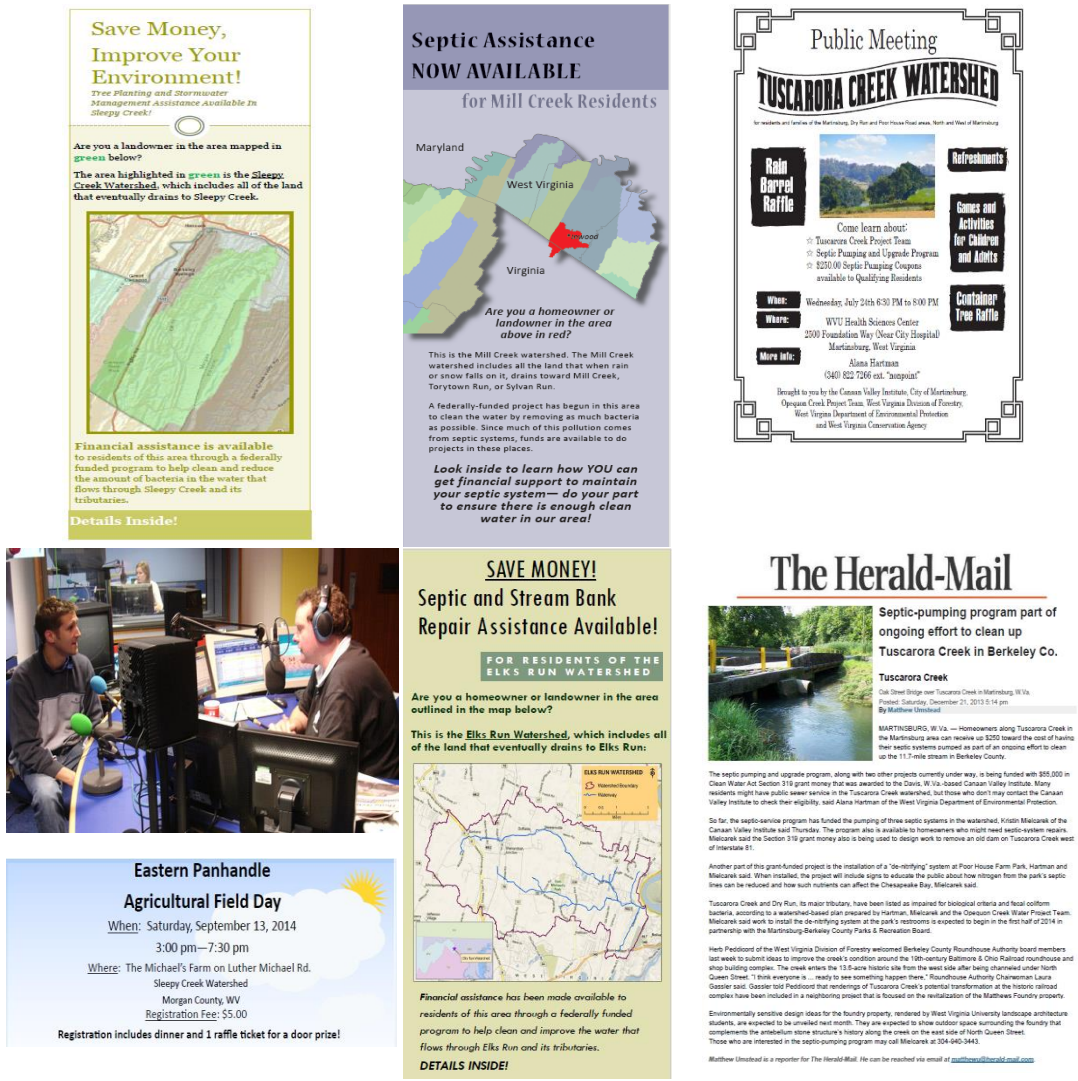
Door-to-door solicitation

Figure 22. Watershed plan boundaries within the Potomac Direct Drains



Brochures/flyers were distributed to schools, local churches, doctor/dentist offices, public buildings etc. Community events such as workshops, and booths at fairs/festivals were typically weekend events. At least twice each year local newspaper articles highlighted the efforts, and radio interviews were given. A door-to-door effort and direct mailing was also undertaken. And finally presentations were given at City Council and Chamber of Commerce meetings, and other local government meetings/events. Many of these efforts were promoted with help from the Local Health Department (County Sanitarian).

Figure 23. Examples of outreach tools used in the Potomac basis



Results

How successful are outreach campaigns?

Tuscarora/Mill Creek: Flyers/brochure were somewhat successful generating interest but more importantly they were a communication tool. Newspaper articles and radio spots generated some interest, but it came from outside the watershed. Presentations at city/county meetings generated little interest, it was our hope to find more partners and match. Workshops and other community outreach events were not successful standing alone, but were more successful at existing fairs/festivals.

Table 13. Potomac septic project summary

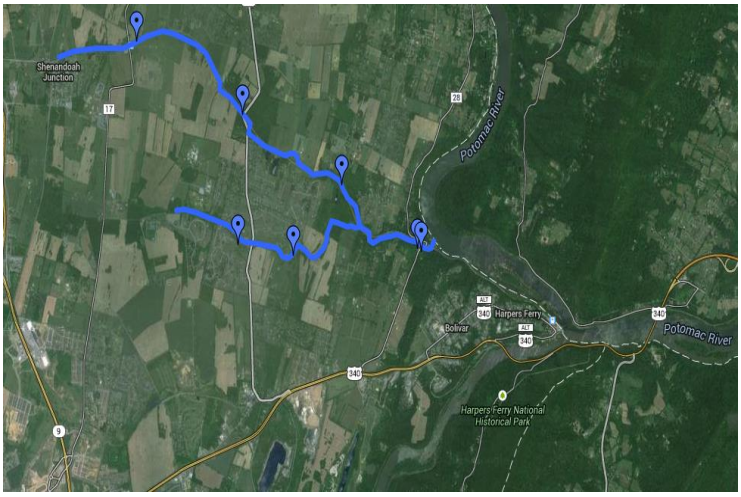
Project	Year	Org	Goal	Actual	Septic LR	%
Mill Creek Opequon	2009	CVI	25	13	7.67E+13	0.52
Sleepy Creek	2008	WVCA	25	43	2.94E+13	1.72
Elks Run	2011	WVCA	11	2	3.29E+12	0.18
Tuscarora Creek	2011	CVU	11	5	3.29E+12	0.45
		Totals	**72**	**63**	**1.13E+14**	0.88
Sleepy Creek 2	2013	WVCA	0	**On-going projects**		
Sleepy Creek 3	2014	WVCA	12			
Mill Creek Opequon 2	2015	CVI	10			
Elks Run	2015	WVCA	10			
Tuscarora Creek 2	2015	CVI	5			
		Totals	**37**			

Sleepy Creek: The grant has been very successful. There has been a steady influx of inquiries about the program and the application process. The great success of the 2008 project had a profound influence on future efforts. The community was very familiar with the program and the local watershed group, Sleepy Creek Watershed Association (SCWA). There was great respect for what SCWA is trying to do. In general, the local communities are more environmentally aware and they want to keep the conditions as clean and healthy as possible.

Elk Run: Thus far, the efforts have not been very successful. The project goals for septic system repairs were not met. Similar outreach tools were used and there was also an effort to target septic installers with a workshop about the programs. Perhaps if they are aware they would also promote the effort. The Elk Run watershed plan left a bad taste among home owners (especially sub-division) because it pointed to that group as a large source in the watershed. Thus far there has been better cooperation and participation in the FY 2014 project.

It is important to note that all of these projects promoted and implemented several BMP types known to reduce bacteria. These seemed to encounter less resistance than the septic programs. Thus far the projects have installed four raingardens, 12 acres of buffers, 4.5 acers of urban/sub-urban tree planting, 5,000 square feet of porous pavement, 57 feet of streambank stabilization and 830 feet of stream channel restoration.

Figure 24. Elk Run monitoring locations



Monitoring

Several monitoring efforts were explored throughout the life of these projects. Initially volunteer monitoring lead by SCWA, OPT and Elk Run Watershed Association (ERWA) were effective but seemed to lack momentum as time passed. ERWA is the newest effort and still moving forward. Getting an approvable QAPP, funding and training for a watershed wide volunteer monitoring effort is challenging. The most effective approach is a partnership

and contract with organizations such as Cacapon Institute (CI), Freshwater Institute (FI) and Shenandoah University (SU). These organizations have professionally trained staff and in-house labs. The lab at SU has agreed to analyze volunteer samples at a reduced rate. Additionally the students get time in the field working with ERWA and others.

Where are we now? Table 14 provides a snap-shot of the progress. There is still more work to do, but results thus far are promising.

Table 14. Project costs and bacteria reduction in the Potomac Direct Drains

Year	Watershed plan	LR needed	Total cost
2008	Mill Creek Opequon	2.79E+15	$5,325,986
2008	Sleepy Creek	5.75E+15	$4,799,010
2011	Tuscarora Creek	4.52E+15	$17,415,822
2011	Elks Run	2.75E+15	$27,326,788
			$54,867,606
319 projects completed		LR achieved	Project cost
2008	Sleepy Creek	7.87E+13	$292,230
2009	Mill Creek Opequon	7.71E+13	$243,992
2011	Tuscarora Creek	1.76E+13	$43,911
2011	Elks Run	3.32E+12	$32,326
			$612,459
319 on-going			
2013	Sleepy Creek	1.74E+13	$70,200
2014	Sleepy Creek	1.97E+13	$74,600
2015	Mill Creek Opequon	5.90E+13	$161,801
2015	Elks Run	1.66E+13	$68,200
2015	Tuscarora Creek	3.14E+13	$56,523
			$431,324
		Total	**$1,043,783**

The total cost and load reductions are estimates from the watershed plans. The cost and load reductions in red are from projects not yet completed. These numbers are not included in the load reductions achieved.

We estimate that 51% of the total bacteria load has been reduced. Note: Indian Run has been delisted (2013 319 Success Story).

Lambert Run Watershed Plan

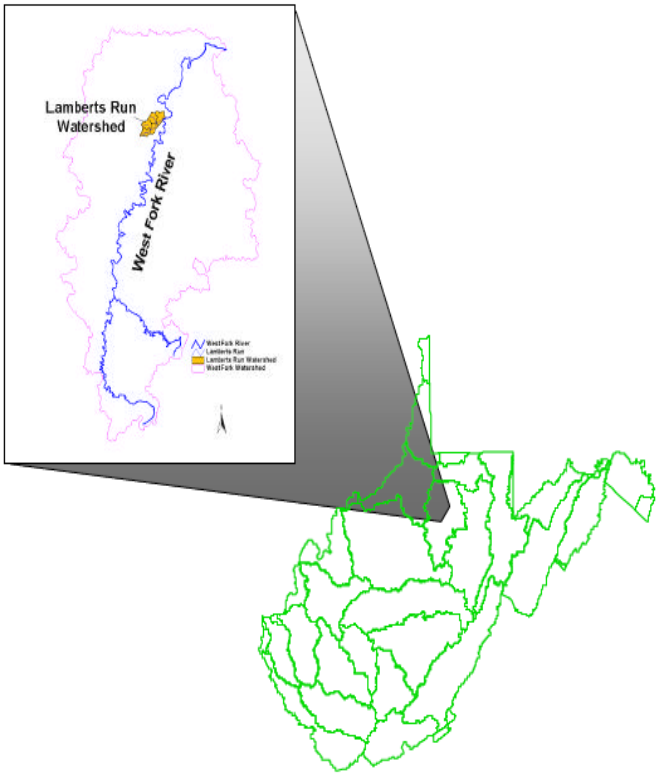
Introduction

Lambert Run is an eight square mile watershed located near the town of Spelter in Harrison County, WV. Deep mining has taken place in the watershed since the 1950s. Most of the mining performed in the watershed was to extract the Pittsburgh coal seam. Water chemistries vary from slightly acidic mine drainage to alkaline mine drainage (AMD).

In 2003 WVDEP, GWF and other partners submitted West Virginia's first watershed plan. It was approved by the US EPA in 2004. The plan allowed the partners to pursue funding for passive treatment remediation of the mine discharges in the watershed. The goal of the watershed plan is to reduce AMD metals (Aluminum (Al), Iron (Fe) and Manganese (Mn)) by > 500,000 lbs/year.

In 2004, a partnership between the WVDEP, Office of Surface Mining (OSM), West Virginia University (WVU) – NMLRC, and the GWF started work toward restoration, installing multiple passive treatment systems. Since 2004, six AMD treatment systems have been installed in the watershed.

Project highlights



Site 3 (Muzzleloader Club)
Completion: 2006 (FY 2004 funds)
Cost: $142,000 for construction (§ 319 and WCAP)

Site 3 was constructed in 2006, and was the first of the projects to be completed. Before treatment, Site 3 was an acidic, metal laden mine discharge. After treatment, the Site 3 discharge is now alkaline with very low metal concentrations. This project has significantly improved the mainstem of Lambert Run by removing a source of metals and acidity.

Site 8 (Oldaker property)
Completion: 2007 (FY 2004 funds)
Cost: $147,000 for construction (§ 319 and WCAP)

After treatment of Site 8, all metal concentrations have decreased. In conjunction with the treatment system at Site 9, Site 8 has remediated an entire tributary of Lambert Run. Recent developments at this site have resulted in an attempt to revive the system due to the ponds filling and vegetation dying. We suspect the damage was caused by the construction of an oil and gas pipeline near the system.

Site 5 (Alan Meadows property)
Completion: 2008 (FY 2004 funds)
Cost: $168,000 for construction (§ 319 and WCAP)

Site 5 was a slightly alkaline source before treatment, which means the main focus of the treatment was to precipitate out the metals from the mine drainage through oxidation. Metal concentrations have been reduced at the site. However, a few minor maintenance issues now need addressed for optimal system performance. This includes repair of the wetland baffles and some minor berm restoration.

Site 9 (Blake Cox property)
Completion: 2009 (FY 2004 funds)
Cost: Appx. $500,000 (§ 319 and Compensatory Mitigation from White Oaks Dev. Project)

The treatment system at Site 9 continues to perform well. Before construction, Site 9 contributed roughly 60 mg/L of acidity to Lambert Run. It is now alkaline water that contributes approximately 100 mg/L of alkalinity. Metal concentrations have also been lowered significantly.

Site 7 (Barnhart Property)
Completed: September 2015 (FY 2011 funds)
Cost: Appx. $400,000 for Engineering and Construction (§ 319, SRF, WCAP)

This site was described in the Project Highlights section of this report.

Figure 25. Before and after at Lambert Site 9

Conclusions and future projects

To date, six AMD remediation projects have been constructed throughout the watershed. Combined, these projects have removed hundreds of tons of metals and acidity from the watershed. Optimistically, Lambert Run will become only the second stream that was listed for mine drainage impairment to be removed from the WV 303(d) list. The NMLRC and GWF plan to revise the watershed plan over the next few years. This will enable partners to verify successful passive projects, perform operation and maintenance, and address areas where AMD issues persist.

Table 15. Lambert Run watershed plan summary

Project	Load reductions	FY	§ 319	State
Lambert treatment projects	Al – 400 lbs/yr Fe - 19,200 lbs/yr	2004	$301,400	$227,600
Lambert Site 3	Al – 34, 800 lbs/yr Fe – 34,600 lbs/yr	2004	$63,998	$42,665
Lambert Site 5	Al – 1,000 lbs/yr Fe – 17,600 lbs/yr Mn – 8,200 lbs/yr	2006	$146,334	$97,614
Lambert Site 6	Acidity – 23,800 lbs/yr Al – 1,800 lbs/yr Fe – 22,820 lbs/yr	2009	$150,000	$100,000
Lambert Site 7	Acidity – 97,808 lbs/yr Fe – 30,000 lbs/yr	2011	$384,375	$169,895
Totals	Acidity – **121,628** lbs/yr Al – **38,000** lbs/yr Fe – **124,220** lbs/yr Mn – **8,200** lbs/yr		**$1,046,107**	**$637,774**

Appendix 1. Project status

Projects	Year	Type	Available	Requested	Spent	Project Balance	Grant Balance	Status	%	Basin Coordinator
WVDEP NP funds	2011	Nonpoint	$828,739	$440,800	$431,135	$9,665	$397,604	Complete		Statewide
WVCA NP funds	2011	Nonpoint		$276,799	$274,610	$2,189	$122,994	Complete		Statewide
WVDEP Oil & Gas	2011	Nonpoint		$42,004	$42,004	$0	$80,990	Complete		Statewide
State Fair raingarden	2011	AGO-NP		$15,000	$15,000	$0	$65,990	Complete		Southern
TMI - AWSM Program	2011	AGO-NP		$20,000	$19,989	$11	$46,001	Complete		Statewide
FOLG State of the Watershed	2011	AGO-NP		$3,163	$3,163	$0	$42,838	Complete		Southern
Elk Headwaters plan	2011	AGO-NP		$2,200		$2,200	$42,838	Terminated		
Piney Creek monitoring	2011	AGO-NP		$5,000	$5,000	$0	$37,838	Complete		Southern
FODC monitoring	2011	AGO-NP		$10,230	$10,230	$0	$27,608	Complete		Northern
CI riparian restoration	2011	AGO-NP		$3,000	$3,000	$0	$24,608	Complete		Potomac
FOB State of the Watershed	2011	AGO-NP		$6,000	$6,000	$0	$18,608	Complete		Northern
FODC Clean Creek Program	2011	AGO-NP		$15,000	$15,000	$0	$3,608	Complete	NP	Northern
Opequon tree maintenance	2011	AGO-NP		$2,000	$2,000	$0	$1,608	Complete	44.2%	Potomac
To Slabcamp	2011	Watershed	$1,044,382		$1,608	-$1,608				
Slabcamp AMD	2011	Watershed		$274,089	$290,571	-$16,482	$753,811	Complete		Northern
Kitchen Creek II	2011	Watershed		$49,520	$49,520	$0	$704,291	Complete		Southern
Muddy Creek - Greenbrier	2011	Watershed		$225,840	$245,288	-$19,448	$459,003	Complete		Southern
Lambert Run Site 7	2011	Watershed		$384,933	$384,375	$558	$74,628	Complete		Northern
Tuscarora Creek	2011	Watershed		$55,000	$43,911	$11,089	$30,717	Complete	WS	Potomac
Elk Run	2011	Watershed		$55,000	$32,326	$22,674	-$1,609	Complete	55.8%	Potomac
Totals	**2011**		**$1,873,121**					**100.0%**		
WVDEP NP funds	2012	Nonpoint	$655,616	$455,616	$334,457	$121,159	$321,159	Active		Statewide
WVCA NP funds	2012	Nonpoint		$200,000	$200,000	$0	$121,159	Complete		Statewide
FOLG raingarden	2012	AGO-NP		$15,000	$12,023	$2,977	$109,136	Complete		Southern
Piney Creek pet waste stations	2012	AGO-NP		$3,000	$3,000	$0	$106,136	Complete		Southern
FOC implementation guide	2012	AGO-NP		$20,000	$19,091	$909	$87,045	Complete		Northern
Davis Creek monitoring	2012	AGO-NP		$3,124	$3,124	$0	$83,921	Complete		Western
FODC Clean Creek Program	2012	AGO-NP		$17,000	$8,910	$8,090	$75,011	Active		Northern
GWA Fish Hatchery wetland	2012	AGO-NP		$20,000	$20,000	$0	$55,011	Complete	NP	Southern
FOC sustainability education	2012	AGO-NP		$20,000		$20,000	$55,011	Active	43.6%	Northern
James River Ag BMPs	2012	Watershed	$1,071,384	$214,841	$214,841	$0	$856,543	Complete		Southern
Kitchen Creek III	2012	Watershed		$70,517	$24,795	$45,722	$831,748	Active		Southern
Milligan Creek Ag BMPs	2012	Watershed		$123,060	$123,060	$0	$708,688	Complete		Southern
Upper Elk NSD-design	2012	Watershed		$21,000	$21,000	$0	$687,688	Complete		Western
Upper Elk - Cup Run NSD	2012	Watershed		$206,880		$206,880	$687,688	Active		Western

Projects	Year	Type	Available	Requested	Spent	Project Balance	Grant Balance	Status		Basin Coordinator
Fayette Square stormwater	2012	Watershed		$131,420	$120,051	$11,369	$567,637	Complete		Southern
Roaring Creek Mars Portals	2012	Watershed		$43,967	$43,967	$0	$523,670	Complete		Northern
Lick Run watershed plan	2012	Watershed		$15,090	$15,077	$13	$508,593	Complete		Northern
Knapp Creek restoration/monitoring	2012	Watershed		$100,000	$100,000	$0	$408,593	Complete	WS	Southern
West Run Morgantown airport	2012	Watershed		$145,214		$145,214	$408,593	Active	62.1%	Northern
West Run Morgantown airport	2012	SRF-State		$409,899	$178,611	$231,288		Active		Northern
LF Buckhannon - Swamp Run	2012	SRF-State		$257,193	$74,610	$182,583		Active		Northern
Sovern Run Titchnell Sands	2012	SRF-State		$202,466	$156,728	$45,738		Active		Northern
Totals	**2012**		**$1,727,000**					**51.8%**		
WVDEP NP funds	2013	Nonpoint	$605,853	$405,853	$275,788	$130,065	$330,065	Active		Statewide
WVCA NP funds	2013	Nonpoint		$190,000	$150,000	$40,000	$180,065	Active		Statewide
EPA watershed plan tracking	2013	Nonpoint		$10,000		$10,000	$180,065	Active		Statewide
Beaver Creek re-engineering	2013	AGO-NP		$58,250	$58,250	$0	$121,815	Complete		Northern
TMI - AWSM Program	2013	AGO-NP		$20,000	$17,293	$2,707	$104,522	Active		Statewide
Morris Creek monitoring	2013	AGO-NP		$4,000	$2,565	$1,435	$101,957	Complete		Western
Hughes River monitoring	2013	AGO-NP		$3,700	$1,624	$2,076	$100,333	Active	NP	Western
Helios Park - Richwood	2013	AGO-NP		$34,000		$34,000	$100,333	Active	37.0%	Western
Sleepy Creek II	2013	Watershed	$1,031,147	$70,200	$56,702	$13,498	$974,445	Active		Potomac
Knapp Creek - NWQI	2013	Watershed		$162,662	$29,289	$133,373	$945,156	Active		Southern
Second Creek	2013	Watershed		$120,500	$93,959	$26,541	$851,197	Active		Southern
Upper Muddy Creek 2.1	2013	Watershed		$222,709	$222,709	$0	$628,488	Complete		Northern
Roaring Creek Portal 5	2013	Watershed		$2,427		$2,427	$628,488	Terminated		
Ingrand Mine & VH-3	2013	Watershed		$276,000	$35,025	$240,975	$593,463	Active		Northern
Summerlee Phase 1.2	2013	Watershed		$29,733	$29,733	$0	$563,730	Complete	WS	Southern
LF Buckhannon - Swamp Run	2013	Watershed		$146,915		$146,915	$563,730	Active	63.0%	Northern
Wolf Creek stream restoration	2013	SRF-State		$196,307	$196,307	$0		Complete		Southern
Muddy Creek improvements	2013	SRF-State		$12,504	$12,504	$0		Complete		Northern
NF Greens Run railroad refuse	2013	SRF-State		$111,523	$107,509	$4,014		Active		Northern
Totals	**2013**		**$1,637,000**					**30.1%**		
WVDEP NP funds	2014	Nonpoint	$747,223	$483,811	$324,120	$159,691	$423,103	Active		Statewide
WVCA NP funds	2014	Nonpoint		$200,000	$86,719	$113,281	$336,384	Active		Statewide
EPA watershed plan tracking	2014	Nonpoint		$10,000	$10,000	$0	$326,384	Complete		Statewide
Lambert watershed plan	2014	Nonpoint		$56,043		$56,043	$326,384	Active		Northern
WV Rivers Coalition monitoring	2014	AGO-NP		$20,000	$20,000	$0	$306,384	Complete		Statewide
Latta's Stormwater	2014	AGO-NP		$34,600	$34,600	$0	$271,784	Complete		Western
Groundwork Guyandotte	2014	AGO-NP		$18,000		$18,000	$271,784	Active		Southern

Projects	Year	Type	Available	Requested	Spent	Project Balance	Grant Balance	Status		Basin Coordinator
CVI stream restoration	2014	AGO-NP		$20,000		$20,000	$271,784	Active		Statewide
TMI - AWSM Program	2014	AGO-NP		$20,000		$20,000	$271,784	Active		Statewide
FOB restoration and planning	2014	AGO-NP		$10,000		$10,000	$271,784	Active		Northern
WV Rivers Coalition monitoring	2014	AGO-NP		$20,000	$4,046	$15,954	$267,738	Active	NP	Statewide
Source water - Fayette Co	2014	AGO-NP		$10,000		$10,000	$267,738	Active	42.7%	Southern
Sovern England AMD	2014	Watershed	$1,002,899	$252,368		$252,368	$1,002,899	Active		Northern
Greens Run railroad refuse	2014	Watershed		$105,000	$84,284	$20,716	$918,615	Active		Northern
Kanes Creek South upgrade	2014	Watershed		$112,750		$112,750	$918,615	Active		Northern
Valley Point 12 revitalization	2014	Watershed		$163,100		$163,100	$918,615	Active		Northern
Sleepy Creek Phase III	2014	Watershed		$74,600	$5,603	$68,997	$913,012	Active		Potomac
Milligan Creek/Davis Springs	2014	Watershed		$150,000	$58,040	$91,960	$854,972	Active		Southern
Finley Run - Friends of Blackwater	2014	Watershed		$64,000		$64,000	$854,972	Active	WS	Northern
Meadow River Septics - WVCA	2014	Watershed		$53,100		$53,100	$854,972	Active	57.3%	Southern
Muddy Creek Schwab 2.1	2014	SRF-State		$57,605	$57,511	$94		Complete		Northern
Beaver Creek re-engineering	2014	SRF-State		$40,302	$40,302	$0		Complete		Northern
Winding Gulf stream restoration	2014	SRF-State		$35,132	$12,217	$22,915		Active		Southern
Totals	**2014**		**$1,750,122**					**3.7%**		
WVDEP NP funds	2015	Nonpoint	$619,640	$355,402	$282,945	$72,457	$336,695	Active		Statewide
WVCA NP funds	2015	Nonpoint		$116,000		$116,000	$336,695	Active		Statewide
EPA watershed plan tracking	2015	Nonpoint		$10,000	$10,000	$0	$326,695	Complete		Statewide
Big Sandy watershed planning	2015	Nonpoint		$84,000	$2,624	$81,376	$324,071	Active		Northern
Opequon tree maintenance	2015	AGO-NP		$3,000		$3,000	$324,071	Active		Potomac
FODC Clean Creek Program	2015	AGO-NP		$12,000		$12,000	$324,071	Active		Northern
WV Rivers Coalition - SWP program	2015	AGO-NP		$15,000	$2,120	$12,880	$321,951	Active		Statewide
Hursher's Run monitoring	2015	AGO-NP		$5,000		$5,000	$321,951	Active	NP	Western
AMD and wastewater research	2015	AGO-NP		$18,000	$1,410	$16,590	$320,541	Active	37.9%	Northern
Tuscarora Creek Phase II	2015	Watershed	$1,017,369	$56,523		$56,523	$1,017,369	Active		Potomac
Mill Creek Opequon Phase II	2015	Watershed		$161,801		$161,801	$1,017,369	Active		Potomac
Morris Creek upper mainstem	2015	Watershed		$49,265		$49,265	$1,017,369	Active		Western
Pase Active Treatment	2015	Watershed		$101,378		$101,378	$1,017,369	Active		Northern
Valley Highwall upgrade	2015	Watershed		$170,500		$170,500	$1,017,369	Active		Northern
Summerlee Phase II	2015	Watershed		$163,412	$12,303	$151,109	$1,005,066	Active		Southern
YMCA land restoration	2015	Watershed		$20,145		$20,145	$1,005,066	Active		Southern
Elk Run Phase II	2015	Watershed		$68,200		$68,200	$1,005,066	Active	WS	Potomac
Herods Run	2015	Watershed		$226,145	$8,479	$217,666	$996,587	Active	62.1%	Northern
Totals	**2015**		**$1,637,009**							
Total projects	**102**									

Appendix 2. BMPs installed in 2015

BMPs	Quantity	Units	Date	HUC8
Alternate water source	19.0	unit	Sep-15	Greenbrier
Alternate water source	2.0	unit	Sep-15	Greenbrier
Alternate water source	11.0	unit	Sep-15	Greenbrier
Alternate water source	1.0	unit	Mar-15	Greenbrier
Alternate water source	7.0	unit	Sep-15	Greenbrier
AMD - Limestone channel	38.0	ft	Sep-15	West Fork
AMD - Limestone channel	435.0	ft	Sep-15	Cheat
AMD - Limestone leachbed	10,126.0	sqft	Sep-15	Monongalia
AMD - Outlet	1.0	unit	Sep-15	West Fork
AMD - Settling pond	11,500.0	sqft	Sep-15	Monongalia
AMD - Wetland	130,680.0	sqft	Sep-15	West Fork
AMD - Wetland	6,000.0	sqft	Sep-15	Cheat
AMD treatment system	1.0	unit	Sep-15	Monongalia
AMD treatment system	5.0	unit	Sep-15	West Fork
AMD treatment system	1.0	unit	Sep-15	Cheat
Buffer	0.3	ac	Sep-15	Potomac
Buffer	37.4	ac	Sep-15	Greenbrier
Buffer	0.6	ac	Mar-15	Statewide
Buffer	1.4	ac	Mar-15	Potomac
Division fence	20,050.0	ft	Sep-15	Greenbrier
Division fence	4,845.0	ft	Sep-15	James
Division fence	47,003.0	ft	Sep-15	Greenbrier
Division fence	3,500.0	ft	Sep-15	Greenbrier
Exclusion fence	713.0	ft	Sep-15	Greenbrier
Exclusion fence	2,586.0	ft	Sep-15	Greenbrier
Exclusion fence	25,996.0	ft	Sep-15	James
Exclusion fence	5,337.0	ft	Sep-15	Greenbrier
Exclusion fence	3,030.0	ft	Sep-15	Greenbrier
Exclusion fence	6,893.0	ft	Mar-15	Greenbrier
Exclusion fence	408.0	ft	Sep-15	Greenbrier
Grazing systems	72.0	ac	Sep-15	Greenbrier
Grazing systems	451.0	ac	Sep-15	James
Grazing systems	722.0	ac	Sep-15	Greenbrier
Grazing systems	562.3	ac	Mar-15	Statewide
Grazing systems	379.0	ac	Sep-15	Greenbrier
Grazing systems	379.0	ac	Sep-15	Greenbrier
Grazing systems	562.0	ac	Mar-15	South Branch
Heavy use protection	15.0	unit	Sep-15	James
Heavy use protection	1.0	unit	Mar-15	Greenbrier
Heavy use protection	1.0	unit	Mar-15	Greenbrier
Heavy use protection	6.0	unit	Sep-15	Greenbrier
Livestock pipeline	1,724.0	ft	Sep-15	Greenbrier
Livestock pipeline	100.0	ft	Sep-15	Greenbrier
Livestock pumping plant	2.0	unit	Sep-15	Greenbrier
Nutrient management	508.4	ac	Mar-15	South Branch
Nutrient management	72.0	ac	Sep-15	Greenbrier
Nutrient management	451.0	ac	Sep-15	James
Nutrient management	958.0	ac	Sep-15	Greenbrier

BMPs	Quantity	Units	Date	HUC8
Nutrient management	81.2	ac	Mar-15	South Branch
Nutrient management	228.0	ac	Mar-15	Greenbrier
Nutrient management	429.0	ac	Sep-15	Greenbrier
Nutrient management	379.0	ac	Sep-15	Greenbrier
Nutrient management	468.0	ac	Mar-15	South Branch
Nutrient management	88.0	ac	Mar-15	South Branch
Nutrient management	541.0	ac	Mar-15	South Branch
Nutrient management	1,138.0	ac	Mar-15	South Branch
Nutrient management	648.0	ac	Mar-15	Cacapon
Nutrient management	15.0	ac	Sep-15	South Branch
Nutrient management	142.0	ac	Sep-15	South Branch
Nutrient management	7.0	ac	Sep-15	Cacapon
Raingarden	2.0	unit	Sep-15	Potomac
Porous pavers	0.6	ac	Sep-15	Potomac
Sediment/erosion control	9.3	ac	Mar-15	Lower Kanawha
Sediment/erosion control	2.2	ac	Sep-15	South Branch
Sediment/erosion control	16.0	ac	Sep-15	Gauley
Sediment/erosion control	7.0	ac	Sep-15	Lower Kanawha
Septic - alternate	1.0	unit	Sep-15	Potomac
Septic - new	32.0	unit	Sep-15	Potomac
Septic - new	3.0	unit	Sep-15	Potomac
Septic - new	2.0	unit	Sep-15	Greenbrier
Septic - repair	2.0	unit	Sep-15	Potomac
Septic - repair	10.0	unit	Sep-15	Greenbrier
Stream restoration	448.0	ft	Sep-15	Potomac
Stream restoration	957.0	ft	Sep-15	Greenbrier
Streambank protection	57.0	ft	Sep-15	Potomac
Streambank protection	365.0	ft	Sep-15	Greenbrier
Streambank protection	275.0	ft	Sep-15	Greenbrier
Streambank protection	51.0	ft	Sep-15	South Branch
Streambank protection	480.0	ft	Sep-15	South Branch
Streambank protection	100.0	ft	Sep-15	Lower Guyandotte
Tree planting	1.5	ac	Sep-15	Potomac
Tree planting	2.5	ac	Sep-15	Potomac

BMPs	quantity	unit
Alternate water sources	40	unit
AMD treatment systems	7	unit
AMD wetlands/ponds	158,307	sqft
Buffers	39.7	ac
Fencing	120,361	ft
Heavy use protection	23	unit
Grazing systems	3,127.3	ac
Nutrient management	6,153.6	ac
Sediment/erosion control	34.5	ac
Septics	50	unit
Streambank protection	1,328	ft

BMPs	quantity	unit
Stream restoration	1,405	ft
Streambank protection	1,328	ft
Tree planting	4	ac

Overall BMP implementation in 2015

Appendix 3. Pollutant load reductions in 2015

Project	GRTS#	Year	Pollutant	LRs	Units	Date	HUC8
Lambert Site 7	5	2011	Acidity	97,808	lbs/yr	Sep-15	West Fork
Slabcamp	6	2011	Acidity	97,017	lbs/yr	Sep-15	Monongalia
Elk Run	4	2011	Fecal coliform	1.25E+13	cfu	Sep-15	Potomac
Tuscarora Creek	7	2011	Fecal coliform	1.76E+13	cfu	Sep-15	Potomac
Tuscarora Creek	7	2011	Fecal coliform	1.88E+13	cfu	Sep-15	Potomac
Muddy Creek	9	2011	Fecal coliform	1.20E+12	cfu	Sep-15	Greenbrier
Muddy Creek	9	2011	Fecal coliform	1.75E+12	cfu	Sep-15	Greenbrier
Kitchen Creek III	6	2012	Fecal coliform	3.56E+12	cfu	Sep-15	Greenbrier
SF Potts Creek	7	2012	Fecal coliform	2.13E+12	cfu	Sep-15	James
Milligan Creek	9	2012	Fecal coliform	5.44E+12	cfu	Sep-15	Greenbrier
Milligan Creek	9	2012	Fecal coliform	2.18E+12	cfu	Sep-15	Greenbrier
Milligan Creek	9	2012	Fecal coliform	7.42E+12	cfu	Sep-15	Greenbrier
Milligan Creek	9	2012	Fecal coliform	2.44E+12	cfu	Sep-15	Greenbrier
Milligan Creek	9	2012	Fecal coliform	1.09E+12	cfu	Sep-15	Greenbrier
Knapp Creek	12	2012	Fecal coliform	2.92E+12	cfu	Sep-15	Greenbrier
Knapp Creek	12	2012	Fecal coliform	8.72E+11	cfu	Sep-15	Greenbrier
WVCA Base Programs	2	2014	Fecal coliform	6.32E+11	cfu	Mar-15	Statewide
Sleepy Creek II	2	2013	Fecal coliform	6.32E+11	cfu	Mar-15	Potomac
Knapp Creek - NWQI	3	2013	Fecal coliform	2.28E+12	cfu	Sep-15	Greenbrier
Knapp Creek - NWQI	3	2013	Fecal coliform	2.61E+11	cfu	Mar-15	Greenbrier
Second Creek Karst	6	2013	Fecal coliform	2.40E+12	cfu	Mar-15	Greenbrier
Second Creek Karst	6	2013	Fecal coliform	4.36E+11	cfu	Mar-15	Greenbrier
Second Creek Karst	6	2013	Fecal coliform	4.79E+12	cfu	Sep-15	Greenbrier
Milligan Creek II	5	2014	Fecal coliform	5.08E+12	cfu	Sep-15	Greenbrier
Slabcamp	6	2011	Metals (Al)	16,681	lbs/yr	Sep-15	Monongalia
Lambert Site 7	5	2011	Metals (Fe)	30,000	lbs/yr	Sep-15	West Fork
Slabcamp	6	2011	Metals (Fe)	2,336	lbs/yr	Sep-15	Monongalia
Elk Run	4	2011	Nitrogen	1.5	lbs/yr	Sep-15	Potomac
Sleepy Creek II	2	2013	Nitrogen	14.6	lbs/yr	Sep-15	Potomac
Muddy Creek	9	2011	Nitrogen	4,000	lbs/yr	Sep-15	Greenbrier
SF Potts Creek	7	2012	Nitrogen	25,056	lbs/yr	Sep-15	James
Milligan Creek	9	2012	Nitrogen	53,272	lbs/yr	Sep-15	Greenbrier
Second Creek Karst	6	2013	Nitrogen	36,500	lbs/yr	Sep-15	Greenbrier
Milligan Creek II	5	2014	Nitrogen	21,056	lbs/yr	Sep-15	Greenbrier
WVCA Base Programs	2	2014	Nitrogen	15,965.2	lbs/yr	Mar-15	Statewide
WVCA Base Programs	2	2014	Nitrogen	5,049.1	lbs/yr	Mar-15	Statewide
WVCA Base Programs	2	2014	Nitrogen	27,062.3	lbs/yr	Mar-15	Statewide
WVCA Base Programs	2	2015	Nitrogen	3,059.1	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	15,965.2	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	5,808	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	29,240	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	990	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	9,372	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	75,108	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Nitrogen	27,062	lbs/yr	Mar-15	Cacapon
WVCA Base Programs	2	2015	Nitrogen	462	lbs/yr	Sep-15	Cacapon
WVCA Base Programs	2	2015	Nitrogen	42,768	lbs/yr	Sep-15	Cacapon
Elk Run	4	2011	Phosphorus	0.6	lbs/yr	Sep-15	Potomac

Project	GRTS#	Year	Pollutant	LRs	Units	Date	HUC8
Sleepy Creek II	2	2013	Phosphorus	0.9	lbs/yr	Sep-15	Potomac
Muddy Creek	9	2011	Phosphorus	2,571	lbs/yr	Sep-15	Greenbrier
SF Potts Creek	7	2012	Phosphorus	16,107	lbs/yr	Sep-15	James
Milligan Creek	9	2012	Phosphorus	34,214	lbs/yr	Sep-15	Greenbrier
Second Creek Karst	6	2013	Phosphorus	23,464	lbs/yr	Sep-15	Greenbrier
Milligan Creek II	5	2014	Phosphorus	13,536	lbs/yr	Sep-15	Greenbrier
WVCA Base Programs	2	2014	Phosphorus	19,028.3	lbs/yr	Mar-15	Statewide
WVCA Base Programs	2	2014	Phosphorus	4,856.0	lbs/yr	Mar-15	Statewide
WVCA Base Programs	2	2014	Phosphorus	31,952.7	lbs/yr	Mar-15	Statewide
WVCA Base Programs	2	2015	Phosphorus	18,216.5	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	19,028.3	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	2,992	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	33,090.7	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	517.5	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	4,899	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	39,261	lbs/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Phosphorus	31,952.7	lbs/yr	Mar-15	Cacapon
WVCA Base Programs	2	2015	Phosphorus	238	lbs/yr	Sep-15	Cacapon
WVCA Base Programs	2	2015	Phosphorus	22,356	lbs/yr	Sep-15	Cacapon
Elk Run	4	2011	Sediment	1.6	tons/yr	Sep-15	Potomac
Tuscarora Creek	7	2011	Sediment	8.3	tons/yr	Sep-15	Potomac
Knapp Creek	12	2012	Sediment	4,468	tons/yr	Sep-15	Greenbrier
Knapp Creek	12	2012	Sediment	395	tons/yr	Sep-15	Greenbrier
WVCA Base Programs	2	2014	Sediment	70	tons/yr	Mar-15	Statewide
Knapp Creek - NWQI	3	2013	Sediment	1,688.3	tons/yr	Sep-15	Greenbrier
Knapp Creek - NWQI	3	2013	Sediment	76.6	tons/yr	Sep-15	Greenbrier
WVCA Base Programs	2	2015	Sediment	23	tons/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Sediment	250	tons/yr	Sep-15	South Branch
WVCA Base Programs	2	2015	Sediment	15	tons/yr	Sep-15	Gauley
WVCA Base Programs	2	2015	Sediment	70	tons/yr	Mar-15	Gauley
WVCA Base Programs	2	2015	Sediment	42.2	tons/yr	Sep-15	Lower Kanawha
WVCA Base Programs	2	2015	Sediment	10.5	tons/yr	Sep-15	Lower Kanawha
WVCA Base Programs	2	2015	Sediment	434.2	tons/yr	Sep-15	Lower Kanawha
WVCA Base Programs	2	2015	Sediment	35.2	tons/yr	Sep-15	Lower Kanawha
WVCA Base Programs	2	2015	Sediment	6.6	tons/yr	Sep-15	Lower Kanawha
WVCA Base Programs	2	2015	Sediment	9	tons/yr	Sep-15	Lower Kanawha
WVCA Base Programs	2	2015	Sediment	275	tons/yr	Mar-15	Lower Guyandotte

Pollutant	Reduction	Unit
Acidity	194,825	lbs/year
AMD metals	49,017	lbs/year
Nitrogen	397,811.3	lbs/year
Phosphorus	318,282.2	lbs/year
Sediment	7,878.2	tons/year
Fecal coliform	9.64E+13	cfu

Overall pollution reductions in 2015

Appendix 4. WV Conservation Agency statewide implementation

BMPs	Quantity	Unit	Nitrogen	Phosphorus	Sediment	HUC code	Latitude	Longitude	Watershed name
Nutrient management	15.0	ac	990.0	517.5		020700010602	39.157314	78.988517	Anderson Run
Nutrient management	7.0	ac	462.0	238.0		020700030202	39.082678	78.566353	Shawan Run - Little Cacapon River
Nutrient management	32.0	ac	2,112.0	1,104.0		020700030501	39.042650	78.713203	Cullers Run - Lost River
Nutrient management	214.0	ac	14,124.0	7,383.0		020700030501	39.023050	78.753469	Cullers Run - Lost River
Nutrient management	508.4	ac	27,062.3	31,952.7		020700030501	38.690953	79.175942	Cullers Run - Lost River
Nutrient management	402.0	ac	26,532.0	13,869.0		020700030501	39.144286	78.692928	Cullers Run - Lost River
Nutrient management	81.2	ac	5,049.1	4,865.0		020700010101	38.743097	79.411169	Laurel Fork - North Fork South Branch
Nutrient management	165.0	ac	10,890.0	5,692.5		020700010101	38.810169	79.369567	Laurel Fork - North Fork South Branch
Nutrient management	222.0	ac	14,652.0	7,659.0		020700010101	38.850067	79.425736	Laurel Fork - North Fork South Branch
Nutrient management	562.3	ac	15,965.2	19,028.3		020700010309	38.781678	79.281789	Briggs Run - South Branch Potomac
Nutrient management	88.0	ac	5,808.0	2,992.0		020700010402	38.954264	79.102503	Johnson Run - Mill Creek
Nutrient management	508.4	ac	27,062.3	31,952.7		020700010501	38.690953	79.175942	Brushy Fork - South Fork South Branch
Nutrient management	33.0	ac	2,178.0	1,138.0		020700010501	39.007161	79.027761	Brushy Fork - South Fork South Branch
Nutrient management	142.0	ac	9,372.0	4,899.0		020700020702	39.331381	78.878781	Middle Fork Patterson Creek
Nutrient management	1,138.0	ac	75,108.0	39,261.0		020700020706	38.889972	78.939158	Cabin Run
Sediment/Erosion control	1.0	ac			16.0	020700010309			Briggs Run - South Branch Potomac
Sediment/Erosion control	0.7	ac			3.7	020700010309			Briggs Run - South Branch Potomac
Sediment/Erosion control	0.5	ac			0.2	020700010309			Briggs Run - South Branch Potomac
Sediment/Erosion control	15.0	ac			15.0	050500050602	37.980138	80.757477	Otter Creek - Meadow River
Sediment/Erosion control	1.0	ac			70.0	050500050605	37.980408	80.757344	Mill Creek - Meadow River
Sediment/Erosion control	0.8	ac			42.2	050500080204	38.515375	81.779275	Heizer Creek
Sediment/Erosion control	0.3	ac			10.5	050500080304	38.555939	81.977067	Scary Creek - Kanawha River
Sediment/Erosion control	0.3	ac			23.5	050500080305	38.448336	81.944342	Poplar Fork
Sediment/Erosion control	0.8	ac			35.1	050500080305	38.461662	81.932572	Poplar Fork
Sediment/Erosion control	1.0	ac			375.6	050500080305	38.441025	81.951128	Poplar Fork
Sediment/Erosion control	0.3	ac			11.0	050500080306	38.443056	81.984047	Hurricane Creek
Sediment/Erosion control	0.9	ac			24.6	050500080306	38.447411	81.950347	Hurricane Creek
Sediment/Erosion control	0.9	ac			6.6	050500080308	38.581839	82.002003	Buffalo Creek - Kanawha River
Sediment/Erosion control	0.8	ac			3.8	050701020201	38.302030	81.965130	Headwaters Trace Fork
Sediment/Erosion control	0.9	ac			5.2	050701020201	38.311000	81.965400	Headwaters Trace Fork
Streambank protection	51.0	ft			3.0	020700010309	38.972670	79.117081	Briggs Run - South Branch Potomac
Streambank protection	450.0	ft			250.0	020700010501	38.179082	79.958431	Brushy Fork - South Fork South Branch
Streambank protection	100.0	ft			275.0	050701020303	38.268908	82.058070	Middle Fork Mud River
	Totals		237,367.0	172,551.7	1,171.0				18 different watersheds

Appendix 5. WIB staff activities

Potomac Basin Coordinator

The Potomac Basin Coordinator (PBC) works with partner agencies and groups to carry out strategies to reduce the amount of nitrogen, phosphorus and sediment that West Virginia streams contribute to the Chesapeake Bay. She continues to facilitate bi-monthly meetings of West Virginia's Chesapeake Bay Tributary Team and coordinate the submittal of annual nonpoint source Best Management Practice data to the Chesapeake Bay Program. In 2015, she helped the West Virginia Department of Agriculture to develop its own BMP database, helped to coordinate the writing of West Virginia's BMP Verification Program, and submitted an historical BMP dataset for the calibration of a revised Chesapeake Bay Watershed Model.

Reducing streambank erosion is a local priority in Potomac Basin 319 watersheds as well as a strategy for reducing sediment delivered to the Chesapeake Bay. The PBC completed the River Assessment and Monitoring course (Rosgen Level 3) and used that experience to train the Watershed Improvement Branch staff on the Bank Erosion Hazard Index. She supported the Back Creek 319 project by supervising an intern's streambank assessment of Tilhance Creek (*photo*) and introducing Back Creek stakeholders to the Berkeley County Planning Department through a special meeting about the Comprehensive Plan update.

She supported the Tuscarora Creek 319 project by helping to assess the streambanks of Dry Run, bank pinning a site on Tuscarora Creek for a possible future project, helping to identify a streambank stabilization site at Poor House Farm Park, conducing the stormwater relay station at an outreach event, and presenting Tuscarora Creek project opportunities to the Berkeley County Chamber of Commerce. For the Elks Run 319 project, the PBC coordinated a meeting with WV Rail Authority representative to plan a stormwater demonstration project.

The PBC connects landowners with buffer and tree planting projects, and encourages group leaders and local governments to apply for tree planting grants for public land. In 2015 she served as a project liaison for planting projects at Hampshire High School in Hampshire County, and Hammonds Mill subdivision in Berkeley County.

The PBC conducted outreach about nonpoint source pollution, including discussing Opequon watershed projects with Berkeley County Council, meeting with City of Romney's administrator regarding stormwater projects, teaching kindergarten and summer camp students about benthic macroinvertebrates, and displaying a map of impaired streams at the Tri-County Fair.

Western Basin Coordinator

Tomi Bergstrom our Western Basin Coordinator (WBC) has a good year full of project anticipation. The Coal River Group's (CRG) Project Proposal was submitted over the summer of 2015, awaiting the approval period, the watershed group was trained by Ms. Bergstrom and Nick Murray of WVDEP's Watershed Assessment Branch (WAB) on DEP's Standard Operating Procedures (SOP) and situated with data forms to begin fecal coliform monitoring as part of their 319 Project Proposal. The WBC will be assisting CRG with an outreach event focused on septic tanks and how fecal coliforms affect stream health.

The Morris Creek Watershed Association's (MCWA) 319 Project Proposal was approved for funding by EPA in the spring of 2015 for the first phase of retrofitting an AMD treatment system. Once MCWA has a paid position through DEP's Watershed Pilot Program (WPP), project implementation will begin with the assistance of the WBC.

Michael Huff, with the Public Information Office (PIO) of WVDEP and Ms. Bergstrom coordinated with fellow BWC's, Alana Hartman and Martin Christ to collect videos and interviews of watershed groups across the state. These videos were made into short films for each watershed group and played at the Annual Watershed

Celebration Day as well as debuted as a collaborative short film for the West Virginia River's Coalition Film Festival under the title, "Currents."

The Western WBC also presented and organized several outreach events including the DEP Earth Day Event, Marshall University Water Festival, Ritchie County Middle School Water Festival, Fayette County Water Festival, Homeschool Water Festival at North Bend State Park, Ohio Island Outreach Anniversary, Coal River Group Water Festival, Morris Creek Water Festival, and the Mill Creek Adventure Day. At the Mill Creek Adventure Day on August 15, 2015, Ms. Bergstrom presented on nonpoint source pollution and herpetology in West Virginia, with co-work and Save Our Streams (SOS) coordinator, Glenn Nelson to over 350 children and adults from the Ripley, WV community. Additionally, she conducted five rain barrel workshops and an outreach event during Charleston's FestivALL with the City of Charleston's Stormwater Department and discussed combined sewer overflows (CSO) and nonpoint source pollution.

Three 319 Additional Grant Opportunities (AGO) final reports were submitted and reviewed by the Western WBC including Friends of the Hughes River Watershed Association (FOH) stream monitoring from Marcellus shale gas exploration efforts, MCWA's AMD monitoring project and concrete dying with AMD floc, and Latta's Stormwater Control Project which included the installation of roof drains to rain gardens and a bioretention system.

Northern Basin Coordinator

My work is most easily organized according to the active watershed groups that I work with.

Buckhannon River Watershed Association

- Running Project Team meetings included notifying participants, writing agenda, running meeting, and writing minutes.
- Monitoring included two trips to monitor Smooth Rock Lick. I supplied flow and water-quality meters and transported sample bottles from the lab to the site and filled bottles back to the lab.
- Project management included calling on WVU-NMLRC to present conceptual designs and progress reports to Project Team, encouraging an extra review of project designs with the landowner, and participation in engineer procurement field trips.
- Assisted BRWA's vigilance over water downstream from permits by graphing discharge monitoring report data and inviting Division of Mining and Reclamation personnel to Project Team meetings.
- Visited Grassy Run in Tallmansville to identify possible future watershed projects with Jonathan Knight of the Office of Abandoned Mine Lands and Reclamation, explored Bull Run of French Creek to assess the water quality problems, and whether they are abandoned or forfeited mine problems.
- Explored the stream impacted by a second Swamp Run project.

Doddridge County Watershed Association

- Attended and provided car-pooling for Randy Huffman's tour of gas-well issues in Ritchie and Doddridge Counties.
- Attended monthly meetings and provided input as appropriate.

Friends of Blackwater/North Fork Project

- Assisted with water-quality monitoring and supplied flow and water-quality meters.
- Advised on monitoring for acidity and discussed the dissolved vs total metal issue.
- Compiled data for the watershed based plan, including a list of AMD sources in the watershed.
- Advised on completion of the watershed based plan.
- Participated in discussions with OAMLR and the United States Forest Service about how to improve water quality in the watershed.
- Supported and conducted research for a §319 proposal.

Friends of Cheat

- Assisted with project management for North Fork Greens Run Railroad Refused by attending pre-bid and pre-construction meetings and making site inspections.
- Toured AMD sites with Friends of Cheat personnel and Jonathan Knight of OAMLR.
- Monitored Muddy Creek with Ladd Williams of the Office of Special Reclamation.
- Participated in planning and discussion of OSR's Martin Creek doser project.
- Attended River of Promise meetings.

Friends of Deckers Creek

- Assisted with project management for Slabcamp Tributary AMD by attending pre-bid meeting and making site inspections.
- Met with Slabcamp Run landowner several times to address concerns.
- Attended Deckers Creek Restoration Team meetings.
- Reviewed financial history checklist and requested modifications of FODC's procurement policy.
- Participated in strategic planning meeting.

Guardians of the West Fork

- Assisted with project management for Lambert Site 7 by attending bid opening, site inspections, and final inspection.

- Worked with WVU-NMLRC to plan maintenance of the Oldaker project.
- Provided information to Environmental Enforcement and the Public Information Office in response to the issues Mr. Oldaker brought up with EQT.
- Reviewed possible future projects with WVU-NMLRC.
- Compiled list of West Fork River Water Trail access points for Water Trail Committee.
- Scoped out two sections of water trail on float trips.
- Convened a meeting with Office of Environmental Remediation to encourage the use of the Spelter site for water trail and rail trail access.

Save the Tygart Watershed Association

- Monitored Sandy Creek watershed with Ladd Williams of the Office of Special Reclamation.
- Convened meeting with OAMLR and DMR to discuss water quality problems on Fords Run.
- Compiled data to support discussions of water remediation plans for Raccoon Creek.
- Compiled coordinates for application to Army Corps of Engineers for limestone sand dumps.

UMRA

- Assisted with project management by attending pre-construction meeting for Van Voorhis boat access site.
- Submitted information about their keeping locks open for Facebook feature of the month.
- Pleasants County Area Chamber of Commerce
- Made recreation maps for Middle Island Creek and French Creek.
- West Run Watershed Association
- Occasional site visits to airport project.
- Reviewed water quality data with WVU Civil and Environmental Engineering

Training

- Automatic External Defibrillator/Cardio-Pulmonary Resuscitation training
- West Virginia Mine Drainage Task Force conference
- Allegheny Highlands Climate Change conference
- Rain barrel workshop training with Tomi
- Attended Forced Pooling info workshop
- Visited Flight 93 memorial/AMD treatment technology transfer
- Mid-Atlantic Chapter International Erosion Control Association conference
- Source Water Protection Plan training with West Virginia Rural Water Association
- Watershed Celebration Day

Program activities

- Data entry on GRTS.
- Help on grant conditions and reporting for Teresa
- CO2 experiment: Experimented with measurement of CO2 concentrations. Found a method that was not a home run.
- Northern Basin Mail Bag
- Participated in meetings between Army Corps of Engineers and OAMLR
- Serve as go-between for Hedin and Southwest Energy
- Outreach at WVRC movie (recruited new chair for WFRWT)
- EPA site visit tours and discussions
- Submitted WaterNet article on NB mine projects
- Recruited WaterNet article on Buckhannon River Boat Ramp

Southern Basin Coordinator

The position has been vacant but we expect to fill it in early 2016. As the need arises, the NPS Program Coordinator, Watershed Program Coordinator and the Western Basin Coordinator have made themselves available to assist local stakeholders and provide support for watershed groups.

Stormwater Specialist

The implementation of adequate stormwater management practices reduces the amount of pollutants entering our waters and decreases peak flows during rain events. The Stormwater Specialist (SWS) promotes Low Impact Development (LID) and the implementation of Best Management Practices (BMPs) to reduce runoff and treat stormwater that does enter our streams. The position is funded through the Chesapeake Bay Regulatory and Accountability Program (CBRAP) and focuses on developed areas within the Chesapeake Bay. However, these concepts can be and are applied to many locations across WV. Working with both regulated and unregulated programs and projects, the SWS provides technical and compliance assistance.

Planning and Implementation: The SWS assisted local governments, NGOs, Home Owner Associations (HOAs), Professional Engineers (PEs), and interested parties with the adoption of Low Impact Development (LID) concepts and the implementation of Best Management Practices (BMPs). Site specific guidance provided stormwater management options for numerous projects. The SWS represented WV in the Urban Stormwater Workgroup and the Enhanced Street and Storm Drain Cleaning Expert Panel to guide implementation and reporting efforts within the Chesapeake Bay watershed. The SWS inspected BMPs and administers the WV BMP and Land Use Change Tracking and Reporting database used to submit stormwater BMP data

to the Chesapeake Bay Program through the National Environmental Information Exchange Network (NEIEN).

Outreach and Education: The SWS presented at and attended numerous meetings and events to promote LID and BMPs. Presentations at local, regional, and national meetings delivered design and implementation methods and challenges. Site visits are frequently used as educational opportunities to inform people involved of not only of potential solutions to site specific stormwater issues, but also general concepts that can be applied elsewhere.

319 Program: The SWS worked with various agencies and organizations on the development and implementation of BMPs. Considering the primary service area, and that 319 money is very limited and competitive, the SWS tries to use CBRAP and Chesapeake Bay Implementation Grant (CBIG) money for activities within the Chesapeake Bay watershed. The goals overlap well and the benefits to our streams are actualized regardless of the source for funding.

Water Quality Swale at the Foxcroft Mall in Martinsburg, WV

Project WET

Project WET makes water education fun and helps educators meet their objectives in innovative ways. The activities are designed to complement existing curricula rather than displace or add additional concepts in the classroom. Project WET activities are interdisciplinary, hands-on, and engaging to make water education fun for students and teachers. Three basic workshop types include:

1. Teacher Training: For educators of grades K-12, both formal and non-formal, these workshops are six hour trainings designed to introduce teachers to Project WET and to familiarize them with both the book and the activities so that they can confidently take the program back to their students.
2. Facilitator Training: These workshops are designed to train water educators to conduct Project WET Teacher Trainings.
3. Specialized Workshops: These workshops focus on a particular area of interest such as wetlands, climate change, and the urban water cycle. Stormwater managers around the state, in particular, have been seeking out Project WET for help implementing their stormwater outreach and education permit requirements.

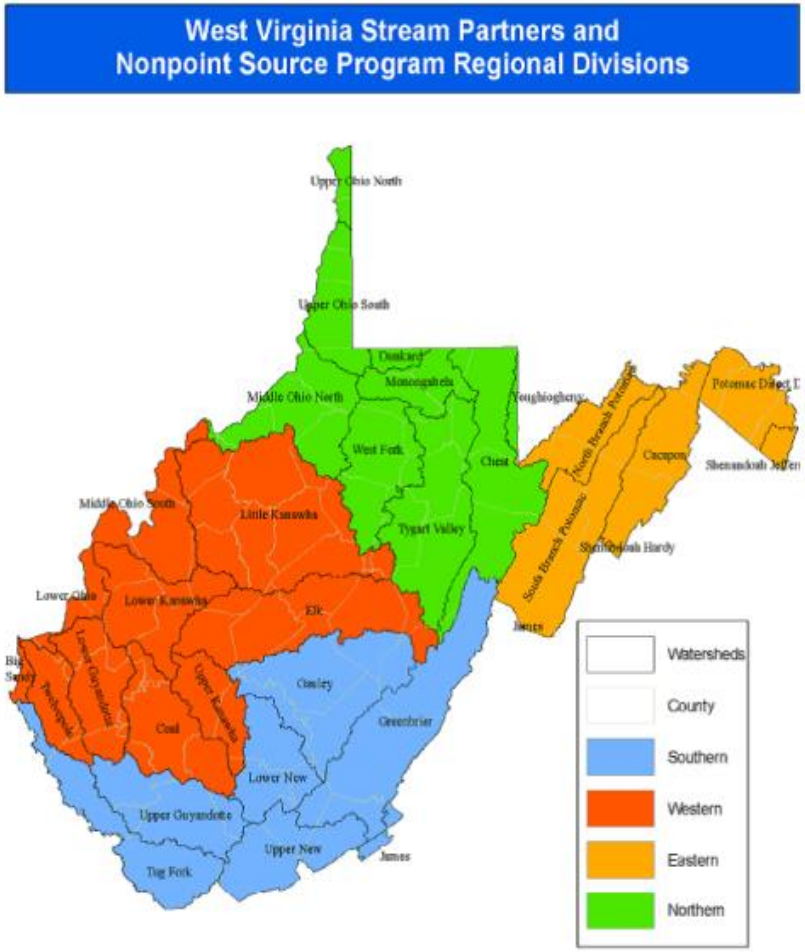


Figure 27. Basin Coordinator Regions

In 2015 Project WET held 21 workshops, 8 of which were conducted at universities across the state for preservice teachers. Workshops trained 378 educators. In addition the program coordinated, or assisted with, eleven water festivals, reaching more than 2,700 students. Project WET is a participant in the Leadership Team for the West Virginia Environmental Education Association, and also coordinated sixteen additional education and outreach events in 2015, servicing more than 1225 participants. West Virginia Project WET is closely tied to other WET programs throughout the United States and was elected to the Coordinator Council in 2015.

The Project WET program utilizes information from resources such as the EPA and NASA, and cultivates online relationships with both individuals and organizations throughout the state. Project WET's Facebook page is a fun and engaging way to connect water educators of West Virginia and beyond. Establishing and maintaining communication with past and future workshop participants is vital for to the effectiveness of the Project WET program.

WV Save Our Streams

The NPS program supports and supervises the activities of Glenn Nelson, WV Save Our Streams (SOS) Program Coordinator. SOS continues to maintain strong relationships with partners while forging and encouraging new partnerships and watershed groups. This year well over 3,500 people actively took part in SOS training. Numbers are significantly higher but hard to quantify due to water festivals where students rotate through stations and mass school presentations.

1. Monitoring workshops: Twenty five (25) workshops were conducted in 2015. A wide variety of groups/areas were serviced including but not limited to Sleepy Creek, Spring Creek, Roan-Jackson Technical Center, TMI's Appalachian Watershed Stream Monitors, WV River Coalition and Trout Unlimited (TU) Shale Monitoring Program, Kanawha State Forest, Montessori School, Twin Branch, Blue Mountain, Shannondale, Ohio Island Refuge, National Park Service, Friend of the Hughes, and the Pocahontas County water task force.
2. Water festivals, outdoor classrooms and outreach: Instructor for WV Division of Natural Resources (WVDNR) Master Naturalist Program, presented at multiple TU meetings, Seneca Discovery Day, Clay Center, Piney Creek, Dartmouth University at Morris Creek, Gesundheit Institute, Holly River State Park, and 10 water festivals.
3. Technical assistance: SOS assumed technical roles in a variety of ways. Most notable are the WV Envirothon and partnerships with The Mountain Institute and Trout Unlimited. SOS is also advisor for mussel surveys with WVDEPs dive team, New River Consortium, North Bend wetland delineation, Rainforest Alliance, Regional Appalachian Improvement League and WV Division of Highways (DOH) culvert removal.

While conducting business as usual certain topics take front line which tends to lead discussion. Therefore it is pertinent to keep abreast of the most up to date topics and events. While this year didn't see the events as observed during the past two years SOS remained quite busy with water quality issues. The most addressed issues this year stem from shale gas and pipeline explorations.

Strong partnerships are central to the mission of SOS. Most notable this year, SOS teamed with TU to teach a Trout Ecology course. The course was well received with numerous agencies present. The course resulted in WV DOH voluntarily replacing culverts within the study reach. WVDNR called upon SOS to be part of a mussel survey on the Kanawha. SOS remains project consultant for Morris Creek Liming Project to treat AMD. Furthermore SOS has taken advisory role with several basin coordinators, River of Promise, WV Environmental Education Association, and Hughes Creek.

West Virginia Department of Environmental Protection
Watershed Improvement Branch
Nonpoint Source Program

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http://www.dep.wv.gov/nonpoint