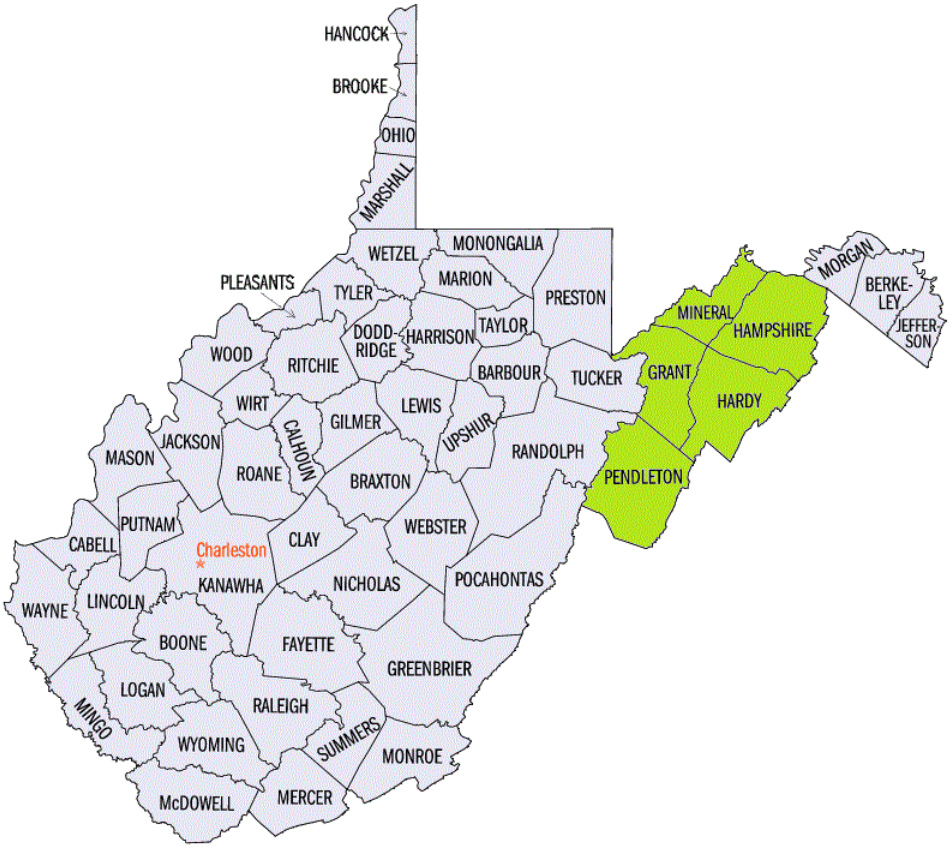


Long Range Plan for Natural Resource Management in the Potomac Valley Conservation District, WV

FOCUSED CONSERVATION APPROACH (FCA) FOR
USDA NATURAL RESOURCES CONSERVATION SERVICE

2016-2021

I. Introduction

Purpose

The purpose of this plan is to summarize the natural resources that exist in the five county Potomac Valley Conservation District in West Virginia. We hope to analyze top ranked resource concerns that could be addressed using the NRCS technical and financial assistance "toolbox" in consultation with private landowners and other partnering agencies and organizations that play a role in conservation efforts. Although this plan will be a dynamic document that can be updated as needed, it will serve to provide a framework for the local District Conservationists to tailor conservation efforts and secure financial resources to help private landowners implement practices so that a cumulative benefit can be quantified. Quantifying accomplishments at the local level will show stakeholders, the community and NRCS leadership that significant environmental outcomes can happen from the local level using voluntary conservation.

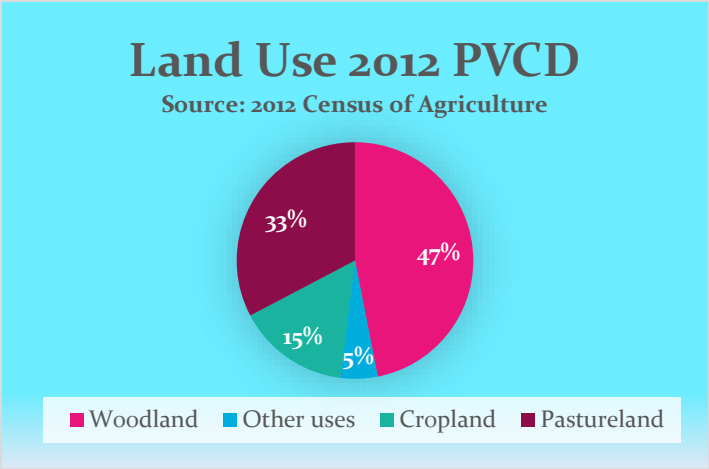
This plan will look at priorities for conservation work in the Potomac Valley Conservation District for the next 5 years. However, the plan should be reviewed annually and adjusted accordingly. Partner contributions and references are listed as **Appendix A** at the end of this document.

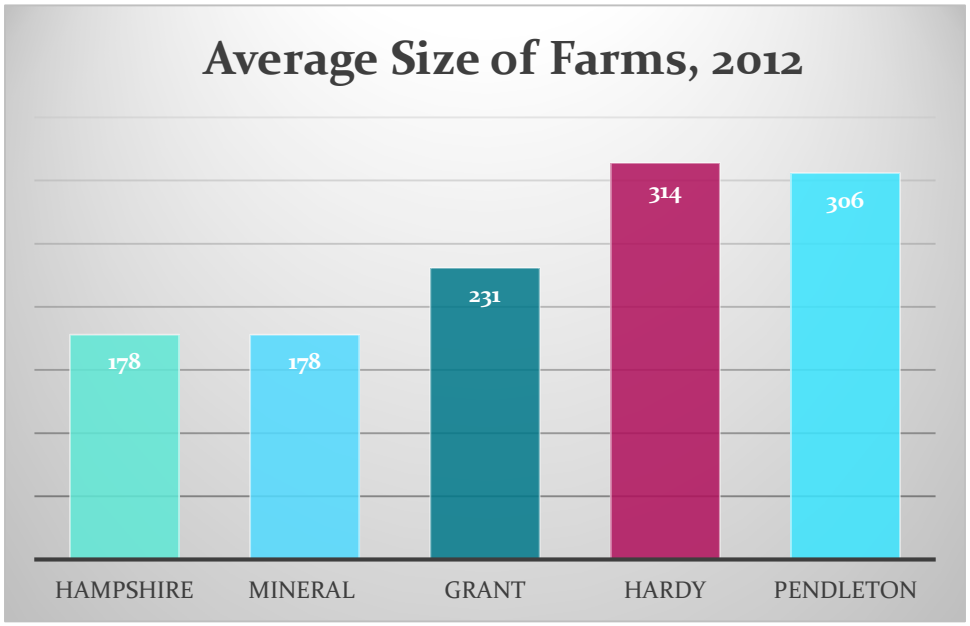
II. County Profiles and Natural Resource Inventory

The Potomac Valley Conservation District (PVCD) is located in the Eastern panhandle of West Virginia and includes the following counties: Grant, Hampshire, Hardy, Mineral and Pendleton County. The average annual rainfall for the PVCD is 43.2 inches. The average growing season for this area is 160 days.

The US Census of Agriculture identifies the PVCD to be of primary importance to West Virginia, based on the total value of agricultural products. Hardy (1), Pendleton (2) and Grant (4) generated nearly $360 million in 2012. This demonstrates that agricultural productivity is essential to the economic stability of the area.

Typical farming operations in this area include: poultry farms (broiler, layer and turkeys), cow – calf operations, corn and hay harvest, beef feeder operations, and sheep farms. The average farm size ranges from 178 acres in Hampshire and Mineral Counties up to slightly over 300 acres for Hardy and Pendleton Counties.





Hampshire County still has several viable orchards in operation, as well as several tree farms over the District. Most of the counties have small to large scale truck crop (vegetable) producers, with many turning toward organic production methods. In Hampshire County especially, those producers are able to capitalize on nearby Washington, D.C. clientele for farm products and agritourism.

The PVCD boasts a variety of recreational opportunities in addition to the strong agricultural base. National forests such as the Monongahela in Pendleton and Grant Counties and the George Washington and Jefferson in Pendleton and Hardy Counties offer scenic views and miles of hiking and vehicular trails. Care should be taken to protect natural resources for future use and also to recognize potential problems.

Appendix B shows generalized soil maps for the district as well as a narrative description of General Soils Information.

III. Evaluation of Resource Concerns

Soil

Soil Erosion – Streambank

Streambank erosion has been the Number #1 Ranked Resource Concern identified by the PVCD LWG since 2008. From the smallest tributaries to the main stems of our rivers, streambank erosion threatens farm fields and contributes thousands of tons of sediment to our waterways. WV NRCS has used practice code 580, Streambank and Shoreline Protection and 395, Stream Habitat Improvement and Management with Natural Stream Restoration techniques (NSR) in a successful partnership with Trout Unlimited on over 20,000 linear feet of streambank. The Chesapeake Bay

Program determined that load reductions were needed for nitrogen, phosphorus, and sediment in West Virginia.[1] Section 8D3.f of the Phase III Watershed Implementation Plan (WIP) specifically identifies NSR as a cost-efficient means to stop sedimentation to WV waterways (and ultimately the Chesapeake Bay). WV has a target of 19,618 linear feet of streambank to be repaired under Non-urban Stream Restoration. To date, approximately 10,000 linear feet have been installed using this partnership through Farm Bill Program dollars, with many more projects planned for construction.

Upstream view of New Creek showing significant bank erosion along the right bank in the middle reach.

Although streambank erosion is a district-wide issue, better results could be realized by using a targeted approach. Targeting an area will achieve a cumulative benefit for reducing sedimentation, eliminating potential sources contributing to water quality degradation, such as from Animal Feeding Operations (AFO's), and providing connectivity for riparian habitat and fisheries. Trout Unlimited provided much input in identification of intact fisheries and making recommendations for targeted areas. These streams and a brief description can be found in **Appendix C**.

Soil Health

Compaction is a concern from a soil health standpoint on woodland, pastures and crop fields on many district farms. Cattle still have access to many woodlots, creating compaction around tree roots and limiting regrowth. Pasture soils are often compacted around heavy use areas but also entire fields due to overstocking and improper grazing management. Crop fields experience compaction due to tillage methods and heavy equipment passage. There is still a need to promote complete no-till systems on cropland and multi-species cover crop usage. Many producers utilize rye or barley cover crops, but harvest for silage in the spring. Additional benefit could be realized by roller crimping or killing with herbicide and tilling under prior to spring planting.

Building organic matter in the soil holds multiple benefits, such as improving water holding capacity for resilience during times of drought and increasing productivity and quality since nutrients are more readily available. A district wide field day event should be pursued to educate producers and landowners about the importance of soil health.

Due to the high concentration of poultry in the district, many soils (especially in cropland) have high or excessive levels of soil Phosphorus. High levels of soil P can limit plant uptake of essential nutrients, particularly iron and zinc. P, usually bound in the soil, becomes mobile when in excess and can contribute to nutrient loadings to waterways. Many best management practices (BMP's) can be encouraged to help alleviate this problem in the Potomac Valley, including cover crops to pull excess nutrients, sound nutrient management planning and installation of conservation buffers. NRCS has assisted many poultry producers with the installation of waste storage structures such as the one shown below. When combined with proper nutrient management, these systems have greatly reduced over-application and nutrient loading in the streams.

Water

Water Quality

The District has significant water resources, including many High Quality Streams identified by WVDNR. Many waterways in the district are impacted by nutrients, although not necessarily from agricultural sources. Fish kills in the summers of 2002, 2005, and 2014 raised many concerns in the South Branch of the Potomac. WVDNR has identified microcystin, a toxin produced by cyanobacteria, in liver and diet tissues of Smallmouth Bass in the South Branch of the Potomac River. This compound bioaccumulated in Smallmouth Bass through the food chain. Several common cyanobacteria species proliferate during times of low flow. High volumes of cyanobacteria have been frequently attributed to high nutrient influxes. WVDNR continues to monitor the situation, but certainly implementation of riparian buffers could help filter any potential nutrients before reaching the South Branch in hopes of helping the situation. Riparian zones established with mature trees will also block sunlight from reaching some shallow zones of the South Branch, impeding photosynthesis and hampering the

proliferation of these species there. Proper nutrient management practices should also be encouraged, especially vulnerable watersheds such as the South Branch of the Potomac.

Several large farming operations utilize poultry litter for soil amendments. Phosphorus is typically bound to soil and not lost to the environment unless through erosion. However, if high levels of P build up in the soil, the nutrient can be lost via leaching or runoff similar to Nitrogen. For this reason, nutrient management planning and proper waste storage continue to be critical in PVCD to protect or enhance water quality.

Appendix D shows impaired streams within the PVCD. While not all, many streams are impaired due to biological and or bacterial sources; it is not determined whether those sources are agricultural in nature. However, benefits to water quality in the PVCD have been realized in the past using NRCS conservation practices. It is felt that more work remains to be done in the area of nutrient management, stabilized winter feeding areas for livestock, development of riparian buffers and off-stream watering sources.

NRCS Land Treatment Programs have been successful enough in identifying and addressing waste management issues that entire reaches of streams were delisted from the impaired streams listing, such as Lost River (Hardy County) and the North Fork of the South Branch (Pendleton County). Over $12 million dollars were spent in the PVCD between 2008 – 2012 through Chesapeake Bay Watershed Initiative (CBWI) on more than 300 contracts with private landowners, resulting in substantial reductions in nutrients and sediment entering our waterways. This represents an estimated $2.5 million of farmer's own money spent on improvements to their operations. Recent data suggests that the quality of the South Branch of the Potomac, one of the targeted watersheds through CBWI, has improved. Additional targeting of priority watersheds that feed into the Chesapeake Bay could identify "late adopters" of conservation while targeting specific watersheds to assist producers in addressing their own water quality related issues.

NRCS provides technical assistance to the Farm Service Agency (FSA) who administers the Conservation Reserve Enhancement Program (CREP), a USDA program that pays producers for taking marginal pastureland and cropland out of production in order to establish Riparian Forest Buffers and/or Filter Strips. Additionally, NRCS targets their own financial resources towards incentivizing riparian establishment, which addresses many resource concerns facing the district.

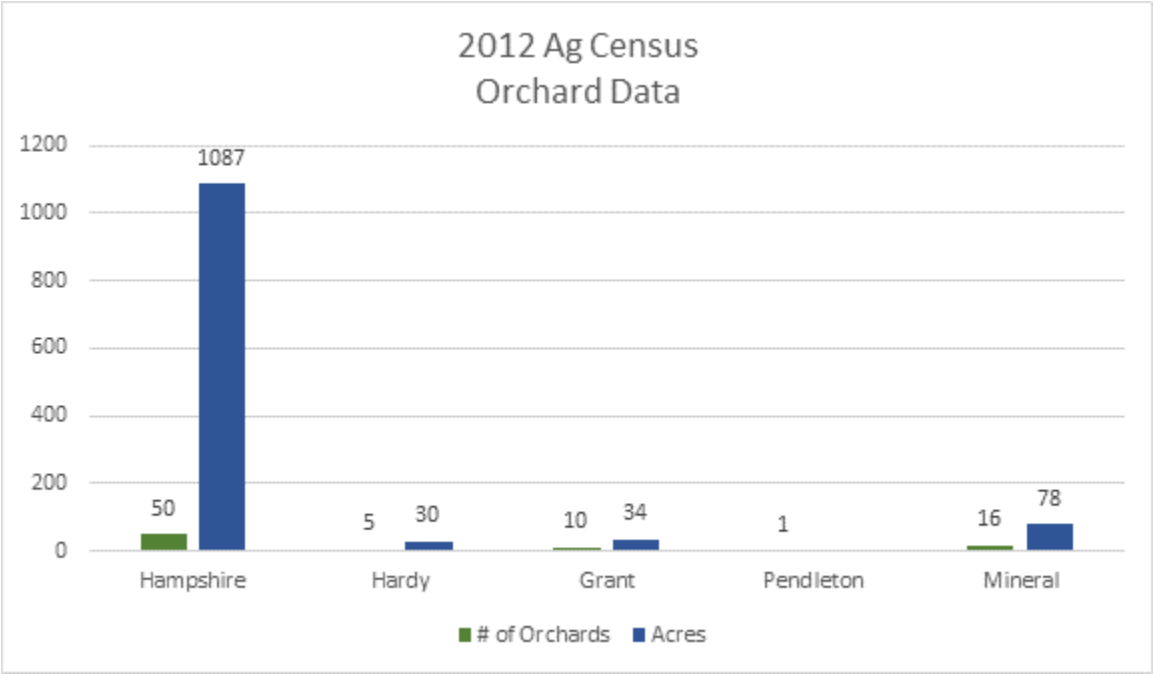
WVDEP assists with the reclamation of abandoned as well as active surface and subsurface mine lands. The communities around the Grant/Mineral County lines still have some active mining lands. Many reclaimed areas are utilized for summer pasture and are in need of typical grazing practices, such as watering systems, fencing, and fertilization. NRCS does not currently have the capabilities of addressing any impacts of acid mine drainage.

Karst areas throughout the district pose special considerations for the protection of groundwater while conducting conservation planning efforts (see Appendix B for additional information about karst areas.

Producers within the district are concerned about pending and current legislation affecting options for water usage of their properties. NRCS and cooperating agencies need to be aware and able to assist producers with complying with changing regulations. Future opportunities exist to evaluate the potential for a Regulatory Certainty Program (supported by National Association of Conservation Districts) for agricultural producers in PVCD.

Water Quality – Pesticides & Pathogens (Surface and/or Groundwater Contamination)

Hampshire County is still home to several Orchardists – 50 orchards totaling approximately 1,087 acres in production. Mineral County follows behind with 16 orchards (78 acres), while the other counties have a few still left in production. (2012 Ag Census). Potential for contamination exists without proper storage and management of agricultural chemicals, making NRCS technical and financial assistance in this area vital to protect water quality.



Given the concentration of poultry operations in the district, the LWG would be amiss to not address the potential for contamination from animal mortality, including catastrophic mortality. WVDA leads the effort for a catastrophic event, and would not typically recommend burial but rather composting in-house. However, even expected mortality can pose a threat to water quality if not properly stored and composted. NRCS has assisted many producers with constructing static bin composting systems and a handful of producers have tried in-vessel composting which may hold even better promise for pathogen containment. Proper composting also alleviates Air Quality concerns, especially odor which can illicit unwelcome attention from non-farm neighbors.

Water Quantity

Water quantity is a district-wide concern on several levels. The most requested practice across the counties is reliable water developments for livestock. Springs are not uncommon across the farmland but these gravity-fed systems are not always located where they are needed. Storage tanks and pumping plants help with distribution over the pastures, but often the volume of water is not sufficient for the number of livestock. Due to the occurrence of caves and caverns underground, and for some areas, the lack of clay content in the soil, ponds are also ineffective on some farms. Wells are expensive but often the best source for livestock water.

The expansion of truck crop production in the district presents a new resource concern challenge in that many operations have inefficient watering systems or completely inadequate quantities for their intended system. Additional water saving measures could be realized through practices such as Irrigation Water Management and Mulching, for example.

The area is blessed with the network of streams that we have and the high water quality that we strive to maintain. Excess water is also a problem, such as the devastating flood events that have caused extensive damages to property and individuals, the worst in recent history being the flood of 1985. In the state, 47 people were killed with Pendleton and Grant Counties having the most fatalities. On November 6th, the South Branch crested in Moorefield 10 feet above flood stage, four feet higher than the previous record set in June of 1949. Damages statewide exceeded $570 million.

The long-term partnership of NRCS, PVCD, and the West Virginia Conservation Agency (WVCA) have been active in flood control measures for over fifty years. During the 1985 flood, the South Fork of the South Branch in Pendleton and Grant Counties was protected from this major disaster by the twenty-three flood control dams in that valley. Some of the structures were filled to over-flowing and suffered damage but the people in that area were happy with the results. The partnership has installed a total of 76 structures in all five counties along Lost River, Lunice Creek, Patterson Creek, New Creek, North & South Mill Creek, along with the South Fork.

Animals

Domestic Livestock and Poultry

District wide concerns regarding water include not just water quality but the availability of water for livestock needs. Karst topography in much of the region limit the water supply and how it can be accessed. Natural springs can be developed in many areas; however, it is noted that many historically reliable springs are drying up in areas of the district. Ponds and drilling wells is a viable option. From the shale ridgetops in areas of Mineral County, to the mountainous hillside pastures in Pendleton, supplying adequate livestock water to help with grazing distribution will likely always be a top resource concern in the Potomac Valley Conservation District.

Wildlife

WVDOF identifies the need to bring back quail and other declining wildlife species. The LWG identified CREP buffers as an excellent opportunity to do this. WVDOF recognized need to assist landowners with establishing grape vine as part of food plots and also encouraging proper encouragement/management of Scrub Oak (dry) sites that produce acorns every year.

Deer overpopulation is a concern voiced by many landowners. Any Orchardist, home gardener, corn/soybean producer, or truck crop operator recognizes the problem associated with keeping deer out of their crop. Bear damage is also prevalent for tree plantings (for orchards, wildlife habitat projects, riparian plantings, etc) and crop fields. Consideration must be given to this issue for every conservation planning effort. Deer populations can also hamper other wildlife habitat improvement efforts. Deer exclusion fencing is a cost-shareable practice in other states to protect new plantings for wildlife. PVCD recently awarded a small amount of funding through their AgEnhancement Program to be used for deer exclusion fencing, but more resources are needed to combat this pervasive problem.

TU is working closely with NRCS to identify target areas for viable instream work to improve trout habitat (see section above on Streambanks). Many other species benefit from the installation of conservation practices. A good example is the development of riparian buffers installed in conjunction with streambank restoration projects. This habitat is critical for the management of many species of bats, particularly those on the Threatened and Endangered species list. With the decline of American honey bee populations, the establishment of plants that promote pollinator species is also being promoted through NRCS programs.

Plants

Noxious and Invasive Species

Several species of noxious or invasive plants can be found throughout the landscape. Autumn Olive is a shrub that despite its wildlife value for food, is invasive and outcompetes desirable forgages. Mutli-flora rose, Barberry, and Tree-of-Heaven are the most common woody species of concern. NRCS programs have been able to target this issue as have the efforts of the Potomac Cooperative Weed & Pest Management Area (CWPMA). Herbaceous species that are invasive in the area include stiltgrass and garlic mustard.

Plant Productivity

West Virginia relies on its pasture agricultural sector and PVCD is no exception. Many opportunities to assist producers with better grassland management present themselves to the staff. Beginning farmers are often self-educated on the benefits of intensive grazing and are requesting technical and financial assistance to implement these systems. Horse owners, new to NRCS program benefits, are numerous and in need of assistance to address pasture concerns specific to horses, who are area-grazers.

Many pastures in the Potomac Valley are deficient in lime which negatively affects productivity. Additionally, we are deficient in fertility in some pastures because they are rugged and difficult to get to and/or farmers focus on crop/hay fields for fertility management. Aerial application of soil amendments could be pursued for steeper areas. This is a district wide problem, but poor grazing management practices are exacerbated on areas of steep slopes (greater than 20%).

Many of the District's pastures are over-stocked and over-grazed. The economics of farming make reductions in livestock numbers difficult, so NRCS must be able to sell other options as well. Increased plant productivity is best achieved when a suite of BMP's are implemented: nutrient management, grazing management, soil health principles, etc.

The district is seeing some diversification of farming enterprises in the form of truck crop producers, including operations utilizing Seasonal High Tunnels to extend their growing season. WV has an active Farm-To-School Program through the West Virginia Department of Agriculture (WVDA). There are many opportunities for district farmers to diversify, expand their current operations, or develop new farming enterprises that capitalize on the farm-to-school movement or the proximity to more urban areas. The PVCD is partnering with WVU Master Gardener's Program and an elementary school for a school garden initiative. There are many active Farmer's Markets throughout the district. The LWG recognizes the unique needs and resource concerns of these producers, that include plant productivity but also inadequate irrigation water, soil health and a myriad of other interconnected issues.

Human Concerns

The average age of Principal Operators in WV is 57.2 as identified in the 2012 Census of Agriculture, leading to questions on whether WV agriculture will stay viable for the future. A concerted effort to encourage young people to choose agriculture as a way of life is important. Hampshire County especially sees an influx of people that come from non-traditional backgrounds and may not understand the flies, odors, etc. that accompany farm operations and may cause friction for current producers in the future. Recreational users in the Potomac Valley are welcome for their tourism dollar but can also bring concerns to the agricultural community. Veterans who decide to come home to farm are not currently given preferential treatment for funding dollars. "Food deserts" exist throughout WV where people do not have ready access to produce.

IV. Prioritization of Natural Resource Problems and Desired Outcomes

I. Streambank Stabilization Measures/Riparian Buffer/Habitat Improvement

The streams identified in this plan are considered a high priority for conservation applications and outreach should be focused there. Additional outreach efforts are needed to address landowner concerns (such as mature trees creating more erosion, flooding/fencing maintenance, etc.) Streambank stabilization, buffers and connected habitat corridors lend themselves well to a focused approach, as they are both measurable and proven to be most effective when geographically connected.

II. Soil Health

Additional education is needed for both producers and agency/district staff in many facets of soil health. Crop fields show evidence of compaction throughout the growing season, and cover crops can serve a dual purpose of scavenging excess nutrients and improving tilth of the soil. Many farms lack proper fencing to exclude cattle from woodlot and wet areas susceptible to compaction issues. Improper grazing management leads to a lack of soil structure and improvement of soil organic matter. Pasture fertility is often neglected and dollars spent on the more visible return associated with cropland. Encouraging soil health will assist us in addressing a myriad of other resource concern issues. NRCS has a soil health team to assist local field offices with their efforts.

III. Nutrient Management/Animal Waste Systems

Viable, more effective means to implement some sort of manure transfer program should be pursued, targeting poultry producers who apply to fields that have Very High P levels. Additional Waste Storage/Mortality Facilities are needed for new and expanding poultry operations. Confinement buildings for cattle that can capture 100% of manure and encourage application according to CNMP's should be priority. NRCS Field Staff have received training on new software technologies and are getting summer interns to help with this workload. Funding to producers to use TSP's for this can also be helpful. Consider alternatives to costly structures to encourage cow/calf operators to relocate winter feeding areas. Heavy Use Area Protection (HUAP) pads should be utilized to assist with manure collection. Priority should be given to target watersheds with an existing TMDL related to fecal coliform.

IV. Assistance to Beginning Farmers/Veterans

WV is home to over 20,000 veterans along with many young people who want to return home to West Virginia but might not have the job opportunities afforded from adjacent states. The PV LWG has a shared goal of working together to assist beginning farmers in the district by providing adequate technical assistance in the form of Conservation Plans and plans for specific resources, such as Forestry and Nutrient Management, to give beginning farmers the tools they

need to make successful operations that are also environmentally-responsible. Many veterans are returning home to family farms to take over the business or are coming home and finding that farming is an option for their re-entry into the workforce. The average age of the majority of farmers in WV is 60 years of age; we need new farmers willing to make conservation and agriculture a lifestyle choice. Farms can be the best way to produce clean water, open space, and good quality of life for all residents. Consideration on how to provide the technical and financial assistance to these groups in a tailored way could encourage more young people and/or veterans to continue with farming and keep WV agricultural sector viable for the future.

V. Assist Forage-Based Livestock Systems with Conservation Efforts

WV is best suited to a forage-based livestock system given the relative lack of adequate prime soils for cropping. Topography can be a challenge when instituting grazing management systems, as well as the lack of adequate livestock water. Additionally, many pastures are difficult to treat for invasives or with lime/fertilizer due to steepness of slope. Many counties in the Potomac Valley have low incomes, such as Hampshire County (part of the Strikeforce Initiative), making improvements financially-difficult to implement. Additional work with educating producers about the benefits of rotational grazing and assisting them with necessary infrastructure should be a focus of conservation efforts in the Potomac Valley Conservation District. Well managed pastures provide good plant productivity, reduce sheet and rill erosion, and improve water quality.

APPENDIX A

PARTICIPANTS FOR 2016

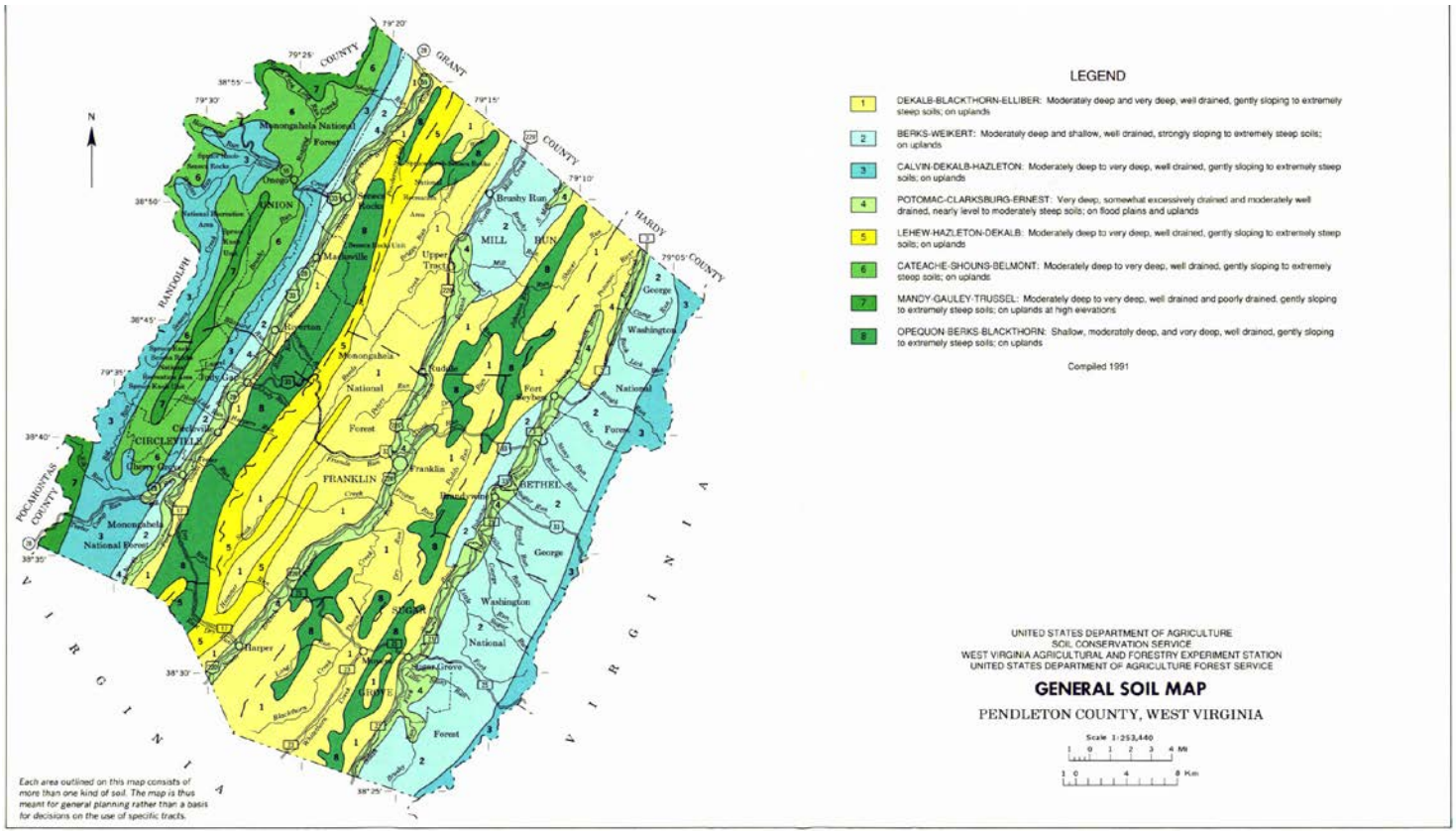
LOCAL WORK GROUP MEETING

February 10, 2016

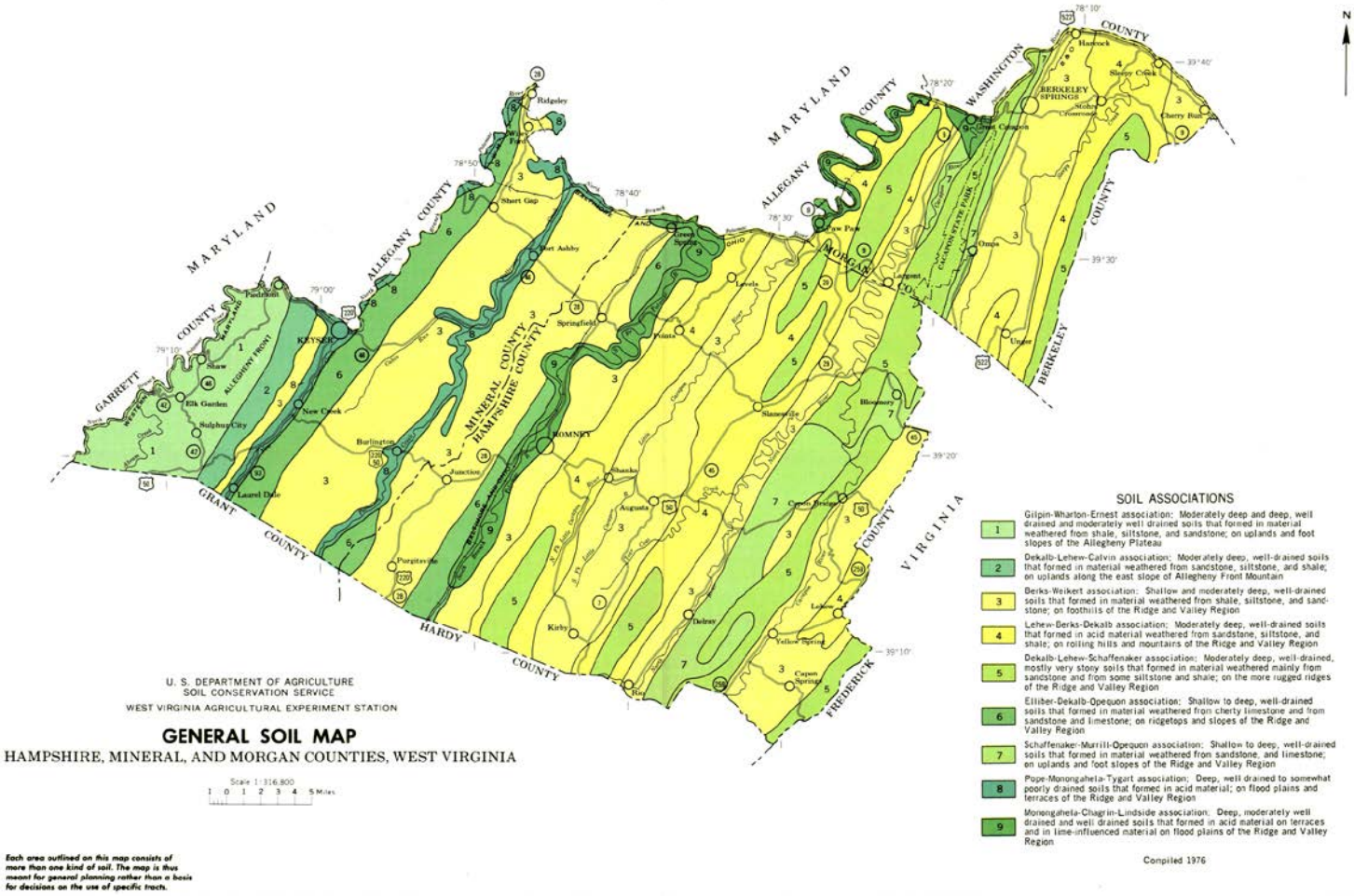
- POTOMAC VALLEY PRODUCERS:
    - Linda Carlson (Cattle_Grant County)
    - Dennis Funk (Poultry/Crop/Cattle_Hardy/Hampshire Counties)
    - John Hicks (Cattle _ Hampshire County)
    - George Leatherman (Cattle/Truck Crop/Poultry/Crop _ Hardy County)
    - Roy Milleson (Cattle Producer_Hampshire County)
    - Rick Woodworth (Cattle/Truck Crops/Direct Marketing _ Mineral County)
- NRCS DISTRICT CONSERVATIONISTS
- POTOMAC VALLEY CONSERVATION DISTRICT
- WVCA REPRESENTATIVES
- FSA CED'S AND COUNTY COMMITTEE MEMBERS
- WVDOF COUNTY FORESTERS
- WVDNR
- TROUT UNLIMITED
- WVDEP
- WVU EXTENSION AGENTS
- USDA USFS REPRESENTATIVES
- CWPMA
- USFWS

APPENDIX B -- General Soil Maps

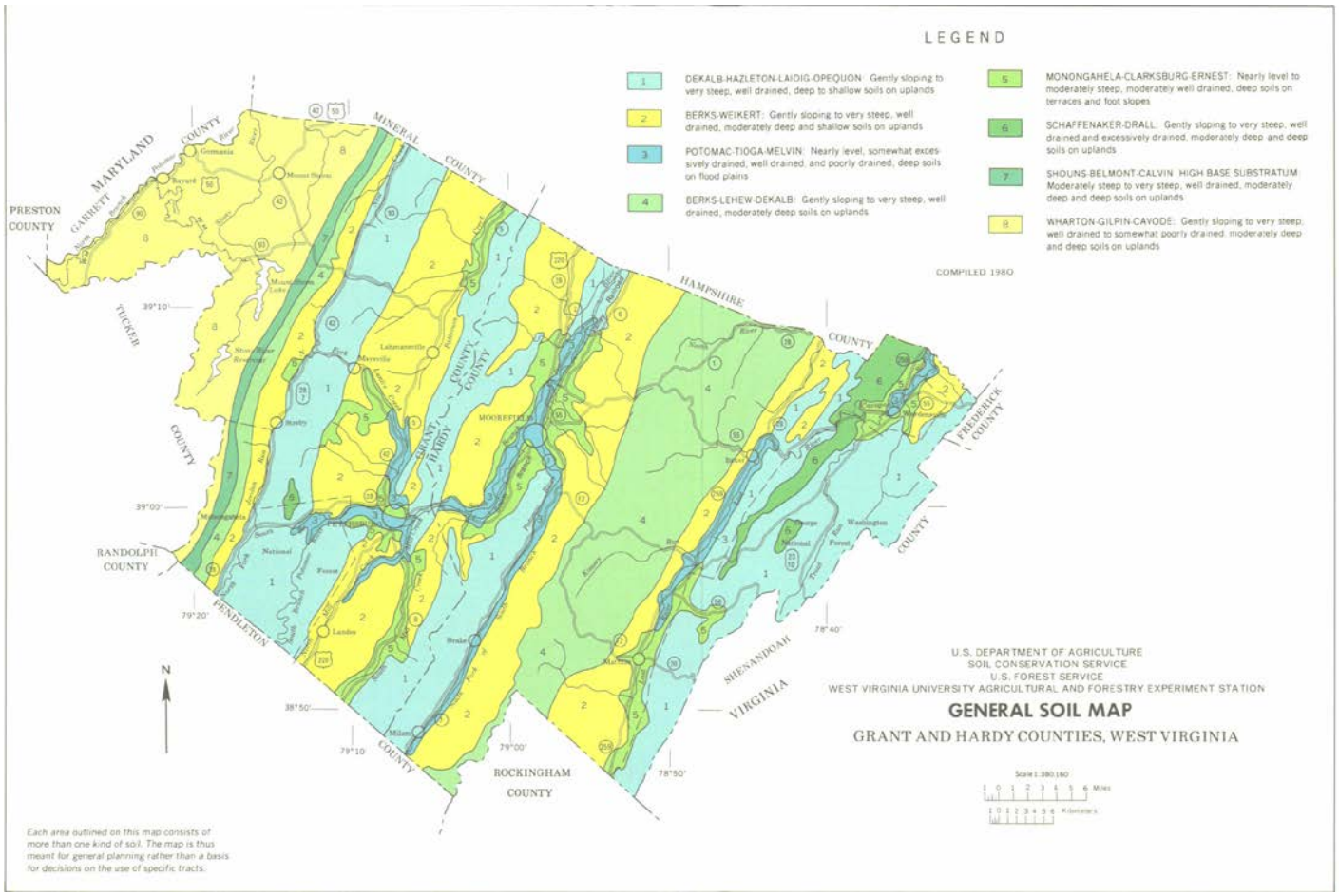
Pendleton County



Hampshire and Mineral Counties



Grant and Hardy Counties



GENERAL SOILS INFORMATION

The Potomac Valley Conservation District is located within two major land resource areas. Most of the land within the five counties is part of the Ridge and Valley Province (MLRA 147). The very western portions of Grant, Mineral, and Pendleton Counties are part of the Eastern Allegheny Plateau and Mountains Province (MLRA 127). While some soils may be mapped in both MLRAs, others may be restricted to one MLRA or the other.

The soils of the district's MLRA 147 area developed from highly folded shale, siltstone, sandstone, and some limestone. A few areas contain chert and a few outcrops of igneous rock. A system of generally parallel rivers drains this area as the rivers flow northeastward toward the Chesapeake Bay. Common soils in this area are the Berks, Weikert, Dekalb, Hazleton, Lehew, Schaffenaker, Opequon, and Elliber soils. Many times these upland soils were mapped as complexes due to landform complexity. Slopes range from 3 to 70 percent, and the steeper slopes are very susceptible to erosion. Berks, Dekalb, and Lehew soils are moderately deep, with low to moderate amounts of clay in subsoil, and rock fragments averaging greater than 35 percent in the soil profile. Hazleton soils are deep with low to moderate amounts of clay in subsoil, and rock fragments averaging greater than 35 percent in the soil profile. Schaffenaker soils are moderately deep with very low amounts of clay in subsoil, and rock fragments averaging greater than 35 percent in the soil profile. Weikert and Opequon soils are shallow, with low to moderate amounts of clay in subsoil, and rock fragments averaging greater than 35 percent in the soil profile. Elliber soils are very deep, with low to moderate amounts of clay in subsoil, and chert fragments averaging greater than 35 percent in the soil profile. While most of these soils are in woodland, Opequon soils have been cleared and used for pasture due to high fertility levels. However, Opequon soils are difficult to manage due to droughtiness and presence of shallow limestone bedrock and rock outcrop. Minor soils such as Clarksburg, Ernest, and Blackthorn, located in foot slope positions, are more suited to pasture and sometimes hayland due to deeper subsoils, though some areas may be limited due to a seasonal high water table or excessive surface stones.

The majority of cropland in MLRA 147 is located on bottomlands, terraces, and gently sloping foot slopes in the river valleys. Common soils in these valleys include the Pope, Potomac, Clarksburg, Ernest, Murrill, and Monongahela soils. Slopes generally range from 0-15%. The bottomlands are generally loamy in texture, with low to moderate amounts of clay in the subsoil, and are very deep to bedrock. Occasional flooding can occur in most of these areas. Potomac soils have many gravels and cobbles in the soil profile, making them somewhat excessively drained and susceptible to droughtiness. Other minor bottomland soils such as Chagrin, Tioga, Lobdell and Philo, are well or moderately well drained. Some bottomlands may have areas of somewhat poorly drained or poorly drained soils in areas away from the main stream channel. The nonflooding Clarksburg and Ernest soils on footslopes are very deep moderately well drained soils with medium textured subsoils. Monongahela soils on terraces are very deep moderately well drained soils with medium textured subsoils. All three soils are limited by a seasonal high water table due to a fragipan layer at around 24 inches deep. Murrill soils are very deep and well drained, are located on footslopes, and are underlain by materials developed from limestone. Footslope soils with stony surfaces are poorly suited or unsuited for cultivated crops.

The soils of the district's MLRA 127 area developed from relatively level to slightly tilted shale, siltstone, and sandstone. Common soils are the Dekalb, Calvin, Gilpin, Wharton, Hazleton and Ernest soils on ridges and mountains developed from acid sandstone, siltstone, and shale. The Cateache (or "Calvin high base"), Shouns, and Belmont soils are in areas developed from red high base shales and limestone. Minor soils include the Dekalb, Calvin, Buchanan, and Laidig soils. Though some areas of the plateau may be gently sloping, most of the MLRA 127 topography is quite rugged, with narrow ridges and steep and very steep side slopes. Sandstone rock outcrops and surface stones and boulders are common. Much of this MLRA is primarily used for timber production. However, areas developed from red shales remain cleared, and are still used for pasture. The Gilpin, Dekalb, Hazleton, Cateache and Calvin soils are moderately deep, well drained, and contain low to medium amounts of clay in the subsoil. Dekalb, Hazleton and Calvin soils have appreciable amounts of rock fragments in the soil profile, which may result in droughtiness during the summer months. The Wharton soils are deep, moderately well drained soils with medium textured subsoils. Ernest, Laidig, and Buchanan soils are very deep, moderately well drained or well drained, with moderate to amounts of clay in the subsoil. Many of these soils are limited in use due to a seasonal high water table and/or excessive surface stones. Shouns soils are very deep well drained soils on footslopes with medium textured subsoils. Belmont soils are deep well drained soils, moderate to moderately high amounts of clay in the subsoil. They are highly fertile, but may be restrictive due to areas of limestone outcrop. Some areas may have sink holes, which will present water quality concerns.

Very little cropland is present in this part of the district. Lesser sloping ridges and footslopes may be suitable to hayland, but many areas are restricted by excessive surface stones and boulders. While some areas are well drained, some moderately well drained foot slopes may be restricted by a seasonal high water table.

Areas above 3,500 feet are located on the highest ridges and peaks, and represent a very small portion of the district. The Allegheny Front is the eastern boundary of this area. The Mandy, Simoda, and Trussel soils are restricted to this area, and are almost exclusively in woodland. Some areas of Cateache and Belmont soils may also be present, with a few areas cleared for pasture, but this area is limited for agricultural uses due to a short growing season and excessive surface stones and boulders.

Strip mine soils are present in this area of Mineral County, and some have been reclaimed and are used for pasture. These soils, currently unnamed, consist of a mixture of soil, rock, and coal fragments generally low in bases. Reclamation to pasture use requires high amounts of lime to reduce acidity levels. These soils in both reclaimed and unreclaimed states are restricted by high acidity levels, droughtiness, and low organic matter content. Unreclaimed areas are best used for tree production.

APPENDIX C – TARGETED WATERSHEDS

As West Virginia's state fish, brook trout are an iconic, heritage species for our people, and serve as a valuable sentinel for conservation efforts throughout the state. Wild brook trout thrive in cold clean water, and they serve as an indicator of fishable, swimmable water, representing the best of the best for water quality. In the Potomac Headwaters, brook trout populations are primarily found within high elevation freestone streams, or spring streams which emanate from the ground and are naturally buffered by limestone geology. Spring streams have stable year round temperatures, water flow, and exceptional water quality. Recent science shows that they will likely be more resilient to climate change as ambient temperatures increase (Hudy and Trumbo et al. 2008). Brook trout only inhabit a portion of their historic range as populations have been fragmented because of poor land management practices associated with timber harvest, agriculture, post flood recovery activities, and development. Recent science identifies brook trout populations at the catchment scale. At this catchment scale, each contiguously connected interbreeding population is known as a patch (Eastern Brook Trout Joint Venture 2012). See Brook Trout Patch Map for Potomac Headwaters. In 2010, the Eastern Brook Trout Joint Venture surveyed brook trout populations throughout the east in an effort to assess the status of the imperiled fish, deeming fisheries as Intact, Reduced, or Extirpated. TU uses EBTJV coupled with recent on-the ground sampling data to drive our restoration efforts. Riparian and in-stream restoration efforts are focused on re-connecting isolated patches to restore their historic range, working from the top of the watersheds downstream, in an effort to export the cleanest water possible to the Chesapeake Bay. These efforts include in stream habitat restoration, stream bank stabilization, aquatic organism passage mitigation, and riparian restoration.

In Pendleton and Grant Counties, the North Fork of the South Branch boasts three of four intact brook trout fisheries in West Virginia, which have some of the best water quality and highest abundances of wild trout in the state. These patches are also some of the largest in the state as well. The "Intact Fisheries" are primarily located on public land within the Monongahela National Forest (Mon). As these streams enter private land, they suffer from a suite of stressors resulting from degraded in-stream and riparian habitat. Restoration efforts in this watershed, which serve as a microcosm for the rest of the panhandle, work to re-connect the healthy watersheds, like Big Run or the Laurel Fork, through riparian and in-stream restoration on the tributaries and main stem of the North Fork. In this watershed, TU and the NRCS have been working with the USFS to address resource concerns at the watershed scale, coupling private and public restoration efforts. The USFS is currently undergoing the National Environmental Policy Act Process in an effort to realize on the ground restoration efforts in the Potomac, however, much of the preliminary habitat assessment has been completed and restoration priorities and focal areas have been established within the Mon. The focal watersheds of the Mon will be Laurel Fork, Big Run and Seneca Creek Watersheds. Specific focal areas within this watershed are:

- Main stem North Fork and its tributaries from Seneca Creek upstream
- Seneca Creek
- Big Run
- Laurel Fork

Spanning Pendleton, Hardy, and Hampshire Counties, the South Branch of the Potomac also boasts some of the largest patches of brook trout in the state, one being Thorn Creek, where partners have worked for over ten years restoring riparian and in-stream habitat. The brook trout resources of

this watershed are much greater in number upstream of its confluence with the North Fork, or above the destination fishery of Smoke Hole. Many of the South Branch tributaries are fragmented from one another as well, and the number of brook trout streams decline as you travel further east. This watershed is primarily privately owned. The strength between the correlation between limestone geology and brook trout presence strengthens as you enter this watershed. Specific focal areas within this watershed are:

- Main-stem South Branch of the Potomac from its confluence with the North Fork upstream and all tributaries within that segment,
- Thorn Creek

As you travel further east into Hardy and Hampshire Counties, you reach the Cacapon Basin, comprised of the Lost, North, and Cacapon Rivers. These streams represent the easternmost stronghold for brook trout in the state. Here the correlation between brook trout water and limestone geology is significant. Spring fed streams provide the water temperature and quality necessary to sustain robust populations of fish in size and number. Growth rates for brook trout tend to be higher here (West Virginia Division of Natural Resources 2015), as winter weather is less severe than that of the higher elevation areas like the North Fork drainage. Specific Focal Areas within this watershed are:

- Edwards Run
- Dillons Run
- Cold Stream Run
- Hiett Run
- Himmelwright Run
- Trout Run
- Lost and North River Headwaters

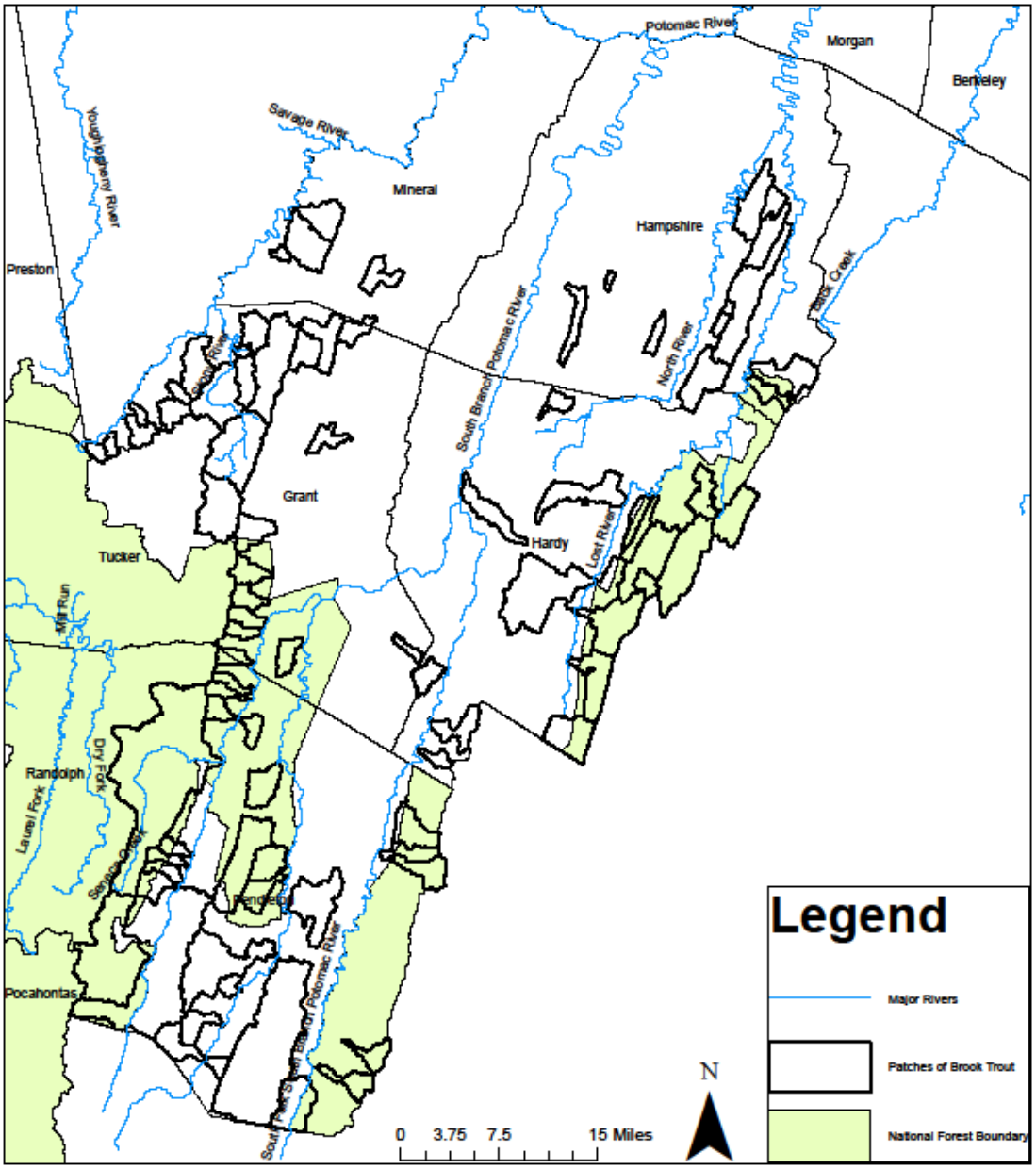
In Grant and Mineral Counties, there are several tributaries where TU has been encouraged by the West Virginia Division of Natural Resources to pursue in-stream and riparian restoration work. This results from recent brook trout abundance surveys, which have identified several large patches in the area. Specific focal areas include:

- New Creek
- Headwaters of Patterson Creek

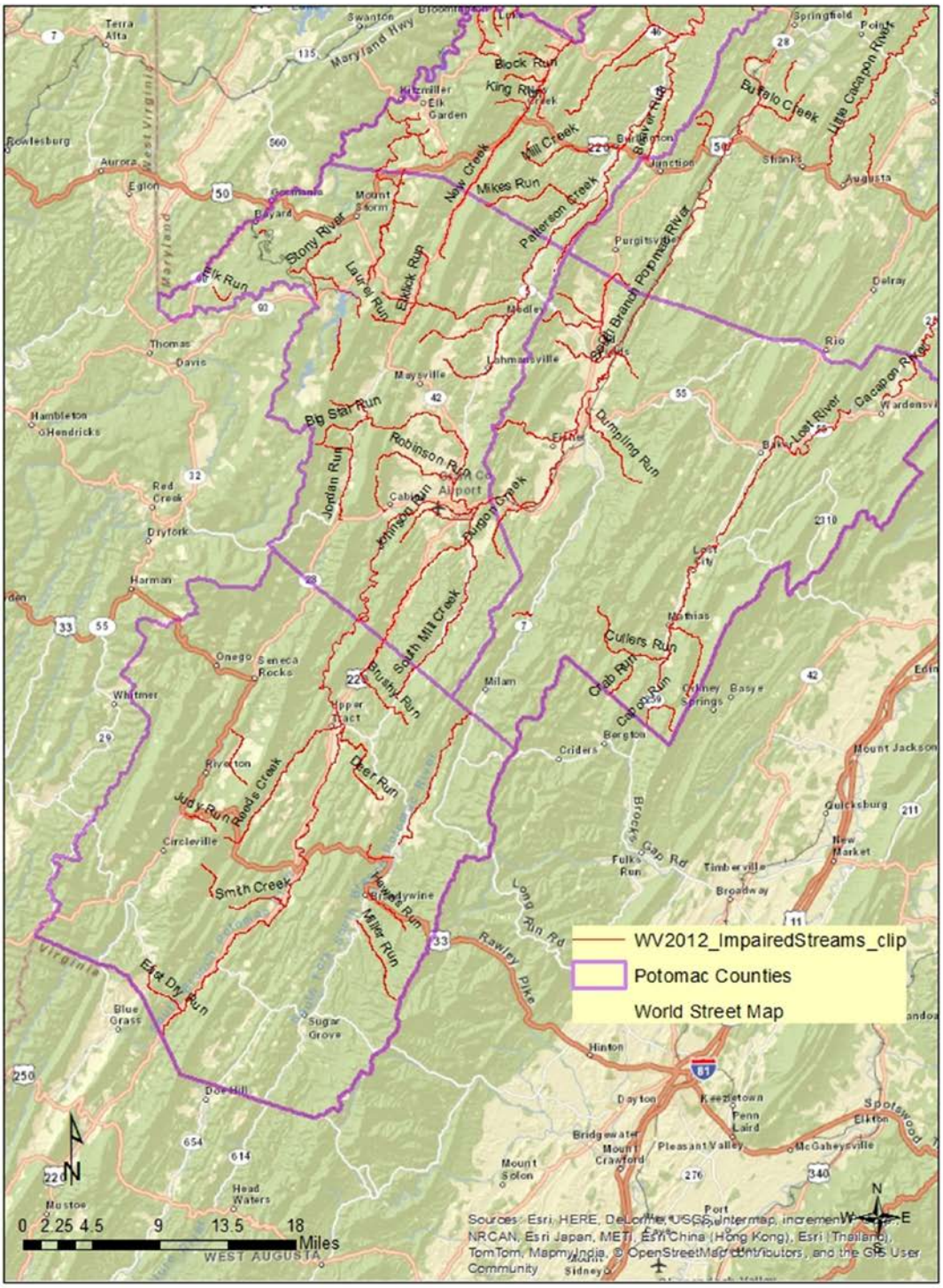
These restoration efforts align with the following Brook Trout management strategies of the Chesapeake Bay Program:

- Protect highly functional Wild Brook Trout Only patches from detrimental changes in land use and water use practices.
- Connect habitats that have a high likelihood of sustaining stable wild Brook Trout populations
- Improve access to Brook Trout spawning and seasonally important habitats (e.g., coldwater refugia, wintering areas).
- Improve Brook Trout habitats that have been impacted by poor land and water use practices.
- Mitigate factors that degrade water quality.
- Enhance or restore natural hydrologic regimes.

- Re-introduce wild Brook Trout into catchments within Wild Brook Trout Only patches, where the species has been extirpated or an increase in genetic fitness of the population is needed.



Focused Conservation Approach: Patch metrics for brook trout in the Potomac Headwaters

Map created by Dustin Wichterman, Trout Unlimited

APPENDIX D – IMPAIRED WATERS