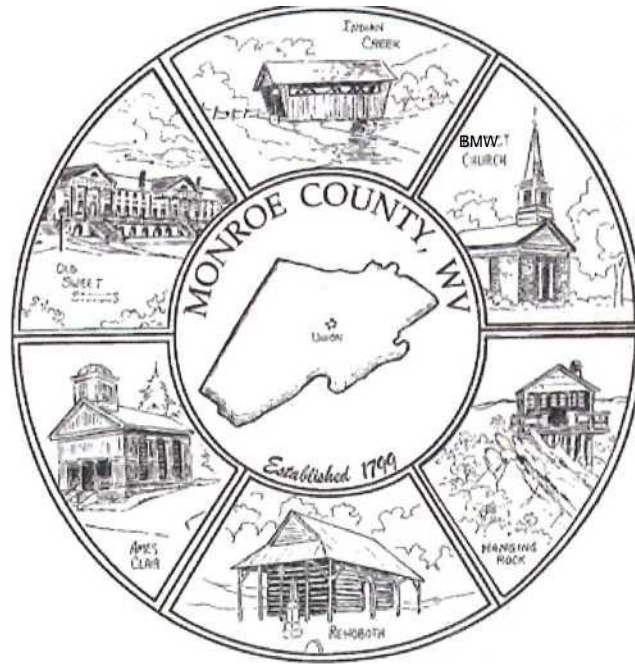




Monroe County, West Virginia Comprehensive Plan



July 27, 2009

Monroe County Comprehensive Plan
July 27, 2009

Monroe County Planning Commission H. Craig Mohler, President Rod Graves, Vice-President Judy Ellison

Lynn Newberry

Larry Mustain

John Terry

Garry Taylor

Margaret Vass

The Monroe County Planning Commission acknowledges the assistance provided by many individuals and organizations in the development of this Comprehensive Plan. Those include:

- ❖ ♦♦ Dale McCutcheon, Monroe County Health Department
- ❖ ♦♦ Jim Menard
- ❖ The Monroe County Commission
- ❖ The West Virginia Bureau of Public Health Source Water Protection Program
- ❖ Indian Creek Watershed Association
- ❖ Friends of Second Creek
- ❖ Region I Planning and Development
- ❖ The Towns of Union, Alderson and Peterstown
- ❖ Red Sulphur Public Service District
- ❖ The West Virginia University College of Law
- ❖ Virginia Polytechnic University's Department of Planning
- ❖ Monroe Tourism

The Planning Commission also acknowledges the tremendous contribution of Glenn Riffe, whose participation and leadership helped guide the development of this Plan. It is our hope that Glenn's tireless dedication to the residents of Monroe County is reflected in the following pages.

The Comprehensive Plan was drafted with assistance from Dave Clark, AICP.

Monroe County Comprehensive Plan

Table of Contents

Introduction & Guiding Principles	4
Demographics and Projections.....	9
Karst and Planning in Monroe County	14
Land use and Rural.....	17
Environmental, Conservation, and Natural Resource.....	29
Housing	53
Transportation.....	62
Infrastructure	80
Public services.....	91
Recreation and Tourism.....	107
Economic development.....	118
Preferred development areas and Redevelopment.....	129
Financing.....	138
Historic Preservation.....	143

Appendices

Appendix A.....	Public Comments & Commission Response
Appendix B.....	Donovan karst study
Appendix C.....	Indian Creek Well Study
Appendix D	Second Ck watershed-based plan
Appendix E.....	Monroe Tourism plan
Appendix F.....	TMDL summaries for the James & Greenbrier Rivers
Appendix G.....	Monroe FRN County Plan

From the 2006 Monroe County Commission Ordinance

Creating the County Planning Commission

The members of the County Commission find that there is an innate value in Monroe County, comprised and defined in part by natural environment, abundant water resources, agricultural influence, locally owned businesses, neighborly small town communities, and a wealth of historic character. We contend that these characteristics will only become more valuable in the future, and assert that it is in the cultural, aesthetic, and economic interest of both current residents and future generations to recognize assets, create goals, and establish a proactive role in the future development of the jurisdiction.

It is acknowledged that Monroe was one of very few West Virginia counties which showed a population increase between the 1990 and 2000 censuses. The growing number of high-end housing developments in recent years is also proof that the very attributes which some simply take for granted are attracting residents from outside areas, while at the same time people are vacating many other counties in the state. The influx is also proof that Monroe has been discovered - and that residents can no longer assume to be too much off the beaten path to consider the possibility of major change in the future. The goal should be to make the most of the changes, the investment, the new opportunities- while at the same time neither discarding nor subjugating the very qualities which make Monroe County unique and valuable in its present condition.

Monroe County, West Virginia

Between 1900 and 1990, Monroe County's population chart is essentially a straight line. Unlike most of its neighbors in the coalfields to the west, or across the state line in the Piedmont communities of Virginia, Monroe County had experienced little of the boom-and-bust economy indicative of the region. Consequently, the number of county residents has remained steady, consistently hovering around 13,000.

The county's mainstay, both culturally and economically, has always been agriculture and forestry, and most county residents still feel vested in the larger agrarian

community. But perhaps even more than the farms that make up much of the local landscape, residents take much pride in the prolific springs that stretch across the county.

At the early part of the 20th century, there were no less than thirteen resorts that had



been developed around some of the more famous springs - Red Sulphur Springs, Salt Sulphur Springs, Sweet Springs, and others. Peters Mountain, running along the southeastern border of the county, contains thousands of these springs, and is the source for most of the county's drinking water.

But beginning in the late 1990's, Monroe County "was discovered," as some residents have put it. As development pressure began to spill over from the 1-81 corridor in Virginia, the number of retirement, second, and commuter homes began to increase. Between 1990 and 2005, Monroe County saw a 23% increase in the number of housing units.

While most residents agreed that some level of growth in the county was acceptable and even desirable, the majority also agree that development cannot come at the cost of the integrity of their water or their quality of life. Local organizations solicited input from state and regional agencies, and eventually came to the conclusion that any intervention would have to be made at the local level. In response, the County Commission held a series of public meetings, leading to the creation of the Monroe County Planning Commission in 2006.

The Monroe County Planning Commission envisions a
Monroe County with:

- ❖ ♦♦ Abundant, clean water;
- ❖ A steady and stable population;
- ❖ An improved transportation system that is proportional to the demand;
- ❖ A strong agricultural influence on the landscape and culture;
- ❖ Basic standards for housing, health care, and safety for the resident population;
- ❖ Locally-owned businesses that serve as the economic base;
- ❖ Preserved historic sites that enhance local economic opportunities;
- ❖ Public recreation opportunities that draw on the surrounding natural environment.

The mission of the Planning Commission is to provide for the common good of present and future county residents.

The Commission will work towards this mission by:

1. Taking stock of Monroe's current assets,
2. Actively engaging county citizens,
3. Providing leadership in efforts to conscientiously manage local resources,
4. Providing the history and background needed to establish a County Comprehensive Plan and related ordinances,
5. Drafting a Comprehensive Plan,
6. Providing for the best use of Monroe's assets for future generations.

Guiding Principles and Assumptions in Planning Monroe County's Future

Planning Commission Goals:

A Foundation for Community Design in Monroe County from the Monroe County Planning Commission

Monroe County is a sparsely settled community that has remained under the influence of an agricultural economy. We have no four lane roads, no traffic lights, and no franchise "box stores." We have three incorporated communities in the county: Alderson, Peterstown, and Union. Alderson is a split town residing partly in Monroe County and partly in Greenbrier, divided by the Greenbrier River. The



Monroe portion is an old established town, contains several historic homes and buildings, and has minimum sprawl. The town of Peterstown borders the Virginia line in the Southwest corner of the county, it serves as a residential community for many persons who work out of county or out of state, and it has maintained many of its small town businesses but is experiencing significant growth and sprawl. Union is the county seat, has significant historic homes and buildings, has maintained its small town businesses within the town therefore maintaining its town boundaries, and is experiencing limited growth. There are several smaller non-incorporated communities scattered throughout the county, and each has its share of unique architecture, history, and culture.

A main focus of this plan is to incorporate the community values into a progressive strategy that protects as well as advances the best interests of the residents of each community. We expect growth, and want to plan for it in such a way that the communities are bettered rather than overwhelmed. We want to balance growth and protection in accordance with the desires of the communities. We want to remain within the constraints of our values as well as within the limits of our infrastructures and resources. We plan to emphasize the rural quality of life issues in the county while providing for the opportunities of growth and expansion in areas of the county where the infrastructure and resources are compatible and the people prefer it.

Unmanaged growth can degrade our natural environment and rural character, but a lack of growth can mean a loss of economic opportunity and stagnation. It is important that we achieve and maintain balance. Like most communities, we also see that we are in need of improvements. We want to ensure the continuation of quality education for our children, and are concerned about maintaining and paying for high quality education. Maintaining a healthy supply of local jobs is important to us so that our young people can remain in Monroe County if they desire. We are also concerned about families living below the poverty level. We see the need to diversify our employment base, while maintaining agriculture, forestry and tourism as an important economic sector. It is important that we achieve and maintain balance in our economic and land use strategies. We see a great deal of energy in our County, and take pride in it as it exists today, as well as in what we want it to become.

Key aspects of our Design are to keep the rural nature of the county intact and to maintain and further the livability factors of the individual communities. We expect the communities to maintain a pedestrian friendly concept as they grow. By keeping the communities more consolidated, they are more efficient in use of energy and tend to keep shopping, and therefore dollars, within the community. We expect hiking and biking to be part of our considerations for all road upgrades and building. We expect to maintain a reverence for the rustic nature of our communities and for the rural, agricultural, and forested appeal as we consider growth. We expect these considerations to be a main factor in influencing the community at large as well as the individual communities to maintain our low crime status as we progress economically as well as socially.

The social values of the community are also to be considered when considering any growth or developmental aspirations. The county is noted for its low crime rate. It has a strong moral compass and wishes to maintain the values that are consistent with that compass. Keeping the county's rural character and working values are germane to its values of social and environmental respect. Allowing those social values to be overwhelmed by the fads that sometimes accompany growth are not consistent with our plan for the future of the county. Therefore, we will attempt to regulate and minimize industries that are inconsistent with our core values such as adult entertainment and gambling.

To guide our efforts the following guidelines are seen as supportive and directive:

1. Prevent uncontrolled sprawl which threatens the rural way of life by taking farm land for development, creating undesirable environmental impacts due to the lack of environmental

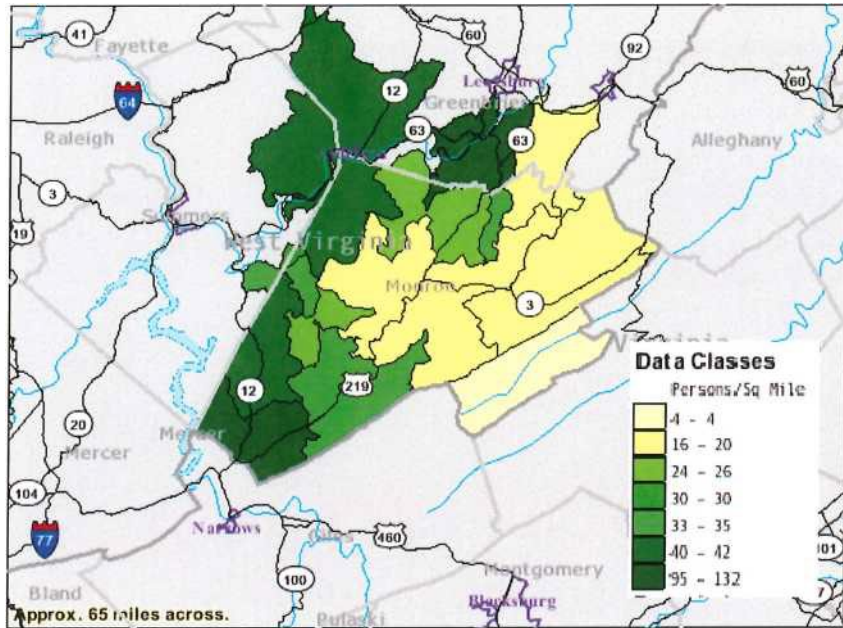
impact studies.

2. Identify and prevent potential threats to water quality.
3. Prevent increased air pollution and view shed pollution.
4. Identify and preserve historic & archeological sites.
5. Minimize and regulate "sin" industries such as adult entertainment and gambling.
6. Maintain and enhance the integrity of the towns with emphasis on pedestrian friendly access.
7. Encourage hiker/biker friendly roads throughout the county whenever roads are upgraded or built.
8. Protect and preserve agriculture and forestry and forestall areas from development consistent with best management plans for agriculture and forestry.
9. Regulate negative visual impacts from all public roads.
10. Conserve natural resources and influence "best practice" criteria for site development, water and energy usage, materials, and indoor environmental quality by referencing the Green Building Rating System.
11. Require public notification and a public comment period for any major development, or other development that would potentially impact surrounding landowners or communities.

Monroe County Population, Demographics and Projections

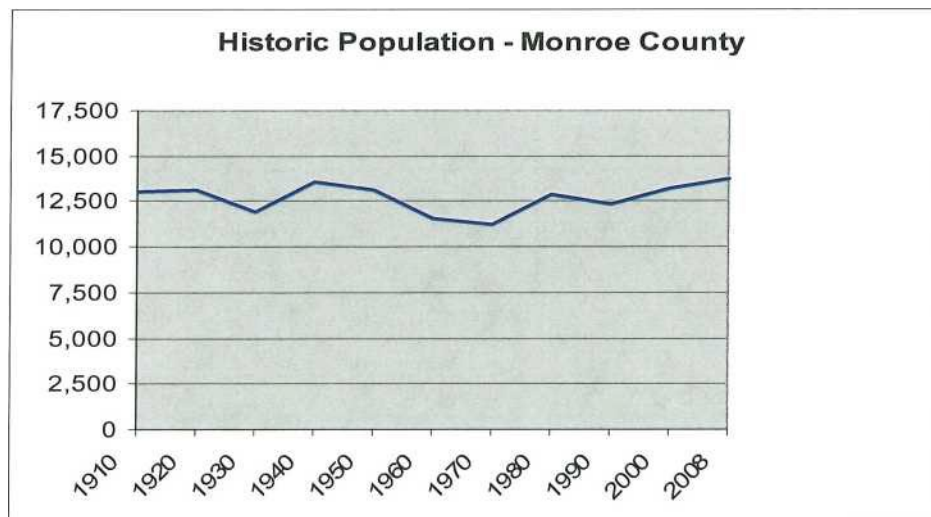
In spite of recent surges in housing development and in-migration, Monroe continues to be a very rural county. The average number of people per square mile in Monroe is 30.8, compared to 75.1 people/square mile for the state of West Virginia.

The highest concentration of population is in the southern area of the county, particularly in and around Peterstown. The proximity of major highways to that region provides for commuter access to more urban areas to the east and west.



There are now an estimated 13,736 people living in Monroe County - more than any other point in Monroe's recorded history. In the last 18 years, the population has risen by 11%.

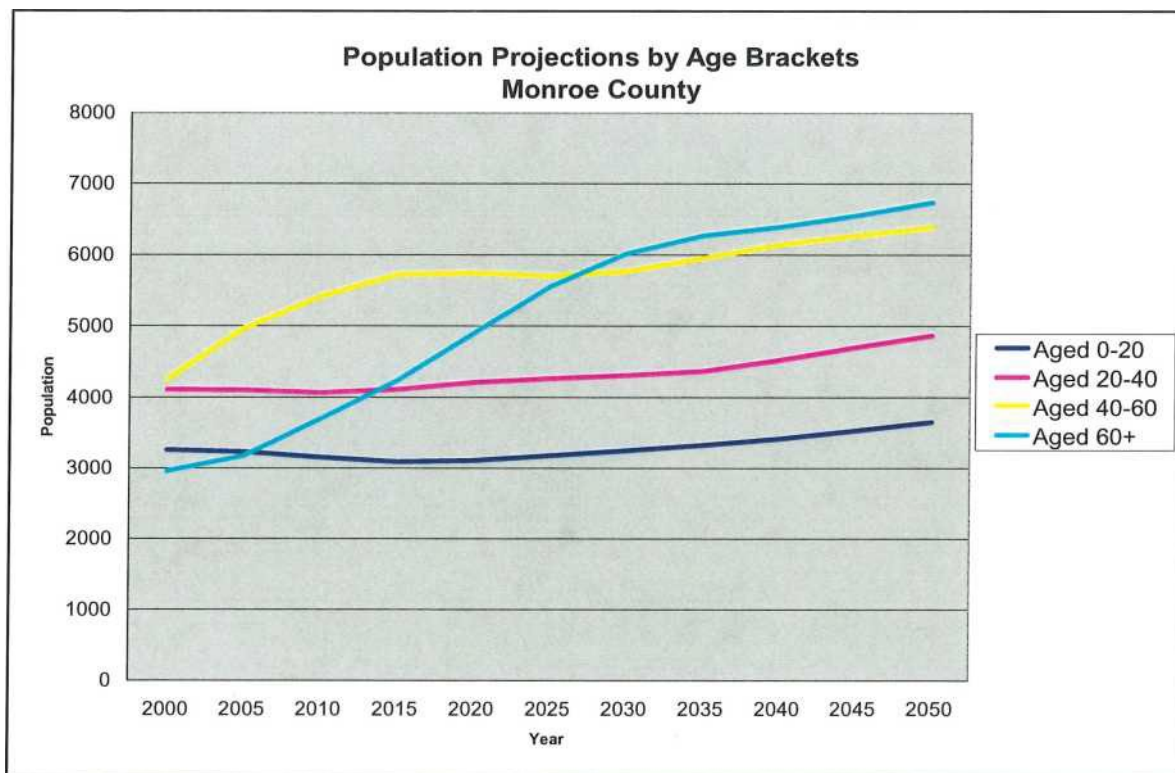
Monroe's demographics mimic much of the state. There are a relatively low number of



minority populations living in Monroe, as is the case in most of West Virginia. The state's homeownership rate is very high when compared to the national average, and Monroe's rate (84.5%)

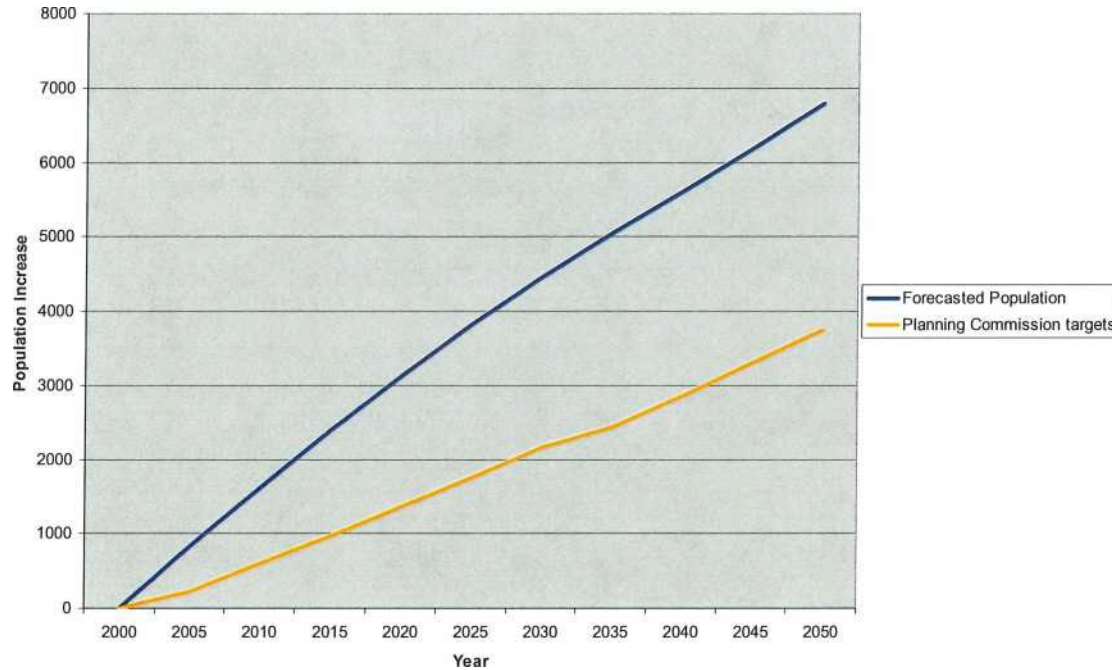
is higher than most of WV. Monroe's poverty rate (14.3%) is below that of much of WV (16.2% state average). Education attainment rates in Monroe fall significantly below the state average -- 8.2% of Monroe residents aged 25 or older have a college degree, compared to 14.8% for the state.

And also like much of West Virginia, Monroe County's population increasingly reflects a rise in the number of older residents. The current median age of Monroe is 39.7 years, and the population aged over 65 years is expected to grow significantly in coming years. This projected shift in demographics will have a tremendous impact on the county and related planning. Consideration will need to be given to housing and the provision of public services in order to adequately accommodate the increased number of elderly residents.



Assumptions and Planning Objectives

Based on the Planning Commission's goal of stable and managed growth, a desired population growth rate was targeted at 1.5% per year. This equates to a very real difference between the projected rate of growth, based on historic trends, and the desired rate.



Projections are, by their very nature, poor forecasters of real population growth or decline since the potential interventions in the otherwise straight projection line are limitless. They do, however, reflect general trends in demographics and migration that are worthy of consideration. In the case of Monroe County, the discrepancy between the projected growth rate and the target rate is significant. Planning goals and objectives have subsequently been developed with the intention of encouraging growth that is in keeping with the Planning Commission’s target and goals.

With regard to future development, other basic assumptions have been made throughout the planning process. For one, given the strong focus on the protection of water resources, the "precautionary principle" is often applied. That is, utilizing the best science and information available to make decisions, without delaying decision-making for want of more data. Conducting more research and collecting data is critically important, particularly in the case of groundwater aquifers. At the same time, when sound but limited data is available, action cannot be delayed when the integrity of vital resources is at risk.

In the interests of getting as much input as possible from other county residents, the Planning Commission held a series of meetings around the county, soliciting feedback on a draft outline of the Comprehensive Plan. Many of those comments and concerns have been incorporated into the Plan, and a summary of those comments can be found in the Appendices.

Karst and Planning in Monroe County

A significant portion of Monroe County is underlain by geology and landforms generally defined as "karst," typified by limestone outcrops, caves, sinkholes and springs. Because these features often provide direct conduits from the surface to groundwater, runoff contaminants dramatically increase



the risk of widespread health and environmental impacts.¹ Underground karst aquifers can contain complex, dendritic channels and tunnels, creating large fluctuations in water levels in springs and wells. These same characteristics provide an additional impediment to county planners, as karst aquifers do not adhere to any visible surface topography, and therefore groundwater recharge areas are difficult to

designate.

Exacerbating the risk, state and local jurisdictions do not currently differentiate between sensitive and non-sensitive areas with regard to groundwater or site-specific environmental risk. While the state legislature has provided for a mechanism to allow greater scrutiny and regulatory actions in defined sensitive groundwater areas,² the state has not chosen to exercise that authority.

There are multiple potential sources of groundwater contamination - runoff from gas stations, agricultural feedlots, various industries - the West Virginia Bureau of Public Health Source Water Assessment and Protection Program lists over 150 possible sources of drinking water contamination³. Many of these possible contaminants, however, are addressed by state and federal regulatory authority. The West Virginia Department of Environmental Protection (WVDEP) is charged with enforcement of various state and federal laws governing groundwater related

¹ George Veni, et al, *Living with Karst, A Fragile Foundation*, 9 (American Geological Institute, 2001).

² West Virginia State Code §22-12-4. This code provides the WV Environmental Quality Board (and subsequently WVDEP) with the authority to "set standards more restrictive than the maximum contaminant levels where it finds that such standards are necessary to protect drinking water use where scientifically supportable evidence reflects factors unique to West Virginia or some area thereof, or to protect other beneficial uses of the groundwater."

³ *Source Water Assessment and Protection Program*, West Virginia Bureau of Public Health, Office of Environmental Health Services, 1999.

pollution,⁴ including:

- Hazardous Waste Management,⁵ including runoff from hazardous waste holding sites,
- the Underground Injection Control Program,⁶ which regulates all direct subsurface (ground) discharges from any commercial source. This includes septic systems that serve multi-family dwellings (i.e. apartment buildings, townhouses),
- the WV Groundwater Protection Rule,⁷ which prohibits waste from industrial and commercial sources from contaminating groundwater through any means, including surface runoff,
- Underground Storage Tanks.⁸

In addition, the Department of Agriculture has oversight of several agriculture related potential harms to groundwater, including pesticide and fertilizer application.⁹

The efficacy of enforcement programs aside, systems are in place to address these potential contaminants from commercial and agricultural sources. The Groundwater Protection Program of the WVDEP has inspection officers and other staff, as well as funding, albeit limited.¹⁰

The WV Bureau of Public Health's Source Water Assessment and Protection Program works to protect public sources of drinking water as well under the jurisdiction of the federal Safe Water Drinking Act. The Wellhead Protection Program promotes protection of areas around public drinking wells through primarily voluntary measures.¹¹

The Source Water Assessment Program (SWAP) provides for data collection and analysis of potential threats to a given water supply, laying the foundation for subsequent protection efforts.

Acknowledging the efforts of state regulators, the Monroe County Planning Commission believes that the most effective, locally-relevant approaches to protecting water resources must come from the county level.

⁴ West Virginia State Code, §20-12-1. This designates the Department as the state lead department for groundwater.

⁵ West Virginia State Code, §22-18-6.

⁶ Id., §22-11-4(a)(16).

⁷ Id., §22-12-5(d).

⁸ Id., §22-17-6.

⁹ Id., §§19-16A-4; 20-5M-5C.

¹⁰ see *Groundwater Programs and Activities, Biennial Report to the West Virginia 2004 Legislature*, West Virginia Department of Environmental Protection.

¹¹ *Source Water Assessment and Protection Program*, p. 13.

Land Use

Purpose: Maintain agricultural presence and influence, preserve open space, reduce/prevent sprawl-type development, maintain the vitality of town centers, and control the impact of subdivision within reasonable levels.

Background

Monroe County can be divided into four general geographic regions: winding stream valleys typical of the Allegheny Plateau make up the county's northwestern section; a belt of rolling karst tableland (primarily underlain by the Greenbrier Limestone) begins in the south central portion of the county and extends beyond the county boundary to the northeast; the southeastern branch of the rugged Allegheny Mountains enters the county from the northeast and terminates near Gap Mills; and the lofty, parallel ridges of the Appalachian Ridge and Valley Range extend along Monroe's southeastern border, represented primarily by Peters and Potts Mountains. Monroe County contains 473 square miles, or 302,957 acres.

Quality farmland exists throughout the central limestone belt, and within the valleys of each of the other regions. Monroe's limited section of the Alleghenies includes Moncove Lake State Park, and many acres of woodland currently used for commercial timbering. The Peter's Mountain aquifer is of considerable importance; currently supplying three public water systems, two commercial water operations, and many households through use of private springs. The southeastern face of the mountain is mostly protected from development by the George Washington and Jefferson National Forest. The mountain's northwestern slopes are nearly all privately owned, although thus far, development has been scattered and minimal. Towns and villages are scattered within each of the county's geographical regions. Likewise, historic buildings and beautiful (though varied) scenery) abounds throughout the entire jurisdiction.



Many county residents still utilize wells or springs as private sources of household water. The susceptibility of karst to contamination, and the uncertainty of the direction and interconnections of underground flow, create particular vulnerability in regard to the county's central limestone belt.

Compared to many areas, agricultural lands, forest lands, and open space are still abundant in Monroe; and commercial sprawl and subdivision are limited. There are 145,054 acres in farmland in Monroe - covering nearly half of the entire county. Recent years, however have seen a marked trend toward a greater level of both subdivision and commercial sprawl, which is of course reducing open space and farmland. This trend will likely continue. Commercial sprawl and subdivision is most evident between Lindside and Peterstown, surrounding the village of Gap Mills, just east of Union, and in and around the community of Pickaway. Residential growth is evident on 122 from Raines' Corner to Greenville; and in subdivisions surrounding Lindside, Peterstown, and Gap Mills, and along Willow Bend Road, Bud Ridge Road, Kates Mountain, and Limestone Hill Road.

Monroe's three principal towns, Peterstown, Alderson, and Union (though reasonably small) still exhibit vitality, and are not greatly impacted by vacant storefronts, decay, or derelict neighborhoods. The county's smaller villages, however, have been significantly impacted by the removal of schools, post offices, and most businesses from their localities. Mennonite-operated businesses have helped preserve a certain amount of commerce in Gap Mills. Proposed reopening of the Sweet Springs Hotel should in the future serve to revitalize that community - perhaps too much, to the point where sprawl and excessive subdivision may need to be addressed. For many other smaller communities, however, only a church and in some cases, a convenience store/gas station remain as the town centers.

History

Artifacts indicate that prehistoric tribes of Native Americans may have lived in the area which would later become Monroe County. Upon the arrival of the first Europeans,

Agriculture in Monroe County from the 2002 Ag Census

- ◆ Average size of farms: 213 acres
- ◆ \$ Average value of agricultural products sold per farm: \$25,273
- ◆ Average value of crops sold per acre for harvested cropland: \$43.53
- ◆ The value of livestock, poultry, and their products as a percentage of the total market value of agricultural products sold: 94.08%
- ◆ Average total farm production expenses per farm: \$20,792
- ◆ Harvested cropland as a percentage of land in farms: 16.17%
- ◆ Average market value of all machinery and equipment per farm: \$33,102
- ◆ The percentage of farms operated by a family or individual: 95.75%
- ◆ Average age of principal farm operators: 57 years
- ◆ Average number of cattle and calves per 100 acres of all land in farms: 16.58
- ◆ Milk cows as a percentage of all cattle and calves: 5.52%

however, there were no permanent native settlements. Various tribes were leading periodic hunting expeditions into the region, when the scattered cabins of white settlers began cropping up around 1760. Agriculture and timbering soon became the mainstays of these early European settlers. Towns began to appear in the late 1700s, and became centers of administrative, judicial, and commercial activities.

Individual landowners controlled the very modest growth for over 200 years.

Communities were well defined, and rural areas were maintained as places to conduct farming and timbering. Mineral extraction has never played an important role in the county, and coal is not known to exist within Monroe's borders in quantity or quality sufficient for mining.

Many of the previously described current characteristics of the county can be attributed to two factors. First, county population has remained stable - neither decreasing greatly nor increasing greatly - throughout the course of the last century. Current trends indicate that this may be

about to change toward significant population increases. Secondly, since its early

settlement, Monroe has been primarily an agricultural community. Since farmers make their living off of the land, it both in their best interest and a part of their natural tendencies to take care of the land; and avoid dividing it into small tracts. The mindset has carried over to a certain degree to the county in general. This "unofficial" policy will continue to have an impact in county development only so long as there is both local interest and profitability in agriculture.

It is only within the last few decades that boundaries between town and country have become blurred or compromised by sprawl. While continuation of the current trend is not inevitable, the tendency toward sprawl does seem to be accelerating. Now, land speculation for residential developments has evolved, and more commercial sprawl may soon follow.

Current Regulatory/Government Authority

1. The Monroe County Farmland Protection Program provides a voluntary conservation easement program.
2. A county ordinance banning the offering of erotic entertainment in public facilities.

Key Partners in Land Use

- o Natural Resource Conservation Service
- o Mountain Regional Conservation & Development
- Region 1 Planning and Development Council
- o WV Department of Environmental Protection
- WV Division of Natural Resources
- o WVU Extension
- o Monroe County Farmland Protection Program
- Civic groups
- o Church groups

Planning for Future Land Use

Goals

The broad goal might perhaps be described as a "sustainable, independent, livable community." Future condition could in some (though not all) aspects be seen as based significantly on the status quo - while, for the purposes of planning, allowing for natural population increase of up to 15% within the next 10 years, and incorporating improved community design, and resource protection techniques. Importance of agriculture, rural character, and open space (in terms of economic impact,

cultural impact, and scenic impact) should be maintained. Efforts should be made to maintain vitality of the county's three principal towns, to restore lost vitality to the multitude of smaller villages, and limit sprawl (which is detrimental to downtown centers and very wasteful in use of land). Subdivision should not be prohibited, but rather controlled to minimize environmental and scenic impacts, and to improve ability of subdivisions to mesh with the surroundings. In regard to watershed recharge and septic issues, subdivision control on mountainous terrain should be more stringent; and could perhaps be tied to slope and soil characteristics. Adult entertainment, bars, and video lottery should be restricted to locations where negative impacts are decreased; and the quantity of all such establishments should be limited.

Support enforcement of existing regulations regarding septic systems and private wells.

In many areas of Monroe County, current regulations provide adequate protection of groundwater from contamination. Enforcement of regulations from both the local Health Department and the WV Department of Environmental Protection are, however, not always adequate due solely to a lack of capacity. Efforts should be made to provide local enforcement entities with the resources needed to provide adequate inspections.

Promote land conservation through partnerships with public and private entities.

Several groups are working within the county to promote voluntary land conservation. These groups, including the Monroe County Farmland Protection Board, the Indian Creek Watershed Association, Friends of the Second Creek and others, have access to critical state and federal resources that benefit the entire county.

Protect and promote agricultural land uses.

As pointed out earlier, maintaining the general agricultural character of Monroe County is important to many residents. Agriculture should continue to be promoted and protected where it is being practiced and local support is evident. Local action should include the consideration of "right-to-farm" policies, minimizing development on agricultural areas, and supporting agriculture-related economic development.

Manage slopeside development.

Development on steep slopes can have a significant detrimental affect on soils and water

quality. While WV Bureau of Public Health's standards do not allow septic placement on steep slopes, there is nothing in place to restrict construction of any other kind. Development on slopes from 15%-25% should be monitored closely particularly in karst terrain, and regulated as needed; development on slopes greater than 25% should be prohibited altogether.

Emphasize and support locally-owned businesses by minimizing mega-commercial development and big box stores.

As witnessed in many parts of the country, mega-commercial and big box store development can devastate smaller, locally-owned businesses. While often bringing jobs and access to cheap goods, the resulting "leakage" from the local economy can be great. Their footprint on the landscape and potential for environmental harm - in the form of increased stormwater runoff, erosion, and stream bank degradation - is significant. Supporting local businesses, including the creation of new businesses, is our primary goal.

Limit the establishment of bars, night clubs, adult entertainment facilities and video lottery venues.

Monroe County residents have consistently voiced concern over the establishment of these types of facilities. At a minimum, businesses in this category should not be sited

near schools, churches, or residential areas. A process providing for greater public input should be implemented regarding their permitting and placement.

Develop a method for tracking development in the county for tax purposes and adherence to future codes or ordinances.

It will be critical for county government to institute an inspection and monitoring program for future development. Developing building codes and providing for their enforcement is one readily available option.

Limit light pollution.

Monroe enjoys one of the darkest night skies in the eastern U.S. Options should be considered for ensuring that major developments limit their impact on the night sky.

Manage development in the county's karst areas.

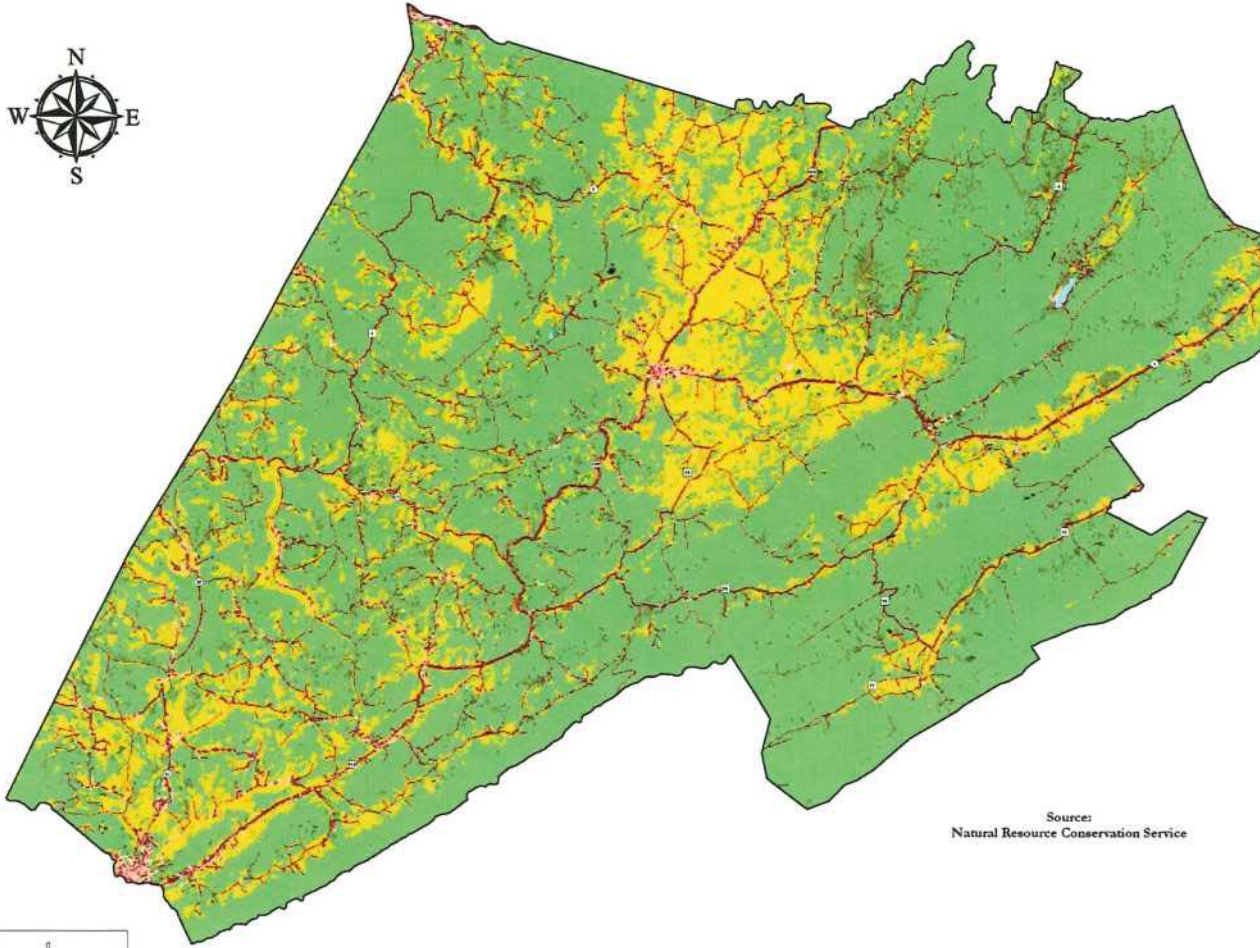
While implied earlier and in other sections of the Comprehensive Plan, the protection of groundwater resources is a very high priority for local residents. All steps should be taken to support continued research to further delineate and assess groundwater aquifers, and to further quantify the potential impacts of development in karst terrain.

Land Use Planning: Maintain agricultural presence and influence, preserve open space, reduce/prevent sprawl-type development, maintain the vitality of town centers, and control the impact of subdivision within reasonable levels.		Very High priority	High priority	Midlevel priority
Goal 1.1	Support enforcement of existing regulations regarding septic systems and private wells.			
Objective 1.1.1	Provide support to the County Sanitarian to enforce existing minimum requirements for septic system and well placement.	•		
Goal 1.2	Promote land conservation through partnerships with public and private entities.			
Objective 1.2.1	Develop agreements with the Indian Creek Conservancy, Indian Creek Watershed Association, Friends of the Second Creek, and other organizations as needed to conserve and protect land and water.	•		
Objective 1.2.2	Coordinate the priorities and plans of the Monroe County Farmland Protection Board into local ordinances and decision-making.		•	
Goal 1.3	Protect and promote agricultural land uses.			
Objective 1.3.1	Designate all of Monroe County as "Rural Agriculture" areas outside of "Preferred Development Areas" (see Chapter 8?).	•		
Objective 1.3.2	Tailor subdivision densities, minimum lot size, and/or design requirements to reduce subdivision or limit its impacts in areas where an agricultural focus is desired.		◦	
Objective 1.3.3	Support Community Supported Agriculture, Farmers' Markets, and similar initiatives.		•	
Objective 1.3.4	Establish "right to farm" policies in compliance with WV Code, to prevent or reduce action or complaint against existing agriculture by new, nearby residential development.			
Goal 1.4	Manage slopeside development.			
Objective 1.4.1	Establish maximum slope restrictions to control subdivision or commercial development on mountainsides.	◦		
Goal 1.5	Emphasize and support locally-owned businesses by minimizing mega-			

	commercial development and big box stores.			
Objective 1.5.1	Promote setback requirements, clustering, and landscaping techniques to minimize impacts and improve quality of development.			•
Objective 1.5.2	Implement policies to encourage location of business in traditional downtown centers, including those of smaller unincorporated villages.	◦		
Objective 1.5.3	Establish maximum square footage limits for retail stores, providing that allowances are made in specific cases where such large retail stores might primarily offer goods not otherwise available, or may be locally owned and operated, and as such could be seen as beneficial.	•		
Goal 1.6	Limit the establishment of bars, night clubs, adult entertainment facilities and video lottery venues.			
Objective 1.6.1	Provide opportunities for public input into the State ABC's permitting process.		•	
Objective 1.6.2	Restrict bars, night clubs, and video lottery establishments to the established business centers of towns and villages, and limit impacts to residences, churches, and schools.	©		
Objective 1.6.3	Limit quantities of video lottery establishments and bars to correlate with local population.	©		
Goal 1.7	Develop a method for tracking development in the county for tax purposes and adherence to future codes or ordinances.			
Objective 1.7.1	Implement use of building permits as a means of tracking development.	&		
Goal 1.8	Limit light pollution.			
Objective 1.8.1	Assess options for regulating exterior lighting to preserve the "night sky" experience	•		
Goal 1.9	Manage development in the county's karst areas.			
Objective 1.9.1	Recommend implementation of a study of the county's karst areas to determine the threshold at which continued growth in these areas (in the absence of public water and sewer] would likely result in significant negative consequences.	©		

Monroe County, West Virginia

Land Cover



Legend

- County Boundary
- Land Cover
- Crops/Pasture
- Barren Land (Rock/Sand/Clay)
- Cultivated Crops
- Pasture/Hay
- Land Cover
- Water/Wetland
- Emergent Herbaceous Wetlands
- Open Water
- Woody Wetlands
- Land Cover
- Forest Land
- Deciduous Forest
- Evergreen Forest
- Grassland/Herbaceous
- Mixed Forest 1st and 2nd Growth
- Shrub/Scrub
- Land Cover
- Developed
- Developed, High Intensity Developed, Medium Intensity Developed, Open Space

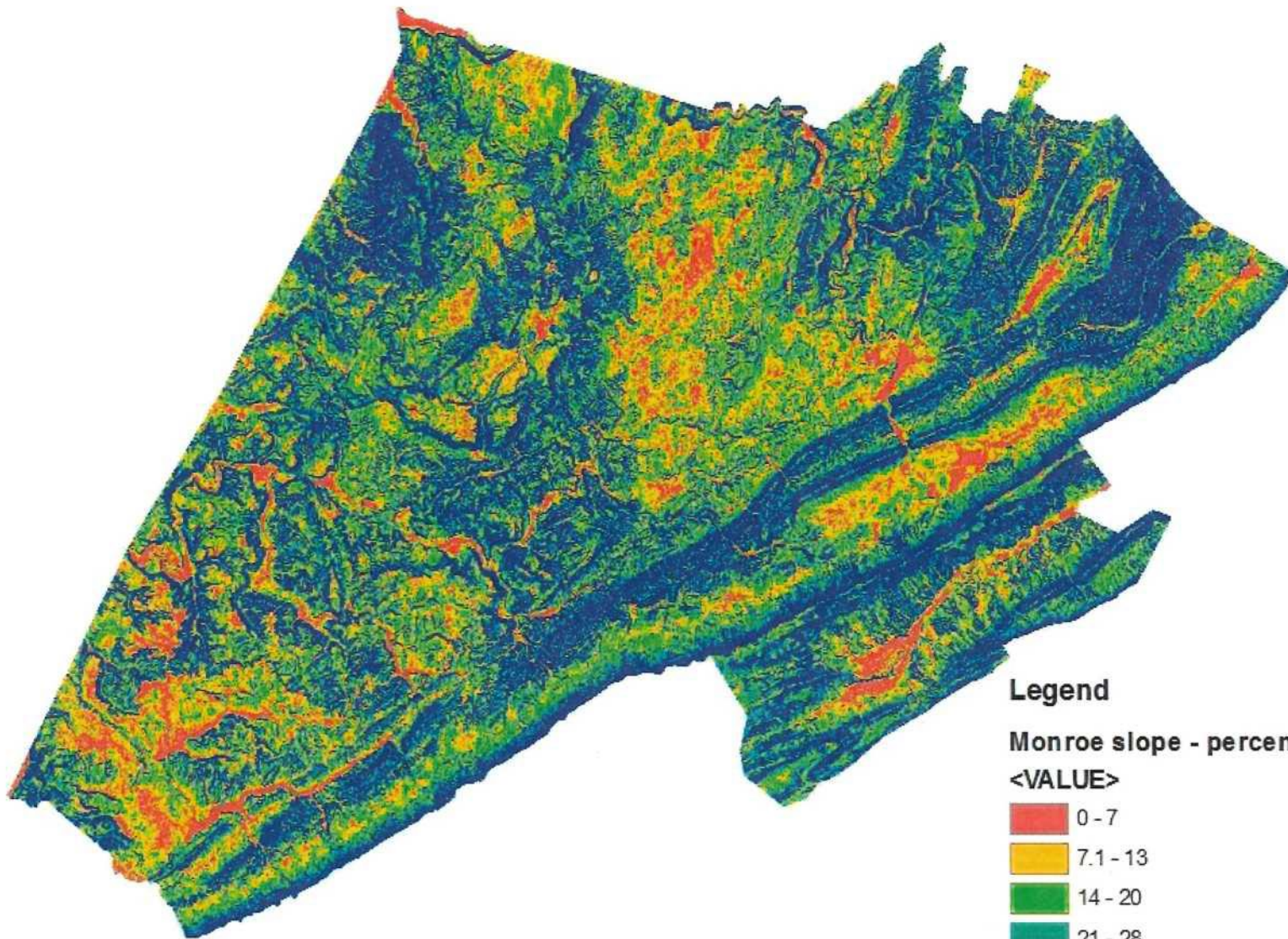
Source:
Natural Resource Conservation Service



Miles



Produced By Region I PDC
1439 E. Main St., Suite 5
Princeton, WV 24740
(304) 431-7225
www.regiononepdc.org

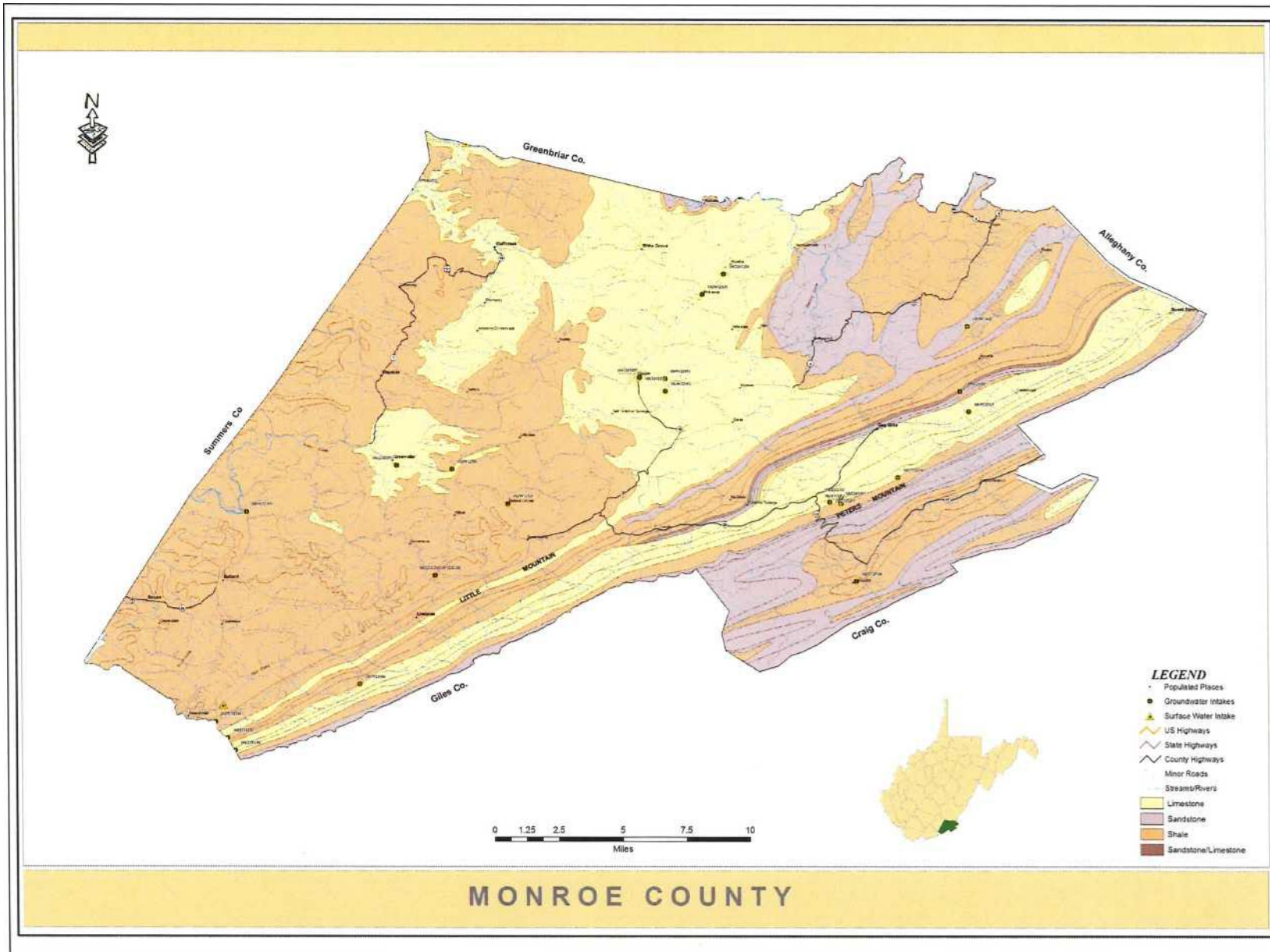


Legend

Monroe slope - percentage

<VALUE>

- 0 - 7
- 7.1 - 13
- 14 - 20
- 21 - 28
- 29 - 81



Natural Resources, Environmental, and Conservation

Purpose: To establish policies for reasonable, responsible use of natural resources; while at the same time fostering conservation practices and good environmental stewardship.

Compared to many areas, water quality, air quality, and general condition of the environment are considered favorable within Monroe County as evidenced by the county being placed on lists as one of the most desirable counties in which to live. The amount of woodland is probably greater now than it was 100 years ago, though mature forests are uncommon. Point-source industrial pollution is almost non-existent, with most potential threats coming from agriculture, timbering, residential sources, and over-use of resources.

Water: Based on surveys conducted by the Exploratory Committee on County Planning, water resources are considered very important by many residents of the county. This is perhaps not surprising, since county assets in this regard are somewhat unique. Dozens of deep springs in the county bring forth water which has in some cases been underground for decades, and often, is exceptionally pure. Several mineral springs exist within the county. Some are true "warm springs" and are naturally carbonated. An unusually high percentage of local residents still use private sources (springs or wells) for household water. Five water-bottling operations have operated within the county in recent years. At present, two are in current operation.

Surface water quality throughout the county is presently impacted by problems related to high levels of bacteria. All major county streams are listed on the WVDEP 303d Impaired Streams Listing for bacteriological pollution. However, county streams do not suffer from many of the pollution problems such as acidity that affect other state streams and diminish usage of the waters. So county streams still serve for recreational purposes such as trout fishing and, to a limited extent, boating.

All or parts of Monroe County have suffered from the effects of drought over the last two years. The result, diminished stream capacity, has a number of ramifications in regard to water quality. As stream flows diminish, water temperatures typically rise and dissolved oxygen levels, essential for the survival and propagation of aquatic life, go down. The negative effect of contaminants is more profound since there is less dilution capacity and thus higher concentrations of those contaminants. Two contaminants, nitrogen and phosphorous, which are common contaminants in agricultural watersheds, may cause algae bloom within the stream.

Drinking water in the county suffers from problem similar to that of surface waters. Over the past decade over half of private wells tested have been found to be unsatisfactory due to the presence of coliform bacteria. This primarily is a result of the karst topography which typifies the county. Contaminated groundwater passes through fissures in the limestone bedrock to underground aquifers without going through the natural process of filtration which typically occurs in other types of subsurface environments.

Indian Creek Watershed Association conducted an extensive survey of both wells and homeowners in 2007-2008. Sixty private wells within the watershed were sampled and tested for total coliform and E-coli bacteria - indicators of surface contamination. Of the 60 wells tested, 30 tested positive for both total coliform and E-coli.

Generally water quality deficiencies [high bacteria levels] have been attributed by the WVDEP to agricultural practices. The two main streams, Second Creek and Indian Creek, flow through large areas of farm pasture wherein livestock have direct access to those streams. Total Maximum Daily Load allocations have been developed by WVDEP for most of the watersheds in Monroe, and these reports provide an in-depth assessment of impairments and potential sources.

Water resources are certainly at risk. Increasing residential and commercial development, and commercial sale of water could impact (and may already be impacting) available quantities of water. Recharge areas are at present not protected from development, and the presence of vast tracts of karst geology in central Monroe is (like all karst) highly vulnerable to accidental contamination. Continued drought conditions may occur resulting in an increase in the problems mentioned above. These latter issues are becoming critical concerns to many residents.

Air: With the exception of one manufacturing plant near Pickaway, local industrial sources of air pollution are completely absent from Monroe County. Automotive exhaust, and smoke from residential and some commercial heating systems are of course present, but since the area is rural, these occur in lesser quantities than would be seen in more urban or suburban areas. From these observations, it might be expected that air quality in Monroe would be exceptionally good. However, there are suspicions that prevailing westerly winds carry considerable quantities of contaminants into Monroe from numerous industrial plants in the Kanawha and Ohio valleys. [Greenbrier County was listed by the EPA for air quality violations for ozone in the eighties.] There have been few, or perhaps no, comprehensive studies conducted within the county to confirm or refute this suspicion.

Soil: Monroe contains many productive soil types. The local NRCS office maintains a list of locally occurring soils which are considered to be prime or of statewide importance. The county farmland protection program utilizes this list as well. Agricultural management practices were implemented many decades ago to reduce soil erosion. Timbering practices have more recently been implemented for the same purpose. As such, erosive loss of soil is rare, except in occasional instances of severe flooding. Perhaps the most significant current threat to availability of productive soil is pavement, and to a lesser extent, residential development. Agriculture census data shows that Monroe lost over 7,000 acres [15%] of its total cropland to development between 1997 and 2002. In the last decade, one major residential development and some other smaller developments have reduced agricultural acreage by over a thousand acres.

Timber: As noted in the introductory paragraph, forest lands are probably more extensive in the county now than they were following the ambitious timbering of the early 20th century. The combination of latitude and altitude seen in the local area provides a mix of both northern and southern species. Deciduous species predominate in most regions of the county, however, soil types favor a somewhat higher percentage of evergreens in Potts Valley and near the communities of Second Creek, Hollywood, and Glace. Many local residents work in the timber industry. Selective cutting predominates, though occasional clear-cuts are seen. Reports of negative impacts from timbering have not been common in recent years - however, roughly two years ago, lack of attention to a public spring during a timbering operation resulted in undrinkable water for customers of the Gap Mills PSD for a period of several days.

Monroe contains roughly 15,750 acres of public forestland - 15,000 acres within the Eastern Divide District of the George Washington and Jefferson National Forest, and 750 acres associated with Moncove Lake State Park. Commercial timbering does not occur at Moncove Lake, nor in designated Wilderness Areas within Monroe's section of the national forest. Selective commercial timbering is sometimes undertaken within "multi-use" areas of the national forest.

Wildlife: A rich diversity of wildlife is found within the borders of Monroe County, including some rare or endangered species such as the Northern Flying Squirrel, James River Spiny Mussel, Bald and Golden Eagle, and various bat species. Occasional sightings of the Eastern Cougar are reported, but the presence of this species has never been officially confirmed. Coyotes began returning to the area in the 1980s, and are now seemingly represented by an indigenous population. Smaller game birds, such as

Bob White Quail and Ruffed Grouse are perceived as less common than they once were, perhaps due to the decrease in the amount of small grain crops grown by local farmers, or predation by coyotes.

Management of game and non-game species is the responsibility of the WV Department of Natural Resources; and the DNR's performance in this regard is considered by most as reasonable. However, some farmers and gardeners believe that the county's current population of White-Tailed Deer is excessive, based on damage done to crops by this species. Increased development in the county could impact many species, though immediate threats are not perceived.

Fish species are also managed by the DNR. Lakes are nonexistent in the county, with the exception of Moncove. The county borders on both the Greenbrier and the New rivers for short distances, though at no point is either river entirely within county borders. Moncove Lake, the New and Greenbrier Rivers, and Monroe's smaller streams all contain viable fish populations. Reproducing populations of both Rainbow and Native Trout occur in some streams within the county - a phenomenon which speaks well of local water quality and which is certainly not commonplace within all parts of West Virginia. Diversity of water species is of course contingent on maintenance of acceptable water quality.

Mineral fnon-renewable extractive resources]: In contrast to most of West Virginia, Monroe contains no coal reserves. Surface geologic layers in the local area are all older than coal-producing strata seen elsewhere in the Appalachians. Coal layers were either never present, or have long ago been eroded away.

Some reserves of natural gas do occur locally, and recent corporate efforts to acquire drilling rights from area landowners may indicate that natural gas extraction will become more commonplace. Potential negative impacts with drilling are almost certainly limited compared to coal mining practices elsewhere in the state - however, some justifiable concern does exist as to possible impacts of drilling on underground water reserves in the karst areas.

Reserves of iron and manganese ore are present in Sweet Springs and Potts Valleys, and perhaps in a few other isolated beds within the county. Commercial mining of these ores did occur in the early decades of the 20th century, but stopped after better grade and/or more easily accessible reserves were discovered in the western states. Economic benefits and potential negative impacts could both be seen if at some point, extraction of these ores becomes once again commercially profitable.

Litter and dumping: Monroe contains one commercial landfill, on Powell Mountain, near Peterstown; and local residents and commercial haulers are also permitted to use a landfill in neighboring Greenbrier County. Roadside dumping is unfortunately still evident in isolated locations, though not as common as it was several decades ago. Likewise, roadside litter is present, though in most locations, not overwhelming [perhaps thanks to the efforts of volunteer clean-up efforts]. Collections of junk cars, scrap metal, and private dumps also are occasionally seen, but, also, not in great frequency.

Actions against illegal dumping are undertaken, in various degree, by the DNR, the county health department, and county government. Local DEP involvement in this regard has not been evident in the past. Abandoned car issues are sometimes address by the WV Dept. of Highways, and local volunteer "Adopt-a-Highway" groups have made considerable progress in keeping highway litter under control.

A recycling program has recently been reinitiated by the Monroe County Solid Waste Authority. At present, the program is not generating sufficient revenue to meet expenses.

History

As with other local assets, the reasonably good status of the local environment is likely due in part to voluntary good stewardship, and in part to very limited development and industrial pressure within the county's recent past.

Use of water as a commercial resource extends back nearly to the first settlement of the county. Mineral springs were promoted as centers for health and relaxation as far back as the latter decades of the 1700s. Likewise, water was harnessed to power mills across the county soon after settlement began. The waters of Second Creek alone once powered over 20 individual mills. Current septic regulations, and management practices widely accepted by both the agricultural and timber industries, may perhaps have resulted in better water quality now than was the case several decades ago; however, some problem areas remain.

Timber, also, has of course been utilized individually and commercially throughout the county's history. As stated earlier, current acreage in timber almost certainly exceeds that seen in the early decades of the 20th century, though it would not compare to the vast tracts of virgin timber of previous centuries. This is not to say, however, that Monroe was completely forested, even at the beginning of European settlement. An exploring party commissioned by Major Abraham Wood in 1671 reported savannahs and "curious meadows" in the area which would later become Monroe County - in effect, describing areas free of timber. Whether these cleared areas reflected lands intentionally

burned by Native Americans, or accidentally burned by wildfires, remains uncertain.

Wildlife, at least in regard to select species, has likewise undergone a cycle of diminishment followed by a rebound, in the last 250 years. Wolf bounty records indicate that this species had been more or less eradicated from the county by about 1850. Similarly, elk and bison, both once native, have not been present as an indigenous native species in 100 years or more. However, white tailed deer, extremely rare locally by the mid 20th century, are now very common. Wild turkey remain plentiful, black bear populations are sufficient to support an annual hunting season, and coyotes, perhaps never a native species, are now at least somewhat entrenched as well. Increased populations of some species reflect management efforts on the part of the WV DNR. Decreased populations of other species, such as the Northern Flying Squirrel or Whip-poor-will, may be attributable to habitat loss or environmental contaminants.

Mining of manganese ore occurred in Sweet Springs Valley, and on Fork Mountain, Potts Valley, during the early and mid 20th century. Some iron ore exists in geologic strata in these same areas, and was also mined commercially a short distance from the Monroe border. However, these mines have not been active for decades, and there are no present indications that mining of manganese or iron are likely to be revived in the local area in the foreseeable future. Natural gas drilling began perhaps 25 years ago. Current speculative interest in drilling rights may indicate the potential for increase in gas extraction; however the number of active or potentially active wells remains limited.

As with water, timber, and some wildlife species, state and federal regulations and voluntary efforts have lessened impacts of roadside litter and garbage dumps. Several decades ago, household dumps or on-farm dumps (often in sinkholes) were essentially, the norm. Towns had community dumps, but these were not maintained with the environmental safeguards applied to today's landfills. At present, commercial garbage pickup is available in nearly all sections of the county - and most (though not all) residents are responsible in the way they handle disposal of refuse.

Regulatory authority

Water quality in regard to pollutants and contamination (surface and presumably subsurface) is regulated on the state level by the Department of Environmental Protection, and in regard to surface waters, by the Department of Natural Resources and the county sanitarian as well.. Air quality is also the responsibility of the DEP, though as mentioned previously, few local sources of air pollution (aside from motor vehicles) exist. Soil erosion falls within the jurisdiction of the DEP, though the local NRCS

office assists in encouraging voluntary management practices for farmers. Timber regulations are enforced by the

Division of Forestry, and the DEP in terms of water contamination or erosion. Wildlife regulation is the responsibility of the DNR, and is reasonably enforced. Mineral extraction, depending on the type, falls under the responsibility of the Office of Surface Mining, or the DEP's Office of Oil and Gas Extraction. Highway litter and roadside dumps are addressed in some degree by the WV Department of Highways, the DNR (if streams are involved), and the county sanitarian.

Potential key players/programs at the local, state, and federal level

West Virginia DEP, WV Bureau of Public Health, WV DNR, Monroe County Health Department, Monroe County Solid Waste Authority, NRCS, WV Division of Forestry, WV Office of Surface Mining, WV Div. of Oil and Gas Extraction (DEP), WV Department of Highways, WV Department of Natural Resources, US Forest Service, Mountain RC&D, Friends of The Second Creek, Indian Creek Watershed Association, WVU Extension and County 4-H Programs, Monroe County Board of Education (re: data from summer school programs assessing water quality), WVU Professor Joe Donovan (Peter's Mtn. Aquifer Study), Rick Eades (various water quality studies].

Wind: Monroe's high ridges, where prevailing winds blow with some frequency and strength, make it likely that promoters of wind turbine generators may someday look at our county with interest. With evidence of global warming increasing, the concept of generating power from wind rather than the burning of fossil fuels seems reasonable and attractive. However, many individuals find the large turbines intrusive to the point of being an eyesore on otherwise undisturbed landscapes. The equipment certainly poses risks to bird and bat species, and construction, road access, and operation might potentially create negative impacts on source water recharge areas. The planning commission should continue to gather additional public input, and work to determine a consensus position among county residents. County government should begin consideration of regulating commercial wind generation with respects to potential impacts to scenery, property values, water and wildlife.

Planning for the Future of Monroe's Natural Resources

General goals include maintaining current favorable environmental status of the county and availability of natural resources for responsible use, while addressing (and improving) specific problem areas in all categories. Considerable baseline data is needed, particularly in regard to groundwater quality and quantity, surface water quantity (stream flow), and air quality - so that threats can be recognized, and actions taken to protect these resources from degradation or depletion.

Goals

Protect surface water resources.

As with most natural resources, protecting creeks and rivers is far less costly and involved than restoring them once degraded. The WV Department of Environmental Protection has many safeguards in place, particularly for large scale, point sources of potential stream pollution. But many of the non-point sources of contaminants are much more difficult to identify and monitor. Examples include sediment from road and building construction, runoff from paved and other impervious surfaces, and household disposal of hazardous waste.

A high priority of many Monroe residents is the protection of water *quantity* from both surface and groundwater sources. Streams and rivers in Monroe are an essential component of the local economy and culture. For multiple generations, streams in Monroe have been utilized for agricultural operations, historic mills, and as a source for public drinking water. The value of these resources cannot be overstated.

As Monroe's population and development continues to grow, local government will need to play a central role in water resource protection. Local agencies can augment DEP's efforts by enforcing existing state code, including monitoring construction sites of any type, identifying potential sources of non-point contaminants and ensuring environmental safeguards are in place.

Additionally, counties and municipalities are enabled to impose specific stormwater management practices. In most cases, these local stormwater ordinances are focused primarily on large, dense developments with the potential to cause significant, and readily recognizable harm. So while the state does make efforts to mitigate runoff and stormwater events during the construction phase, the few protections that are in place once a development is completed are compelled by local governments.

Monroe's streams are also critically important as fisheries. Local cold water trout streams, as defined by WVDNR, are both a critical component of the local ecosystem and a vanishing resource.

Additional protection should be afforded these streams.

Protect groundwater resources.

1. Define critical groundwater areas.

Monroe County would benefit from additional work with state and federal agencies and private organizations to identify and delineate, as best as possible, groundwater recharge areas and/or sensitive groundwater areas. Assessment should take into consideration the “precautionary principle” wherever possible -- utilizing the best available data to establish adequate buffer areas, and not delaying decisions until more information is available. Additional study of the recharge areas will be critical but also necessarily lengthy.

There are several models already established by state agencies and organizations to consider. These applications and services have been developed for a variety of purposes, but could be applicable to delineation of sensitive groundwater areas needing protection. West Virginia Conservation Agency's Water Resource Assessment program provides resources to assess current and future water-related needs of a county.¹² In Hardy County, for example, a Water Resource Assessment included an overview of the characteristics and usages of known groundwater reserves. These same tools could be further enhanced and utilized in Monroe to fund and develop assessments of groundwater reaches.

The US Environmental Protection Agency has developed a computer model, known by its acronym DRASTIC, to assess the relative risk of pesticide application with regard to groundwater. The model takes into consideration several different surface and subsurface physical features, and can be applied to other potential contaminants well beyond its intended pesticide use. Applications of the DRASTIC model have been developed for several counties in the West Virginia/Northern Virginia region.

In addition, research assistance is often made available to West Virginia communities through West Virginia University's Water Research Institute and the US Geologic Survey. Pooling resources from universities and federal agencies, while helping to share the financial burden and often significant workload, also works to create a more comprehensive understanding by assimilating

¹² This program derives its authority and funding through 16 USCS § 1005, Chapter 18, *Watershed Protection and Flood Prevention*, and is commonly referred to as PL-566 and PL 534. Funds are administered through the U.S. Department of Agriculture's Natural Resources Conservation Service.

research techniques and skill sets.

While this is by no means an exhaustive list or reflective of any rigorous scientific review, the prevalence of these tools demonstrate that resources are available to assist Monroe County in identifying groundwater aquifers and recharge areas.

2. Establish subdivision ordinances aimed at protecting the resource and human health

Identify a minimum subdivision acreage allowable to protect groundwater resources and related community health, and use that minimum allowance to set a subdivision ordinance for application county-wide. Subdivision ordinances are, among other things, clearly meant to protect public health and safety, as noted above. Given the connection between failing septic systems, stormwater runoff, and the potential contamination of drinking water sources, county planning commissions can justify using conservative estimates to establish appropriate parcel size when subdividing. Assignment of an appropriate parcel size must therefore take into consideration adequate space for proper siting of septic systems and stormwater dispersal.

While zoning has received little public support statewide, subdivision ordinances, perhaps perceived as less invasive and prescriptive, appear to be much more acceptable. A

recent survey of counties in West Virginia found that over one-third of counties have some type of subdivision ordinance currently in place.

Determination of a minimum parcel size within a subdivision ordinance based on groundwater protection must be applied uniformly across a county. In *Singer v. Jefferson County*, the courts made clear that subdivision ordinances cannot be applied to only a portion of the county, and essentially become *de facto* zoning ordinances. Subdivision ordinance, like zoning ordinances, must also be consistent with the goals outlined in the comprehensive plan.

Models for citing groundwater protection in subdivision ordinance application currently exist in West Virginia. Mineral County's subdivision ordinance, for example, cites the protection of water supplies and other natural resources in laying out the purpose of the ordinance and subsequent limit of a two-acre minimum parcel size. In those West Virginia counties underlain by karst, and all the inherent risks and unpredictability that the topography confers, a higher minimum parcel size may be appropriate.



4. *Provide for additional protection of sensitive groundwater areas.*

With a delineation of sensitive groundwater areas based on available data and research, and a basic level of protection afforded across the county through subdivision ordinances, provision

could then be made for "density bonuses." This would allow increased density development on non-sensitive lands, in exchange for a cash equivalent to purchase easements on known critical groundwater recharge areas.

Providing added protection of resources through density bonuses is not a new technique. Municipalities and counties have often allowed developers to build at greater densities in some areas in exchange for the provision of



local amenities - infrastructure development, parks, or affordable housing. The same concept, however, can also be applied to the increased protection of important natural resources. Certainly under the "innovative land use technique" provision of WV statute §8A, density bonuses can be utilized to further the county's plans for resource management. In this case, density bonuses would allow for the increased subdivision of land into smaller parcels. If a county subdivision ordinance, for example, provided for a minimum of four acres across the county for residential development, a density bonus would allow land outside of defined sensitive groundwater areas to be further subdivided into a minimum of one or more acre parcels.

Any allowance for increased densities on non-sensitive lands should mandate certain conditions. For example, increased housing development density on non-sensitive groundwater recharge areas could incorporate all available best management practices with regard to wastewater treatment and stormwater management. Examples include tertiary treatment or better for on-site wastewater treatment systems; that is, treatment that goes beyond a standard septic tank and drainfield system. Stormwater management for the subdivisions can include rain gardens, infiltration basins, constructed wetlands and others. Subdivisions that are considered for increased density allowances should provide for a minimum of these practices.

One option, depending on the Monroe's final Comprehensive Plan and the proximity to existing services, could mandate that increased density is allowable only when new development is connected to public wastewater treatment.

Additionally, developers seeking a density bonus could be required to either [1] place conservation easements on sensitive groundwater areas if such areas exist within the land considered for subdivision, or (2) charged a fee, corresponding to the number and size of desired subdivisions, for the discreet purpose of purchasing conservation easements on

sensitive groundwater areas. Such practices, while not common, have been effectively utilized in other areas of the country.

It is imperative that any fees assessed be consistent with the desired outcome of groundwater protection, and to distinguish them from impact fees. When enacted at the local level, impact fees, which are provided for in West Virginia State Code, are mandatory for all subdivisions, and are intended to generally offset many of the costs of development, including infrastructure development, roads, schools and other additional services. Fees generated as a result of density bonuses for groundwater protection, however, are voluntary and specific. In addition, such an arrangement targeted to groundwater protection is clearly in keeping with §8A, which specifically allows for "density bonuses and/or density transfers" to offset the impacts of haphazard development.

Monroe County would have to closely examine local conditions to determine both allowable densities and the return sought from the developer. Consideration will have to be given to the added costs of compliance, increased property values as a result of improvements, as well as current market rates and other factors.

5. Utilize existing Monroe County Voluntary Farmland Protection Program (FPP).

Farmland protection boards, as noted above, have the authority and management systems in place to develop specific conservation easements. Since prime farmland is often found on karst terrain and contain springs and seeps, several of the existing county boards already identify the potential for water resource protection as a prioritization criterion.

Fees assessed through density bonuses can be directly transferred to existing farmland protection boards. Most boards also have a provision whereby they can accept specific, targeted funding for purchase of an easement outside of their other ranking criteria. County commissions could direct the Farmland Protection Board to establish a fund specifically for



money collected for the purchase of voluntary easements on sensitive groundwater areas. Counties could then insure that fees collected from density bonuses or other sources would then have a clearly defined path and intent.

The added benefit of utilizing the existing FPP is the general acknowledgement and acceptance of the program as voluntary. The board would necessarily have to match up willing landowners, sensitive groundwater areas, and available funding - an alignment that may not always be possible. And, it could be argued, as a voluntary program dependent on individual landowner willingness, protection may be scattered and disjointed.

But with the developer's contribution through a density bonus also voluntary, any such combination is potentially more likely to receive public acceptance.¹³ Again, the success of voluntary farmland protection programs statewide would suggest that similar approaches would also be successful. With regard to a cohesive protection strategy, if the objective is groundwater protection in sensitive areas, having contiguous parcels is less critical than if the objectives were open space or maintaining large tracts for habitat. While such a program does not provide for the wholesale protection of entire aquifers, it does provide protection measures that will be politically and publicly viable, and in the end, more likely to endure changing governmental administrations and varying development pressures.

Marcellus Shale Gas Drilling and Groundwater Protection

Public feedback has indicated that there is concern with the potential impact of oil and gas drilling activities as a result of Marcellus Shale gas production. This is a legitimate concern in that there have been a number of environmental problems associated with drilling in other areas of the country. The process of drilling and recovering natural gas in this activity requires the usage of millions of gallons of water per well and the contamination of that water with byproducts which may be potentially hazardous. In that there are currently minimal regulatory guidelines in regard to this type of drilling, the Planning Commission is looking at a regulatory system which will support the protection of both water quantity and quality during gas development.

Support existing regulatory authorities in the protection of natural resources.

Current law exists pertaining to protection of water, air, soil, and wildlife, and for the

¹³ Murphy, *Innovative Tools and Techniques*. As the author notes, such voluntary programs “tend not to be opposed by developers who often challenge impact fees and mitigation requirements where no benefits are offered to them.”

prevention of scattered litter and illegal dumps. Encouraging and assisting various responsible agencies with enforcement could be very beneficial, as many specific problem areas are likely the result of violation of existing law. Policy may need to be changed in regard to public reporting of problems. Efforts at enforcement have been hindered in the past by the insistence of some agencies that reports of possible violations must be presented as signed complaints. Individuals are often reluctant to sign complaints against persons in their neighborhood, and would rather remain anonymous. Efforts need to be made to increase enforcement of laws against littering the roadsides. This could possibly be a joint effort between local law enforcement, the WV Department of Highways, and possibly the DNR. Use of surveillance cameras may be beneficial at areas where roadside dumping is occurring.

Support voluntary targeted actions to protect and restore resources.

Best management agricultural practices, suggested by NRCS and others, are in many instances voluntary when it comes to implementation by farmers. Best management practices in regard to the timber industry are also voluntary in some cases. Many local civic groups pick up highway litter on a voluntary basis. Facilitation of these practices is certainly worthwhile. In some cases, financial assistance may be needed for implementation. In other cases, education on the importance of the work, and recognition for efforts made, could be stimulus enough.

Friends of The Second Creek, and the Indian Creek Watershed Association have both been engaged in water quality analysis, stream bank restoration, and education of both students and adults on the importance of water resources. Indian Creek Watershed Association is also currently involved in a study of ground water quality in the Union area. The efforts of both of these groups are having an impact and should be supported.

Collect information on current and potential sites of resource extraction.

A county water resources assessment is a valuable tool for future planning in relation to this valuable resource. The Planning Commission should encourage the funding and completion of such an assessment and use it in determining both growth limitations and potentials.

Improve the energy efficiency of public buildings.

Energy assessments should be initiated on a staggered basis for all public buildings over the

next five years. As funding becomes available, necessary upgrades to improve energy efficiency should be made. Upgrades could range from replacing light fixtures to installation of programmable thermostats to installation of alternative heat sources.

Consider, address and support renewable energy system development.

As an alternative to supporting or tolerating commercial wind generation in the county, or in addition to the same, the planning commission could actively encourage individual efforts at energy independence - such as smaller windmills, water generators, solar panels, and "green construction" techniques for individual use at homes and farmsteads. Assistance could come with providing information on such products, documenting where technical advice can be found on where such products may be used effectively, and (provided that a funding stream could be located), offering financial assistance for the installation of such devices. Of considerable importance to this approach would be legislation requiring that utility companies purchase "excess energy" generated by individual citizens. Such action would most likely need to occur on the state or federal level, however the local planning commission could take the position of encouraging this legislation.

Encourage passage of new state regulations.

Selected members of the WV Legislature have tried repeatedly in recent years to pass a bottle-refund bill; however attempts have thus far proven unsuccessful. It seems the consensus of members currently on the planning commission that passage of such a bill could greatly reduce refuse along the highways, since bottles make up a substantial portion of highway litter. The county could perhaps more actively support future attempts at such legislation on the state level.

As funding allows, create and/or expand a position(s) within county government to monitor compliance in regard to natural resource, land use, and historic preservation components.

If Monroe County is to take steps to protect its resources at the local level, adequate staffing must be put in place. In this time of shrinking budgets and revenue, current officials with local and state agencies are already often over-extended with existing responsibilities. Management of our local resources must be made a funding and staffing priority.

2. Natural Resources, Environment, and		Very High priority	High priority	Midlevel priority
Conservation <i>To establish policies for reasonable, responsible use of natural resources; while at the same time fostering conservation practices and good environmental stewardship.</i>				
Goal 2.1	Protect surface water resources.			
Objective 2.1.1	Compile and disseminate information on the quality of streams.	®		
Objective 2.1.2	Support data collection on baseline flows of streams in the county.	.		
Objective 2.1.3	Based on historic flow rates of county streams, regulate the quantity of water withdrawn from streams for commercial use.			
Objective 2.1.4	Support the efforts of The Friends of Second Creek and the Indian Creek Watershed Associations to assess surface water quality and quantity.	.		
Goal 2.2	Protect groundwater resources.			
Objective 2.2.1	Compile and disseminate information on the quality of groundwater resources.	©		
Objective 2.2.2	Compile and disseminate information on the quantity of groundwater resources.	©		
Objective 2.2.3	Develop more protective regulations for the placement of septic systems, considering slope and soil limitations.	.		
Objective 2.2.4	Establish reasonable restrictions on the quantity of water withdrawn from wells for commercial purposes.	.		
Objective 2.2.5	Create enforceable protection zones around recharge areas for public water sources including limits to septic installation, chemical use, erosion control, and timber operation.	.		
Objective 2.2.6	Promote efforts to educate residents on potentially harmful actions that could compromise groundwater quality.	.		
Goal 2.3	Support existing regulatory authorities in the protection of natural resources.			
Objective 2.3.1	Provide additional support to the Monroe Co. Health Dept, for inspection of septic systems and the siting and installation of new septic systems.	.		

Objective 2.3.2	Clarify and streamline enforcement of existing regulations, and make reporting of violations easier and more anonymous.	•		
Objective 2.3.3	Promote open communication between county government and state and federal entities to bring attention to potential problems.			
Objective 2.3.4	Increase efforts to enforce regulations against littering & illegal dumping.	a		
Goal 2.4	Support voluntary targeted actions to protect and restore resources.			
Objective 2.4.1	Promote best management practices relating to agriculture through outreach, financial assistance, and public recognition.	•		
Objective 2.4.2	Promote best management practices relating to forestry through outreach, financial assistance, and public recognition.	•		
Objective 2.4.3	Promote best management practices relating to grounds & maintenance of private residences.	©		
Goal 2.5	Collect information on current and potential sites of resource extraction.			
Objective 2.5.1	Identify and compile data on predominant areas of commercial timbering.		©	
Objective 2.5.2	Compile data on the general status of forests in the county, including number of acres, locations, and forest types.		®	
Objective 2.5.3	Compile data on current and potential areas of extractive industry activity.	•		
Goal 2.6	Improve the energy efficiency of public buildings.			
Objective 2.6.1	Complete an energy assessment of all publicly-owned buildings within the county in five years, retrofit building to improve energy efficiency as available funding allows, and re-assess as necessary.	o		
Goal 2.7	Consider, address and/or support renewable energy system development.			
Objective 2.7.1	Conduct outreach and education, and assess public sentiment on the development of commercial wind power generators.			
Objective 2.7.2	Actively encourage development of small renewable energy systems through the provision of technical assistance, financial assistance, and promoting related state and	o		

	federal legislation.			
Goal 2.8	Provide for local government staffing to support resource protection.			
Objective 2.8.1	As funding allows, create and/or expand a position(s) within county government to monitor compliance in regard to natural resource, land use, and historic preservation components.			

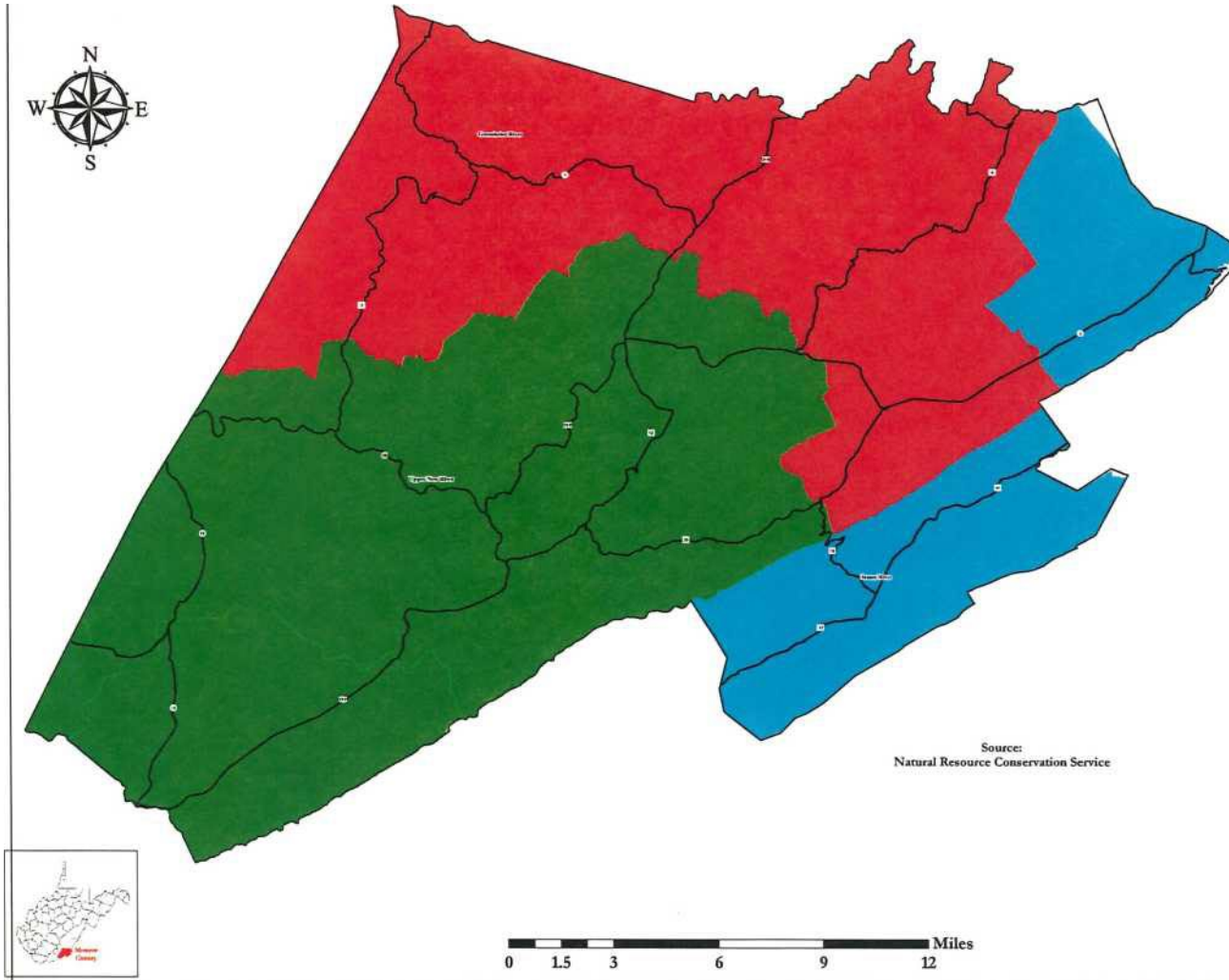
Monroe County, West Virginia

Major Watersheds



Legend

- County Boundary
- Major Roads
- Major Watersheds
 - Greenbrier River
 - James River
 - Upper New River



Source:
Natural Resource Conservation Service

Produced By Region I PDC
1439 E. Main St, Suite 5
Princeton, WV 24740
(304) 431-7225
www.regiononepdc.org

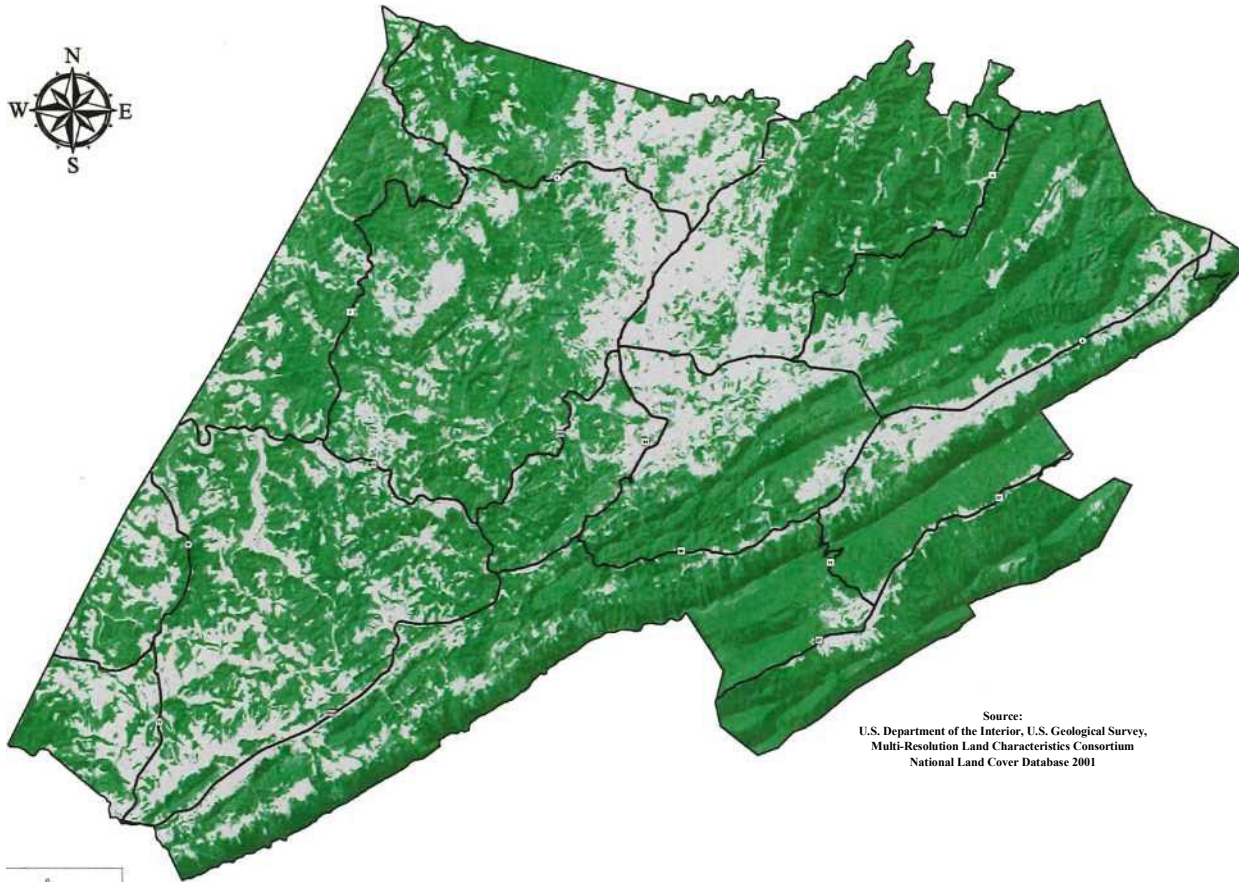
© 2007-2008, West Virginia Major Watershed Planning Commission. All rights reserved.

Monroe County, West Virginia

Tree Canopy



Legend



Source:
U.S. Department of the Interior, U.S. Geological Survey,
Multi-Resolution Land Characteristics Consortium
National Land Cover Database 2001

Produced By Region I PDC
1439 E. Main St., Suite 5
Princeton, WV 24740
(304) 431-7225
www.regiononepdc.org

Housing

Purpose: Provide a diversity of quality housing that meets the housing needs of all residents, encourage continued use and reuse of existing structures, and apply innovative land management practices for all housing developments.

Historically Monroe County has been a rural agrarian community with few large industrial employers. Many residents travel out of the county for employment, and land and housing prices consistently remained low for years. Increased housing cost in surrounding states and cities, and recent publicity designating Monroe County as one of the most desirable places to live, have driven up housing prices drastically in recent years. As we plan for future growth and development, housing prices are expected to continue on a natural rate of growth (in spite of the recent economic downturn] making it difficult for low or moderate income individuals to purchase homes.

Without managed growth, major housing site developments may consume large areas of land suitable for farming, be located in areas not environmentally compatible and thereby creating a potential source of ground water pollution. Roads associated with housing may not be compatible with increased vehicular traffic caused by major development. The county currently does not have an ordinance pertaining to light discipline to maintain a rural nighttime environment, or a sound/noise ordinance. Without these ordinances there will be an impact on the rural character of the county in the event of major development.

Current Status of Housing

West Virginia has the highest rate of homeownership in the country. In addition, the number of residents that own their homes in Monroe County is significantly higher than the state average: 84.5% to WV's 75.2%. The high rate of homeownership in Monroe can be attributed in part to its rural character and a culture centered strongly on agriculture and a sense of place.

There are currently 7,508 houses in Monroe County, and 1,857 (25%) were built prior to 1950. While older homes, in many cases, contribute to the historic and cultural qualities of the county, many of the older homes are occupied by families that cannot afford the upkeep needed to make them safe and energy efficient. Various programs have, at times, operated in Monroe providing home upgrades and rehabilitation (REACH, Southeastern Appalachian Rural Alliance). There are, however, no consistent programs in place to

assist homeowners with repairs.

Perhaps the most significant development in housing in the county in recent years is the dramatic increase in new home construction, providing for both new residents and second home purchasers. Of the 7,508 homes in Monroe, 1,414 (19%) were built since 1990. Median house values have also risen substantially -- in 2000, median home value was \$62,000; in 2007, it had risen to nearly \$96,000. While this reflects trends in the national housing market during that time, it also is indicative of the higher value homes developed in Monroe.

Senior Housing

Monroe County currently has one nursing home and one assisted living home providing care to senior citizens. With population projections suggesting a dramatic increase in the number of elderly residents in the coming years, local government and service providers need to provide for a range of housing alternatives. These include assisted living facilities, nursing homes, senior rental housing, and handicap-accessible upgrades to existing single family homes.

Building Codes and Inspection

Building contractors are required by State Code to build new homes compliant with the State Building Code and referenced materials. There is no inspection or review process in place to assure that builders are complying with these requirements in single family dwellings.

Building Codes provide a means to ensure safe, sanitary housing that will not become a burden to neighboring homeowners or the county in future years. Without

adequate safeguards in place and given the increased rate of home construction in the county, the potential for the development of substandard housing is very real.

Building Codes also provide a less intrusive mechanism for ensuring housing development that is compatible with the Community Design objectives of the Planning and County Commissions. Components of a Building Code Ordinance can include minimum setbacks from roads and sidewalks, minimum/maximum lighting requirements, and a quantifiable approach to identifying unsafe and substandard housing.

Floodplain Ordinance

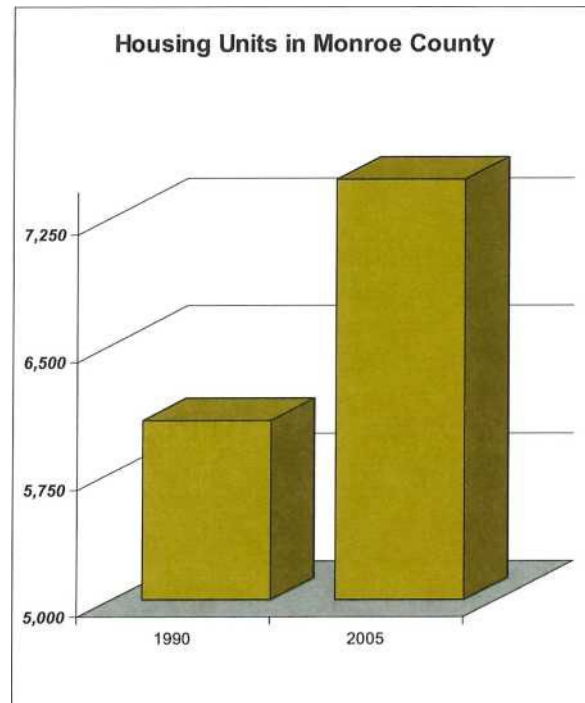
As with many counties in WV, Monroe County has a floodplain ordinance in place. Participation in the National Flood Insurance Program mandates that a county ordinance be in place in order to be eligible, and the current Monroe ordinance provides basic guidelines about development in the floodplain, as stipulated by the NFIP and its WV counterpart, the WV Office of Emergency Services and its State Floodplain Coordinator.

Monroe's ordinance is fairly dated, however, and does not reflect current understanding about floods and floodplain management. The Floodplain Ordinance can provide the basic framework for limiting potentially dangerous floodplain development. The State OES office has provided counties with a model ordinance, providing updated information on best practices. Limiting floodplain development, and detailing how and when floodplain development can occur. By extension, the Floodplain Ordinance serves as a basic building permit, providing for basic safety features for structures built in the floodplain.

Support dilapidated or abandoned building ordinance, in the interests of public safety, maintenance of property values., including foreclosed properties.

Planning for Future Housing Needs

Goals



Provide a diversity of affordable, quality housing that gives county residents a choice of housing based on individual desires or physical needs.

As Monroe continues to be a destination area for second homes and retirees, ensuring that affordable housing options remain for residents is critical. The County Commission and Planning Commission must establish partnerships with existing organizations, or consider establishing new entities that can adequately address housing needs in the County.

Promote residential growth in designated areas.

For Monroe's growth to continue in a manageable and organized manner, county government will need to take the necessary steps to promote housing development in targeted areas. Those target areas include communities identified as "Preferred Development Areas," including regions of the county that already have public water and sewer. Rehabilitation and reuse of existing housing stock should be encouraged (e.g. promotion of the USDA's Housing Preservation grant program]

Encourage the continued development of a growth management plan that includes the most current innovations in good land management practices for both minor and major housing developments.

The Comprehensive Plan initiates a 'growth management' strategy and framework. With regard to housing development, "Preferred Development Areas," "Community Design" and related components of the Plan should be considered a starting point. As subsequent ordinances and guidelines are developed, Planning Commissioners will need to be versed in best management practices.

Regulate housing development in environmentally unsuitable areas to protect groundwater resources.

Continued managed growth in the housing sector is an essential component of Monroe County's future. Unmanaged, poorly planned development, however, poses perhaps the largest threat to Monroe's groundwater resources. Stormwater runoff from both construction and permanent impervious surfaces, as well as poorly sited septic systems and improper waste disposal can have major impacts.

A strong majority of Monroe residents have consistently voiced support for measures to protect groundwater quality and quantity. As demand for additional housing increases, much attention will need to

be paid to the areas of the county underlain by karst. Future conditions may warrant limiting housing development in those areas through application of targeted subdivision ordinances or other growth management tools.

Provide a means to regulate camping units

Camping is a recreational activity enjoyed by many Monroe residents and visitors. These temporary structures, however, can sometimes become permanent residences without provision for adequate services, and often without notice of health or county officials.

		Very High priority	High priority	Midlevel priority
<i>Housing:</i> Design a housing plan and ordinances that are consistent with the needs of the public, compliant with state and federal regulatory requirements to assure safe living conditions, provide opportunity for local recreation, and are environmentally safe with limited or no impact.				
Goal 3.1	Provide a diversity of affordable, quality housing that gives county residents a choice of housing based on individual desires or physical needs.			
Objective 3.1.1	Increase the availability of rental housing, and promote the development of mixed use residential housing with a range of affordability.		o	
Objective 3.1.2	Promote the development of affordable starter and workforce housing.		©	
Objective 3.1.3	Assess the need and provide housing opportunities for senior citizens, disabled and low-middle income residents.	q		
Objective 3.1.4	Create a Housing Authority with power to advocate and require affordable housing.			
Goal 3.2	Promote residential growth in designated areas.			
Objective 3.2.1	Encourage continued use and reuse of existing structures to preserve the character and historic values of the community.	.		
Objective 3.2.2	Promote growth in areas where public water and sewer system are currently available.	.		
Objective 3.2.3	Limit lot size where public water or sewer is not provided	.		
Objective 3.2.4	Encourage village centers/mixed use development in designated growth areas		o	
Goal 3.3	Encourage the development of a growth management plan that includes the most current innovations in good land management practices for both minor and major housing developments.			
Objective 3.3.1	Provide clear guidance and needed restrictions to manage light and sound impacts.		©	
Objective 3.3.2	Identify proper and suitable areas for desirable low, medium and high density residential development through management of public services, employment, and infrastructure.		.	
Objective 3.3.3	Integrate relevant parts of neighborhood design principles into new development proposals.		.	
Objective 3.3.4	Encourage open space for recreation in cluster development.		o	

Goal 3.4	Regulate housing development in environmentally unsuitable areas to protect groundwater resources.			
Objective 3.4.1	Regulate housing to protect karst regions and natural resources.	⊙		
Objective 3.4.2	Ensure that all housing is developed in accordance with any defined floodplain regulations.		•	
Goal 3.5	Provide a means to regulate camping units.			
Objective 3.5.1	Prevent clustering of camps used for recreational purposes.		⊙	
Objective 3.5.2	Discourage campers from becoming permanent or semi-permanent residences		•	
Objective 3.5.3	Encourage recreational camping and traditional, temporary camping units.		⊙	

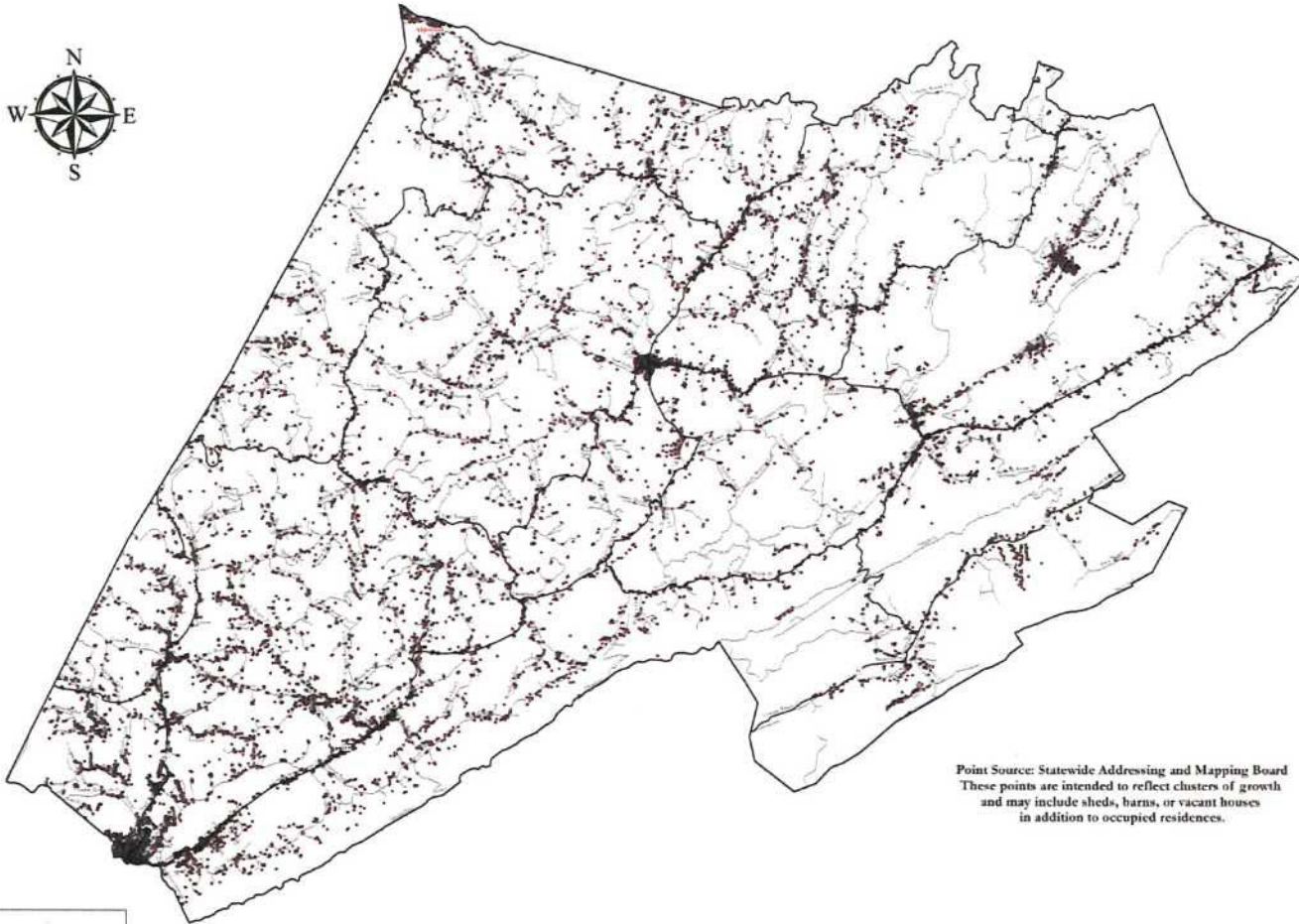
Monroe County, West Virginia

Building Points



Legend

- County Boundary
- Major Roads
- Secondary Roads
- Buildings



Point Source: Statewide Addressing and Mapping Board
These points are intended to reflect clusters of growth
and may include sheds, barns, or vacant houses
in addition to occupied residences.



Produced By Region I PDC
1439 E. Main St., Suite 5
Princeton, WV 24740
(304) 431-7225
www.regiononepdc.org

Transportation

Purpose: Create an improved transportation system which is proportional to demand; increase recreational and healthful exercise opportunities by an improved system of hiking and bicycle trails; and enhance vitality of town economic centers by improving parking and walkability.

Public Highways

Monroe County contains within its boundaries one U.S. highway [two-lanes], four state highways (two-lanes), and numerous secondary roads which are an assortment of two-lane paved, one-lane paved, and one-lane gravel or dirt-surfaced. These county secondary roads were formerly under the control of local government, however for the last many decades all public highways, even those referred to as "county routes," are under the control and jurisdiction of the WV Department of Transportation. Currently the system can be crowded in a few select locations at certain times of the day, although the vast majority of roads would be considered far from congested by most observers.

Pavement is in generally good condition on most primary routes, and in generally poor condition on many secondary roads. Lane width on the county's primary routes is not adequate to comfortably accommodate the size of modern commercial trucks, and potentially dangerous curves are a concern on some of these primary routes as well. Lane width and curves are generally not seen as so much of an issue on secondary routes. Large trucks travel these roads infrequently or not at all, and most motorists do not anticipate being able to drive in these areas at a high rate of speed.

The state still maintains rights-of-way on many public roads which are no longer maintained for vehicular travel (or only marginally maintained). These routes are sometimes used by 4-wheel-drive enthusiasts and for hiking or horse-back riding. Some of these latter mentioned routes have been blocked by adjoining landowners who feel they no longer need to recognize the public rights-of-way.

The county contains one designated WV Scenic Byway, the Farm Heritage Road, which incorporates portions of WV Routes 12,122, 3, 311, and U. S. 219. A WV Scenic Backway, the Mountain's Shadow Trail, was established concurrently with the scenic

byway. This latter route generally follows the base of Peter's Mountain from Peterstown to Gap Mills, and incorporates portions of Rich Creek Valley Road, Watson Mill Road, Painter Run Road, Back

Valley Road, and Zenith Road.

Mass Transit

Passengers may still board a passenger train in Alderson - a claim which cannot be made by many rural counties in this era of declining rail service. This Amtrak line which touches the northern tip of Monroe County is The Cardinal - providing rail service between New York City and Chicago by way of Washington D.C, Charlottesville, Staunton, and Covington in Virginia, White Sulphur Springs, Alderson, Hinton, Charleston, and Huntington in West Virginia, Cincinnati, Ohio, and etc. Runs on the line are generally twice per week, in both directions.

There are no commercial airports within Monroe. Local travelers have access to a reasonable number of connector flights at the Greenbrier Valley Airport in Lewisburg, roughly 30 minutes from the center of Monroe County by automobile. A wider assortment of commercial flights is available at Roanoke Regional Airport, Roanoke, VA, and Yeager Airport, Charleston, WV; roughly 1% hours and 2% hours distant, respectively, from the center of the county.

Regular commercial bus service is not currently available, nor is taxi service. An extensive bus service is of course operated by the school system; and the Monroe County Council on Aging offers limited transportation in a passenger van for senior citizens who are unable to drive on their own. There are no waterways within or bordering the county which are navigable by anything larger than a canoe, kayak, or raft.

Parking and Pedestrian

Monroe's three incorporated towns, Alderson, Peterstown, and Union, all have reasonably efficient sidewalk systems in their downtown business districts. Streetscape and sidewalk renovations in Alderson and Union have greatly improved the attractiveness of these areas. Many "side streets," however, are without sidewalks. Union is currently undertaking a fairly substantial sidewalk extension along WV Rt. 3 east.

Parking along the main street in each of the three towns is generally sufficient, although all could perhaps benefit from the addition of a small municipal parking lot to accommodate overflow during peak usage. Neither parking nor public sidewalks are perhaps as significant an issue in the county's smaller villages. Most do not have a sufficient concentration of business and residential

locations in close enough proximity to make foot travel a frequently used option. However, exceptions do exist and even some of these smaller villages could perhaps benefit from improved walking areas. For example, three Mennonite-owned businesses are currently operating in the old town-center of Gap Mills. On-site parking at these businesses is adequate, however no sidewalks exist between the facilities.

Foot Travel and Bicycling

Monroe is one of only two West Virginia counties which contain a portion of the Appalachian Trail, a well known long-distance footpath extending from Georgia to Maine. The AT follows the crest of Peter's Mountain (and the Giles-Monroe border] from the southwestern tip of Monroe for about 10 miles to the northeast. At the point where the Appalachian Trail turns to the southeast to go deeper into Virginia, the Allegheny Trail begins. This latter trail follows along or near the crest of Peter's Mountain to the northeastern corner of the county - an additional 20 miles. The Allegheny, a much newer footpath, is not yet complete in all sections. When the route is finished, it will extend from Monroe County to Pennsylvania; traversing the rugged eastern mountains of West Virginia. The Groundhog Trail connects secondary roads in the Back Valley near Lindside with the Appalachian Trail at the crest of the mountain. The Potts Mountain Trail followed the crest of Potts Mountain for about 10 miles along Monroe's southeastern border. It, too, joined with the Appalachian Trail, within the borders of Giles County, VA. Parts of the Potts Mountain trail are still walkable; however it is no longer maintained by the forest service as a public trail. The above trails are all predominately within Monroe's portion of the George Washington and Jefferson National Forest.

A network of five marked hiking trails exists at Moncove Lake State Park, traversing the roughly 750 acres of public lands surrounding Moncove Lake. The longest trail is about 2 miles in length. Hiking opportunities are also present along many old timber roads within the national forest, although most of these are not officially marked as trails. Funding is currently being sought to create a bicycling and hiking trail along a 5-mile section of abandoned railway in Potts Valley. The county tourism office is also exploring the idea of establishing and promoting a series of biking and hiking trails along lightly traveled secondary roads, or old public roads which are no longer maintained for vehicular travel.

Some recreational walking, jogging, or bicycling is currently done along less heavily traveled

public roads. One route rather consistently used for this purpose is the Willow Bend Road, just south of Union. In many cases, such usage can probably be accomplished with reasonable safety even though designated pedestrian or bicycle lanes do not exist on these routes - however, if funding were available, walking or bicycle lanes would be preferable. The practice is certainly less consistently safe along the county's primary roads - where traffic flow and vehicle speeds are higher.

History

Public Highways

The earliest transportation corridors in what is now Monroe County were "Indian" trails. These in turn may have been established to follow animal paths. The most well-known of these is the Seneca Trail or Warrior's Path, the route of which is closely matched by present-day U.S. 219 from the New River (about a mile west of Monroe County's southwestern corner] northward into the Niagara region of western New York. The path was originally used by members of the Seven Nations (Iroquois] tribes to conduct hunting and raiding expeditions into the Virginia territory and perhaps further to the southwest. One of the tribes was the Seneca. Widening and some rerouting of the original road has occurred on numerous occasions throughout the 250 year period of Monroe's settlement by the Europeans. Traces of a former "219" are clearly visible at several locations near the present road in Monroe; particularly to the south of Union. One such place is at the Indian Creek Covered Bridge, which rests about 50 yards off of current 219, but was of course used to carry travelers across Indian Creek along one of 219's earlier incarnations. The small section of earlier roadway which skirts the hillside between the covered bridge and

St. John's Church is particularly striking, as it is incredibly narrow even by today's standards for unpaved single lane roads.

Of equal importance to early Monroe pioneers was an Indian trail which ran from the Jackson and James River country (in what is now Alleghany County, VA] upstream along Dunlap's Creek. The route entered Monroe just east of Sweet Springs, followed Sweet Springs Valley, and passed through the two Second Creek gaps in the Little Mountain range at Gap Mills. Similarly to the association seen with U.S. 219, modern day WV Rt. 3 closely follows the route of this old trail from Sweet Springs to a point a few miles east of Union. Near the present day intersection of Rt. 3 and the

Gates Road, however, the old path turned more to the southwest; crossing Byrnside Hollow and following the southern rim of this stream valley to the place along the Seneca Trail near Salt Sulphur Springs where Byrnside and Tackett branches join to create the beginning of Indian Creek. The impact of this route in central and eastern Monroe County is demonstrated by an assessment of the location of structures built between 1763 and 1800. Rehoboth Church (Methodist), Good Hope Church (Presbyterian), Byrnside Fort, the earliest lodgings at Sweet Springs, and the log homes of the Alexander, Tackett, Neel, and Keenan families, just to name a few, were all constructed along or within a short distance of the old Dunlap trail.

Following the partition of Greenbrier and the establishment of Monroe in 1799, local government understandably placed a great emphasis on road building. Overseers were appointed to facilitate construction of specific routes, and local landowners were often expected to contribute either money or labor to the portions of the roads near their properties. Such landowners were frequently allowed to collect tolls from travelers to compensate for their expenses. A pole or pike was often placed across the route, which could be turned to permit passage once a traveler had paid their toll - hence the name "turnpike" for such roads. Access to the mineral springs resorts was often a focal point for road-building. Discussion of a new road between Fincastle (Botetourt County, VA) and Sweet Springs was ongoing as early as 1812. Several turnpikes radiated from Salt Sulphur Springs and Red Sulphur Springs as well. By 1835, stage coaches were running three times per week from Fincastle to Sweet Springs and then Lewisburg. Another stage line ran from Lewisburg through Union, Salt Sulphur Springs, and Pearisburg, to Newburn, VA, also three times per week. A fairly thorough discussion of early road-building appears in Morton's History of Monroe County.

Monroe's network of highways, both past and present, is typical of the dendritic pattern generally associated with roads in mountainous or hilly terrain. The regular and precise grid pattern often used for highways in flat topography was never implemented in Monroe, nor would it have worked well had it been attempted. Routes were determined by the lay of the land, and in general terms, followed the paths of least resistance.

Once principal arteries were in place, efforts over subsequent decades focused on improving road conditions. Early surfaces were rough, narrow, and offered only difficult passage in wet weather. It's probably safe to assume that all local roads were still unpaved single lane affairs as late as the 1920s, but paving and widening of major thoroughfares to two lanes began in the subsequent few decades. Widening and route modification of these routes continued into the 1970s or 1980s,

but such improvements have been less evident in recent decades. Paving and widening of previously unpaved or single lane secondary roads has continued to the present date; though again, significant route modification has been predominantly absent in recent years.

In the mid 1990s, an economic development agency in north central West Virginia proposed the creation of Continental 1, a high speed limited access international freeway which from Buffalo, NY to the Virginia border, was to follow the course of U.S. 219. Almost concurrently, the West Virginia Department of Transportation also proposed an upgrade of U.S. 219 - to 4-lane status in Greenbrier County, and as a limited access 2-lane in Monroe, with rights-of-way being purchased for the eventual addition of two more lanes. Grassroots organizations arose in opposition to the proposals in both Monroe and Greenbrier counties, with the Monroe group incorporating under the name of Monroe 219. Expressed concerns included the division of farmland, the loss of some homes, businesses, and historic structures, loss of local rural identity, and economic damage associated with the proposed by-passes of town business centers. While Continental 1 proponents had touted economic benefits of such a road to the entire region, Monroe 219 publicized a previous study from WVU which had found that only areas with an existing population center of at least 30,000 benefited economically from large freeways. At the time, Monroe County's entire population was roughly 13,000 - spread over an area of 464 square miles. While opposing the limited-access upgrades, the local group adopted a stance in favor of more moderate improvements to existing 219, including lane widening, improved safety measures, and modification of more dangerous curves. The opposition positions in both Monroe and Greenbrier were generally well-received by the public. Even Snowshoe Resort in Pocahontas County, as distant from interstate access as perhaps any location on Monroe or Greenbrier, voiced its opposition to the upgrades. Continental 1 proponents eventually abandoned their efforts, and the WVDOT has also neglected to pursue the proposals, at least for now.

Only a few years ago, the West Virginia Legislature passed language which allows the use of ATV vehicles on all public roads which do not have a center-line. At present, users are not required to carry collision or liability insurance on these vehicles. Counties may enact stricter regulations on ATVs, provided a comprehensive plan is in place.

Mass Transit

By 1850, a railway extended down the Valley of Virginia to Bristol. In 1857, the Virginia

Central (later to become the C&O) had completed lines to Low Moor in neighboring Alleghany County. There was considerable excitement among local residents that the natural extension of the railway from Low Moor to the Ohio Valley would come by way of Monroe County. The route up Dunlap Creek, through Sweet Springs Valley, and then down either Second Creek or Indian Creek to the Greenbrier or New Rivers seemed almost readymade for such a project. In 1873, the C&O was in fact completed to the Ohio, but it traveled by way of Greenbrier and not Monroe. The railway's choice of the much more difficult route over the Alleghenies to White Sulphur Springs is evidence of the considerable influence of the Greenbrier Hotel and the city of Lewisburg during that era. Whether Monroe was made better or worse to have gotten only a tiny corner of the C&O at Alderson remains a matter of debate.

By 1909, the N&W had built several miles of track into Monroe County. The line, known as the Potts Valley Branch, began from the N&W main line along the New River near Pearisburg, and extended the length of Monroe's portion of Potts Valley, to reach a dead end at the village of Paint Bank, in Craig County. Initial interest in the line was spurred by deposits of manganese and iron ore, but the money-maker for the railway proved to be vast stands of virgin timber in the valley. By the 1930s, most of the timber had been harvested and the line was discontinued. Tracks were promptly removed, and much of the public secondary highway from Goldbond to Paint Bank follows the course of the old railway.

Commercial bus service was available in the county during the 1940s and 1950s, as was taxi service. As more local residents acquired their own automobiles, such service became unprofitable in such a rural area - and these public transportation options have long been unavailable within the county borders. Commercial airports have never operated within Monroe County, although private air strips have existed in the past and continue to be present. Larger creeks and rivers were used extensively for navigation by Native Americans, and likely by early white settlers. These are not deep enough nor free enough of rocks and rapids in the local area to accommodate larger boats. Ferries did once operate at several locations along or near the county borders to carry travelers across the New and Greenbrier Rivers before bridges became commonplace.

Foot travel and bicycling

Up until about 70 years ago, foot travel was so often a necessity, that few people viewed it as a recreational opportunity. The Appalachian Trail was completed in 1937, but has undergone many

minor (and some major] relocations. It probably did not exist in its present location along the Monroe-Giles county border until somewhat later. Plans for the Allegheny Trail were initiated in 1975, and much (though not all] of Monroe County's portion was completed by the mid 1990s. The Potts Mountain Trail was in use in the 1950s, and was likely a local project of the Jefferson National Forest. Its route is now broken in a few places by small segments of private property, and the trail is no longer significantly promoted. Most of the route can still be followed, though, within national forest boundaries. Moncove Lake Public Hunting and Fishing Area was created in 1960, and establishment of trails began soon thereafter. A portion of the land was set aside in 1990 as a West Virginia State Park.

Older footpaths in the county did exist, though these were viewed as a means of transportation more so than recreation. Many of these old trails, such as the Seneca Trail and the Dunlap Trail, were later developed into roadways. Others were not, and many have of course been forgotten with the passage of many generations of residents. Three historic footpaths which were prominent enough to cause their names to be at least vaguely remembered were the Becky Neel Path, the Wray Path, and the Symms Gap Path. All crossed Peter's Mountain, and all may have predated the first roadways across the mountain. The Becky Neel Path crossed in the vicinity of Gap Mills; the Wray path, near Zenith; and the Symms Gap Path, between Lindside and Peterstown. Some of these, most particularly the Becky Neel path, were used by persons without automobile transportation even into the mid 20th century.

In the United States, bicycle travel never attained the importance as a means of transportation which it has enjoyed in much of the rest of the world - but has rather always been seen more as a means of exercise or recreation. There have historically been no designated bicycle routes within Monroe County, though secondary roads have been used for this purpose for generations. The five-mile Potts Valley Rail Trail, for which funding is currently being sought, will be the first in the local jurisdiction to be specifically designated for both bicycle and pedestrian use.

Current status

Existing available data

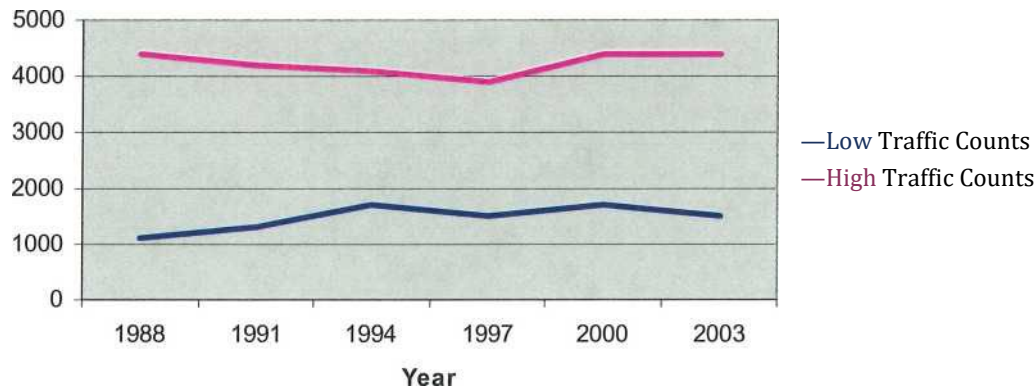
The following data on principal roadways was provided by W.W. Dept, of Highways:

<u>Route</u>	<u>Total Mileage within Monroe</u>
--------------	------------------------------------

U.S. 219	33.34 miles
WV 3	38.34 miles
WV 12	11.31 miles
WV 122	11.89 miles
WV311	3.98 miles

High & low traffic data reflects that 24-hour highs were typically in western Monroe, and 24-hour lows were generally in northern Monroe. Both highs and lows did not vary greatly over the 15 year period.

Traffic Highs/Lows, 1988-



Existing regulatory authority and level of enforcement

Decisions regarding design, upgrades, planning, and maintenance of public highways are the responsibility of the West Virginia Department of Transportation, the District 9 DOT office in Lewisburg, and (more specific to maintenance) the local DOT office in Union. Political influence often plays greatly into such decisions. Enforcement of highway safety laws is the responsibility of the WV State Police and individual town and county law enforcement agencies. Rail passenger service, and airport schedules and routes are determined by the individual carriers, and are based on demand, availability, and economic considerations. In regard to public transportation, safety measures and regulations are reviewed and enforced by the Federal Transportation Safety Commission; although individual carriers often implement their own regulations as well. Funding for trail construction is often provided by federal monies routed through the WV Department of Transportation. However, decisions on where trails will be built, if or when they are abandoned, and how they are constructed and promoted, are largely within the jurisdiction of the entity owning the land in question, or the

organization which initiates and maintains the effort.

Potential Key Players

West Virginia Department of Transportation (state, district, and local offices);

Amtrak; Greenbrier Valley Airport; Roanoke Regional Airport; Yeager Airport; Monroe 219;

Greenbrier Valley Economic Development Authority; National Park Service (Appalachian Trail);
George Washington and Jefferson National Forest; WV Scenic Trails Association; Moncove Lake State
Park; Monroe County Tourism Director.

Planning for Future Transportation Needs

Goals

Improve primary highways as needed.

In regard to primary highways, the target may well vary with the specific roads. Based on moderate truck traffic and its status as the most heavily traveled road in the county, U.S. 219 should be widened uniformly to 11 or 12 foot lanes, and the more dangerous curves, intersections, and bridges should be modified if at all possible. The Rt. 219 bridge at the county line in Peterstown is of particular concern to local residents in regard to both its condition and width. Recent government efforts to have this bridge replaced had not yet been successful, perhaps in part because it is seemingly within the jurisdiction of both the West Virginia and Virginia Departments of Transportation. A few passing lanes or truck pull-offs might also be beneficial, particularly between Union and Rock Camp. WV Rt. 3 east of Union is in good condition, and is easy to travel. WV Rt. 3 west of Sinks Grove is narrow and winding, though light use may not justify extensive modifications. Rt. 12 from Peterstown to the Summers County line is in generally good condition. WV Rt. 122 through Greenville and to the Summers County line could greatly benefit from lane widening. WV Rt. 311 is reasonable, considering that it is clearly a mountain road; though the same route on similar terrain in Virginia is wider and exhibits somewhat gentler curves.

Modern safety improvements, such as non-skid pavement on curves and center-line reflectors to improve visibility at night, should be considered for all the federal and state routes within the county. Because of previously mentioned concerns in regard to division of properties, loss of structures, loss of rural character, and negative economic impacts, upgrades to limited access status should be implemented only when traffic flow clearly justifies the absolute need for such modifications - and not simply because the opportunity exists to do so. When such need is evidenced, designs should be sensitive to the scenic and historic character of the county; and local preference should be considered in regard to bypasses. County surveys during previous proposed upgrades of Rt. 219 showed that most residents of Union were opposed to any by-pass of the downtown; while many residents of Peterstown favored a by-pass.

Improve and/or maintain secondary roads as needed

Pavement should be improved on many county secondary roads, and these roads should be widened or upgraded as traffic flow and safety demand. There is local support for the reestablishment of a centerline on the road down Potts Valley. This route was originally one-lane, and later widened and marked with a centerline. In subsequent years, the centerline has been paved over, so that it is once again a one-lane road.

However, this is not to say that every one-lane paved road should eventually become a two-lane, or that every gravel-surfaced road should eventually be paved. Small rural country roads have a value and charm of their own, and local examples contribute to the overall atmosphere of the county. Narrow, winding roads also contribute to slower driving speeds, and in most cases, accidents which do occur on such roads are less severe than on major highways.

Likewise, remaining primitive roads which are currently only marginally maintained should continue at their current status until such time that increased usage demands otherwise. Many local residents have in the past enjoyed driving these old roads recreationally, and the practice will no doubt continue into the future.

Support continued and/or expanded mass transit service to the region.

Passenger train service should be continued at Alderson; and expanded schedules might be conducive to increased patronage. A full-service station would be desirable as well - though such is not likely to happen with very limited numbers of persons boarding there. Continued service at area airports is vital; and van transportation for local seniors unable to drive on their own is a much needed service and should be maintained and expanded. Commercial bus service and taxi service within the county would offer benefits; but implementation is unlikely with limited population and usage. Increasing fuel costs may perhaps make mass transportation a more attractive alternative to automobile travel, and may perhaps lead to the return of more mass transit alternatives in the local area. As Monroe's population is projected to both increase and age substantially, maintaining and future expansions of the senior bus/van service should definitely be promoted.

Encourage pedestrian-friendly improvements where appropriate.

Efforts should continue at improving walkability of the county's three principal downtown districts; and similar goals should be carried forward to smaller villages where need is evident and funding can be found. Parking availability should be monitored, and spaces created as need determines. Any focus on sidewalks and walkability issues in towns and villages should also incorporate wherever possible the

needs of persons with disabilities.

Expand opportunities for walking, hiking and bicycling.

Recreational trail opportunities for casual walking, hiking, and bicycling should be expanded. Investigation should continue into the possibility of designating trails on unmaintained or lightly-traveled public roads - as this may be the most economical and efficient means of such expansion in the short term. Continued maintenance and promotion of existing trails should also be a priority. Incorporation of bike or pedestrian lanes in conjunction with highway improvements should be considered, as noted under "public highways" above.

Consideration should be given to the creation of bicycle or pedestrian lanes, where financially feasible, when any major highway upgrades are undertaken. Safe routes for nonmotorized travel would likely increase the number of persons employing such means of travel - providing inherent benefits of exercise, recreation, and decreased fuel consumption.

Limit ATV use on public roads.

As in many areas of the state, public roads are frequently used for ATV travel. Inappropriate use of ATVs on public roads is a significant hazard, resulting in accidents and fatalities. While many farm owners utilize ATVs and farm use should be distinguished from recreational use, ATV use on public roads should be strictly limited.

Evaluation and monitoring

In regard to public highways, the planning commission should meet at regular intervals with local government, civic, and community leaders and highway officials to evaluate progress and determine areas where focus is needed. Similar actions could be undertaken with participating agencies or groups on the topic of trails. Members should be alert for news of significant potential changes in access to rail and air transportation, and use what influence is available to support positive change or ward off negative developments.

Monroe County Planning Commission

Transportation <i>Create an improved transportation system which is proportional to demand; increase recreational and healthful exercise opportunities by an improved system of hiking and bicycle trails; and enhance vitality of town economic centers by improving parking and walkability.</i>		Very High priority	High priority	Midlevel priority
Goal 4.1	Improve primary highways as needed.			
Objective 4.1.1	Widen Rt. 219; modify dangerous curves, intersections and bridges; provide passing lanes.			
Objective 4.1.2	Widen Ft. 122 through Greenville and to the Summers County line.		•	
Objective 4.1.3	Improve primary highways with modern safeguards (e.g. non-skid pavement on curves, center line reflectors, pot-hole repair).		⊙	
Goal 4.2	Improve and/or maintain secondary roads as needed			
Objective 4.2.1	Pave, widen, and/or upgrade as traffic and safety demand.		◦	
Objective 4.2.2	Reestablish centerline on Potts Valley road.		⊙	
Objective 4.2.3	Preserve and maintain rural, single lane, country roads that contribute to local rural character and where low traffic flows deem appropriate.	•		
Objective 4.2.4	Assess additional roads for potential scenic byway designation where local interest is present.		◦	
Goal 4.3	Support continued and/or expanded mass transit service to the region.			
Objective 4.3.1	Support expanded rail, air, bus and/or van services.		◦	
Objective 4.3.2	Support expanded transit services for seniors in the county.	•		
Goal 4.4	Encourage pedestrian-friendly improvements where appropriate.			
Objective 4.4.1	Improve walkability and parking in the county's three incorporated downtown districts.		•	
Goal 4.5	Expand opportunities for walking, hiking and bicycling.			
Objective 4.5.1	Continue maintenance and promotion of existing trails in the county.	•		

Objective 4.5.2	Investigate opportunities for designating trails on unmaintained or lightly traveled public roads.		•	
Objective 4.5.3	Expand hiking and biking trails where feasible (including the Narrows of Hans Creek].		◦	
Objective 4.5.4	Create bicycle and/or pedestrian lanes when any major highway upgrades are undertaken.		©	
Goal 4.6	Limit ATV use on public roads.			
Objective 4.6.1	Restrict ATV use on all paved roads.			
Objective 4.6.2	Restrict ATV use on all public roads.		.	
Objective 4.6.3	Require that all persons driving ATVs on public highways be required to carry appropriate insurance.	◦		
Objective 4.6.4	Require driver's license for recreational use of ATVs on all public highways.	.		

Infrastructure

Purpose: Maintain current infrastructure where adequate, support improvement of critical existing facilities where needed, and promote expansion into areas where population density, lack of available services, or potential environmental hazards make such expansion advisable.

Background

Commercial electric service came with much fanfare to the town of Union in 1909. Many outlying areas did not receive electric service until significantly later - the 1940s and 1950s, for example, in Potts Valley. Likewise, access to telephone communications began in the county's three incorporated towns, and gradually spread outward to finally become ubiquitous throughout the more rural areas. Monroe is just now witnessing these same trends in regard to the more modern technologies of cellular phone service, emergency radio communication, and high speed internet. The county 911 center incorporated a second transmitter near Peterstown and upgraded from a VHF to a UHF system within the last five years.

Public water and sewer service, likewise, began in county population centers, and to a lesser degree, have spread outward into surrounding rural areas. A nearby water source was essential for development of towns and villages. Among the earliest efforts were improvements incorporated into public springs for use by local residents. One such facility was still operating on Pump Street in Union into the early 1970s. An elevated pipe spewed forth a constant stream of water, which could be caught in containers and taken home by local residents. A concrete trough below the pipe collected the overflow; presumably for use in watering livestock or washing clothes.

The dates marking the onset of the piping of public water into homes are difficult to determine. Wooden water pipes have been unearthed in Union, indicating that the practice may have been in use at least in some degree during the 19th century. Greenville's community system is little changed from when it was first implemented. It remains unmetered, and utilizes a wooden storage tank. Later improvements to water systems have included the testing and treatment of drinking water and the use of more distant sources, as well as the creation of public sewer systems to complement public water systems. In

contrast to electric and telephone service, however, Monroe's uneven terrain, rural nature, and the general availability of good quality drinking water from private wells and springs may make it less likely that a countywide public water and sewer system will be the ultimate result, at least in the foreseeable future.

Current conditions and potential impacts and threats

Electric: Electric service in Monroe County is provided to most residents by either Allegheny Power (in central, northern, and eastern Monroe), and Appalachian Power, in the western portions of the county. A small proportion of county residents (in the Potts Valley section) receive service from Craig Botetourt Electric Company. Transmission is almost entirely by way of overhead lines. Maintenance of these rights-of-way by power companies has been generally good in recent years. Power outages do sometimes occur following storms, but these are generally not frequent, nor of excessively long duration. In the not so distant past, an Allegheny Power substation was in use within the floodplain of the Greenbrier River. Flooding following a winter storm in 1996 left many residents without power for several days, during extremely cold weather.

Water and Sewer: Public water and sewer systems are mostly centered around incorporated towns, and in many rural areas of the county, residents use private wells or springs for drinking water and have individual septic tanks for processing of sewage.

Red Sulphur Public Service District (PSD), based in Peterstown, serves the largest customer base, and unlike most other systems, does extend significantly into surrounding rural areas. The PSD offers both water and sewage services. It extends along U.S. 219 nearly to Rock Camp, and also serves customers in the Dry Pond area and along Rt. 12 toward Ballard. Water is obtained from three springs arising near the base of Peters Mountain.

Municipal water and sewer systems in Union and Alderson are geared more toward residents of the towns themselves; although Union does offer water-only service to customers along Rt. 3 east, and recently completed a water and



sewer extension to the B.F. Goodrich plant a few miles to the north along Rt. 219. Union uses a Peters Mountain spring located about 8 miles east of the town, and also a local well.

The Gap Mills Public Service District provides water-only service to the residents of the Gap Mills community. Its source is also a Peters Mountain spring at the headwaters of Second Creek. The water lines extend along Rt. 3 for some distance from the center of the community, and also along the Zenith Road. An extension is currently being planned to serve residents of Moncove Lake Road - where safe and palatable drinking water has in recent years not been readily available.

The Greenville Public Water system is neither a municipal system, nor a PSD, and has been operated in the past as essentially an all-volunteer community effort. The system is in need of updates and maintenance, and volunteers are having difficulty meeting increasing demands and regulation. Plans have been approved for a take-over of the Greenville system by the Red Sulphur PSD, and funding is currently being sought for this effort.

Communications infrastructure: Land telephone lines provide service throughout the county. All are a part of the Verizon network - formerly Bell Atlantic, and before that, the C&P [Chesapeake and Potomac] Telephone Company.

Cellular phone service is provided in varying degree by U. S. Cellular and AT&T. Each company has one tower within county borders. U. S. Cellular's tower is located atop Bickett's Knob, a few miles northwest of Union. Coverage with this company is primarily limited to central and north central portions of the county. AT&T operates a tower on top of Peter's Mountain, south of Peterstown, providing reception in western portions of the county. Cell phone reception is not available in many locations in eastern and northeastern Monroe.

County emergency radio service is likewise provided by towers atop Bickett's Knob, and also the same Peter's Mountain location south of Peterstown. Emergency radio reception is lacking in the Moncove Lake/Glace area, in northeastern Sweet Springs Valley, and in all of Potts Valley. The county 911 center has proposed locating a repeater near the Crowder Road crossing of Peter's Mountain, which would rectify coverage in all three areas. Initial applications were denied by the FCC, however, since the location is within the radio-quiet zone of the National Radio Observatory at Green Bank. Negotiations on a repeater are ongoing with Green Bank and the FCC.

Cable television service is limited primarily to the county's three incorporated towns, as is

Utility Providers in Monroe County

- Appalachian Power (a division of AEP)
- Allegheny Power
- Craig Botetourt Electric
- Mountaineer Gas
- Red Sulphur PSD,
- © Town of Union Municipal Water and Sewer
- Gap Mills PSD
- © Town of Alderson Municipal Water and Sewer
- Greenville Community Water System
- © Verizon
- © U. S. Cellular
- AT&T (formerly Cellular One)

highspeed or DSL internet service. Many residents rely on satellite television. Dial-up internet service is generally available throughout the county. Some rural customers frustrated with the limitations of dial-up service have resorted to high-speed access via satellite - however, costs for such service remain significantly higher than with line-based systems.

Natural Gas, Heating Oil, and Propane: A natural gas pipeline crosses Monroe in a generally east-west direction, somewhat north of the center of the county - providing service to the town of Union and to residences near the line. Renewed exploratory drilling for natural gas in the local area is anticipated, and installation of

additional lines may increase areas where natural gas service is available. Home heating oil and propane is provided by vendors who transport into the county from facilities in adjoining areas. Refills of small bottled gas containers are available from various vendors within the county.

Renewable Energy Development

Small scale renewable energy production is becoming increasingly viable, including applications of solar, wind, and geothermal technologies. Producing energy on-site is often in the best interests of the local landowner, and reduces the demand for public transmission

infrastructure. Homeowners should be encouraged to develop small scale systems however possible.

Additional Infrastructure Needs

As noted in the chapter on Economic Development, there are multiple forms of infrastructure, each critical to the County's well-being and sustainable development. This chapter focuses exclusively on "hard" infrastructure - those utilities that convey to us the basic services that traditionally define infrastructure, including water, sewer, electricity, and communications. While not addressed here, the other forms of infrastructure are equally important, and those include *soft infrastructure* (e.g. schools, medical services, libraries), *green infrastructure* (e.g. soils, water, topography), and *fiscal & administrative infrastructure*. These components are each addressed separately in other sections of this Plan.

Planning for Future Infrastructure Development

Goals

Efforts at providing needed infrastructure should be consistent with and sensitive to the existing intrinsic qualities of the area and its culture. In regard to public water and sewer, countywide public service may not be particularly suitable to local terrain; water quality may not equal that already available from private sources; and countywide service would likely be counterproductive in regard to established goals of limited sprawl and maintenance of rural character.

Expansion of infrastructure should be undertaken with the utmost sensitivity to scenic viewsheds, ecosystems, and established goals of preservation of rural atmosphere and open space. Public water and sewer expansions should only be implemented as need determines and with consideration to preferred development areas, since the availability of public water and sewer will likely hasten subdivision and sprawl development. Erection of cell phone and emergency radio towers should be limited to the minimum quantity needed to provide adequate coverage. Underground electric and telephone wires should be considered for sensitive areas or new subdivisions.

Collect and maintain data on current status of infrastructure delivery and needs.

Conduct periodic reviews of provider performance and reliability and ensure that established performance standards are met. Provide a contact to coordinate reviews of infrastructure performance and needs.

Provide for public water and sewer as needed.

Establish guidelines that specify how need will be determined, and what areas will be considered for public water and sewer.

Support the continued availability of utility services to all residents of the county.

Work with utilities to ensure that services are provided reliably, that proper maintenance is being performed, and that any conflicts with county goals are resolved

Expand cellular phone, high-speed internet and cable television services to make such options

available for a greater portion of county residents.

Work to facilitate a compromise involving the F.C.C. and the Green Bank Observatory, in regard to emergency radio communication in eastern Monroe.

Support the ongoing government incentives to increase availability of high-speed internet or broadband service Search out opportunities for funding service expansion..

Regulate cellular phone and radio towers.

Create a county permitting requirement for cellular and radio towers, such that towers are approved only as necessary to meet the need, and are located to minimize scenic and environmental impacts. Sitings should be considered which would allow shorter towers (perhaps only minimally above tree line] - thereby eliminating the need for aircraft warning lights.

Require that towers be removed at the company's expense when they are no longer necessary.

Coordinate the delivery and upgrade of infrastructure services.

Ensure that delivery and upgrades of infrastructure are performed in accordance with county guidelines and planning goals. While communication between jurisdictions and public service districts in Monroe is ongoing to an extent, formalizing regular coordination between these entities will be essential.

Promote the increased use of alternative energy sources.

County government should support or provide incentives to homeowners who develop small scale alternative energy production. Permitting should be considered for construction of wind-generation turbines, allowing some local control in siting large windgeneration towers.

Priorities

Priority should be given to assessing immediate risks to adequate electric, telephone, water, and emergency communications services, and taking what actions are available to minimize such risks. Included in this action would be the assessment of areas where local private sources of water are inadequate or failing. Implementation of suggested county regulatory actions should occur concurrently.

Ongoing Evaluation

Planning commission members should meet periodically with PSD boards and county officials

and employees to assess needs or potential problems in regard to water and sewer service and emergency communication. Channels of communication should remain open with utility companies (electric, telephone, and natural gas] to assess needs, risks, and proposed changes which could prove either beneficial or detrimental to the local area. Periodic monitoring of the customer base served by cellular phone, cable, and internet companies should be performed to assess whether service is expanding, decreasing, or remaining static.

If county regulatory action is taken, regular monitoring will be needed to ensure that regulations are being complied with.

Infrastructure: <i>Maintain current infrastructure where adequate, support improvement of critical existing facilities where needed, and promote expansion into areas where population density, lack of available services, or potential environmental hazards make such expansion advisable.</i>		Very High priority	High priority	Mid- level priority
Goal 5.1	Collect and maintain data on current status of infrastructure delivery and needs.			
Objective 5.1.1	Collect information on coverage areas, customers served, and capacity for additional customers from: Allegheny Power, Craig Botetourt Electric, Mountaineer Gas, Red Sulphur PSD, Gap Mills PSD, Union and Alderson municipal water sewer systems, Greenville Community Water System, Verizon, U.S. Cellular, AT&T, DSL & broadband providers.		⊙	
Objective 5.1.2	Catalog risks which could cause interruption of electric or telephone service (e.g., transmission/telephone lines at risk, substations located in floodplains).		⊙	
Objective 5.1.3	Identify areas where local private sources of water are inadequate, unsafe or failing.	.		
Goal 5.2	Provide for public water and sewer as needed.			
Objective 5.2.1	Support adequate maintenance of existing water and sewer systems through staff training, regular facility assessment, and funding coordination.		⊙	
Objective 5.2.2	Expand public water and sewer only as need determines and with consideration to preferred development areas.	o		
Objective 5.2.3	Expand public sewer systems, or install alternative treatment systems, where private septic systems are not feasible.			
Objective 5.2.4	Provide public water, within financial restraints, for underserved citizens.	⊙		
Objective 5.2.5	Support the development of private water treatment systems for residential and commercial uses where appropriate.	9		
Objective 5.2.6	Assist residents with acquiring access to quality drinking water.	⊙		
Goal 5.3	Support the continued availability of utility services to all residents of the county.			
Objective 5.3.1	Require that all new subdivision utilities be placed underground.		⊙	
Goal 5.4	Expand cellular phone, high-speed internet			

	and cable television services to make such options available for a greater portion of county residents.			
Objective 5.4.1	Encourage government incentives to increase availability of high-speed internet or broadband services.		⊙	
Goal 5.5	Regulate cellular phone and radio towers.			
Objective 5.5.1	Implement a permitting process for all towers, approving only those that are necessary and in locations which minimize scenic and environmental impacts.	⊙		
Objective 5.5.2	Require that all towers be removed at the company's expense when they are no longer in use.	•		
Goal 5.6	Promote the increased use of alternative energy sources.			
Objective 5.6.1	Support or provide incentives to homeowners who develop small scale alternative energy production.	⊙		
Objective 5.6.2	Require permitting for construction of windgeneration turbines, providing for local input on if and where turbines are located.	⊙		
Goal 5.7	Coordinate the delivery and upgrade of infrastructure service.			
Objective 5.7.1	The Planning Commission, County Commission, PSD boards and others must meet regularly to coordinate and prioritize infrastructure services.		•	

Public Services

Purpose: *Provide and/or enhance services which meet the medical, cultural, historical, community, social, and educational needs of county residents.*

Assisting with the coordination of public services is a critical function of a Planning Commission and the County Comprehensive Plans. Within this context, “public services” includes services and amenities related to medical care, cultural resources, family support, and education.

History

Medical: It is almost a certainty that the early residents of the county had little or no access to medical care - aside from what they could provide for themselves. By the mid to late 1800s, doctors were established within the more populous communities of the county. Even so, transportation was slow and an M.D. might be called upon to travel from community to community - sometimes spending a few days at each stop to tend to people with various ailments while in the neighborhood. Even into the 1960s, ambulance service (essentially, a transport only service] was still being provided by local morticians.

Cultural, social, community: Community social and cultural activities most likely played a larger role in Monroe County’s past than they do in the present. Television, radio, movies, the internet, and other modern forms of more “individual” entertainment simply did not exist to fill what little free time was available after the day’s work was done. Church socials, pie suppers, quilting bees, and the like were common affairs. Newspapers from the late 1800s were replete with reports on the activities of debate societies, oratory groups, croquet clubs, book clubs, marching bands for adults, etc. We can perhaps fortunately note that community-centered entertainment, though diminished, most likely still plays a larger role here than in the nation's more urban jurisdictions.

As with many rural areas, entertainment facilities have diminished somewhat in recent decades. In the 1940s and 1950s, Union could boast a movie theater, skating rink, and bowling alley. The increasing mobility of the automobile age has tended to focus such establishments in larger population centers. No such facilities operate anywhere within the county now - though most are

available in neighboring counties.

Current service clubs are mostly a creation of the 20th century, although the Masons and some other fraternal organizations date back locally well into the 1800s. Independent baseball leagues were common from the 1920s into the 1950s. Quasi-governmental entities focusing on the needs of the poor or abused began to appear in the later decades of the 20th century. Before that time, churches and individuals often attended to these needs to the best of their abilities. A “poor farm” did operate near the community of Gates during the Depression era - as did a CCC camp established just south of Union

The first newspapers were published in the county in the 1850s. Several were born and met their demise within only a few years. The Monroe Watchman began in 1872 as the Border Watchman, and has been published continuously since that time. The Monroe Mail was also published for a couple of decades beginning in the 1920s.

Education: The Colonial Virginia aristocracy generally saw education as a private affair. Wealthy families hired tutors for their children, and families who could not afford this "luxury" simply did without. This essentially English concept met opposition among Scotch- Irish and German settlers, who tended to favor some form of education for all. A law of 1811, in which funds were to be provided to educate poor children in the colony, reflected the beginnings of a change in thinking in public educational policy. The first board of school commissioners was appointed in Monroe County in 1820. By 1851, eleven school districts had been established in Monroe, each with its own assigned trustee. By 1876, 63 white and 6 "colored" schools were reported in the county. By 1916, the number of schools had increased to 120. Soon thereafter, the one room schools began to be consolidated into two, four, and six room facilities. In the 1950s, high schools included Waiteville, Gap Mills, Union, Greenville, and Peterstown; with more numerous grade and middle school facilities. By the 1970s and 1980s, high schools were in operation only at Union and Peterstown - with grade school and junior high facilities at Gap Mills, Union, Greenville, and Peterstown.

In regard to private institutions of higher learning, Union Academy was established in 1820. Trustees for the facility were named in an act of the Virginia General Assembly. The facility remained in operation for approximately 50 years. In 1872, the West Virginia Female Seminary was chartered, also in Union. In 1876, it was sold and renamed the “Johnson Female College.” While reported to be fairly successful, the facility lasted only until the mid 1880s. Other private colleges included the

Rocky Point Academy, at Sinks Grove; and a boarding school established by William Adair at Red Sulphur Springs in 1855, which reported attracted students from as far away as Bedford County.

The Sally Miles Reading Room (functioning as a library) was established in Union in the 1920s and operated into the 1950s. The first public library there was built (also in Union) as a WPA project during the depression era. A bookmobile program (the first in the state) was implemented in the 1950s, wherein a panel van loaded with library books traveled to schools wherein students could browse and check out books.

Current Status

Medical: The county is currently served by the Monroe County Health Center, an entity which receives some government funding and operates under the guidance of a board of directors appointed by the Monroe County Commission. The Health Center operates facilities in Union, Peterstown, New Castle, Virginia, and in each of the county's public schools, is staffed by several doctors, and offers a sliding-scale fee structure for low-income residents. Also housed at the county health center is the Monroe County Board of Health (and the county sanitarian), involved in food service inspections, sewer system inspections, and other public health issues. In addition to the health center, two privately-owned facilities offer medical services to local residents, as does one chiropractic clinic and one physical therapy facility. Dental offices are present in both Union and Peterstown, and pharmacies operate in Union, Peterstown, and Alderson. FMRS Mental Health operates a satellite clinic in Union. Eye care is not currently available within county borders, however facilities in Greenbrier, Mercer, and Giles counties serve local residents in reasonably convenient fashion.

<u>Health Indicators</u>	Percentage of residents Monroe County	Percentage of residents West Virginia	Rank Amongst WV Counties
No Health Insurance Ages 18-64	27.9	22.8	9
No Leisure Exercise	33.8	28.2	7
Diabetes	10.3	10	13
Hypertension	36.3	32.6	5
High Cholesterol	42.2	39.1	12
Obesity	29.3	27.7	12

Cigarette Smoking	27.1	27.5	21
Smokeless Tobacco Use	23.5	16.9	7
Binge Drinking	7.6	10.1	28
Heart Attack, Angina or Stroke	16.2	13	5
Current Asthma	9	9.2	17
Arthritis	38.2	33.9	7
Fair or Poor Health	29.8	24.3	7

There are likewise no hospitals within the county, nor have they been present here in the past. Residents in central and eastern Monroe generally utilize Greenbrier Valley Hospital, Fairlea, WV, or Alleghany Regional Hospital, Low Moor, VA - both of which are between 20 and 60 minutes distant from the above-mentioned sections of Monroe. Residents of western Monroe County are most commonly served by Princeton Community Hospital, Princeton, WV; Giles Carilion Memorial Hospital, Pearisburg, VA; or Montgomery Regional Hospital, Blacksburg, VA. Travel times to these facilities are generally between 15 and 60 minutes for residents of western Monroe. More advanced medical treatments are available at Roanoke Memorial Hospital and Lewis Gale Hospital, both in Roanoke, VA; Charleston Area Medical Center, Charleston, WV; and the University of Virginia Medical Center, Charlottesville, VA. All of these facilities are between one and three hours distant from most sections of the county. Monroe is served by three community rescue squads and one county-wide paramedic unit. These entities are discussed in more detail in the Public Safety protocol.

Cultural, Social, and Community: Cultural, social, and community needs are met locally by a host of clubs and civic groups, including Rotary, Ruritan, and Lions Clubs, Masons and Shriners, church groups, and the CEOS clubs operated by the extension service. Special interest groups include an Antique Tractor club, a Spinning and Weaving group, and informal literary and bridge clubs. The Monroe Arts Alliance offers classes in various art venues for adults and children, and sponsors art exhibits and musical performances.

Opportunities for young people include baseball, basketball, football, and soccer leagues, girl scouts and boy scouts, and a very active 4-H program. The community festival concept is represented locally by the annual Farmer's Day Parade, sponsored by the Union Area Chamber of Commerce; the Autumn Harvest Festival, sponsored by WVU Extension; and 4th of July Parades in Alderson and Lindside. Numerous "community centers" sponsor smaller social events throughout the county. Many of these facilities are situated in former public school buildings. Neighborhood cultural events like apple-butter making, molasses making, and quiltings are hosted sporadically. A wider selection

of musical, art, and theatrical events are available nearby in Lewisburg and Blacksburg.

The county is currently served by one local newspaper, the Monroe Watchman, and also a radio station at the county high school. Nearby newspapers also circulate within the county - and reception in varying degrees is available for radio and television stations within the region. Cable TV service is generally limited to the residential areas of Union and Alderson - with the exception of western Monroe, where such service is available in Peterstown and also extends well beyond municipal boundaries.

Assistance for low-income families, and other families following fires or other disasters is provided by the Monroe County Family Resource Network, the local Department of Health and Human Resources (DHHR) office, and CASE Monroe, each with offices in Union. The Greenbrier Valley Chapter of the American Red Cross is also active within the county. The Family Refuge Center, an organization dedicated to assisting abused women and children, is based in Greenbrier County as is the WIC Program, and each provides services in Monroe. All of these entities have well-established plans and protocols, in regard to their roles and responsibilities within the area.

Needs of the elderly are addressed by the Monroe County Council on Aging, which offers social events, a "Meals on Wheels" program, and limited public transportation (as discussed in the Transportation document). Country View Assisted Living and Springfield Comprehensive Care Center provide assisted living and full nursing home care, respectively, for area residents. Country View, near Peterstown, is locally owned and operated. Springfield Center is affiliated with Princeton Community Hospital.

Animal control and stray animal housing are issues which need more attention whenever such is financially possible. There is currently no pound or animal shelter within the county, although shelters in neighboring counties will accept local strays when space is available. The county employs one part-time animal control officer, who could easily be kept busy full time if again, such funding were available. The Monroe County Animal League, a local volunteer group, has played and continues to play a very important role in helping to adopt homeless animals, and encouraging spaying and neutering of pets. A "Puppy Rescue" program, operated by the group, has quite literally adopted hundreds of unwanted local puppies through agreements with no-kill shelters in Massachusetts and the DC Metro area.

Veterinary care is currently available through three local practices and multiple practices in adjoining counties. Large animal (livestock) service providers are somewhat less numerous than

they once were, and waits may be experienced in busy times of the year.

Education: Monroe is presently served by one consolidated public high school, situated near Lindside; and two k-8 public schools - one at Union and one at Peterstown. Pre-K programs have recently been implemented. Schools are thought to be generally effective and in good condition. James Monroe High School has been designated a Blue Ribbon School by the state on one occasion within the last 10 years. As in most areas of the country, though, concerns about student apathy, performance, and drug abuse are not entirely absent.

Private schools include: Ballard Christian School, a K-12 facility in the community of Ballard, and the Mennonite School at Gap Mills, which serves children of that faith. Some parents within the jurisdiction homeschool their children, although this is likely a small percentage in comparison to the total student population.

Of the three current facilities, Peterstown's school buildings are the oldest, and perhaps most in need of updates or repairs. The consolidation of two former high schools in the 1990s has led to increased opportunities for students in terms of subject matter and extracurricular activities. It has also created some hardships in transportation, and perhaps made it more difficult for students from some communities to participate in afterschool events. Students in some sections are more than an hour's bus ride away from the high school.

The county board of education offers various adult education classes and GED programs - often working with local libraries in both regards. Public libraries operate in Peterstown and Union. Alderson's library is on the Greenbrier County side of the municipality. Peterstown Public Library has struggled with funding in recent years. The WVU Extension Office in Union sponsors numerous adult education opportunities ranging in topics from agriculture to health and nutrition, and also facilitates local CEOS (Community Education and Outreach Service) clubs.

There are currently no colleges or universities within Monroe's boundaries. Within a 90 minute drive of most parts of the county, however, are: the Greenbrier Valley Campus of New River Community and Technical College; Dabney Lancaster Community College; Bluefield State College; Concord University; Virginia Tech; Radford University; Roanoke College; Hollins College; and Virginia Western.

Law Enforcement, Fire and Rescue Services: The county is currently being served by the following fire departments and rescue squads:

Fire Departments: Union, Lindside, Ballard, Peterstown

Rescue Squads: Union, Sweet Springs, Peterstown, Medic 1 (county-wide paramedic unit)

Alderson: The Monroe County side of the city is provided fire and rescue services headquartered on the Greenbrier County side of the city.

Cooperative agreements exist with nearby departments; and such departments have in the past respond when needed. Fire and rescue departments/squads from Paint Bank, Dunlap, White Sulphur, Lewisburg, Fairlea, Alderson, and Giles County have all answered calls in Monroe on occasion.

Law enforcement and police services are provided by the Monroe County Sheriff's Office and the West Virginia State Police. Adequate staffing continues to be an ongoing concern to most residents due to poor response times caused by the lack of available officers on duty.

Training requirements for fire and rescue squads are established by the state. Since Monroe County and many counties in West Virginia are served primarily by volunteers, it is very difficult to recruit and maintain adequate personnel to operate effectively due to the extensive training requirements. Therefore, members of the WV Legislature should be contacted to discuss potential changes with the Bureau of Public Health to better accommodate volunteer fire and rescue squads.

Disasters: Most local fire and rescue departments have protocols and locations for establishment of emergency shelters in the event of power outages in cold weather, extreme storms, flooding, etc. The county Office of Emergency Services (OES) also has contingency plans in place for such events. A Threat Preparedness Group, sponsored by the Health Center has recently developed plans for dealing with potential bioterrorism and epidemics or pandemics. Region 1 Planning and Development has completed a "Hazuz" plan for the six counties within their jurisdiction. The effectiveness of all such plans is difficult to judge, since large-scale disasters have not been experienced in the recent past. The county's topography (with the exception of Alderson) limits flooding to small stream events, wherein typically only small numbers of residents could be displaced. Lengthy power outages from wind, snow, and ice storms have been uncommon in recent years.

Hurricanes have (at least thus far] never traveled this far inland, and tornados are rare and generally not intense. Earthquakes, likewise, are uncommon and have not caused significant damage. Wildfires occasionally occur in the forestlands, but have not impacted communities or farmlands.

Regulatory Authority

Monroe Health Center is governed by a board of directors appointed by the county commission. The County Board of Health (also appointed by the county commission) oversees the activities of the county sanitarian - whose duties and powers are further established by state and federal law. Recent persons filing this role have attended to their duties with reasonable diligence. Private medical, dental, psychiatric, veterinary, and ophthalmic facilities are regulated in some degree by state practice acts governing these professions. FRMS is governed by a regional board of directors.

The Monroe County FRN and CASE Monroe are quasi-governmental organizations, subject to some state oversight. The FRN has a comprehensive website at <http://www.monroecountywestvirginiafamilyresourcenetwork.com>, containing a link to a resource directory, the most recent Community Plan, and a *Monroe County Assessment, 2007*. The Monroe County Council on Aging is operated by a local board and director, and also is connected to a state - level organization. DHHR is a state agency. The Greenbrier Valley Chapter of the American Red Cross and the Family Refuge Center are both governed by local boards. Red Cross is of course also governed by nationally established policy. School policy is determined by a locally elected board of education, which in turn is responsible for hiring the county superintendent. Local libraries are governed by boards of directors. Countywide disaster planning is the responsibility of the county OES director, an employee of the county commission.

On National Forest lands, the US Forest Service provides law enforcement, fire control and emergency services to some extent.

Potential key players

Monroe Health Center
Monroe County Board of Health
Drs. Gelderman, Gelderman, Miller,
Kilcollin, Harvey, and Harvey
Peterstown Pharmacy, Union Pharmacy,
Alderson Pharmacy
FMRS
Monroe County Council on Aging
Valley Vet Clinic, Tri-County Veterinary
Clinic, Monroe Veterinary Housecalls
Civic clubs, church groups, and special
interest clubs
Monroe Arts Alliance
WVU Extension
Scout leaders
Little League and other Youth sports
organizations
Radio Station at VoTech
Monroe County FRN
CASE Monroe
DHHR
Greenbrier Valley Chapter, Red Cross
Family Refuge Center
Monroe County Board of Education
Monroe County Library
Peterstown Library
Monroe County Office of Emergency
Services
Cable companies
Monroe County Extension Office

Planning for the Provision of Future Public Services

Goals

Facilitate increased coordination between related agencies and organizations, and expansion of services where appropriate.

Continuation of existing medical, cultural, social, community, and educational services; with provision for increasing variety of opportunities and expanding services for underserved communities or underserved groups or focus areas. Ensure open channels of communication between groups or organizations whose roles may sometimes overlap.

Help identify local needs and bring these to the attention of government or quasigovernment entities such as the Office of Emergency Services, WV DHHR, Monroe County FRN, CASE Monroe, and the Board of Education Work to improve channels of communication between agencies. Such might be addressed by sponsoring periodic workshops and inviting representatives from each group to attend. Such workshops could also include representatives from non-government entities with similar goals. Increase funding for areas within county government's area of responsibility (such as animal control) as soon as financially possible.

Familiarize the public with resources available from such groups. Improve channels of communication (as referenced above). Support fundraising efforts and grant applications to the greatest extent possible. Additional funding could greatly benefit local libraries, MCAL, and other such groups; and could be considered if county budget expands to beyond the current minimal levels.

Promote recognition of the positive impacts made by volunteer service and special focus groups. Support fundraising efforts and grant applications to the greatest extent possible. Improve channels of communication between government agencies and volunteer groups, and encourage involvement of volunteer groups where applicable

Provide for animal control services.

As stated above, animal control is an essential service, and warrants additional staff and funding as those resources become available. Animal control services should include support of the

Monroe County Animal League.

Support and improve disaster preparedness across the county.

Identify incident command based on the requirements of the National Incident Management System for implementation in the event of a large-scale disaster. Ensure that county emergency plan is designated to meet the needs of residents in each individual geographic location, including those of persons with disabilities. Continue county wide emergency preparedness training process for the 911 center, rescue squads and fire departments and identify how their responsibilities will be shared during a county wide disaster or community disaster. Increase opportunities for public education in disaster preparedness.

Require disaster preparedness drills at regular intervals, involving county OES and various fire and rescue departments.

Actions involving disaster preparedness - drills, assessing adequacy of plans, etc., can be initiated soon. Plans for county-wide "public services" workshops for assessing needs and improving services could also be implemented in the near future. Most other topics in this section are outside of the direct authority of either the planning commission or the county commission. Actions will be limited to assessing needs and encouraging governmental, private, and volunteer groups in their ongoing efforts.

Support improvements to schools in keeping with Board of Education priorities.

The Monroe County Board of Education is required to develop an Educational Plan for the county's schools every 5 years. The Planning Commission, County Commission, and other service providers should support and coordinate with that Plan to the fullest extent possible. Likewise, the Planning Commission should be represented when such Education Plans are being developed.

Many residents have also voiced support for the Board's efforts to upgrade or replace the Peterstown High School, a facility which is currently inadequate to serve the education needs of that region. This should remain a priority, and garner support from the County Commission and other local government entities.

PobHc Services <i>Provide and/or enhance services which meet the medical, cultural, historical, community, social, educational, and disaster needs of county residents.</i>		Very High priority	High priority	Mid level priority
Goal 6.1	Provide for animal control services.			
Objective 6.1.1	Create a new animal control service, and provide for stray animal housing.		.	
Goal 6.2	Support improvements to schools in keeping with Board of Education priorities.	9		
Objective 6.2.1	Prioritize upgrading & improvement to Peterstown school buildings.	©		
Goal 6.3	Support and improve disaster preparedness across the county.			
Objective 6.3.1	Ensure full development of an incident command structure based on the requirements of the National Incident Management System.	0		
Objective 6.3.2	Ensure that county emergency plan is adequate to meet the needs of residents in each individual geographic location, including those with special needs.	Q		
Objective 6.3.3	Continue county wide emergency preparedness training for the 911 center, rescue squads and fire departments.	.		
Objective 6.3.4	Identify how responsibilities will be shared during a county wide disaster or community disaster.	.		
Objective 6.3.5	Increase opportunities for public education in disaster preparedness.	.		
Goal 6.4	Facilitate increased coordination between related agencies and organizations, and expansion of services where appropriate.			
Objective 6.4.1	Improve communication between agencies and organizations through workshops, informational meetings and other venues (e.g. the Office of Emergency Services, WV DHHR, Monroe County FRN, CASE Monroe, WVU Extension and the Board of Education].	.		
Objective 6.4.2	Support fundraising and volunteer recruitment efforts.		.	
Objective 6.4.3	Promote continuation of existing medical, cultural, social, community, and educational		©	

	services; with provision for increasing variety of opportunities and expanding services for underserved communities or underserved groups or focus areas.			
Objective 6.4.4	Increase support, including financial assistance, provided to local libraries as funding is available.			

Recreation and Tourism

Purpose: Promote the creation of additional recreational opportunities for county residents and visitors, and encouraging growth of the tourism industry as a means of economic opportunity.

Monroe is somewhat unusual in that use of the county for the purpose of recreation and tourism is historic itself, extending back over 200 years. Mineral springs resorts were drawing people to the area as early as the Revolutionary War era - and during most of the 1800s, business was booming at Sweet Springs, Salt Sulphur Springs, Red Sulphur Springs, and numerous smaller facilities. Travelers flocked from the lowlands of coastal Virginia and the Carolinas and even from as far away as Louisiana to escape the heat and diseases of the summer time. Throughout the latter years of the 1800s and the beginning of the 1900s, it was not uncommon for private homes in the county to rent out rooms to summer visitors.

Most of the large resorts had closed, however, during or somewhat before the Great Depression, and tourism was reasonably dormant in the area for several decades. In the 1960s and perhaps the early 1970s, the Mountaineer Travel Council resurrected the promotion of tourism in the region, but this organization ceased to exist by the mid to late 1970s. Only in the last 10 years or so has the tourism industry in the county seemed poised for a rebound.

Monroe is blessed with an abundance of pastoral and mountain landscapes, clean streams, and historic structures. All of these characteristics lend themselves to recreation and tourism opportunities. While the county's scenic attributes are innate, in recent decades more specific destination points have been less common, and tourism development has been limited somewhat by both a lack of specific attractions, and a lack of organized promotion. Although many historic buildings remain, few have been open and accessible to the public. The lack of promotion and opportunity is beginning to change.

A county tourism director was hired in 2003, a county tourism/recreation website has been developed, and county brochures are in circulation which attempt to tie together various recreational opportunities and points of interest. The number of businesses

catering to tourist or “leisure” customers has increased in recent years in both Union and Alderson. Represented are such things as upscale restaurants, novelty or craft shops, and antique stores. Mennonite businesses at Gap mills are attracting visitors from a fairly wide area. However, within the last few months (2008), the county has lost some ground in this area. Union's only antique shop has closed, as has an art supply store and an upscale restaurant which drew patrons from neighboring counties. In Alderson, a lovely arts and crafts shop is located on the Monroe County side of the river.

While the grand resort hotels of the 1850s had all closed their doors before the middle of the 20th century, tourism continues to have an economic impact in Monroe County today. And that impact is increasing. According to a Dean Runyan Associates study released in 2005,

Travel Spending (\$M) increased from 6.9 in 2000 to 8.8 in 2006p;
 Earnings were impacted by visitors (\$M) at 1.7 in 2000 and 2.0 in 2006p;
 and Employment (jobs) decreased slightly from 140 in 2000 to 130 in 2006p (2.9%
 of total employment in Monroe County).

In January of 2004, hoping to fund an infrastructure for the tourism industry, the Monroe County commission instituted a Hotel Occupancy Tax.

Since the tax was instituted, the amount collected has more than doubled:

FY ending June 30, 2004	\$ 522.41/6 months
FY ending June 30, 2005	\$2,842.00/12 months
FY ending June 30, 2006	\$3,618.98/12 months
FY ending June 30, 2007	\$3,300.00/12 months

Some of Monroe County's Historic Assets include:

- Four grist-mills, one still in operation (Reed's Mill), one not operating but in good condition (Cooks Mill at Greenville), one in fair condition (McClung's), and one in desperate need of attention (Rodgers).
- Two covered bridges (Indian Creek and Laurel Creek), one historic church-museum (Rehoboth), four National Register of Historic Places districts (Alderson, Lynnside, Pickaway Rural, and Union), four structures in Union owned by the Monroe County Historical Society, some of which are open to the public with reasonable frequency during the warmer seasons (Monroe Historical Society Museum, Clark-Wiseman House, Ames Clair Hall, and First Baptist Church), and many old cemeteries (always interesting to genealogy researchers).
- Many old church buildings still in use, several quaint "mom and pop" businesses, and many historic homes (some quite impressive and unique, and more than ten outside the historic districts individually listed on the National Register of Historic Places).
- Miles of scenic views interpreted in part by four driving tours: The Springs Tour, the Farm Heritage Road, the Mountain's Shadow Backway and the Wolf Creek Backway.
- Moncove Lake State Park, offering boating, fishing, camping, hiking, and picnicking, and Slaty Mountain Preserve (a conserved area of rare shale barren habitat).
- Numerous caves offering opportunities for spelunkers, although none are currently operated commercially.
- 15,000 acres of the George Washington and Jefferson National Forest, including Hanging Rock Observatory, the Allegheny Trail, the Appalachian Trail, and the proposed Potts Valley Rail Trail (hiking and biking - currently under development).

Q Fishing opportunities in numerous streams, including Second Creek Fly Fishing area.

- Hunting opportunities in national forest, at "package hunt" facilities (Stony Brook, Mountain Meadow, Potts Valley Outfitters and Hollow Hill Farm), and (with permission) on private property.
- Lodging opportunities at a handful of unique facilities, (Creekside Resort, Salt Sulphur Springs Guesthouse, High Meadow Farm Lodge, Mountain Shadows Cabin, The Guest Cottage, Larew Cottage).
- Good potential for tourism related activity with the proposed development of Old Sweet Springs Resort, with the Old Mill complex at Greenville, and at the now dormant Trout House Lodge facility.

-Note: A more extensive list of assets may be found in the appendix.

Tourism is uniquely compatible with other established goals of historic preservation, and the maintenance of agricultural influence and the scenic beauty of the region. The vision is that in fifteen years Monroe County will be a rural, agricultural community that continues to offer an

authentic experience to the traveler.

Potential key players/programs at the local, state, and federal level

Local: Monroe County Tourism Office, Monroe County Tourism Advisory, Monroe County Historical Society, Monroe Arts Alliance, Monroe County Artists Guild, Friends of THE Second Creek, Indian Creek Watershed Association, Autumn Harvest Festival Committee, Union Area Chamber of Commerce, Alderson Main Street, Monroe Farm Market

Regional and State: Moncove Lake State Park, West Virginia Caving Association, West Virginia Scenic Trails Association, Southern West Virginia Convention and Visitors Bureau, West Virginia Division of Tourism, West Virginia Department of Transportation, West Virginia University Extension Service, and Mountain RC&D.

Federal: George Washington and Jefferson National Forest, United States Department of Agriculture Rural Development, US Park Service, US Army Corps of Engineers.

Planning for Future Recreation and Tourism

Challenges

A certain density of attractions and lodgings are required to attract substantial numbers of visitors. However, it may be financially risky for entrepreneurs to open tourism-related facilities, when tourism numbers may not yet adequately support such businesses. Growth in facilities, and growth in number of visitors, must happen incrementally, and to a certain degree, also concurrently. In addition, growth must happen wisely and within local limits of taste and acceptability.

A second obstacle is the lack of personnel to provide reasonably constant access to historic sites. Private owners of sites of potential interest to tourists (such as Reed's Mill, Cook's Mill, etc.) are not always able to have their facilities open on a regular, predictable basis. This is even true in regard to the historic society properties - lack of staffing frequently means that these facilities are closed when tourists might wish to visit.

A final obstacle is limited funding for promotion, or development of new facilities. The county has enacted the hotel/motel tax, which must be used for tourism or recreation. However, with the limited number of lodging beds in the county, income from this tax is small - typically \$3,000 to \$4,000 per year. (County Commissioners have recently raised the bed tax from 3% to 6% which will still fall far short of current needs.) In comparison, "bed tax" revenue in nearby Greenbrier and Pocahontas exceeds \$1,000,000 per year in each county. Income from the hotel/motel tax will of course increase as more lodging facilities are established. The opening of a large facility (such as the Sweet Springs Hotel) would greatly improve funding for tourism and recreation.

Goals

Support public and private tourism expansion efforts by coordinating the collection and dissemination of important data.

Multiple organizations and individual business owners are contributing to tourism expansion in the county through site and destination promotion, and marketing of local tourism related businesses. Local government should encourage these and additional efforts through coordination of relevant data collection and distribution. Outputs could include current local tourism maps, collected interpretive information, and joint marketing campaigns. These efforts may best be served through support of the ongoing efforts of Monroe County Tourism.

Support historic and cultural tourism efforts.

Preservation of historic structures are important to tourism and recreation. Ongoing efforts of the Monroe County Historical Society should be supported and encouraged. The Indian Creek Conservancy has been working in the county for several years toward the goal of preservation of open space. This, too, is important for tourism and recreation. Likewise, highway litter control and clean-ups undertaken by various civic groups and adopt-a-highway programs should be supported and encouraged.

Publicly sponsored events include the annual Autumn Harvest Festival and Farmer's Day Parade. Expansion of these concepts could provide additional opportunities for tourism and recreation.

Historic home or site tours could have positive impacts. Efforts could be made to encourage participation of private homeowners in such events, with attention devoted to finding ways to make such landowners feel secure in regard to issues such as possible injury liability. In regard to staffing issues at facilities which are already sometimes open to the public, perhaps greater use could be made of volunteer youth groups.

Support protection of open space and public recreation areas.

The Monroe County Farmland Protection Board, through purchase of conservation easements and assistance with donation of conservation easements, is likewise engaged in protection of farmland and open space. As noted with the Indian Creek Conservancy, this effort will also enhance tourism potential and opportunities for local recreation.

Support the creation of new tourism-related business wherever possible.

Great potential also exists for agri-tourism and heritage tourism which has thus far not extensively

been utilized. Current agri-tourism is limited to summer activities at Morgan Orchard, fall festivals at Cinderella Pumpkin Farm and Byrnside Branch Farm, and the milling of grains at the Reed's Mill.

Creation of new tourism-related business in the private sector is needed, and should be encouraged in whatever fashion possible.

Protect and expand the county's system of trails and scenic byways.

Much time and effort on the part of local volunteers has been put into the development of trails and byways, and these efforts have clearly supported tourism promotion in the county. Byways should continue to be protected and maintained.

Efforts to expand hiking and biking trails in the county are also underway, and these should likewise be encouraged. Local government can help ensure that mechanisms are put in place to provide for long-term upkeep of new trails and byways.

Coordinate and support related efforts of local government agencies and organizations.

Established comprehensive planning goals in regard to land use, maintaining agricultural character, revitalization of communities, control of strip development, subdivision, clean water, litter control and public eyesores (abandoned cars, dumps, derelict buildings), and adult entertainment all have the potential to positively impact tourism and recreation opportunities. These are dealt with in more detail in other committees.

Encouraging enforcement of existing regulations.

There are few existing regulations which would apply to tourism or recreation. One is certainly the continued application of the hotel/motel tax. While limited in impact, the

tax is nonetheless contributing a few thousand dollars per year for tourism and recreation development and promotion. As previously noted, as number of lodgings grow, benefit from the tax will also increase. The continued presence of a county tourism office is very important, and should be maintained.

Existing state and local regulations pertaining to clean water, litter control, and public eyesores (abandoned cars, dumps, derelict buildings) are also important. One great potential draw for tourists considering a visit to Monroe County is the area's pristine natural character. Clean streams, and clean farmland and woodland also enhance potential of enjoyment for local recreationists.

Facilitating voluntary targeted actions

Preservation of historic homes, and use of historic buildings for business purposes would also positively impact tourism and recreation (see *Historic Preservation*).

Recreation opportunities, of course, benefit both tourists and local residents. Efforts should be made to expand these opportunities. In addition to opportunities listed under current assets, a Monroe County Tourism Advisory committee is considering creation of a network of biking trails on lightly used or abandoned county roads.

In general, local government should encourage public input and development of locally-specific guidelines regarding recreational activities that are environmentally destructive, excessively loud, or may not be in keeping with other stated planning goals.

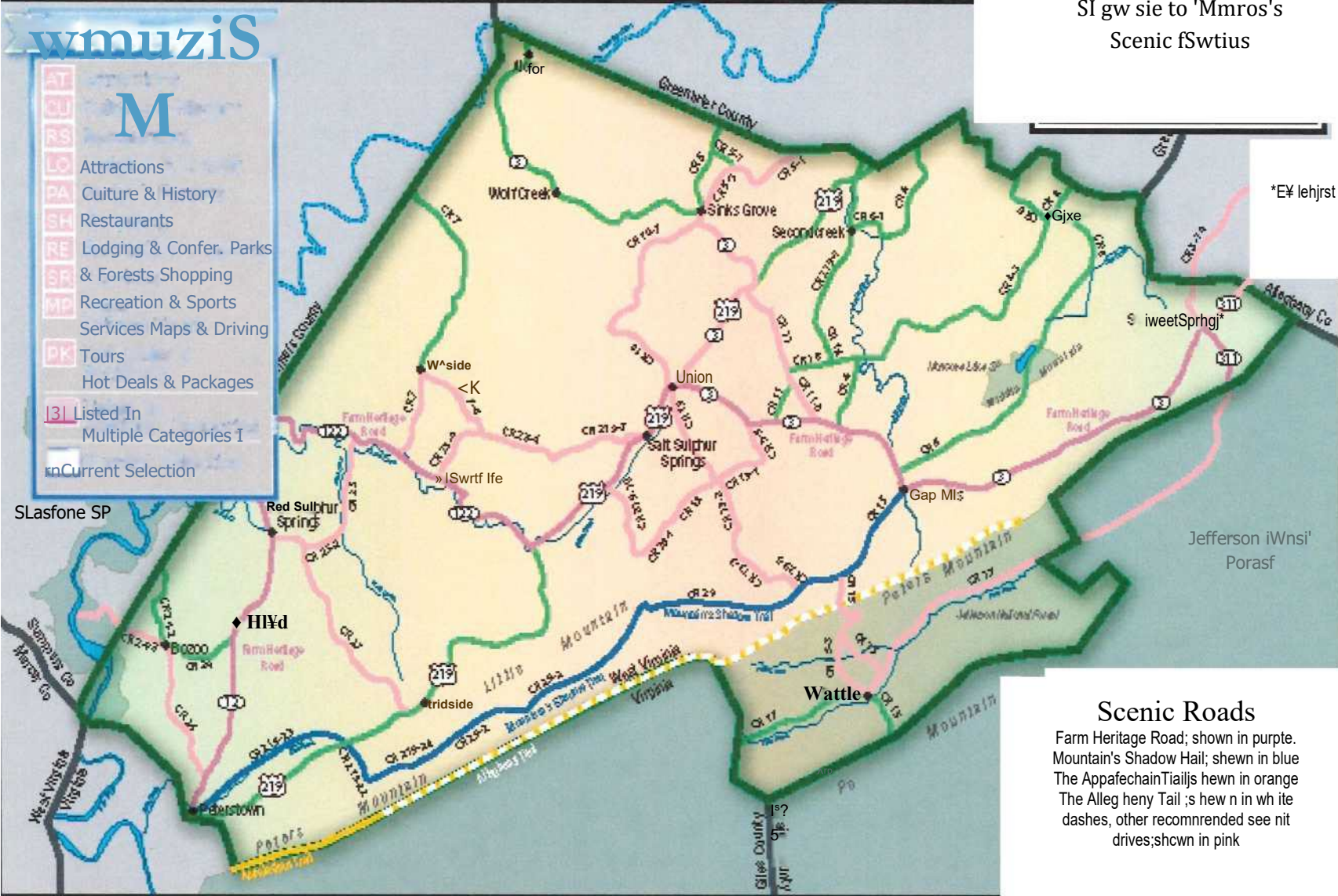
Recreation and Tourism <i>Promote the creation of additional recreational opportunities for county residents and visitors, and encouraging growth of the tourism industry as a means of economic opportunity.</i>		Very High priority	High priority	Mid level priority
Goal 7.1	Support public and private tourism expansion efforts by coordinating the collection and dissemination of important data.			
Objective 7.1.1	Update and maintain a comprehensive list and map of currently available tourism and recreational opportunities.	◦		
Objective 7.1.2	Collect and maintain a comprehensive list of potential tourism or recreational opportunities, and steps needed to make them publicly accessible.		©	
Objective 7.1.3	Collect, maintain, and distribute data on current level of tourism site usage, visitor numbers, and economic impacts.		©	
Goal 7.2	Support historic and cultural tourism efforts.			
Objective 7.2.1	Support the preservation of historic structures in the county, and assist the Monroe County Historical Society with their efforts.	0		
Objective 7.2.2	Encourage and facilitate participation in historic home or site tours.		◦	
Objective 7.2.3	Provide staffing of historic sites to allow easier visitation by the public.		©	
Objective 7.2.4	Encourage those privately own historic properties to make them open to the public.		Q	
Objective 7.2.5	Support efforts to develop increased agritourism sites and events.		○	
Goal 7.3	Support protection of open space and public recreation areas.			
Objective 7.3.1	Support local land trusts and the Monroe County Farmland Protection board in efforts to protect open space in the county.	©		
Objective 7.3.2	Maintain current publicly accessible recreation areas and increase where appropriate for hiking, biking, hunting, and other outdoor recreation pursuits.	©		
Objective 7.3.3	Expand economic benefits of tourism on all public lands.		.	
Goal 7.4	Support the creation of new tourism-related business wherever possible.			

Objective 7.4.1	Encourage the development of new lodgings, restaurants, and craft or specialty stores, or other related private sector businesses.	•		
Goal 7.5	Protect and expand the county's system of trails and scenic byways.		⊙	
Objective 7.5.1	Establish bike trails and a bike-friendly atmosphere.		•	
Objective 7.5.2	Provide support to Monroe County Tourism in the creation of a network of biking trails on lightly used or abandoned county roads.		◦	
Objective 7.5.3	Protect the rural beauty and character of state-designated Scenic Byways and Backways within the county, as well as the area's many other enjoyable and scenic country roads.		⊙	
Goal 7.6	Coordinate and support related efforts of local government agencies and organizations.			
Objective 7.6.1	Maintain the county tourism office, and provide additional resources for expansion when possible.		⊙	
Objective 7.6.2	Support a vibrant tourism economy by adhering to other related priorities in the County Comprehensive Plan, including protection of the county's agricultural character, the revitalization of town centers, reasonable control of strip development, management of subdivisions, protection of clean water, provision of litter control and the reduction of public eyesores (abandoned cars, dumps, derelict buildings] and adult entertainment venues.	◦		

wmuziS

M

- AT Attractions
- CU Culture & History
- RS Restaurants
- LQ Lodging & Confer. Parks
- PA & Forests Shopping
- SH Recreation & Sports
- RE Services Maps & Driving
- GF Tours
- MP Hot Deals & Packages
- PK [3] Listed In Multiple Categories 1
- Current Selection



SI gw sie to 'Mmros's
Scenic fSwtius

*E# lehjrst

Scenic Roads

Farm Heritage Road; shown in purple.
Mountain's Shadow Trail; shown in blue
The Appalachian Trails shown in orange
The Allegheny Trails shown in white dashes, other recommended scenic drives; shown in pink

Economic Development

Purpose: Identify development opportunities that best meet the rural nature of Monroe County; continue promotion of sustainable industries such as agriculture, small industry, forestry, tourism and recreation, and service oriented businesses.

History

Agriculture has always been at the center of Monroe County's economy since settlers occupied the area. Pioneer farming for survival transformed into profitable farming as hotels and spas sprang up in the area in the early 1800s. The gentle climate and healing springs in the area provided the backdrop of a thriving tourist industry. The demand for the farmers' goods and services was tremendous and a thriving economy flourished. As various political and economic factors vacillated so did the need for farm goods. Farming has had to adapt to remain a way of life. Farmers and strategically placed merchants have cooperatively coexisted often utilizing a barter system and script in lieu of money. This has nurtured an environment and economy built on loyalty and trust sadly lost in much of today's national economy.



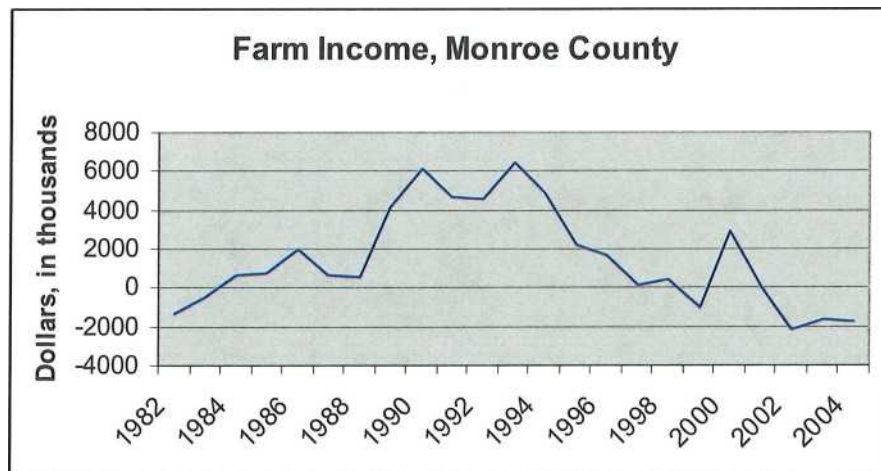
As the role of farming has waxed and waned in this county, other means of employment have been sought and occasionally provided. Often, civic and business leaders in the early 1900's were successful in attracting industry to areas within close proximity to the county. This has provided work opportunities as many of the county's residents travel outside county lines to obtain jobs. While helping to maintain the economy, these off-the- farm jobs have also helped sustain many farms of a smaller scale that are not independently financially stable. And the communities in the county have adjusted along with the changes in farming to maintain a support system that still functions as an integrated agricultural economy.

Current Economic Structure

Agriculture Today

Farming continues to play a significant part in the county's economy - although not nearly to the extent of its historic role. Farming does account for 18% of full and part-time jobs in the county. And in an era when corporate farms have become the norm, 96% of Monroe's farms are operated by a family or individual.

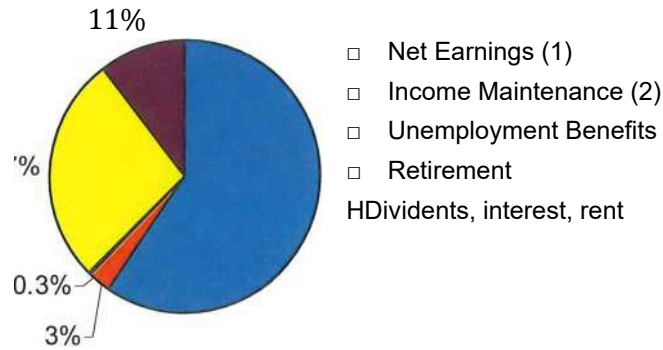
But while farms cover nearly half of Monroe's landscape, they account for 2% of all wages paid out in the county. In 2002, there were 682 farms in Monroe County. 465 of those farms, or nearly 70%, made less than \$10,000. Total market production of farms in Monroe is greater than \$17,000,000 a year; for several years, overall proceeds coming from farms in Monroe has been in the negative.



Sources of Income

Average per capita income in Monroe in 2004 was \$20,615. This ranks 40th in the state, and total personal income throughout Monroe accounted for .6% of West Virginia's total.

Per Capita Income Sources



- (1) Includes wages, compensation
- (2) Includes SSI payments, general assistance payments, food stamp payments, emergency assistance

From 2004 data

Local, state and federal government employment accounts for half of all wages dispersed in Monroe County. In addition to farms, the largest employers by industry include manufacturing, education and health services, and retail trade.

Total Employment and Total Wage Compensation in Monroe by Selected Industry, 2004

Industry	% of total county employment	% of total wage compensation
Government (federal, state, local)	20%	50%
Farm	18%	2%
Construction	9%	10%
Retail	8%	3%
Health Care and Social Services	6%	4%
Forestry	2%	1%
Entertainment, Gambling, and Recreation	1%	1%

40% of Monroe's workforce commutes outside of the county to work, reinforcing the general perception that many of Monroe's towns are increasingly becoming "bedroom

communities," particularly in the southern end of the county.

	Number of Employed Residents Traveling to	As a Percentage of Monroe County
Work County Monroe County, WV	Work County 2,073	Employed Residents 39.9
Greenbrier County, WV	1,123	21.6
Giles County, VA	889	17.1
Mercer County, WV	189	3.6

Potential key players and programs at local, state and federal level

We have in place a regional economic development authority that plans, funds, and implements economic development projects in our county. The Greenbrier Valley Economic Development Corporation assists the needs of the business community of Greenbrier, Monroe and Pocahontas Counties, West Virginia. They provide a variety of services to new and existing businesses such as business financing, general and technical assistance, and site selection for development projects.

- © Monroe County Board of Education
- © Greenbrier Valley Economic Development Commission
- West Virginia Department of Commerce
- U.S. Department of Agriculture
- Department of Natural Resources, Region One
- Chamber of Commerce.

Planning for Economic Development

This and future economic plans should consider: [A] Opportunities, strengths and weaknesses of the local economy and workforce; (B) Identifying and designating economic development sites and/or sectors of the county; and (C) Type of economic development sought, correlated to the present and projected employment needs and appropriate use of the residents of

the county.

We expect growth will be of such scale that it can be managed and adequately funded, ecologically feasible, and socially supported. As with other components of the Plan, design is for an expected population growth of about 15% in the next ten years. This will equate to over 1,000 additional people. We are assuming this figure to be on the high end of probable growth and will revisit this figure annually for planning adjustments.

We are aware of the extent of the workforce (over 20%) that commutes to out-of- county jobs and intend to work with the citizenry to keep this number acceptable. We are also aware that many of those who commute are content with keeping their living quarters separate from their work environment so as to maintain the rural quality of life they enjoy at home.

Any economic plan must emphasize sustainability. This can be defined as economic development that can be depended on for the long term. Strategies should consider whether any proposed development is ecologically sustainable, consistent with the social values of the community, and from the grassroots of the community. Any plan should consider the interaction of three systems inherent in our community's life: (1) The biological and resource system; (2) The economic system; and (3) The social system. Sustainability must be applicable to all forms of economic and social activity, ranging from agriculture and forestry to industry and human settlements.

To establish the framework for a sustainable economy that complies with all the considerations above, we must consider the necessary infrastructures to support it. A way of categorizing these infrastructures is to consider them in four forms: (1) Hard; (2) Soft; (3) Green; and (4) Administrative/fiscal.

(1) Hard Infrastructure:

- 0 Water, including treatment, distribution, and supply
- 0 Sewer, including treatment and collection
- 0 Transportation, including road, rail, water, and air
- 0 Power: including both generation and distribution
- 0 Solid waste, including collection, disposal, and recycling
- 0 Storm water, including drainage, collection, and treatment

- 0 Communications, including microwave, fiber optics, towers, etc.

[2] Soft Infrastructure:

- 0 Schools and education facilities
- 0 Libraries
- 0 medical facilities
- 0 police
- 0 fire and rescue
- 0 open space and recreation.

[3] Green (natural) Infrastructure:

- 0 soils
- 0 topography
- 0 geology
- 0 water
- 0 climate
- 0 flood and drainage

If a community's environment is degraded it becomes less livable and less marketable.

[4] Administrative/Fiscal Infrastructure:

Clear and concise regulations make development and controls more time sensitive and less expensive. Tax structures may promote or inhibit development. Clear emphasis on the type of growth desired or opposed can prevent expensive contests, legal and administrative, in accomplishing the economic goals of the community.

The community must be aware of the capacity of all these different types of infrastructure if we expect to be successful in promoting and maintaining sustainable economic development

Goals

Manage environmental impacts of development at the local level to promote health and safety and adequate living conditions of all residents.

As discussed throughout the Comprehensive Plan, protection of natural resources, and particularly water resources, are of primary concern of Monroe residents. Any commercial development will need to be monitored to ensure minimal environmental impacts. The WV Bureau of Public Health and local public water providers have identified areas of concern around public water sources, and any consideration of commercial and industrial development should be thoroughly scrutinized and reviewed with public infrastructure managers.

With regard to agriculture and forestry, best management practices should be encouraged and promoted by local government and its private and federal partners. Monroe farmers and foresters have managed resources sustainably for generations, and as increased demands are put on the local environment, we must continue to ensure that best practices continue to be the norm.

Support efforts to better educate & train workforce.

With an emphasis on promoting small business growth and development, Monroe's workforce will need to be flexible, adaptive, and entrepreneurial. Workforce training at all levels should continue to emphasize the essential skills demanded by all small businesses - critical thinking, communication, technology applications, and others.

Solicit or promote business which would provide economic opportunities without negatively impacting rural character and culture (e.g. tourism, crafts, artisans, high-tech, innovative agriculture).

Agriculture will continue to remain a cultural and economic mainstay in the county for the foreseeable future. With a large number of small independently-owned farms, prime farm land, and proximity to markets, Monroe is well positioned to explore and implement innovative approaches to production and marketing.

As stated previously, existing small businesses should be supported by all available means, including discouraging "big box" national retailers particularly when in direct competition with locally-owned businesses.

Implement extensive outreach and collaboration efforts with each community to

determine the preferred and locally-acceptable levels of development.

Given the diverse needs of the county, every effort should be made to collaborate with individual communities to further refine local goals and preferences. Local input should be of primary importance in the consideration of any commercial or industrial development.

7. Economic Development <i>Identify development opportunities that best meet the rural nature of Monroe County, continue promotion of agriculture, small industry, forestry, tourism and recreation and service oriented businesses.</i>		Very High priority	High priority	Mid= level priority
Goal 8.1	Manage environmental impacts of development at the local level to promote health and safety and adequate living conditions of all residents.		⊙	
Objective 8.1.1	Promote development that preserves the quality and quantity of surface and sub-surface water supplies.	•		
Objective 8.1.2	Promote a harmonious relationship between timber industry and conservation needs utilizing Best Management Practices.		9	
Objective 8.1.3	Promote a harmonious relationship between agricultural industry and conservation needs utilizing Best Management Practices.		o	
Objective 8.1.4	Infrastructure limitations and capacities should be considered when siting any development.	•		
Goal 8.2	Support efforts to better educate & train workforce.		•	
Goal 8.3	Solicit or promote business which would provide economic opportunities without negatively impacting rural character and culture (e.g. tourism, crafts, artisans, high-tech, innovative agriculture).	•		
Objective 8.3.1	Foster collaborative relationship with county extension office, farm service agency, NRCS, etc. to research and develop innovative and desirable agricultural opportunities and markets.		⊙	
Objective 8.3.2	Foster collaborative relationship with WV WorkForce Development, the Economic Development Authority, etc. to research and develop innovative and desirable non-agricultural		o	

	opportunities and markets.			
Objective 8.3.3	Emphasize and support locally-owned businesses by minimizing megacommercial development and big box stores, and that support local businesses that provide employees with livable wages and benefits.	⊙		
Objective 8.3.4	Promote vertical marketing of timber products.	◦		
Goal 8.4	Implement extensive outreach and collaboration efforts with each community to determine the preferred and locally-acceptable levels of development.	•		
Objective 8.4.1	Consider and identify those areas where the citizenry wishes to remain residential/agricultural instead of job centered.	•		
Objective 8.4.2	Consider agricultural, service, and tourist (or even no) industries as more appropriate for those areas where the citizenry prefer a rural environment.	•		

9. Preferred Development Areas

Purpose: To identify areas where incentives should be used to encourage development, infill development, or redevelopment in order to promote well designed and coordinated communities and prevent sprawl

Monroe County has in the past maintained a generally well defined separation between its towns and its open spaces and requires little infill or redevelopment in order to maintain its status as an orderly, pleasant community. Some areas of the county have grown more than others, and sprawl-type development is becoming more evident in certain parts of the county. Some areas seek to continue to grow, while other areas seem to exhibit a preference for remaining rural.

History

Locations of pioneer thoroughfares and forts, access to natural resources such as water, tillable soil, and timber, and efforts by Colonial Virginia to settle its western frontier through entities such as the Greenbrier Land Company or Loyal Land Company, all impacted early settlement patterns within the county. With the exception of the town of Union, which was legislated into existence in 1799 as the seat of government for the new county of Monroe, centers of development sprang up at different times across the county as dictated both by chance and convenience for the residents of the time. Future towns and villages might have begun at the location of an early water-powered mill, at an important crossroads, or (in one case] as the result of the coming of the railroad in the 1880s.

For the last century, development areas in the county have basically included three incorporated towns and a few dozen unincorporated villages. In the past, these unincorporated communities often contained a school, post office, church, a general store, and perhaps other businesses. At present, many of these former communities are represented only by a church or perhaps a community center. It is only within the last few decades that significant tendencies have been observed for creation of housing developments or commercial enterprises outside of existing towns and villages.

Development Trends and Boundaries

Very few mechanisms are currently in place which have any impact in controlling or regulating where continued development does or does not occur. Past development trends have simply reflected personal preference and tradition. Some control lies with the County Board of Health and County public health department inspection system in regard to the necessity of approving septic systems for commercial and residential developments which lie outside of public sewer systems. Development within flood plains is regulated to some degree by federal floodplain designations and county enforcement in regard to the same. Other existing regulatory authority, especially with larger developments or industries, may also lie with the DEP; Dept of Environmental Health; Dept of Ag; Corps of Engineers; and DOT. City and town ordinances play a role within their jurisdictions. Enforcement is not strongly and uniformly in place. Funding and staffing are major issues.

Planning for Future Development

A primary goal of the Planning Commission is the creation of a plan that facilitates and supports desirable growth while at the same time offering protection from sprawl, in concert with the Land Use and Economic Development components of the county plan. Monroe's towns are still the center of commerce and population in this county. It is the planning commission's goal to establish incentives for maintaining our towns as viable, non-sprawling, resident friendly entities, to preserve rural and natural areas in between areas of development, and to encourage growth only in those areas where the infrastructure and social support can sustain it.

Possible Interventions

West Virginia Code section §8A-3-4 requires that county planning commissions establish preferred development areas within their jurisdictions. Rather than selecting currently undeveloped areas of the county for development, it is the preference of the Monroe County Planning Commission that preferred development areas generally be

established to include and be limited to the county's three municipalities as well as numerous other traditional village centers. In addition, the Rt. 219 corridor between Lindside and Peterstown has

also been selected as a development area; largely because considerable development is ongoing here already, and because the corridor is served by public water and sewer service.

This approach is consistent with Planning Commission goals of both preserving and improving the vitality and economic health of traditional town centers, as well as protecting open space and rural character in the outlying areas. Suggested boundaries of development areas are provided at the end of this section.

Actions in conjunction with and in addition to the establishment of preferred development areas would include:

1. Extensive outreach and collaboration with the community and the key players to reach cooperative agreements on the concept and implementation of "Preferred Development."
2. Implementation of policies and regulations to encourage growth in preferred areas.
3. Foster collaborative relations with Chambers of Commerce, Land Protection organizations, infrastructure planners, and city/town leaders.
4. Create a feedback process that measures the effectiveness of the plan at guiding growth in the designated areas and protecting undeveloped areas. Continue to monitor public acceptance of the designations, and assess any indicators which might show potential need for future modifications.

Proposed Preferred Development Areas

The following recommendations are proposals, and not intended to be exclusive or inflexible.

Alderson (Monroe side only)

Commercial - current municipal boundary plus .2 miles in all directions

Residential - current municipal boundary plus .4 miles in all directions

Ballard

Commercial - .2 mile radius from intersection of WV 12 and CR33

Residential - .4 mile radius from intersection of WV 12 and CR 33

Bozoo

Commercial - .15 mile radius from intersection of CR 24 and CR 24/2

Residential - .3 mile radius from intersection of CR 24 and CR 24/2

Cashmere

Commercial - .2 mile radius from intersection of WV12 and CR 31/4

Residential - .4 mile radius from intersection of WV12 and CR 31/4

Cloverdale

Residential - .2 mile radius from intersection of CR 24 and CR 24/8

Coulter's Chapel

Commercial - .2 mile radius from intersection of US 219 and CR 25

Residential - .4 mile radius from intersection of US 219 and CR25

Creamery

Commercial - .15 radius from intersection of CR 7 and CR7/2

Residential - .3 mile radius from intersection of CR 7 and CR 7/2

Gap Mills

Commercial and Residential - .3 miles on either side of WV 3, from Red Mill to intersection of WV 3

and CR 3/19

Residential Only - .2 miles on either side of CR 15 from intersection of WV 3 and CR 15 to intersection of CR 15 and CR 15/8.

All of CR 15/1 excluded from preferred development area.

Gates

Commercial - .15 mile radius from intersection of CR 13/1 and CR 3/9

Residential - .3 mile radius from intersection of CR 13/1 and CR 3/9

Glace

Commercial - .15 mile radius from intersection of CR 8 and CR 4/2

Residential - .3 mile radius from intersection of CR 8 and CR 4/2

Greenville

Commercial and Residential - .2 miles on either side of WV 122, between intersection of WV 122 and CR 23/4 and intersection of WV 122 and CR 23/3

Hillsdale

Commercial - .15 mile radius from intersection of CR 11 and CR 219/5

Residential - .3 mile radius from intersection of CR 11 and CR 219/5

Hollywood

Commercial - .15 mile radius from intersection of CR 4 and CR 4/2

Residential - .3 mile radius from intersection of CR 4 and CR 4/2

Keenan

Commercial - .15 mile radius from intersection of WV 3 and CR 11

Residential - .3 mile radius from intersection of WV 3 and CR 11

Knobs

Commercial - .15 mile radius from intersection of CR 10 and CR 10/1

Residential - .3 mile radius from intersection of CR 10 and CR 10/1

Lillydale

Commercial - .15 mile radius from intersection of CR 219/7 and CR 219/11

Residential - .3 mile radius from intersection of CR 219/7 and CR 219/11

Lindside

Commercial - .2 mile radius from intersection of US 219 and CR 219/19

Residential - .4 mile radius from intersection of US 219 and CR 219/19

Lindside-Peterstown Corridor

Commercial and Residential - .3 miles on either side of US 219 between Lindside and Peterstown.

Moncove Lake

Commercial and Residential - .2 miles from CR 8, along SE side only, between intersections of CR 8 and both ends of the lake loop road.

Monitor

Commercial - .15 mile radius from intersection of US 219 and CR 219/4

Residential - .3 mile radius from intersection of US 219 and CR 219/4

Orchard

Commercial - .15 mile radius from intersection of CR 27 and CR 33

Residential - .3 mile radius from intersection of CR 27 and CR 33

Peterstown

Commercial - current municipal boundary plus .2 miles in all directions

Residential - current municipal boundary plus .4 miles in all directions

Plus Lindside-Peterstown Corridor

CR 219/23 excluded from preferred development area

Pickaway

Commercial - .15 mile radius from intersection of US 219 and WV 3

Residential - .3 mile radius from intersection of US 219 and WV 3

Raines Corner

Commercial - .15 mile radius from intersection of US 219 and WV 122

Residential - .3 mile radius from intersection of US 219 and WV 122

Red Sulphur Springs

Commercial - .15 mile radius from intersection of WV 12 and CR 27

Residential - .3 mile radius from intersection of WV 12 and CR 27

Rock Camp

Commercial - .15 mile radius from intersection of US 219 and CR 29

Residential - .3 mile radius from intersection of US 219 and CR 29

Sait Sulphur Springs

Commercial - .15 mile radius from intersection of US 219 and CR 219/7

Residential - .3 mile radius from intersection of US 219 and CR 219/7

Sarton

Commercial - .15 mile radius from intersection of CR 7/4 and CR 23/13

Residential - .3 mile radius from intersection of CR 7/4 and CR 23/13

Second Creek

Commercial - .15 mile radius from intersection of CR 219/1 and CR 219/4

Residential - .3 mile radius from intersection of CR 219/1 and CR 219/4

Sinks Grove

Commercial - .15 mile radius from intersection of WV 3 and CR 5

Residential - .3 mile radius from intersection of WV 3 and CR 5

Sweet Springs

Commercial - .15 mile radius from intersection of WV 3 and US 311

Residential - .3 mile radius from intersection of WV 3 and US 311

Union

Commercial - current municipal boundary plus .2 miles in all directions Residential - current municipal boundary plus .4 miles in all directions 219 corridor north of municipal boundary and area between WV 3 and CR 13 SE of municipal boundary is excluded from preferred development area.

Waiteville

Commercial - .15 mile radius from intersection of CR 17 and CR 15/3

Residential - .3 mile radius from intersection of CR 17 and CR 15/3

Wayside

Commercial - .15 mile radius from intersection of CR 7 and CR 9

Residential - .3 mile radius from intersection of CR 7 and CR 9

Wikel

Commercial - .15 mile radius from intersection of CR 219/17 and CR 23/7

Residential - .3 mile radius from intersection of CR 219/17 and CR 23/7

Willow Bend

Commercial - .15 mile radius from intersection of CR 13 and CR 29/1

Residential - .3 mile radius from intersection of CR 13 and CR 29/1

Wolf Creek

Commercial - .15 mile radius from intersection of WV 3 and CR 10

Residential - .3 mile radius from intersection of WV 3 and CR 10

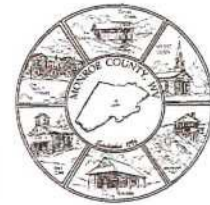
Zenith

Commercial - .15 mile radius from intersection of CR 29 and CR 13

Residential - .3 mile radius from intersection of CR 29 and CR 13.

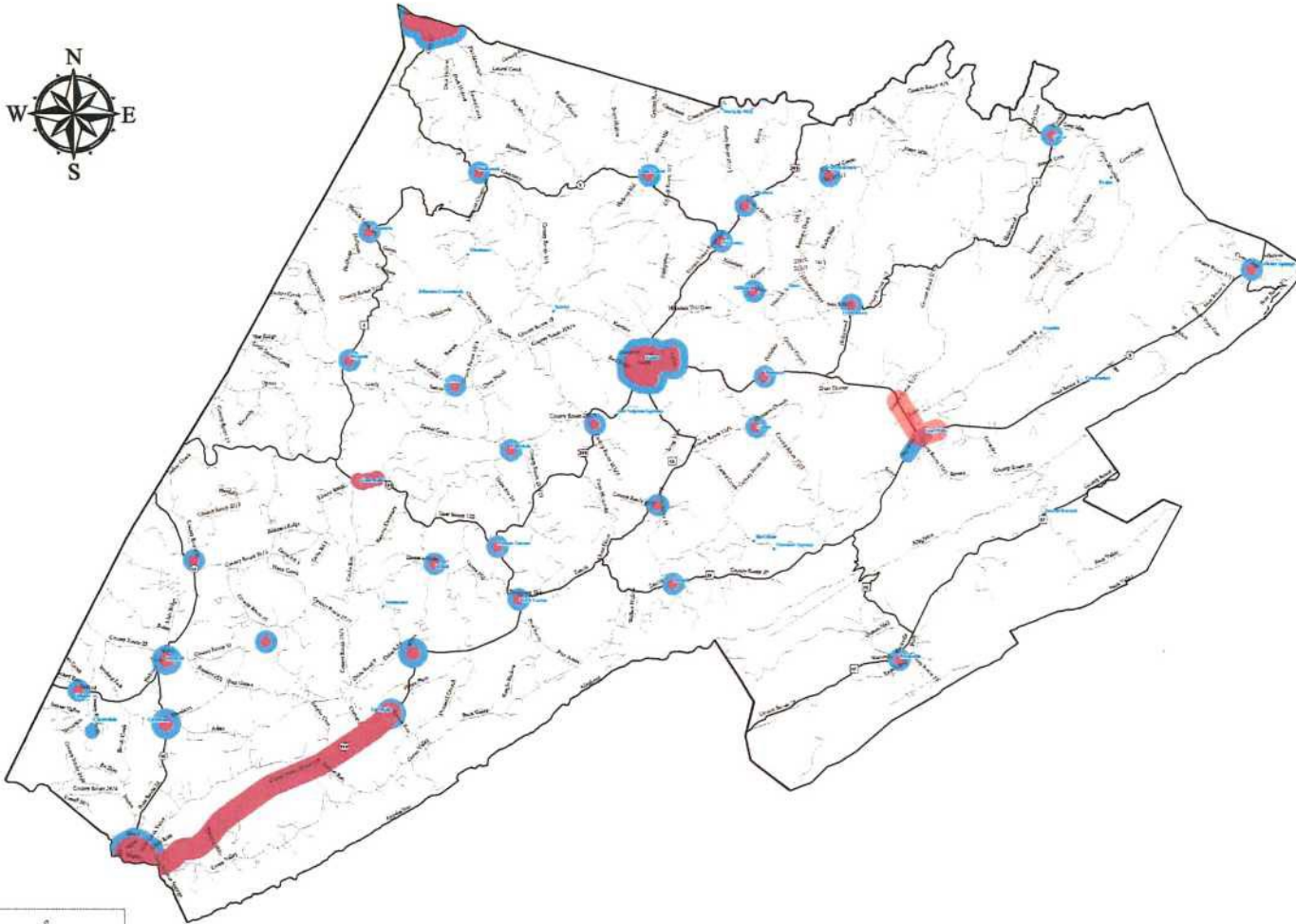
Monroe County, West Virginia

Preferred Development Areas



Legend

- Major Roads
- Secondary Roads
- Preferred Development Areas
 - Commercial
 - Residential
- County Boundary
- Communities



Produced By Region I PDC
1439 E. Main St., Suite 5
Princeton, WV 24740
(304) 431-7225
WWW.regionIOHepdc.org

Financing

The County Comprehensive Plan lays out a series of ambitious goals, many of which will need some level of financial support. Recognizing that the County Commission and its affiliates have very limited revenue streams or budget surpluses, the following is a brief sampling of potential funding sources and resources. It is, by no means, meant to be a comprehensive list; in fact, the very nature of local government financing and resource development in West Virginia demands a creative, dynamic and adaptive approach.

Resources

Natural Resource Protection and Restoration

Potential Partnerships

- 1) Local watershed groups, including Indian Creek Watershed Association and The Friends of Second Creek, have access to volunteers and state technical and financial assistance.
- 2) Local land trusts and county Farmland Protection Program have access to resources for land protection, including state and federal financing programs (e.g. state and federal Farmland Protection Programs, Forest Legacy Program).

State and Federal Government Resources

- 1) WV Dept, of Environmental Protection has several funding programs available for stream protection and restoration. DEP's Non-Point Source Program oversees watershed-based funding programs, including the Stream Partners program and Non-Point Source project funding, authorized by section 319 of the Clean Water Act. This funding can be used for projects that remove pollutants caused by non-point sources (e.g. agriculture, excess sedimentation, failing septic systems), and requires the development of a Watershed-Based Plan.

Given that a small portion of Monroe County lies in the Chesapeake Bay Watershed,

additional resources are available primarily through DEP. The US Environmental Protection Agency also has specific funding programs, often best accessed, again, through WVDEP.

- 2) WV Bureau of Public Health has funding programs available for source water protection. Any funding sought should be coordinated with local public water providers.
- 3) WV Conservation Agency and the Southern Conservation District have access to funding, equipment, and staff to assist with stream restoration and protection efforts.
- 4) The WV Development Office administers the Land and Conservation Fund, which can support protection and related recreation programs.

Private and University Resources

- 1) West Virginia University can often access funding through the Water Research Institute. Technical resources can often be leveraged through various academic programs, including groundwater and stream assessments.
- 2) Resource Conservation and Development office is a publicly-supported non-profit organization affiliated with US Dept, of Agriculture. RC&Ds can often provide small amounts of funding for protection and restoration projects, and can provide assistance with accessing additional funds for similar projects.
- 3) USDA's Natural Resource Conservation Service provides funding for land protection to private landowners through several programs, including the Wildlife Habitat Improvement Program (WHIP), the Conservation Reserve Enhancement Program (CREP) and others.
- 4) Private non-profit organizations that can provide financial or technical assistance for resource protection includes Canaan Valley Institute, American Rivers, American Farmland Trust, Virginia Environmental Endowment, National Fish and Wildlife Foundation, and others.

Housing

Potential Partnerships

- 1) The Greenbrier County Housing Authority and its affiliate the Southeastern Appalachian Rural Alliance have access to state and federal resources for housing development and rehabilitation, as well as a rental assistance program.
- 2) WV Habitat for Humanity has local affiliates statewide, and can coordinate home

construction for qualified applicants.

- 3) Faith-based organizations often provide volunteer and financial assistance for specific housing projects. The WV Council of Churches can provide information on specific organizations and their areas of service.

State and Federal Government Resources

- 1) The WV Housing Development Fund coordinates all housing-related funding available to the state, and has a variety of funding programs for home and rental unit development.
- 2) USDA's Rural Development program also has several assistance programs related to housing, including its Housing Preservation Grant Program, its 502 Direct and Guaranteed Loan Programs, and a 504 Housing Repair Program.

Private and University Resources

- 1] CommunityWorks in WV is a non-profit membership organization that can provide technical assistance and loan funding.
- 2] The WV Affordable Housing Trust Fund is a relatively new program to WV, providing grant and loan funding for housing-related endeavors.
- 3] Several foundations and federally-sponsored organizations have an emphasis on affordable housing. In WV, some of the largest private funders or assistance providers include the Benedum Foundation, the Federal Home Loan Bank system, NeighborWorks, and the Local Initiatives Support Corporation.

Infrastructure

Potential Partnerships

- 1] Local Public Service Districts and municipalities, as the managers of public infrastructure, are critical partners in any development or expansion of water and sewer.
- 2] Region I Planning and Development is one of eight Region's around the state, whose primary purpose is to assist local governments with infrastructure and economic development. Region I coordinates much of the public funding devoted to water and sewer system development in the county, and often acts as a project manager. They have access to a host of other funding and technical assistance programs.

State and Federal Government Resources

- 1] Most public funding for infrastructure development is coordinated by the WV Infrastructure and Jobs Development Council (IJDC). The IJDC is made up of representatives of several of the major funding entities.
- 2] Specific federal sources for infrastructure funding include:
 - WV State Revolving Loan Fund, directed to the state by USEPA, and managed by the WVDEP;
 - Other EPA-based funding also managed by WVDEP;
 - WV Drinking Water Fund, managed by the WVBPH;
 - © USDA's Rural Utility Service program;
 - Various programs available through the US Army Corps of Engineers, typically coordinated by congressional districts;
- 3] The WVDEP's Non-point Source program has, again, small amounts of funding available for clean water projects;
- 4] Low interest loans for septic system installation or upgrades are available through the WV Housing Development Fund and USDA's 504 program, which also has limited grant funding.

Other Resources

- 1] Tax credit programs at both the state and federal level can provide good incentives for private investment, and local government can provide assistance with the application and documentation process. These can include Historic Tax Credits and New Market Tax Credits for larger scale redevelopment projects, renewable and energy efficiency credits for both commercial and residential applications, low income housing tax credits, and others.
- 2] The WV Division of Arts and Culture has several programs available to support historic preservation, arts development and public access to the arts.
- 3] The WV Development Office coordinates a host of funding programs for economic development, including business retention & expansion loans and grants, tourism promotion grants, and access to the Appalachian Regional Commission.

Historic Preservation

Purpose: Protect the wealth of historic structures, archeological sites, and landscapes within Monroe County; encourage their rehabilitation and use as a means of promoting unique county identity, improving quality of life for existing residents, and creating economic opportunity through tourism; and nurture Monroe's rather unique cultural identity, reflective of a respect for the land and a respect for generations past.

Monroe contains an incredible collection of historic architecture. A very general and partial listing includes:

- * Union's designated historic district, which lists over 30 individual properties; the Pickaway Rural Historic District (the largest such district in the state); numerous properties individually listed on the National Register; and a current effort to designate Second Creek as an historic watershed.
- Two covered bridges.
- Five grist mills which are still standing, Reeds Mill and Cooks Mill in reasonably good shape, McClung's Mill in fair condition; and Rogers and Nickell's Mill in dire need of assistance.
- ◊ Significant architecture remaining at two mineral springs resorts, which once housed U.S. presidents and other internationally famous guests. Use of Salt Sulphur Springs dates to the 1820s. Patronage at Sweet Springs extends back to the latter decades of the 1700s.
- © Dozens of historic churches, ranging from the Rehoboth, circa 1780, to classic revival churches of the mid 1800s, and Victorian and Gothic structures of the turn of the century.
- Many one room schools still standing (including Second Creek, which is actually still furnished). Some are simply abandoned, and some have been put to use for homes, barns, and community buildings.
- ® Countless historic homes, including elaborate ante-bellum plantation houses, early log homes, Victorian farmhouses, and more modest examples of local vernacular architecture spanning the county's 240 years of settlement.
- Two turn-of-the-century train stations.
- ® Numerous historic business buildings, including community groceries, post offices, and department stores.
- A unique stone roadside fountain pavilion
- © Historic agricultural buildings and the classic "farm home complexes" should also not be forgotten in

these listings. Even in areas which remain largely agricultural, vintage wooden barns, and the typical complex of small outbuildings surrounding a farm home, are disappearing rapidly. A recent visitor to Monroe commented on the abundance of old wooden barns in the area. Even though he lived in an agricultural community in North Carolina, he noted that vintage wooden barns had almost disappeared from that area.

Potential threats range from benign neglect, resulting in the loss of structures to decay over a span of perhaps decades, to destruction of older structures to make room for new construction. In the absence of regulation, loss in this latter category would be expected to increase with increased residential or commercial development.

A reasonably comprehensive county history was published by Oren F. Morton in 1915, and a somewhat less extensive work was published in the 1940s which focused a bit more on western Monroe. Since that time, county history has not been documented in any single source, although much exists in more diffuse fashion - in bulletins, historic pamphlets, and newspaper articles.

In what may be typical fashion in close-knit rural communities, a fair amount of information still exists in the form of oral history. The continuing local interest in quilting and weaving, historic farming techniques, crafts, antiquated building techniques, and community socials and festivals, all reflect evidence of living history.

Potential partners

Monroe County Historical Society, Monroe County Tourism Office, Monroe County Commission, WV Division of Culture and History, The National Register of Historic Places, Civic and Church groups, and the Monroe County Farmland Protection Program (in the sense that protecting agricultural lands is a way of helping preserve that component of county history)].

Planning for Future Historic Preservation

The historic structures and towns that dot the county's landscape are a central component of Monroe's identity. The protection and preservation of these structures is critical to its economic and social development. The preservation and protection of local culture and tradition, in addition to historic structures, must also be considered, along with actions taken to foster its continued importance in local

society.

Historic preservation offers increased economic opportunities through tourism, and provides a unique and enjoyable environment in which area residents can live and work.

Goals

Identify and protect historic buildings and sites within the County.

The identification and registration of sites with all appropriate organizations and agencies should be strongly encouraged. Coordinate preservation organization and agency requirements with County ordinances to ensure that adequate protection is afforded to sites and structures. The formation of an archive of information and history should be pursued. Conduct additional public surveys to gauge the extent to which county government intervention for historic preservation is acceptable to the public.

Promote the use & rehabilitation of historic structures.

The Planning Commission and local partners should encourage any collection and dissemination of information on location and desired use of sites, with owner agreement.

Local government can provide assistance with tax credit applications related to historic preservation and restoration, lower or waive Business and Occupation taxes for reuse and rehabilitation, and offer other incentives.

All efforts to reuse or restore historic structures should be recognized and publicly commended.

Support the efforts of non-governmental organizations and voluntary actions on the part of the general public.

Continue support of the Monroe County Historical Society's substantial contributions to historic preservation, in their several decades of activity. Accomplishments include: documentation of substantial amounts of history in written form; the gathering of previously published documents and works of historic importance; acquisition and protection of a sizeable collection of historic photographs, artifacts, and furniture; acquisition of three historic buildings and two historic churches which are now owned by the society; the creation of two public-access museums; and assistance provided to numerous private property owners in listing their sites on the National Register. Planning Commission support of these efforts is warranted.

For the last few decades, there has been increasing interest among area residents in restoring historic properties both for residential and business purposes, and efforts by various individuals and groups at keeping local traditions alive have been ongoing for many years. These activities are in every sense voluntary; and in the absence of more stringent regulation, they have formed the bulk of the mechanism for historic preservation throughout the history of the county. Ways of promoting these efforts should be explored, perhaps among other things to include public recognition of accomplishments in historic preservation.

The Friends of Second Creek have taken on a significant and unprecedented effort to achieve a "Historic Watershed" designation. This approach, as opposed to the more typical neighborhood or community approach, has caught the attention of state and federal agencies, as well as national organizations. They have documented much of the commercial and human history of the watershed. Local government and organizations should not only applaud the work done, but support replication in other areas of the county.

Conduct public education and outreach regarding historic preservation.

Information on newly-designated historic sites and success stories in preservation and reuse should routinely be published in local media. Disseminate information regarding funding and support available for historic preservation. Owners of historic properties are not always aware of the historic and cultural value of their property, so specific outreach efforts should be targeted towards those owners.

Local efforts should encourage the assimilation of widely diffuse historic information for the purpose of expanding on information provided in Morton's History of Monroe, and to perhaps help facilitate the creation of updated published county history, to include the 90 years since the completion of Morton's work.

Historic Preservation <i>Protect the wealth of historic structures, archeological sites, and landscapes within Monroe County; encourage their rehabilitation and use as a means of promoting unique county identity, improving quality of life for existing residents, and creating economic opportunity through tourism; and nurture Monroe's rather unique cultural identity, reflective of a respect for the land and a respect for generations past.</i>		Very High priority	High priority	Mid level priority
Goal 9.1	Identify and protect historic buildings and sites within the County.			
Objective 9.1.1	Compile list of properties on the National Register, other historically important properties, and important archeological sites.	o		
Objective 9.1.2	Protect historic buildings and sites through specific county regulations limiting demolition or major modification.	.		
Objective 9.1.3	Require notification of Planning Commission whenever destruction of historic structures or archeological sites is being considered.	o		
Objective 9.1.4	Consider funding public purchase of the most important historic sites if they are in danger of destruction.		.	
Goal 9.2	Promote the use & rehabilitation of historic structures.			
Objective 9.2.1	Create incentives for persons willing to locate businesses or homes in older buildings.	o		
Objective 9.2.2	Create disincentives (e.g. more restrictive permitting) to make it less desirable to construct new buildings when existing structures are available.		.	
Objective 9.2.3	Publicly recognize accomplishments in historic preservation.		.	
Goal 9.3	Support the efforts of non-governmental organizations and voluntary actions on the part of the general public.			
Objective 9.3.1	Support the many efforts of the Monroe County Historical Society.		o	
Objective 9.3.2	Support the watershed-based work of The Friends of Second Creek, and promote replication in other watersheds where there is interest.	o		
Objective 9.3.3	Support efforts to update existing county historic chronicles.	.		
Objective 9.3.4	Facilitate the preservation and protection of local culture and tradition, and support actions taken to foster the continued integration of that culture		.	

	in local society.			
Goal 9.4	Conduct public education and outreach regarding historic preservation.			
Objective 9.4.1	Conduct additional public surveys to gauge the extent to which county government intervention for historic preservation is acceptable to the public.	◦		
Objective 9.4.2	Promote the economic benefits of historic preservation and tourism, as well as the improved quality of life historic preservation affords.		◦	
Objective 9.4.3	Provide outreach and education to specific historic property owners regarding both the local importance of the site and funding opportunities for preservation and restoration.	©		

Monroe County Comprehensive Plan
Comments from Local Residents & Responses

Chapter	Comments and Response
Land Use	<p>(Melissa Scott). Failed to reference flood plain ordinance in either current conditions, existing regulatory authority, target, or action.</p> <p>Response: <i>Incorporated into "Housing" Chapter.</i></p>
	<p>(Richard Ettlston). Change wording that says "mineral extraction has never played an important role in the county," based on current natural gas issue.</p> <p>Response: <i>The reference is from the "history" section of the chapter, and not meant as a reflection of current conditions.</i></p>
Craig? I've read the rpt, and not sure what to do with this one?	<p>(Richard Ettlston). Add data from 1996 Cultural Attachment study (James Kent & Assoc., Boulder Co.,) to last paragraph about local residents taking care of land.</p> <p>Response: <i>The Janies Kent study was reviewed, and it was determined that the study was very locally specific, and not as relevant for a full county plan.</i></p>
	<p>(Richard Ettlston). Add to key players list: U.S. Forest Service, U. S. Navy, National Park Service, U.S. Army Corps of Engineers, and National Radio Observatory.</p> <p>Response: <i>All added except U.S.Navy, and National Radio Observatory'. Those entities are referenced elsewhere, and not necessarily appropriate for Land Use.</i></p>
	<p>(Warren Weikel). Says that 15% growth rate is not a reasonable assumption, and will likely be much less.</p> <p>Response: <i>This may be quite true, however, 15% figure was not intended as a prediction so much as a goal (or maximum desired amount).</i></p>
	<p>(Richard Ettlston). Replace "Waiteville" with "Potts Valley" in regard to areas of agricultural focus.</p> <p>Response: <i>Yes, such a revision would be more correct</i></p>
	<p>(Larry Mustain). Include Second Creek in discussion of Agricultural Focus areas.</p> <p>Response: <i>Further discussion among Commission members led to the decision to identify only two major land use categories: Preferred Development Areas, and Agricultural areas. Second Creek is among the latter.</i></p>
	<p>(Connie Helvey). No strip clubs, bars, or gambling within the county.</p> <p>Response: <i>The current language restricts these to business districts. The Planning Commission agreed to recommend limits on these establishments, but felt a full ban on all would not be desired or supported by a majority of county residents.</i></p>
	<p>(Connie Helvey). Farm animals and used car lots should not be permitted in residential areas.</p> <p>Response: <i>Used car lots, as with other commercial development, would be encouraged to locate in Preferred Development Areas. Salvage yards are already regulated by the VW DEP. Farm animals are certainly part of the local landscape, and the Planning Commission has fully endorsed "Right to Farm" principles. .</i></p>
	<p>(Richard Ettlston). Include prohibition against "ridge-top development" since they are visible over long distances, particularly at night.</p>

	Response: <i>See Goal 1.4.</i>
	(Richard Ettlston). Night lights on power company poles could be shielded so that light doesn't impact neighbors. Response: <i>See Goal 1.8.</i>
	(Richard Ettlston). County Rt. 17 in Potts Valley should be included as a county scenic byway. Response: <i>The Planning Commission fully supports maintaining and expanding county byway (See "Recreation and Tourism"). No specific roads have been recommended for byway designation, however, since the list of potential roads could be long and will require additional research.</i>
	(Richard Ettlston). Add County Route 17 to mention of Willow Bend Road as popular site for bicycling. Response: <i>No specific roads are mentioned in the final Draft regarding bicycling routes.</i>
	(Richard Ettlston). Add mention of the "incline railway" at Ray Siding to discussion of transportation history. Response:
	(Richard Ettlston). Add forest service officers to regulatory authority discussion on page 22. Response: <i>Yes. Forest Service and DNR both have enforcement authority in regard to transportation within their jurisdictions. Incorporated into "Transportation."</i>
	(Richard Ettlston). Suggests stronger language on statement that "renewed exploratory drilling for natural gas in the local area is anticipated." States that over 30,000 acres in the county have already been leased. Response: <i>The natural gas issue is fast-moving, and capturing a current snapshot within the Comprehensive Plan may not be feasible given the timelines of drafting and review.</i>
	(Richard Ettlston). High voltage lines and gas lines should be situated alongside existing lines. Response: <i>See "Infrastructure" goals.</i>
	(Richard Ettlston). Communication companies should be compelled to share towers. Don't locate towers in visually sensitive areas. Limit height of towers, so flashing red aircraft warning lights are not needed. Response: <i>See Goal 4.5 in "Infrastructure." This chapter & objective addresses tower siting and potential regulations.</i>
Public Services	
	(Richard Ettlston). Satellite TV and Dish Network also serves the county without being directly "wired." Response: <i>Addition made in chapter narrative.</i>
	(Richard Ettlston). The Monroe County Animal League should be directly funded by the county. Response: <i>See Goal 5.1.</i>
	(Richard Ettlston). Add Roanoke College, Hollins College, and Virginia Western to list of nearby institutes of higher learning.

	<p>Response: <i>Incorporated into Education in Public Services chapter.</i></p>
	<p>(Richard Ettlston). Suggests statement that “typically only small numbers of residents are displaced by flooding” is incorrect, and references Hurricane Hugo. Asks that more flood plain protection measures are needed.</p> <p>Response: <i>Floodplain concerns are addressed in the Housing chapter. .</i></p>
	<p>(Richard Ettlston). Requests prohibition of “Mud bogging” facilities in Potts Valley, and also that hunting and fishing be added into discussion of public services.</p> <p>Response: <i>See final paragraph of “Recreation and Tourism” (pg. 114).</i></p>
	<p>(Richard Ettlston). Suggests that Library deserves county support and funding.</p> <p>Response: <i>See Objective 6.4.4</i></p>
	<p>(Shirley Hall, Monroe County FRN). The FRN has a website at http://www.monroecountywestvirginiafamilyresourcenetwork.com, and the is a resource directory link and under our 2007-2008 Community Plan link at the bottom of the page is a link called Monroe County Assessment 2007.</p> <p>Response: <i>Incorporated into the Public Services chapter narrative.</i></p>
Recreation and Tourism	<p>(Helen Graves). Under current status, the Arts and Crafts Shop which “had moved to the Greenbrier side of the River,” has now moved back to Monroe.</p> <p>Response: <i>Revision made.</i></p>
	<p>(Richard Ettlston). Potts Valley Outfitters and Hollow Hill Farm offer “packaged hunts” in Monroe County.</p> <p>Response: <i>Included in list.</i></p>
	<p>(Monroe County Tourism) Visitors at Salt Sulphur were from South Carolina, not North Carolina.</p> <p>Response: <i>The reference in the draft is a statement that “travelers flocked (to the mineral spring resorts) from coastal Virginia and the Carolinas and even from as far away as Louisiana. ”</i></p>
	<p>(Monroe County Tourism). Add the following to list of assets: 500 hunting around Moncove Lake; hunting and fishing in general; genealogy interests - historical society data, paper, cemeteries; elderhostel visits - 6th consecutive year; motorcycle potential of 219/122/3/12/311; caves - scott hollow, saltpeter caves.</p> <p>Response: <i>List provided, as noted, is not meant to be a comprehensive, inclusive list. Additional assets may be better directed to the Monroe County Tourism’s Tourism Assets, included as an appendix to the Comprehensive Plan .</i></p>
	<p>(Helen Graves). According to a Dean Runyan Associates study released in 2007, Travel Spending (\$M) increased from 7.0 in 2000 to 8.8 in 2006(p) Earnings were impacted by visitors (\$M) at 1.7 in 2000 and 2.0 in 2006(p) and Employment (jobs) decreased slightly from 140 to 130 in the same time period (2.9% of total employment in Monroe County).</p> <p>Response: <i>Spending & employment data updated.</i></p>
	<p>(Monroe County Tourism) Add the following to list of goals (target): market local crafts; share assets and improve communication; incentive packages for new businesses (waive fees/taxes); new options on litter control; visitor center; Indian Creek hiking trail, More trails in general; Organized tours - home, garden, farm; target groups for tourism - artists, seniors, motorcyclists, etc.; mural projects;</p>

	<p>develop gen... assets; signs to attractions - dept, of highways; encourage a Peterstown chamber or a county-wide chamber.</p> <p>Response: <i>Most suggestions are incorporated into various goals/objectives in the chapter. In absence of change in state law, county does not have the authority to wave taxes as an incentive package.</i></p>
	<p>(Richard Ettlston). _DEP should be listed in regard to illegal dump enforcement.</p> <p>Response: <i>Illegal dumps are addressed primarily in the Natural Resource chapter.</i></p>
	<p>(Richard Ettlston). Include U.S. Park Service and Army Corps of Engineers.</p> <p>Response: <i>Entities included in list of "key players. "</i></p>
	<p>(Richard Ettlston). Requests that train stations at Waiteville and Laurel Branch should be added to list of stations in appendix to Tourism draft.</p> <p>Response: <i>Will forward comment to Monroe Tourism, who authored the appendix.</i></p>
	<p>(Cynthia Schiffer, FS District Ranger). Due to the distance from the district office and the lack of other FS facilities in the immediate area, the forest service does not plan to pursue the picnic shelter at Sugar Camp Farm, unless the county or a private group would agree to maintain it.</p> <p>Response: <i>Will forward comment to Monroe Tourism, who authored the appendix.</i></p>
	<p>(Richard Ettlston). Suggests adding description for Potts Valley road (rt. 17) to driving tour noted in the tourism appendix.</p> <p>Response: <i>Will forward comment to Monroe Tourism, who authored the appendix.</i></p>
	<p>(Cynthia Schiffer, FS District Ranger). In list of tourism assets in neighboring counties, the Glen Alton project should be added to the discussion of Giles. Plans include lodging, fishing, birding trails, a handicapped trail, etc.</p> <p>Response: <i>Will forward comment to Monroe Tourism, who authored the appendix</i></p>
Economic Development	
	<p>(Richard Ettlston). Include timbering in discussion of economic development. Include discussion of Gypsy Moth issue.</p> <p>Response: <i>Forestry is discussed in the Chapter. Adequate data on economic impacts of Gypsy Moth infestation has not been found.</i></p>
Community Design	
	<p>(Richard Ettlston). Suggests that "managed growth can also degrade our natural environment and rural character." A lack of growth does not mean loss of economic opportunity. Maintaining current character would be more accurately reflected as "growth vs. non-growth." Goal should be to keep things as they are - not to simply be corrupted at a slower rate.</p> <p>Response: <i>The Planning Commission has sought to balance preservation with growth and economic development.</i></p>
	<p>(Warren Weikel). Two different figures are given in the drafts for the 2000 census population of Monroe. Page 21 says 13,900. Pg. 55 says 14,583.</p> <p>Response: <i>This reflects an error in the 2000 census, wherein county officials were informed by the census department that about 630 inmates at the federal prison in</i></p>

	<i>Alderson were mistakenly counted in Monroe, rather than Summers. The corrected population numbers are used wherever possible. Some analysis done by external parties, however, use the higher estimate, and this is pointed out where needed.</i>
	(Richard Ettlston). Suggests that impact fees should be created in regard to natural gas drilling. Also, that development should be limited if not in the county's best interests, not just based on county's ability to provide services. Response: <i>The imposition of impact fees requires, among other things, a comprehensive zoning ordinance. This would be best explored at a subsequent phase of the planning process.</i>
Natural Resources	
	(Richard Ettlston). Takes issue with statement that "point source pollution is almost non-existent," and suggests that Goodrich be identified as a major source of pointsource pollution. Response: <i>As with other point source discharges in the county, Goodrich's discharge is regulated through a National Pollutant Discharge Elimination System (NPDES) permit issued by the WV DEP.</i>
	(Richard Ettlston). Suggests that acid rain and pollutants from the Ohio Valley are impacting local forests and air quality - and that Forest Service has documentation in regard to local impacts. Also again references lack of mention on gypsy moth. Response: <i>No data from Forest Service is readily available.</i>
	(Richard Ettlston). Suggests that all endangered or threatened wildlife and plant species should be listed, or that none should be listed. Listing some, according to respondent, suggests that others are not important.
	(Richard Ettlston). Suggests that WVDNR also believes deer populations are excessive. Also suggests that cold-water trout streams, as designated by the DNR, are a vanishing resource, and should be granted special protection. Response: <i>See discussion under "Goals - 1. Protect Siu face Water Resources" (pg. 37).</i>
	(Richard Ettlston). Feels that risks of natural gas drilling are understated.
	(Richard Ettlston). Says that DEP has been involved in the clean-up of an illegal dump near Laurel Branch. Response: <i>Illegal dumping is addressed in Goal 9.3.</i>
	(Richard Ettlston). Suggests that there was no mention of illegal dumps that should be inventoried.
	(Richard Ettlston). Takes issue with the draft statement giving credit to a history of good stewardship of the environment in the local area - suggesting that "benign neglect" would be a better assessment. Response: <i>The Planning Commission respectfully disagrees.</i>
	(Richard Ettlston). Again suggests greater emphasis should be placed on natural gas issue. Suggests that Forest Service GIS data, and DEIS document from AEP. Transmission Line case should be references as available data. Suggests that county should do more to protect itself, and not count on state agencies.
	(Dave Blakeslee). Concerned about commercial wind generation within the county, and potential impacts to scenery, property values, water, and wildlife. Suggests a county-wide height restriction of man-made structures might effectively control commercial wind generation.
	(Connie Helvey). Do more to address abandoned vehicles and machinery close to roadways. More closely monitor septic tanks, especially near streams.

	Response: <i>Illegal clumping and support of existing regulations (inc. abandoned vehicles and salvage yards) is addressed in the chapter. Septic tanks are addressed in both Land Use and Housing chapters.</i>
	(Larry Mustain). Set limits on amount of water that can be removed from a stream. Response: <i>See Goal 9.2.</i>
Safety	
	(Richard Ettlston). Suggests that law enforcement, fire control, and emergency relief are also a forest service responsibility on land within their jurisdiction. Response: <i>Included in Public Services chapter.</i>
	(Tim Wilson, 911 Center). Responded that chapter is reasonable as presented, and did not offer specific recommendations for changes
General	
	(Richard Ettlston). Requests support for designation of “Peters Mountain Scenic Area,” to include Potts Valley. Response: <i>A few years ago, some preliminary meetings were conducted by Park Service officials in regard to the possible creation of a National Recreation Area in this area. This would have included Monroe, as well as nearby counties in both West Virginia and Virginia. I think the tentative name was to be The Ridge and Valley National Recreation Area. It would be worthwhile to follow up with the Park Service to see if this is still being considered.</i>
	(Richard Ettlston). Some position statement should be added that Monroe County interests should not be sacrificed for state or national interests, such as military bases, nuclear repositories, high voltage power lines, etc.

Hydrogeology and Geochemistry of the Peters Mountain Aquifer, Monroe County, WV

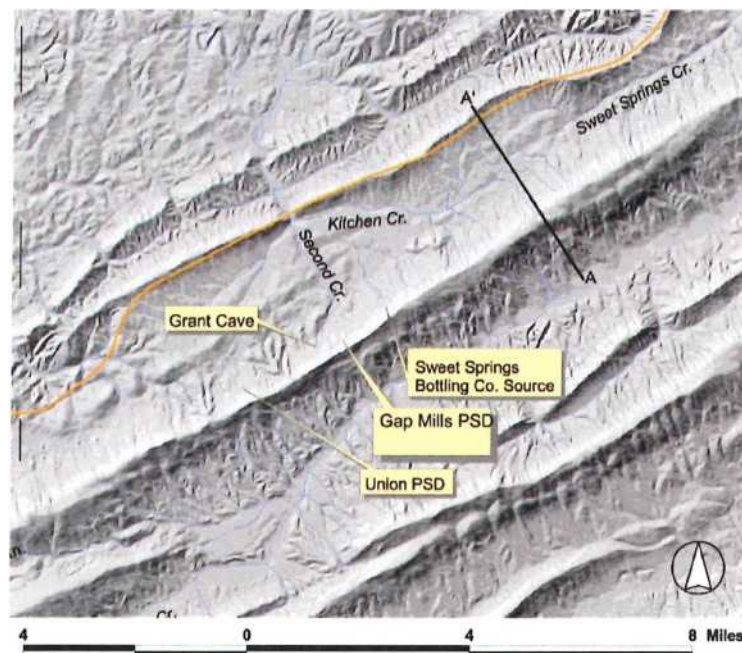
Geoff Richards & Joe Donovan, WVU

Presented by Tammy Vandivoort, WVU Water Research Institute

Study Area

The study examined groundwater occurrence in Peters Mountain between the towns of Centennial and Zenith.

Peters Mountain lies on the leading edge of the Allegheny front thrust fault complex and forms the VA-WV border for several miles. The area has abundant groundwater and relatively little current use. The groundwater is very high in chemical quality, supporting a public service district, bottled water company, and local communities. The remote mountain recharge setting means water is relatively pristine and not currently subject to risk of contamination.



Water uses and surface water systems of Peters Mt. near Gap Mills, WV

Purpose

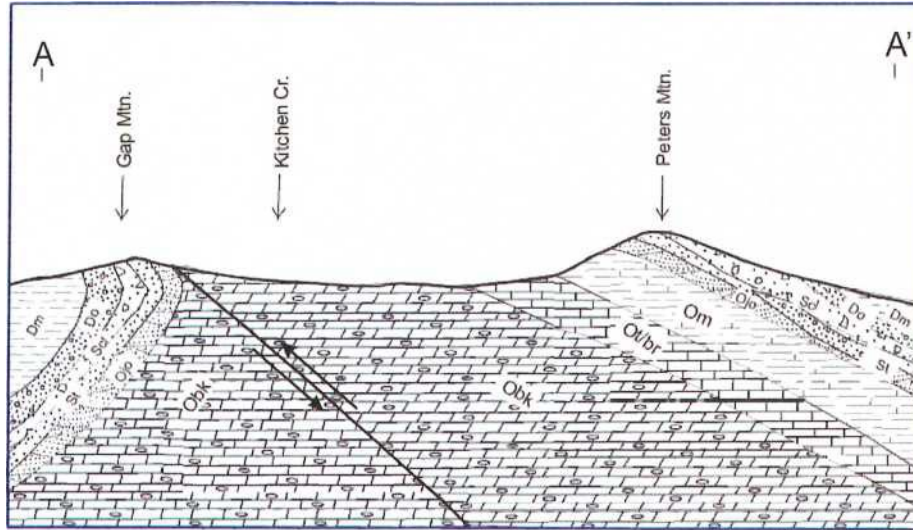
To test the hypothesis that there are systematic differences in groundwater chemistry within a karst flow regime that can be interpreted to reflect the source of aquifer lithology, structure, and stratigraphy.

General Method

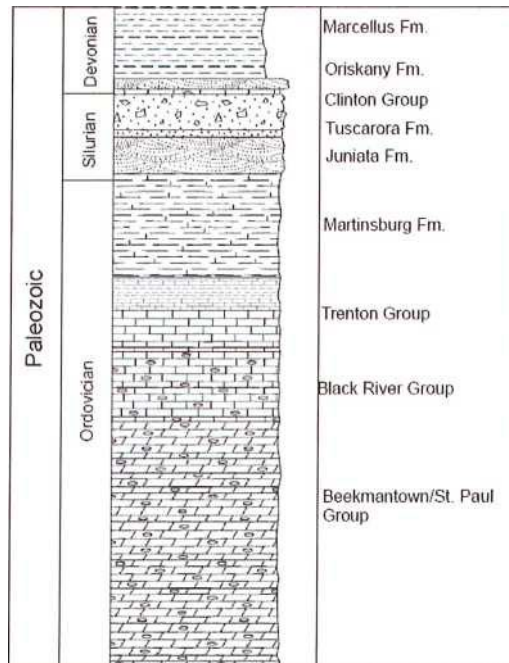
Springs were mapped in the field, and then classified according to surface geology. Springs were also sampled for water chemistry. Statistical analyses were then performed to test the hypothesis.

Objectives

1. Locate and map groundwater discharge points (springs).
2. Delineate major hydrologic zones along Peters Mt.
3. Perform spring reconnaissance and quantify equilibrium geochemistry.
4. Apply statistical analyses to the chemical variables illustrating similarities and differences between aquifer group.
5. Interpret how the variability influences groundwater chemistry.



Geologic cross section of Hanging Rock adapted from Reger (1927).



Columnar section measured near Hanging Rock, Peters Mt. after the description in Reger (1926).

Methodology

Spring reconnaissance and mapping

From May-Aug 2004, 221 springs were located; 76 were measured for pH, temp., and specific conductance. Discharge was estimated.

In July-Aug 2004, samples were collected at 22 springs for analysis of major ion chemistry.

Springs were located and mapped.

Sampling and chemical analysis

Springs were selected for chemical analysis to be representative of 3 main aquifer types in the area. Alkalinity, pH, and spec. conductance were measured in the field. Major ion chemistry was analyzed in Morgantown (NRCCE lab).

Analysis of results

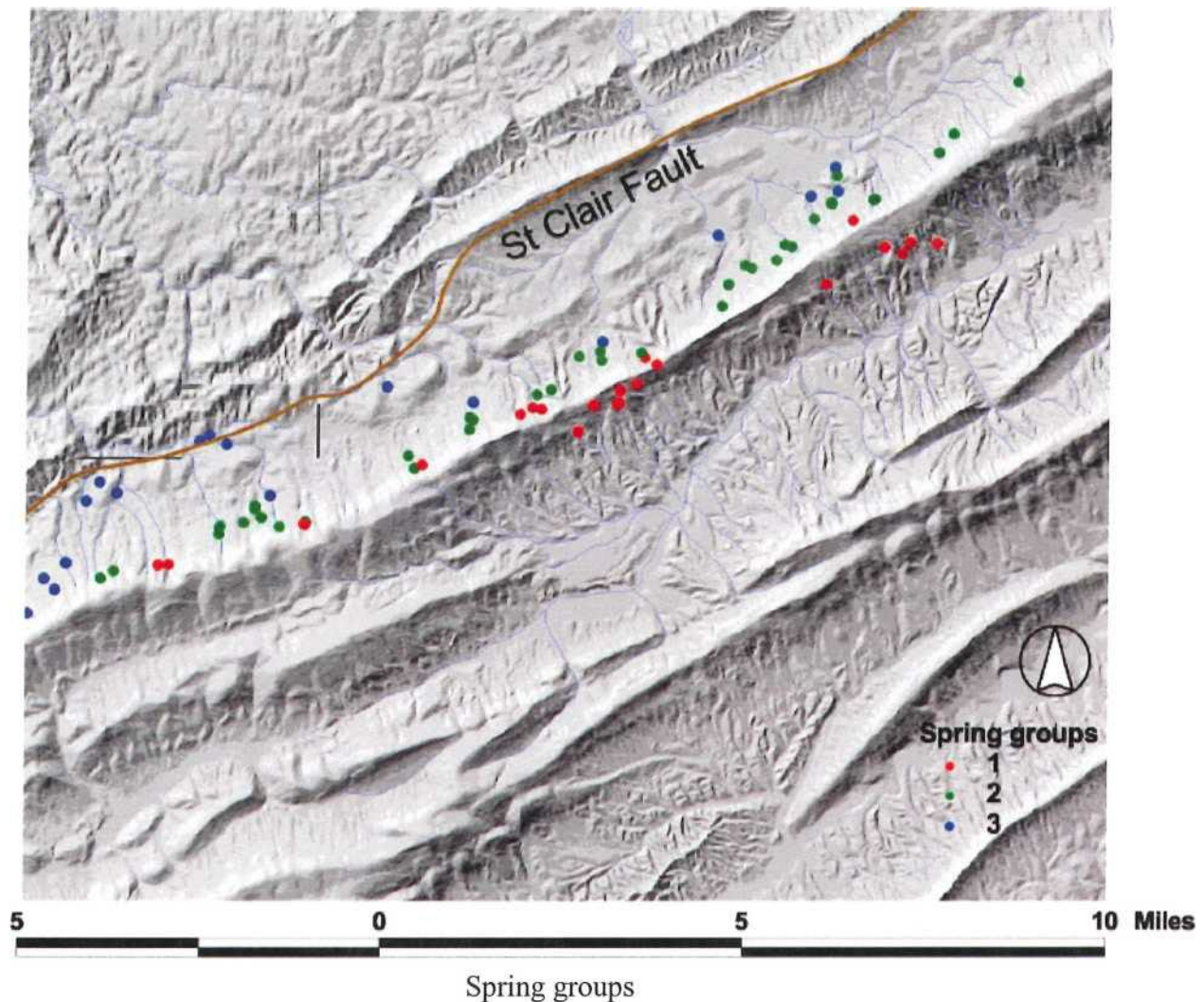
The equilibrium partial pressure of carbon dioxide and saturation indices with respect to calcite and dolomite was calculated for each water sample. The contrasts in these results were then interpreted to be different aquifer groups.

All spring locations and geology were placed in a GIS format. Statistical analyses were then performed to test for significant differences between aquifer groupings.

Outcomes

Springs and seeps within the Second Creek and Indian Creek Watersheds were identified and classified into one of three groups based on surface geology:

1. Silurian/Devonian clastic rocks on the east slopes of Peters Mt.
2. The Martinsburg Fm near the top of Peters Mt.
3. Ordovician carbonate aquifers on the west slopes of Peters Mt.



Group 1: Silurian/Devonian clastic rocks on east slopes of Peters Mt.

Springs occurred all up and down the east side of the mountain. Chemical signatures were similar to regional precipitation. Springs were widely scattered and relatively low in discharge.

Group 2: Martinsburg Fm near top of Peters Mt.

Springs occurred at high elevation. There were significantly higher concentrations of dissolved solids than group 1 which were similar to regional precipitation. Springs were much more frequent, relatively low in discharge, and occur in cluster on upper slopes. These springs are controlled mainly by stratigraphy.

Group 3: Ordovician carbonate aquifers on the west slopes of Peters Mt.

Springs occurred at low elevation. They had significantly higher concentrations of dissolved solids than did group 1 which were similar to regional precipitation. Springs were few in number, widely scattered, and of generally high discharge. These springs are believed to be influenced by conduit zones in the Cambro- Ordovician, possibly in some cases by fault location. Springs are controlled by structure/faulting.

Significance

This study provides a basis for local government and organizations to understand and classify their groundwater resources. Insight is provided into which aquifers yield:

- Ⓢ The most desirable water quality (Group 2)
- Ⓢ The highest quantity of water (Group 3)
- o The most vulnerable groundwater to protect from contamination (Group 3)

Interpretations

- e Dominant modes of pH are at 5.8 and 7.3; this delineates two basic types of ground water from Peters Mt:
 - Low-alkalinity waters derived from clastic materials and
 - More strongly alkaline waters derive from aquifers containing carbonate materials
- Dominant modes of specific conductance are 0-50 and 125
 - Waters with low SC (<50 pS/cm) have few dissolved solids
 - Waters with higher SC have Ca or Mg dominating from the dissolution of carbonate minerals.
- Alkalinity... non-normal and negatively skewed
 - Low end represents groundwater flowing thru clastic rock; alkalinity being a function of availability
 - Moderate alkalinities of group 2 springs have source aquifer with calcareous shales and limestones
 - More strongly alkaline waters derive from aquifers with limestone and dolomite
- Ca concentrations are strongest in waters flowing exclusively thru limestones
- Ca concentrations are low in water discharging from clastic rocks
- Mg in groundwater is believed to be dissolution of dolomite
- Only 4 locations have appreciable Mg concentrations of 4x to 1 Ox that of other springs

	U	pH	SC	Aik	Ca	Mg	Na	—	—ST"	Cl	"SOT pco ₂	"ST"	9 _d	eiev	
Q	1.00	<u>0.18</u>	<u>0.22</u>	-0.17	0.44	0.00	0.40	0.31	0.07	-0.08	0.33	0.17	0.16	<u>-0.56</u>	
PH		1.00	<u>0.65</u>	0.12	0.19	0.21	0.24	0.41	-0.25	-0.03	0.19	0.01	-0.02	0.03	<u>-0.40</u>
SC			1.00	0.31	0.37	0.32	-0.01	0.21	0.06	-0.14	0.04	0.24	0.18	0.22	<u>-0.60</u>
AJk				1.00	0.84	0.89	-0.01	0.56	0.29	-0.09	0.47	0.82	0.62	0.71	-0.30
Ca					1.00	0.65	0.20	0.32	0.45	-0.05	0.30	0.75	0.77	0.81	-0.42
Mg						1.00	-0.21	0.63	0.09	-0.07	0.52	0.66	0.34	0.47	-0.42
Na							1.00	0.04	0.11	-0.09	-0.08	0.11	0.24	0.20	-0.16
K								1.00	-0.13	-0.06	0.47	0.57	-0.06	0.06	-0.58
Si									1.00	-0.17	-0.16	0.37	0.38	0.35	0.03
Cl										1.00	-0.26	-0.27	0.07	0.04	0.26
SO											1.00	0.35	-0.05	0.03	-0.32
PCO2												1.00	0.49	<u>0.56</u>	<u>-0.60</u>
Sic													1.00	0.99	-0.21
Sid														1.00	-0.29
Elev															1.00

Correlations matrix for Datasets A and B (a = in red; b = in blue). Values of R exceeding tR (a=75%) are underlined, and those exceeding tR (a=95%) are highlighted in bold and also underlined.

- Notable differences occur in means between the 3 aquifer groups.
- Key differences are:
 - Alkalinity, Ca, Sic and Sid between Groups 1 and 2
 - Alkalinity, Ca, Sic, Sid, and PCO2 between Groups 1 and 3
 - Differences between Groups 2 and 3 versus Group 1 are due to carbonate dissolution
 - Group 1 has no carbonates and is therefore lower in concentrations of the above

variables

- Groups 2 and 3 have carbonate minerals that comprise aquifer materials and range from calcareous shales, calcite, and in some parts of Group 3, dolomite

Statistic	Groups	Aik	Ca	Mg	Na	K	Si	ClSO ₄	Q	pH	SC logPCO ₂	Sic	Sid		
n	1	5	4	4	4	4	4	4	22	22	22	2	2		
n	2	9	9	9	9	9	9	9	39	39	39	9	9		
n	3	12	9	9	9	9	9	99	18	18	18	9	9		
mean	1	7.1	6.7	0.8	0.7	0.8	2.6	0.9	6.6	13.6	5.839.3	-2.8	-5.6	-11.5	
mean	2	53.7	22.9	1.1	1.0	0.4	3.0	4.0	3.8	10.6	6.9	110	-2.6	-11	-3.3
mean	3	114	40.1	12.4	1.1	0.9	32	1.5	6.2	32.8	7.1	200	-2.2	-0.7	-1.9
std dev	1	6.35	5.42	0.22	0.31	0.16	0.73	0.02	0.68	21.5	0.85	62.0	0.17	0.03	0.06
std dev	2	8.84	5.68	0.18	0.58	0.18	0.45	9.13	1.69	12.2	0.70	90.7	0.23	0.31	0.51
std dev	3	57.2	9.59	13.0	0.65	0.32	0.67	0.63	4.33	38.4	0.26	113	0.20	0.34	0.99
alpha		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
df	12	11	11	11	11	11	11	11	59	59	59	9	9	9	
df	15	11	11	11	11	11	11	11	38	38	38	9	9	9	
df	19	16	16	16	16	16	16	16	55	55	55	16	16	16	
tons	1-2	5.75	2.90	1.78	0.63	1.82	0.74	0.39	1.90	0.18	1.46	0.87	1.03	15.18	17.09
	1-3	2.17	3.86	1.05	0.68	0.65	0.95	1.01	0.12	0.63	2.05	1.82	2.98	15.57	10.23
tc-os	2-3	1.36	2.18	1.23	0.11	1.94	0.45	0.38	0.73	0.94	0.41	0.91	1.70	1.31	1.77
tent	1-2	2.18	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.00	2.00	2.00	2.26	2.26	2.26
	1-3	2.13	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.02	2.02	2.02	2.26	2.26	2.26
lon	2-3	2.09	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.00	2.00	2.00	2.12	2.12	2.12

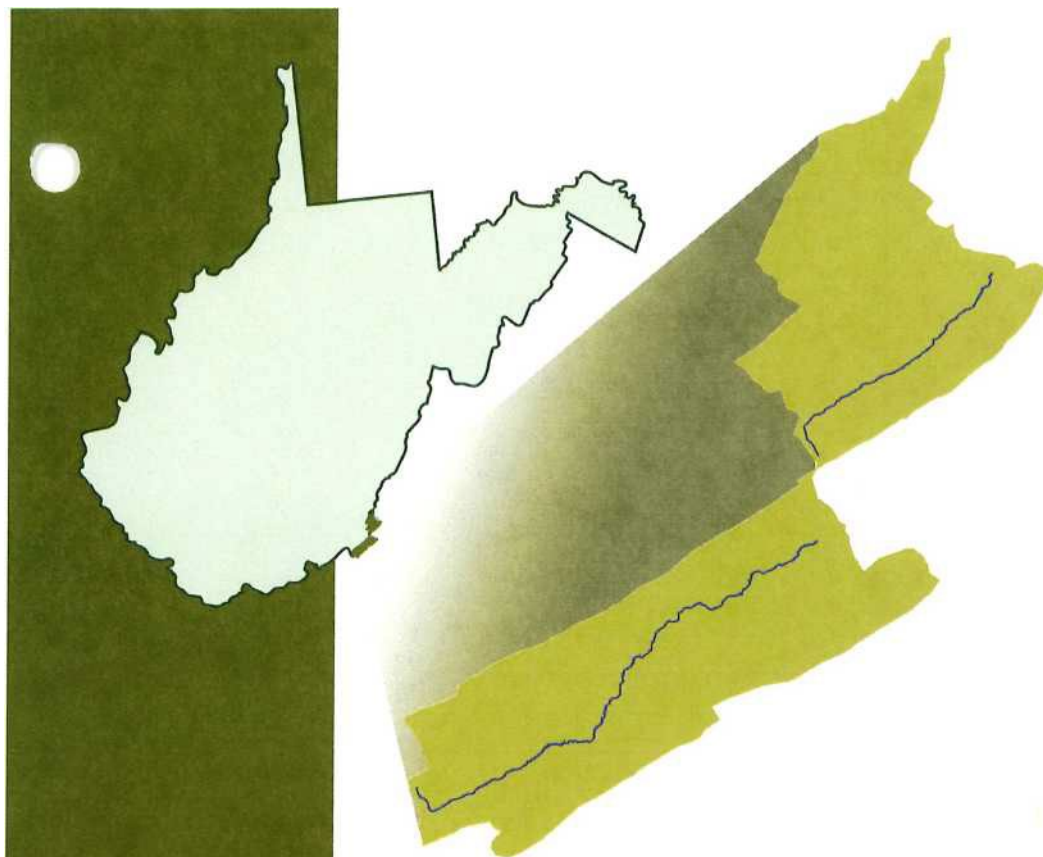
Parametric statistics and T-test results for Datasets A and B, broken into three groups (Group 1 and 2, Groups 1 and 3, and Groups 2 and 3).

Conclusions

- 1) Spring discharge on Peters Mt. has unique geochemical signatures related to surface geology at the springs.
- 2) Hydrochemistry of the groundwater appears to be strongly influenced by local lithology.
- 3) This results in groundwater that can be identified by the formation from which it discharges regardless of flow paths that may or may not cross lithologic boundaries.
- 4) Elevation, location, quantity, and chemistry of springs are all a function of structural and stratigraphic influences.
- 5) Group 1 springs emerge in the Silurian and Devonian clastics on the southern side of Peters Mt.
- 6) Discharges contain concentrations of dissolved solids and pH that are similar to rainwater, with very minor dissolution of calcite.
- 7) Group 1 springs may be ephemeral.
- 8) Group 2 springs discharge from the Ordovician Martinsburg Fm
- 9) Groundwater on this side of the mountain flows opposite to the direction of dip.

- 10) Clastic units intercalated with more soluble limestones are thought to produce multiple perched aquifer layers.
- 11) The groundwater has 2 chemical signatures:
 - a) Springs from the clastics of the upper Martinsburg have lower alkalinities and lower concentrations of dissolved solids (similar to group 1)
 - b) Groundwater flowing thru these perched aquifer layers commonly sinks and rises along a flow path and may be ephemeral.
- 12) Springs in the basal Martinsburg have higher alkalinities and solutes are derived almost exclusive from calcite dissolution
- 13) Group 3 springs discharge from the Ordovician dolomites lower in the valley at the western base of Peters Mt.
- 14) This aquifer is believed to be dominated by conduits and thought to receive recharge from sinking streams flowing down Peters Mt.
- 15) The St. Clair fault creates a structural boundary that may limit or preclude groundwater flow and appears to be the western extent of groundwater discharge.
- 16) Group 3 springs have two chemical signatures
 - a) One group of springs flows entirely thru Ordovician limestones and have Ca/Mg. ratios varying from 12-20.
 - b) The second group has more unified ratios of Mg to Ca which implies flow-paths are exclusively dolomitic.

June 2008
Final Approved Report



Total Maximum Daily Loads for Selected Streams in the James River Watershed West Virginia

Prepared for:

West Virginia Department of Environmental Protection

Division of Water and
Waste Management

Watershed Branch, TMDL Section

Prepared by:

Water Resources and TMDL Center

Tetra Tech, Inc.

405 Capitol Street, Suite 608

Charleston, WV 25301

• Jr "

Total Maximum Daily Loads for Selected



Streams in the James River Watershed, West Virginia

FINAL APPROVED REPORT

June 2008

Indian Creek Watershed Association
Water Quality Study, 2007-2008, Final Report
 Union Recharge Area

Water samples for this study, collected by the Monroe County Sanitarian between May and November 2007, are part of a water quality data base for Monroe County. The water tests were conducted by the WV Department of Health and Human Services, Bureau of Public Health, WV State Certified Laboratory. The water samples were tested to determine the presence of fecal coliform and e. coli. Participation in this study was voluntary, free to participating households and confidential. The water test results can be considered valid data because the water was collected by a certified County Sanitarian and tests were conducted by a WV State Certified Laboratory. ICWA is keeping names of households surveyed confidential, as promised.

Location	Number Surveyed	Number Tested	# Tests Unsatisfactory	# Tested Satisfactor	# Refused Test	#Not Tested	Satisfactory Test %
Knobs	26	13	6	7	8	5	54
Rt. 219N.	33	9	5	4	19	4	44
Rt. 219 S.	32	14	7	7	16	3	50
Willow Bend 39		22	10	12	12	6	55
Rt. 3*	18	2	2	0	12	4	NA
Total 149		68	38	38	67	22	58%

*Many homes along Rt. 3 are served by Union Public Service District

149 houses surveyed. Nine (9) houses visited refused to participate in the survey.

82 Yes to water test

67 No to water test

55% Consented to water test

Six (6) more extensive water tests were conducted in February 2008, results just recently sent to us. Copies of these results are attached to this report. Their good/bad analysis will be forthcoming.

Funding for this Water Quality Study was provided from grants through the WVDEP Stream Partners Program and Canaan Valley Institute. Many thanks to the Monroe County Sanitarian employed by the Monroe County Health Department and to the many residents who participated in the study.

The purpose of the Water Quality Study undertaken by Indian Creek Watershed Association was twofold: the initiation of a water education outreach process and the creation of a water quality data base. The study was

conducted in Union Public Service District's Source Water Protection Area or Recharge Area as defined a Source Water Assessment Report (Jan. 2003), prepared by WVDHHR, Bureau of Public Health, Office of Environmental Health Services.

The area chosen for this study is the land or recharge area located around Union's two back up wells, which serve customers in Union's Public Service District. The wells are located behind Monroe's Courthouse. The oval-shaped recharge area, covering approximately 13,171 acres, runs from below Bickett's Knob, over to the top of Knobs Rd., southeast through Salt Sulphur Springs and the WVU Extension Farm, swinging around to go northwest towards Gates and Rehobeth Church, north towards Beckett's Park, then west up to the Knobs.

Two interns were hired to conduct the door-to-door study, using a custom-designed, 28 question Water Study. Most homes in the Recharge Area were surveyed. After being surveyed by an intern, householders were given an educational sheet covering information on safe water, septic systems and common pollutants. After the surveys were completed, sixty (60) water samples were collected by the Monroe County Sanitarian who then sent the samples to the state laboratory for testing. After water tests were completed, the results were mailed to the households, along with additional information on well safety and chlorination procedures.

It is the hope that this study will generate an interest in Monroe County's water resources. One intern stated, "While working in the community, survey respondents expressed great interest regarding the quality of their water. Bringing up the topic of water and conducting the survey seemed to work as a catalyst in the important discussions on Monroe's water."

Union's Source Water Assessment Report, produced by the WV Bureau of Public Health, outlines several protection activities which could be undertaken in addition to citizen education. Three areas of concern could be investigated by ongoing protection activities, as follows.

One, obtain information on underground storage tanks located in this area. Five (5) abandoned gas stations have been identified. WVDEP (Department of Environmental Protection) records indicate not all of the old, abandoned tanks have been removed. The old tanks can create a problem if they begin to leak More investigative work should be conducted regarding these old stations.

Two, sinkholes and karst topography, are a major concern in regards to water protection. Karst does not permit the adequate filtration of groundwater. A discharge or spill of contaminants has the potential to create severe health hazards. Citizens need to be made aware of potential contaminants including industrial and commercial products, pesticides and other chemicals. The use of Best Management Practices should be used in surrounding agricultural areas.

Three, abandoned wells pose a potential hazard to groundwater protection. Improperly capped wells can be a direct line to underground water reserves. Wells can only be properly capped by a certified well driller. Landowners should be notified about the potential danger from abandoned wells and correct remedies to this problem.

This Water Study presents concrete ideas towards establishing a water protection plan for Monroe County, West Virginia. Our other intern expressed her feelings, "Eveiy person who is bom on this earth should leave it cleaner than when they got here."

The following percentages represent answers to some survey questions.

Has your well or spring ever gone dry?

97% No 3% Yes

Where does your home drinking water come from?

Private well
Public water system
Shared well
Spring 84% 7% 5% 3%
Cistem 1%

What is the distance between your home and your home's water source?

Half mile or more Few hundred 34%
yards 100 feet to 100 yards less 24.5%
than 100 feet 9.5%
9.5%

What is the age of your septic system?

Older than 20 years 46%
11-20 years 23.5%
6-10 years 14%
0-5 years 9.5%
Don't know 8%

What is the distance between your septic system and your water source?

Less than 100 feet 11%
Between 100 feet and 100 yards 48%
A few hundred yards 30%
Other 1.5%
Don't know 9.5%

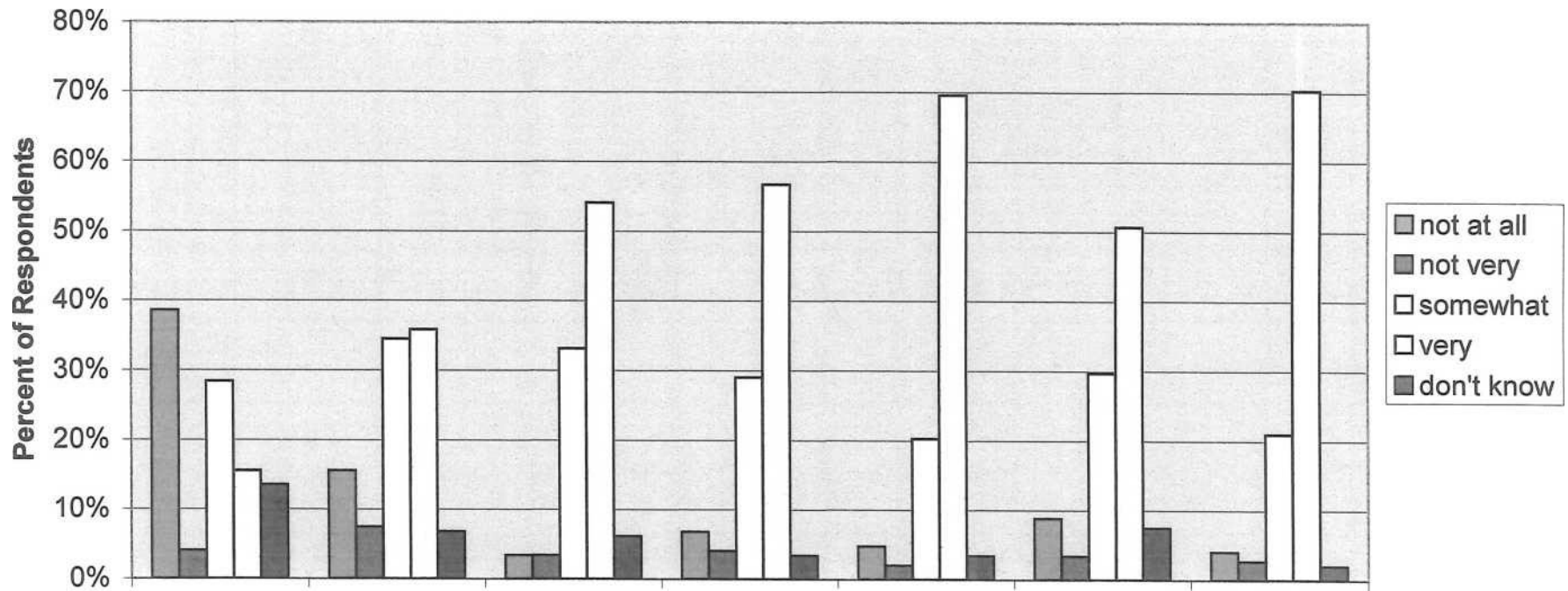
How concerned are you with pollution and environmental quality in your local water and streams?

53%
31%
Very concerned Somewhat 4%
concerned Not very concerned Not 9%
at all concerned Don't know 3%

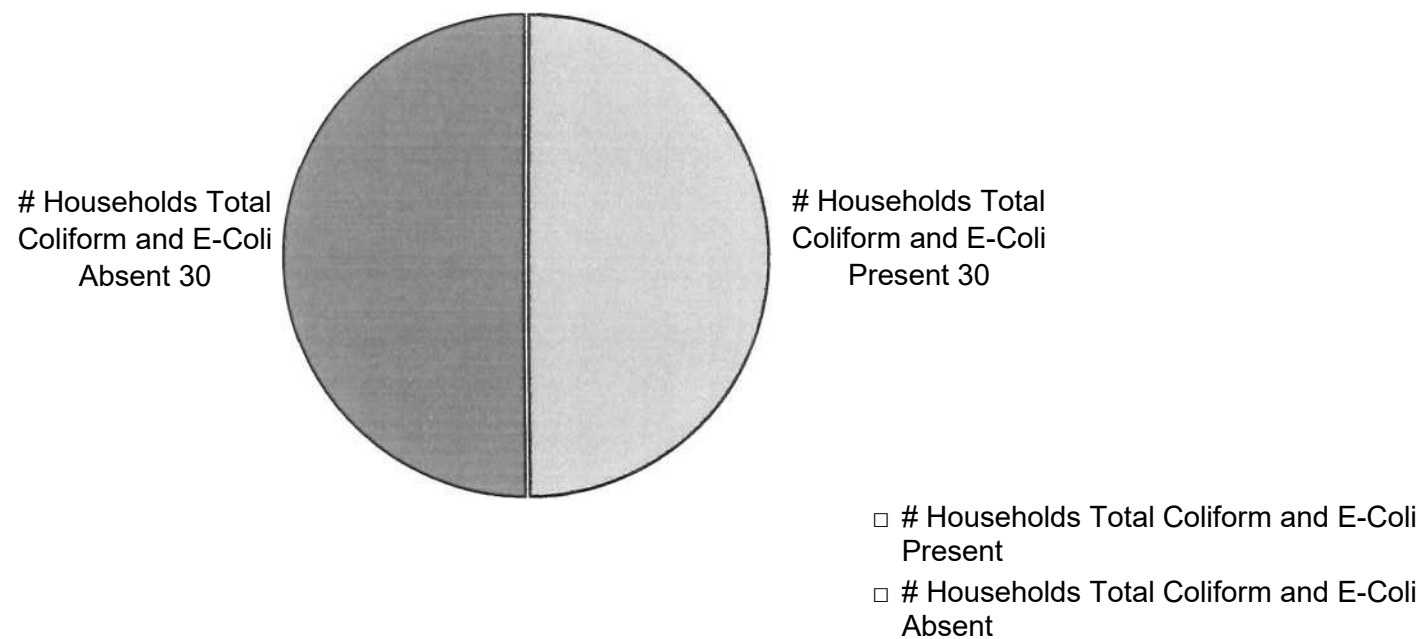
How high a priority should our local officials and county government place on protecting our water and local watersheds?

78%
17%
High Medium 1%
Low 0%
No priority Don't know 4%

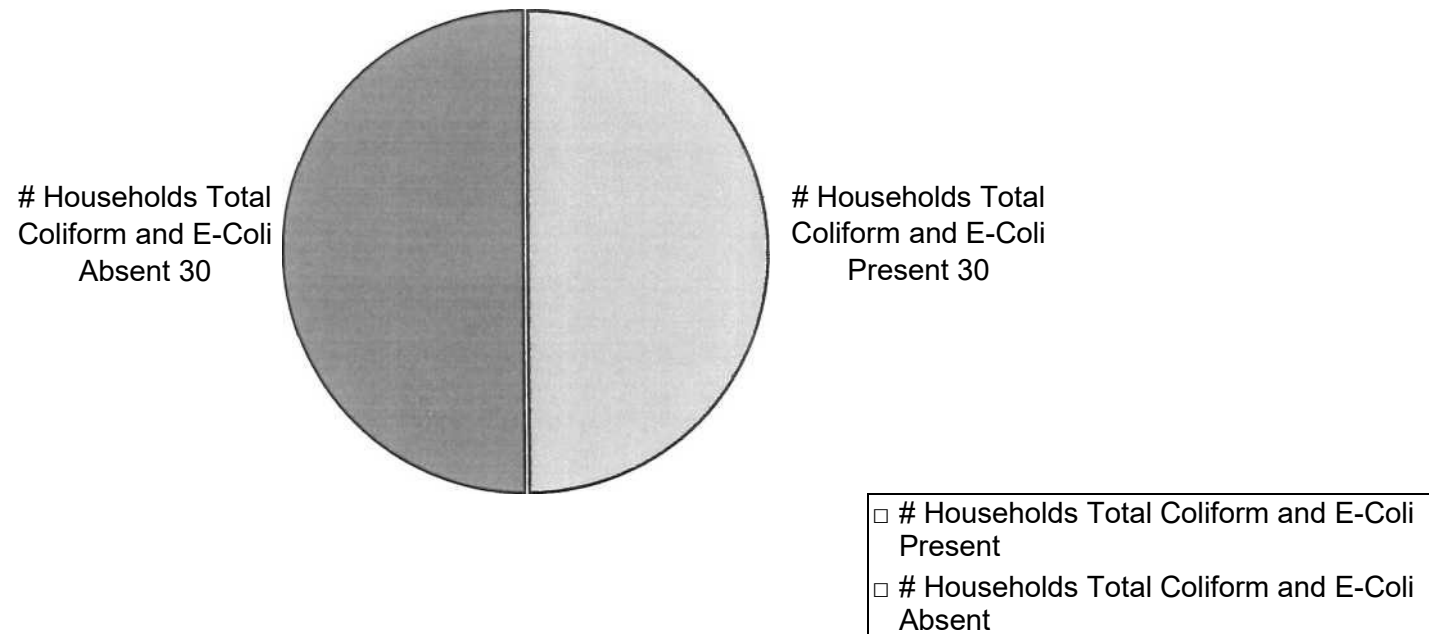
Who Should Be Responsible for Water and Environmental Protection in Monroe County?



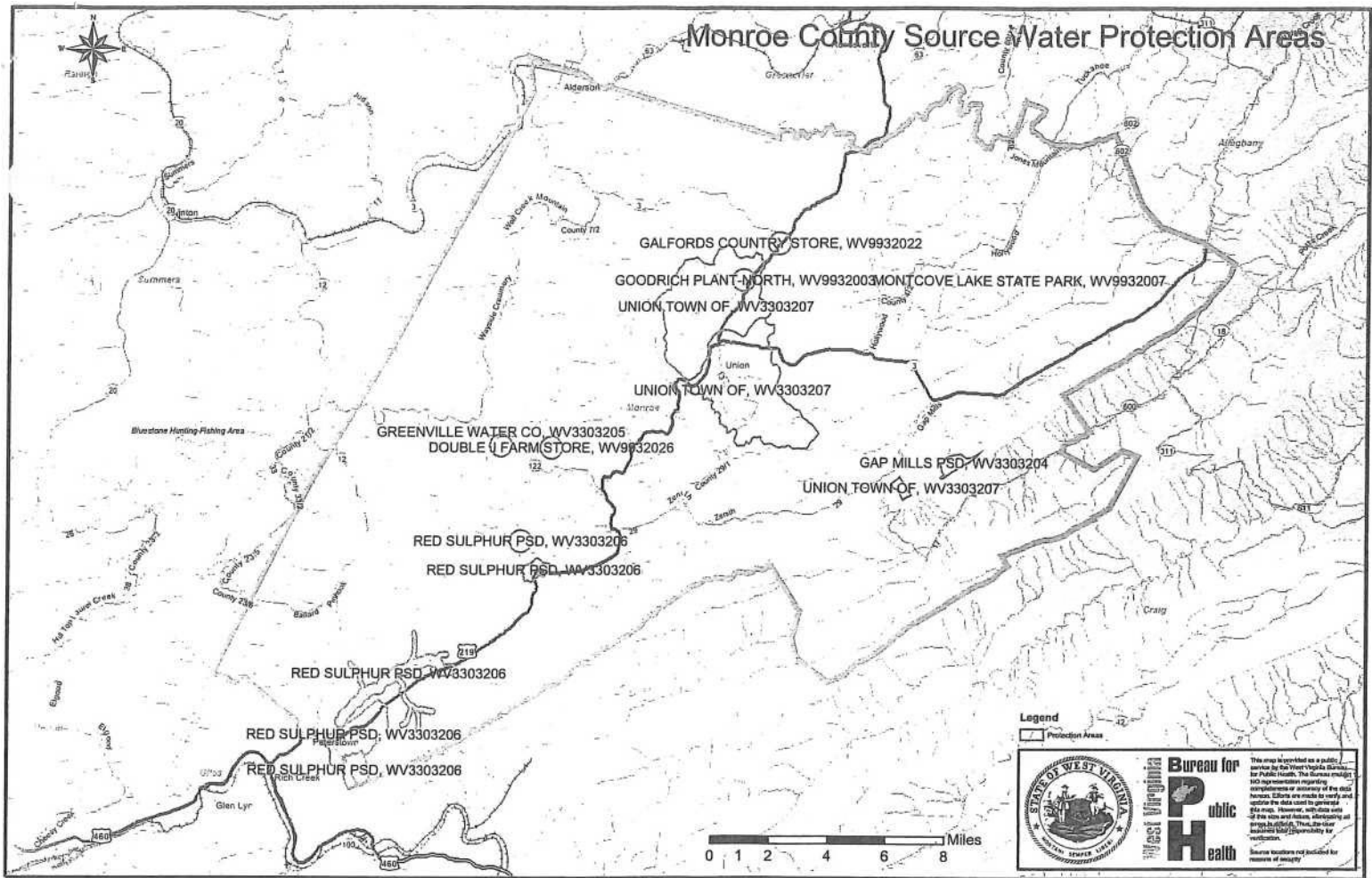
Water Bacteriological Report
Households in Town of Union Recharge Area
Indian Creek Watershed Association Report



Water Bacteriological Report
Households in Town of Union Recharge Area
Indian Creek Watershed Association Report



Monroe County Source Water Protection Areas



Legend

Protection Areas



Bureau for Public Health

This map is provided as a public service by the West Virginia Bureau for Public Health. The Bureau makes no representation regarding the completeness or accuracy of the data herein. Errors are made to verify and update the data used to generate this map. However, with due care of the data and maps, the Bureau is not liable for any errors or omissions. The user assumes full responsibility for verification.

Source locations not included for reasons of security.



From Monroe Tourism Advisory

1 1/16/06

The Monroe Tourism Advisory was formed in February of 2005. Its goal is to meet quarterly. Its function is to set direction for the tourism program in Monroe County.

Members of the advisory are:

- Representatives of three tourism-related businesses
 - Representative of the Monroe County Commission
 - Representative of the towns of Union, Alderson and Peterstown
 - Representative of Moncove Lake State Park
 - Representative of George Washington and Jefferson National Forest
 - Representative of Monroe Historic Society
 - Representative of Alderson Main Street
 - Representative of Union Area Chamber of Commerce
 - Representative of Friends of THE Second Creek
 - Representative of Monroe County Farm Bureau
 - Representative of Monroe Arts Alliance
-

MONROE COUNTY ASSETS WITH THE POTENTIAL TO DRAW TOURISTS

HISTORY

Names of interesting things which happened in the county's past. These may be "significant" events like a Civil War battle or items of primarily local interest like a ghost story. The aspects of an area's might include: industrial, agricultural, cultural, geological, military, social, settlement patterns, connection to famous people etc. History may be from different periods like the depression, the 60's, pre-Columbus, prehistoric, etc. How did the county begin? What major changes has it gone through? What is there that an outsider might be interested to learn about?

County -

James Monroe, fifth president of the United States presided over a period of time known as the "era of good feeling," because of the lack of fractional quarrels. Monroe County, which was formed in 1799, honors Monroe, but for his contributions before he became president.

Towns -

Peterstown - Named for Christian Peters who helped establish the town along the banks of Rich Creek in 1803.

Union Historic District - First settled in 1774 by James Alexander and established as the county seat in 1799. The historic district is composed of residences, commercial structures, county governmental buildings, two large cemeteries, and the land of part of three historic farms. Walking tour of National Register historic district exhibits several antebellum homes and churches. (NRHP)

Alderson Historic District - Along the banks of the Greenbrier River, Alderson offers a variety of quaint shops, restaurants, and historic architecture. Platted by George Alderson after 1872, there were 60 houses and 400 people by 1877. The arrival of the C& O Railroad did much to shape the town. This district also extends across the river into

Greenbrier County, but the Monroe County side contains the historic commercial business

district. (NRHP)

Areas -

Pickaway Rural Historic District - This grouping of 20 farms clustered near the village of Pickaway has a broad selection of buildings dating from the log homes of the 1790s to turn of the century housing. (NRHP)

Lynnside Historic District (Sweet Springs Vicinity) - This district receives its name from the traditional name of the Lewis family house. The large red brick Greek Revival mansion is 1 1/2 stories on a raised masonry foundation. It was constructed in 1845 by William Lynn Lewis. The area contains several distinctive out buildings, two wooden timber bridges and a small pond. (NRHP)

Mann-Miller Springfield/Hunter Springs Historical Area - This project, sponsored by the Greenville Ruritan, is planning a historical marker, pavilion, maps and information detailing an area of middle Indian Creek Valley where pioneers settled.

Mineral Spring Resorts -

Red Sulphur - Aside from the village itself, nothing remains of the old spa except for the stone spring enclosure.

Salt Sulphur Springs Historic District - The complex of buildings and spring sites commonly called the Old Salt Sulphur Springs Resort, of "Old Salt," survives as one of the largest native stone pre-Civil War groupings in West Virginia. Remaining stone buildings include a wing of the hotel, the bath house, spring house, church, and general store. All are in fairly good shape. Many 19th century clientele came to take the "cure," as the spring waters were commonly believed to possess medicinal benefits. Some notable visitors to the area were: President Van Buren, Governor John Floyd of Virginia, and Jerome N. Bonaparte, nephew of Napoleon Bonaparte. (NRHP)

Old Sweet Springs - The first hotel was erected on the site in 1792, making the resort one of the area's earliest. The brick hotel, cottages, and bathhouse which remain date from the 1830's. The claim persists that Thomas Jefferson was employed to create the design for the resort complex. District Court proceedings for the counties of Greenbrier, Kanawha, Monroe (after 1799), Botetourt, and Montgomery were held here from 1796 until 1807. (NRHP)

Military Structures or Events -

Cook's Fort - A marker notes the location of a wooden stockade which reportedly enclosed an area of roughly 1.5 acres. 300 settlers took refuge there in 1778. Nothing remains of the structure itself.

Wood's Fort - A small stockade fort, and one of several fortifications which were erected in the county prior to the American Revolution. Nothing remains at the location now.

Confederate Soldiers of Monroe County Monument, Union - Plot was donated to the Daughters of the Confederacy in the late 1890's by a descendant of Hugh Caperton, a congressman from 1813 to 1815. The monument was dedicated in September of 1901.

Grist Mills -

Cook's Mill (currently called the Old Mill) - Erected in 1857 on the site of the original mill dating to the late 1700's. Much restoration has been done by the mill's owners. Not currently open to the public. (NRHP)

McClung's Mill - Moved to its present site in the early 1900's from Craig County, Virginia. The mill was used almost continuously for the grinding of grain through the late

1960's. Not currently open to the public.

Reed's Mill - Located on Second Creek near the Greenbrier County line, portions of the old gristmill building date back to the late 1700's. The mill remains open and functions commercially during limited hours. At one time, there existed 22 grist mills, 4 woolen mills, one powder mill, and many saw and planing mills along Second Creek. (NRHP)

Nickell Homestead and Mill - This Federal farmhouse is estimated to have been built in 1794. Although the family members were primarily farmers, they also operated a grist mill along Second Creek from 1814 to 1949, supplying both Monroe and nearby Greenbrier Counties. (NRHP)

Covered Bridges -

Indian Creek Covered Bridge - Route 219 was built along the course of the old Indian path known as the Seneca Trail, or alternately, The Warrior's Path. The covered bridge was built along the course of the old road in 1898. Present day 219 doesn't vary too greatly from the course of the path used by tribes of the Iroquois Nation. (NRHP)

Laurel Creek Covered Bridge - Built in 1911, this bridge is still in use on Laurel Creek Road, between Lillydale and Greenville, the bridge has the distinction of being the smallest remaining covered bridge in the state of WV. (NRHP)

Churches -

Rehoboth Church, Union - Reported to be the oldest church building in the Virginias, west of the Shenandoah Valley. The small log structure was erected c. 1785. The building remains, though now covered by a protective shed room. Rehobeth's rough-hewn sturdiness and simplicity of style reflect the frontier atmosphere in which the church was built. In 1960, by the action of the General Conference of the United Methodist Church, Rehobeth Church was designated one of ten Methodist Shrines in America. A museum is also operated on the site. (NRHP)

First Baptist Church, Union - This 1845 structure is owned and maintained by the Monroe County Historical Society.

Ames-Clair Hall, Union - A restored 1857 African-American church, owned and maintained by the MCHS. Currently used for concerts and community gatherings.

St. John's Catholic Chapel, Sweet Springs - Oldest continuously used Catholic Church in WV, having been erected before 1859 and maybe as early as 1839. It was erected by slave labor and is extremely unique in its construction, particularly the last row of brick before the roof line.

St. Michael's, Salt Sulphur Springs

Marvin Chapel, Willow Bend - Founded about 1869 by Southern sympathizers who broke away from the near-by Dropping Lick Methodist congregation. Currently used as studio by private owner.

Mount Pleasant Presbyterian, Sinks Grove

Trinity Methodist, Pickaway

New Lebanon Associate Reformed Presbyterian, Pickaway - Founded in 1770, the church was the only organized ARP church in WV until another one opened in Fairlea in 1938.

Broad Run Baptist Church—Established in 1853 by some of the counties earliest settlers. (More detailed information can be obtained from Shirley Hancock, the unofficial historian

of the church.)

Homes -

Wallace Estill Sr. House - The Estill House is actually two units. The earlier section, is of rubble stone construction and the later is a two-bay clapboard portion, with its own exterior end chimney of stone. The house was built in 1773. (NRHP)

McNeer House (Hope Manor), Salt Sulphur Springs - This frame 2 1/2 story Colonial Revival house was built in 1919 by Lewis Caperton McNeer. A notable feature of this house is the unusually large entrance hall that has often been used as a small ballroom. (NRHP)

Spring Valley Farm (Richard Dickson Farm) - Began as a two-story log cabin built by John Knox in the late 1700s. After its purchase in 1834, Richard Dickson extensively enlarged the structure between 1837 and 1841 into a two-story, vernacular, frame house. There are many distinctive farm buildings and structures surrounding the house. The Dickson family, who have farmed this property since 1835, have been among the first to use new and improved farming methods, thereby serving as a model for other farms in Monroe County. (NRHP)

Brigadier General John Echols House - The house in Union was built by John W. Lanins, who owned the property between 1845 and 1848. The Echols family owned the house between 1848 and 1865. The foundation is constructed of native blue limestone and the walls are of handmade brick made in a nearby brick kiln. (NRHP)

Byrnside-Beirne-Johnson House (Willowbrook) - This house stands prominently on a bluff overlooking the Byrnside Branch of Indian Creek. The home incorporates many different eras of Monroe County history. Built as a fortified log house by pioneer James Byrnside in 1770, the structure evolved into a dog-trot style dwelling after an addition in the early 1800's. In the years prior to the Civil War, the house was remodeled in the Gothic Revival style with board and batten siding and a two-story front porch. (NRHP)

Clarence Campbell House (Hillcrest) - This house, constructed between 1907 and 1909, is a large, wood frame 1 1/2 story Queen Anne style farmhouse. (NRHP)

William Gaston Caperton, Jr. House (Wyndridge) - This Greek Revival residence was built by William Gaston Caperton, Jr., in 1872. The woodwork is native black walnut cut from the property. There are several adjacent buildings on this property which include two-story 18th century log structures and a late 19th century carriage shed. (NRHP)

Elmwood (Hugh Caperton House) - Hugh Caperton, II, built his two-story c. 1835 Classical Revival style home with hand-made bricks and timber from his land. (NRHP)

Andrew Beirne House (Walnut Grove) - This rambling two-story dwelling evolved over a period of fifty years. The original two-story log house, now enclosed within the north-south wing, was constructed c. 1783 by Michael Erskine, Jr., an early settler. (NRHP)

Maple Lawn, Rich Creek Valley -

Sunset Hill, Flat Mountain Road -

Train Stations -

Alderson Depot - Historic C & O depot (circa 1910) of board and batten construction. Railroad memorabilia and welcome center.

Persons/Families -

Andrew S. Rowan, the Spanish-American war hero who was immortalized in Elbert

Hubbard's "A Message to Garcia," called Monroe County home.

Brigadier General John Echols - John Echols was a graduate of Virginia Military Institute and married the daughter of Hugh Caperton. By 1860, Echols had won distinction as a lawyer, orator, and statesman. He was president and director of the Virginia Branch Bank in Union, and was an elder in the Presbyterian Church. He organized the Monroe Guards and served in the Confederate Army in the Stonewall Brigade and eventually attained the rank of Brigadier General. Interested in railroads, Echols induced C.P. Huntington to ride horseback with him over a proposed route, which may have influenced the construction of the C& O Railroad to Huntington, West Virginia. The family moved to Staunton, Virginia in 1865 where they lived until his death in 1896.

Hugh Caperton, II - Served as a Virginia state Legislator and as a Representative to the United States Congress from 1813 to 1815.

Andrew Bierne - A prominent local businessman and politician whose service to the community included building the local grist mill, working on three turnpike commissions, and serving as a member of the Virginia House of Delegates and twice as a United States Congressman.

Jones Family, In 1928, in the town of Peterstown, West Virginia, a father and son set up a game of horseshoes in a vacant lot. It was a game of horseshoes which they will never forget-for during the course of that game they accidentally discovered the "Punch Jones," a thirty-four-carat (34.46-carat) diamond. This family also set the world's record for consecutive male births- 17 kids—and U.S. President Franklin Roosevelt hosted Grover Jones Family Day at the 1939 New York World's Fair.

Joseph Swope; Monroe County's first settler came to Wolfcreek in 1752. Son Michael born 1755 was the first white child born in Monroe County, (and maybe southern West Virginia). Another son Joseph was seized in 1756 by the Shawnee Indians and held captive for 9 years. Swope served in the colonial wars and his sons Joseph, John and Michael served in the American Revolution. Son Joseph is buried in a Wolf Creek cemetery.

Museums and Other Historic Sites -

Monroe County Museum, Union - This headquarters of the Monroe County Historical Society is located in an 1820 brick building which was once the law office of Allen Taylor Caperton, who served as a Senator to the Confederacy and, after the Amnesty Act of 1872, became a Senator to the United States. This building also serves as a depository for the society's archives and provides a seasonal Visitor's Information Center.

Clark-Wiesman House and Owen Neel Houses, Union - Adjacent to the Monroe County Museum, these reconstructed log houses are furnished in period furnishings entirely from Monroe County.

Pickaway School - Site of 1st 4-H Club in West Virginia.

Alderson Bridge - Graceful concrete bridge was erected in 1915. When the bridge was threatened by demolition in 1977, the bridge was preserved through local efforts and was converted to pedestrian use. (NRHP)

RECREATION

List of recreational activities that are or could be done in the area. This could include hunting, fishing, mushroom picking, ginsenging, motor sports, hiking, caving or storytelling etc. Also any recreational features or infrastructure like trails (biking, riding, walking etc.), lakes, dams, rivers, fishing areas, parks, campgrounds etc.

Parks or Management Areas -

Shanklin's Ferry - Location of the old ferry crossing of the New River. Now a part of the Bluestone Wildlife Management Area.

Moncove Lake State Park - The park, in a remote section of the county formerly known as Devil's Hollow, offers fishing, boating, camping, hiking, and picnicking in a serene, peaceful setting.

Conserved Lands -

Slaty Mountain Preserve - Owned by The Nature Conservancy, a national organization which attempts to preserve wild lands world-wide. Area is comprised of a dry hardwood and pine woodland including a globally rare shale barren community. Open year-round for hiking and nature study.

Hiking Trails -

Allegheny Trail - Originating from the Appalachian Trail near Pine Swamp Ridge, this trail follows the crest of Peters Mountain northeastward, beyond Sweet Springs. When completed, the footpath will extend northward through West Virginia, and into Pennsylvania.

Sugar Camp Farm - A part of the Jefferson National Forest, the Groundhog Trail which originates from the farm provides access to the Appalachian Trail. Plans are in the works for a picnic shelter and interpretive trail here.

Appalachian Trail - The famous Maine-to-Georgia footpath follows the crest of Peters Mountain above the farm, making Monroe County one of only two counties in West Virginia which can claim a portion of the Appalachian Trail.

Hunting and Fishing -

Second Creek Fly Fishing - Catch and release fly fishing in an isolated setting, along a little-used country road. Managed by WV Department of Natural Resources.

Potts Creek and South Fork of Potts Creek. Waiteville - Stocked with trout once each month February through May.

Moncove Lake, Gap Mills - 144 acre impoundment provides a warm water fishery for largemouth bass, bluegill, and channel catfish.

Zenith Fee Fishing, Zenith - Customers can angle for citation trout or catfish.

Brewer's Trout Farm, Zenith -

Mountain Meadow, Greenville - Upland bird and trophy whitetail deer hunting preserve situated on 400 acres of beautiful rolling mountain meadows and hardwood forests.

Special attention has been paid to handicapped accessibility with accessible tree stands and rooms in the lodge.

Stoney Brook Plantation - Hunting and fishing in a fabulous, 18,000 acre private setting. Hunts available for deer, wild turkey, ducks, and various upland game birds. Fishing enthusiasts may try their skill on Brook, Brown, and Rainbow Trout, and Small and Largemouth Bass. Lodging and meals available on the premises.

Golfing -

Fountain Springs Golf Course - A recently completed and highly acclaimed 18 hole course, complete with driving range and well appointed clubhouse.

Rock Climbing -

Bozoo Rocks - Bluestone State Park along Mary Ingels trail beside the New River.

PHYSICAL CHARACTERISTICS

List of the significant physical characteristics of the county and surrounding area - mountains, forests, rivers, swamps, old industrial sites, rock quarries, mines, farms, geographic or physical landmarks etc. What activities one might do in relationship to these things - explore, learn about, look at or interact with in some other way.

Caves -

Salt peter Caves - Salt peter was mined from these caverns for the manufacture of gunpowder during the previous century. Wagon ruts are still visible in the dry, undisturbed cave floor. Tours may be available on a limited basis.

Scott Hollow Cave - Recently discovered and still under exploration. Contains a fairly sizeable underground stream known as the Mystic River. Guided primitive cave tours of this extensive system offered.

Divide -

Great Eastern Divide - Monroe is the only WV county which straddles the eastern divide. Rain falling in Sweet Springs Valley east of the divide will eventually empty into the Chesapeake Bay by way of the James River. Rain falling west of the divide finds it's way to the Greenbrier and New Rivers and will reach the Gulf of Mexico through the courses of the Kanawha, Ohio, and Mississippi. Although Peters Mountain still looms high over the valley at the location of the divide, the valley floor here is in excess of 2600 feet above sea level.

SCENERY AND THINGS TO SEE

List of the beautiful scenery in the area. Some possibilities include fall foliage, forests, mountains, a snowy meadow, a vast desert, rock formations, cave interiors etc. There may also be interesting things to see that aren't natural or even beautiful like large industrial projects (dams, strip mines etc.), environmental damage, industries at work (steelmaking, stone quarry etc.).

Vistas -

Hanging Rock Observatory - Situated atop Peters Mountain, the site was once manned as a fire observation post of the Jefferson National Forest. Now used by hawk watchers to observe migrations in the autumn, the vantage point rests at an elevation of 3,812 feet.

nearly 2,000 feet above the valley floors below. The lookout offers an outstanding panorama of Monroe County, and on clear days, can extend well into Mercer, Summers, and Greenbrier counties in West Virginia, and Allegheny, Craig, Roanoke, and Giles counties in Virginia. The observatory is reached via a 40 minute walk along the Allegheny Trail from the mountaintop parking lot along Monroe County 15.

ADVENTURES

List of adventures someone entering your county could go on - climbing a mountain, cross country skiing, exploring an old (or operational) mine, exploring a cave, coon hunting, frog gigging, panning for gold, rafting down a river, touring an old cemetery at night, sleeping in a haunted house etc.

Old Roadways -

Salt Sulphur Turnpike - The old turnpike came into being in the years between 1835 and 1860 as a stagecoach road which connected Christiansburg and the resorts in Montgomery County, Virginia, with Salt Sulphur Springs. (The Mountain Lake Hotel, which was featured in the film *Dirts' Dancing*, originally developed as a stagecoach stop along this route.) The present condition of the Peters Mountain section of this old road is probably not that different than it was in the days when it was traveled by stage. Road is presently suitable for high-clearance 4-wheel drive vehicles, hiking, mountain biking, and horseback riding.

Country Roads -

Farm Heritage Road - A West Virginia Scenic Byway (part of the National Scenic Byway System), this road offers a picture of life in rural, agricultural communities which in many ways, retains the character imparted upon it by previous generations. The route encompasses three distinct geographical settings: the quaint winding course of Indian Creek; the gently rolling plateaus of karst farmland; and finally, the picturesque Sweet Spring Valley, nestled alongside the lofty ridge of Peters Mountain in the Appalachian Ridge and Valley region. The push of industry and commercialism has largely by-passed the area, therefore, many old homes, farms, and public buildings remain from throughout the county's 200 year history. Two lane paved road.

Mountain's Shadow Trail - A West Virginia Scenic Backway, this road carries on the same theme and general character as the Farm Heritage Road, though in a slightly more rugged fashion. The farms carved out of these mountain valleys reflect the handiwork of settlers who, by choice or economic necessity, created an existence for themselves in somewhat isolated areas. The variety of the backway is bound together by the tangible presence of Peters Mountain, the 40 mile ridge of which is undoubtedly the county's most notable geographic feature. Although wildlife is abundant throughout the area, it is perhaps even more easily seen along these less traveled roads. One lane paved and narrow gravel.

Wolf Creek Backway - This road winds into karst topography with 18th century settlements - Wolf Creek, Pickaway and Sinks Grove - and great farm scenery.

Neff Orchard Road - Cattle and sheep farms and a modern working orchard. A place to rest your eyes wherever you look. Investigate branch roads: Morre Road and Rogers' Mill???? Road where there is catch and release stocked trout fishing on Second Creek.

Bozoo Road - Scenic, rolling farmland en route to the Shanklin's Ferry Wildlife Management Area. Two lane paved, one lane paved, and gravel.

Orchard Road and Hans Creek Road - Rural farmland, and the picturesque valley of Hans Creek. One lane paved roads.

Wayside to Lillydale - This road winds around the southern end of Swope's Knobs

offering nice views back toward Greenville. Route passes through the Laurel Creek covered bridge and to the community of Lillydale. One lane paved, and narrow gravel.

Greenville to Lillydale - Another option for seeing the Laurel Creek Covered Bridge. One lane paved roads.

Pyne's Mountain Road - There are very few homes along this road, but it is a lovely woodland drive, particularly in autumn. After crossing the mountain, return to Union on Willow Bend Road, passing by scenic, open farmland. Narrow gravel and one and two lane paved.

The Knobs - This road offers spectacular views to the north and east as you descend the mountain toward Sinks Grove. Once off the mountain, the route offers a chance to admire the farmland around Pickaway, a WV Rural Historic District. Or, the longer loop may be taken, which passes by Morgan Orchard and the gravel road descending to the Second Creek Fly Fishing area. Steep one land paved, reasonable^ wide gravel, normal one lane paved, and two lane paved.

Gates Road - This drive offers nice views of the range of Little Mountain and the lofty ridge of Peters Mountain beyond. One lane paved, gravel, and two lane paved.

Hillsdale - Attractive rolling farm country. Nice views of the Pickaway plains and Swopes Knobs.

Cove Creek Road - An interesting, and fairly short trip through a secluded valley. One lane paved.

Potts Valley - This road crosses Peters Mountain; passing by the parking lot for the Allegheny Trail and the Hanging Rock Observatory, then descends into Potts Valley. Views are extensive to the north and south on either side of the mountaintop, particularly after foliage has been shed in the fall. One lane paved and two lane paved.

Turkey Creek Road - The route is mostly wooded as it passes through the range of Little Mountain, then the countryside opens up a bit as one enters the rolling hill country near Willow Bend and Union. The stream crossed twice by the road is the upper portion of Turkey Creek; one of the few streams in the state where native Rainbow Trout are known to spawn. Road is narrow gravel, and one and two lane paved.

ATMOSPHERE

What is the atmosphere of the area like? How is the atmosphere different than other places? Contrast it to a place like New York City or Japan. Are there things that people from those areas would find interesting or different or a refreshing change?

The inhabitants of this farming county in the southeastern corner of West Virginia have been living in harmony with the land since the late 1700's. The practice of agriculture was the driving force in the early days of Monroe County's economy, and remains a significant part of the lives of many Monroe Countians to this day.

When asked what sets Monroe County apart and makes it unique, residents listed:

- 1) Beautiful
- 2) Quaint
- 3) Historic

- 4) Artistic Friendly Rural Agricultural
- 5)
- 6) Organizations working to preserve and protect the working landscapes and
- 7) viewsheds -

Indian Creek Conservancy
 Indian Creek Watershed Association
 Monroe County Farmland Protection Board
 Nature Conservancy

EVENTS

List of fairs, festivals and other events or activities in the area. Most of the time in rural areas these events tend to be community activities that basically draw residents from within a 50 mile radius. Do any of these events have the potential to be developed to the point of drawing people from outside the area (i.e. would someone drive over 50 miles to attend)? This category could also include things like plays, outdoor dramas, historical reenactments, festivals, flea markets, hunting and fishing shows, musical events, dances, races, concerts, sporting events or just watching the fall foliage.

Fairs and Festivals -

Farmer's Day, Union - First weekend of June. Dance and games Friday night; Grand Parade, horse show, and entertainment on Saturday.

Fourth of July, Alderson - Parade, live entertainment, impressive fireworks display.

Autumn Harvest Festival, Willow Bend - Last full weekend in September. Exhibition of local arts, crafts, produce, canning, flowers, and farm crops. Live entertainment. Demonstrations of antique farming techniques and machinery.

Union Christmas Parade: First Friday in December.

Various Musical and Art Shows sponsored by Monroe Arts Alliance.

TALENTS

List of talents of people in the county (musical, storytelling, lying, crafts, carving, artistic, theatrical, etc.)

Musicians and thespians Bill Whipple

SKILLS

List of the skills of residents in the county (woodworking, furniture building, carpentry, metal work, mechanical etc.)

Craftspersons

Mark Soukup, Chairmaker, Gap Mills - Mark has filled orders for Monticello, Poplar Forest, and other museums and private collections.

Joe Chasnoff, Woodworker, Zenith

Allen Ritzman, Woodworker, Zenith

Nancy White's log cabin on US 219N, Union. Spinning, weaving, painting and potting.

PROXIMITY

Is the county within 100 miles of any other tourism or recreational draw? Is the county near any main tourist routes?

Greenbrier County - County seat of Lewisburg is full of quaint shops, fine restaurants, cultural attractions and historic architecture with some structures dating to the late 1700's. The Midland Trail, another of West Virginia's Scenic Byways crosses Greenbrier County west to east and leads to the world famous Greenbrier Hotel in White Sulphur Springs; one of the few of the areas old mineral springs resorts which still functions as a resort today. Two commercial cave tours operate in the county. Organ Cave and Lost World Caverns offer lighted tours on pathways constructed for easy walking. Camping is available at the Greenbrier River Campground, along Route 63 near Alderson. The Greenbrier River Trail, built on an old C&O rail bed, shows off some of the state's best scenery as it travels 77 miles north from Caldwell to Cass in Pocahontas County.

Summers County - Route 12 between Alderson and Hinton offers several points of interest. The Pence Springs Hotel has been restored to its former grandeur and provides lodging and dining opportunities. The small railroad town of Talcott is home to the John Henry Memorial, a monument to the "steel drivin' man" of American railway folklore. The Graham House, a restored Colonial era log house is worth a visit. The city of Hinton, another railroad town, lies at the junction of the Greenbrier and New Rivers and is the entrance to the New River Gorge National River. Rafting tours can be booked here. Nearby, Bluestone Dam and Bluestone Lake offer boating and fishing opportunities. Pipestem Resort was recently voted the "reader's favorite" state park in *Southern Living Magazine*. Camping, hiking, hunting, and picnic and canoe launch areas are provided in the Bluestone Wildlife Management area. Just over the Monroe County line, in Forest Hill, Wakerobin Gallery showcases a local potter's work.

Mercer County - Contains the two sizable towns of Princeton and Bluefield. The East River Mountain Lookoff, along old route 52 south of Bluefield, provides a nice vantage point. Another of West Virginia's Scenic Byways, the Coal Heritage Trail, begins in Bluefield and winds its way through coal mining country and toward the city of Beckley. The town of Bramwell, along the Coal Heritage Trail, is noted for the opulent homes built here by coal barons near the turn of the century. It remains a quaint, peaceful town, and is interesting to visit.

Craig County - Perhaps more similar to Monroe than any of her other neighbors. The Route 311 Virginia Scenic Byway joins the Farm Heritage Road at the state line on the top of Peters Mountain, and leads the traveler through some very scenic countryside to the county seat of New Castle, and onward to the city of Roanoke. Route 42, between New Castle and Newport is a very scenic country drive. Hollow Hill Farm, home of the largest bison herd in Virginia is located near the village of Paint Bank. Paint Bank is the home of The Paint Bank General Store and The Depot Lodge Bed and Breakfast, offering warmhearted hospitality in a restored historic train depot.

Giles County - The Narrows of the New River, in Giles County, is just a couple of miles from the western end of the Farm Heritage Road in Peterstown. The towns of Narrows and Pearisburg are both interesting places to visit. Giles County contains a wealth of outdoor recreation opportunities, including the Cascades, the White Rocks Campground, the Appalachian Trail, and the Mountain Lake Wilderness Area. Mountain Lake Hotel, a stone lodge situated on the shore of a serene natural high mountain lake, is the site where the movie Dirty Dancing was filmed.

Allegheny County - The Humpback Bridge, near Covington; a covered bridge rather unique for being built on an arched platform, spans Dunlap Creek along the course of old Route 60. Earlhurst Log Cabin Inn, rooms available in a re-constructed log lodge, lies just east of Sweet Springs on 311 north. Douthat State Park lies to the east of Covington, and to the north, US 220 provides a scenic drive toward the Homestead in Bath County. The Homestead, like the Greenbrier, still functions as an opulent mineral springs resort.

ARCHITECTURE

List of any interesting architecture or buildings in the area. This could be an old church, a still operating soda fountain, a “Mail Pouch” barn, a string of coal camp houses, a railroad round house, a closed industrial complex like a foundry, or just pick out ten houses that represent the architecture of each decade of the 20th Century. A structure doesn’t have to be historically significant to be of interest. Sometimes a place that is an eyesore to the locals might be an eclectic attraction to an outsider.

THINGS TO LEARN

Some interesting things a person could learn, in or about the area - flora and fauna of the area; the industrial, agricultural, military, geological or cultural history of the area; what was the place like 50 or 100 or 1000 years ago; famous residents; infamous residents. Are there artisans who could teach people a craft or skill (pottery, spinning, quilting, carving, calligraphy etc.)? Are there older citizens who could teach people what life was like 50 years ago? Are there farmers or industrial workers who could teach people what it was like to do their jobs or what life was like for people doing their jobs 50 years ago?

Environmental -

Institute for Earth Education - International organization, home-based in Greenville. The group promotes education on living with the earth. Academics, orientation, camping. Worldwide focus and presence. Visitors by appointment.

Agricultural -

Morgan Orchard - Commercial orchard., “Pick Your Own” fruit or select orchard-picked fruit in the farm market. They grow 40 varieties of apples; peaches; plums; black, red, and purple raspberries; thornless blackberries; pumpkins; vegetables in season; baked goods; jams; and sauces. Tours and fruit growing advice available with advance notice. Open June through November.

Cinderella Pumpkin Farm - Pumpkins, Halloween supplies and decorations, and fall displays. Homemade baked goods and preserves. Great family entertainment and views of Indian Creek Valley. Open September and October.

McCormick’s Corn Maze - Open for the first time in the fall of 2004. A family can get some good exercise, enjoy a fall day , laugh as a family and learn about agriculture in a corn-fusing field of cornstalks towering high above their heads.

Wolf Creek Winery - A farm winery that raises and processes the grapes on a family farm. Planting of the wine grapes (French Hybrids: Seyval, Vidal, Chambourcin and Foch) started in 1991. Also bottle fruit wines in cooperation with Morgan Orchard. Tasting room on premises looks out over the fields and the grape vines.

Bob Pond Blueberry Farm, Peterstown - Pick Your Own seasonal berries.

SHOPPING

Shopping experiences in the county? Are there any unique items or shopping experiences that a person could find? These might include such things as milk straight from a cow, home canned vegetables, home cooking, quality handcrafts, area souvenirs, home grown tomatoes, area delicacies, area oddities etc. Shopping experiences might include purchasing vegetables from the person who grew them, shopping in an old general store or in a store that hasn’t changed much in 50years, watching an artisan make the item you are going to purchase, being able to have input into the design of an item you are going to purchase etc.

Old Fashioned General Stores

Emma Jean's General Store, Wayside - Authentic 1800s general store selling antiques and groceries.

Crafts, Artisans, Specialty Stores

Wolf Creek Winery, Wolf Creek - See listing under THINGS TO LEARN.

Alderson's Store - A rare and beautiful example of vintage Art Deco architecture and interior design. Distinctive fashions, unique gifts, and Alderson area souvenirs. Family operated since the late 1800's.

Quilt Essentials, Peterstown - Quilts, quilting work and supplies, silks and accessories, handmade baskets and rugs.

Creekside Natural Foods, Greenville - Natural foods and Monroe County Crafts.

Double J Store, Back Creek Road near Greenville - A gift and souvenir shop with a restaurant.

Union Outfitters, Union - Hunting, fishing, and outdoor gear.

Valley Springs Furniture, Gap Mills - Solid oak and cherry tables, crafted in a family-run woodworking shop. Visitors welcome.

Cheese and More Store, Gap Mills - Cheeses, dried fruit, specialty foods, area novelties.

Kitchen Creek Bakery, Gap Mills - Features baked goods.

Valley Springs Country Gift Shop - Hand made furniture - ready made and to order - and gifts.

Morgan Orchard, Sinks Grove - Apples, peaches, plums, berries, seasonal produce and selected cooked and preserved products. See listing under THINGS TO LEARN.

Antiques

Riverbend Auction House, Alderson - Dealing in antiques and collectibles.

LODGING

List of lodging facilities.

Country Resorts/Cottages/Lodges:

Creekside Resort, Greenville - Vacation homes and cottages on 200 secluded acres. Hike or bike the mountain trails, fish Indian Creek, enjoy the private swimming pool and a relaxing massage. Lodgings are completely furnished with equipped kitchens and most have Jacuzzi, fireplace, or woodstove. Meal plans and get-away packages available as well as conference and wedding facilities.

Salt Sulphur Springs Guest House, Salt Sulphur Springs - Located in a portion of the old 1820's hotel. Elegant period decor. Great atmosphere for history buffs.

High Meadow Farm Lodge, Wolf Creek - Accommodations in lodges built of hand-hewn white oak logs by some of the area's earliest settlers. Situated on its own private road, the location offers privacy yet provides spectacular panoramic views of the surrounding mountains and the Wolf Creek Valley.

Larew Cottage, Hans Creek - A 1920's fully remodeled bungalow-style house. Very private.

Mountain Shadow Cabin - Early 1800's hand-hewn log cabin, located at the foot of Peters Mountain, in an ideal location from those seeking rest and relaxation, mountain views, or walks in the woods. Located on the Mountain Shadow Backway, just a "stones throw" away from the Allegheny and Appalachian Trail.

Bed & Breakfast:

Camping:

Jefferson National Forest - Monroe County contains 18,000 acres of the George Washington and Jefferson National Forest, most of which is open to primitive camping.

Moncove Lake - See listing under RECREATION.

RESTAURANTS

List of restaurants. Is there a restaurant with food so good you could turn dining there into an event by adding music or drama to the experience?

Gourmet -

Moxie Cafe, Union - Set in quaint old store building, the Moxie offers upscale lunch and dinner menus. Owner was formerly a chef in the Adirondacks and at the world-famous Greenbrier Hotel. His talent reflects his experience.

Country Cooking -

Hometown Restaurant, Peterstown

Corner Dairy Bar, Ballard

Kalico Kitchen, Union

Taste of Monroe, Union

Betty's Korner Kafe, Pickaway

Shale Bank Diner, Lindside

Fountain Springs Clubhouse, Peterstown

Double J Store, Back Creek Road near Greenville

OTHER ASSETS

Other assets that could be built upon.

Psalm 23 Camp - Non-denominational Christian camp operated in conjunction with a sheep farm (i.e. Psalm 23). Located in a beautiful open valley near the source of Second Creek. Visitors welcome.

Sweet Springs Valley Water Company - Repeat champion at national and international water tasting competitions, the bottling plant lies near the spring's source at the foot of Peters Mountain.

Yoder's Country Kettle - Home-made jams and jellies. Plant tours available with prior notice.

Enhance Massage and Bodywork, Peterstown - Fitness center, massage and body works, hair salon, nail technician juice bar and exercise classes.

Closed or discontinued, as of July 9, 2007:

Trout House Lodge - Former location of the Mercer Angler's Club; a private trout hatchery. Offers catch and pay fishing, a restaurant, and hiking.

Moncove Lake Summer Festival - Third weekend of June. Parade, antique car show, games and contests.

Peterstown Horse Show - Typically the third weekend in July.

Sydneys, Union - Gift items including SunnyBrook hand-poured scented candles, gourmet teas and accessories, specialty foods and kitchen gadgets, antiques, collectibles, and fine art by local artists.

Llama Llady, Union

Wine Goblet & Spirits, Union - Gifts and an assortment of wines and liquors. Wolf Creek wines.

Wolf Creek Gallery, Alderson - Gifts for any occasion.

Americana Homestead, Sweet Springs - In-home artisans specialize in reproducing primitive early American painted furniture with a mixture of antiques and accessories.

North Street Antiques, Union - Several local dealers offer an extensive selection of antique and vintage furniture. There is also crystal and collectible glass, pottery, rugs, decorative art, and estate jewelry.

Lil lydale Cottage, Salt Sulphur - Cozy and romantic "country getaway." Easily accessible from US 219.

The Trout House Restaurant, Rich Creek Valley - Specializes in trout raised adjacent to the restaurant in freshwater ponds.

Monroe Dining, Alderson

Confetti's Cocktail Lounge, Union - Cocktail lounge, sports bar, cafe, meeting place. Nightly drink and appetizer specials. Unique mural of local folks.

TOURISM ADVISORY COMMITTEE GOALS

PROGRESS ON MONROE COUNTY TOURISM PRIORITIES
As set by Tourism Advisory Group on February 9, 2005

TOP PRIORITIES

Web site	Liability/ legalities	Bus tours	Thoma tours	Targeted advertising campaign	Music & arts festival	Open historic homes
<p>Develop a good web site - one that is highlighted and linked with other sites.</p> <p>◆ Web site went on line in February of 2006. is easy to manage and has received rave reviews for appearance and ease of use.</p> <p>◆ Lodging and Realtor sheets for e mail requests.</p>	<p>Pursue research, e.g. the liability of crossing private property with hiking or hiking trails or having tourists occasionally stay overnight in a private residence.</p> <p>◆ Public meeting held.</p>	<p>Develop & Promote Bus Tours. e.g. cemeteries and old churches, or covered bridges, or backway & byway roads.</p> <p>*Working with John Luckton Agency to bring bus tours into county.. Looking to fall of 07.</p> <p>◆ \$2500 Hallowell grant received for publicity for bus tours.</p>	<p>Develop & Promote themed tours of about 7 hours duration</p>	<p>Target our advertising to 1c magazines or tour groups. Develop an advertising campaign. Update Byways brochure.</p> <p>◆ Active advertising committee.</p> <p>◆ Have focused on 'free' publicity » articles in Blue Ridge Country, Gbr. Valley Quarterly, Beckly Post Herald, book by author Leonard Adkins. County ad in fall Gbr. Valley Quarterly.</p> <p>• Byways brochure updated.</p>	<p>Develop an annual music or arts festival</p> <p>◆ Serve on Board of Directors of Monroe Aris Alliance. Group has sponsored art classes and musical performances.</p> <p>◆ Ziegler's at Old Mill in Greenville hope to host summer art fairs..</p>	<p>Open historic homes for one night of housing</p>

SECONDARY PRIORITIES

Promote agri-tourism	Promote environmental tourism	Identify additional recreation	Package deals	Create "National Park for Disabled" ¹¹	Historic and cultural tourism	Promote restaurants	Network
<p>Identify farms that could open to tours</p> <p>◆ Morgan Orchard, Wolf Creek Winery, Sparglers Greerhouse and Organic Farm, Almost Heaven Farm, Breezy Acres, Cinderella Pumpkin Farm. By m side Branch Farm, Reed s Mid Hendrick's</p>	<p>Identify birding spots.</p>	<p>For example: tours of Potts Creek (Glen A ton White Rocks area) or hiking and biking trails on abandoned roads</p> <p>◆ Trails Group working to designate biking trails. ◆ Working with Jefferson National Forest to designate rail bed on old rail bed. Three miles out and back.</p>	<p>Create and Promote</p>		<p>Develop tours of historic homes & places. Develop a condensed version of Monroe County history</p>		<p>Form ties with adjoining towns and counties in Virginia and wv</p>

OTHER ACCOMPLISHMENTS

- ◆ Placement of large brochure rack in Monroe County Historic Society Museum, Distribution of small brochure racks throughout county.

- ◆ \$2000 LED Grant from Budget Digest to place kiosks at county gateways.
- ◆ As a member of the CRED Community Leadership Team, Graves participated in the development of thirty leadership training curriculums with packaged power point presentations. She was the co-developer of the “Leadership Styles and Roles” piece and editor of “Five Keys to Effective Volunteer Program Development - An Overview.”

Two of the curriculums and were piloted with the Monroe County Health Center Board of Trustees.

- ◆ Engaged in inspection and introspection through Recrutable Communities/First Impressions (May & June 2005)/Community Design Team (June 2006) /Dr. Deng’s Graduate Students (October 2006) programs.

- ◆ Philosophy -

The development of tourism in rural communities while maintaining their rural character and countryatmosphere can be a challenge. Though rural authenticity is valued by both rural residents and visitors, tourism development can transform rural areas physically and socially in ways that reduce the very asset appeal on which tourism is dependent. Thus, tourism development should consider its potential negative impacts on rural society and environment and strategies should be followed to minimize the impact.

“A Union of the Past and the Future”, Community Design Team, p. 4

- ◆ Tips -

- ◆ Tap into visitor stream traveling through to other destinations or traveling close-by.
- ◆ Or figure ways to grow their experience while they're here.
- ◆ Keep efforts small.

- ◆ Suggestions -

- ◆ Rather than advertising Monroe County alone, put the county on travel itineraries and in promotional tourism packages (perhaps through the WV Division of Tourism)
 - Web site could have suggestions for day trips (motor bikes, autos, and bicycles) with downloadable maps.
- ◆ Visitor information
 - Rather than staffing a center; find a small, centrally located, highly visible place where information can be shown and brochures can be displayed.
- ◆ Target youth
 - Young tourists make relatively modest demands on overnight housing.
 - Establishment of a campground is less likely to affect the rural environment and atmosphere than construction of large motels or hotels.
- ◆ Farm tourism
 - Attract visitors to stay on farms; participate in farm activities.
- ◆ Events and Festivals
 - Explore one or two new events.
- ◆ Develop towns as gateway communities
 - Visitors from Kentucky, Virginia, and North Carolina who enter the state may use the town as a staging point to other points or attractions.
- ◆ Serve travel needs of the disabled (accessible tourism)
 - Study the possibility of developing facilities that cater to the needs of the disabled.
 - Would increase demand for medical services in the county which would benefit tourists and permanent residents alike.
- ◆ Enhance downtowns as shopping areas
 - Present an enticing enough collection of businesses for travelers to stop and get out of the car.
- ◆ Keep downtowns clean.
 - Cleanliness is not only important because it creates the impression of prosperity, but also

creates the impression of safety.

- ◆Business ownership succession and cooperation

If downtown retail businesses are not already working together on marketing, events, etc., it is recommended that they form an association to begin to do so.

- ◆Seek funds for tourism development

STATUS OF RURAL AMERICA:

America's rural communities face an uncertain future - these communities struggle to maintain their vitality and sense of identity. Over the past 50 years, many rural communities seem to have lost their purpose. There are fewer, larger and more specialized farms. Rural populations are declining, and the demand from local markets is declining.

These realizations have exacerbated the economic decay of many rural communities as industry hunting became a preoccupation of many small town councils and chambers of commerce. Jobs - any kind, at any cost - seemed to be a primary objective from some declining rural communities.

The challenge of rural economic development is to create places where workers can be developed, and productive, where they will want to stay and become part of the community.

Rural communities can no longer depend on agriculture as the primary engine of rural economic development. Development linked to other local resources will protect the physical and social environments of the community and enhance quality of life.

Quality of life is the product of relationships among people and between people and their environments. The linkage of rural community development with varied local resources will be increasingly important.

Home to a fifth of our nation's people, rural areas once were dominated by farming, but today rural residents who are not engaged in farming outnumber those who are by more than 10 to one. Yet, rural people have been and continue to be the keepers of natural amenities and national treasures. They safeguard a unique part of American culture, traditions, and history.

Increasingly, rural communities seek ways to diversity, to replace and supplement traditional incomes. Tourism is one appealing way. The economy of rural communities has begun to rely increasingly on small businesses and individual entrepreneurs who cultivate a demand for unique niche products and services. In fact, the USDA reports that tourism, home-based businesses, and small-scale retailing are the leading areas of interest among rural communities.

Society has once again reached a point of returning to matters of the human spirit, to more traditional cultural and historical values. Small towns and communities can prosper by promoting this spirit and promoting special products and services not otherwise available. The historic character of a small town or community can be used to promote community identity and spark economic recovery.

Rural tourism is alive on secondary roads that lead us through small towns, communities, and the countryside. Travelers learn and experience along the way by enjoying local museums, historic sites, cuisine, architecture, landscape, heritage crafts, and customs.

Demographic trends of rural communities, as well as demographic trends of potential changes in rural communities, become increasingly important to the concept of rural tourism. Overall trends due to demographic, economic, and cultural changes include the aging of U.S. population, shrinking size of households, increasing urbanization, the increased number of two-paycheck households, and an increasing interest in the environment.

These trends certainly impact rural tourism. There is also a perceived attitude that urban dwellers have fewer children, have both parents working outside the home, and are interested in the environment. The rural countryside offers them opportunities to experience the interesting and different rural culture and an agrarian environment.

In addition to taking shorter vacations rather than longer vacations, people are showing a growing interest in vacations involving action and involvement, hands-on, and experience-driven activities. These changes have led to the growth of the new rural tourism market, including ecological, cultural, heritage, and agricultural tourism.

Can rural communities compete in the tourism industry? Lane (1994) questioned how rural tourism could effectively compete with urban or resort-based tourism that is relatively concentrated, professionally managed, and increasingly operated in international markets. But despite their small settlements, weak infrastructure, small establishments, local ownership, few visitors, and amateur management, rural tourism can compete. This assumption is based on these facts: capital investments are lower for simple commodity production, smaller part-time tourist operators can provide fixed capital needs of enterprise at lower cost, and family labor can be utilized. Rural tourism also has potential for environmentally friendly and cultural-sensitive offerings. Family businesses may offer niche tourist products and create new opportunities not captured by large-scale tourism ventures. They also can share cultural attributes. It may even be easier to develop new tourism ventures in relatively undeveloped tourist destinations than to revitalize traditional tourist resorts. Most importantly, rural tourism must be community driven. For tourism development is not free. It requires resources and commitment.

CONTENTS

Acronyms, Abbreviations, and Definitions.....	v
Executive Summary	viii
1 .0 Report Format.....	1
2 .0 Introduction.....	1
2.1 Total Maximum Daily Loads	1
2.2 Water Quality Standards	4
3 .0 Watershed Description and Data Inventory.....	5
3.1 Watershed Description	5
3.2 Data Inventory	8
3.3 Impaired Waterbodies	9
4 .0 Biological Impairment and Stressor Identification .	10
4.1 Introduction	10
4.2 Data Review.....	10
4.3 Candidate Causes/Pathways	11
4.4 Stressor Identification Results.....	13
5 .0 Fecal Coliform Source Assessment.....	14
5.1 Fecal Coliform Point Sources.....	14
5.2 Fecal Coliform Nonpoint Sources	15
5.2.1 On- site Treatment Systems.....	15
5.2.2 Urban/Residential Runoff	18
5.2.3 Agriculture.....	18
5.2.4 Natural Background (Wildlife)	18
6 .0 Modeling Process	19
6.1 Modeling Technique for Fecal Coliform Bacteria	19
6.1.1 MDAS Setup.....	20
6.1.2 Hydrology Calibration.....	22
6.1.3 Fecal Coliform Bacteria Calibration.....	23
6.2 Allocation Analysis	24
6.2.1 TMDL Endpoints.....	24
6.2.2 Baseline Conditions and Source Loading Alternatives.....	25
6.3 TMDLs and Source Allocations	28
6.3.1 Fecal Coliform Bacteria TMDLs	28

6.3.2	Seasonal Variation	28
6.3.3	Critical Conditions	29
6.3.4	TMDL Presentation	29
7	.® TMDL Result Tables	30
8	..© Future Growth	31
8.1	Fecal Coliform Bacteria.....	31
9	.0 Public Participation....	31
9.1	Public Meetings.....	31
9.2	Public Notice and Public Comment Period.....	31
10	.0 Reasonable Assurance....	32
10.1	Watershed Management Framework Process.....	32
10.2	Public Sewer Projects.....	33
11	.0 Monitoring Plan.....	33
11.1	Nonpoint Source Project Monitoring	33
11.2	TMDL Effectiveness Monitoring	33
12	.0 References.....	34

FIGURES

Figure 1-1. Examples of a watershed, TMDL watershed, and subwatersheds	vii
Figure 2-1. Hydrologic groupings of West Virginia’s watersheds	3
Figure 3-1. Location of the James River watershed	7
Figure 4-1. Conceptual model of candidate causes and potential biological effects	12
Figure 5-1. Failing septic flows	17
Figure 6-1. James River subwatershed delineation	21
Figure 6-2. Shrewsbury Hollow fecal coliform observed data	23
Figure 6-3. Annual precipitation totals and percentile ranks for the Union 3 SSE (WV9011) weather station in Union, West Virginia	25
Figure 6-4. Examples of baseline and TMDL conditions (instantaneous and geometric mean) for fecal coliform bacteria	27

TABLES

Table 2-1. Applicable West Virginia water quality criteria.....	4
Table 3-1. Modified modeled landuse for the 10 modeled subwatersheds in the James River watershed.....	6
Table 3-2. Datasets used in TMDL development.....	8
Table 3-3. Waterbodies and impairments for which TMDLs have been developed	9
Table 4-1. Significant stressors of biologically impaired streams in the watershed	13
Table 6-1. TMDL endpoints	24
Table 7-1. Fecal coliform bacteria TMDLs for the James River watershed.....	30
Table 7-2. Biological TMDLs for the James River watershed	30

ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

7Q10 AD	
AMD AML	
AML&R	
BMP BOD	
BPH CAIR	7-day, 10-year low flow Acid Deposition Model acid mine drainage
CFR CSO	abandoned mine land [WVDEP] Office of Abandoned Mine Lands &
CSR DEM	Reclamation best management practice biochemical oxygen demand
DESC-R	[West Virginia] Bureau for Public Health Clean Air Interstate Rule Code of
DMR DNR	Federal Regulations combined sewer overflow Code of State Rules
DO	Digital Elevation Model
DWWM	Dynamic Equilibrium In-stream Chemical Reactions model [WVDEP]
ERIS GAP	Division of Mining and Reclamation [WVDEP] Division of Natural
GIS gpd	Resources dissolved oxygen
GPS HAU	[WVDEP] Division of Water and Waste Management Environmental
LA pg/L	Resources Information System Gap Analysis Land Cover Project
MDAS	geographic information system gallons per day global positioning system
mg/L mL	home aeration unit load allocation micrograms per liter
MF MPN	Mining Data Analysis System milligram per liter milliliter membrane filter
MOS MS4	counts per test most probable number margin of safety municipal
NED	separate storm sewer system National Elevation Dataset
NOAA-NCDC	National Oceanic and Atmospheric Administration, National Climatic Data Center
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System Natural Resources
NRCS OOG	Conservation Service [WVDEP] Office of Oil and Gas publicly owned
POTW	treatment works
PSD	public service district
SI	stressor identification

SMCRA	Surface Mining Control and Reclamation Act
SRF	State Revolving Fund
SO ₂	sulfur dioxide
SSO	sanitary sewer overflow
STATSGO	State Soil Geographic database
TMDL	Total Maximum Daily Load
TSS	total suspended solids
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UNT	unnamed tributary
WLA	wasteload allocation
WVDEP	West Virginia Department of Environmental
WVSCI	West Virginia Stream Condition Index
WVU	West Virginia University

Watershed

A general term used to describe a drainage area within the boundary of a United States Geologic Survey's 8-digit hydrologic unit code. Throughout this report, the James River watershed refers to all of the tributary streams in West Virginia that eventually drain to the James River in Virginia. The term "watershed" is also used more generally to refer to the land area that contributes precipitation runoff that eventually drains to the James River.

TMDL watershed

This term is used to describe the total land area draining to an impaired stream for which a TMDL is being developed. This term also takes into account the land area drained by unimpaired tributaries of the impaired stream. This report addresses three impaired streams located in three TMDL watersheds (Figures 3-1 and 6-1).

Subwatershed

The subwatershed delineation is the most detailed scale of the delineation that breaks each TMDL watershed into numerous catchments for modeling purposes. The entire West Virginia portion of the James River watershed has been subdivided into a total of 25 sub watersheds. Only 10 of these subwatersheds (those which contain or contribute to impaired waters) were modeled as part of this effort. Pollutant sources, allocations and reductions are presented at the subwatershed scale to facilitate future permitting actions and TMDL implementation. An example of a watershed, TMDL watershed and sub watershed are shown in Figure 1-1.

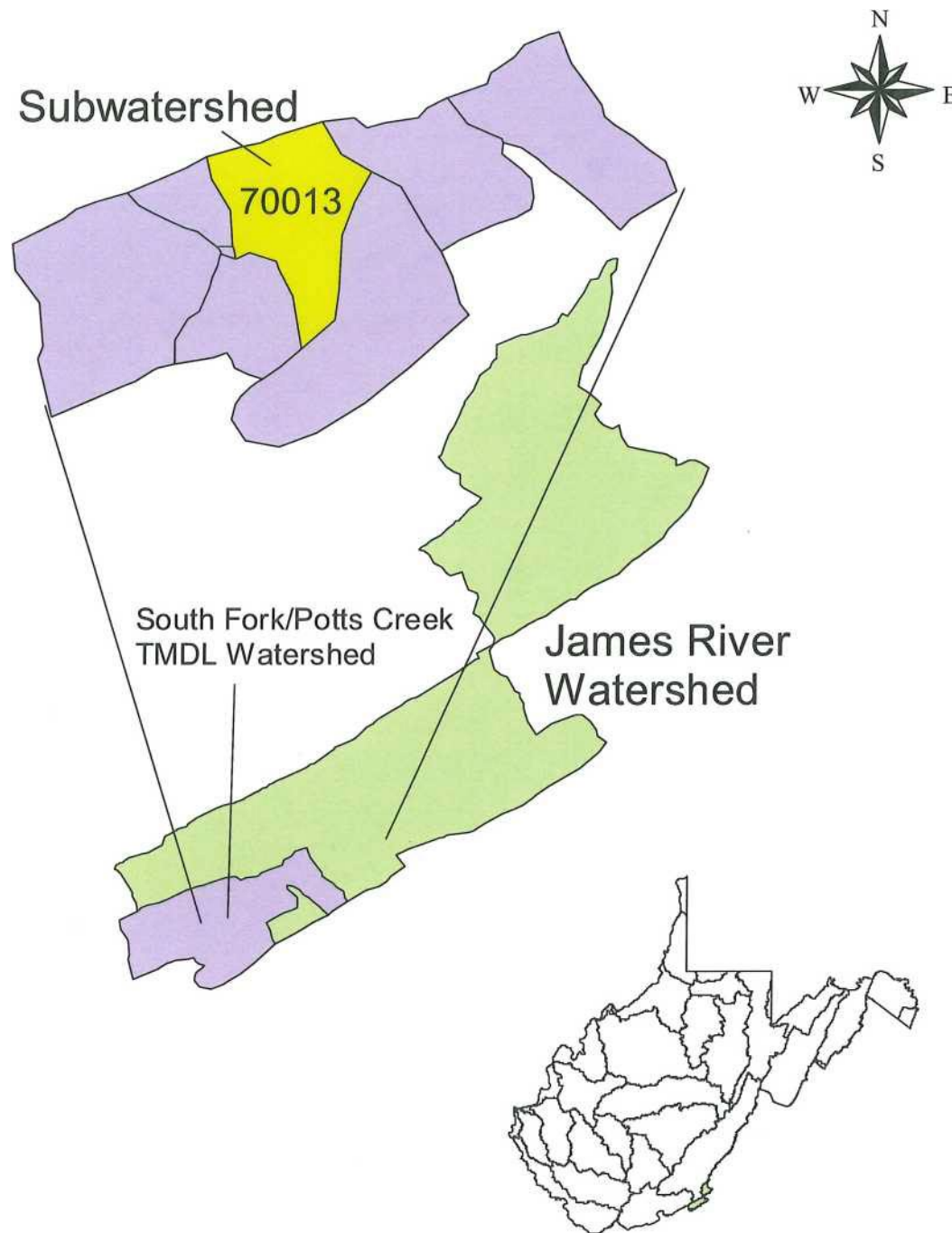


Figure 1=1. Examples of a watershed, TMDL watershed, and subwatersheds
EXECUTIVE SUMMARY

The James River watershed is in southeastern West Virginia and encompasses approximately 71 square miles. The West Virginia portion of the James River watershed lies entirely within Monroe County. Major West Virginia tributaries include Potts Creek, North Fork, and South Fork of Potts Creek.

This report includes Total Maximum Daily Loads (TMDLs) for three fecal coliform impaired streams in the James River watershed. A TMDL establishes the maximum allowable pollutant loading for a waterbody while still complying with water quality standards, distributes the load among pollutant sources, and provides a basis for actions needed to restore water quality.

West Virginia's water quality standards are codified at Title 47 of the *Code of State Rules* (CSR), Series 2, and titled *Legislative Rules, Department of Environmental Protection: Requirements Governing Water Quality Standards*. The standards include designated uses of West Virginia waters and numeric and narrative criteria to protect those uses. The West Virginia Department of Environmental Protection (WVDEP) routinely assesses use support by comparing observed water quality data with criteria and reports impaired waters every two years as required by Section 303(d) of the Clean Water Act ("303(d) list"). The act requires that TMDLs be developed for listed impaired waters.

All of the subject streams are included on West Virginia's 2006 Section 303(d) list. Documented impairments are related to numeric water quality criteria for fecal coliform bacteria. Ray Fork is also biologically impaired based on the narrative water quality criterion of 47 CSR 2-3.2.i, which prohibits the presence of wastes in state waters that cause or contribute to significant adverse impacts to the chemical, physical, hydrologic, and biological components of aquatic ecosystems.

Impaired waters were organized into three TMDL watersheds. For hydrologic modeling purposes, impaired and unimpaired streams in these TMDL watersheds were further divided into 10 sub watersheds. The subwatershed delineation provided a basis for georeferencing pertinent source information, monitoring data, and presentation of the TMDLs.

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage for fecal coliform bacteria. Currently, only nonpoint sources contribute to the fecal coliform bacteria impairments in the watershed. Failing on-site systems and precipitation runoff from agricultural areas are significant nonpoint sources of fecal coliform bacteria.

In addition to impairment related to fecal coliform bacteria, Ray Fork of the South Fork of Potts Creek has been determined to be biologically impaired. Biological integrity/impairment is based on a rating of the stream's benthic macroinvertebrate community using the multimetric West Virginia Stream Condition Index (WVSCI). The first step in TMDL development for biologically impaired waters is stressor identification (SI). Section 4 discusses the complete SI process. The causative stressor to the benthic community in Ray Fork was identified in this effort as organic enrichment. SI was followed by stream-specific determinations of the pollutants for which TMDLs must be developed. It was determined that implementation of the Ray Fork fecal coliform TMDL would remove untreated sewage and reduce agricultural animal wastes, thereby reducing the organic and nutrient loading causing the biological impairment.

The main section of the report describes the TMDL development and modeling processes, identifies impaired streams and existing pollutant sources, discusses future growth and TMDL achievability, describes allocation methodologies and documents the public participation associated with the process. Various provisions attempt to ensure the attainment of criteria throughout the watershed, achieve equity among categories of sources, and target pollutant reductions from the most problematic sources.

An accompanying spreadsheet provides TMDLs and example allocations of loads to categories of nonpoint sources that achieve the total TMDL. Also provided is an interactive ArcExplorer geographic information system (GIS) project that allows for the exploration of spatial relationships among the source assessment data.

Considerable resources were used to acquire recent water quality and pollutant source information upon which the TMDLs are based. The TMDL modeling is among the most sophisticated available, and incorporates sound scientific principles. TMDL outputs are presented in various formats to assist user comprehension and facilitate use in implementation.

1® REPORT FORMAT

This report consists of a main section, a supporting geographic information system (GIS) application, and spreadsheet data tables. The main section describes the overall Total Maximum Daily Load (TMDL) development process for the James River watershed, identifies impaired streams, and outlines the assessment of fecal coliform sources and biological stressors. It also describes the modeling process, presents TMDL allocations, and lists measures that will be taken to ensure that the TMDLs are met. The main section is supported by a compact disc containing an interactive ArcExplorer GIS project that provides further details on the data and allows the user to explore the spatial relationships among the source assessment data. With this tool, users can magnify streams and other features of interest. Also included on the CD are spreadsheets (in Microsoft Excel format) that provide the data used during the TMDL development process, as well as detailed source allocations associated with successful TMDL scenarios. A Technical Report that describes the detailed technical approaches used throughout the TMDL development process is also included.

2 .0 INTRODUCTION

The West Virginia Department of Environmental Protection (WVDEP), Division of Water and Waste Management (DWWM), is responsible for the protection, restoration, and enhancement of the state's waters. Along with this duty comes the responsibility for TMDL development in West Virginia.

2.1 Total Maximum Daily Loads

Section 303(d) of the federal Clean Water Act and the U.S. Environmental Protection Agency's (USEPA) Water Quality Planning and Management Regulations (at Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require states to identify waterbodies that do not meet water quality standards and to develop appropriate TMDLs. A TMDL establishes the maximum allowable pollutant loading for a waterbody to achieve compliance with applicable standards. It also distributes the load among pollutant sources and provides a basis for the actions needed to restore water quality.

A TMDL is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. TMDLs can be expressed in terms of mass per time or other appropriate units. Conceptually, this definition is denoted by the following equation:

$$\text{TMDL} = \text{sum of WLAs} + \text{sum of LAs} + \text{MOS}$$

WVDEP is developing TMDLs in concert with a geographically-based approach to water resource management in West Virginia—the Watershed Management Framework.

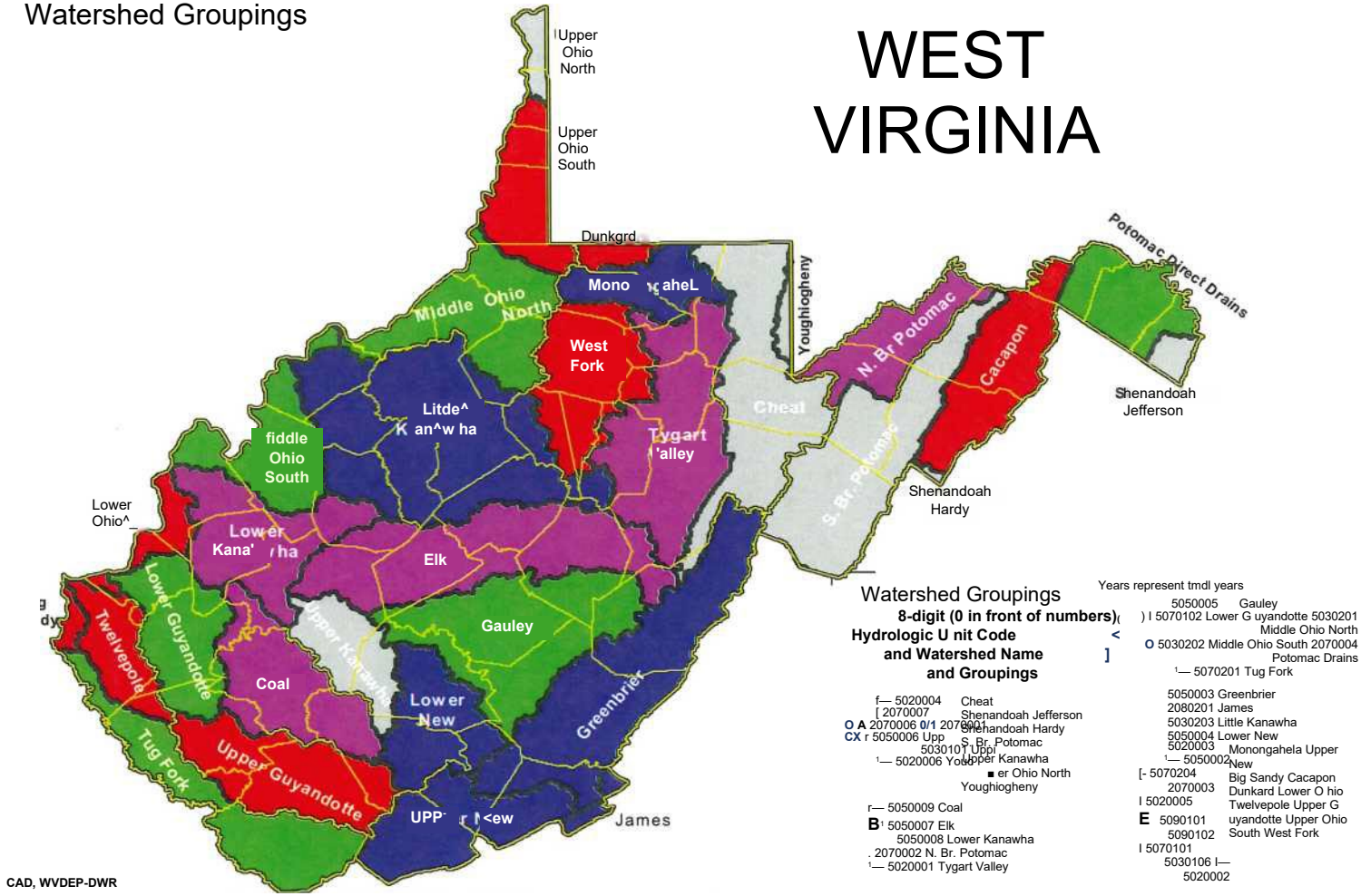
Adherence to the Framework ensures efficient and systematic TMDL development. Each year, TMDLs are developed in specific geographic areas. The Framework dictates that 2007 TMDLs should be pursued in Hydrologic Group D, which includes the James River watershed. Figure 2-1 depicts the hydrologic groupings of West Virginia's watersheds; the legend includes the target year for finalization of each TMDL. This document provides TMDLs for the James River watershed stream/impairment listings from West Virginia's 2006 Section 303(d) list.

WVDEP is committed to implementing a TMDL process that reflects the requirements of the TMDL regulations, provides for the achievement of water quality standards, and ensures that ample stakeholder participation is achieved in the development and implementation of TMDLs. A 48-month development process enables the agency to carry out an extensive data generating and gathering effort to produce scientifically defensible TMDLs. It also allows ample time for modeling, report finalization, and frequent public participation opportunities.

The TMDL development process begins with the selection of streams to be addressed. The selected streams are then advertised for public comment. A meeting is held in the affected watershed to present the proposed sampling plan and to address any questions from the public. The next steps in the process are pre-TMDL water quality monitoring and source identification and characterization. Data obtained from pre-TMDL efforts are compiled, and the impaired waters are modeled to determine baseline conditions and the gross pollutant reductions needed to achieve water quality standards. WVDEP then presents its allocation strategies in a second public meeting, after which a draft TMDL report is developed. The draft TMDL is advertised for public review and comment, and a third informational meeting is held during the public comment period. Public comments are addressed, and the draft TMDL is submitted to USEPA for approval.

Watershed Groupings

WEST VIRGINIA



CAD, WVDEP-DWR

Figure 2-1. Hydrologic groupings of West Virginia's watersheds

2.2 Water Quality Standards

The determination of impaired waters involves comparing instream conditions to applicable water quality standards. West Virginia’s water quality standards are codified at Title 47 of the *Code of State Rules (CSR)*, Series 2, titled *Legislative Rules, Department of Environmental Protection: Requirements Governing Water Quality Standards*. These standards can be obtained online from the West Virginia Secretary of State internet site (<http://www.wvsos.com/csr/vcrify.asp?TitleCriteria=47-02>).

Water quality standards consist of three components: designated uses; narrative and/or numeric water quality criteria necessary to support those uses; and an antidegradation policy. Appendix E of the Standards contains the numeric water quality criteria for a wide range of parameters, while Section 3 contains the narrative water quality criteria. Designated uses include: propagation and maintenance of aquatic life in warmwater fisheries and troutwaters, water contact recreation, and public water supply.

In the West Virginia portion of the James River watershed, water contact recreation and public water supply uses have been determined to be impaired pursuant to numeric water quality criteria for fecal coliform bacteria. In addition to those impairments, the aquatic life use in Ray Fork has been determined to be impaired pursuant to narrative water quality criteria in Section 3 of the Standards. That section, titled “Conditions Not Allowable in State waters,” contains various general provisions related to water quality. The narrative water quality criterion at Title 47 CSR Series 2 - 3.2.i prohibits the presence of wastes in state waters that cause or contribute to significant adverse impacts to the chemical, physical, hydrologic, and biological components of aquatic ecosystems. This provision is the basis for the “biological impairment” of Ray Fork. Biological impairment signifies a stressed aquatic community, and is discussed in detail in Section 4.

The numeric water quality criteria for fecal coliform bacteria are shown in Table 2-1. The stream-specific impairments are displayed in Table 3-3.

Table 2-1. Applicable West Virginia water quality criteria

POLLUTANT	USE DESIGNATION
	Human Health
	Contact Recreation/Public Water Supply
Fecal coliform bacteria	Human Health Criteria Maximum allowable level of fecal coliform content for Primary Contact Recreation (either MPN [most probable number] or MF [membrane filter counts/test]) shall not exceed 200/100 mL as a monthly geometric mean based on not less than 5 samples per month; nor to exceed 400/100 mL in more than 10 percent of all samples taken during the month.

Source: 47 CSR, Series 2, *Legislative Rules, Department of Environmental Protection: Requirements Governing Water Quality Standards*.

3 .0 WATERSHED DESCRIPTION AND DATA INVENTORY

3.1 Watershed Description

As shown in Figure 3-1, the West Virginia portion of the James River watershed lies entirely within Monroe County in southeast West Virginia. The remainder of the James River watershed is located in the state of Virginia. A component of the Chesapeake Bay Drainage, the West Virginia portion of the James River watershed encompasses nearly 71 square miles. Impaired streams in West Virginia are headwaters of the James River. The average elevation in the watershed is 2,676 feet. The highest point is at 4,033 feet at Arnolds Knob in the Potts Mountain chain, which is the southern watershed divide between West Virginia and Virginia. The minimum elevation is 1,868 feet along Potts Creek at the border between West Virginia and Virginia. The total population for Monroe County West Virginia, according to the 2000 U.S. Census data, is 14,583 people. The population in the 10 modeled subwatersheds is estimated to be 100 people.

Landuse and land cover estimates were originally obtained from vegetation data gathered from the West Virginia Gap Analysis Land Cover Project (GAP). The Natural Resource Analysis Center and the West Virginia Cooperative Fish and Wildlife Research Unit of West Virginia University (WVU) produced the GAP coverage. The GAP database for West Virginia was derived from satellite imagery taken during the early 1990s, and it includes detailed vegetative spatial data. Enhancements and updates to the GAP coverage were made to create a modeled landuse by custom edits derived primarily from WVDEP source tracking information and 2003 aerial photography with 1 -meter resolution. Additional information regarding the modeled landuse manipulation is provided in Appendix C of the Technical Report. The categories for vegetation cover were consolidated to create eight landuse categories, summarized in Table 3-1.

As shown in Table 3-1, the dominant modeled landuse type in the 10 subwatersheds is forest, which constitutes 87.47 percent of the total landuse area. Other important modeled landuse types are grassland (7.66 percent), pasture (3.97 percent), and urban/residential (0.52 percent). Individually, all other land cover types compose less than one percent of the total watershed area.

Table 3-1. Modified modeled landuse for the 10 modeled subwatersheds in the James River watershed

Landuse Type	Area of Watershed		Percentage
	Acres	Square Miles	
Water	<0.01	0.00	<0.01%
Wetland	0.45	0.00	0.01%
Forest	6730.04	10.52	87.46%
Barren	3.79	0.01	0.05%
Grassland	589.67	0.92	7.66%
Cropland	24.92	0.04	0.32%
Pasture	305.58	0.48	3.97%
Urban/Residential	40.00	0.06	0.52%
Total Area	7694.45	12.02	100.00%

Note: < = less than

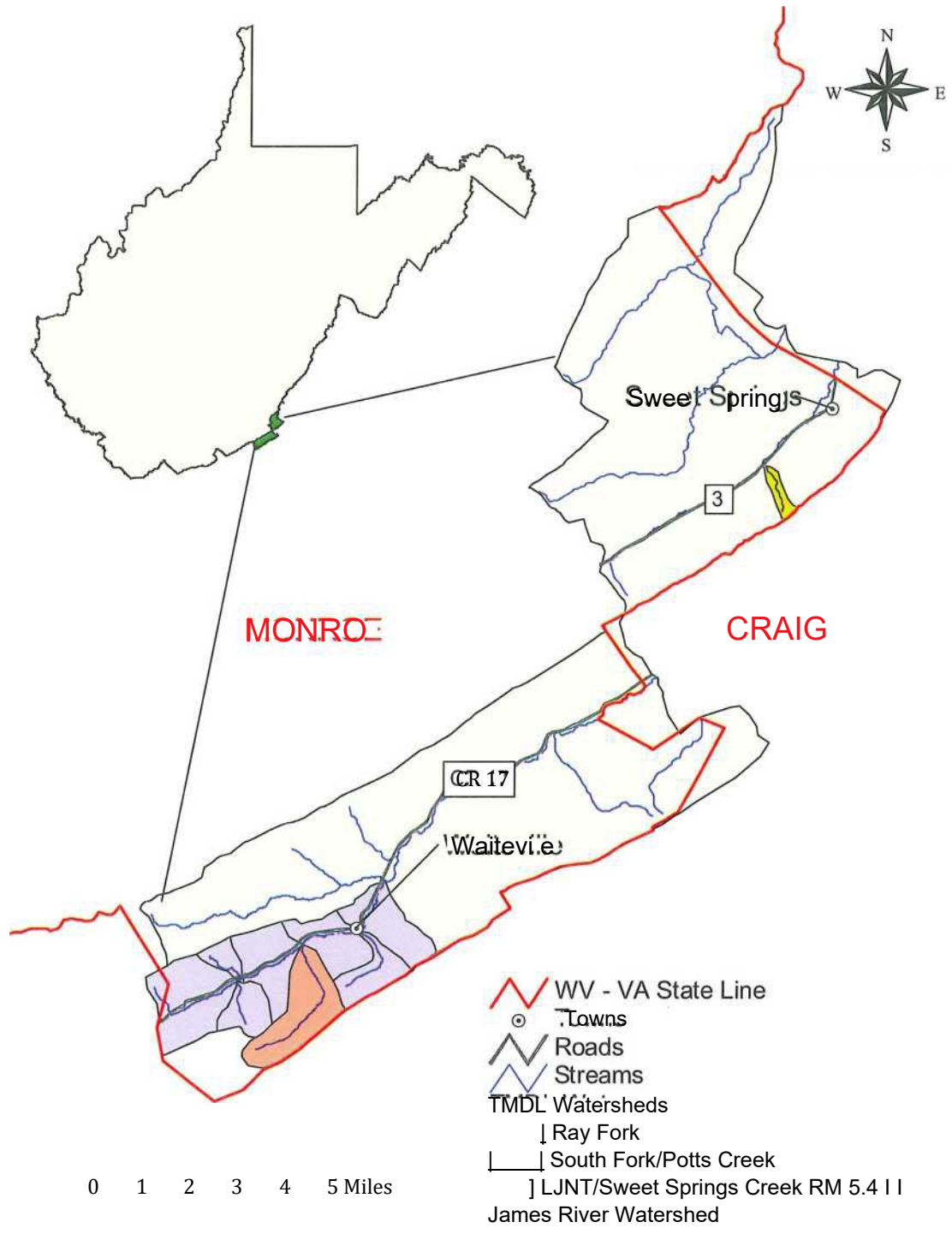


Figure 3=1. Location of the James River watershed

3.2 Data Inventory

Various sources of data were used in the TMDL development process. The data were used to identify and characterize sources of pollution and to establish the water quality response to those sources. Review of the data included a preliminary assessment of the watershed's physical and socioeconomic characteristics and current monitoring data. Table 3-2 identifies the data used to support the TMDL assessment and modeling effort for the James River watershed. These data describe the physical conditions of the TMDL watersheds, the potential pollutant sources and their contributions, and the impaired waterbodies for which TMDLs need to be developed. Prior to TMDL development, WVDEP collected comprehensive water quality data throughout the watershed. This pre-TMDL monitoring effort contributed the largest amount of water quality data to the process and is summarized in the Technical Report, Appendix I. The geographic information is provided in the ArcExplorer GIS project included on the CD version of this report.

Table 3-2. Datasets used in TMDL development

	Type of Information	Data Sources
Watershed physiographic data	Stream network	West Virginia Division of Natural Resources (WVDNR)
	Landuse	WV Gap Analysis Project (GAP)
	2003 Aerial Photography (1-meter resolution)	WVDEP
	Counties	U.S. Census Bureau
	Cities/populated places	U.S. Census Bureau
	Soils	State Soil Geographic Database (STATSGO) U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) soil surveys
	Hydrologic Unit Code boundaries	U.S. Geological Survey (USGS)
	Topographic and digital elevation models (DEMs)	National Elevation Dataset (NED)
	Dam locations	USGS
	Roads	U.S. Census Bureau TIGER, WVU WV Roads
	Water quality monitoring station locations	U.S. Census Bureau, WVDEP, USEPA STORET
	Meteorological station locations	National Oceanic and Atmospheric Administration, National Climatic Data Center (NOAA-NCDC)
	Permitted facility information	WVDEP Division of Water and Waste Management (DWWM), WVDEP Division of Mining and Reclamation (DMR)
	Timber harvest data	WV Division of Forestry
	Oil and gas operations coverage	WVDEP Office of Oil and Gas (OOG)
Abandoned mining coverage	WVDEP DMR	
Monitoring data	Historical Flow Record (daily averages)	USGS
	Rainfall	NOAA-NCDC
	Temperature	NOAA-NCDC
	Wind speed	NOAA-NCDC
	Dew point	NOAA-NCDC

Type of Information		Data Sources
	Humidity	NOAA-NCDC
	Cloud cover	NOAA-NCDC
	Water quality monitoring data	USEPA STORET, WVDEP
	National Pollutant Discharge Elimination System (NPDES) data	WVDEP DMR, WVDEP DWWM
	Discharge Monitoring Report data	WVDEP DMR
	Abandoned mine land data	WVDEP DMR, WVDEP DWWM
Regulatory or policy information	Applicable water quality standards	WVDEP
	Section 303(d) list of impaired waterbodies	WVDEP, USEPA
	Nonpoint Source Management Plans	WVDEP

33 Impaired Waterbodies

WVDEP conducted extensive water quality monitoring from July 2004 through June 2005 in the James River watershed. The results of that effort were used to confirm the impairments of waterbodies identified on previous 303(d) lists and to identify other impaired waterbodies that were not previously listed. TMDLs were developed for three impaired streams in the James River watershed (Figure 3-1). Table 3-3 displays the TMDL watershed, stream code, stream name, and impairments for each of the three streams.

Table 3-3. Waterbodies and impairments for which TMDLs have been developed

TMDL Watershed	Code	Stream Name	FC	BIO
South Fork/Potts Creek	WVJ-1-E	South Fork/Potts Creek	X	
Ray Fork	WVJ-1-E-1	Ray Fork	X	X
UNT/Sweet Springs Creek RM 5.4	WVJ-2-H	UNT/Sweet Springs Creek RM 5.4	X	

Note:

FC indicates fecal coliform bacteria impairment

BIO indicates biological impairment

UNT = unnamed tributary.

4 .0 BIOLOGICAL IMPAIRMENT AND STRESSOR IDENTIFICATION

Initially, TMDL development in biologically impaired waters requires identification of the pollutants that cause the stress to the biological community. Sources of those pollutants are often mine drainage, untreated sewage, and sediment. The Technical Report discusses biological impairment and the SI process in detail.

4.1 Introduction

Assessment of the biological integrity of a stream is based on a survey of the stream's benthic macroinvertebrate community. Benthic macroinvertebrate communities are rated using a multimetric index developed for use in wadeable streams of West Virginia. The West Virginia Stream Condition Index (WVSCI; Gerritsen et al., 2000) is composed of six metrics that were selected to maximize discrimination between streams with known impairments and reference streams. In general, streams with WVSCI scores of less than 60.6 points, on a normalized 0-100 scale, are considered biologically impaired.

Biological assessments are useful in detecting impairment, but they may not clearly identify the causes of impairment, which must be determined before TMDL development can proceed.

USEPA developed *Stressor Identification: Technical Guidance Document* (Cormier et al., 2000) to assist water resource managers in identifying stressors and stressor combinations that cause biological impairment. Elements of the SI process were used to evaluate and identify the significant stressors to the impaired benthic communities. In addition, custom analyses of biological data were performed to supplement the framework recommended by the guidance document.

The general SI process entailed reviewing available information, forming and analyzing possible stressor scenarios, and implicating causative stressors. The SI method provides a consistent process for evaluating available information. TMDLs were established for the responsible pollutants at the conclusion of the SI process. As a result, the TMDL process established a link between the impairment and benthic community stressors.

4.2 Data Review

WVDEP generated the primary data used in SI through its pre-TMDL monitoring program. The program included water quality monitoring, benthic sampling, and habitat assessment. In addition, the biologists' comments regarding stream condition and potential stressors and sources were captured and considered. Other data sources reviewed were: source tracking data, WVDEP mining activities data, GAP2000 landuse

information, Natural Resources Conservation Service (NRCS) STATSGO soils data, NPDES point source data, and literature sources.

4.3 Candidate Causes/Pathways

The first step in the SI process was to develop a list of candidate causes, or stressors. The candidate causes responsible for biological impairments are listed below:

- Metals contamination (including metals contributed through soil erosion) causes toxicity
 - Acidity (low pH) causes toxicity
 - High sulfates and increased ionic strength cause toxicity
 - Ⓜ Increased total suspended solids (TSS)/erosion and altered hydrology cause sedimentation and other habitat alterations
 - Ⓢ Altered hydrology causes higher water temperature, resulting in direct impacts
 - Ⓢ Altered hydrology, nutrient enrichment, and increased biochemical oxygen demand (BOD) cause reduced dissolved oxygen (DO)
 - Ⓢ Algal growth causes food supply shift
- High levels of ammonia cause toxicity (including increased toxicity due to algal growth)
- Chemical spills cause toxicity

A conceptual model was developed to examine the relationship between candidate causes and potential biological effects. The conceptual model (Figure 4-1) depicts the sources, stressors, and pathways that affect the biological community.

WV Biological TMDLs - Conceptual Model of Candidate Causes

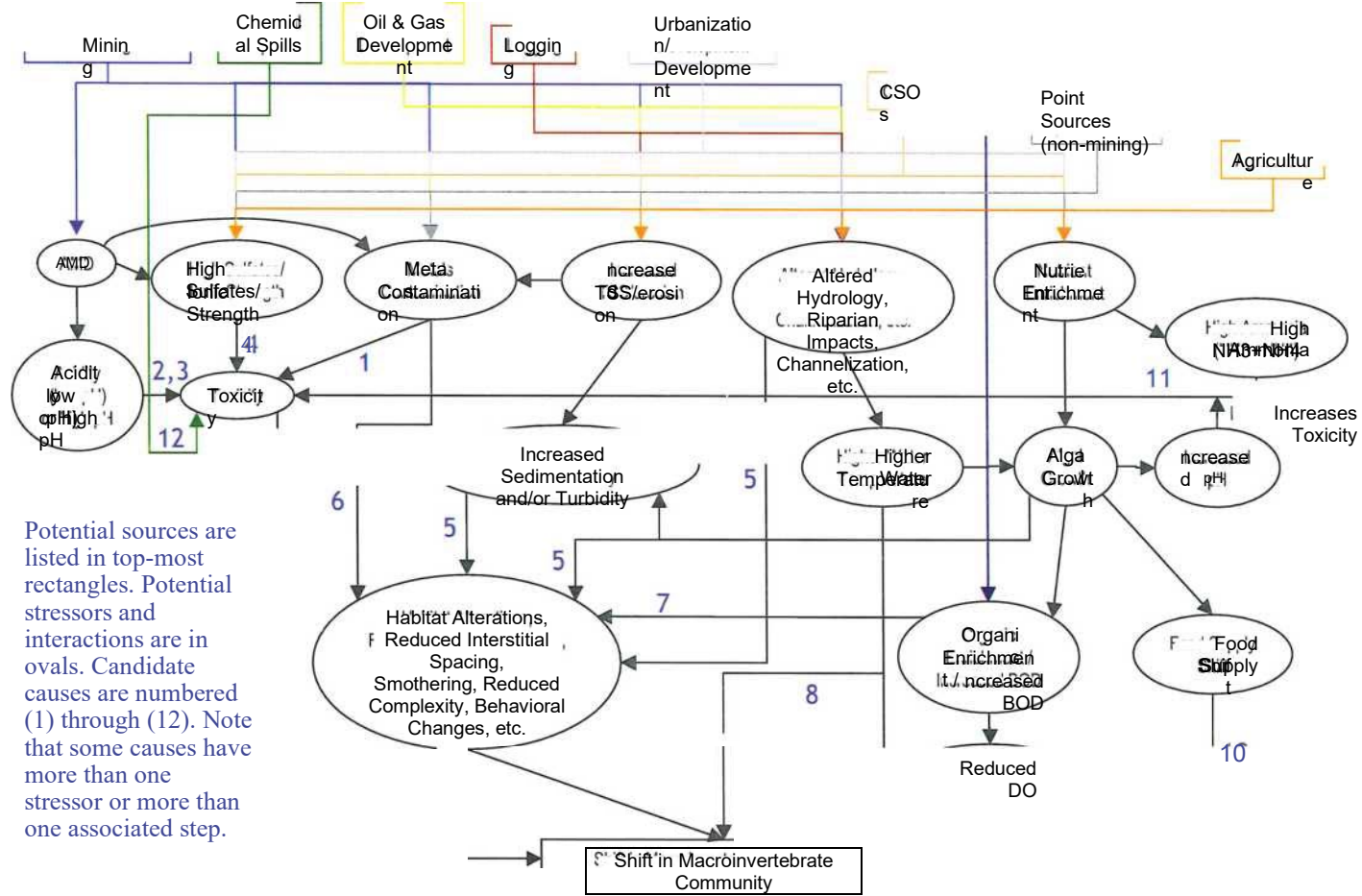


Figure 4-1. Conceptual model of candidate causes and potential biological effects

4.4 Stressor Identification Results

The SI process identified organic enrichment as the cause of biological impairment in Ray Fork, where data also indicated violations of the fecal coliform water quality criteria. The predominant sources of both organic enrichment and fecal coliform bacteria in the watershed are inadequately treated sewage and runoff from pasture landuse. WVDEP determined that implementation of fecal coliform TMDLs would remove untreated sewage and reduce agricultural runoff thereby reducing the organic and nutrient loading causing the biological impairment in Ray Fork. Therefore, fecal coliform TMDLs will serve as a surrogate where organic enrichment was identified as a stressor.

Table 4-1 summarizes the significant stressors' contributions to biological impairment in the watershed.

Table 4-1. Significant stressors of biologically impaired streams in the watershed

TMDL Watershed	Stream	Stream Code	Biological Stressor	TMDL Developed
Ray Fork	Ray Fork	WVJ-I-E-1	Organic enrichment	Fecal coliform

5 .0 FECAL COLIFORM SOURCE ASSESSMENT

This section identifies and examines the potential sources of fecal coliform impairments. Sources can be classified as point (permitted) or nonpoint (non-permitted) sources.

A point source, according to 40 CFR 122.3, is any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, and vessel or other floating craft from which pollutants are or may be discharged. The National Pollutant Discharge Elimination System (NPDES) program, established under Clean Water Act Sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources. For purposes of this TMDL, NPDES-permitted discharge points are considered point sources.

Nonpoint sources of pollutants are diffuse, non-permitted sources. They most often result from precipitation-driven runoff. For the purposes of these TMDLs only, WLAs are given to NPDES- permitted discharge points, and LAs are given to discharges from activities that do not have an associated NPDES permit, such as septic systems. The assignment of LAs to failing septic systems and straight pipes do not reflect any determination by WVDEP or USEPA as to whether there are, in fact, unpermitted point source discharges within these landuses. Likewise, by establishing these TMDLs with failing septic system and straight pipe discharges treated as LAs, WVDEP and USEPA are not determining that these discharges are exempt from NPDES permitting requirements.

The physiographic data discussed in Section 3.2 enabled the characterization of pollutant sources. As part of the TMDL development process, WVDEP performed additional field-based source tracking activities to supplement the available source characterization data. WVDEP staff recorded physical descriptions of pollutant sources and the general stream condition in the vicinity of the sources. WVDEP collected global positioning system (GPS) data and water quality samples for laboratory analysis as necessary to characterize the sources and their impacts. Source tracking information was compiled and electronically plotted on maps using GIS software. Detailed information, including the locations of pollutant sources, is provided in the following sections, the Technical Report, and the ArcExplorer project on the CD version of this TMDL report.

5.1 Fecal Coliform Point Sources

The most common fecal coliform point sources are the permitted discharges from sewage treatment plants. These facilities (including publicly and privately owned treatment works,) are regulated by NPDES permits. Permits require effluent disinfection and compliance with strict fecal coliform limitations (200 counts/100 milliliters (mL) [average monthly] and 400 counts/100 mL [maximum daily]).

Additionally, USEPA's stormwater permitting regulations require municipalities to

obtain permit coverage for all stormwater discharges from municipal separate storm sewer systems (MS4s) in urbanized areas. Such discharges are potential point sources.

Collection system overflows are also point sources that may contribute significant loadings of fecal coliform bacteria to receiving streams. Combined sewer overflows (CSOs) are outfalls from POTW sewer systems that carry untreated domestic waste and surface runoff. CSOs are permitted to discharge only during precipitation events. Sanitary sewer overflows (SSOs) are unpermitted overflows that occur as a result of excess inflow and/or infiltration to POTW separate sanitary collection systems.

WVDEP determined that there are no publicly owned or privately owned wastewater treatment facilities, combined sewer overflows, sanitary sewer overflows, or municipal separate storm sewer systems, within the TMDL watersheds of the James River watershed. Therefore, the potential impacts and characterization of these source types will not be discussed further.

The following sections discuss the specific types of fecal coliform point sources that were identified in the James River watershed.

5.2 Fecal Coliform Nonpoint Sources

5.2.1 On-site Treatment Systems

Overall, failing septic systems and straight pipes represent a significant nonpoint source of fecal coliform bacteria in the watershed. Information collected during source tracking efforts by WVDEP yielded an estimate of 40 homes in the fecal coliform impaired watersheds that are not served by centralized sewage collection and treatment systems. These homes are represented in the model as having completely or periodically failing septic systems. Estimated septic system failure rates across the watershed ranged from 3 percent to 28 percent.

Due to a wide range of available literature values relating to the bacteria loading associated with failing septic systems, a customized Microsoft Excel spreadsheet tool was created to represent the fecal coliform bacteria contribution from failing on site septic systems. WVDEP's pre-TMDL monitoring and source tracking data were used in the calculations. To calculate failing septic wastewater flows, the watershed was divided into four septic failure zones. The TMDL watersheds contain only two failure zones, moderate and high. During the WVDEP source tracking process, septic failure zones were delineated by geology (soil permeability, depth to bedrock, depth to groundwater and drainage capacity) as shown in USDA county soil survey maps, and defined by rates of septic system failure. Two types of failure were considered, complete failure and periodic failure. For the purposes of this analysis, complete failure was defined as 50 gallons per house per day of untreated sewage escaping a septic system as overland flow to receiving waters. Periodic failure was defined as 25 gallons per house per day of untreated sewage escaping a septic system as overland flow to receiving waters. Figure 5-1 shows the failing septic flows in the modeled sub watersheds.

Once failing septic flows had been modeled, the next step was to develop a modeled fecal coliform concentration for failing septic system discharges in the TMDL watersheds.
Based on

past experience with other West Virginia TMDLs, a base concentration of 10,000 counts per 100 mL was used as a beginning concentration. This concentration was used as a starting point and was further refined during model calibration. A sensitivity analysis was performed by varying the modeled failing septic concentrations in multiple model runs, and then comparing model output to pre-TMDL monitoring data. Additional details of the failing septic analyses are presented in the Technical Report

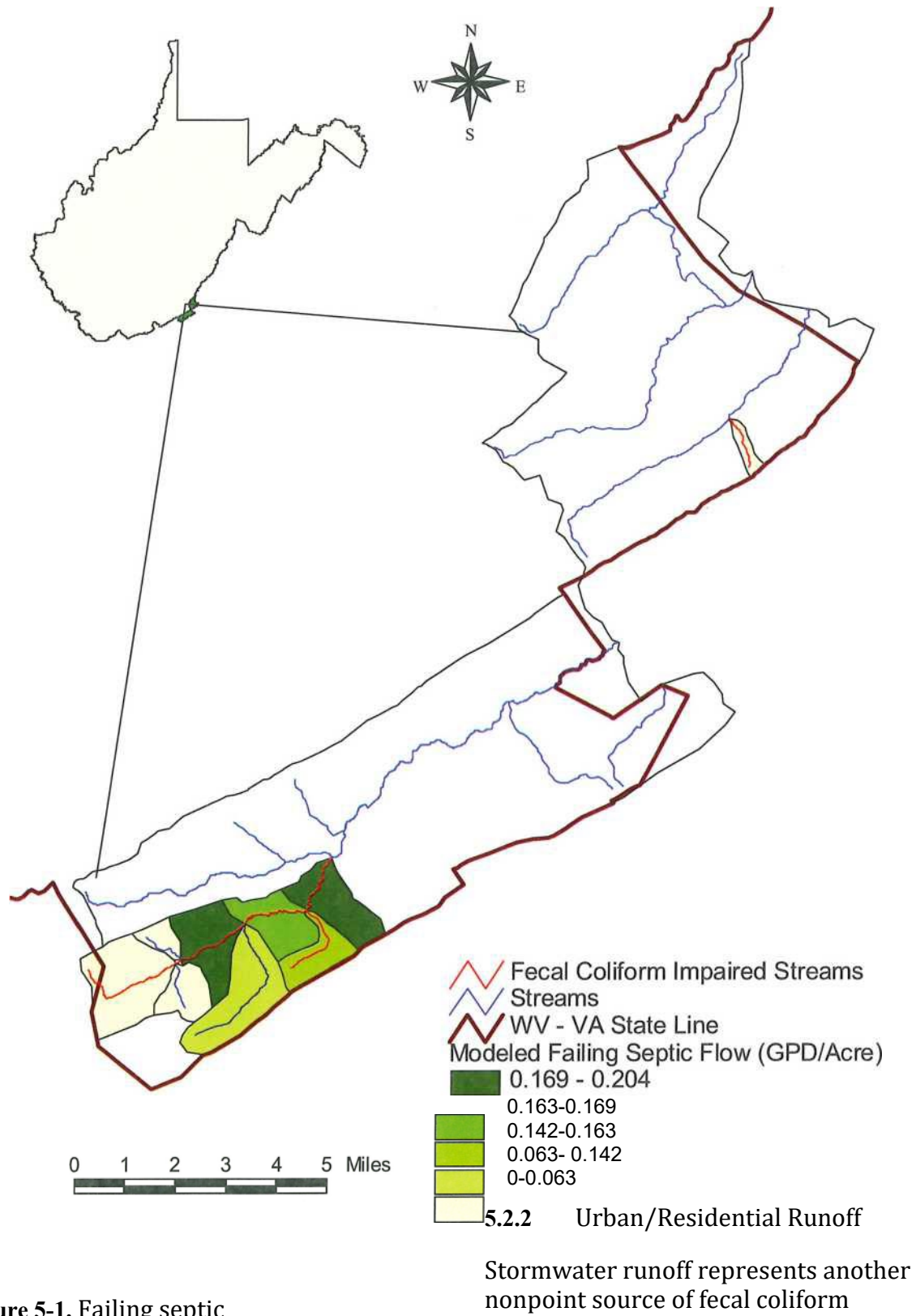


Figure 5-1. Failing septic

bacteria in residential and urbanized areas. Runoff from residential and urbanized areas during storm events can be a significant source, delivering bacteria from the waste of pets and wildlife to the waterbody. GAP 2000 landuse data were used to determine the number of acres of residential and urbanized areas and literature reference values were used to determine fecal accumulation rates for these areas. Although represented in the modeling, residential and urban landuse accounts for only a small percentage of the TMDL watersheds and urban/residential runoff is not considered to be a significant fecal coliform source.

5.2.3 Agriculture

Agricultural activities can contribute fecal coliform bacteria to receiving streams through surface runoff or direct deposition. Grazing livestock and land application of manure result in the deposition and accumulation of bacteria on land surfaces. These bacteria are then available for wash-off and transport during rain events. In addition, livestock with unrestricted access can deposit feces directly into streams.

Agriculture activities are present in portions of the TMDL watersheds. Source tracking efforts identified pastures and feedlots near impaired segments that have significant impacts on instream bacteria levels. GAP 2000 landuse data was used in conjunction with WVDEP source tracking assessments of livestock (density and access to streams) to develop fecal coliform bacteria loadings for agricultural sources.

5.2.4 Natural Background (Wildlife)

A certain “natural background” contribution of fecal coliform bacteria can be attributed to deposition by wildlife in forested areas. Accumulation rates for fecal coliform bacteria in forested areas were developed using reference numbers from past TMDLs, incorporating wildlife estimates obtained from West Virginia’s Division of Natural Resources (WVDNR). In addition, WVDEP conducted storm-sampling on a 100 percent forested subwatershed (Shrewsbury Hollow) within the Kanawha State Forest, Kanawha County, West Virginia to determine wildlife contributions of fecal coliform. These results were used during the model calibration process. On the basis of the low fecal accumulation rates for forested areas, the storm water sampling results, and model simulations, wildlife is not considered to be a significant nonpoint source of fecal coliform bacteria in the TMDL watersheds.

M MODELING PROCESS

Establishing the relationship between the instream water quality targets and source loadings is a critical component of TMDL development. It allows for the evaluation of management options that will achieve the desired source load reductions. The link can be established through a range of techniques, from qualitative assumptions based on sound scientific principles to sophisticated modeling techniques. Ideally, the linkage will be supported by monitoring data that allow the TMDL developer to associate certain waterbody responses with flow and loading conditions. This section presents the approach taken to develop the linkage between sources and instream response for TMDL development.

6.1 Modeling Technique for Fecal Coliform Bacteria

Selection of the appropriate analytical technique for TMDL development was based on an evaluation of technical and regulatory criteria. The following key technical factors were considered in the selection process:

- e Scale of analysis
- Point and nonpoint sources
- ⁶ Fecal coliform bacterial impairments are temporally variable and occur at low, average, and high flow conditions
- Time-variable aspects of land practices have a large effect on instream bacteria concentrations
- ° Bacteria transport mechanisms are highly variable and often weather-dependent

The primary regulatory factor that influenced the selection process was West Virginia water quality criteria. According to 40 CFR Part 130, TMDLs must be designed to implement applicable water quality standards. The applicable water quality criteria for fecal coliform bacteria in West Virginia are presented in Section 2, Table 2-1. West Virginia numeric water quality criteria are applicable at all stream flows greater than the 7-day, 10-year low flow (7Q10). The approach or modeling technique must permit representation of instream concentrations under a variety of flow conditions to evaluate critical flow periods for comparison with criteria.

The TMDL development approach must also consider the dominant processes affecting pollutant loadings and instream fate. In the James River watershed, only nonpoint sources contribute to the impairments. Some of the nonpoint sources are rainfall-driven with pollutant loadings primarily related to surface runoff, but others such as inadequate on-site residential sewage treatment systems, function as continuous discharges. While loading function variations must be recognized in the representation of the various sources, the TMDL allocation process must prescribe WLAs for any

contributing point sources and LAs for all contributing nonpoint sources.

The MDAS was developed specifically for TMDL application in West Virginia to facilitate large scale, data intensive watershed modeling applications. The MDAS is a system designed to support TMDL development for areas affected by nonpoint and point sources. The MDAS component most critical to TMDL development is the dynamic watershed model because it provides the linkage between source contributions and instream response. The MDAS is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and instream water quality. It is capable of simulating different flow regimes and pollutant loading variations. A key advantage of the MDAS' development framework is that it has no inherent limitations in terms of modeling size or upper limit of model operations. In addition, the MDAS model allows for seamless integration with modern-day, widely available software such as Microsoft Access and Excel. Fecal coliform bacteria were modeled using the MDAS.

6.1.1 MDAS Setup

Configuration of the MDAS model involved subdividing the James River watershed into sub watershed modeling units connected by stream reaches. Physical characteristics of the subwatersheds, weather data, landuse information, continuous discharges, and stream data were used as input. Flow and water quality were continuously simulated on an hourly time-step.

The entire James River watershed within West Virginia was broken into a total of 25 separate subwatershed units. However, only 10 subwatersheds contribute to the three impaired streams, as shown in Figure 3-1. The sub watersheds were divided to allow evaluation of water quality and flow at pre-TMDL monitoring stations. This subdivision process also ensures a proper stream network configuration within the basin. The subwatershed delineation is shown in Figure 6-1.

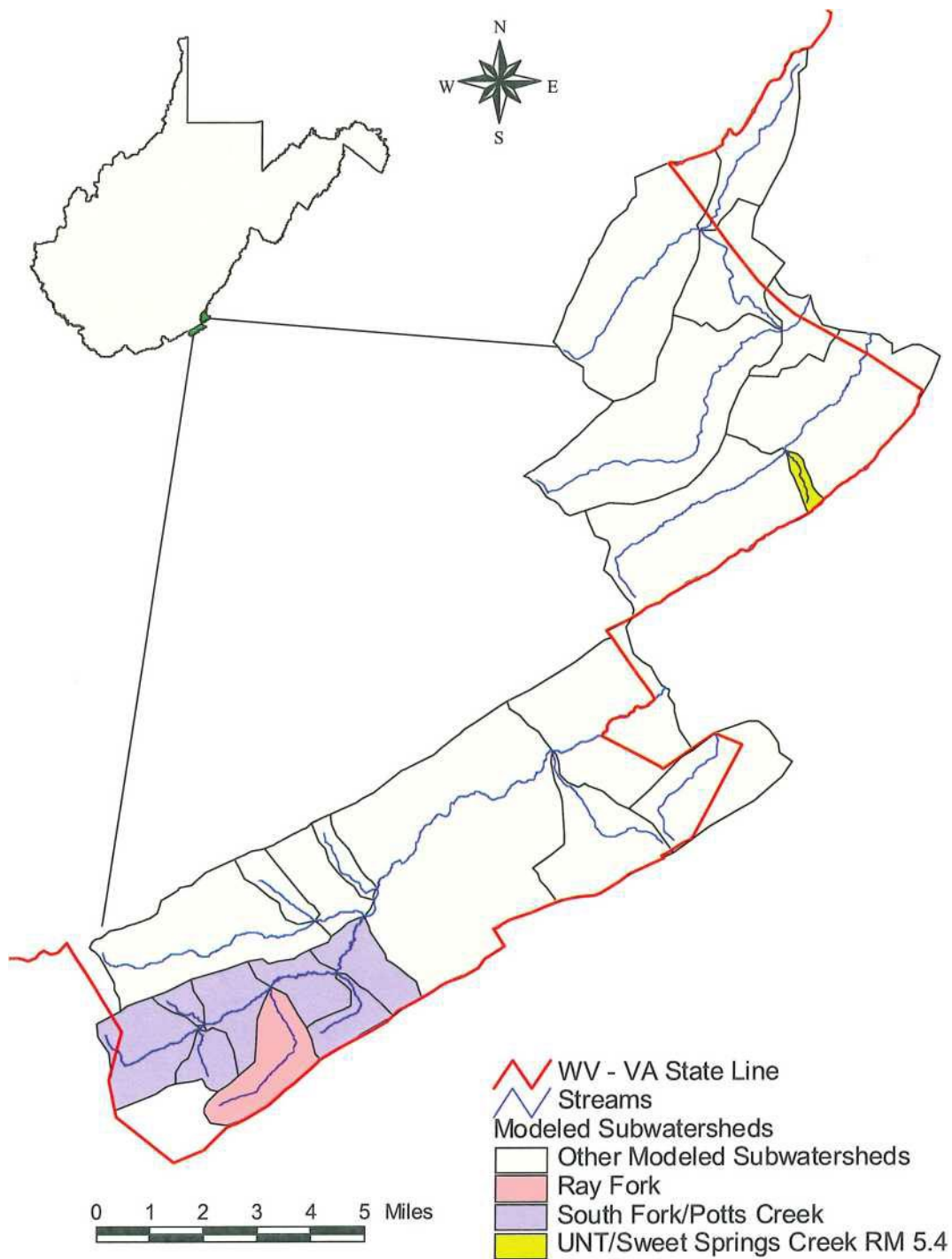


Figure 6-1. James River subwatershed delineation

Modeled landuse categories contributing to bacteria loads include pasture, grassland, cropland, urban/residential pervious lands, urban/residential impervious lands, and forest (including barren and wetlands). Other sources, such as failing septic systems and straight pipes were modeled as direct, continuous-flow sources in the model.

The MDAS was configured to model hydrology, and water quality for fecal coliform

bacteria. In the James River watershed, pollutant loads are delivered to the tributaries with surface runoff, subsurface flows, and direct discharges to the streams. The MDAS provides mechanisms for representing all of these various pathways of pollutant delivery.

The basis for the initial bacteria loading rates for landuses and direct sources is described in the Technical Report. The initial estimates were further refined during the model calibration. A variety of modeling tools were used to develop the fecal coliform bacteria TMDLs, including the MDAS, and a customized spreadsheet to determine the fecal coliform loading from failing residential septic systems identified during source tracking efforts by WVDEP. Section 5.2.1 describes the process of assigning flow and fecal coliform concentrations to failing septic systems. The failing septic system analysis provided initial values for model input; however, these values were further refined during the model calibration process.

After model configuration, calibration of the hydrology followed by calibration of water quality was performed. The goal of the calibration was to obtain realistic model prediction by selecting parameter values that reflect the unique characteristics of the watershed. Spatial and temporal aspects were evaluated through the calibration process.

The model selection process, modeling methodologies, and technical approaches are discussed further in the Technical Report.

6.1.2 Hydrology Calibration

Hydrology and water quality calibration were performed in sequence because water quality modeling is dependent on an accurate hydrology simulation. Typically, hydrology calibration involves a comparison of model results to instream flow observations from USGS flow gauging stations throughout the watershed. However, USGS flow gauging stations are not present in the West Virginia portion of the James River watershed. Therefore hydrology calibration of the James River watershed was completed in conjunction with the hydrology calibration of the Greenbrier River watershed. Both models were calibrated to the observed data recorded at three USGS gages: USGS 03184000 Greenbrier River at Hill Dale, USGS 03183500 Greenbrier River at Alderson, and USGS 03182500 Greenbrier River at Buckeye. Hydrology calibration was based on observed data from those stations and the landuses present in the watersheds at that time. Key considerations for hydrology calibration included the overall water balance, the high- and low-flow distribution, storm flows, and seasonal variation. The hydrology was validated for the time period of January 1, 1992 to September 30, 2005. As a starting point, many of the hydrology calibration parameters originated from the USGS Scientific Investigations Report 2005-5099 (Atkins, 2005). Final adjustments to model hydrology were based on flow measurements obtained during WVDEP's pre-TMDL monitoring in the James River watershed. A detailed description of the hydrology calibration and a summary of the results and validation are presented in the Technical Report.

6.1.3 Fecal Coliform Bacteria Calibration

Following hydrology calibration, water quality calibration was performed for fecal coliform bacteria. The water quality was calibrated by comparing modeled versus observed instream fecal coliform bacteria concentrations. The water quality calibration consisted of executing the MDAS model, comparing the model results to available observations, and adjusting water quality parameters within reasonable ranges. Available monitoring data in the watershed was identified and assessed for applicability to calibration. Monitoring stations with observations that represented a range of hydrologic conditions, source types, and pollutants were selected. The time-period for water quality calibration was selected based on the availability of the observed data and their relevance to the current conditions in the watershed. WVDEP also conducted storm monitoring on Shrewsbury Hollow in Kanawha State Forest, Kanawha County, West Virginia. The data gathered during this sampling episode was used in the calibration of fecal coliform and to enhance the representation of background conditions from undisturbed areas. The results of the fecal coliform storm sampling and fecal coliform model calibration are shown in Figure 6-2.

Water Quality Calibration - Fecal Coliform Bacteria Forested Reference Site (Shrewsbury Hollow)

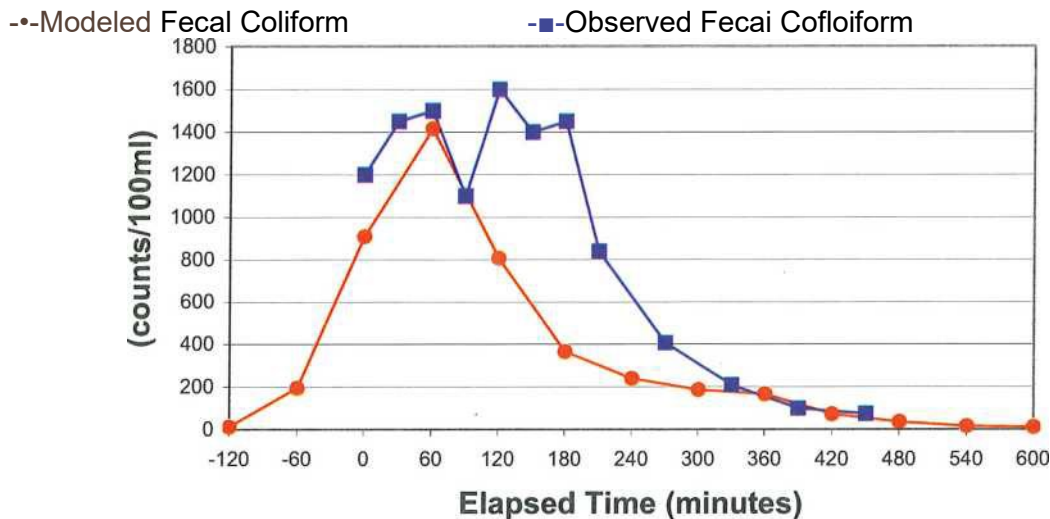


Figure 6-2. Shrewsbury Hollow fecal coliform observed data
6.2 Allocation Analysis

As explained in Section 2, a TMDL is composed of the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background levels. In addition, the TMDL must include a MOS, implicitly or explicitly, that accounts for the uncertainty in the

relationship between pollutant loads and the quality of the receiving waterbody. TMDLs can be expressed in terms of mass per time or other appropriate units. Conceptually, this definition is denoted by the equation:

$$\text{TMDL} = \text{sum of WLAs} + \text{sum of LAs} + \text{MOS}$$

To develop fecal coliform bacteria TMDLs for each of the waterbodies listed in Table 3-3 of this report, the following approach was taken:

- o Define TMDL endpoints
- o Simulate baseline conditions
- o Assess source loading alternatives
- o Determine the TMDL and source allocations

6.2.1 TMDL Endpoints

TMDL endpoints represent the water quality targets used to quantify TMDLs and their individual components. In general, West Virginia's numeric water quality criteria for the subject pollutants (identified in Section 2) and an explicit five percent MOS were used to identify endpoints for TMDL development.

The five percent explicit MOS was used to counter uncertainty in the modeling process. Longterm water quality monitoring data were used for model calibration. Although these data represented actual conditions, they were not of a continuous time series and might not have captured the full range of instream conditions that occurred during the simulation period. The explicit five percent MOS also accounts for those cases where monitoring might not have captured the full range of instream conditions. The TMDL endpoints for the various criteria are displayed in Table 6-1.

Table 6-1. TMDL endpoints

Water Quality Criterion	Designated Use	Criterion Value	TMDL Endpoint
Fecal Coliform	Water Contact Recreation and Public Water Supply	200 counts / 100mL (Monthly Geometric Mean)	190 counts / 100mL (Monthly Geometric Mean)
Fecal Coliform	Water Contact Recreation and Public Water Supply	400 counts / 100mL (Daily, 10% exceedance)	380 counts / 100mL (Daily, 10% exceedance)

6.2.2 Baseline Conditions and Source Loading Alternatives

The calibrated model provides the basis for performing the allocation analysis. The first step is to simulate baseline conditions, which represent existing nonpoint source loadings. Baseline conditions allow for an evaluation of instream water quality under the highest expected loading conditions.

Baseline Conditions for MDAS

The MDAS model was run for baseline conditions using hourly precipitation data for a representative six-year simulation period (January 1, 1998 through December 31, 2003). The precipitation experienced over this period was applied to the landuses and pollutant sources, as they existed at the time of TMDL development. Predicted instream concentrations were compared directly with the TMDL endpoints. This comparison allowed for the evaluation of the magnitude and frequency of exceedances under a range of hydrologic and environmental conditions, including dry periods, wet periods, and average periods.

Figure 6-3 presents the annual rainfall totals for the years 1980 through 2004 at the Union 3 SSE (WV9011) weather station in Union, West Virginia. The years 1998 to 2003 are highlighted to indicate the range of precipitation conditions used for TMDL development in the James River watershed.

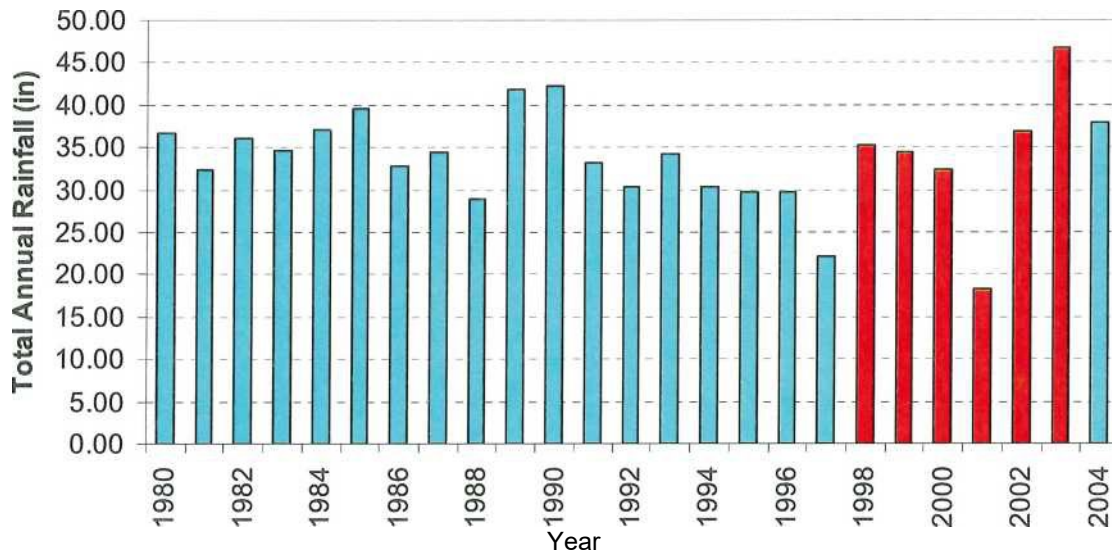


Figure 6-3. Annual precipitation totals and percentile ranks for the Union 3 SSE (WV9011) weather station in Union, West Virginia

Source Loading Alternatives

Simulating baseline conditions allowed for the evaluation of each stream’s response to variations in source contributions under a variety of hydrologic conditions. This sensitivity analysis gave insight into the dominant sources and the mechanisms by which potential decreases in loads would affect instream pollutant concentrations. The loading contributions from nonpoint sources were individually adjusted; the modeled instream concentrations were then evaluated.

Multiple allocation scenarios were run for the impaired waterbodies. Successful scenarios were those that achieved the TMDL endpoints under all flow conditions throughout the modeling period. The averaging period and allowable exceedance frequency associated with West Virginia water quality criteria were considered in these

assessments. In general, loads contributed by sources that had the greatest impact on instream concentrations were reduced first. If additional load reductions were required to meet the fecal coliform TMDL endpoints, less significant source contributions were subsequently reduced.

Figure 6-4 shows examples of model output for a fecal coliform baseline condition and a successful TMDL scenario for both instantaneous output and the 30 day geometric mean of the output.

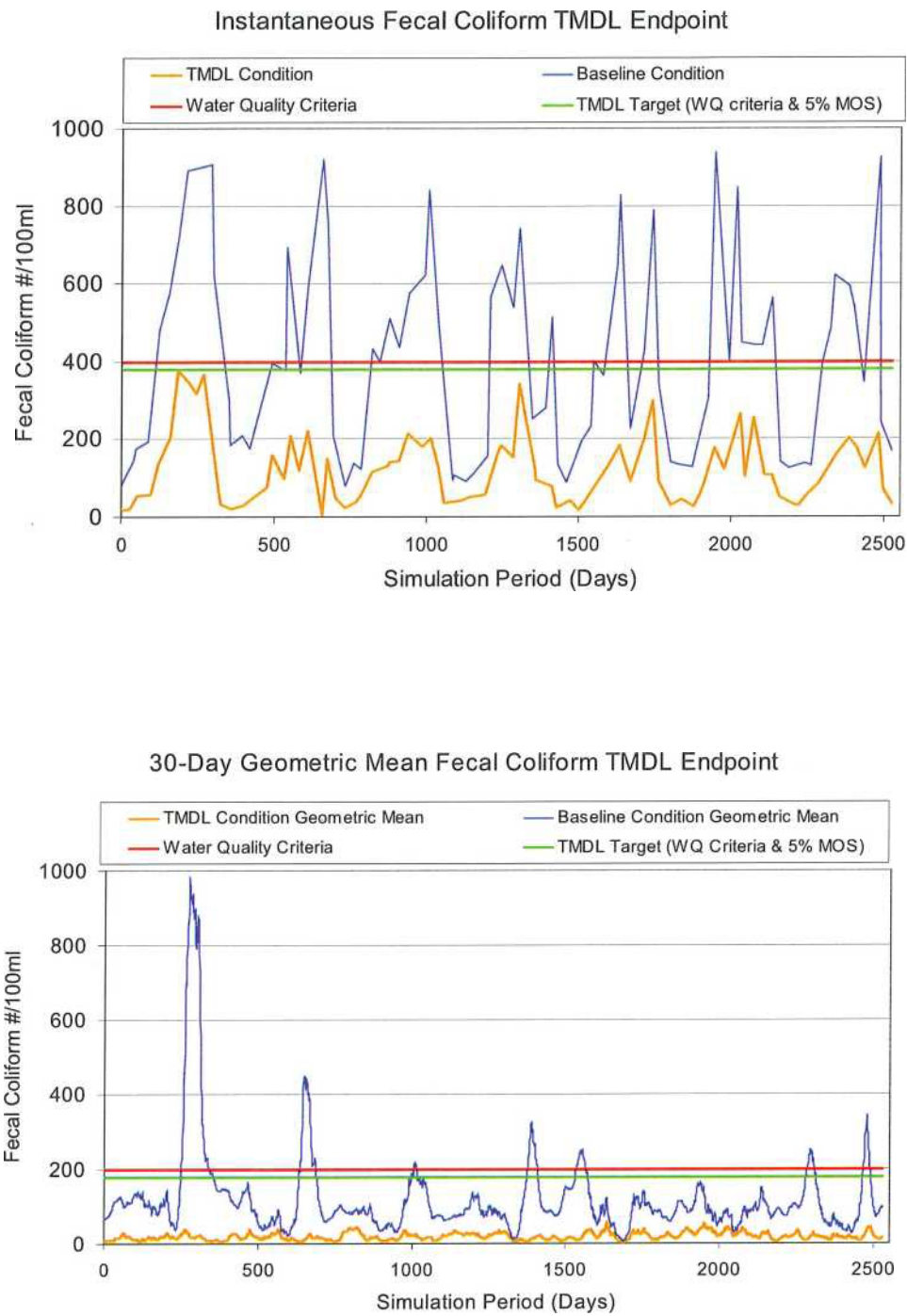


Figure 6-4. Examples of baseline and TMDL conditions (instantaneous and geometric mean) for fecal coliform bacteria

6.3 TMDLs and Source Allocations

6.3.1 Fecal Coliform Bacteria TMDLs

TMDLs and source allocations were developed for impaired segments and their tributaries on a sub watershed basis. A top-down methodology was followed to develop these TMDLs and allocate loads to sources. Headwaters were analyzed first because their loading affects downstream water quality. The loading contributions of unimpaired headwaters and the reduced loadings for impaired headwaters were then routed through downstream waterbodies. Using this method, contributions from all sources were weighted equitably. Reductions in sources affecting impaired headwaters ultimately led to improvements downstream and effectively decreased necessary loading reductions from downstream sources. Nonpoint source reductions did not result in loadings less than natural conditions

The following general methodology was used when allocating loads to fecal coliform bacteria sources. Because West Virginia Bureau for Public Health (BPH) regulations prohibit the discharge of raw sewage into surface waters, all illicit discharges of human waste from failing septic systems and straight pipes were reduced by 100 percent in the model. If further reduction was necessary, nonpoint source loadings from agricultural lands were subsequently reduced until instream water quality criteria were met.

Wasteload Allocations

Because no existing point sources were identified in the TMDL watersheds, the prescription of wasteload allocations was unnecessary.

Load Allocations (LAs)

LAs were assigned as required to the following the source categories:

- ® Pasture
 - On-site Sewage Systems — loading from all illicit, non-disinfected discharges of human waste (including failing septic systems and straight pipes)
- © Residential — loading associated with urban/residential runoff
- ® Background and Other Nonpoint Sources — loading associated with wildlife sources from forest and grasslands (contributions/loadings from wildlife sources were not reduced)

6.3.2 Seasonal Variation

The TMDL must consider seasonal variation. For the James River watershed fecal coliform TMDLs, seasonal variation was considered in the formulation of the modeling analysis. Continuous simulation (modeling over a period of several years that captured precipitation extremes) inherently considers seasonal hydrologic and source loading variability. The fecal coliform concentrations simulated on a daily time step by the model were compared with

TMDL endpoints. Allocations that met these endpoints throughout the modeling period were developed.

6.3.3 Critical Conditions

A critical condition represents a scenario where water quality criteria are most susceptible to violation. Analysis of water quality data for individual streams within the James River watershed shows high pollutant concentrations during both high- and low-flow thereby precluding selection of a single critical condition. Both high-flow and low-flow periods were taken into account during TMDL development by using a long period of weather data that represented wet, dry, and average flow periods.

Nonpoint source loading is typically precipitation-driven and impacts tend to occur during wet weather and high surface runoff. During dry periods little or no land-based runoff occurs, and elevated instream pollutant levels may be due to straight pipes and failing on-site sewage systems. These sources (categorized as nonpoint sources but represented as continuous flow discharges) often have associated low-flow critical conditions, particularly where such sources are located on small receiving waters.

6.3.4 TMDL Presentation

TMDLs, LAs, and WLAs are shown in Tables 7-1 and 7-2 as well as in the allocation spreadsheets associated with this report. TMDLs and their components are presented as average daily loads and average annual loads and were developed to meet TMDL endpoints throughout the range of conditions simulated over the design precipitation period.

Pollutant source representation attempted to capture the functionality and conveyance methods of both storm runoff from precipitation-induced sources and continuous discharges that are not directly related to precipitation. Simulation of baseline conditions on an hourly time-step provided a basis for evaluating in-stream response to varying source contributions under a wide range of precipitation and stream flow conditions. Hourly model outputs were aggregated into daily values. TMDL allocations were developed by reducing baseline pollutant contributions until model output at each subwatershed outlet demonstrated attainment of water quality criteria, exactly in accordance with the prescribed criterion value, averaging period and exceedance frequency. For each impaired stream, annual average TMDLs were derived by calculating the total pollutant load associated with the TMDL condition exiting the mouth subwatershed for each year simulated by the model and then averaging those annual loads. The average daily TMDLs were calculated by dividing the annual average loads by 365 days.

The filterable allocation spreadsheets include multiple display formats that allow comparison of pollutant loadings among categories and facilitate implementation. A brief description of presented information is included on the "Introduction" tab of the spreadsheet. Load allocations for nonpoint source categories are presented for each model subwatershed as annual average loads, along with the associated percentage pollutant reduction from baseline conditions.

7 .0 TMDL RESULT TABLES

TMDLs and source allocations were developed for the impairments displayed in Table 3-3. The TMDLs for fecal coliform bacteria are shown in Table 7-1 and the TMDL for the biological impairment in Ray Fork is displayed in Table 7-2. The TMDLs for fecal coliform bacteria are presented in number of colonies (counts) per day.

Detailed source allocations are provided in the allocation spreadsheets associated with this report.

Table 7-1. Fecal coliform bacteria TMDLs for the James River watershed

TMDL Watershed	Stream Code	Stream Name	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
South Fork/Potts Creek	WVJ-1-E	South Fork/Potts Creek	4.49E+10	NA	2.36E+09	4.73E+10
Ray Fork	WVJ-1-E-1	Ray Fork	3.74E+09	NA	1.97E+08	3.94E+09
UNT/Sweet Springs Creek RM 5.4	WVJ-2-H	UNT/Sweet Springs Creek RM 5.4	1.62E+09	NA	8.55E+07	1.71E+09

NA = not applicable; UNT = unnamed tributary.

“Scientific notation” is a method of writing or displaying numbers in terms of a decimal number between 1 and 10 multiplied by a power of 10. The scientific notation of 10,492, for example, is 1.0492×10^4 .

Table 7-2. Biological TMDLs for the James River watershed

TMDL Watershed	Stream Code	Stream Name	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Ray Fork	WVJ-1-E-1	Ray Fork	3.74E+09	NA	1.97E+08	3.94E+09

NA = not applicable

“Scientific notation” is a method of writing or displaying numbers in terms of a decimal number between 1 and 10 multiplied by a power of 10. The scientific notation of 10,492, for example, is 1.0492×10^4 .

8 .0 FUTURE GROWTH

8.1 Fecal Coliform Bacteria

Specific fecal coliform bacteria future growth allocations are not prescribed. The absence of specific future growth allocations does not prohibit new development in the watersheds of streams for which fecal coliform bacteria TMDLs have been developed, or preclude the permitting of new sewage treatment facilities.

In some instances, the implementation of the TMDLs will consist of providing public sewer service to unsewered areas. The NPDES permitting procedures for sewage treatment facilities include technology-based fecal coliform effluent limitations that are more stringent than applicable water quality criteria. Therefore, a new sewage treatment facility may be permitted anywhere in the watershed, provided that the permit includes monthly average and maximum daily fecal coliform limitations of 200 counts/100 mL and 400 counts/100 mL, respectively. Furthermore, WVDEP will not authorize construction of combined collection systems or permit overflows from newly constructed collection systems.

9 .0 PUBLIC PARTICIPATION

9.1 Public Meetings

Informational public meetings were held on May 6, 2004 at the New River Community and Technical College and June 11, 2007 at the public library in Lewisburg, West Virginia. The May 6, 2004 meeting occurred prior to pre-TMDL stream monitoring and pollutant source tracking and included a general TMDL overview and a presentation of planned monitoring and data gathering activities. The June 11, 2007 meeting occurred prior to allocation of pollutant loads and included proposed WVDEP allocation strategies. A public meeting was held to present the draft TMDLs on February 11, 2008 at the public library in Lewisburg. The meeting began at 7:00 PM. and provided information to stakeholders to facilitate comments on the draft TMDLs.

9.2 Public Notice and Public Comment Period

The availability of Draft TMDLs was advertised in various local newspapers between January 29, 2008 and January 31, 2008. Interested parties were invited to submit comments during the public comment period, which began on February 1, 2008 and ended March 3, 2008. WVDEP did not receive any comments on the Draft TMDLs. The electronic documents are available on the WVDEP's internet site at <http://www.wvdcop.org/wvtmdl>.

10 .0 REASONABLE ASSURANCE

Reasonable assurance for maintenance and improvement of water quality in the affected watershed rests primarily with two programs. The NPDES permitting program is

implemented by WVDEP to control point source discharges. The West Virginia Watershed Network is a cooperative nonpoint source control effort involving many state and federal agencies, whose task is protection and/or restoration of water quality.

WVDEP's Division of Water and Waste Management (DWWM) is responsible for issuing non-mining NPDES permits within the State. As part of the permit review process, permit writers have the responsibility to incorporate the required TMDL wasteload allocations into new or reissued permits. Because no existing point sources are present, permit reissuance activities are not relevant to the implementation of the subject TMDLs. New facilities may be permitted in accordance with the future growth provisions discussed in Section 8.1.

10.1 Watershed Management Framework Process

The Watershed Management Framework is a tool used to identify priority watersheds and coordinate efforts of state and federal agencies with the goal of developing and implementing watershed management strategies through a cooperative, long-range planning effort.

The West Virginia Watershed Network is an informal association of state and federal agencies, and nonprofit organizations interested in the watershed movement in West Virginia. Membership is voluntary and everyone is invited to participate. The Network uses the Framework to coordinate existing programs, local watershed associations, and limited resources. This coordination leads to the development of Watershed Based Plans to implement TMDLs and document environmental results.

The principal area of focus of watershed management through the Framework process is correcting problems related to nonpoint source pollution. Network partners have placed a greater emphasis on identification and correction of nonpoint source pollution. The combined resources of the partners are used to address all different types of nonpoint source pollution through both public education and on-the-ground projects.

Among other things, the Framework includes a management schedule for integration and implementation of TMDLs. In 2000, the schedule for TMDL development under Section 303(d) was merged with the Framework process. The Framework identifies a six-step process for developing integrated management strategies and action plans for achieving the state's water quality goals. Step 3 of that process includes "identifying point source and/or nonpoint source management strategies - or Total Maximum Daily Loads - predicted to best meet the needed [pollutant] reduction." Following development of the TMDL, Steps 5 and 6 provide for preparation, finalization, and implementation of a Watershed Based Plan to improve water quality.

Each year, the Framework is included on the agenda of the Network to prioritize watersheds within a certain Hydrologic Group. This selection process includes a review and evaluation of TMDL recommendations for the watersheds under consideration. The Network intends to prioritize Hydrologic Group D watersheds in March 2008. Development of Watershed Based Plans for priority watersheds is based on the efforts of local project teams. These teams are composed of Network members and stakeholders having interest in or residing in the

watershed. Team formation is based on the type of impairment(s) occurring or protection(s) needed within the watershed. In addition, teams have the ability to use the TMDL recommendations to help plan future activities. Additional information regarding upcoming Network activities can be obtained from the Nonpoint Source Program Southern Basin Coordinator Jennifer DuPree (jduprce@wvdc.org).

10.2 Pin folic Sewer Projects

Within WVDEP DWWM, the Engineering and Permitting Branch's Engineering Section is charged with the responsibility of evaluating sewer projects and providing funding, where available, for those projects. All municipal waste water loans issued through the State Revolving Fund (SRF) program are subject to a detailed engineering review of the engineering report, design report, construction plans, specifications, and bidding documents. The staff performs periodic on-site inspections during construction to ascertain the progress of the project and compliance with the plans and specifications. Where the community does not use SRF funds to undertake a project, the staff still performs engineering reviews for the agency on all POTWs prior to permit issuance or modification. For further information on upcoming projects, a list of funded and pending water and wastewater projects in West Virginia can be found at <http://www.wvinfrastructure.com/projects/index.html>.

11 .0 MONITORING PLAN

The following monitoring activities are recommended:

11.1 Nonpoint Soinrce Project Monitoring

All nonpoint source restoration projects should include a monitoring component specifically designed to document resultant local improvements in water quality. These data may also be used to predict expected pollutant reductions from similar future projects.

11.2 TMDL Effectiveness Monitoring

TMDL effectiveness monitoring should be performed to document water quality improvements after significant implementation activity has occurred where little change in water quality would otherwise be expected. Full TMDL implementation will take significant time and resources, particularly with respect to the abatement of nonpoint source impacts. WVDEP will continue monitoring on the rotating basin cycle and will include a specific TMDL effectiveness component in waters where significant TMDL implementation has occurred.

12 .0 REFERENCES

Atkins, John T. Jr., Jeffery B. Wiley, Katherine S. Paybins. 2005. *Calibration Parameters Used to Simulate Streamflow from Application of the Hydrologic Simulation Program- FORTRAN Model (HSPF) to Mountainous Basins Containing Coal Mines in West Virginia*. Scientific

Investigations Report 2005-5099. U.S. Department of the Interior, U.S. Geological Survey.

Cormier, S., G. Sutter, and S.B. Norton. 2000. *Stressor Identification: Technical Guidance Document*. USEPA-822B-00-25. U.S. Environmental Protection Agency, Office of Water and Office of Research and Development, Washington, DC.

Gerritsen, J., J. Burton, and M.T. Barbour. 2000. *A Stream Condition Index for West Virginia Wadeable Streams*. Tetra Tech, Inc., Owings Mills, MD.

Novotny, V., and H. Olem. 1994. *Water Quality: Prevention, Identification, and Management of Diffuse Pollution*. Van Nostrand Reinhold, New York, NY.

Scientific notation. Dictionary.com. *The American Heritage® Dictionary of the English Language, Fourth Edition*. Houghton Mifflin Company, 2004.
[http://dictionary.reference.com/browse/scientific notation](http://dictionary.reference.com/browse/scientific%20notation) (accessed: May 22, 2007).

June
2008 Approved Report



Total Maximum Daily Loads for Streams in the Greenbrier River Watershed West Virginia

Prepared for:

West Virginia Department of Environmental Protection
Division of Water and Waste Management
Watershed Branch, TMDL Section

Prepared by:

Water Resources and TMDL Center
Tetra Tech, Inc.
405 Capitol Street, Suite 608
Charleston, WV 25301



Total Maximum Daily Loads for Streams in the Greenbrier River Watershed, West Virginia

FINAL APPROVED REPORT

June 2008

CONTENTS

Acronyms, Abbreviations, and Definitions.. .. .	iv
Executive Summary.....	vii
1 .0 Report Format.....	1
2 .0 Introduction.....	1
2.1 Total Maximum Daily Loads	1
2.2 Water Quality Standards	4
3 .0 Watershed Description and Data Inventory.	5
3.1 Watershed Description	5
3.2 Data Inventory.....	10
3.3 Impaired Waterbodies	11
4 .0 Fecal Coliform Source Assessment.....	14
4.1 Point Sources	14
4.1.1 Individual NPDES Permits	14
4.1.2 Overflows	14
4.1.3 General Sewage Permits	14
4.2 Nonpoint Sources	15
4.2.1 On-site Treatment Systems	15
4.2.2 Urban/Residential Stormwater Runoff	17
4.2.3 Agriculture	17
4.2.4 Natural Background (Wildlife)	17
5 .0 Modeling Process	17
5.1 Modeling Technique for Fecal Coliform Bacteria	18
5.1.1 MDAS Setup	19
5.1.2 Hydrology Calibration	21
5.1.3 Fecal Coliform Bacteria Calibration	22
5.2 Allocation Analysis	22
5.2.1 TMDL Endpoints.....	23
5.2.2 Baseline Conditions and Source Loading Alternatives	24
5.3 TMDLs and Source Allocations	27
5.3.1 Fecal Coliform Bacteria Source Allocations	27
5.3.2 Seasonal Variation	28
5.3.3 Critical Conditions.....	28
5.3.4 TMDL Presentation.....	28
6 .0 TMDL Results for Fecal coliform bacteria	29

7 .0 **Future Growth**..... 34

8 .0 **Public Participation**34

 8.1 **Public Meetings**..... 34

 8.2 **Public Notice and Public Comment Period** 34

9 .0 **Reasonable Assurance**...35

 9.1 **Permit Reissuance** 35

 9.2 **Watershed Management Framework**Process
 35

 9.3 **Public Sewer Projects**..... 36

10 .0 **Monitoring Plan**..... 37

 10.1 **NPDES Compliance**..... 37

 10.2 **Nonpoint Source Project Monitoring** 37

 10.3 **TMDL Effectiveness Monitoring**..... 37

11 .0 **References**.....38

FIGURES

Figure 1-1. Examples of a watershed, TMDL watershed, and subwatersheds vi

Figure 2-1. Hydrologic groupings of West Virginia’s watersheds 3

Figure 3-1. Location of the Greenbrier River watershed 6

Figure 3-2. Karst geology of the Greenbrier River watershed 9

Figure 3-3. Greenbrier River TMDL watersheds12

Figure 4-1. Greenbrier River failing septic flows16

Figure 5-1. Greenbrier River subwatershed delineation20

Figure 5-2. Shrewsbury Hollow fecal coliform bacteria observed data22

Figure 5-3. Annual precipitation totals for the Marlinton (WV5672) weather station...24

Figure 5-4. Examples of baseline and TMDL conditions (instantaneous and geometric mean) for
 fecal coliform26

TABLES

Table 2-1. Applicable West Virginia water quality criteria 4

Table 3-1. Modeled landuse type in the Greenbrier River watershed 7

Table 3-2. Data sets used in TMDL development..... 10

Table 3-3. Waterbodies for which fecal coliform TMDLs have been developed..... 13

Table 5-1. TMDL endpoints..... 23

Table 6-1. Fecal coliform bacteria TMDLs for the Greenbrier River watershed..... 30

ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

7Q10 AD	
AMD AML	
AML&R	
BMP BOD	
BPH CAIR	7-day, 10-year low flow Acid Deposition Model acid mine drainage
CFR CSO	abandoned mine land [WVDEP] Office of Abandoned Mine Lands &
CSR DEM	Reclamation best management practice biochemical oxygen demand
DESC-R	[West Virginia] Bureau for Public Health Clean Air Interstate Rule Code of
DMR DNR	Federal Regulations combined sewer overflow Code of State Rules
DO	Digital Elevation Model
DWWM	Dynamic Equilibrium In-stream Chemical Reactions model [WVDEP]
ERIS GAP	Division of Mining and Reclamation Department of Natural Resources
GIS gpd	dissolved oxygen
GPS HAU	[WVDEP] Division of Water and Waste Management Environmental
LA pg/L	Resources Information System Gap Analysis Land Cover Project
MDAS	geographic information system gallons per day global positioning system
mg/L mL	home aeration unit load allocation micrograms per liter
MF MPN	Mining Data Analysis System milligram per liter milliliter membrane filter
MOS MS4	counts per test most probable number margin of safety municipal
NED	separate storm sewer system National Elevation Dataset
NOAA-NCDC	National Oceanic and Atmospheric Administration, National Climatic Data
Center	
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System Natural Resources
NRCS OOG	Conservation Service [WV DEP] Office of Oil and Gas publicly owned
POTW	treatment works
PSD	public service district

SI	stressor identification
SMCRA	Surface Mining Control and Reclamation Act
SRF	State Revolving Fund
SO ₂	sulfur dioxide
SSO	sanitary sewer overflow
STATSGO	State Soil Geographic database
TMDL	Total Maximum Daily Load
TSS	total suspended solids
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UNT	unnamed tributary
WLA	wasteload allocation
WVDEP	West Virginia Department of Environmental
WVSCI	West Virginia Stream Condition Index
WVU	West Virginia University

Watershed

A general term used to describe a drainage area within the boundary of a United States Geologic Survey's 8-digit hydrologic unit code. Throughout this report, the Greenbrier River watershed refers to the mainstem of the Greenbrier River and all of the tributary streams that eventually drain to the Greenbrier River (Figure 1-1). The term "watershed" is also used more generally to refer to the land area that contributes precipitation runoff that eventually drains to the Greenbrier River.

TMDL watershed

This term is used to describe the total land area draining to an impaired stream for which a TMDL is being developed. This term also takes into account the land area drained by unimpaired tributaries of the impaired stream. There are 39 impaired streams, contained within 20 TMDL watersheds, in the Greenbrier River watershed (Figure 3-3).

Subwatershed

The subwatershed delineation is the most detailed scale of the delineation that breaks each TMDL watershed into numerous catchments for modeling purposes. The 20 TMDL watersheds in the Greenbrier River watershed have been subdivided into a total of 364 sub watersheds. All 364 subwatersheds were modeled as part of this effort. Pollutant sources, allocations and reductions are presented at the subwatershed scale to facilitate future permitting actions and TMDL implementation.

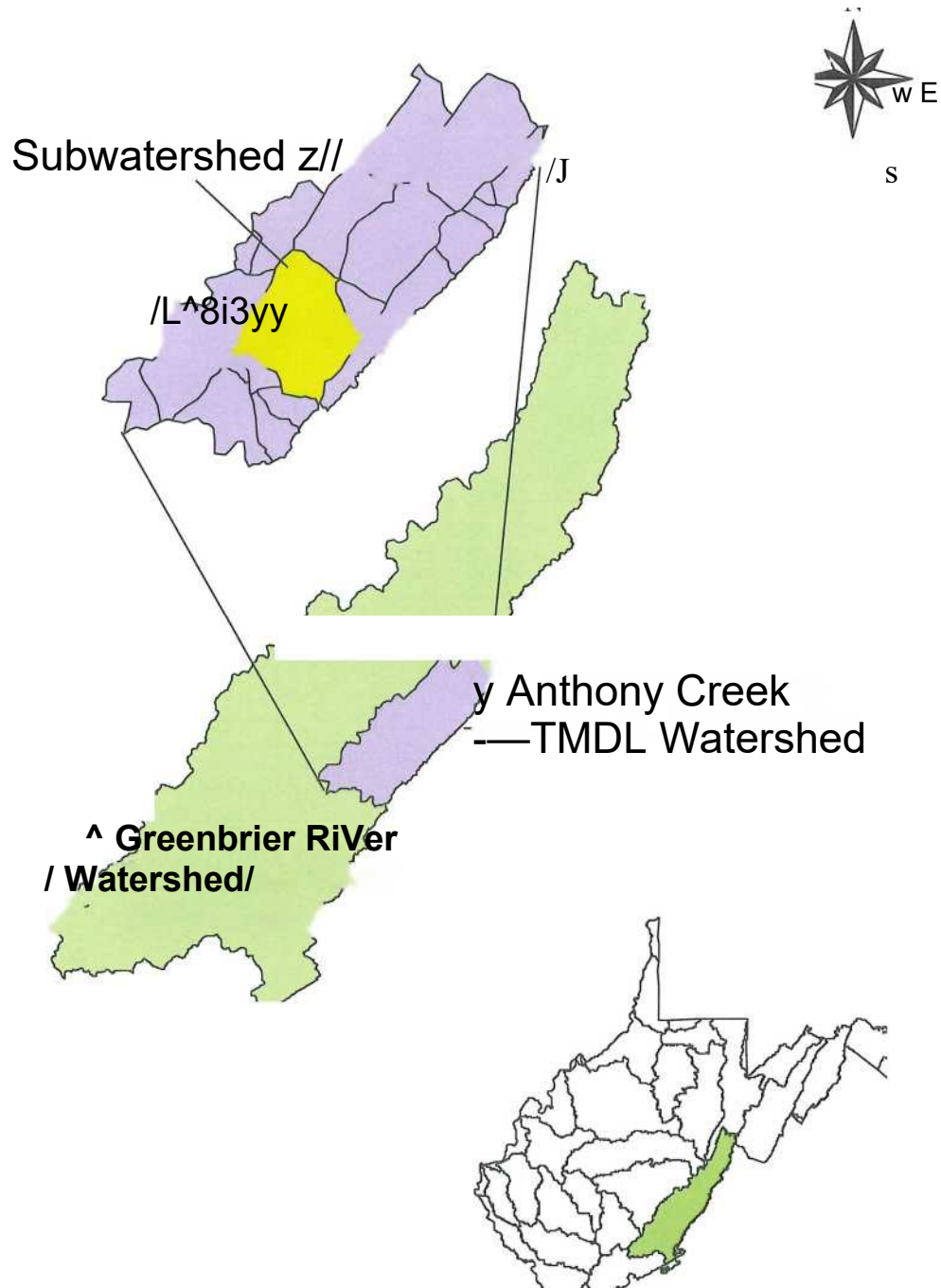


Figure 1=1. Examples of a watershed, TMDL watershed, and subwatersheds

EXECUTIVE SUMMARY

The Greenbrier River watershed is in southeastern West Virginia and encompasses approximately 1,646 square miles. The majority of the watershed lies within Pocahontas, Greenbrier, Monroe and Summers counties. Major tributaries include, East Fork and West Fork of the Greenbrier River, Deer Creek, Sitlington Creek, Knapp Creek, Anthony Creek, Spring Creek, Howard Creek, Second Creek, and Muddy Creek.

This report includes Total Maximum Daily Loads (TMDLs) for various impaired streams in the Greenbrier River watershed. A TMDL establishes the maximum allowable pollutant loading for a waterbody while still complying with water quality standards, distributes the load among pollutant sources, and provides a basis for actions needed to restore water quality.

West Virginia's water quality standards are codified at Title 47 of the *Code of State Rules (CSR)*, Series 2, and titled *Legislative Rules, Department of Environmental Protection: Requirements Governing Water Quality Standards*. The standards include designated uses of West Virginia waters and numeric and narrative criteria to protect those uses. The West Virginia Department of Environmental Protection (WVDEP) routinely assesses use support by comparing observed water quality data with criteria and reports impaired waters every two years as required by Section 303(d) of the Clean Water Act ("303(d) list"). The act requires that TMDLs be developed for listed impaired waters.

West Virginia's 2006 Section 303(d) list includes 39 impaired streams in the Greenbrier River watershed. The impairments are related to numeric water quality criteria for fecal coliform bacteria. For hydrologic modeling purposes, impaired and unimpaired streams in the 20 TMDL watersheds were further divided into 364 sub watersheds. The subwatershed delineation provided a basis for georeferencing pertinent source information, monitoring data, and presentation of the TMDLs.

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage for fecal coliform bacteria. Both point and nonpoint sources contribute to the fecal coliform bacteria impairments in the watershed. Failing on-site systems, direct discharges of untreated sewage and precipitation runoff from agricultural and residential areas are significant nonpoint sources of fecal coliform bacteria. Point sources of fecal coliform bacteria include the effluents of sewage treatment facilities and collection system overflows from publicly owned treatment works (POTWs).

The main section of the report describes the TMDL development and modeling processes, identifies impaired streams and existing pollutant sources, discusses future growth and TMDL achievability, describes allocation methodologies and documents the public participation.

Various provisions attempt to ensure the attainment of criteria throughout the watershed, achieve equity among categories of sources, and target pollutant reductions from the most problematic sources. Nonpoint source reductions were not specified

beyond natural (background) levels. Similarly, point source wasteload allocations (WLAs) were no more stringent than numeric water quality criteria.

Accompanying spreadsheets provide TMDLs, WLAs for individual point sources, and example allocations of loads to categories of nonpoint sources that achieve the total TMDL. Also provided is an interactive ArcExplorer geographic information system (GIS) project that allows for the exploration of spatial relationships among the source assessment data.

Considerable resources were used to acquire recent water quality and pollutant source information upon which the TMDLs are based. The TMDL modeling is among the most sophisticated available, and incorporates sound scientific principles. TMDL outputs are presented in various formats to assist user comprehension and facilitate use in implementation.

1J REPORT FORMAT

This report consists of the main TMDL report, a supporting geographic information system (GIS) application, and spreadsheet data tables. The main TMDL report describes the overall Total Maximum Daily Load (TMDL) development process for the Greenbrier River watershed, identifies impaired streams, and outlines the source assessment of fecal coliform bacteria. It also describes the modeling process, presents TMDL allocations, and lists measures that will be taken to ensure that the TMDLs are met. The main TMDL report is supported by a compact disc containing an interactive ArcExplorer GIS project that provides further details on the data and allows the user to explore the spatial relationships among the source assessment data. With this tool, users can magnify streams and other features of interest. Also included on the CD are spreadsheets (in Microsoft Excel format) that provide the data used during the TMDL development process, as well as detailed source allocations associated with successful TMDL scenarios. A Technical Report that describes the detailed technical approaches used throughout the TMDL development process is also included.

2 .0 INTRODUCTION

The West Virginia Department of Environmental Protection (WVDEP), Division of Water and Waste Management (DWWM), is responsible for the protection, restoration, and enhancement of the state's waters. Along with this duty comes the responsibility for TMDL development in West Virginia.

2.1 Total Maximum Daily Loads

Section 303(d) of the federal Clean Water Act and the U.S. Environmental Protection Agency's (USEPA) Water Quality Planning and Management Regulations (at Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require states to identify waterbodies that do not meet water quality standards and to develop appropriate TMDLs. A TMDL establishes the maximum allowable pollutant loading for a waterbody to achieve compliance with applicable standards. It also distributes the load among pollutant sources and provides a basis for the actions needed to restore water quality.

A TMDL is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. TMDLs can be expressed in terms of mass per time or other appropriate units. Conceptually, this definition is denoted by the following equation:

$$\text{TMDL} = \text{sum of WLAs} + \text{sum of LAs} + \text{MOS}$$

WVDEP is developing TMDLs in concert with a geographically-based approach to water

resource management in West Virginia—the Watershed Management Framework.
Adherence to

the Framework ensures efficient and systematic TMDL development. Each year, TMDLs are developed in specific geographic areas. The Framework dictates that in 2007 TMDLs should be pursued in Hydrologic Group D, which includes the Greenbrier River watershed. Figure 2-1 depicts the hydrologic groupings of West Virginia's watersheds; the legend includes the target year for finalization of each TMDL.

WVDEP is committed to implementing a TMDL process that reflects the requirements of the TMDL regulations, provides for the achievement of water quality standards, and ensures that ample stakeholder participation is achieved in the development and implementation of TMDLs. A 48-month development process enables the agency to carry out an extensive data generating and gathering effort to produce scientifically defensible TMDLs. It also allows ample time for modeling, report finalization, and frequent public participation opportunities.

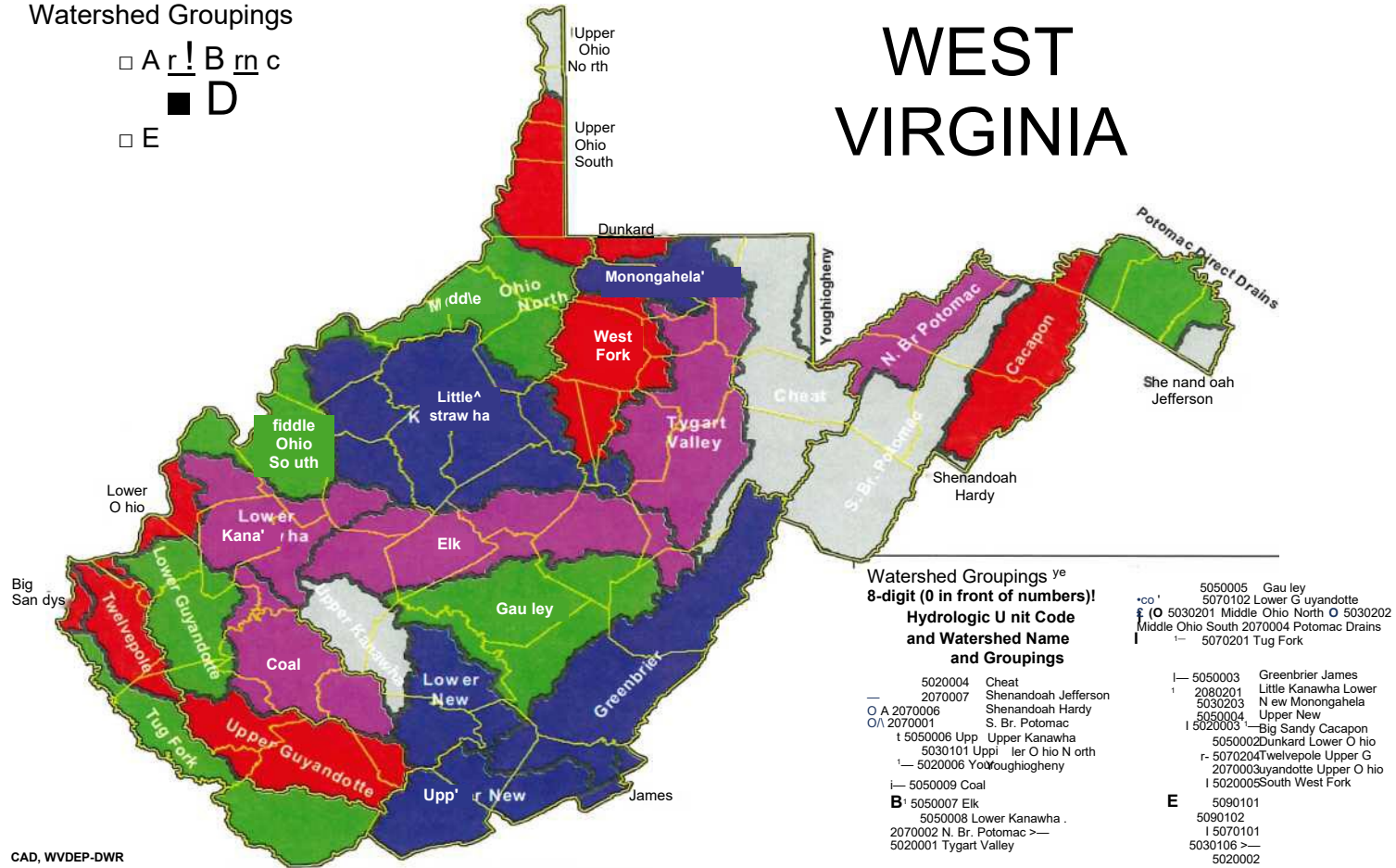
The TMDL development process begins with the selection of streams to be addressed. The selected streams are then advertised for public comment. A meeting is held in the affected watershed to present the proposed sampling plan and to address any questions from the public. The next steps in the process are pre-TMDL water quality monitoring and source identification and characterization. Data obtained from pre-TMDL efforts are compiled, and the impaired waters are modeled to determine baseline conditions and the gross pollutant reductions needed to achieve water quality standards. WVDEP then presents its allocation strategies in a second public meeting, after which a draft TMDL report is developed. The draft TMDL is advertised for public review and comment, and a third informational meeting is held during the public comment period. Public comments are addressed, and the final TMDL is submitted to USEPA for approval.

This document provides TMDLs for the 39 Greenbrier River watershed stream/impairment listings from West Virginia's 2006 Section 303(d) list.

Watershed Groupings

- A r ! B m c
- D
- E

WEST VIRGINIA



CAD, WVDEP-DWR

Watershed Groupings ^{ye}
8-digit (0 in front of numbers)!

Hydrologic Unit Code
and Watershed Name
and Groupings

—	5020004	Cheat	I—	5050003	Greenbrier James
—	2070007	Shenandoah Jefferson	1	2080201	Little Kanawha Lower
O A	2070006	Shenandoah Hardy		5030203	New Monongahela
O/\	2070001	S. Br. Potomac		5050004	Upper New
t	5050006	Upper Kanawha	I	5020003	Big Sandy Cacapon
	5030101	Upper Ohio North	r-	5070204	Twelvepole Upper G
1-	5020006	Youghiogheny	r-	2070003	Guyandotte Upper O hio
i-	5050009	Coal	I	5020005	South West Fork
B	5050007	Elk	E	5090101	
	5050008	Lower Kanawha		5090102	
	2070002	N. Br. Potomac		1	5070101
	5020001	Tygart Valley		5030106	>—
				5020002	

Figure 2-1. Hydrologic groupings of West Virginia's watersheds

2.2 Water Quality Standards

The determination of impaired waters involves comparing instream conditions to applicable water quality standards. West Virginia’s water quality standards are codified at Title 47 of the *Code of State Rules (CSR)*, Series 2, titled *Legislative Rules, Department of Environmental Protection: Requirements Governing Water Quality Standards*. These standards can be obtained online from the West Virginia Secretary of State internet site (<http://www.wvsos.com/csr/vcrify.asp?TitleScrics=47-02>).

Water quality standards consist of three components: designated uses; narrative and/or numeric water quality criteria necessary to support those uses; and an anti degradation policy. Appendix E of the Standards contains the numeric water quality criteria for a wide range of parameters, while Section 3 of the Standards contains the narrative water quality criteria. Designated uses include: propagation and maintenance of aquatic life in warmwater fisheries and troutwaters, water contact recreation, and public water supply.

In the Greenbrier River watershed, water contact recreation and public water supply uses have been determined to be impaired pursuant to numeric water quality criteria for fecal coliform bacteria. The numeric water quality criteria for fecal coliform bacteria are shown in Table 2-1.

Table 2-1. Applicable West Virginia water quality criteria

POLLUTANT	USE DESIGNATION
	Human Health Contact Recreation/Public Water Supply
Fecal coliform bacteria	Human Health Criteria Maximum allowable level of fecal coliform content for Primary Contact Recreation (either MPN [most probable number] or MF [membrane filter counts/test]) shall not exceed 200/100 mL as a monthly geometric mean based on not less than 5 samples per month; nor to exceed 400/100 mL in more than 10 percent of all samples taken during the month.

Source: 47 CSR, Series 2, *Legislative Rules, Department of Environmental Protection: Requirements Governing Water Quality Standards*.

3 J WATERSHED DESCRIPTION AND DATA INVENTORY

3.1 Watershed Description

As shown in Figure 3-1, the Greenbrier River watershed lies mostly within Pocahontas, Greenbrier, Monroe, and Summers counties in southeastern West Virginia. As a component of the New/Kanawha River drainage, the Greenbrier River watershed encompasses nearly 1,646 square miles. Major tributaries include, East Fork and West Fork of the Greenbrier River, Deer Creek, Sitlington Creek, Knapp Creek, Anthony Creek, Spring Creek, Howard Creek, Second Creek, and Muddy Creek.

The average elevation in the watershed is 3,034 feet above mean sea level. The highest point is at 4,703 feet on Red Spruce Knob, which is in the western portion of the watershed in Pocahontas County. The minimum elevation is 1,365 feet at the confluence of the Greenbrier River with the New River.

The total population for the entire Greenbrier River watershed was derived by area weighting Webster, Pocahontas, Greenbrier, and Nicholas counties populations from the 2000 U.S. Census data. The resulting population estimate is 38,402 people.

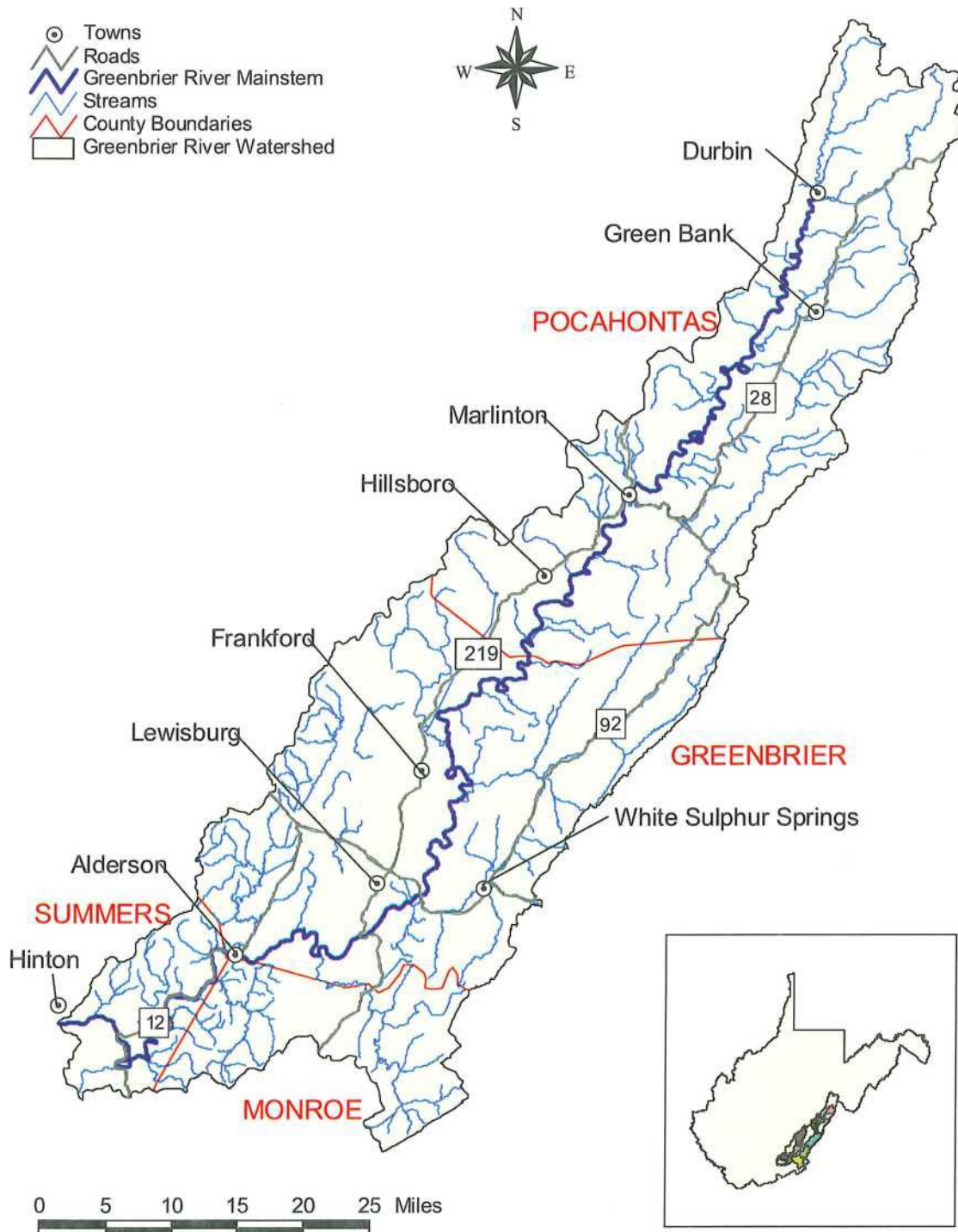


Figure 3-1. Location of the Greenbrier River watershed
Landuse and land cover estimates were originally obtained from vegetation data gathered from the West Virginia Gap Analysis Land Cover Project (GAP). The Natural Resource Analysis Center and the West Virginia Cooperative Fish and Wildlife Research Unit of West Virginia University (WVU) produced the GAP coverage. The GAP database for West Virginia was derived from satellite imagery taken during the early 1990s, and it includes

detailed vegetative spatial data. Enhancements and updates to the GAP coverage were made to create a modeled landuse by custom edits derived primarily from WVDEP source tracking information and 2003 aerial photography with 1-meter resolution. Additional information regarding the modeled landuse manipulation is provided in Appendix C of the Technical Report. The GAP landuse categories were consolidated to create eleven modeled landuse categories, summarized in Table 3-1.

As shown in Table 3-1, the dominant modeled landuse type in the Greenbrier River watershed is forest. Other important modeled landuse types are pasture, karst pasture, grassland and karst grassland. Individually, all other land cover types compose less than one percent of the total watershed area.

Table 3-1. Modeled landuse type in the Greenbrier River watershed

Landuse Type	Area of Watershed		Percentage
	Acres	Square Miles	
Water	8,083.0	12.6	0.8%
Wetland	2,123.8	3.3	0.2%
Forest	820,767.4	1,282.4	77.9%
Barren	1,103.6	1.7	0.1%
Grassland	64,808.3	101.3	6.2%
Cropland	981.7	1.5	0.1%
Pasture	41,940.2	65.5	4.0%
Urban/Residential	7,122.2	11.1	0.7%
Karst Grassland	33,762.0	52.8	3.2%
Karst Cropland	1,097.4	1.7	0.1%
Karst Pasture	71,965.4	112.4	6.8%
Total Area	1,053,754.9	1,646.5	100.0%

Approximately 10.1 percent of the Greenbrier River watershed is characterized as karst landuse, as depicted in Figure 3-2. The karst landscape is formed by the dissolution of soluble limestone by groundwater that creates the following unique landforms: depressions such as sinkholes, disrupted surface water drainages (sunken streams) and large springs, and caves or underground drainage networks (Jones, 1997). Rapid recharge and flow rates through karst aquifers makes the groundwater extremely susceptible to contamination. Surface contaminants can quickly infiltrate through the land surface and be transmitted throughout a karst aquifer to interconnected springs (Jones, 1997). Cross basin transfer of contaminants can also occur easily if a surface contaminant source is connected by the groundwater aquifer. WVDEP conducted source tracking activities to determine and document karst drainage network patterns. Significant sources of information included *The Karst Hydrology Atlas of West Virginia*, West Virginia Association for Cave Studies and West Virginia Speleological Survey. Subwatershed boundaries were modified to incorporate the known karst drainage patterns.

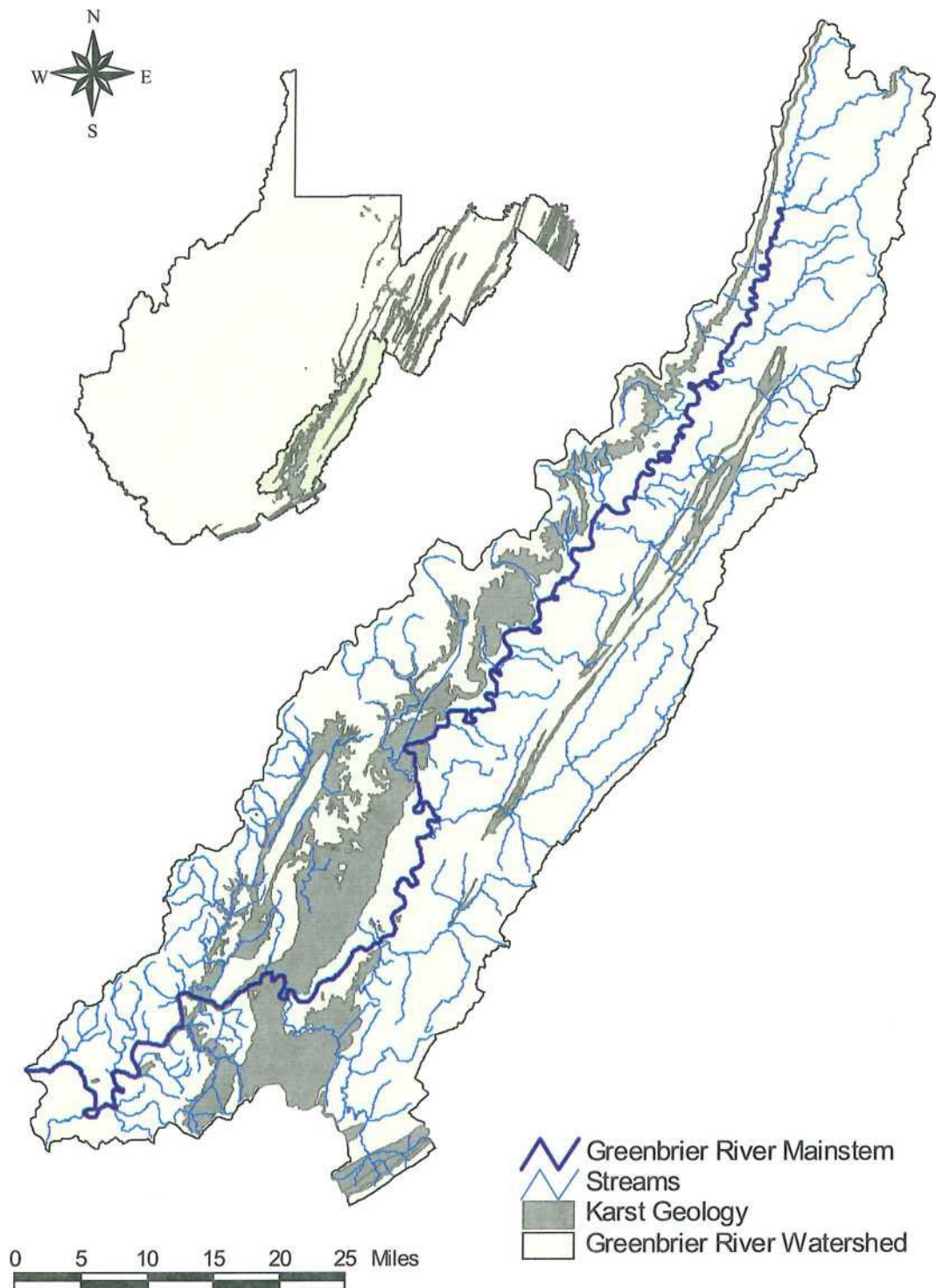


Figure 3-2= Karst geology of the Greenbrier River watershed

3.2 Data Inventory

Various sources of data were used in the TMDL development process. The data were used to identify and characterize sources of pollution and to establish the water quality

response to those sources. Review of the data included a preliminary assessment of the watershed’s physical and socioeconomic characteristics and current monitoring data. Table 3-2 identifies the data used to support the TMDL assessment and modeling effort for the Greenbrier River watershed. These data describe the physical conditions of the watershed, the potential pollutant sources and their contributions, and the impaired waterbodies for which TMDLs need to be developed. Prior to TMDL development, WVDEP collected comprehensive water quality data throughout the watershed. This pre-TMDL monitoring effort contributed the largest amount of water quality data to the process and is summarized in the Technical Report, Appendix I. The geographic information is provided in the ArcExplorer GIS project included on the CD version of this report.

Table 3=2. Data sets used in TMDL development

	Type of Information	Data Sources
Watershed physiographic data	Stream network	West Virginia Division of Natural Resources (DNR)
	Landuse	WV Gap Analysis Project (GAP)
	2003 Aerial Photography (1-meter resolution)	WVDEP
	Counties	U.S. Census Bureau
	Cities/populated places	U.S. Census Bureau
	Soils	State Soil Geographic Database (STATSGO) U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) soil surveys
	Cataloging Unit boundaries	U.S. Geological Survey (USGS)
	Topographic and digital elevation models (DEMs)	National Elevation Dataset (NED)
	Dam locations	USGS
	Roads	U.S. Census Bureau TIGER, WVU WV Roads
	Water quality monitoring station locations	U.S. Census Bureau, WVDEP, USEPA STORET
	Meteorological station locations	National Oceanic and Atmospheric Administration, National Climatic Data Center (NOAA-NCDC)
	Permitted facility information	WVDEP Division of Water and Waste Management (DWWM), WVDEP Division of Mining and Reclamation (DMR)
	Timber harvest data	WV Division of Forestry
	Oil and gas operations coverage	WVDEP Office of Oil and Gas (OOG)
	Abandoned mining coverage	WVDEP DMR
Karst Geology	WVDEP, DWWM, Groundwater/Underground Injection Control Programs The Karst Hydrology Atlas of West Virginia, West Virginia Association for Cave Studies, West Virginia Speleological Survey	

	Type of Information	Data Sources
Monitoring data	Historical Flow Record (daily averages)	USGS
	Rainfall	NOAA-NCDC
	Temperature	NOAA-NCDC
	Wind speed	NOAA-NCDC
	Dew point	NOAA-NCDC
	Humidity	NOAA-NCDC
	Cloud cover	NOAA-NCDC
	Water quality monitoring data	USEPA STORET, WVDEP
	National Pollutant Discharge Elimination System (NPDES) data	WVDEP DMR, WVDEP DWWM
	Discharge Monitoring Report data	WVDEP DMR, Mining Companies
Regulatory or policy information	Abandoned mine land data	WVDEP DMR, WVDEP DWWM
	Applicable water quality standards	WVDEP
	Section 303(d) list of impaired waterbodies	WVDEP, USEPA
	Nonpoint Source Management Plans	WVDEP

3.3 Impaired Waterbodies

WVDEP conducted extensive water quality monitoring from July 2004 through June 2005 in the Greenbrier River watershed. The results of that effort were used to confirm the impairments of waterbodies identified on previous 303(d) lists and to identify other impaired waterbodies that were not previously listed.

TMDLs were developed for impaired waters in 20 TMDL watersheds (Figure 3-3). The fecal coliform impaired waters for which TMDLs have been developed are presented in Table 3-3. The table includes the TMDL watershed, stream code, and stream name for each stream.

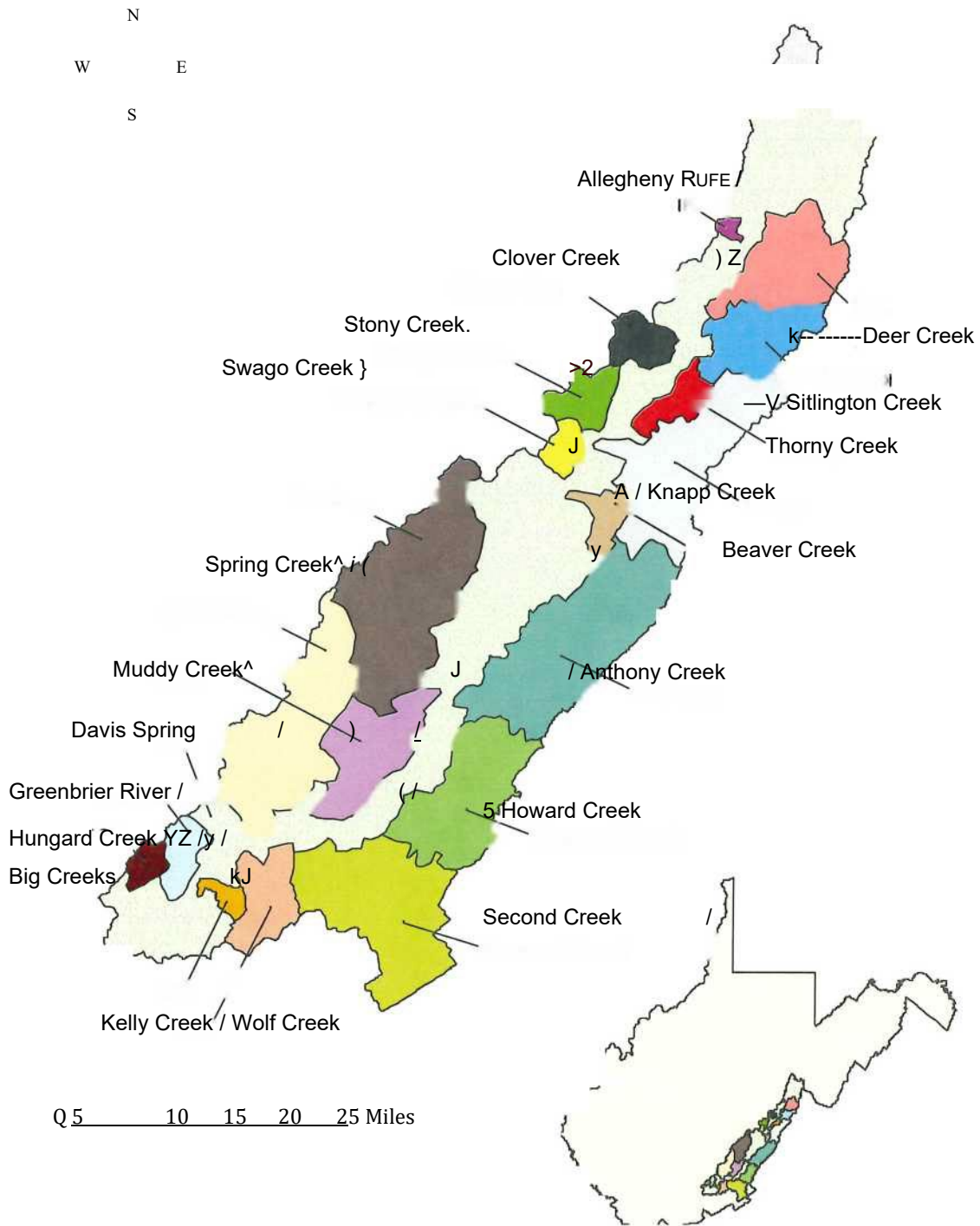


Figure 3-3. Greenbrier River TMDL watersheds

Table 3-3. Waterbodies for which fecal coliform TMDLs have been developed

TMDL Watershed	Stream Code	Stream Name
Greenbrier River	WVKNG	Greenbrier River
Big Creek	WVKNG-3	Big Creek
Hungard Creek	WVKNG-13	Hungard Creek
Kelly Creek	WVKNG-15	Kelly Creek
Kelly Creek	WVKNG-15-A	Flint Hollow
Wolf Creek	WVKNG-18	Wolf Creek
Wolf Creek	WVKNG- 18-A	Laurel Creek
Wolf Creek	WVKNG- 18-B	Broad Run
Muddy Creek	WVKNG-22	Muddy Creek
UNT/Greenbrier River RM 37.5 (Davis Spring)	WVKNG-22.7-A-1-(S)	Milligan Creek
Muddy Creek	WVKNG-22-A	Mill Creek
Muddy Creek	WVKNG-22-C	Kitchen Creek
Muddy Creek	WVKNG-22-E	UNT/Muddy Creek RM 19.8
Muddy Creek	WVKNG-22-E-1-(S)	Sinking Creek
Muddy Creek	WVKNG-22-E-1-A-(S)	Hughart Creek
Second Creek	WVKNG-23	Second Creek
Second Creek	WVKNG-23-G	Kitchen Creek
Second Creek	WVKNG-23-H	Back Creek
Howard Creek	WVKNG-25-A	Monroe Draft
Anthony Creek	WVKNG-28-D	Little Creek
Anthony Creek	WVKNG-28-F	Whites Draft
Anthony Creek	WVKNG-28-F-2	UNT/Whites Draft RM 2.0
Anthony Creek	WVKNG-28-Q	Meadow Creek
Spring Creek	WVKNG-3 0	Spring Creek
Beaver Creek	WVKNG-47	Beaver Creek
Swago Creek	WVKNG-49	Swago Creek
Knapp Creek	WVKNG-53	Knapp Creek
Knapp Creek	WVKNG-53-D	Browns Creek
Knapp Creek	WVKNG-53-H	Douthat Creek
Stony Creek	WVKNG-55	Stony Creek
Stony Creek	WVKNG-55-A	Indian Draft
Thomy Creek	WVKNG-59	Thomy Creek
Thomy Creek	WVKNG-59-E	UNT/Thomy Creek RM 9.3
Clover Creek	WVKNG-61	Clover Creek
Sitlington Creek	WVKNG-66-D	Shock Run
Sitlington Creek	WVKNG-66-E	Galford Run
Deer Creek	WVKNG-68	Deer Creek
Deer Creek	WVKNG-68-F	Buffalo Run
Allegheny Run	WVKNG-75	Allegheny Run

Note:

UNT = unnamed tributary, RM = river mile

4 .0 FECAL COLIFORM SOURCE ASSESSMENT

4.1 Point Sources

The most significant fecal coliform point sources are the permitted discharges from sewage treatment plants. These facilities (including publicly and privately owned treatment works, combined sewer overflows, and home aeration units) are regulated by NPDES permits. Permits require effluent disinfection and compliance with strict fecal coliform limitations (200 counts/100 milliliters (mL) [average monthly] and 400 counts/100 mL [maximum daily]). However, noncompliant discharges and collection system overflows can also contribute significant loadings of fecal coliform bacteria to receiving streams. The following sections discuss the specific types of fecal coliform point sources that were identified in the Greenbrier River watershed.

4.1.1 Individual NPDES Permits

WVDEP issues individual NPDES permits to both publicly owned and privately owned wastewater treatment facilities. Publicly owned treatment works (POTWs) are relatively large facilities with extensive wastewater collection systems, whereas private facilities are usually used in smaller applications such as subdivisions and shopping centers.

Six POTW permits are present in the Greenbrier River watershed, one of which, Greenbrier PSD No. 1, is a collection system that discharges into the City of Ronceverte POTW. Two additional individual permits for sewage treatment plants are located in the watershed. A portion of the City of Hinton's sewage collection system extends into the watershed. However, Hinton's effluent and CSOs do not discharge in the Greenbrier River watershed. Compliant POTW effluents do not cause fecal coliform bacteria impairments because they are permitted to discharge only at limits more stringent than water quality criterion.

4.1.2 Overflows

Combined sewer overflows (CSOs) are outfalls from POTW sewer systems that carry untreated domestic waste and surface runoff. CSOs are permitted to discharge only during precipitation events. Sanitary sewer overflows (SSOs) are unpermitted overflows that occur as a result of excess inflow and/or infiltration to POTW separate sanitary collection systems. Both types of overflows contain fecal coliform bacteria. There is one CSO associated with permit number WV0024473 (City of Marlinton) and one SSOs associated with permit number WV0084000 (City of White Sulphur Springs) in the watershed.

4.1.3 General Sewage Permits

General sewage permits are designed to cover like discharges from numerous individual owners and facilities throughout the state. General Permit WV0103110 regulates small, privately owned sewage treatment plants ("package plants") that have a design flow of less than 50,000 gallons per day (gpd). General Permit WV0107000 regulates home

aeration units (HAUs). HAUs are small sewage treatment plants primarily used by individual residences where site considerations preclude typical septic tank and leach field installation. Both general permits contain fecal coliform effluent limitations identical to those in individual NPDES permits for sewage treatment facilities. In the Greenbrier River watershed, 24 facilities are registered under the “package plant” general permit and 4 are registered under the “HAU” general permit.

4.2 Nonpoint Sources

4.2.1 On-site Treatment Systems

Overall, failing septic systems and straight pipes represent a significant nonpoint source of fecal coliform bacteria in the Greenbrier River watershed. Information collected during source tracking efforts by WVDEP and using statewide 911 structures data yielded an estimate of 21,570 homes in the Greenbrier watershed that are not served by centralized sewage collection and treatment systems. Estimated septic system failure rates across the watershed range from 3 percent to 28 percent.

Source tracking information yielded an estimate of 5,964 homes in the watershed with completely or periodically failing septic systems. Due to a wide range of available literature values relating to the bacteria loading associated with failing septic systems, a customized Microsoft Excel spreadsheet tool was created to represent the fecal coliform bacteria contribution from failing on site septic systems. WVDEP’s pre-TMDL monitoring and source tracking data were used in the calculations. To calculate loads, values for both wastewater flow and fecal coliform concentration are needed.

To calculate failing septic wastewater flows, the TMDL watersheds were divided into four septic failure zones. During the WVDEP source tracking process, septic failure zones were delineated by soil characteristics (soil permeability, depth to bedrock, depth to groundwater and drainage capacity) as shown in USDA county soil survey maps. Two types of failure were considered, complete failure and periodic failure. For the purposes of this analysis, complete failure was defined as 50 gallons per house per day of untreated sewage escaping a septic system as overland flow to receiving waters; and periodic failure was defined as 25 gallons per house per day.

Figure 4-1 shows the failing septic flows represented in the model by subwatershed.

Once failing septic flows had been modeled, a fecal coliform concentration was determined at the TMDL watershed scale. Based on past experience with other West Virginia TMDLs, a base concentration of 10,000 counts per 100 ml was used as a beginning concentration for failing septic systems. This concentration was further refined during model calibration at the sub watershed scale. A sensitivity analysis was performed by varying the modeled failing septic concentrations in multiple model runs, and then comparing model output to pre-TMDL monitoring data. Additional details of the failing septic analyses are elucidated in the Technical Report.

For the purposes of this TMDL, discharges from activities that do not have an associated NPDES permit, such as failing septic systems and straight pipes, are considered nonpoint

sources. The decision to assign LAs to those sources does not reflect a determination by WVDEP or USEPA as to whether they are, in fact, non-permitted point source discharges. Likewise, by establishing these TMDLs with failing septic systems and straight pipes treated as nonpoint sources, WVDEP and USEPA are not determining that such discharges are exempt from NPDES permitting requirements.

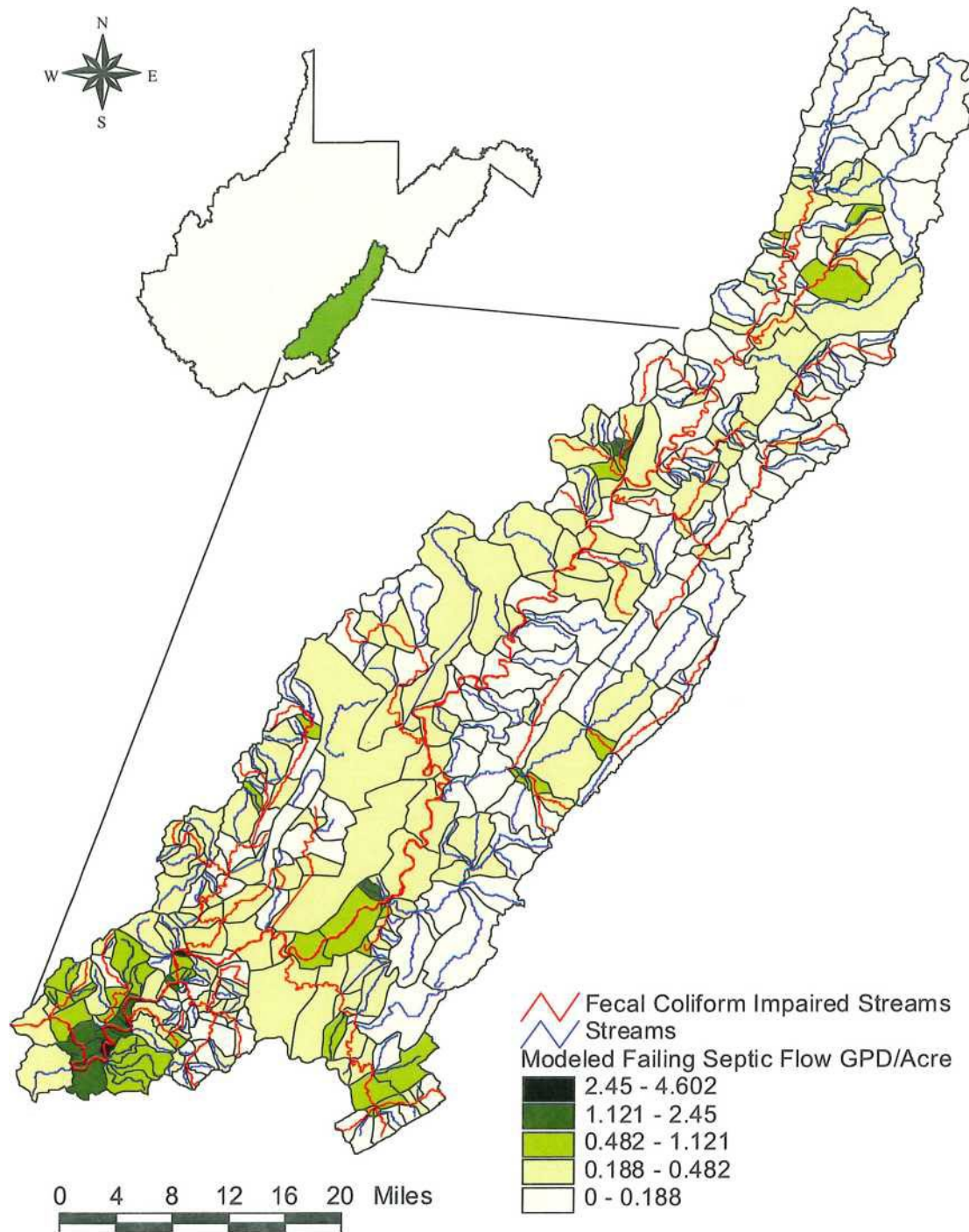


Figure 4-1. Greenbrier River failing septic flows
 4.2.2 Urban/Residential Stormwater Runoff

Stormwater runoff represents another nonpoint source of fecal coliform bacteria in residential and urbanized areas. Runoff from residential and urbanized areas during storm events can be a significant source, delivering bacteria from the waste of pets and wildlife to the waterbody. GAP 2000 landuse data were used to determine the number of

acres of residential and urbanized areas in the Greenbrier River watershed. Literature reference values were used to determine fecal accumulation rates for these areas.

4.2.3 Agriculture

Agricultural activities can contribute fecal coliform bacteria to receiving streams through surface runoff or direct deposition. Grazing livestock and land application of manure result in the deposition and accumulation of bacteria on land surfaces. These bacteria are then available for wash-off and transport during rain events. In addition, livestock with unrestricted access can deposit feces directly into streams.

Agriculture is the most prevalent landuse within unforested portions of the Greenbrier River watershed. Source tracking efforts identified pastures and feedlots throughout the watershed that have significant impacts on instream bacteria levels. WVDEP source tracking assessments of livestock (density and access to streams) were used to develop fecal coliform bacteria loadings for agricultural sources.

4.2.4 Natural Background (Wildlife)

A certain “natural background” contribution of fecal coliform bacteria can be attributed to deposition by wildlife in forested areas. Accumulation rates for fecal coliform bacteria in forested areas were developed using reference numbers from past TMDLs, incorporating wildlife estimates obtained from West Virginia’s Division of Natural Resources (DNR). In addition, WVDEP conducted storm-sampling on a 100 percent forested sub watershed (Shrewsbury Hollow) within the Kanawha State Forest, Kanawha County, West Virginia to determine wildlife contributions of fecal coliform. These results were used during the model calibration process. On the basis of the low fecal accumulation rates for forested areas, the storm water sampling results, and model simulations, wildlife is not considered to be a significant nonpoint source of fecal coliform bacteria in the Greenbrier River watershed.

5 J MODELING PROCESS

Establishing the relationship between the instream water quality targets and source loadings is a critical component of TMDL development. It allows for the evaluation of management options that will achieve the desired source load reductions. The link can be established through a range of techniques, from qualitative assumptions based on sound scientific principles to sophisticated modeling techniques. Ideally, the linkage will be supported by monitoring data that allow the TMDL developer to associate certain waterbody responses with flow and loading conditions. This section presents the approach taken to develop the linkage between sources and instream response for TMDL development in the Greenbrier River watershed.

5.1 Modeling Technique for Fecal Coliform Bacteria

Selection of the appropriate analytical technique for TMDL development was based on

an evaluation of technical and regulatory criteria. The following key technical factors were considered in the selection process:

- Scale of analysis
- Point and nonpoint sources
 - Fecal coliform bacterial impairments are temporally variable and occur at low, average, and high flow conditions
 - Time-variable aspects of land practices have a large effect on instream bacteria concentrations
 - Bacterial transport mechanisms are highly variable and often weather-dependent

The primary regulatory factor that influenced the selection process was West Virginia water quality criteria. According to 40 CFR Part 130, TMDLs must be designed to implement applicable water quality standards. The applicable water quality criteria for fecal coliform bacteria in West Virginia are presented in Section 2, Table 2-1. West Virginia water quality criteria are applicable at all stream flows greater than the 7-day, 10-year low flow (7Q10). The approach or modeling technique must permit representation of instream concentrations under a variety of flow conditions to evaluate critical flow periods for comparison with criteria.

The TMDL development approach must also consider the dominant processes affecting pollutant loadings and instream fate. In the Greenbrier River watershed, an array of point and nonpoint sources contributes to the various impairments. Most nonpoint sources are rainfall-driven with pollutant loadings primarily related to surface runoff, but some, such as inadequate on-site residential sewage treatment systems, function as continuous discharges. Similarly, certain point sources are precipitation-induced while others are continuous discharges. While loading function variations must be recognized in the representation of the various sources, the TMDL allocation process must prescribe WLAs for all contributing point sources and LAs for all contributing nonpoint sources.

The MDAS was developed specifically for TMDL application in West Virginia to facilitate large scale, data intensive watershed modeling applications. The MDAS is a system designed to support TMDL development for areas affected by nonpoint and point sources. The MDAS component most critical to TMDL development is the dynamic watershed model because it provides the linkage between source contributions and instream response. The MDAS is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and instream water quality. It is capable of simulating different flow regimes and pollutant loading variations. A key advantage of the MDAS' development framework is that it has no inherent limitations in terms of modeling size or upper limit of model operations. In addition, the MDAS model allows for seamless integration with modern-day, widely available software such as Microsoft Access and Excel. Fecal coliform bacteria were modeled using the MDAS.

5.LI MDAS Setup

Configuration of the MDAS model involved subdividing the Greenbrier River watershed into subwatershed modeling units connected by stream reaches. Physical characteristics of the sub watersheds, weather data, landuse information, continuous discharges, and stream data were used as input. Flow and water quality were continuously simulated on an hourly time-step.

The watershed was broken into 20 separate TMDL watersheds based on the groupings of impaired streams shown in Figure 3-3. These TMDL watersheds were further subdivided into 364 individual subwatershed units to allow evaluation of water quality and flow at pre-TMDL monitoring stations. This subdivision process also ensures a proper stream network configuration within the basin. The 364 individual sub watershed units across all of the 20 TMDL watersheds are shown in Figure 5-1.

Modeled Subwatersheds

- Allegheny Run
 - Anthony Creek
 - Beaver Creek
 - Big Creek
 - Clover Creek
 - Davis Spring
 - Deer Creek
 - Greenbrier River
 - Howard Creek
 - Hungard Creek
 - Kelly Creek
 - Knapp Creek
 - Muddy Creek
 - Second Creek
 - Sitlington Creek
 - Spring Creek
 - Stony Creek
 - Swago Creek
 - Thorny Creek

11 Wolf Creek

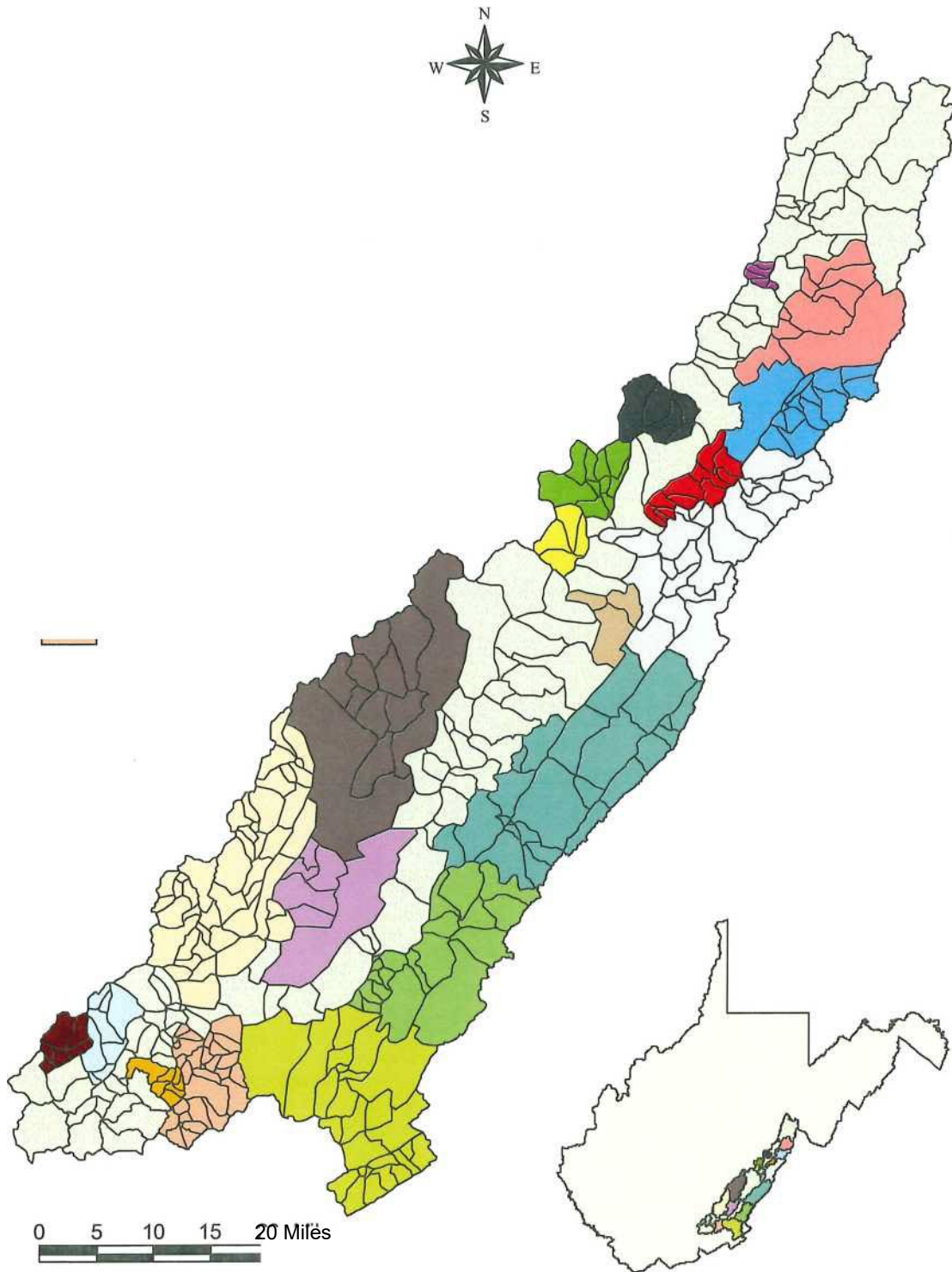


Figure 5-1. Greenbrier River sub watershed
The modeled landuse categories contributing to bacteria loads include pasture, karst

pasture, grassland, karst grassland, cropland, karst cropland, urban/residential pervious lands, urban/residential impervious lands, and forest (including barren and wetlands). Grassland, pasture, and cropland areas with limestone karst geology were identified and differentiated from non-karst agricultural landuses because drainage patterns are significantly different in karst areas. Other sources, such as failing septic systems, straight pipes, and permitted sources, were modeled as direct, continuous-flow sources in the model.

The MDAS was configured to model hydrology and water quality for fecal coliform bacteria. In the Greenbrier River watershed, pollutant loads are delivered to the tributaries with surface runoff, subsurface flows, and direct discharges to the streams.

The basis for the initial bacteria loading rates for landuses and direct sources are described in the Technical Report. The initial estimates were further refined during the model calibration. A variety of modeling tools were used to develop the fecal coliform bacteria TMDLs, including the MDAS, and a customized spreadsheet to determine the fecal loading from failing residential septic systems identified during source tracking efforts by the WVDEP. Section 4.2.1 describes the process of assigning flow and fecal coliform concentrations to failing septic systems. The failing septic analysis provided initial values for model input; however, these values were further refined during the model calibration process.

After model configuration, calibration of the hydrology followed by calibration of water quality was performed. The goal of the calibration was to obtain realistic model prediction by selecting parameter values that reflect the unique characteristics of the watershed. Spatial and temporal aspects were evaluated through the calibration process.

5.1.2 Hydrology Calibration

Hydrology and water quality calibration were performed in sequence because water quality modeling is dependent on an accurate hydrology simulation. Typically, hydrology calibration involves a comparison of model results to instream flow observations from USGS flow gauging stations throughout the watershed. There are three USGS flow gauging stations in the Greenbrier River watershed with adequate data records for hydrology calibration. The model was calibrated to the observed data recorded at the following USGS gages: USGS 03184000 Greenbrier River at Hill Dale, USGS 03183500 Greenbrier River at Alderson, and USGS 03182500 Greenbrier River at Buckeye.

Hydrology calibration was based on observed data from the three aforementioned USGS stations and the landuses present in the watersheds at that time. Key considerations for hydrology calibration included the overall water balance, the high-flow/low-flow distribution, storm flows, and seasonal variation. The hydrology was validated for the time period of January 1, 1992 to September 30, 2005. As a starting point, many of the hydrology calibration parameters originated from the USGS Scientific Investigations Report 2005-5099 (Atkins, 2005). Final adjustments to model hydrology were based on flow measurements obtained during WVDEP's pre-TMDL monitoring in the Greenbrier

River watershed. A detailed description of the hydrology calibration and a summary of the results and validation are presented in the Technical Report.

5.1.3 Fecal Coliform Bacteria Calibration

Following hydrology calibration, water quality calibration was performed for fecal coliform bacteria. The water quality was calibrated by comparing modeled versus observed instream fecal coliform bacteria concentrations. The water quality calibration consisted of executing the MDAS model, comparing the model results to available observations, and adjusting water quality parameters within reasonable ranges. Available monitoring data in the watershed was identified and assessed for application to calibration. Monitoring stations with observations that represented a range of hydrologic conditions, source types, and pollutants were selected. The time-period for water quality calibration was selected based on the availability of the observed data and their relevance to the current conditions in the watershed. WVDEP also conducted storm monitoring on Shrewsbury Hollow in Kanawha State Forest, Kanawha County, West Virginia. The data gathered during this sampling episode was used in the calibration of fecal coliform to enhance the representation of background conditions from undisturbed areas. The results of the storm sampling fecal coliform calibration are shown in Figure 5-2.

Water Quality Calibration - Fecal Coliform Bacteria Forested Reference Site (Shrewsbury Hollow)

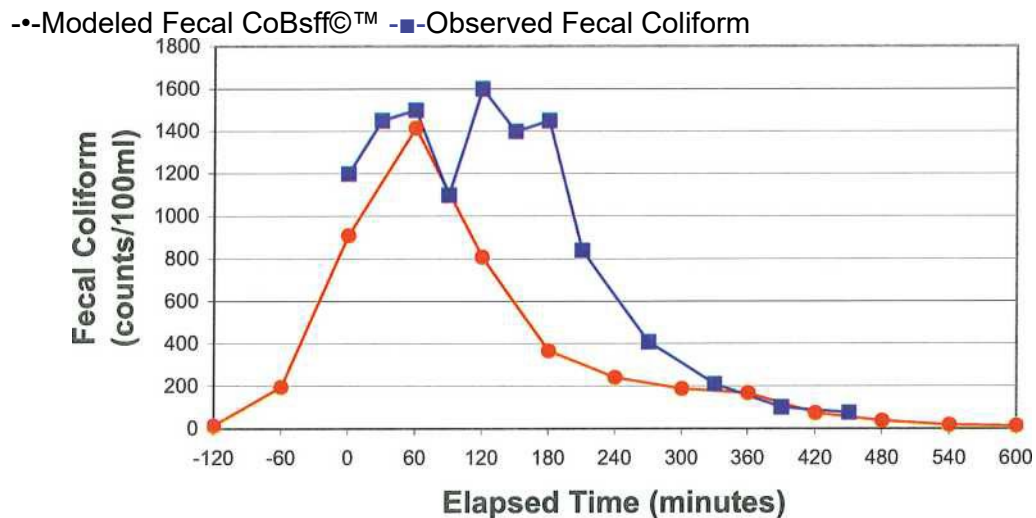


Figure 5-2. Shrewsbury Hollow fecal coliform bacteria observed data

5.2 Allocation Analysis

As explained in Section 2, a TMDL is composed of the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background levels. In addition, the TMDL must include a MOS, implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. TMDLs can be expressed in terms of mass per time or other appropriate units. Conceptually, this definition is denoted by the equation:

$$\text{TMDL} = \text{sum of WLAs} + \text{sum of LAs} + \text{MOS}$$

To develop fecal coliform bacteria TMDLs for each of the waterbodies listed in Table 3-3 of this report, the following approach was taken:

- o Define TMDL endpoints
 - Simulate baseline conditions
- o Assess source loading alternatives
- ® Determine the TMDL and source allocations

5.2.1 TMDL Endpoints

TMDL endpoints represent the water quality targets used to quantify TMDLs and their individual components. In general, West Virginia's numeric water quality criteria for fecal coliform bacteria and an explicit five percent MOS were used to identify endpoints for TMDL development.

The five percent explicit MOS was used to counter uncertainty in the modeling process. Longterm water quality monitoring data were used for model calibration. Although these data represented actual conditions, they were not of a continuous time series and might not have captured the full range of instream conditions that occurred during the simulation period. The explicit five percent MOS also accounts for those cases where monitoring might not have captured the full range of instream conditions.

The TMDL endpoints for fecal coliform are displayed in Table 5-1.

Table 5-1. TMDL endpoints

Water Quality Criterion	Designated Use	Criterion Value	TMDL Endpoint
Fecal Coliform	Water Contact Recreation and Public Water Supply	200 counts / 100mL (Monthly Geometric Mean)	190 counts / 100mL (Monthly Geometric Mean)
Fecal Coliform	Water Contact Recreation and Public Water Supply	400 counts / 100mL (Daily, 10% exceedance)	380 counts / 100mL (Daily, 10% exceedance)

5.2.2 Baseline Conditions and Source Loading Alternatives

The calibrated model provides the basis for performing the allocation analysis. The first step is to simulate baseline conditions, which represent existing nonpoint source

loadings and point sources loadings at permit limits. Baseline conditions allow for an evaluation of instream water quality under the highest expected loading conditions.

Baseline Conditions for MDAS

The MDAS model was run for baseline conditions using hourly precipitation data for a representative six-year simulation period (January 1, 1998 through December 31, 2003). The precipitation experienced over this period was applied to the landuses and pollutant sources, as they existed at the time of TMDL development. Predicted instream concentrations were compared directly with the TMDL endpoints. This comparison allowed for the evaluation of the magnitude and frequency of exceedances under a range of hydrologic and environmental conditions, including dry periods, wet periods, and average periods.

Permitted conditions for fecal coliform bacteria point sources were represented during baseline conditions using the design flow for each facility and the monthly average effluent limitation of 200 counts/100 mL.

Figure 5-3 presents the annual rainfall totals for the years 1980 through 2004 at the Marlinton, West Virginia (WV5672) weather station. The years 1998 to 2003 are highlighted to indicate the range of precipitation conditions that was used for TMDL development in the Greenbrier River watershed.

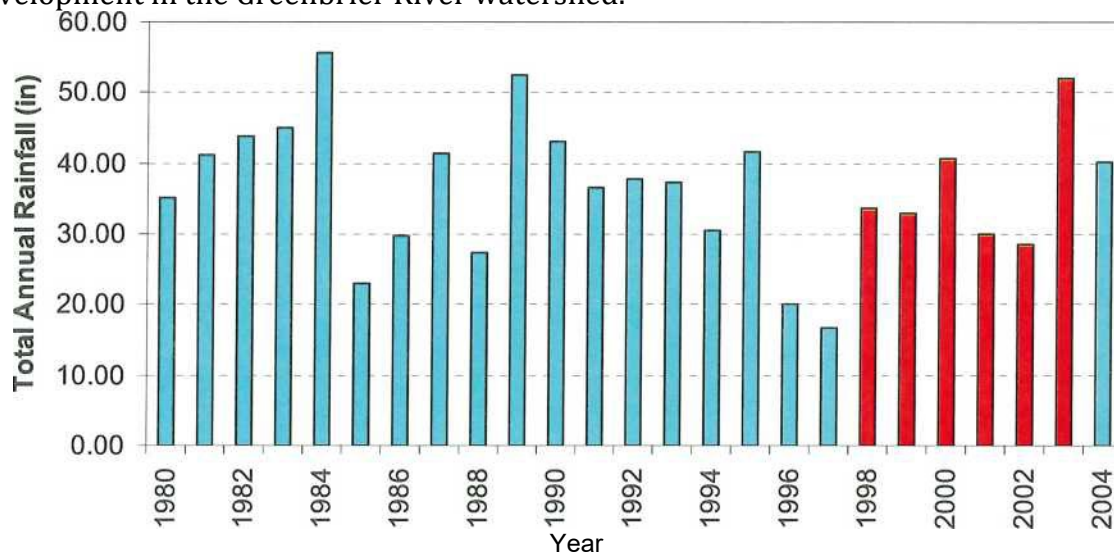


Figure 5-3. Annual precipitation totals for the Marlinton (WV5672) weather station

Source Loading Alternatives

Simulating baseline conditions allowed for the evaluation of each stream's response to variations in source contributions under a variety of hydrologic conditions. This sensitivity analysis gave insight into the dominant sources and the mechanisms by which potential decreases in loads would affect instream pollutant concentrations. The loading contributions from nonpoint sources were individually adjusted and the modeled

instream concentrations were evaluated for compliance with TMDL endpoints.

Multiple allocation scenarios were run for the impaired waterbodies. Successful scenarios were those that achieved the TMDL endpoints under all flow conditions throughout the modeling period. The averaging period and allowable exceedance frequency associated with West Virginia water quality criteria were considered in these assessments. In general, loads contributed by sources that had the greatest impact on instream concentrations were reduced first. If additional load reductions were required to meet the fecal coliform TMDL endpoints, less significant source contributions were subsequently reduced.

Figure 5-4 shows examples of model output for a fecal coliform baseline condition and a successful TMDL scenario for both instantaneous output and the 30 day geometric mean of the output.

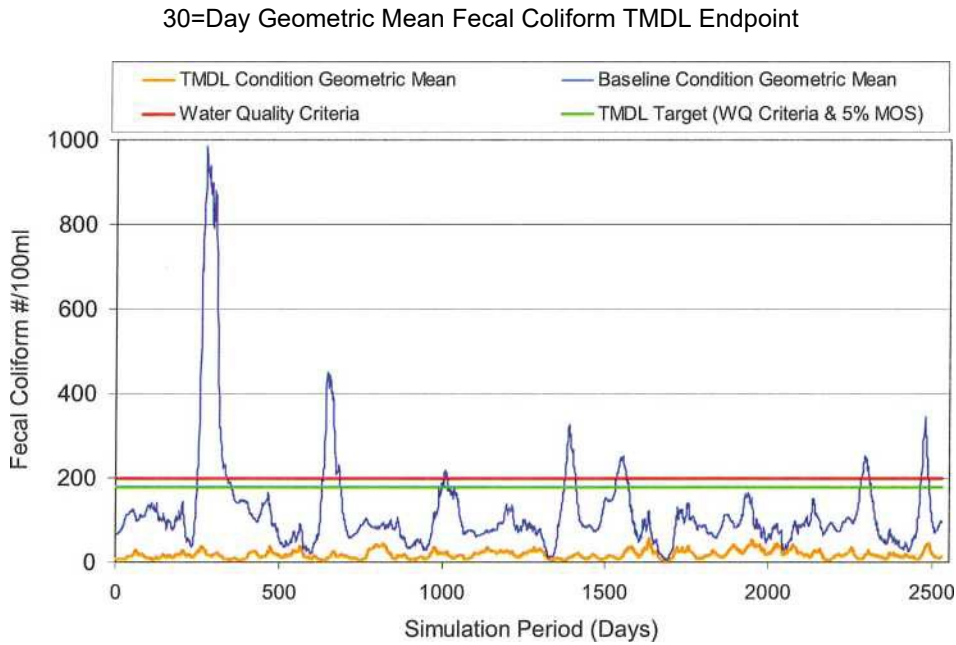
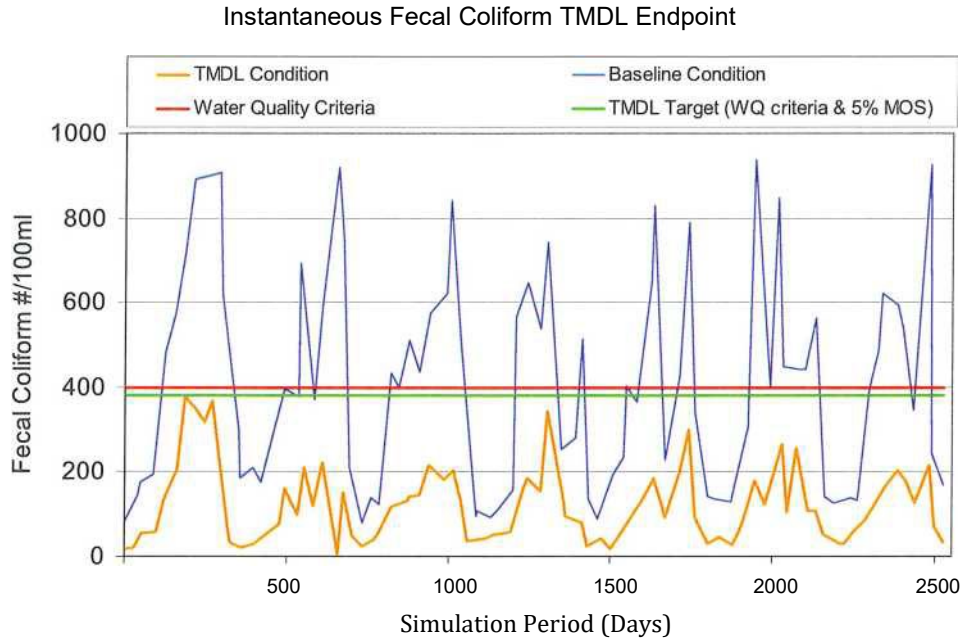


Figure 5-4. Examples of baseline and TMDL conditions (instantaneous and geometric mean) for coliform

5.3 TMDLs and Source Allocations

5.3.1 Fecal Coliform Bacteria Source Allocations

TMDLs and source allocations were developed for impaired stream segments and their tributaries on a subwatershed basis. A top-down methodology was followed to develop these TMDLs and allocate loads to sources. Headwaters were analyzed first because their loading affects downstream water quality. The loading contributions of unimpaired headwaters and the reduced loadings for impaired headwaters were then routed through downstream waterbodies. Using this method, contributions from all sources were weighted equitably. Reductions in sources affecting impaired headwaters ultimately led to improvements downstream and effectively decreased necessary loading reductions from downstream sources. Nonpoint source reductions did not result in loadings less than natural conditions, and point source allocations were never more stringent than numeric water quality criteria.

The following general methodology was used when allocating loads to fecal coliform bacteria sources. All point sources in the watershed were set at the existing effluent limitations of applicable NPDES Permits (200 counts/100 mL monthly geometric mean). Because West Virginia Bureau for Public Health regulations prohibit the discharge of raw sewage into surface waters, all illicit, non-disinfected discharges of human waste from failing onsite systems were reduced by 100 percent in the model. SSOs are illegal under NPDES regulations; all such discharges were similarly reduced. If further reduction was necessary, CSOs and nonpoint source loadings from agricultural lands and residential areas were subsequently reduced until instream water quality criteria were met.

Wasteload Allocations (WLAs)

WLAs were developed for all facilities permitted to discharge fecal coliform bacteria. Existing, technology-based fecal coliform effluent limitations for sewage treatment facilities are more stringent than water quality criteria; therefore, all permitted fecal coliform sources were represented by the monthly average fecal coliform limit of 200 counts/100 mL and no reductions were applied.

Load Allocations (LAs)

LAs were assigned as required to the following source categories:

- © Pasture
 - o On-site Sewage Systems — loading from all illicit, non-disinfected discharges of human waste (including failing septic systems and straight pipes)
- ® Residential — loading associated with urban/residential runoff
- © Background and Other Nonpoint Sources — loading associated with wildlife

sources from forest and grasslands (contributions/loadings from wildlife sources were not reduced)

5.3.2 Seasonal! Variation

The TMDL must consider seasonal variation. For the Greenbrier River watershed fecal coliform TMDLs, seasonal variation was considered in the formulation of the modeling analysis.

Continuous simulation (modeling over a period of several years that captured precipitation extremes) inherently considers seasonal hydrologic and source loading variability. The fecal coliform concentrations simulated on a daily time step by the model were compared with TMDL endpoints. Allocations that met these endpoints throughout the modeling period were developed.

5.3- 3 Critical Conditions

Nonpoint source loading is typically precipitation-driven and impacts tend to occur during wet weather and high surface runoff. During dry periods little or no land-based runoff occurs, and elevated instream pollutant levels may be due to point sources (Novotny and Olem, 1994). Also, failing on-site sewage systems (categorized as nonpoint sources but represented as continuous flow discharges) often have an associated low-flow critical condition, particularly where such sources are located on small receiving waters.

A critical condition represents a scenario where water quality criteria are most susceptible to violation. Analysis of water quality data for individual streams within the Greenbrier River watershed shows high pollutant concentrations during both high- and low-flow thereby precluding selection of a single critical condition. Both high-flow and low-flow periods were taken into account during TMDL development by using a long period of weather data that represented wet, dry, and average flow periods.

5.3.4 TMDL Presentation

TMDLs, LAs, and WLAs are shown in Table 6-1 and in the allocation spreadsheets associated with this report. TMDLs and their components are presented as average daily loads and average annual loads and were developed to meet TMDL endpoints throughout the range of conditions simulated over the design precipitation period.

Pollutant source representation attempted to capture the functionality and conveyance methods of both storm runoff from precipitation-induced sources and continuous discharges that are not directly related to precipitation. Simulation of baseline conditions on an hourly time-step provided a basis for evaluating in-stream response to varying source contributions under a wide range of precipitation and stream flow conditions. Hourly model outputs were aggregated into daily values. TMDL allocations were developed by reducing baseline pollutant contributions until model output at each

subwatershed outlet demonstrated attainment of water quality criteria, exactly in accordance with the prescribed criterion value, averaging period and exceedance frequency. For each impaired stream, annual average TMDLs were derived by calculating the total pollutant load associated with the TMDL condition exiting the mouth subwatershed for each year simulated by the model and then averaging those annual loads. The average daily TMDLs were calculated by dividing the annual average loads by 365 days.

The filterable allocation spreadsheets include multiple display formats that allow comparison of pollutant loadings among categories and facilitate implementation. A brief description of presented information is included on the "Introduction" tab of the spreadsheet. Load allocations for nonpoint source categories are presented for each model subwatershed as annual average loads, along with the associated percentage pollutant reduction from baseline conditions. Wasteload allocations for individual and general NPDES permits for sewage treatment facilities are presented both as annual average loads, for comparison with other pollutant sources, and equivalent allocation concentrations. The prescribed concentrations are the operable allocations for NPDES permit implementation.

O TMDL RESULTS FOR FECAL COLIFORM BACTERIA

TMDLs and source allocations were developed for the impairments displayed in Table 3-3. The TMDLs for fecal coliform bacteria are shown in Table 6-1. The TMDLs for fecal coliform bacteria are presented in number of colonies (counts) per day.

Detailed source allocations are provided in the allocation spreadsheets associated with this report.

Table 6-1. Fecal coliform bacteria TMDLs for the Greenbrier River

TMDL Watershed	Stream Code	Stream Name	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Greenbrier River	WVKNG	Greenbrier River	2.96E+15	1.11E+13	1.57E+14	3.13E+15
Hungard Creek	WVKNG-13	Hungard Creek	3.82E+13	NA	2.01E+12	4.02E+13
Kelly Creek	WVKNG-15	Kelly Creek	1.74E+13	NA	9.14E+11	1.83E+13
Kelly Creek	WVKNG-15-A	Flint Hollow	8.41E+11	NA	4.43E+10	8.86E+11
Wolf Creek	WVKNG-18	Wolf Creek	8.29E+13	NA	4.36E+12	8.72E+13
Wolf Creek	WVKNG-18-A	Laurel Creek	1.00E+13	NA	5.28E+11	1.06E+13
Wolf Creek	WVKNG- 18-B	Broad Run	1.87E+13	NA	9.84E+11	1.97E+13
Muddy Creek	WVKNG-22	Muddy Creek	2.42E+14	NA	1.27E+13	2.55E+14
Muddy Creek	WVKNG-22.7-A-I-(S)	Milligan Creek	6.00E+13	NA	3.16E+12	6.32E+13
Muddy Creek	WVKNG-22-A	Mill Creek	3.77E+13	NA	1.98E+12	3.96E+13
Muddy Creek	WVKNG-22-C	Kitchen Creek/Muddy Creek	1.21E+13	NA	6.37E+11	1.27E+13
Muddy Creek	WVKNG-22-E	UNT/Muddy Creek RM 19.8	6.90E+13	NA	3.63E+12	7.26E+13

TMDL Watershed	Stream Code	Stream Name	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Muddy Creek	WVKNG-22-E-I(S)	Sinking Creek	3.68E+13	NA	1.94E+12	3.88E+13
Muddy Creek	WVKNG-22-E-I-A(S)	Hughart Creek	2.44E+13	NA	1.28E+12	2.57E+13
Second Creek	WVKNG-23	Second Creek	1.93E+14	2.07E+10	1.01E+13	2.03E+14
Second Creek	WVKNG-23-G	Kitchen Creek/Second Creek	2.22E+13	NA	1.17E+12	2.34E+13
Second Creek	WVKNG-23-H	Back Creek	1.88E+13	NA	9.88E+11	1.98E+13
Howard Creek	WVKNG-25-A	Monroe Draft	9.43E+12	NA	4.96E+11	9.93E+12
Anthony Creek	WVKNG-28-D	Little Creek	3.26E+13	NA	1.72E+12	3.44E+13
Anthony Creek	WVKNG-28-F	Whites Draft	5.49E+12	NA	2.89E+11	5.78E+12
Anthony Creek	WVKNG-28-F-2	UNT/Whites Draft RM 2.0	2.22E+12	NA	1.17E+11	2.33E+12
Anthony Creek	WVKNG-28-Q	Meadow Creek	1.22E+13	1.66E+11	6.52E+11	1.30E+13
Big Creek	WVKNG-3	Big Creek	1.31E+13	NA	6.90E+11	1.38E+13
Spring Creek	WVKNG-30	Spring Creek	3.54E+14	NA	1.86E+13	3.72E+14
Beaver Creek	WVKNG-47	Beaver Creek	1.99E+13	1.02E+10	1.05E+12	2.09E+13

TMDL Watershed	Stream Code	Stream Name	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Swago Creek	WVKNG-49	Swago Creek	2.89E+13	5.53E+10	1.53E+12	3.05E+13
Knapp Creek	WVKNG-53	Knapp Creek	2.02E+14	1.05E+10	1.06E+13	2.13E+14
Knapp Creek	WVKNG-53-D	Browns Creek	1.97E+13	1.05E+10	1.04E+12	2.07E+13
Knapp Creek	WVKNG-53 -H	Douthat Creek	3.92E+13	NA	2.07E+12	4.13E+13
Stony Creek	WVKNG-55	Stony Creek	7.29E+13	4.98E+10	3.84E+12	7.68E+13
Stony Creek	WVKNG-55-A	Indian Draft	2.96E+13	4.98E+10	1.56E+12	3.13E+13
Thomy Creek	WVKNG-59	Thomy Creek	3.07E+13	3.57E+11	1.63E+12	3.27E+13
Thomy Creek	WVKNG-59-E	UNT/Thomy Creek RM 9.3	4.95E+12	NA	2.61E+11	5.21E+12
Clover Creek	WVKNG-61	Clover Creek	4.81E+13	NA	2.53E+12	5.06E+13
Sitlington Creek	WVKNG-66-D	Shock Run	1.70E+13	NA	8.96E+11	1.79E+13
Sitlington Creek	WVKNG-66-E	Galford Run	4.52E+13	NA	2.38E+12	4.76E+13
Deer Creek	WVKNG-68	Deer Creek	1.95E+14	2.90E+10	1.03E+13	2.06E+14
Deer Creek	WVKNG-68-F	Buffalo Run	1.39E+13	NA	7.32E+11	1.46E+13

TMDL Watershed	Stream Code	Stream Name	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Allegheny Run	WVKNG-75	Allegheny Run	6.10E+12	NA	3.21E+11	6.42E+12

NA = not applicable; UNT = unnamed tributary.

“Scientific notation” is a method of writing or displaying numbers in terms of a decimal number between 1 and 10 multiplied by a power of 10. The scientific notation of 10,492, for example, is 1.0492×10^4 .

7.0 FUTURE GROWTH

Specific fecal coliform bacteria future growth allocations are not prescribed. The absence of specific future growth allocations does not prohibit new development in the watersheds of streams for which fecal coliform bacteria TMDLs have been developed, or preclude the permitting of new sewage treatment facilities.

In some instances implementation of the TMDLs will consist of providing public sewer service to unsewered areas. The NPDES permitting procedures for sewage treatment facilities include technology-based fecal coliform effluent limitations that are more stringent than applicable water quality criteria. Therefore, a new sewage treatment facility may be permitted anywhere in the watershed, provided that the permit includes monthly average and maximum daily fecal coliform limitations of 200 counts/100 mL and 400 counts/100 mL, respectively. Furthermore, WVDEP will not authorize construction of combined collection systems or permit overflows from newly constructed collection systems.

M PUBLIC PARTICIPATION

8.1 Public Meetings

Informational public meetings were held on May 6, 2004 at the New River Community and Technical College and on June 11, 2007 at the public library in Lewisburg, West Virginia. The May 6, 2004 meeting occurred prior to pre-TMDL stream monitoring and pollutant source tracking and included a general TMDL overview and a presentation of planned monitoring and data gathering activities. The June 11, 2007 meeting occurred prior to the allocation of pollutant loads and included proposed WVDEP allocation strategies.

A public meeting was held to present the draft TMDLs on February 11, 2008 at the public library in Lewisburg. The meeting began at 7:00 PM. and provided information to stakeholders to facilitate comments on the draft TMDLs.

8.2 Public Notice and Public Comment Period

The availability of Draft TMDLs was advertised in various local newspapers between January 29, 2008 and January 31, 2008. Interested parties were invited to submit comments during the public comment period, which began on February 1, 2008 and ended March 3, 2008. WVDEP did not receive any comments on the Draft TMDLs. The electronic documents are available on the WVDEP's internet site at <http://www.wvdep.org/wvtmdl>.

9 J REASONABLE ASSURANCE

Reasonable assurance for maintenance and improvement of water quality in the affected watershed rests primarily with two programs. The NPDES permitting program is

implemented by WVDEP to control point source discharges. The West Virginia Watershed Network is a cooperative nonpoint source control effort involving many state and federal agencies, whose task is protection and/or restoration of water quality.

9.1 Permit Reissuance

WVDEP's Division of Water and Waste Management is responsible for issuing non-mining NPDES permits within the State. As part of the permit review process, permit writers have the responsibility to incorporate the required TMDL wasteload allocations into new or reissued permits. Both the permitting and TMDL development processes have been synchronized with the Watershed Management Framework cycle, such that TMDLs are completed just before the permit expiration/reissuance time frames. Permits for existing sewage treatment facilities in the Greenbrier River watershed will be reissued beginning in July 2008 and current effluent limitations satisfy the wasteload allocations of the TMDLs.

WVDEP also implements a program to control discharges from CSOs. Specified fecal coliform wasteload allocations for CSOs will be implemented in accordance with the provisions of the national Combined Sewer Overflow Control Policy and the state Combined Sewer Overflow Strategy. Those programs recognize that comprehensive CSO control may require significant resources and an extended period of time to accomplish. The wasteload allocation prescribed for CSOs are necessary to achieve current fecal coliform water quality criteria. However, the TMDL should not be construed to supersede the prioritization and scheduling of CSO controls and actions pursuant to the national CSO program.

9.2 Watershed Management Framework Process

The Watershed Management Framework is a tool used to identify priority watersheds and coordinate efforts of state and federal agencies with the goal of developing and implementing watershed management strategies through a cooperative, long-range planning effort.

The West Virginia Watershed Network is an informal association of state and federal agencies, and nonprofit organizations interested in the watershed movement in West Virginia. Membership is voluntary and everyone is invited participate. The Network uses the Framework to coordinate existing programs, local watershed associations, and limited resources. This coordination leads to the development of Watershed Based Plans to implement TMDLs and document environmental results.

The principal area of focus of watershed management through the Framework process is correcting problems related to nonpoint source pollution. Network partners have placed a greater emphasis on identification and correction of nonpoint source pollution. The combined resources of the partners are used to address all different types of nonpoint source pollution through both public education and on-the-ground projects.

COMMUNITY PLAN
**Monroe County Coalition for Children and
Families, Inc.**

P.O. Box 737, Union, West Virginia 24983 telephone (304) 772-5960 fax (304) 772-4607 e-mail
monroefrn@verizon.net

Goal 1: Monroe County parents will have adequate resources to protect, nurture, educate and support their children - see link to Strong Families

Goal 2: Monroe County children will be ready to succeed in school - see link to Ready for School

Goal 3: Monroe County citizens will achieve and maintain good physical and mental health - see link to Healthy People

Goal 4: Monroe County's children will live in permanent, stable homes - see link to Stable Homes

Goal 5: Monroe Countains will be safe in their homes and community - see link to Safe Communities

Goal 6: The FRN will meet all contractual requirements of its funder and be organized to respond to the needs of Monroe County.

Background: The Monroe County Coalition for Children and Families, Inc. (Family Resource Network) was one of the first five Family Resource Networks funded in West Virginia in 1992. Since 1992, working teams have planned and are providing much needed resources in our rural county in Southern West Virginia..

Goal 1: Oversight of this goal is provided by the Service Delivery System Committee and FCOC team.

Goal 2: Oversight of this goal is provided by TLC Early Childhood Collaborative and Community Baby Shower Committee.

Goal 3: Oversight of this goal is provided by Monroe/Summers Counties Tobacco Prevention Coalition and Breast Cancer Awareness Committee.

Goal 4: Oversight of this goal is provided by Volunteer Carpenter's Club, Ministerial Outreach and FRN.

Goal 5: Oversight of this goal is provided by the STOP Domestic Violence team under the umbrella of the Family Refuge Center.

Goal 6. Oversight of this goal is provided by the Family Resource Network Board of Directors.

Strong Families

Monroe County parents will have adequate skills and resources to protect, nurture, educate & support

their children in a family-centered, family friendly atmosphere.

- unmet needs of 100 Monroe County families a year will be identified and met.
- Service Delivery System Committee will coordinate with other agencies, individuals, civic groups to aid needy families
- Work on Service Array Capacity process to assure that "Families have an enhanced capacity to provide for their children's needs"
- Educate the public about families with children with no cash income living in Monroe County, in West Virginia and the in the United States

The Service Delivery System Committee provides oversight of the FCOC flex fund. The FCOC flex fund is used to identify unmet needs of families in Monroe County and to coordinate a maximum of \$200 per year per family to pay for a service identified as an unmet need for the family. In 2008, this fund helped 106 families of which 30 had no cash income and 18 of the 30 families with no cash income had children. There is no safety net for low income and no income families in the current recession. The FRN works to help families by coordinating free clothing distributions, SHARE food co-op, free semi-truck loads, tax-aide and Christmas Giving.

Ready for School

Monroe County children will be ready to succeed in school.

- Find children ages birth to five and invite parents to have children screened at annual "Kiddie Fair." Refer those with developmental delays and health problems to appropriate helping programs.
- Monroe County parents of babies up to age one will receive resources and parenting education to help them reach their maximum potential as a parent. This will provided at Community Baby Showers.

"Kiddie Fair" Every year in March or April, Monroe County has a "Kiddie Fair." Parents or custodians of children birth to five are invited to come and get their children screened at no charge. The Developmental Screening includes language, speech, health, vision and hearing. The screenings are held at the Lindside United Methodist Church Community Center. Agencies that serve Monroe County are also invited to come and offer their services directly to families. It also gives the agencies time to visit with one another and educate themselves about services available. If you have a child ages birth to five or are an agency that would like to participate, please call Jeana Comer-Carr, Head Start Director at (304) 772-3284 to be a part of the yearly "Kiddie Fair" in Monroe County.

"Community Baby Showers" The Monroe County Coalition for Children and Families (Family

Resource Network) is awarded a grant from PIP-Partners In Prevention. Funding for the initiative comes from the West Virginia Children's Trust Fund, West Virginia Department of Health and Human Resources and Claude Worthington Benedum Foundation. Monroe County holds Community Baby Showers with the funding. Some objectives of the project include (1) Parents will receive help with items a baby needs (2) Parents will be educated about the importance of the first few years of life in brain development. (3) Parents will learn the importance of bonding and interacting in a loving way with their baby. (4) Parents will be educated about nutrition needs of the baby and mom, child car seat safety, Dad's role in a child's life, child abuse and neglect and CPR (5) Parents will have an opportunity to connect with other parents and the community to talk and share concerns and stories about their

babies. If you are expecting a baby or have a baby up to age one, call Shirley Hall at (304) 772-5960 to find out how you can be a part of our next Community Baby Show.

Healthy People

Monroe County citizens will achieve and maintain good physical and mental health.

- Provide research based information on wellness to the public at least six times year.
- Continue monthly Monroe/Summers Counties Tobacco Prevention Coalition Meetings.
- Educate the public on breast cancer health issues
- Educate the public on CHIP (Children's Health Insurance Program)
- Publish at least three Wellness Topics Newsletters a year

The Breast Cancer Awareness team and Monroe/Summers Counties Tobacco Prevention Coalition have teamed up together to combine meetings and efforts.

The Monroe/Summers Counties Tobacco Prevention Coalition provides oversight of a grant that enables this Coalition to publish at least three issues of Wellness Topics Newsletter that is inserted into the Monroe Watchman and Hinton News reaching a minimum of 5,000 households in both counties. We are dedicated to educating the public about the health risks of tobacco use. click [Tobacco Prevention Grant](#) Application 2007- 2008.

The Breast Cancer Awareness Committee plans and coordinates a yearly Cancer Walk in Monroe County in October. Money raised from the walk provides screenings for women that have no insurance or are underinsured.

Safe and Stable Communities

Monroe Countians will be safe in their homes & community and will live in permanent, stable homes.

- Continue STOP Domestic Violence team meetings in Monroe County.
- Educate the public and service providers on domestic violence, date rape, sexual assault, child abuse and other safety issues.
- Continue the "Volunteer Carpenter's Club" developed to help low income families with small home repair.