

# Greenbrier County

Land Use Master Plan 2013





## Executive Summary

This Land Use Master Plan (LUMP) conveys information on Greenbrier County's current demographic and geographic status. This plan will be used to evaluate the potential of post-mine sites for development, and evaluate Greenbrier County's investment position.

Senate Bill (SB) 603 mandates the development of a LUMP by counties with surface mining operations. The LUMP will be an effective tool towards achieving Greenbrier County's development goals. The Nick J. Rahall Appalachian Transportation Institute (RTI) will coordinate with the Office of Coalfield Community Development to provide this essential information. Greenbrier County has already commenced with a controversial post-mine land use site that, despite its issues, is a perfect example of how a LUMP could be useful.

Greenbrier County has rebounded from a new millennium population slump, and is now projected to increase in proportion with West Virginia. The county's median age and age distribution indicate a population capable of productivity in the labor force.

Employment consists mainly tourism and hospitality, government services, trade, transportation, and utilities, and education and healthcare, four sectors that almost total over 80 percent of the workforce. Each sector contributes a nearly equivalent percentage to the total county's wages, revealing a diverse economic portfolio. The recession and the troubles of the Greenbrier Resort can clearly be seen in the

unemployment rate and wage calculations, as can the recovery in both cases. Of particular note is the amount of income, as opposed to wages, derived from government transfers. Thirty-one percent of Greenbrier County income is from government transfers. Alas, Greenbrier County is not alone in this situation, as West Virginia finds many of its counties deriving almost a third of their incomes from government transfers.

Greenbrier County's educational statistics have widely varied for unknown reasons. Greenbrier County's dropout rate is exceptionally low however. Greenbrier County's residents also have great educational achievement overall, with a fifth of the residents having a college degree.

Utility prices are varied throughout the county, and this plan provides municipal and private rates for electricity, sewer, and water. Broadband, an increasingly important utility in the age of globalization, is highlighted to show the necessity for improvement and access, and showcase the developable properties of this utility.

Transportation is an important issue in any development strategy. Greenbrier County has various transportation options, including a small regional airport, interstate access, and several state routes.

Greenbrier County encountered some controversy with its first attempt at post-mine land use. The Beech Ridge Wind Farm was not favored by everyone, but stands as an example of how mine sites can



still be used once the initial functions have been exhausted. Greenbrier County also has a tradition of historic preservation, a fact that should be noted when developing. One historic site, the Greenbrier Hotel, is still in use today. Historic preservation can be a basis for tourism, cultural identity, and community cohesion.

This plan also reviews energy and environmental issues in Greenbrier County. Already a diverse county, some energy options could also be considered to bring even more prosperity. Greenbrier County has an extensive inventory of wetlands, forests, and wildlife management, thanks to a national forest and a state park. Greenbrier County is also not on the list of air pollution non-attainment areas, which is positive. Greenbrier County is lacking in gas pipes, oil fields, and Marcellus Shale wells and opportunities. Production of alternative energy appears to be better for Greenbrier in geothermal and wind, but must be investigated further.

This information is as critical as the site information for several reasons. One is that development is not a process that can occur in a vacuum. Without understanding the resources available in the county, and the demand for more investment, money will end up wasted. Another is that investment requires active partners who will need information on each of the county's essential demographic topics to determine their level of risk. Without this, investors will not be persuaded to enter the county. Finally, this information can help policy makers target their land use strategies to any of these

topics, as long as they understand the situation.

Site analysis is integral to this report. Researchers identified all the post mine sites given certain criteria for Greenbrier County. The researchers created a distance analysis using a scoring system based on distance to certain essential utilities and features, summed the scores, and plotted each score for each mine site. A workforce analysis was conducted to determine available labor within certain radii for each site, and a retail analysis was conducted to determine which areas had the most retail activity.

The top five mine sites were then identified, and are displayed individually. Map A contains the sites available in a view of the county.

The tables below are comprehensive comparisons of the five post-mine sites. In Tables A and B, distances and total scores are compared between sites, providing an idea of the more suitable sites under a considered criterion. For example, if we want to look for a site which is located closest to power lines, the answer is site ranking #1, permit ID S300805. However, if we wanted the site closer to oil pipes, the best site is site ranking #5, permit ID S303393.

Table C explains how each criterion contributes to the final total score and importance of the weights. Because of the assumption that one criterion may be more important than others (different weights), the site with higher absolute and relative scores is still able to receive a smaller total score than others. Site ranking #2 is a good



explanation of this situation. Site #2 has smaller relative scores compare to site #3 and #4. Still, site #2 receives higher total

score because the distances from this site to major criteria (with weights from 8-10) are much shorter than the other two.



**Table A: Distances comparison between five sites for potential development**

<b>Suitability Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Weight</b>
Existing Highway	7.47	13.95	9.60	8.32	9.60	<b>8</b>
Proposed Highway	49.15	54.15	63.54	64.91	66.11	<b>9</b>
Intermodal Terminal Facilities	58.84	71.25	62.25	60.97	62.26	<b>6</b>
Interstate	13.40	14.72	24.13	25.51	26.69	<b>8</b>
National Waterway Network Ports	137.10	149.53	140.18	138.92	140.20	<b>5</b>
Sewer Treatment Facilities	7.70	17.26	11.19	9.91	11.20	<b>7</b>
Solid Waste Treatment Facilities	22.94	22.38	24.99	23.71	25.00	<b>8</b>
Tri-state Airport	146.44	158.84	149.47	148.22	149.49	<b>3</b>
Yeager Airport	90.77	103.18	93.19	91.92	93.20	<b>3</b>
Broadband	0.22	0.19	3.92	4.16	4.19	<b>9</b>
Gas Pipes	12.76	12.21	4.42	2.98	2.81	<b>6</b>
National Waterway Network	34.54	37.54	40.46	40.07	41.17	<b>4</b>
Power Lines	1.67	4.61	4.72	5.09	6.36	<b>10</b>
Oil Pipes	15.88	15.93	8.81	7.38	7.21	<b>6</b>
Railroad	1.49	4.29	4.71	5.11	6.04	<b>5</b>
Sewer Lines	3.85	6.40	6.99	5.55	5.31	<b>8</b>
Water Lines	4.05	6.62	6.99	5.55	5.31	<b>10</b>

**Table B: Total score comparison between five sites for potential development**

<b>Suitability Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Weight</b>
Existing Highway	56	10	42	42	28	<b>8</b>
Proposed Highway	9	6.75	6.75	4.5	2.25	<b>9</b>
Intermodal Terminal Facilities	6	1.5	4.5	4.5	3	<b>6</b>
Interstate	56	30	18	12	6	<b>8</b>
National Waterway Network Ports	5	1.25	3.75	3.75	2.5	<b>5</b>
Sewer Treatment Facilities	21	1.75	5.25	15.75	3.5	<b>7</b>
Solid Waste Treatment Facilities	18	24	12	18	6	<b>8</b>
Tri-state Airport	3	0.75	2.25	2.25	1.5	<b>3</b>
Yeager Airport	3	0.75	2.25	2.25	1.5	<b>3</b>
Broadband	67.5	90	20.25	4.5	2.25	<b>9</b>
Gas Pipes	1.5	3	4.5	4.5	6	<b>6</b>
National Waterway Network	4	3	2	3	1	<b>4</b>
Power Lines	50	7.5	7.5	5	2.5	<b>10</b>
Oil Pipes	3	1.5	4.5	4.5	6	<b>6</b>
Railroad	35	11.25	11.25	2.5	1.25	<b>5</b>
Sewer Lines	40	4	2	6	6	<b>8</b>
Water Lines	10	5	2.5	7.5	7.5	<b>10</b>
<b>Total Score</b>	<b>388</b>	<b>202</b>	<b>151.25</b>	<b>142.5</b>	<b>86.75</b>	

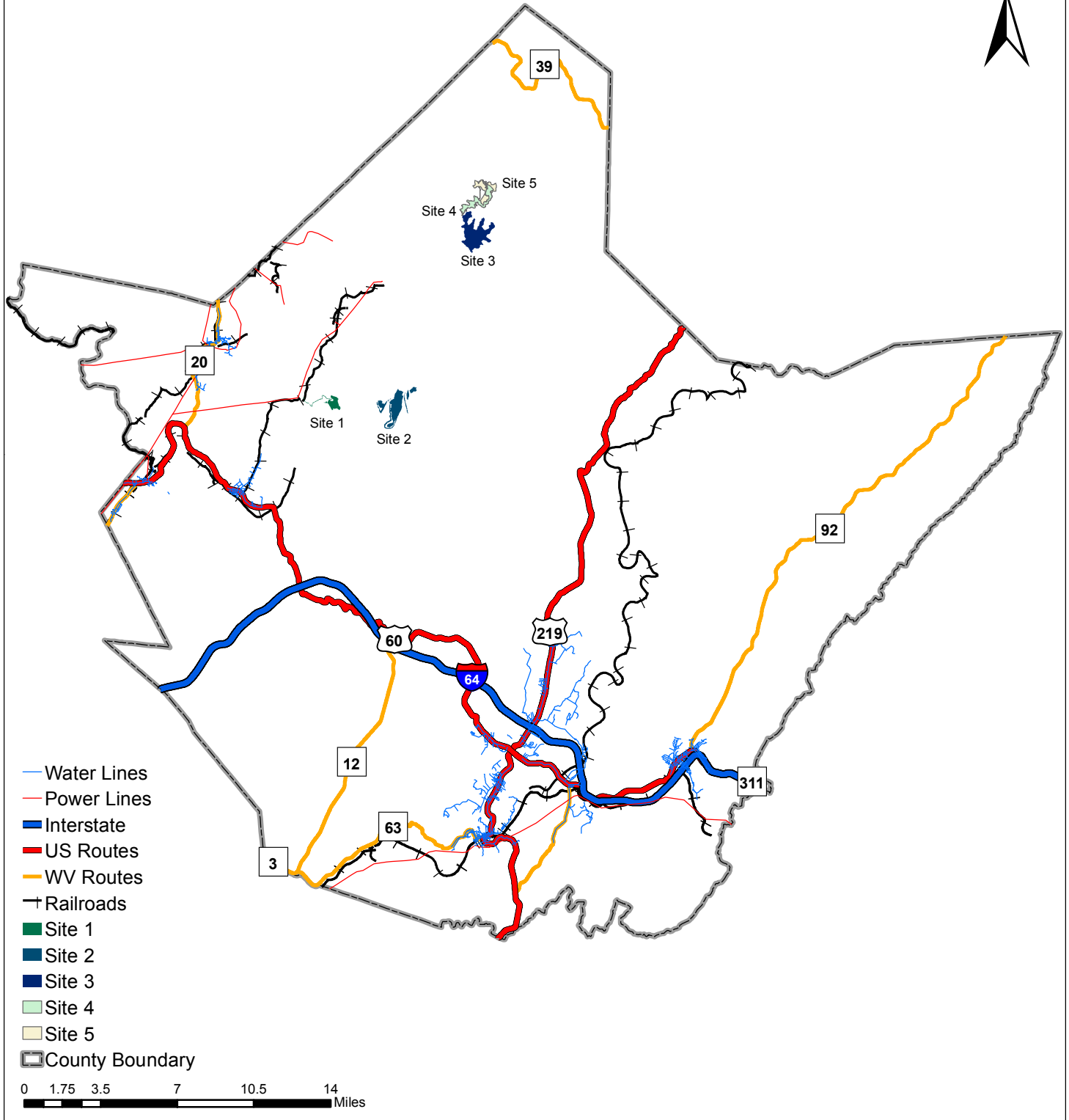


**Table C: Absolute/relative score comparison between five sites**

<b>Suitability Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Weight</b>
Existing Highway	7	5	7	7	7	<b>8</b>
Proposed Highway	1	1	1	1	1	<b>9</b>
Intermodal Terminal Facilities	1	1	1	1	1	<b>6</b>
Interstate	7	5	3	3	3	<b>8</b>
National Waterway Network Ports	1	1	1	1	1	<b>5</b>
Sewer Treatment Facilities	3	1	1	3	1	<b>7</b>
Solid Waste Treatment Facilities	3	3	3	3	3	<b>8</b>
Tri-state Airport	1	1	1	1	1	<b>3</b>
Yeager Airport	1	1	1	1	1	<b>3</b>
Broadband	10	10	3	1	1	<b>9</b>
Gas Pipes	1	1	1	1	1	<b>6</b>
National Waterway Network	1	1	1	1	1	<b>4</b>
Power Lines	5	1	1	1	1	<b>10</b>
Oil Pipes	1	1	1	1	1	<b>6</b>
Railroad	7	3	3	1	1	<b>5</b>
Sewer Lines	5	1	1	1	1	<b>8</b>
Water Lines	1	1	1	1	1	<b>10</b>
<b>Total Absolute Score</b>	56	38	31	29	27	
<b>Suitability Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Weight</b>
Existing Highway	10	2.5	7.5	7.5	5	<b>8</b>
Proposed Highway	10	7.5	7.5	5	2.5	<b>9</b>
Intermodal Terminal Facilities	10	2.5	7.5	7.5	5	<b>6</b>
Interstate	10	7.5	7.5	5	2.5	<b>8</b>
National Waterway Network Ports	10	2.5	7.5	7.5	5	<b>5</b>
Sewer Treatment Facilities	10	2.5	7.5	7.5	5	<b>7</b>
Solid Waste Treatment Facilities	7.5	10	5	7.5	2.5	<b>8</b>
Tri-state Airport	10	2.5	7.5	7.5	5	<b>3</b>
Yeager Airport	10	2.5	7.5	7.5	5	<b>3</b>
Broadband	7.5	10	7.5	5	2.5	<b>9</b>
Gas Pipes	2.5	5	7.5	7.5	10	<b>6</b>
National Waterway Network	10	7.5	5	7.5	2.5	<b>4</b>
Power Lines	10	7.5	7.5	5	2.5	<b>10</b>
Oil Pipes	5	2.5	7.5	7.5	10	<b>6</b>
Railroad	10	7.5	7.5	5	2.5	<b>5</b>
Sewer Lines	10	5	2.5	7.5	7.5	<b>8</b>
Water Lines	10	5	2.5	7.5	7.5	<b>10</b>
<b>Total Relative Score</b>	152.5	90	112.5	115	82.5	

# Top Five Sites for Potential Development

## Greenbrier County



Source: Rahall Transportation Institute Analysis 2013

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### Site's General Info

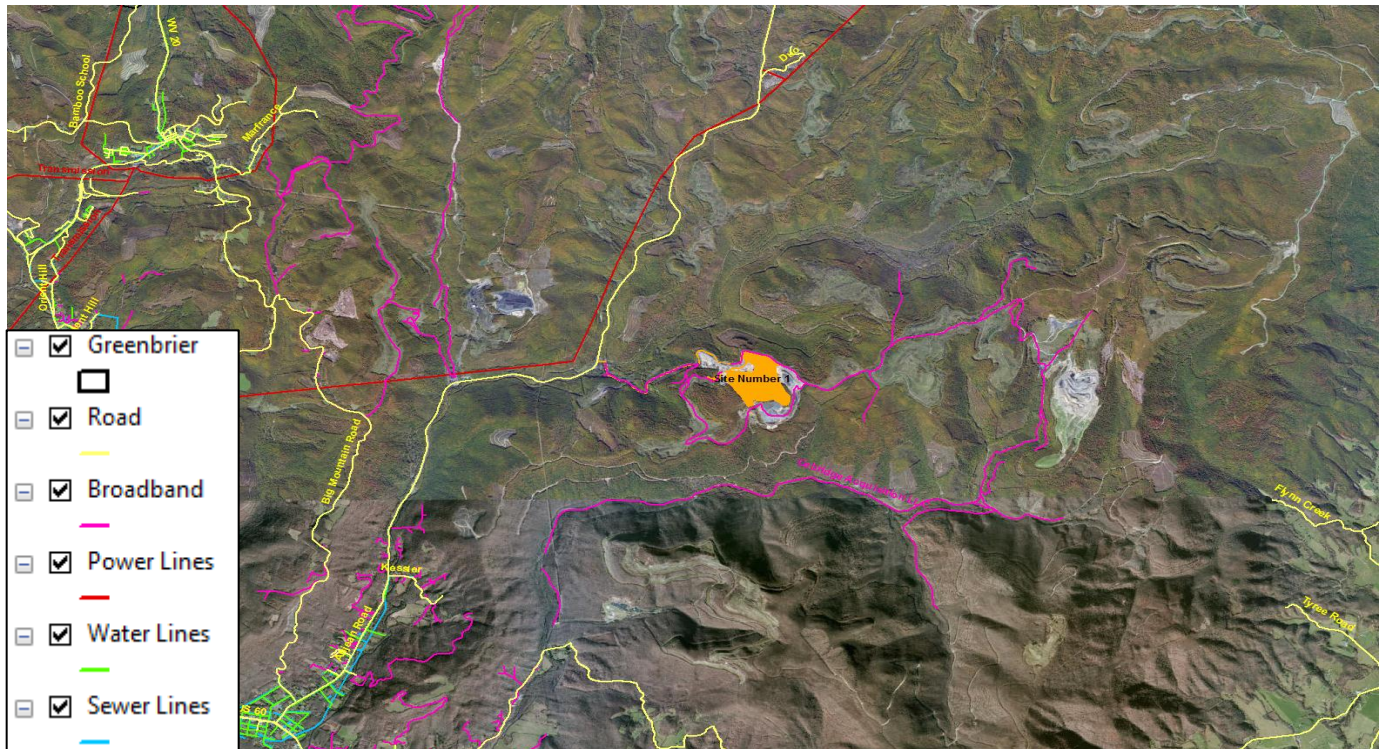
Permittee	Greenbrier Smokeless Coal Mining, Llc
Facility Name	Buck Lilly Surface Mine
Permit ID	S300805
Issue Date	12/15/2006
Expiration Date	12/15/2016
Current Acres	167.00
Lat	38° 01' 03.0000"
Long	80° 36' 20.0000"
Nearest Post Office	Rupert

Site Number	<b>1</b>
Suitability Ranking	<b>1</b>
Total Score	<b>388</b>

Site Number 1 has the best distance from broadband, highways, the interstate, and other essential infrastructure, including water and sewer lines. Its top ranking in nearly all aspects makes it the number 1 site.

### Distance Analysis Results

Existing Highway	7.47
Proposed Highway	49.15
Intermodal Terminal Facilities	58.84
Interstate	13.40
National Waterway Network Ports	137.10
Sewer Treatment Facilities	7.70
Solid Waste Treatment Facilities	22.94
Tri-state Airport	146.44
Yeager Airport	90.77
Broadband	0.22
Gas Pipes	12.76
National Waterway Network	34.54
Power Lines	1.67
Oil Pipes	15.88
Railroads	1.49
Sewer Lines	3.85
Water Lines	4.05





### Site's General Info

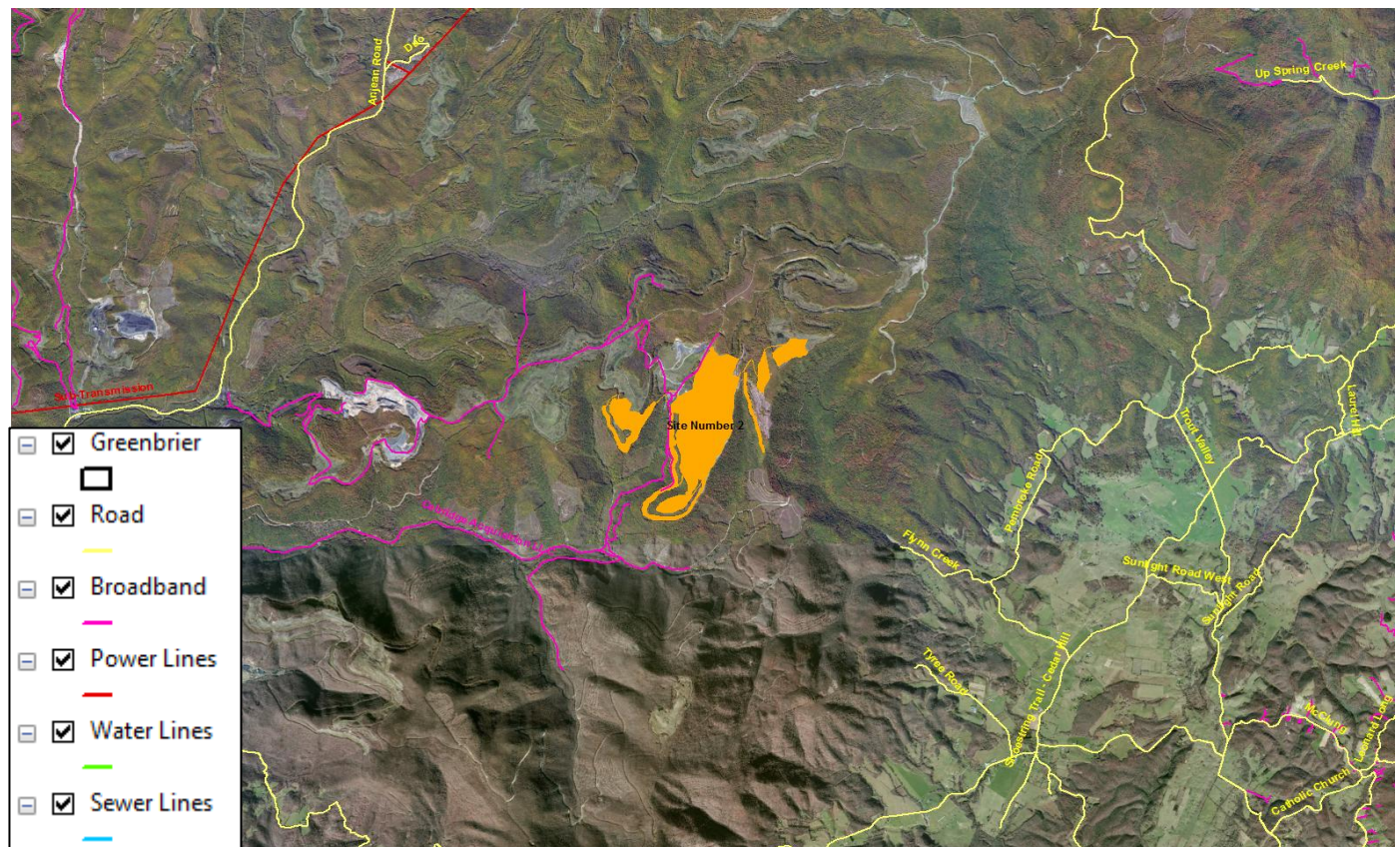
Permittee	Midland Trail Resources, Llc
Facility Name	Midland Trail Surf. Mine No1
Permit ID	S301507
Issue Date	12/21/2007
Expiration Date	12/21/2017
Current Acres	584.82
Lat	38° 00' 39.0000"
Long	80° 33' 04.0000"
Nearest Post Office	Rupert

Site Number	<b>2</b>
Suitability Ranking	<b>2</b>
Total Score	<b>202</b>

Site 2 has great access to roads, sewer and water lines, and broadband. It is not as close as site 1 to all the major criteria, and it lacks intermodal and airport access. but is still a great site for development

### Distance Analysis Results

Existing Highway	13.95
Proposed Highway	54.15
Intermodal Terminal Facilities	71.25
Interstate	14.72
National Waterway Network Ports	149.53
Sewer Treatment Facilities	17.26
Solid Waste Treatment Facilities	22.38
Tri-state Airport	158.84
Yeager Airport	103.18
Broadband	0.19
Gas Pipes	12.21
National Waterway Network	37.54
Power Lines	4.61
Oil Pipes	15.93
Railroads	4.29
Sewer Lines	6.40
Water Lines	6.62





### Site's General Info

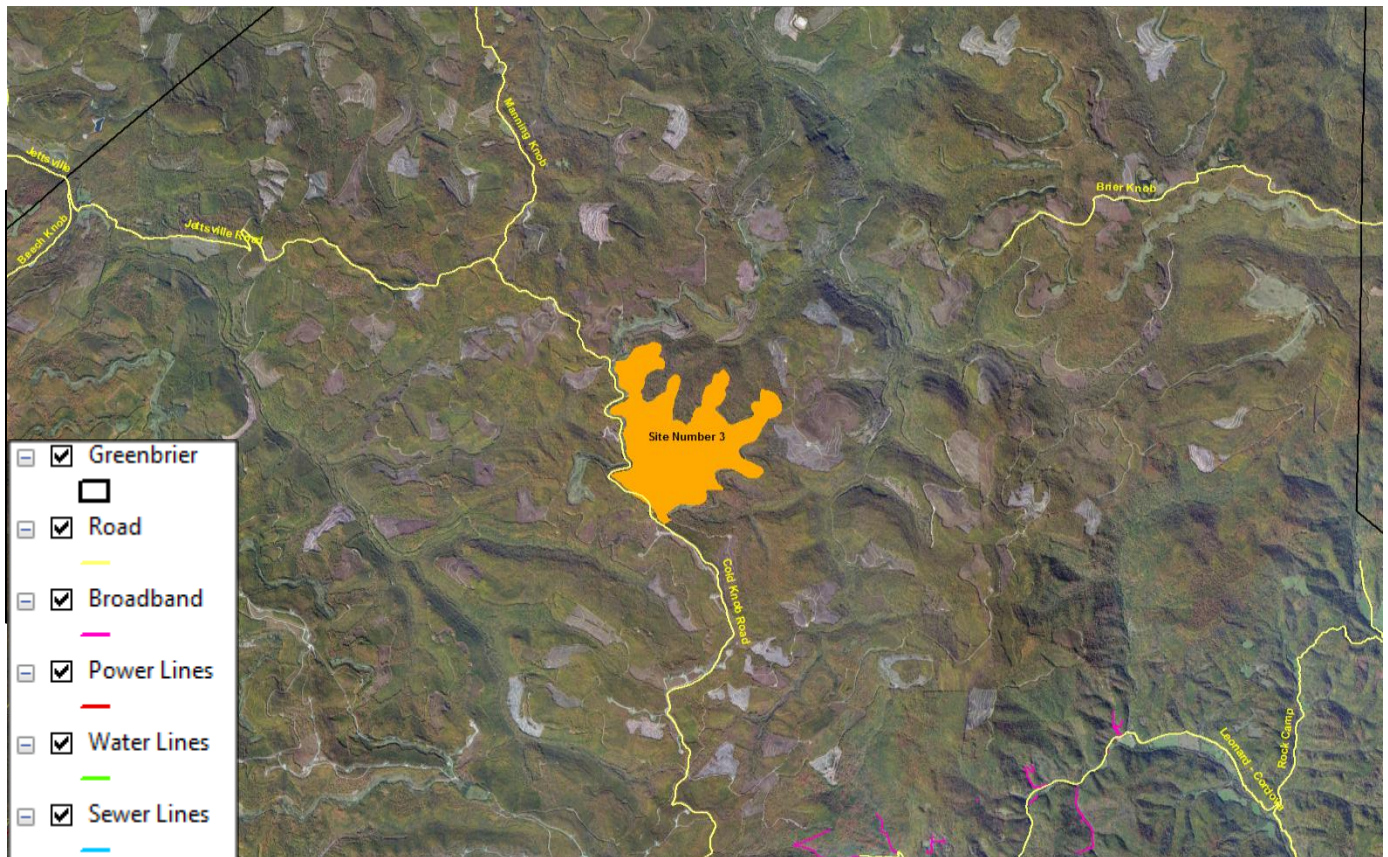
Permittee	South Fork Coal Company Llc
Facility Name	Blue Knob surface Mine No. 1
Permit ID	S300511
Issue Date	8/2/2017
Expiration Date	8/2/2017
Current Acres	852.06
Lat	38° 07' 18.0000"
Long	80° 28' 57.0000"
Nearest Post Office	Richwood

Site Number	<b>3</b>
Suitability Ranking	<b>3</b>
Total Score	<b>151.25</b>

Site number 3 has good access to water and sewer lines, but suffers mostly on interstate and highway access. The site has the median in infrastructure criteria, making it the median in site development possibility.

### Distance Analysis Results

Existing Highway	9.60
Proposed Highway	63.54
Intermodal Terminal Facilities	62.25
Interstate	24.13
National Waterway Network Ports	140.18
Sewer Treatment Facilities	11.19
Solid Waste Treatment Facilities	24.99
Tri-state Airport	149.47
Yeager Airport	93.19
Broadband	3.92
Gas Pipes	4.42
National Waterway Network	40.46
Power Lines	4.72
Oil Pipes	8.81
Railroads	4.71
Sewer Lines	6.99
Water Lines	6.99





### Site's General Info

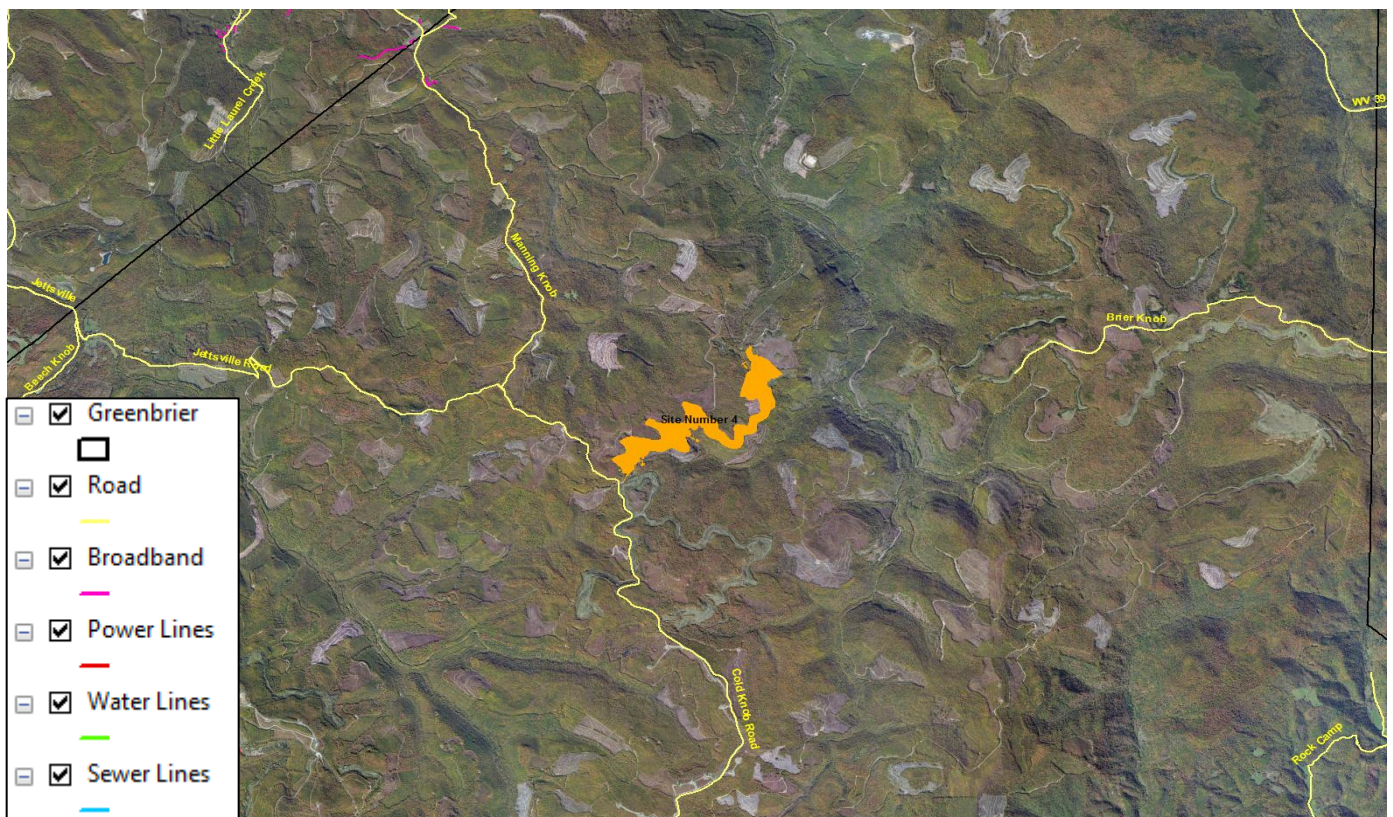
Permittee	South Fork Coal Company Llc
Facility Name	unknown
Permit ID	S013878
Issue Date	6/16/1978
Expiration Date	6/14/2017
Current Acres	308.42
Lat	38° 08' 30.0000"
Long	80° 29' 24.0000"
Nearest Post Office	Richwood

Site Number	<b>4</b>
Suitability Ranking	<b>4</b>
Total Score	<b>142.5</b>

Site number 4 has great access to water and sewer lines, but is further from broadband and roads. It also has a greater distance to state airports.

### Distance Analysis Results

Existing Highway	8.32
Proposed Highway	64.91
Intermodal Terminal Facilities	60.97
Interstate	25.51
National Waterway Network Ports	138.92
Sewer Treatment Facilities	9.91
Solid Waste Treatment Facilities	23.71
Tri-state Airport	148.22
Yeager Airport	91.92
Broadband	4.16
Gas Pipes	2.98
National Waterway Network	40.07
Power Lines	5.09
Oil Pipes	7.38
Railroads	5.11
Sewer Lines	5.55
Water Lines	5.55





### Site's General Info

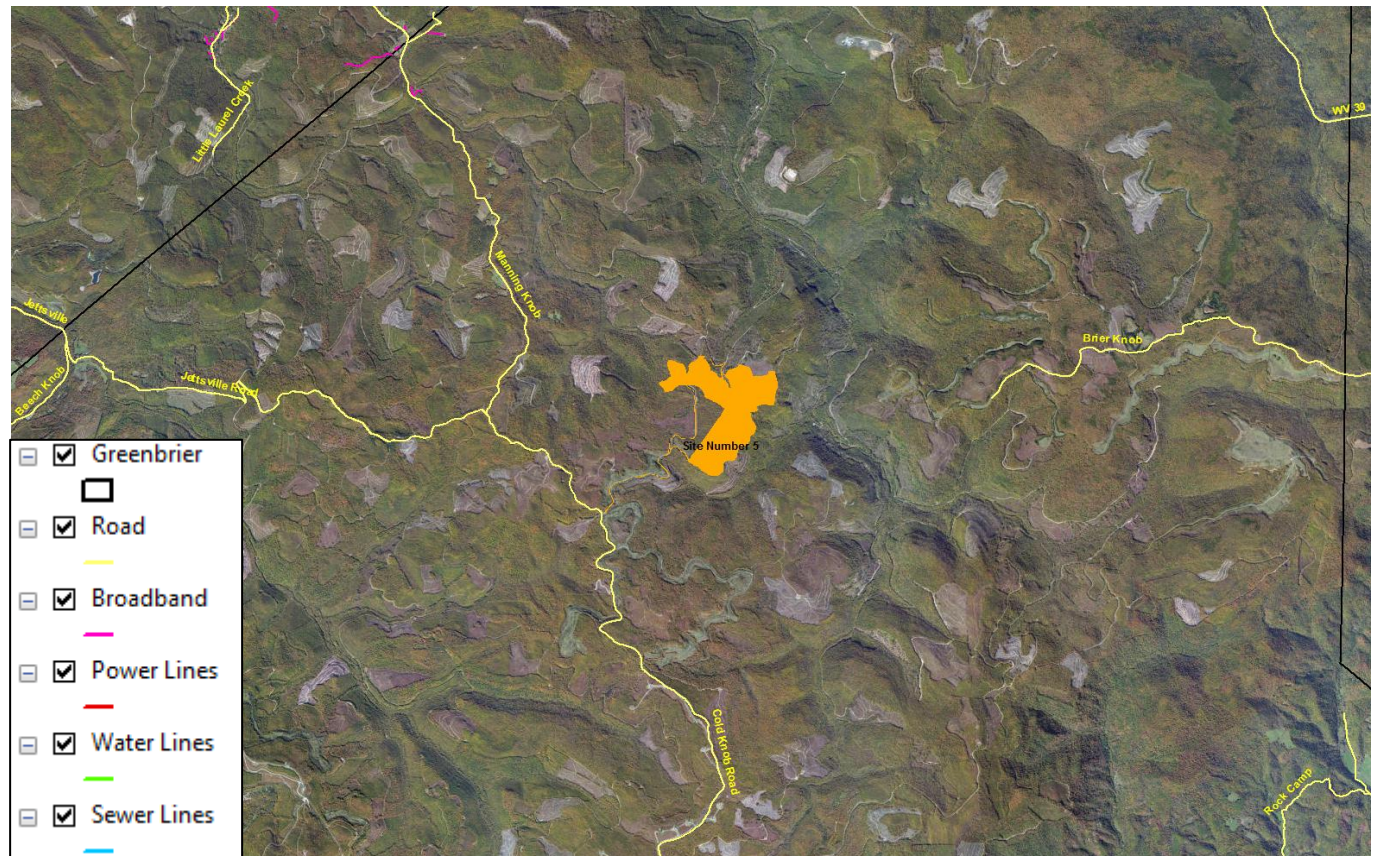
Permittee	South Fork Coal Company Llc
Facility Name	Lost Flats #2
Permit ID	S303393
Issue Date	2/1/1995
Expiration Date	2/1/2015
Current Acres	393.25
Lat	38° 09' 07.0000"
Long	80° 28' 13.0000"
Nearest Post Office	Williamsburg

Site Number	<b>5</b>
Suitability Ranking	<b>5</b>
Total Score	<b>86.75</b>

Site 5 is the lowest scoring site in the model. Though it has shorter distances to sewer and water lines than some, its distance from broadband, treatment facilities, and roads make the site score lower.

### Distance Analysis Results

Existing Highway	9.60
Proposed Highway	66.11
Intermodal Terminal Facilities	62.26
Interstate	26.69
National Waterway Network Ports	140.20
Sewer Treatment Facilities	11.20
Solid Waste Treatment Facilities	25.00
Tri-state Airport	149.49
Yeager Airport	93.20
Broadband	4.19
Gas Pipes	2.81
National Waterway Network	41.17
Power Lines	6.36
Oil Pipes	7.21
Railroads	6.04
Sewer Lines	5.31
Water Lines	5.31



## **I. Introduction**

Senate Bill (SB) 603, passed in the 2001 Legislative Session, mandates the development of a Land Use Master Plan (LUMP) by counties with surface mining operations. The creation of a LUMP would facilitate the development of economic or community assets, secure developable land and infrastructure, and ensure that post-mining land use proposed in any reclamation plan is in compliance with the specified land use in the approved LUMP. In order to promote acceptable principles of smart growth within the desired community it has become evident that a sustainable land use plan is needed to determine development needs within a community. The detailed document addresses the physical development needs of properties within the coalfield counties and provides guidelines, strategies, and a framework for future decisions relating to land use and projected community needs.

The 1977 Surface Mining Control and Reclamation Act established a program for the regulation of surface mining activities and the reclamation of coal-mined lands. The Act requires that coal operators minimize the disturbance and adverse impact on the environment and community in addition to restoring the mined property to its approximate original contour. Special provisions are granted for operators who offer development plans for post-mining land use, in which the coal operators (private sector) make capital investments towards land development that would benefit the community (public sector) affected by the mining operations. This unique opportunity, also known as Public-Private Partnership (P3), has far-reaching consequences on those communities with coal mining operations. The operators utilize the LUMP, created by the county officials with post-mine land use in mind, to gain insight into the land and infrastructure needs of the local community and then materialize the development opportunities described in the LUMP. The LUMP leverages private investment to facilitate public development, which is critical to the sustainability of counties and communities. Community sustainability requires a transition from poorly managed land to land use planning practices that create and maintain efficient infrastructure, ensure close-knit neighborhoods and sense of community, and preserve our natural systems.

RTI, a nationally recognized center of excellence for rural transportation research, was established through the Transportation Equity Act for the 21st Century passed by Congress in 1998 and is funded through a grant from the Research and Innovative Technology Administration (RITA) of the US Department of Transportation. As a University Transportation Center, RTI has cultivated relationships with private industry and public agencies to leverage resources, technology and strategic thinking to improve mobility and to stimulate economic development. RTI has taken the lead in conducting site-specific research, supporting multimodal planning and analysis to improve mobility and global connectivity for rural regions. The Office of Coalfield Community Development (OCCD) was created by the 1999 Legislative Session to assist communities affected by surface mining activity throughout the State. With the passage of SB 603 in 2001, the responsibilities of the OCCD changed to include working with local

economic development agencies to develop land use master plans and include the recommendations of local economic redevelopment authorities in the reclamation plans of surface mine permits. The OCCD established criteria to consider development of these sites, provided for certain land uses as post-mining land uses and stipulated that master plans must comport to environmental reclamation requirements. The office allows existing and future surface mining permits to include master plan criteria and reclamation standards.

This plan provides information and analysis specifically for Greenbrier County. Greenbrier County is one of the more successful coal counties and has managed to use its land to diversify its economic portfolio, providing jobs and opportunities. However, the only major post-mine land use is the Beech Ridge Wind Farm, a unique yet at times controversial energy project. The project is still a classic example of taking advantage of the opportunities of post mine land, and this report will assist in the planning process for future development.

## **II. Planning Area**

This history comes from Greenbrier County's website:

“Greenbrier County is the second largest county in West Virginia, with 1021 square miles and was created in March of 1778 from portions of Montgomery and Botetourt counties (Virginia) and was named for its primary river. Greenbrier County is considered the "mother county" of southern West Virginia as Boone, Cabell, Jackson, Kanawha, Mason, Monroe, Nicholas, Putnam, Roane, Wayne and Webster counties were created either in part or in whole from the original territory.”<sup>1</sup>

Greenbrier County's chief product was historically agricultural products, and coal mining is deeply seated in the region.<sup>2</sup> However, in recent times the hospitality industry has taken advantage of the natural attributes of the county to become a major attraction for tourism. Education and healthcare have become the primary products of the county, showcasing both the versatility and diversity in the county economy.

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<sup>1</sup> “County History,” Greenbrier County, Accessed April 30, 2013, [www.greenbriercounty.net](http://www.greenbriercounty.net)

<sup>2</sup> Ibid.



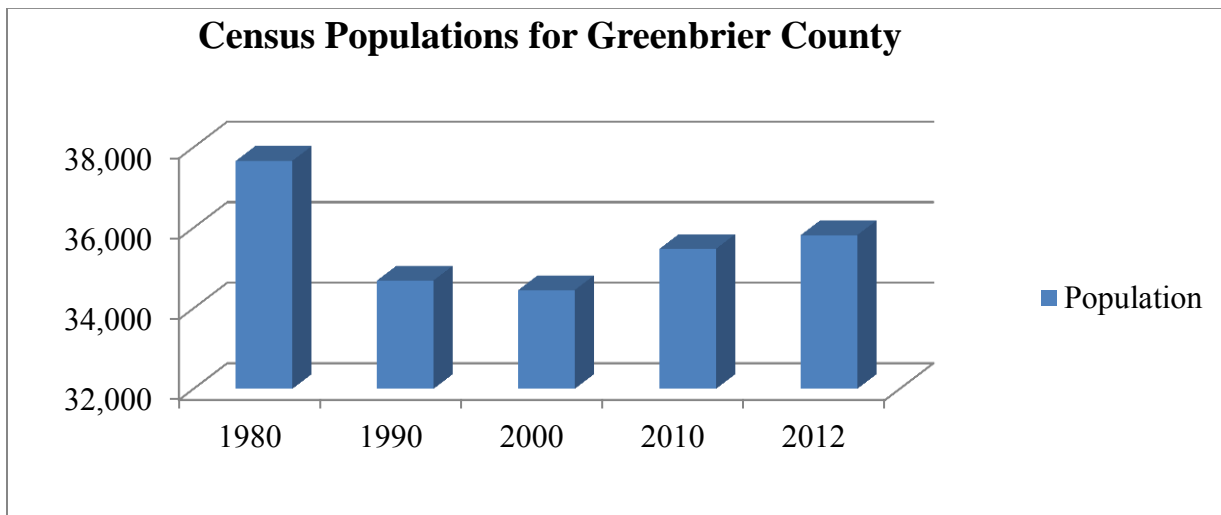
### III. Existing Conditions

This information will provide a background understanding of the demographic trends in the county. This base information is meant to provide overall detail on Greenbrier County's status as it stands. Part IV will deal with possible future site development information, to be considered with the demographic data to target strategies for investment.

#### Population

The population of Greenbrier County in 2011 was 35,498 according to the 2011 American Community Survey (ACS) 5-year estimates, ranking it 16<sup>th</sup> in county population among the 55 counties in West Virginia.<sup>3</sup> The decennial censuses show that Greenbrier County was steadily decreasing in population until around 2000, at which point the population began to recover. The drop in population was not as steep as in other counties in WV, with the lowest decennial population reached being 91.5 percent of the 1980 population, a difference of only 8.5 percent.

**Figure 1**

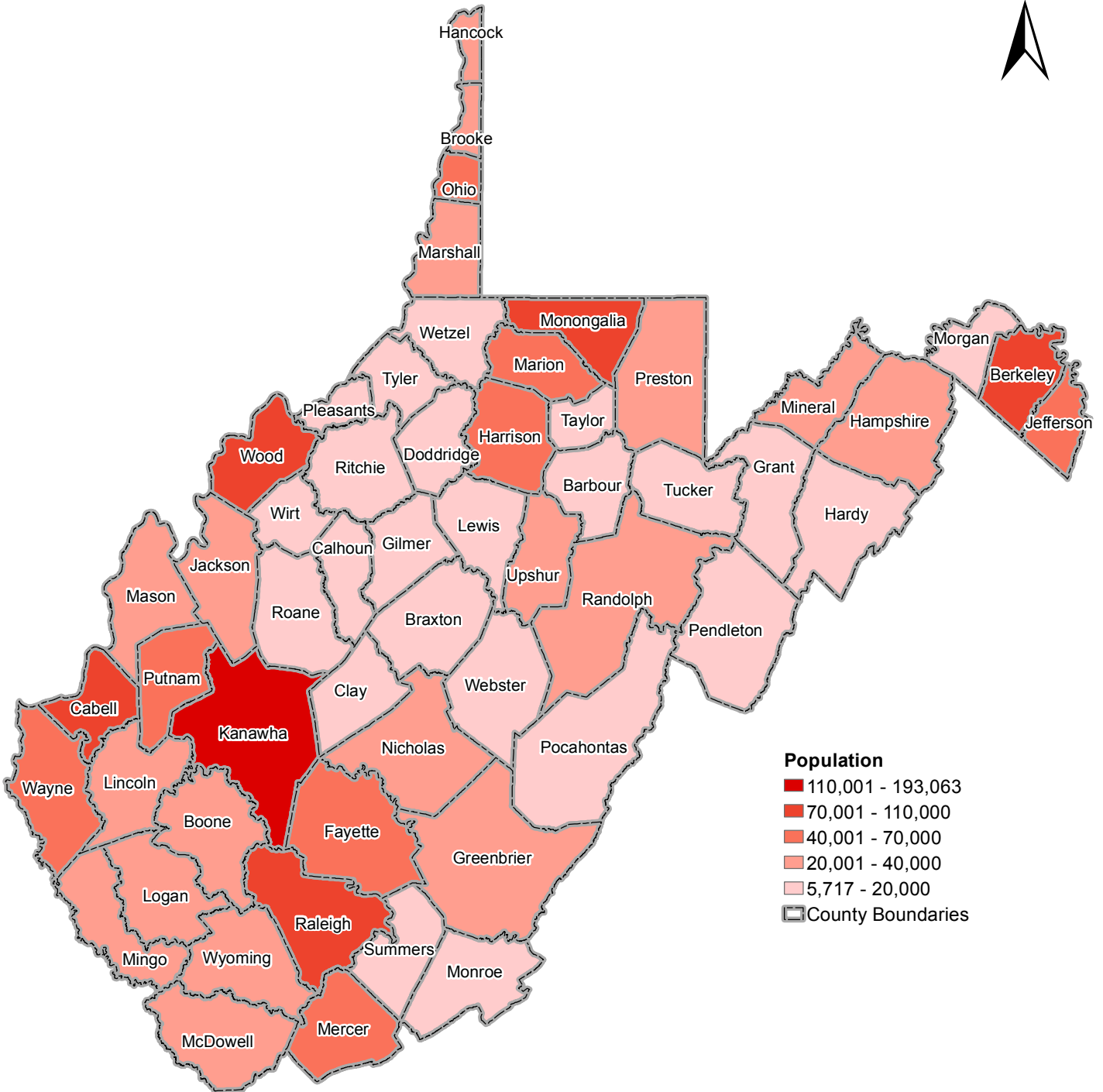


Source: Stats Indiana, USA Counties in Profile

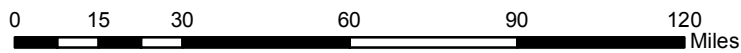
Map 1 illustrates the Greenbrier County population compared to West Virginia overall. Greenbrier is at the lower end of the spectrum but is not as rural as many other counties in central and eastern West Virginia

<sup>3</sup> United States Census Bureau, "2011 American Community Survey 5-year Estimates," Accessed April 20, 2013, [www.factfinder2.census.gov](http://www.factfinder2.census.gov)

# Demographic Population



**Population**  
■ 110,001 - 193,063  
■ 70,001 - 110,000  
■ 40,001 - 70,000  
■ 20,001 - 40,000  
■ 5,717 - 20,000  
□ County Boundaries



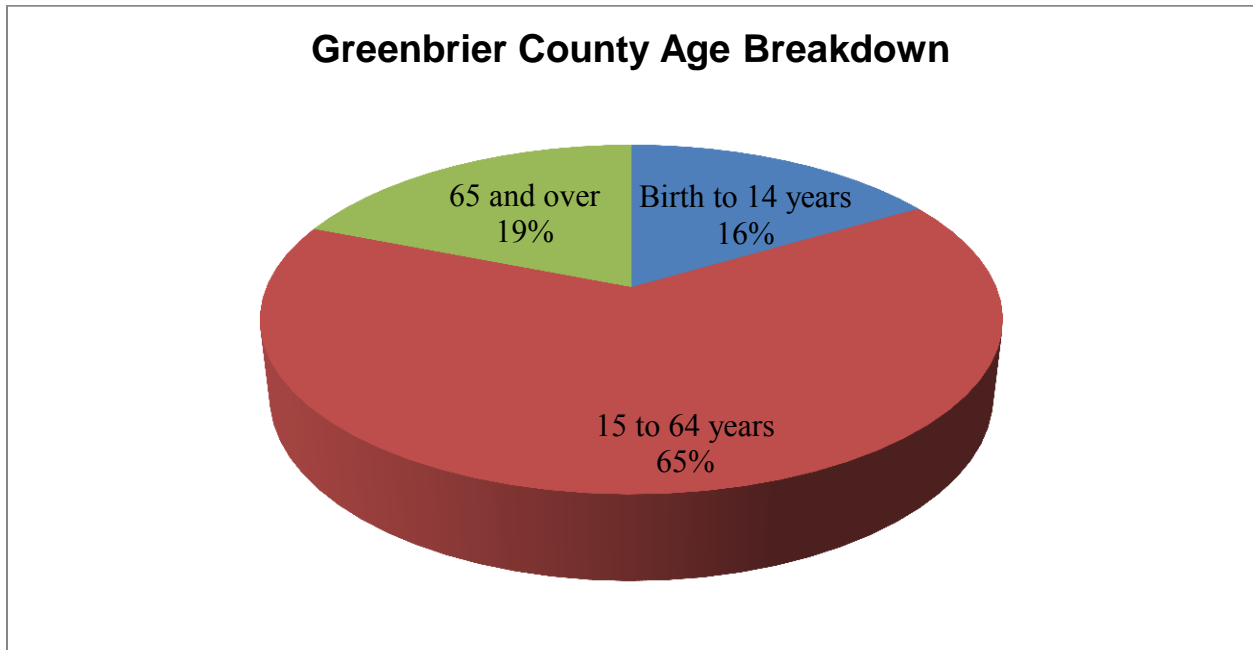
Source: United States Census Bureau 2011

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According to the ACS, 26 percent of Greenbrier County residents are 60 years of age and over, while almost 17 percent are between 5 and 17 years of age and 5.4 percent are below the age of 5. As a result, approximately 5,000 people are of retirement age. The median age in Greenbrier is 44.6, which is the same as the West Virginian median age (Map 2). The majority of the population is of working age, as denoted in Figure 2.

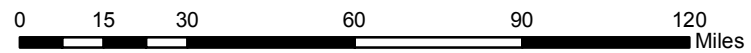
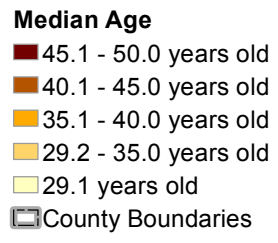
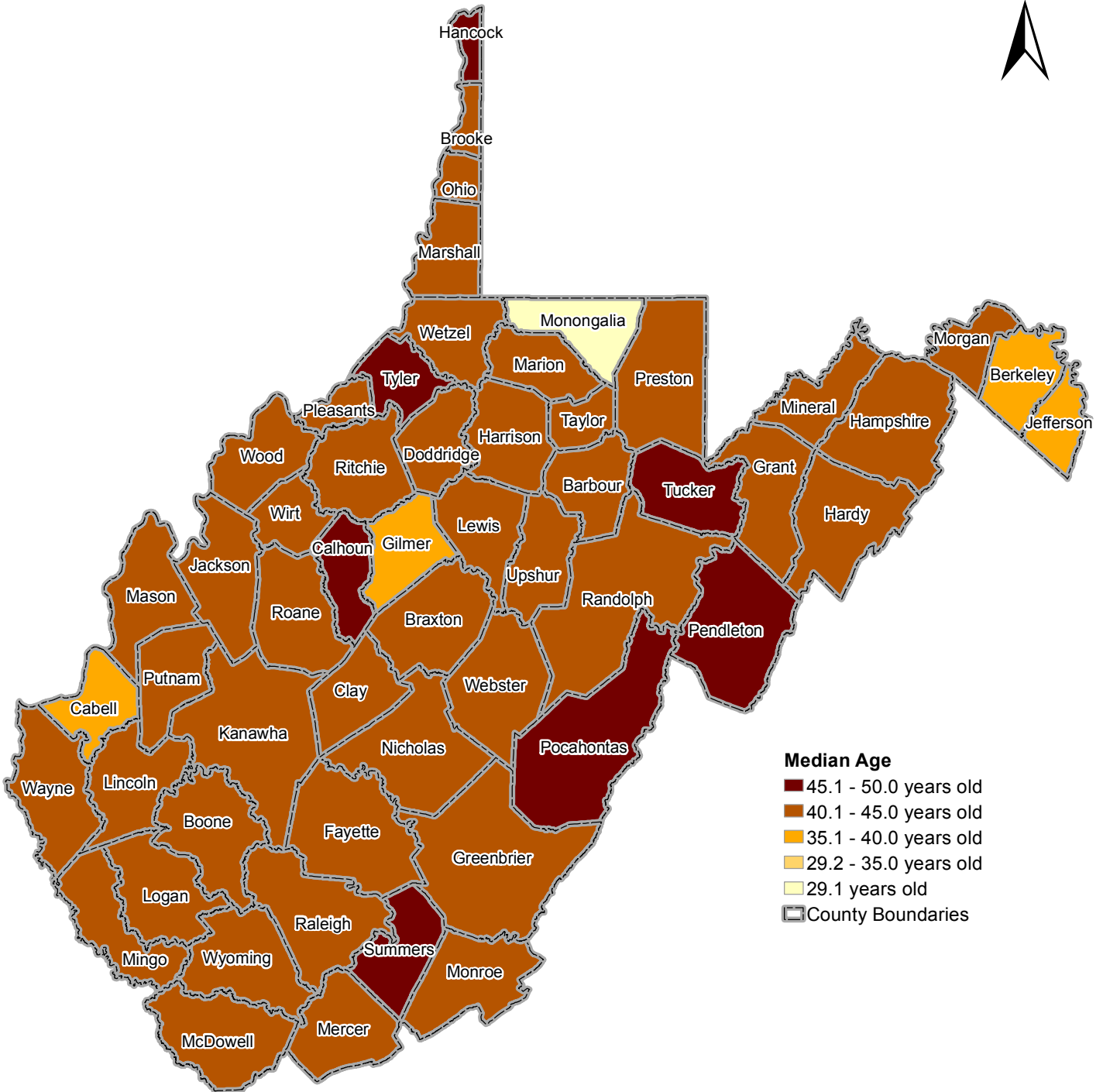
**Figure 2**



Source: 2011 American Community Survey 5-Year Estimate Calculation



# Demographic Median Age



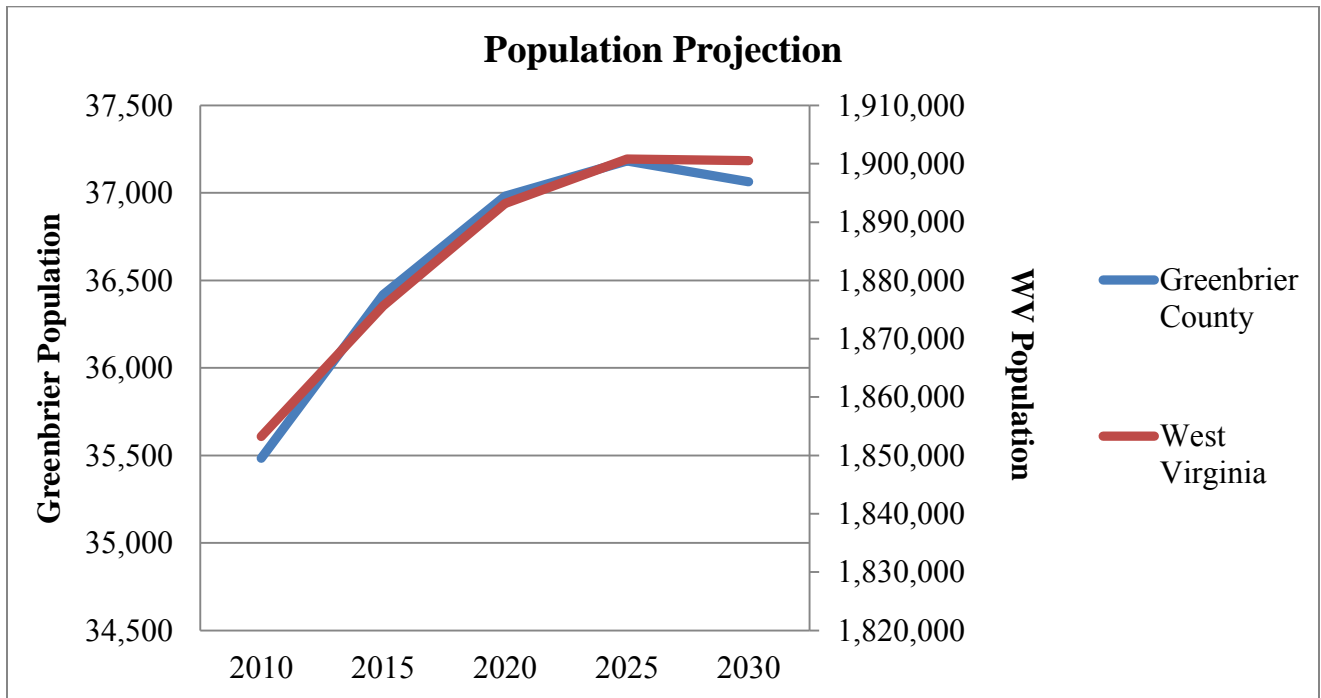
Source: United States Census Bureau 2011

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The Bureau of Business and Economic Research at West Virginia University projects a 4.5 percent increase in the Greenbrier County population between 2010 and 2030, which tracks the projected growth of West Virginia almost exactly.<sup>4</sup> The model for the projection is based on past population patterns and statistics, and should not be taken as permanent. The projected growth, mostly coming from retiring seniors and a revived and refocused tourism industry, will be incredibly beneficial for Greenbrier’s future plans, supplemented by the information in this report.

**Figure 3**



Source: WVU Bureau of Business and Economic Research

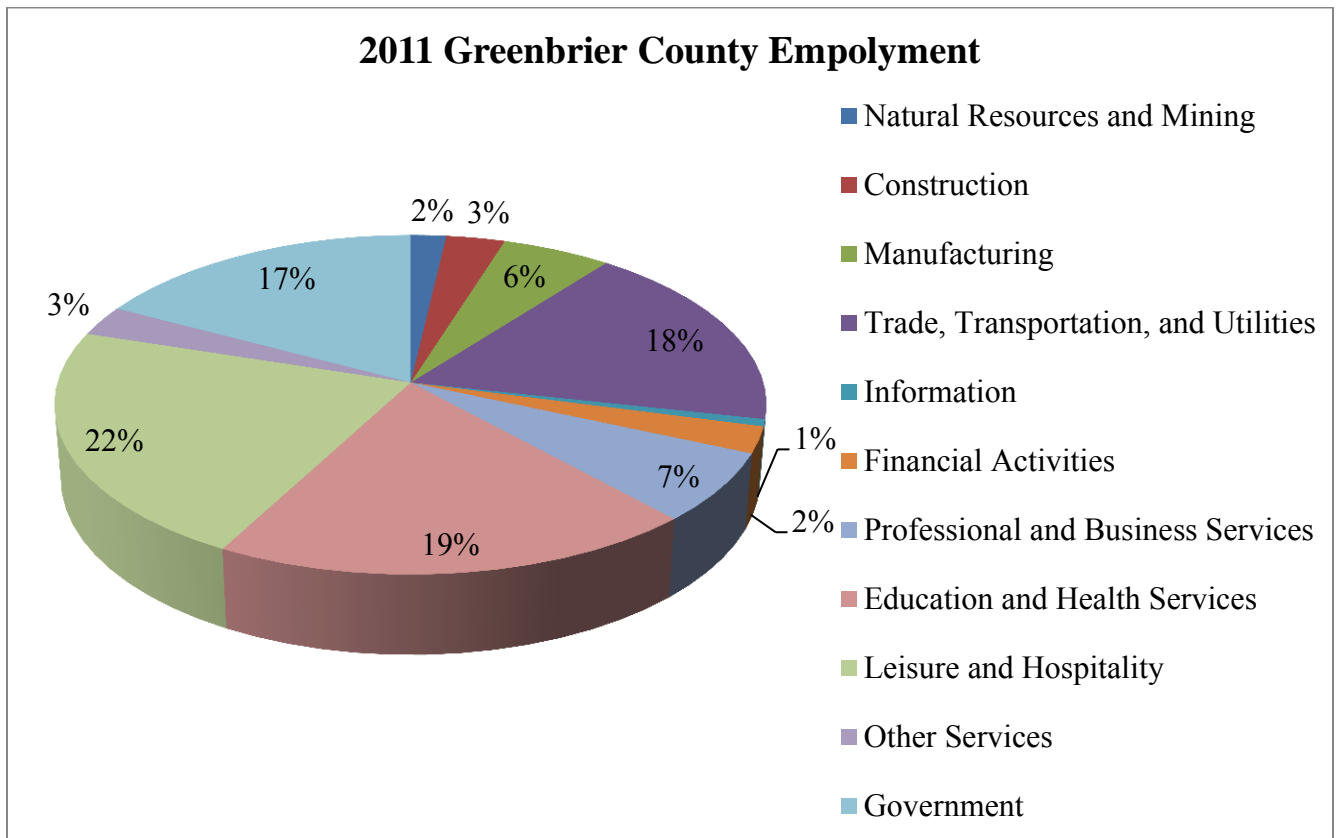
**Employment**

Workforce WV has a complete dataset on employment numbers and wages. The total number of employed in 2011 was 13,505. Approximately 22 percent of wage earners in Greenbrier County worked in leisure and hospitality, mostly due to the Greenbrier Hotel and related tourist industries. Greenbrier County also has a high level of government employees, which is consistent with West Virginia employment patterns as a whole.

<sup>4</sup> Christiadi. “Population Projection for West Virginia Counties.” Bureau of Business and Economic Research, College of Business and Economics, West Virginia University, Morgantown, WV (August 2011).



**Figure 4**

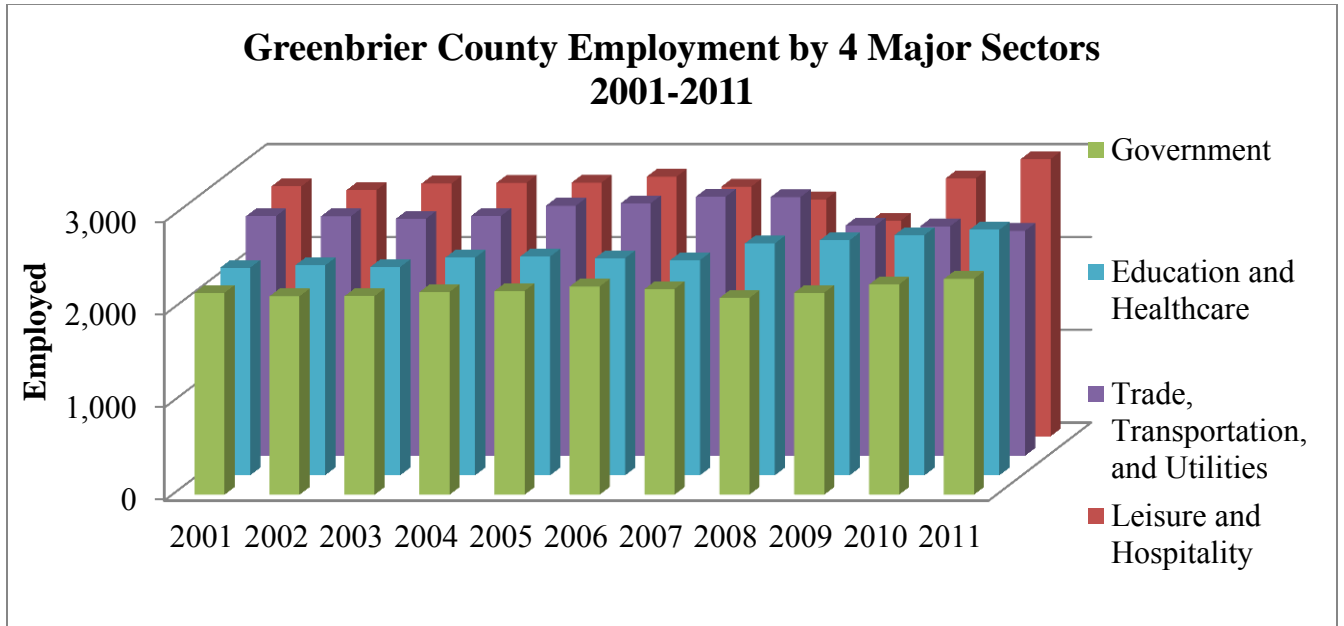


Source: Workforce WV

Four sectors have been the major contributors to employment throughout the past decade: Leisure and Hospitality; Trade, Transportation, and Utilities, Education and Health Services, and Government. Leisure and Hospitality has been the highest employer for all but three years, and Trade, Transportation, and Utilities and Education and Healthcare have come exceptionally close and in some cases become the highest employing sectors. This shows a healthy economic diversification in the county that may be useful in withstanding business cycles. The fall in employment in Leisure and Hospitality may also be traced to the troubles of the Greenbrier Hotel, which went bankrupt in 2009 and was forced to furlough almost 700 workers<sup>5</sup>, just under a third of all workers in hospitality and approximately 5 percent of the entire county labor force. This was stoppered when the Greenbrier was bought by the Justice Family Group, LLC, and the entire sector has since recovered.

<sup>5</sup> “Greenbrier resort to lay off half its employees,” *The Associated Press*, January 13, 2009, Accessed May, 20, 2013, [http://usatoday30.usatoday.com/travel/hotels/2009-01-13-greenbrier-layoffs\\_N.htm](http://usatoday30.usatoday.com/travel/hotels/2009-01-13-greenbrier-layoffs_N.htm).

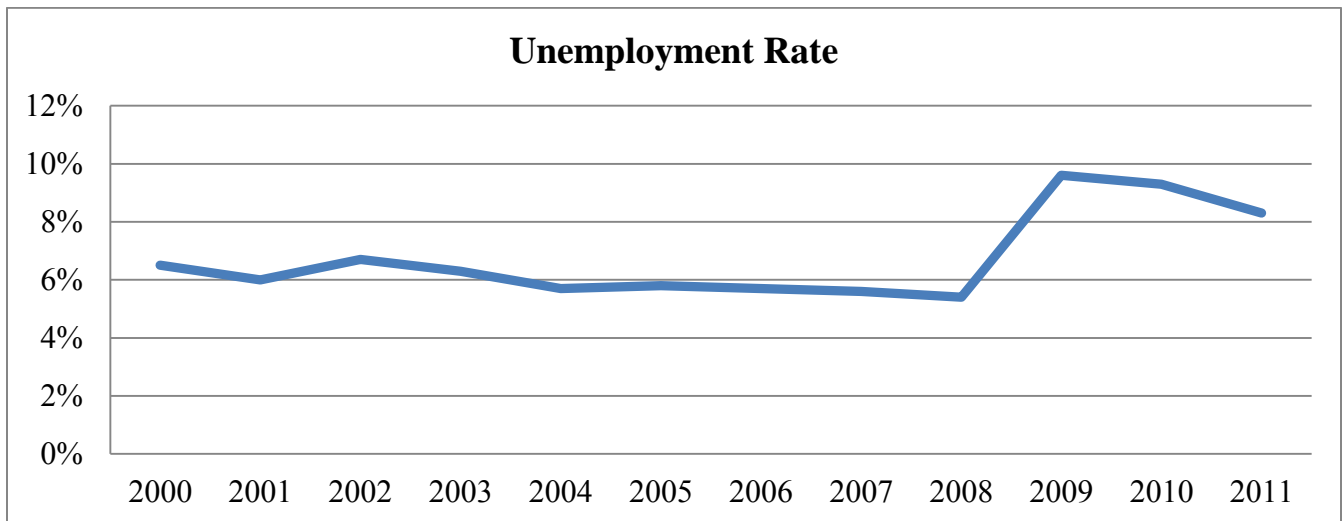
**Figure 5**



Source: Workforce WV

The civilian labor force in the county, the statistic most interesting to determine potential investors, is in the middle of the spectrum. As Map 3 shows, Greenbrier’s participation rate appears to be the mean for the State. Unemployment over the past decade was remarkably steady until 2008. This is because the three top employing sectors are notoriously susceptible in recessions (Figure 6). The unemployment rate increased sharply at the end of the decade, due to the recession and the cost-saving measures of tourism and trade, including the Greenbrier Resort. Map 4 provides 2011 unemployment rates for Greenbrier compared with the rest of the State.

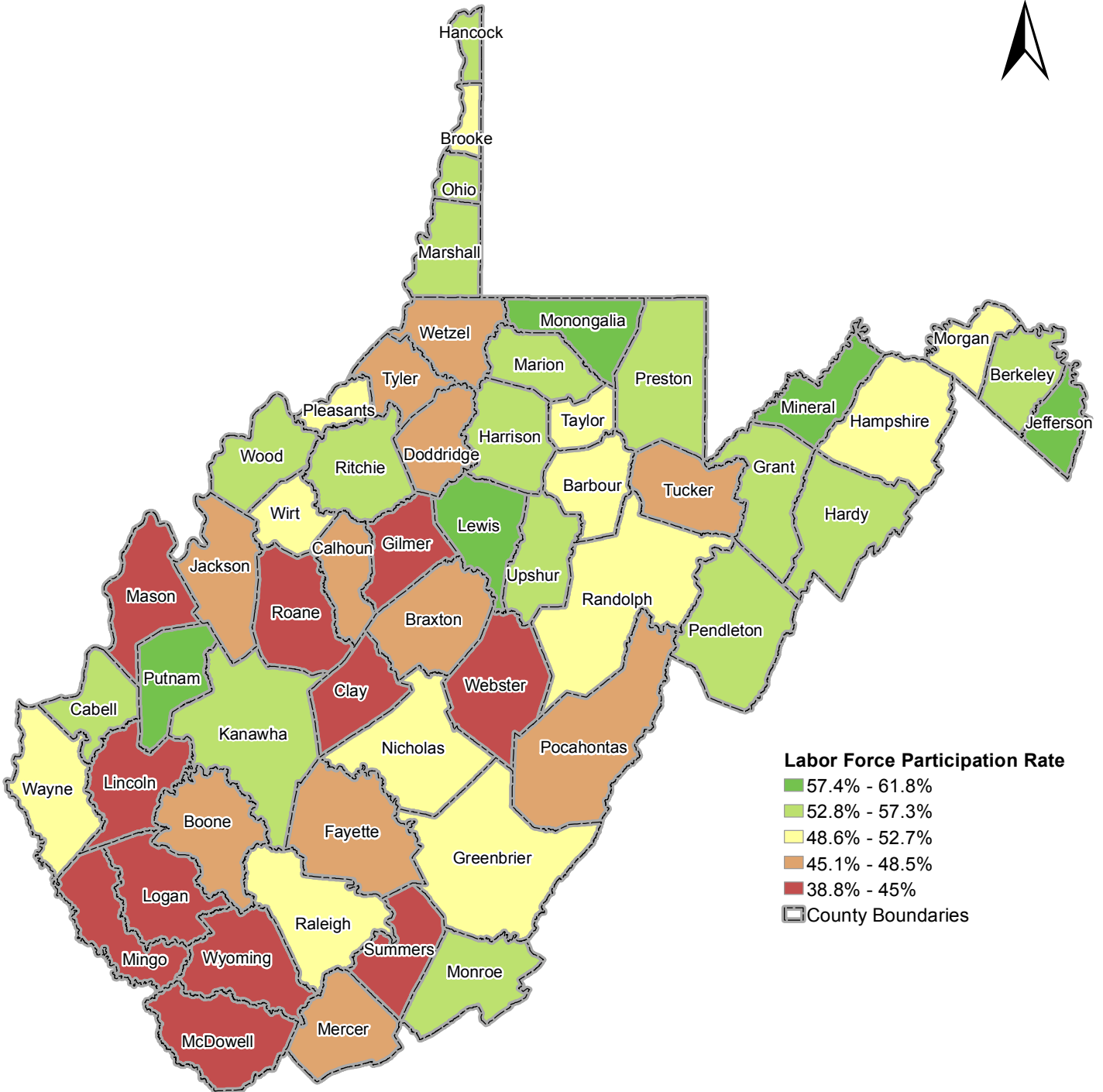
**Figure 6**



Source: Workforce WV

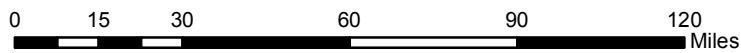
# Demographic

## Labor Force Participation Rate



**Labor Force Participation Rate**

- 57.4% - 61.8%
- 52.8% - 57.3%
- 48.6% - 52.7%
- 45.1% - 48.5%
- 38.8% - 45%
- County Boundaries

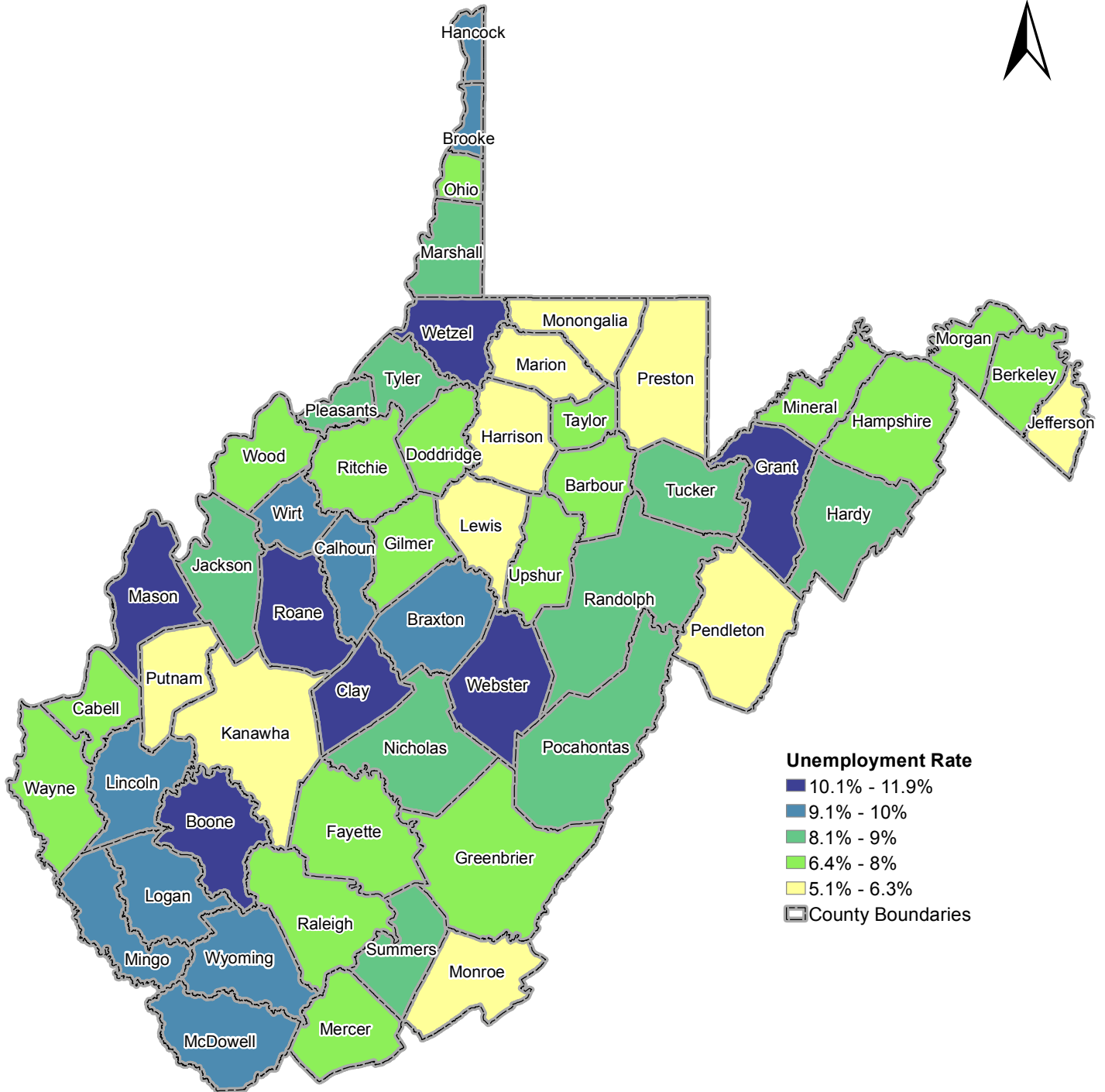


Data Source: Workforce WV 2011

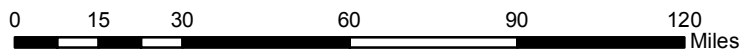
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# Demographic Unemployment Rate



**Unemployment Rate**  
 ■ 10.1% - 11.9%  
 ■ 9.1% - 10%  
 ■ 8.1% - 9%  
 ■ 6.4% - 8%  
 ■ 5.1% - 6.3%  
 □ County Boundaries



Source: Workforce WV 2011

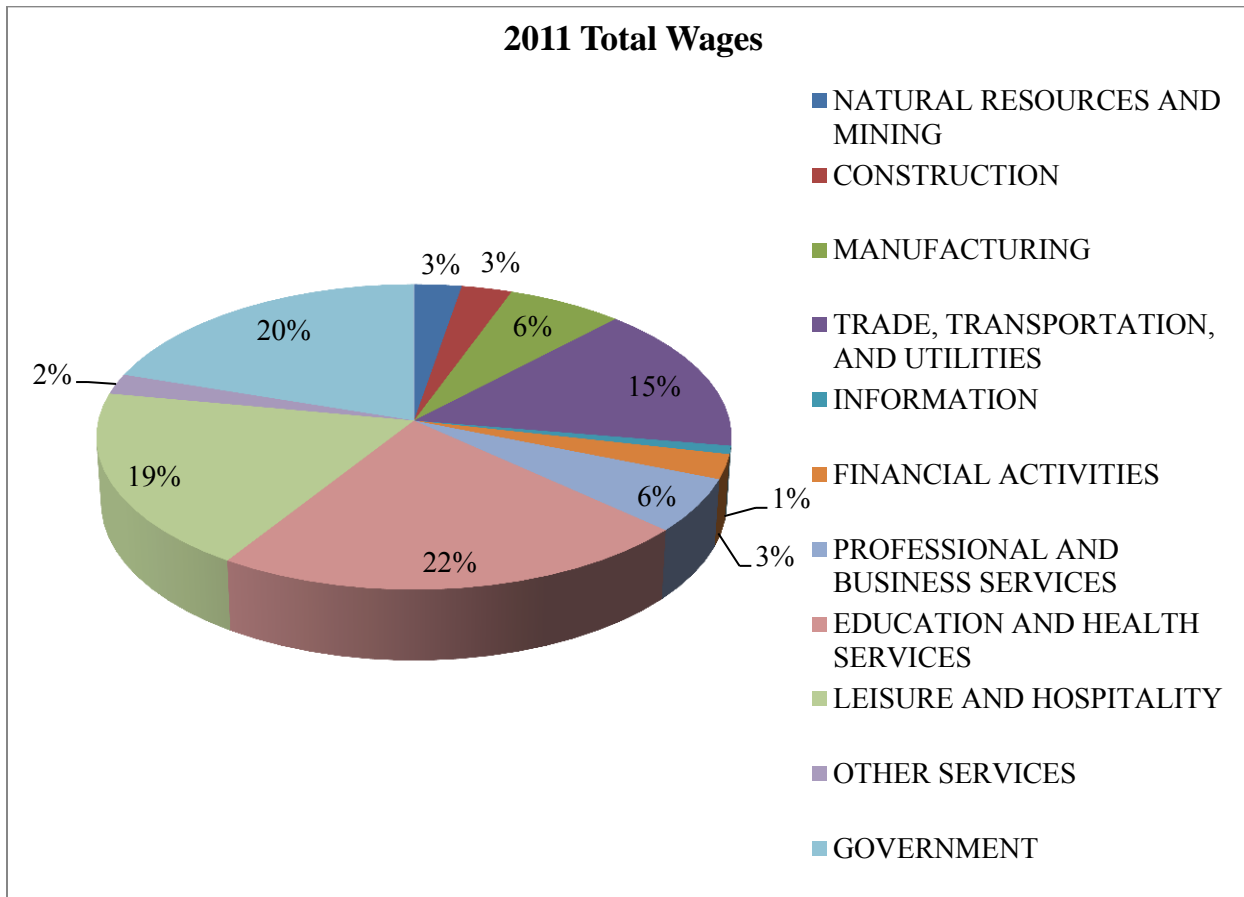
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## Wages and Income

Greenbrier County's wage contributors are varied. The four highest employing sectors had an almost equal division of total wages, though education and health services contributed more (Figure 7). This showcases a fairly diversified economy, slightly more dependent on government revenue than normal, but also less susceptible to business cycles.

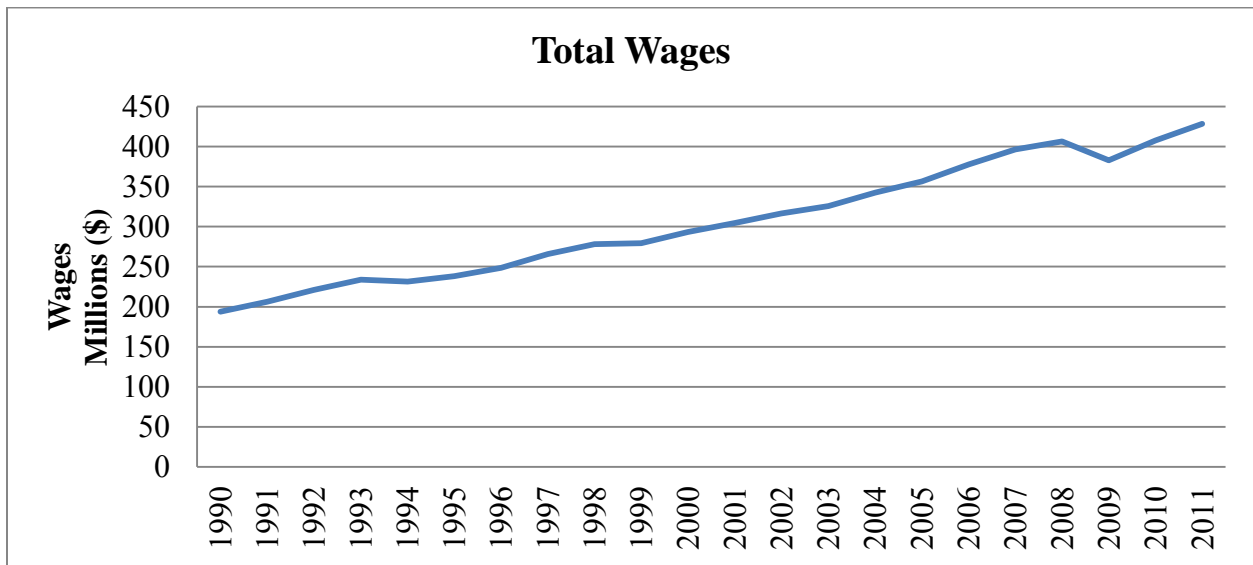
**Figure 7**



Source: Workforce WV

Historically, wages for Greenbrier County have shown a tendency to rise. Greenbrier County has managed to market itself as an adventure and luxury tourist area, thus maintaining its total wage growth for the past two decades. Figure 8 shows total wages for Greenbrier County, which steadily rose until 2008. The year 2008 was the year the recession began, and many people began cutting vacations from their budgets. The Greenbrier also began furloughing employees during this time, before Jim Justice took control. A look at the changes in employment at this time reveals these forces at work both in leisure and hospitality and trade, transportation, and utilities.

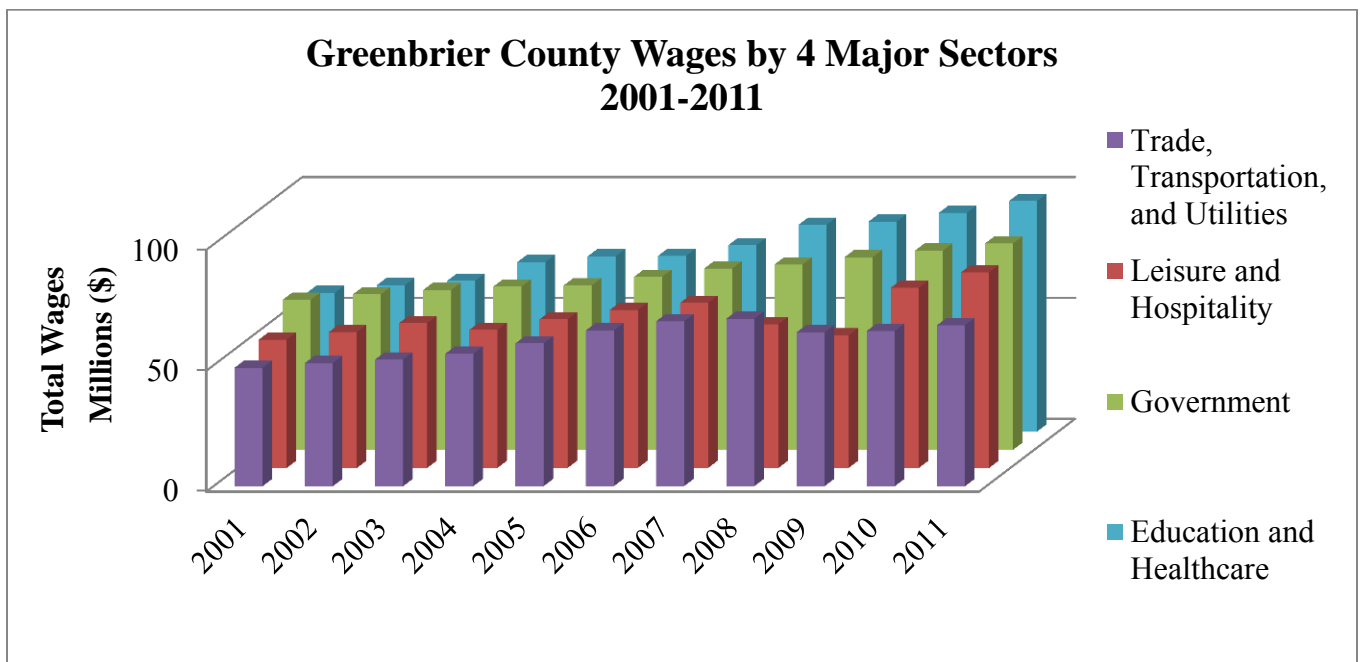
**Figure 8**



Source: Workforce WV

Figure 9 confirms the general rise in wages until the troubled years beginning in 2008. Education and healthcare and government have risen steadily, while the other major sectors showed a steady rise with a decline during the recession, steepest in leisure and hospitality for aforementioned reasons. Both sectors have shown decent recoveries from their respective issues, however.

**Figure 9**

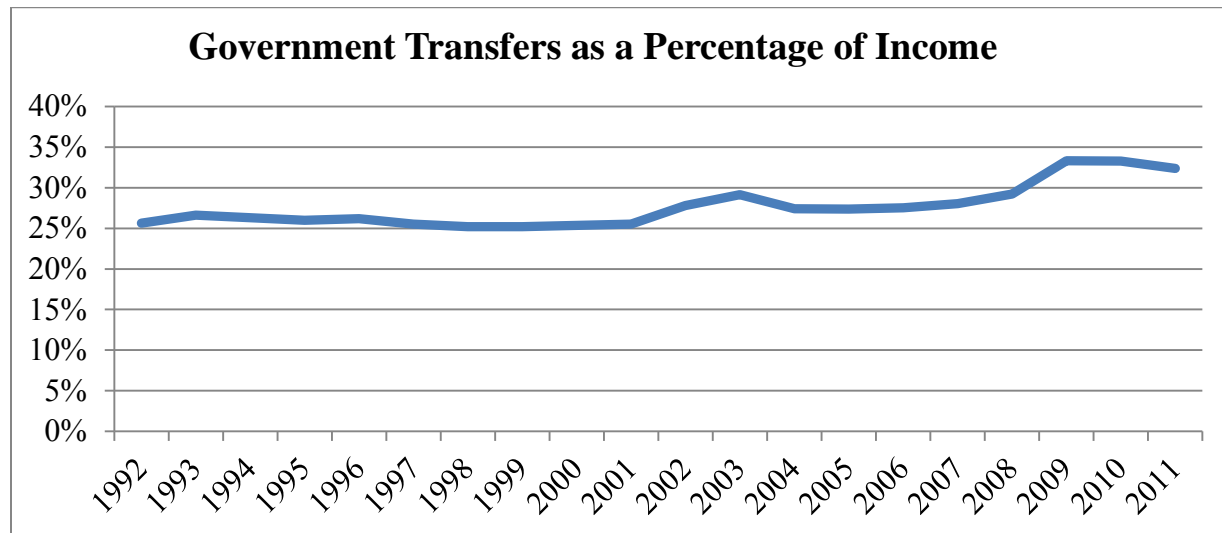


Source: Workforce WV



In most American counties, one would find that the majority of income for people stems from wages. In Greenbrier County, however, an important distinction must be made between income and wages. Income is the total receipt of earnings resulting from any economic activity, while wages are derived from actual work in an employed setting. Therefore, dividends from stockholdings are considered income, but not wages. The distinction is necessary in the case of Greenbrier County because in 2011, Greenbrier County wages were \$428 million for all industries.<sup>6</sup> Income for the County was larger (around \$1.1 billion). Though there are many components to income other than work earnings, 32 percent of total Greenbrier County income is derived from government transfers.<sup>7</sup> Government transfers accounted for about 95 percent of total transfers to Greenbrier County, dwarfing transfers from private institutions such as charities. Greenbrier County has depended heavily on government transfers for the past 30 years, with said transfers contributing a quarter to over a third of county income. This could be due to a large number of retirees and/or a large number of welfare recipients.

**Figure 10**



Source: United States Bureau of Economic Analysis

The total personal income of Greenbrier County is therefore made up of 32 percent government transfers and about 33 percent wages from work. Greenbrier County is close to being the median in West Virginia, and three other counties (Jackson, Nicholas and Ritchie) have the exact same ratio of government transfers. According to the BEA, per capita income was \$32,130 for Greenbrier County. Earned income, or income from work, is displayed in Map 5, and Greenbrier

<sup>6</sup> “Employment and Wages – 2011, Greenbrier County,” Workforce WV, Accessed February 13, 2013, <http://www.workforcewv.org/lmi/EW2011/ew11x059.htm>

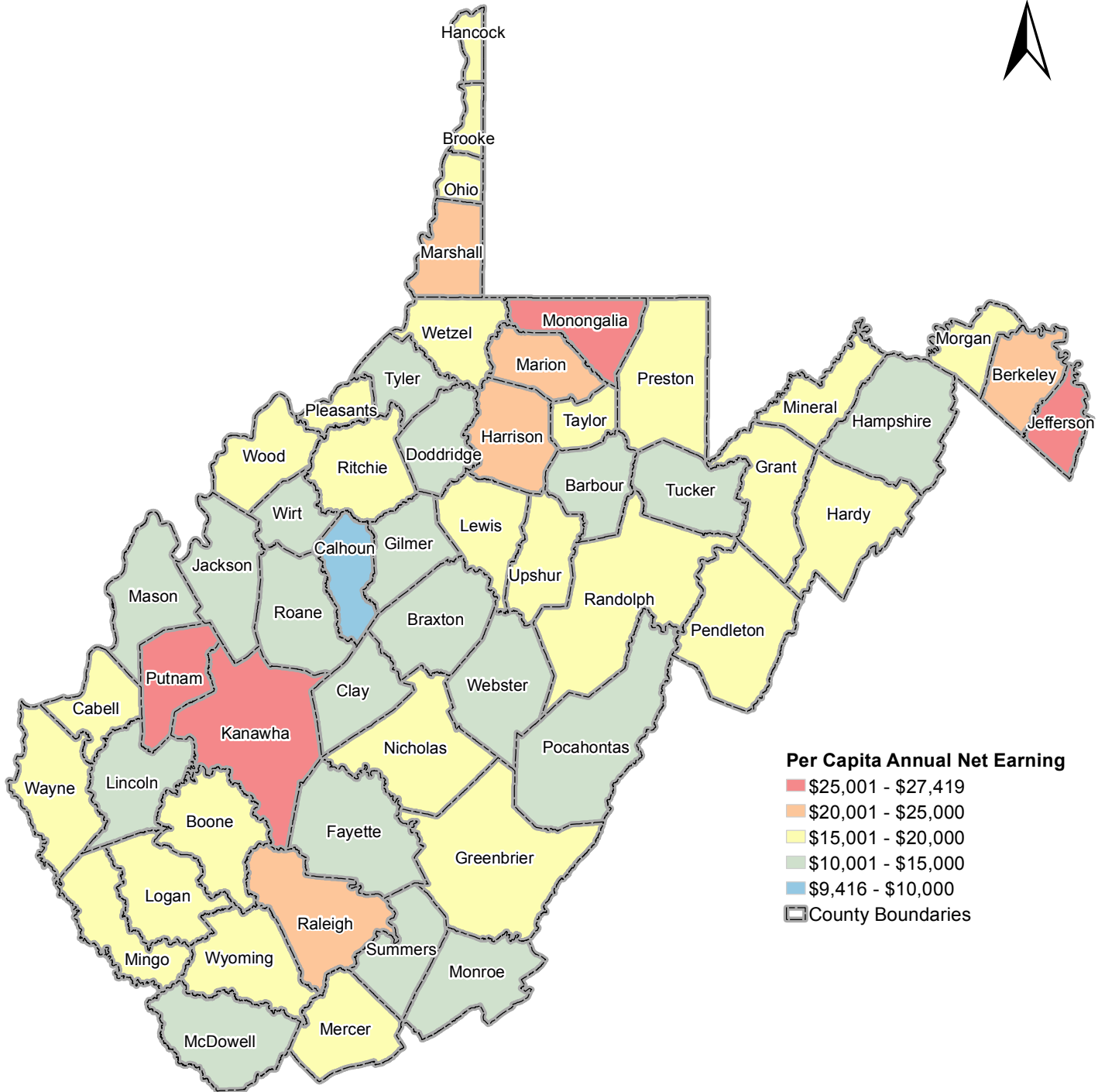
<sup>7</sup> “Tables CA 04 and CA 35 analysis,” Bureau of Economic Analysis, Regional Economic Accounts, Local Area Person Income and Employment, Accessed February 13, 2013, <http://www.bea.gov/regional/index.htm>.

is ranked about the median in earned income in West Virginia. Per capita income has steadily grown for Greenbrier as a result of the mix between wages and transfers.

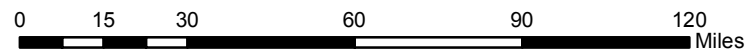
Another measure of economic health is the number of establishments that do business in the area. Map 6 shows the number of establishments in each county in West Virginia. Greenbrier County appears to be at the lowest end of the spectrum, but in reality Greenbrier is on the cusp of the next level of the spectrum, missing the ranks of Putnam, Raleigh, Mercer and others by a mere dozen establishments. Greenbrier should therefore be seen as one of the healthier counties in number of establishments despite having no large cities. This volume can be attributed to the tourism and trade sectors, which are characterized by a high number of competitive firms.

# Demographic

## Per Capita Annual Net Earning



**Per Capita Annual Net Earning**  
■ \$25,001 - \$27,419  
■ \$20,001 - \$25,000  
■ \$15,001 - \$20,000  
■ \$10,001 - \$15,000  
■ \$9,416 - \$10,000  
□ County Boundaries



Source: United States Census Bureau 2011

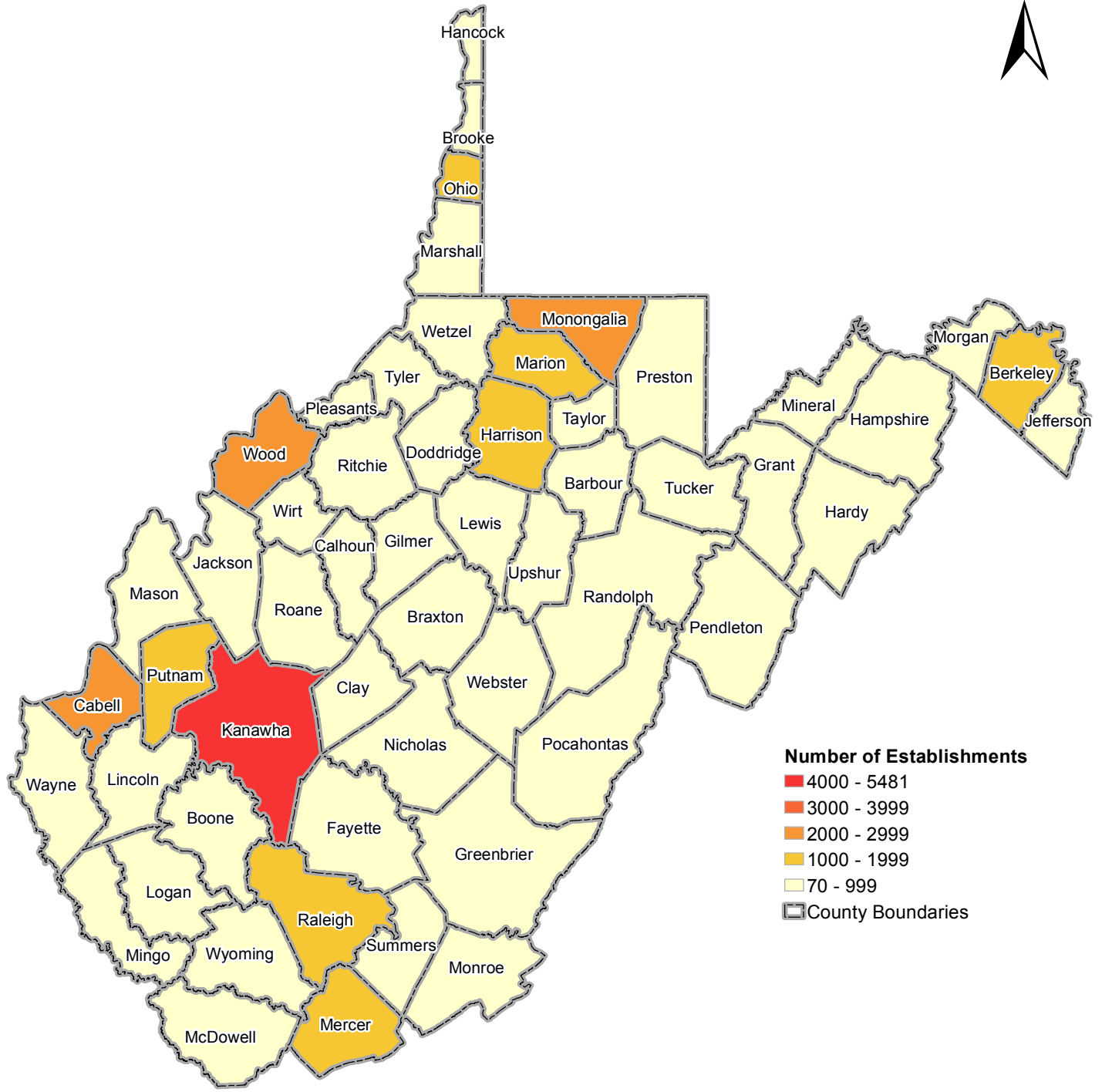
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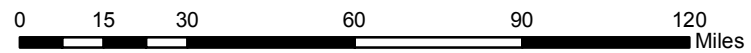
# Demographic

## Number of Establishments



**Number of Establishments**

- 4000 - 5481
- 3000 - 3999
- 2000 - 2999
- 1000 - 1999
- 70 - 999
- County Boundaries



Source: United States Census Bureau 2011

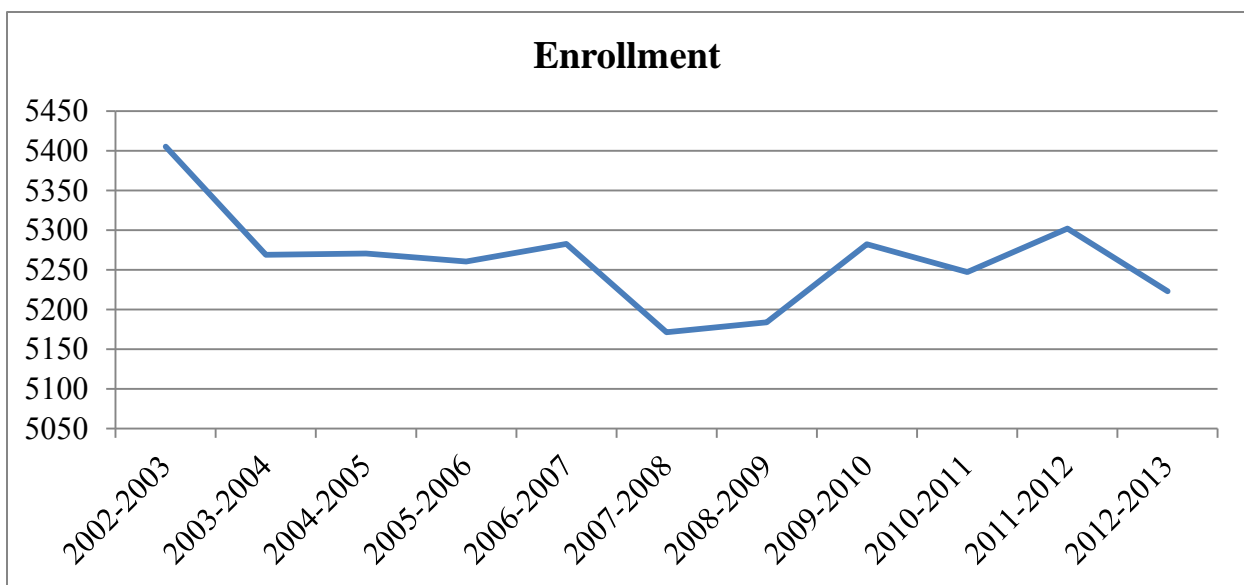
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## **Education**

Greenbrier County has two high schools, two middle schools, and nine elementary schools as of the 2011-2012 school year.<sup>8</sup>

Greenbrier County 2<sup>nd</sup> month school enrollment has varied wildly, and the variations have not been small. A steep drop characterized the 2002 and 2003 school years, and then another drop occurred between 2006 and 2008. As in many topics of education, Greenbrier County 2<sup>nd</sup> month enrollment is at the low end of the spectrum but greater than most counties in central and eastern West Virginia (Map 7).

**Figure 11**

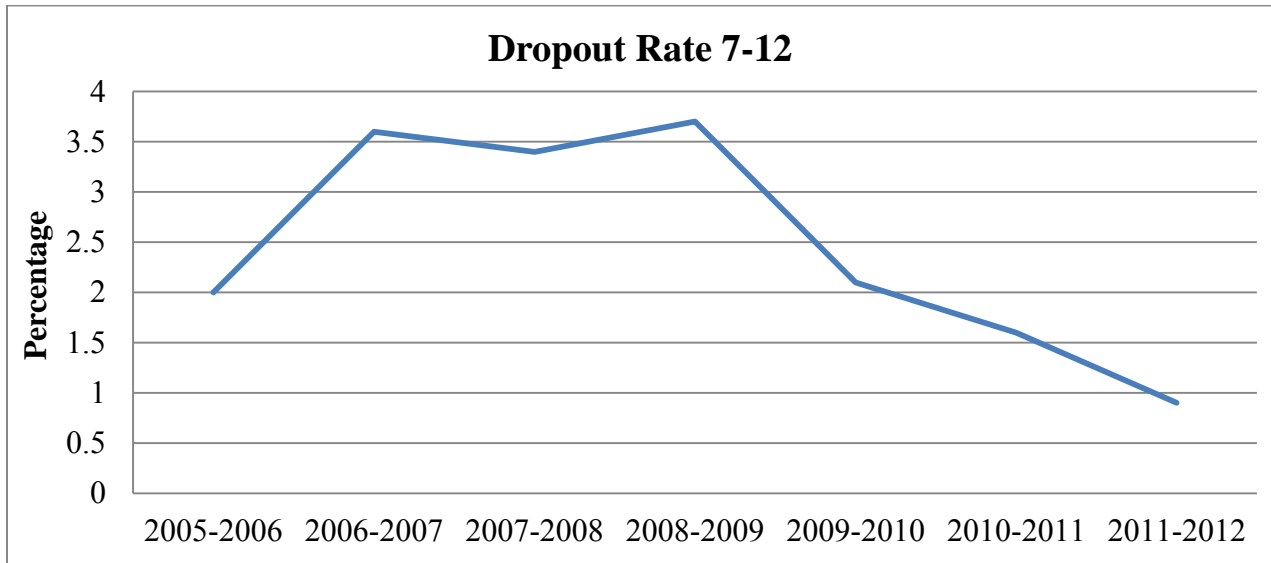


Source: WVEIS

The West Virginia Education Information System (WVEIS) also has dropout rates for the school years from 2005 to 2012. Dropout rates for grades 7-12, which showcase the most likely time for school dropouts, do not follow the total enrollment statistic, as total enrollment is computed with the grades below 7<sup>th</sup> grade as well. Dropout rates were creeping upwards between 2005 and 2008, but then decline radically afterwards. This could be due to the approval in 2008 of a \$37.7 million bond project which led to upgrades and building of new schools and an expansion of Pre-K services, which is a predictor of future school achievement and retention (Figure 12). It would have to be the anticipation of this factor that led to this achievement, however.

<sup>8</sup> “School Profiles,” West Virginia Education Information System, West Virginia Department of Education, Accessed February 13, 2013, [http://wveis.k12.wv.us/nclb/profiles/c\\_profile.cfm?cn=054](http://wveis.k12.wv.us/nclb/profiles/c_profile.cfm?cn=054).

**Figure 12**



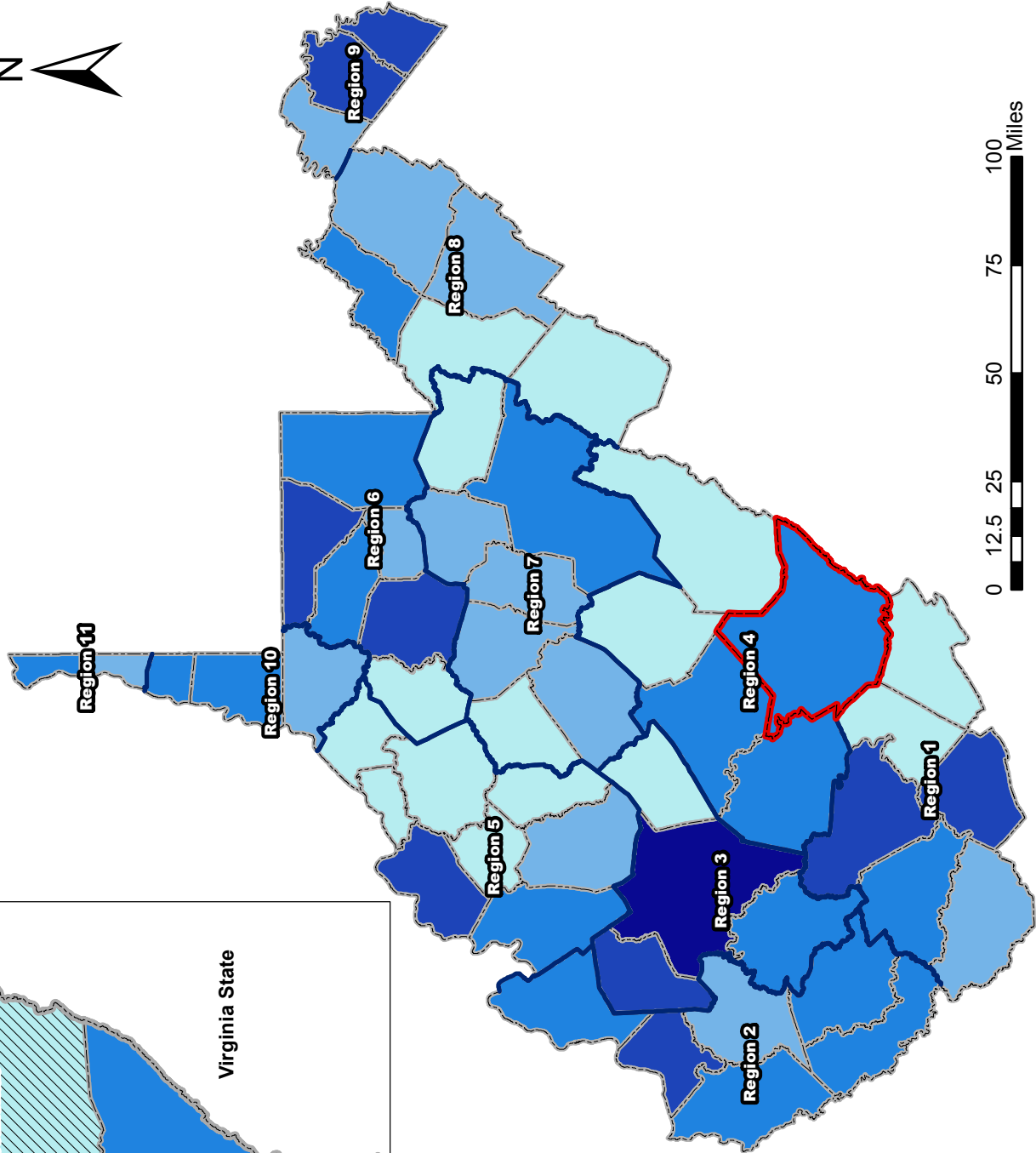
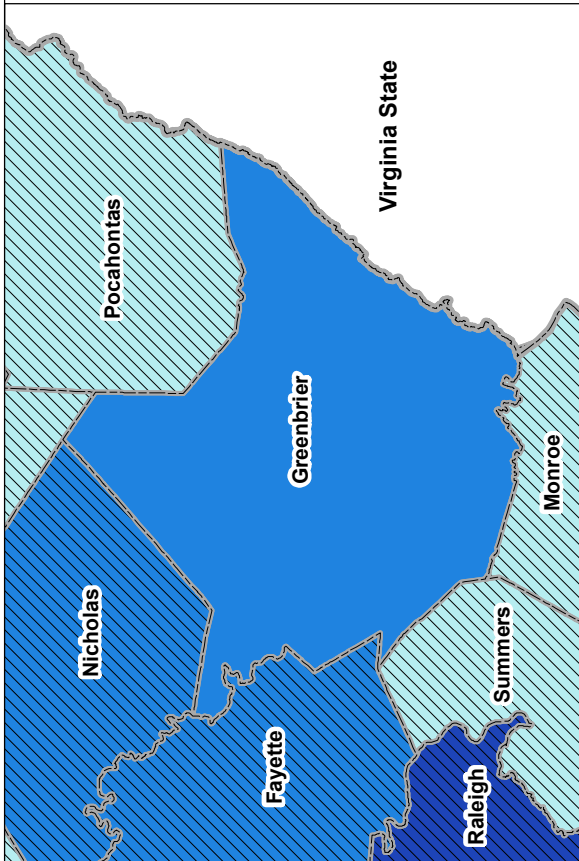
Source: WVEIS

Greenbrier County currently has a very low dropout rate. This is an achievement that not many counties in West Virginia share. Map 8 shows each county's dropout rate. Maps 9 and 10 show the total graduates and the graduation rate by county. Greenbrier County has a small number of graduates compared to counties like Berkeley and Kanawha but more than most of the counties in the north-central area of West Virginia. The graduation rate is slightly lower than most of the State's, however. Greenbrier County has several schools with large attendance; their locations are noted in Map 11. Not coincidentally, the two major schools are located in the most populated Lewisburg area on a US route with nearby interstate access. The largest school by attendance in the county is Greenbrier East High School. The significance of the locations of these schools is the access to major transportation routes. The schools, with the exception of Smoot Elementary, appear to be built in order for parents and students to maintain steady access, which is important to discourage dropping out and to maintain attendance levels.



# NCLB - Second Month Enrollment

Greenbrier County



- Planning Regions Line
- 943 - 2071
- 2072 - 3867
- 3868 - 8104
- 8105 - 17721
- 17722 - 28458
- County Boundaries

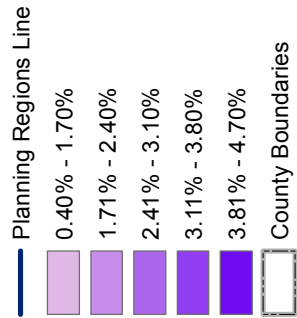
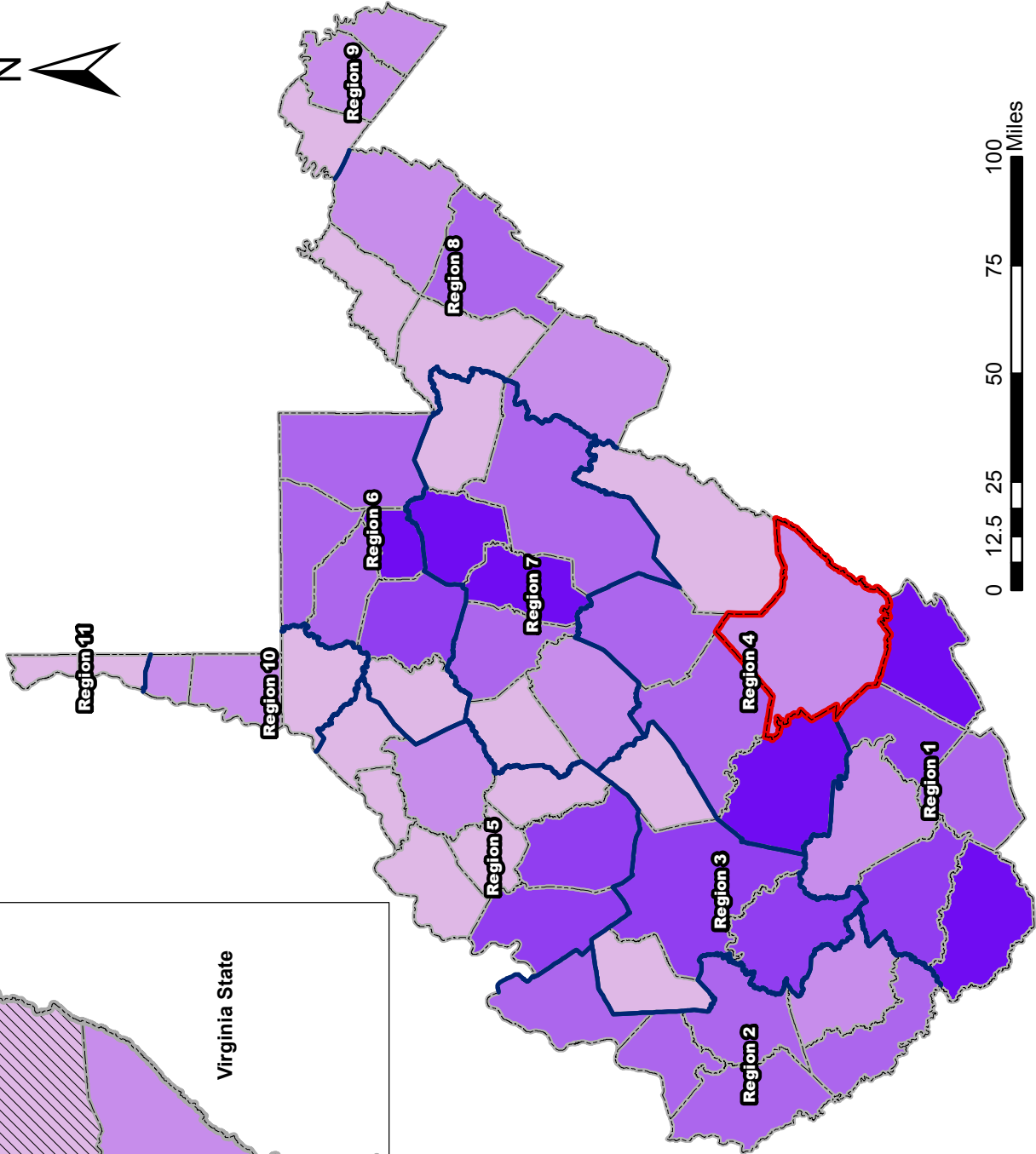
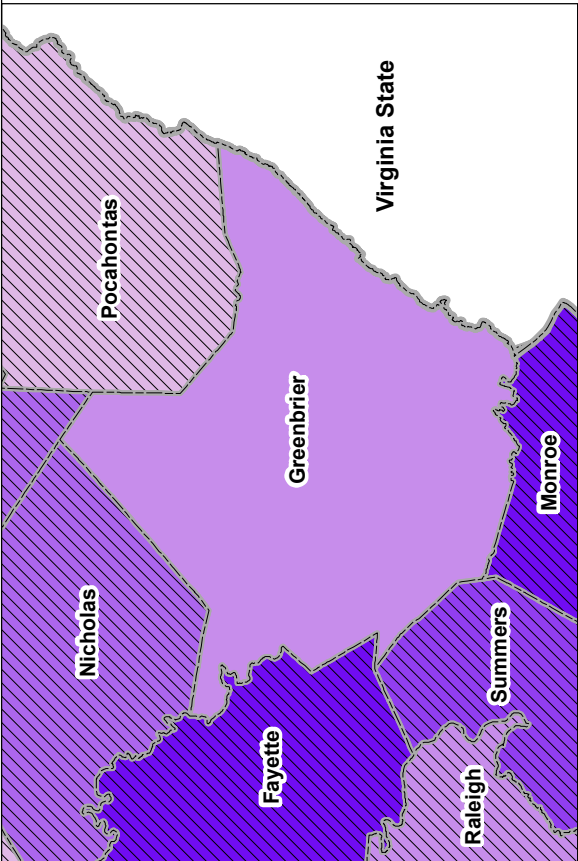
Data Source: West Virginia Department of Education 2012

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# NCLB - Dropout Rate

## Greenbrier County

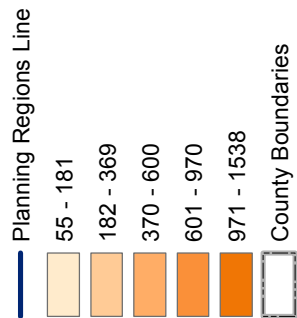
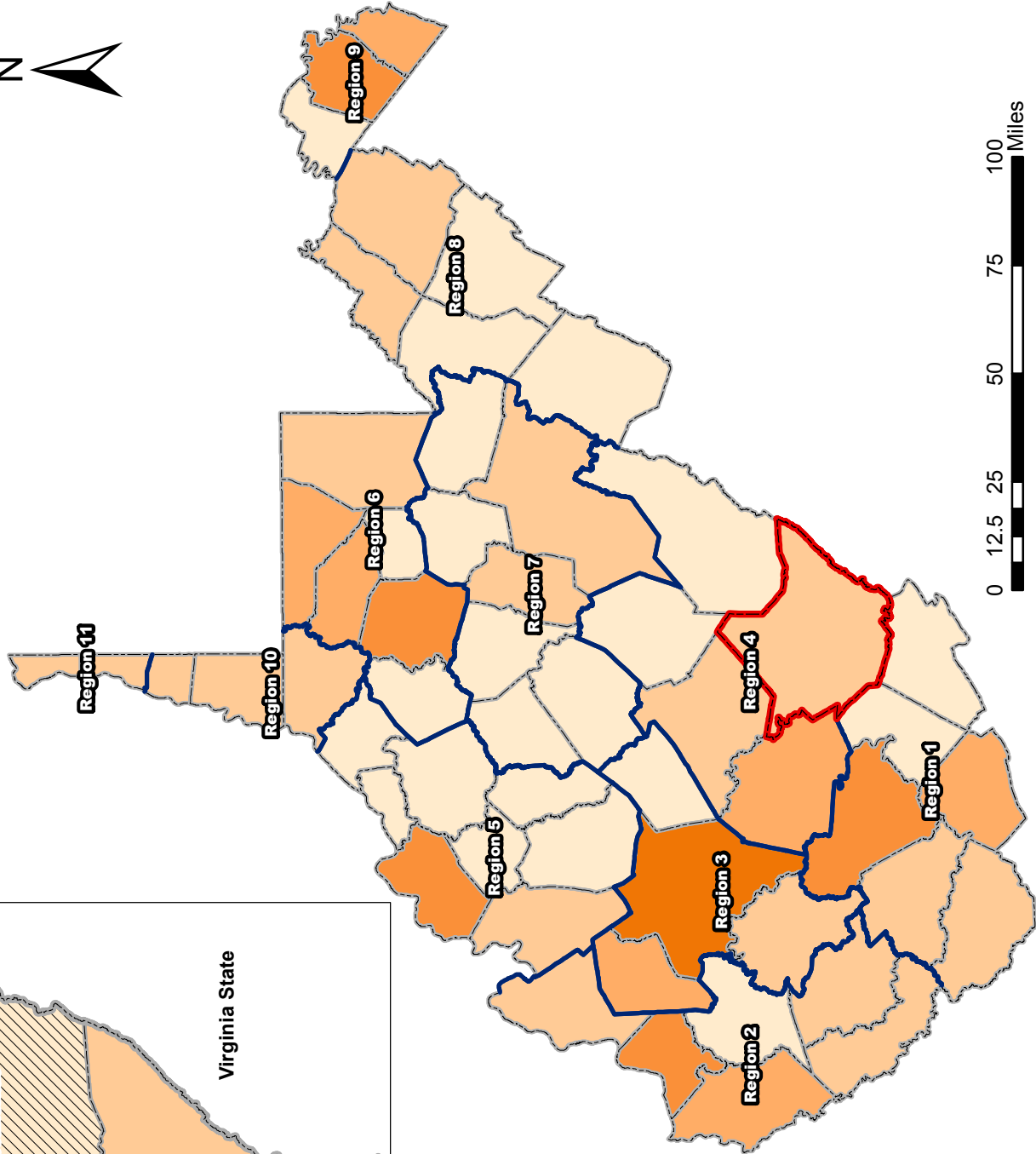
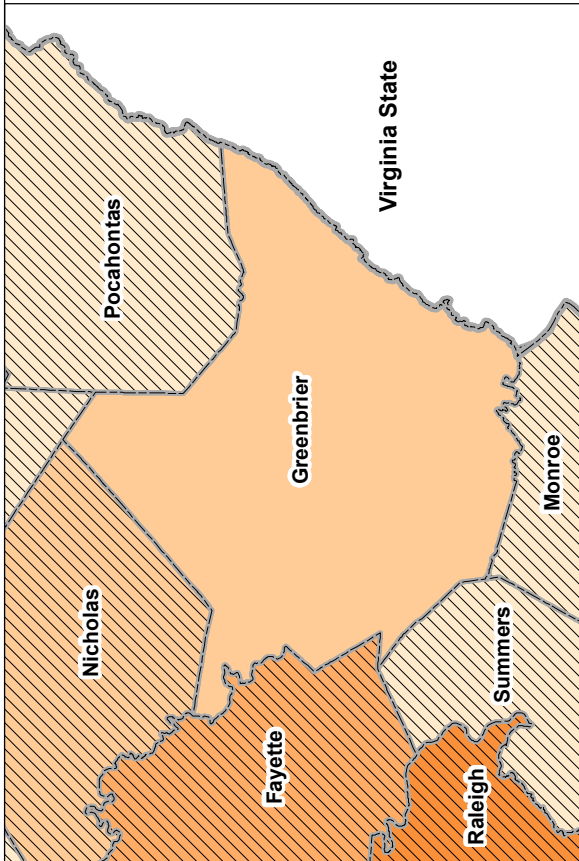


Data Source: West Virginia Department of Education 2012

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# NCLB - Total Graduates

## Greenbrier County



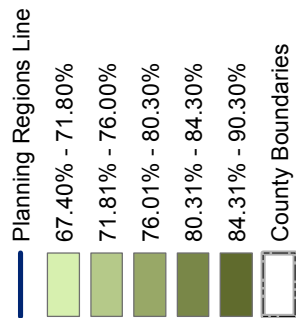
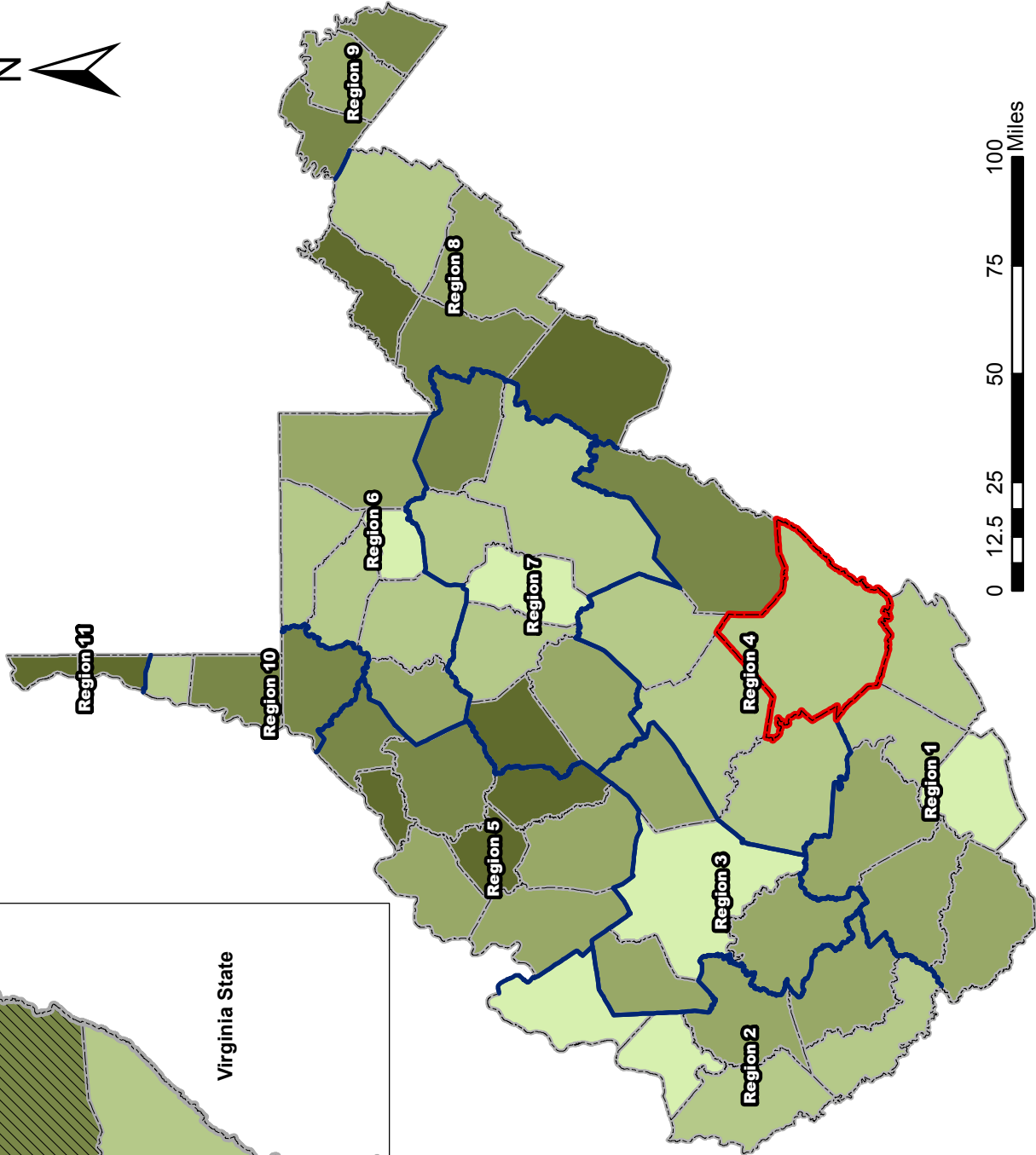
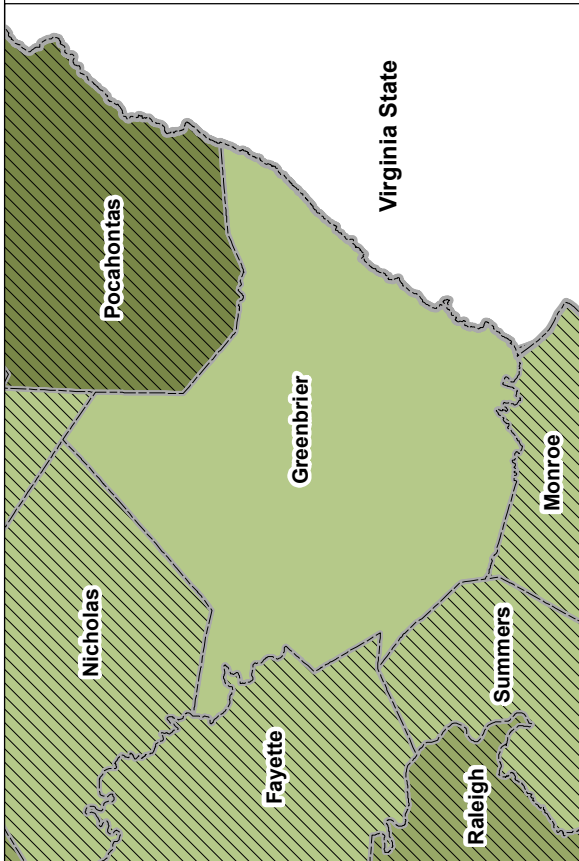
Data Source: West Virginia Department of Education 2012

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# NCLB - Graduation Rate

## Greenbrier County



Data Source: West Virginia Department of Education 2012

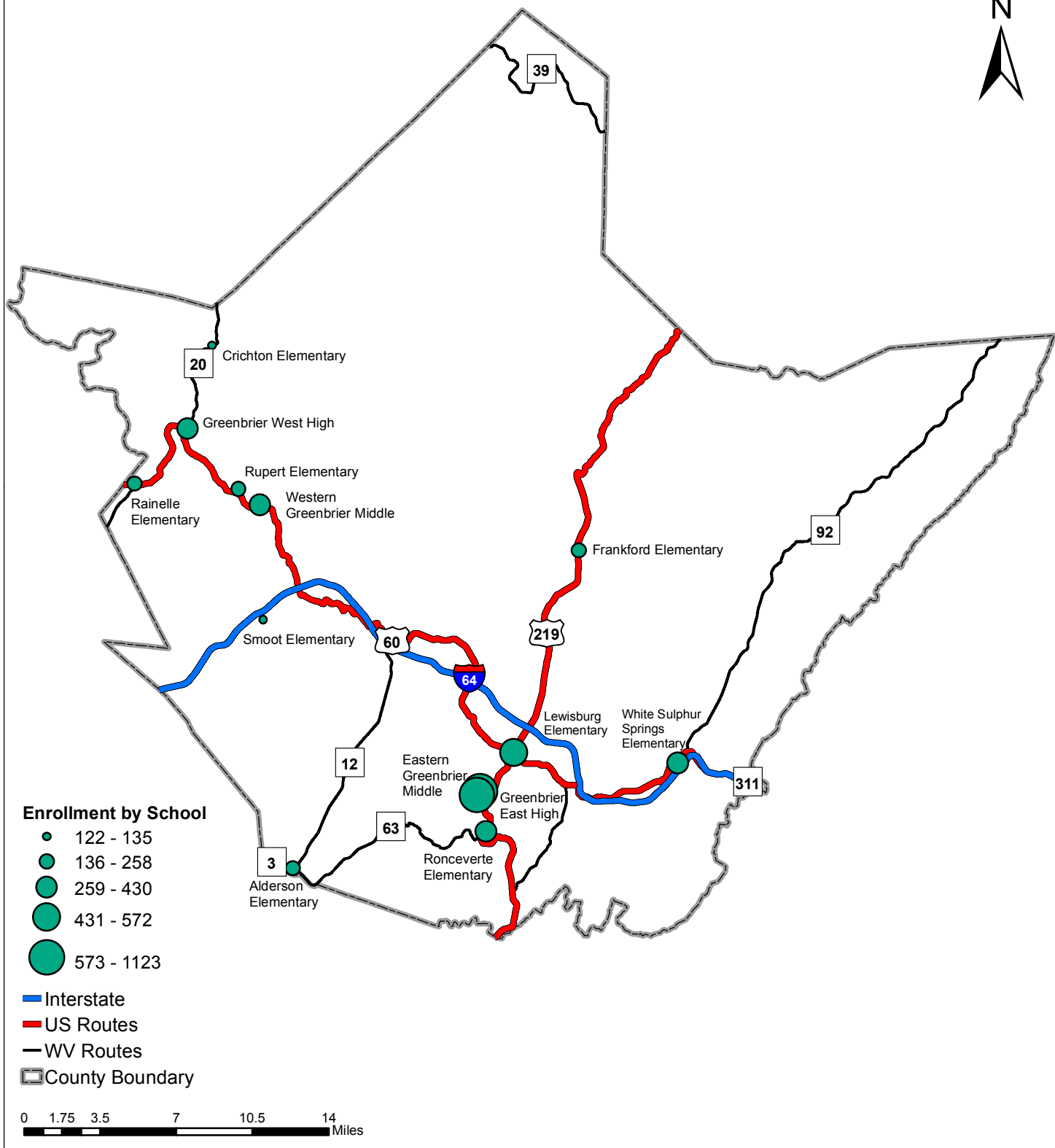
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# Total Attendance by School - 2012

## Greenbrier County



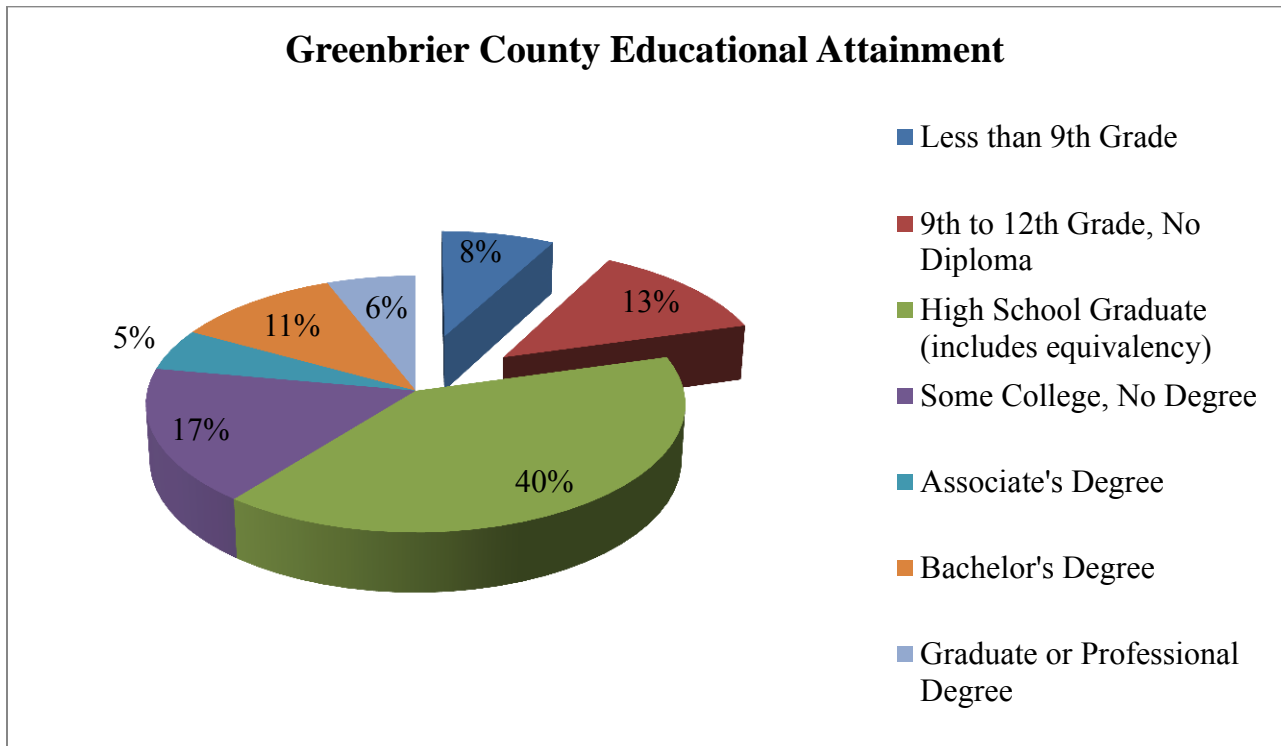
Data Source: West Virginia Department of Education 2012

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The ACS also maintains data on the educational attainment of the population that is 25 years and over. Forty percent of these residents have a high school diploma or equivalent. However, a close minority of the population consists of tertiary educational achievement, with 22 percent having an associate's degree or higher.

**Figure 13**



Source: 2011 American Community Survey 5-Year Estimates

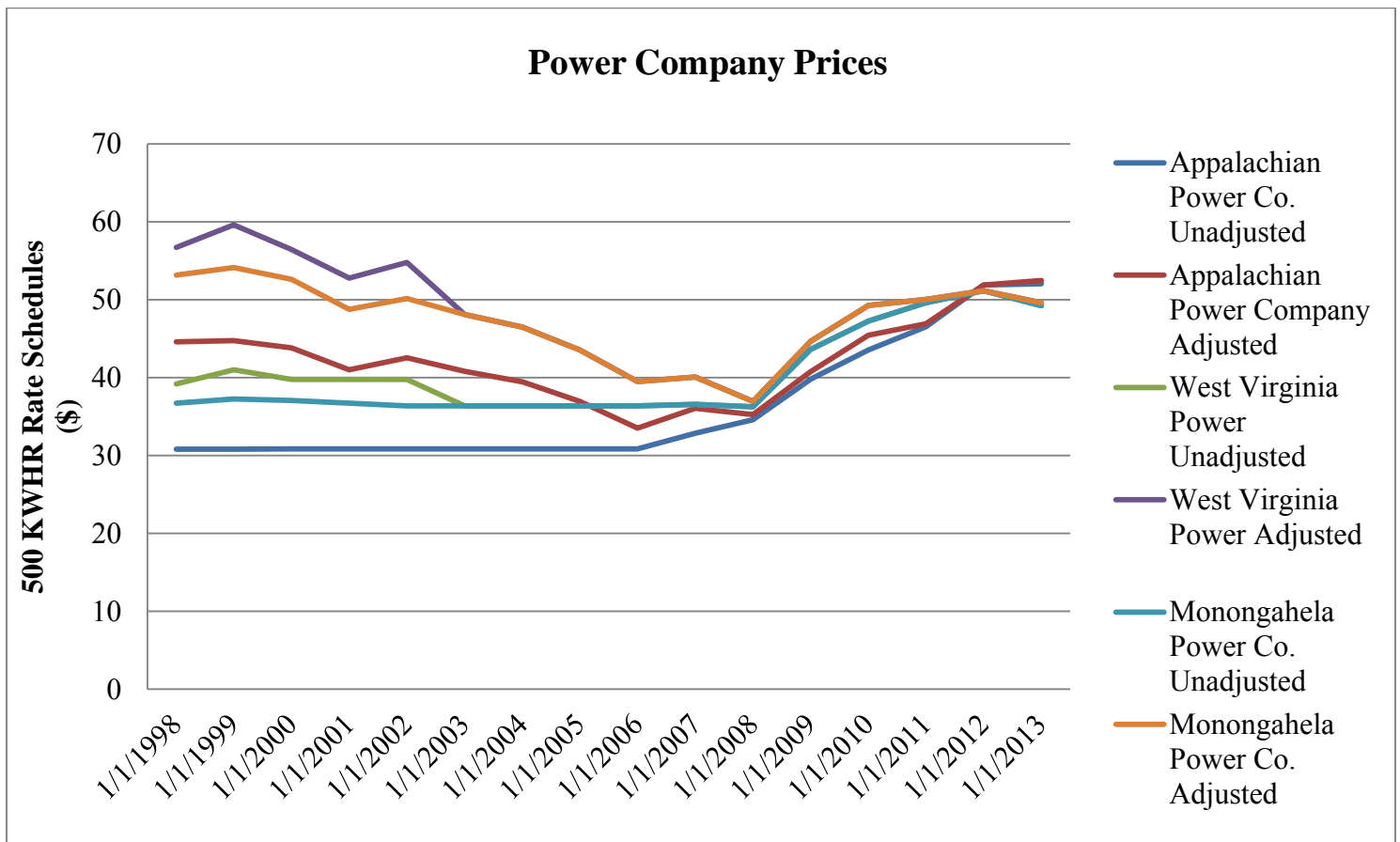
**Utilities and Infrastructure**

Greenbrier County has 25 utility companies according to the West Virginia Public Service Commission (PSC). Economic development depends on infrastructure, and Greenbrier County has several providers of water, sewer, and electricity. Three companies, Appalachian Power Company (American Electric Power), West Virginia Power, and Monongahela Power Company, used to provide residential, industrial, and large-capacity service to Greenbrier County. In 2003 all of West Virginia Power's residential customers began to be served under the tariff of Monongahela Power.

The West Virginia Public Service Commission maintains tariff rates for all companies involved in providing utilities. Of particular importance are electricity tariffs; the monitoring of these tariffs is an ongoing project. To that end, the PSC observes the growth rate of tariffs and possesses a 20 year comparison based on the average residential utility rate of the State. This provides a significant overview of how electric prices behave in West Virginia as a whole. As

Figure 14 shows, if the tariffs are not adjusted by the Consumer Price Index (CPI), it would appear that rates are constantly increasing. Viewing rates in such a manner would be a misunderstanding, and would be incorrect in reference to a State with the highs and lows of West Virginia's past. The Bureau of Labor Statistics has a CPI for electricity prices dating to 1998. The adjusted and unadjusted prices are provided in Figure 14. As the tariffs for West Virginia Power and Monongahela Power merged in 2003, West Virginia power is not shown in the analysis below after 2003.

**Figure 14**

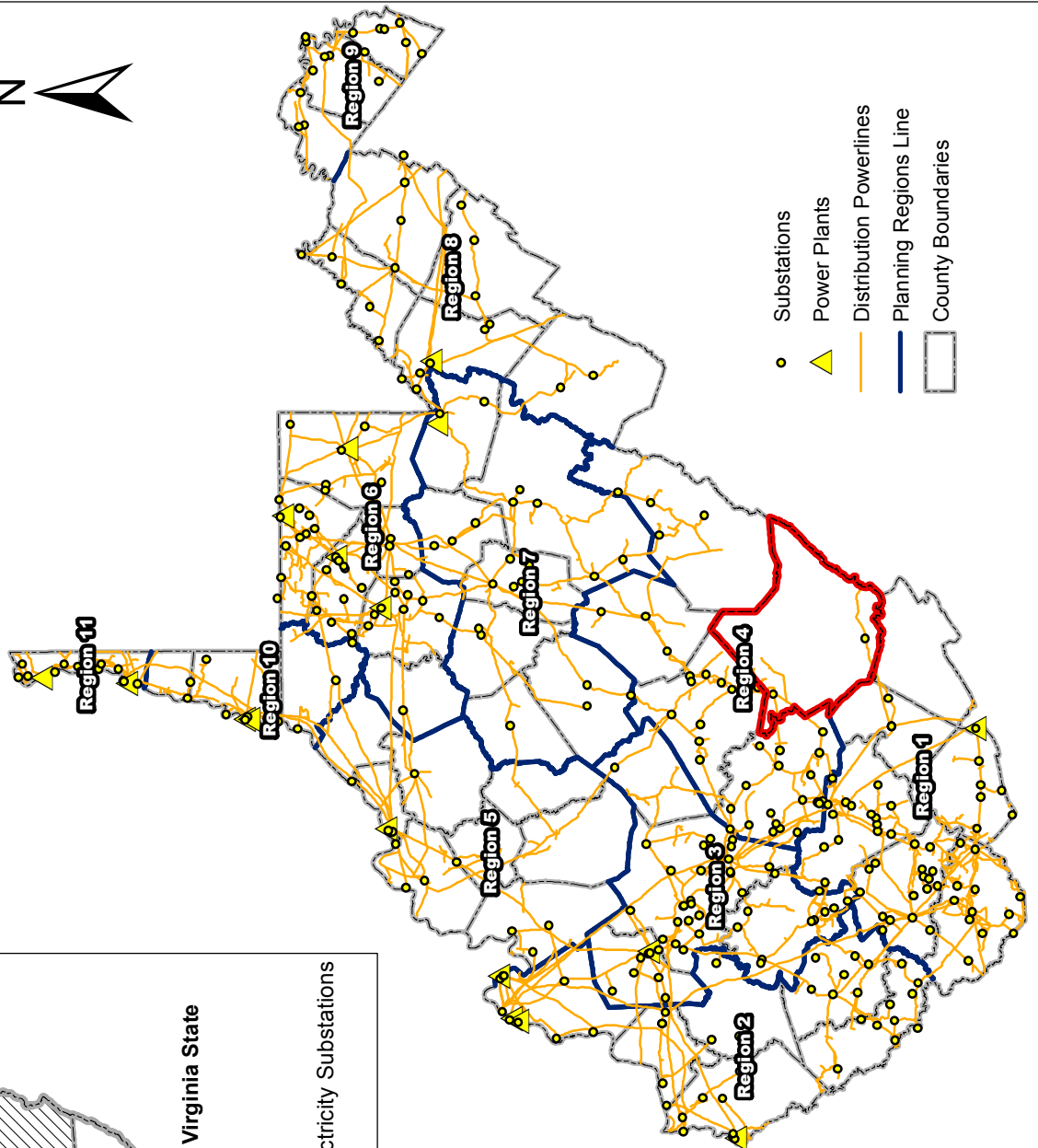
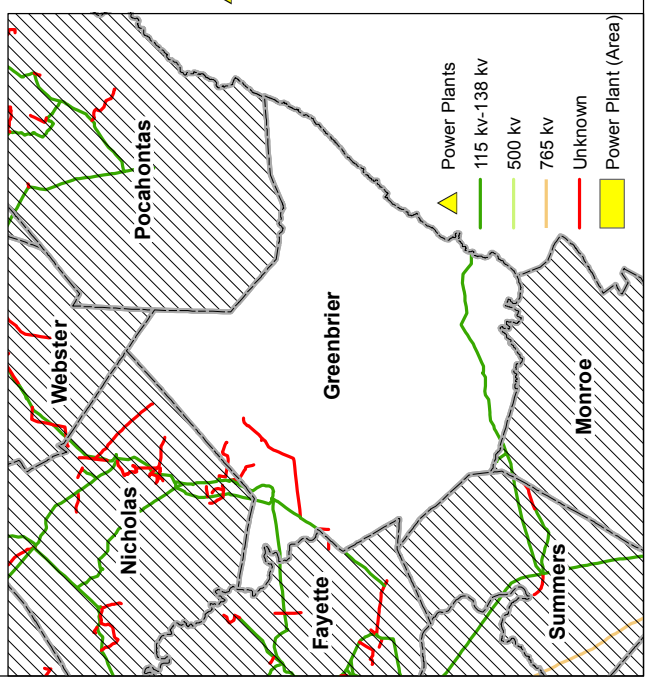
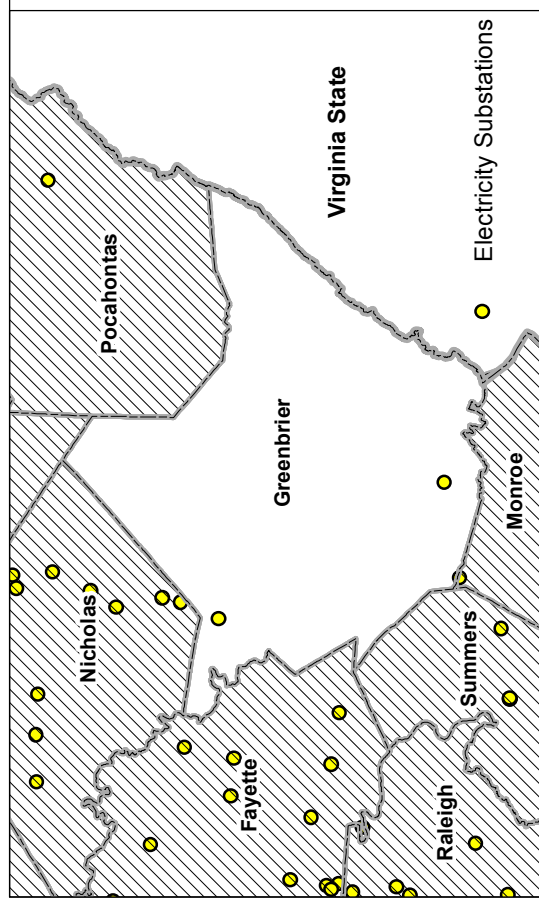


Source: WV Public Service Commission and United States Bureau of Labor Statistics

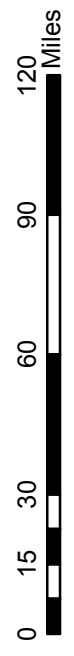
The graph shows that electricity rates steadily decreased in real terms through 2006 and remained fairly constant with adjustment. Both adjusted and unadjusted prices have increased since 2006. Many possible factors contributed to this rise, including the increased costs of energy and the increased demand. Another trend seen here was the tendency for the power companies to merge in pricing, indicating competition. Map 12 also shows the distribution of power lines, plants, and substations within West Virginia and Greenbrier County.

# Utilities - Electricity

## Greenbrier County



- Substations
- ▲ Power Plants
- Distribution Powerlines
- Planning Regions Line
- County Boundaries



Source: West Virginia Division of Natural Resources, Statewide Addressing and Mapping 2008

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The two other utilities of particular importance are water and sewer rates. Table 1 displays water and sewer metered rates for the providers of those services. They are all municipal services with varying rates and categories. Greenbrier County has 11 municipal sewer and water providers. Maps 13 and 14 show the water and sewer facilities and the served areas for each of these utilities, as well as the solid waste management facilities in West Virginia, including the one located in Greenbrier.

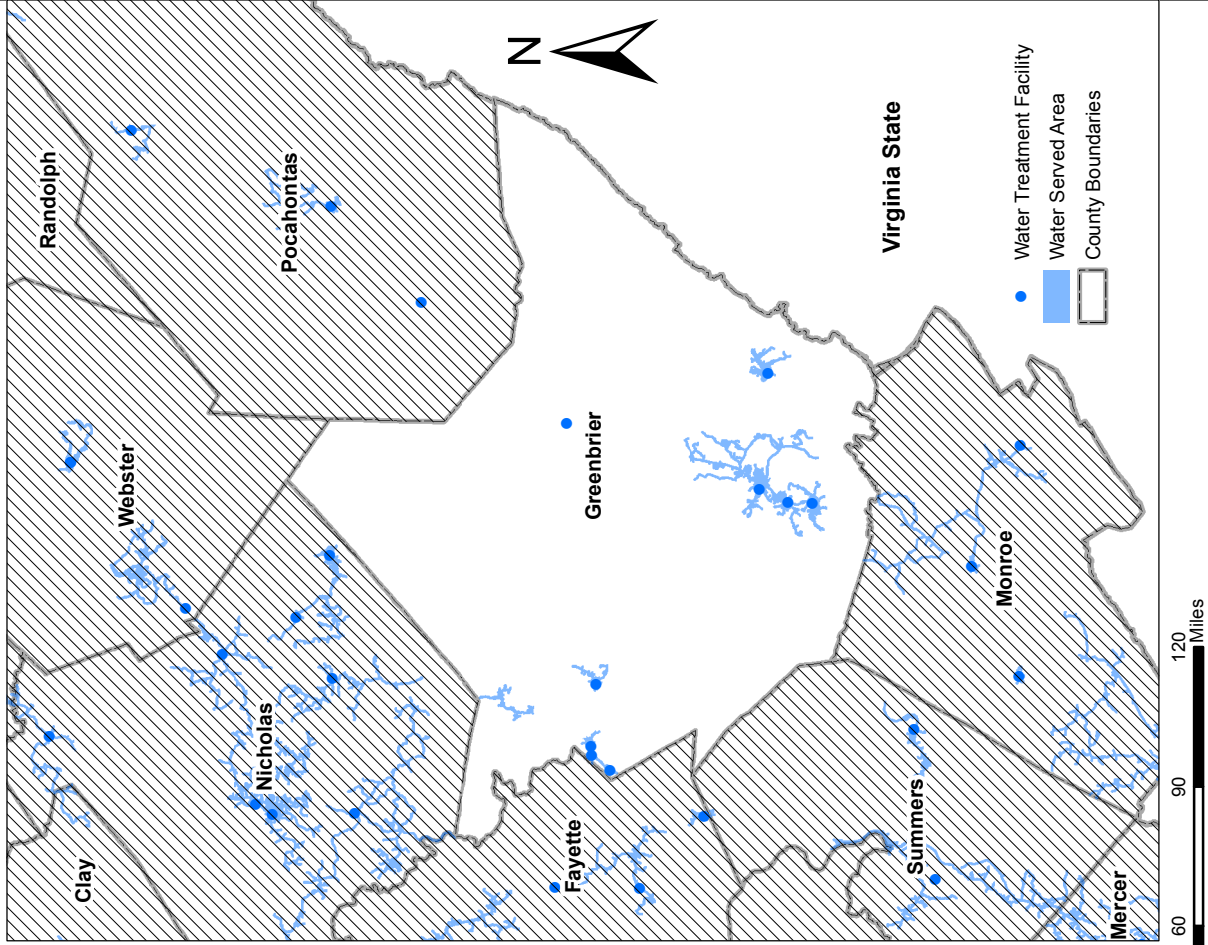
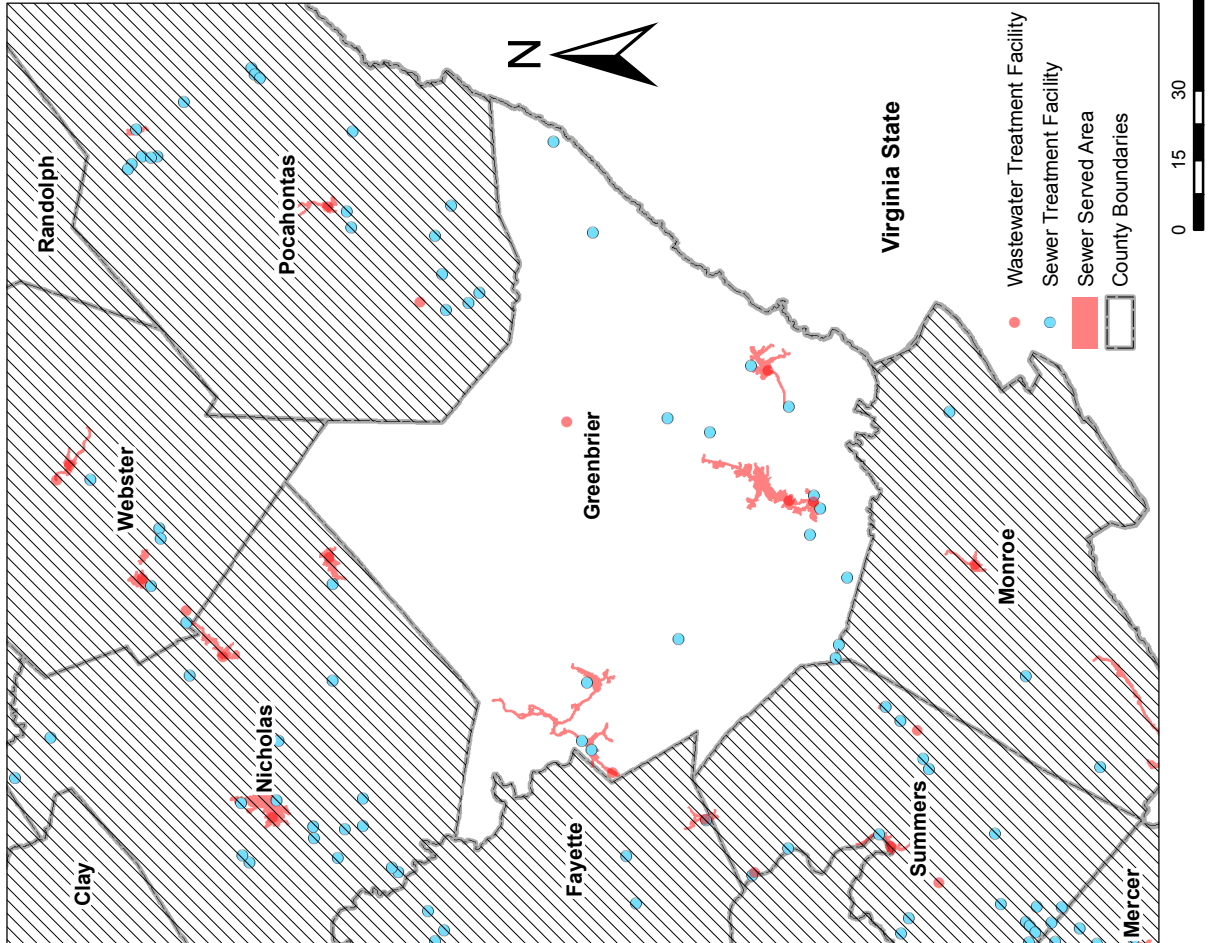
**Table 1: Greenbrier County Water and Sewer Rates**

<b>Greenbrier Public Service District No. 1</b>	
<b>Sewer Rates</b>	
First 2000 gallons used per month	9.55 per 1000 gallons
Next 8000 gallons used per month	7.57 per 1000 gallons
All Over 10000 gallons used per month	6.99 per 1000 gallons
<b>Greenbrier County Public Service District No. 2</b>	
<b>Sewer Rates</b>	
All services	9.10 per 1000 gallons
<b>Water Rates</b>	
First 3000 gallons used per month	13.13 per 1000 gallons
Next 3000 gallons used per month	12.25 per 1000 gallons
Next 4000 gallons used per month	11.15 per 1000 gallons
Next 10000 gallons used per month	9.86 per 1000 gallons
Over 20000 gallons used per month	9.12 per 1000 gallons
<b>City of Lewisburg</b>	
<b>Water Rates</b>	
First 20000 gallons used per month	8.71 per 1000 gallons
First 60000 gallons used per month	6.10 per 1000 gallons
All Over 80000 gallons used per month	4.22 per 1000 gallons
<b>City of Ronceverte</b>	
<b>Sewer Rates</b>	
First 1000 gallons used per month	13.08 per 1000 gallons
All Over 1000 gallons used per month	8.61 per 1000 gallons
<b>Water Rates (beginning September 14, 2013 at the latest)</b>	
First 1000 gallons used per month	15.38 per 1000 gallons
All Over 1000 gallons used per month	9.95 per 1000 gallons
<b>City of White Sulphur Springs</b>	
<b>Sewer Rates</b>	
All 1000 gallons used per month	8.04 per 1000 gallons
<b>Water Rates</b>	
First 2000 gallons used per month	9.89 per 1000 gallons
All Over 2000 gallons used per month	9.89 per 1000 gallons
<b>City of Rainelle</b>	
<b>Water Rates (pending completion of water expansion project)</b>	
First 3000 gallons used per month	8.50 per 1000 gallons

Next 3000 gallons used per month	8.00 per 1000 gallons
Next 4000 gallons used per month	7.50 per 1000 gallons
Next 10000 gallons used per month	6.50 per 1000 gallons
All Over 20000 gallons used per month	6.00 per 1000 gallons
<b>Town of Alderson</b>	
<b>Sewer Rates</b>	
First 3000 gallons used per month	9.37 per 1000 gallons
Next 7000 gallons used per month	9.37 per 1000 gallons
Next 20000 gallons used per month	8.00 per 1000 gallons
Next 70000 gallons used per month	8.00 per 1000 gallons
Over 100,000 gallons used per month	3.63 per 1000 gallons
<b>Water Rates (after October 12, 2013)</b>	
First 3000 gallons used per month	8.94 per 1000 gallons
Next 7000 gallons used per month	7.87 per 1000 gallons
Next 50000 gallons used per month	4.97 per 1000 gallons
All Over 60000 gallons used per month	4.40 per 1000 gallons
<b>Town of Rupert</b>	
<b>Water Rates</b>	
First 2000 gallons used per month	12.02 per 1000 gallons
All Over 2000 gallons used per month	11.58 per 1000 gallons
<b>Town of Renick (Corporation of Falling Spring)</b>	
<b>Water Rates</b>	
First 2000 gallons used per month	10.70 per 1000 gallons
All Over 2000 gallons used per month	10.70 per 1000 gallons

# Utilities - Water and Sewer

## Greenbrier County



Source: West Virginia Infrastructure and Jobs Development Council N.A.

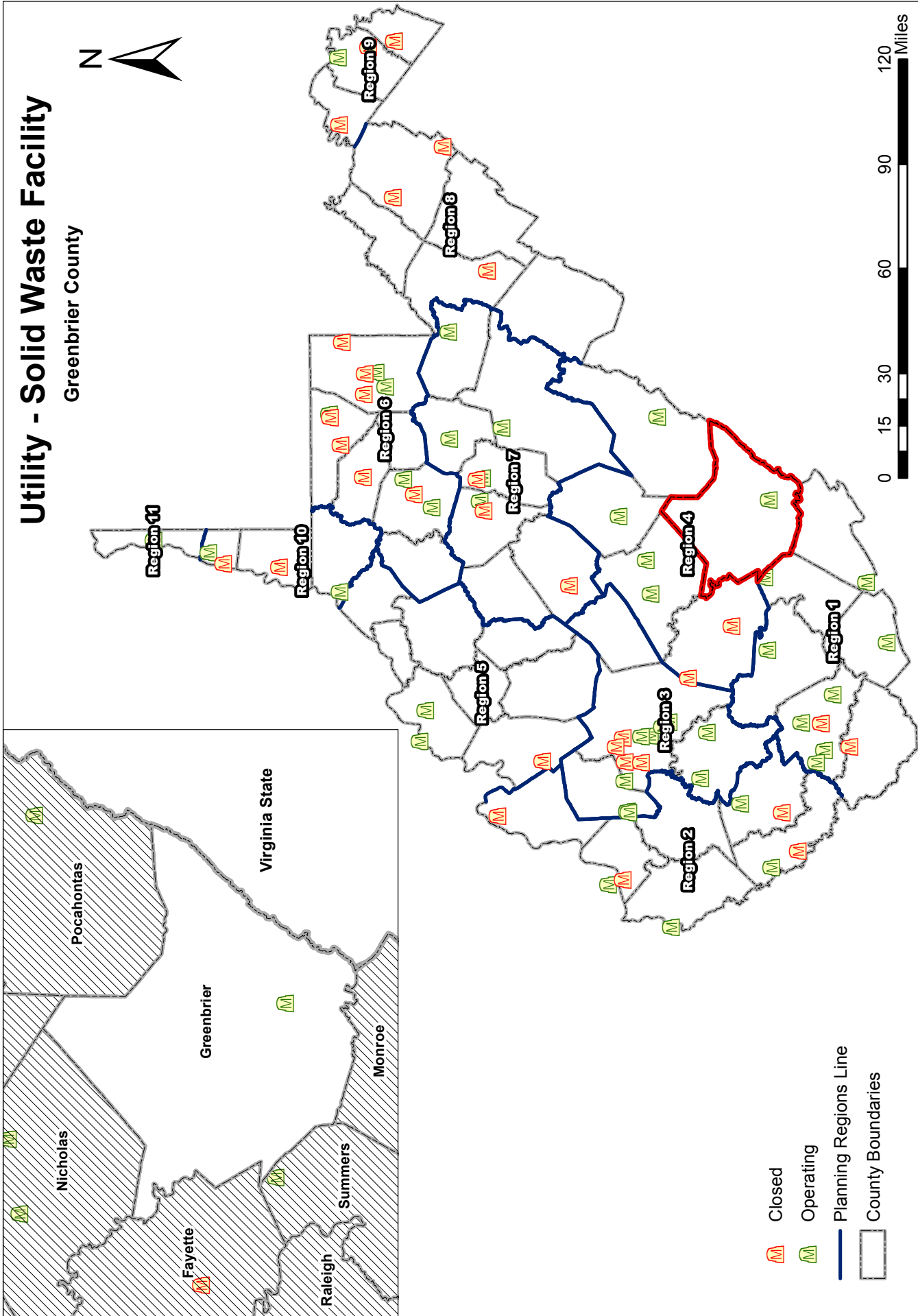
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# Utility - Solid Waste Facility

## Greenbrier County



-  Closed
-  Operating
-  Planning Regions Line
-  County Boundaries



Source: West Virginia Department of Environmental Protection 2002

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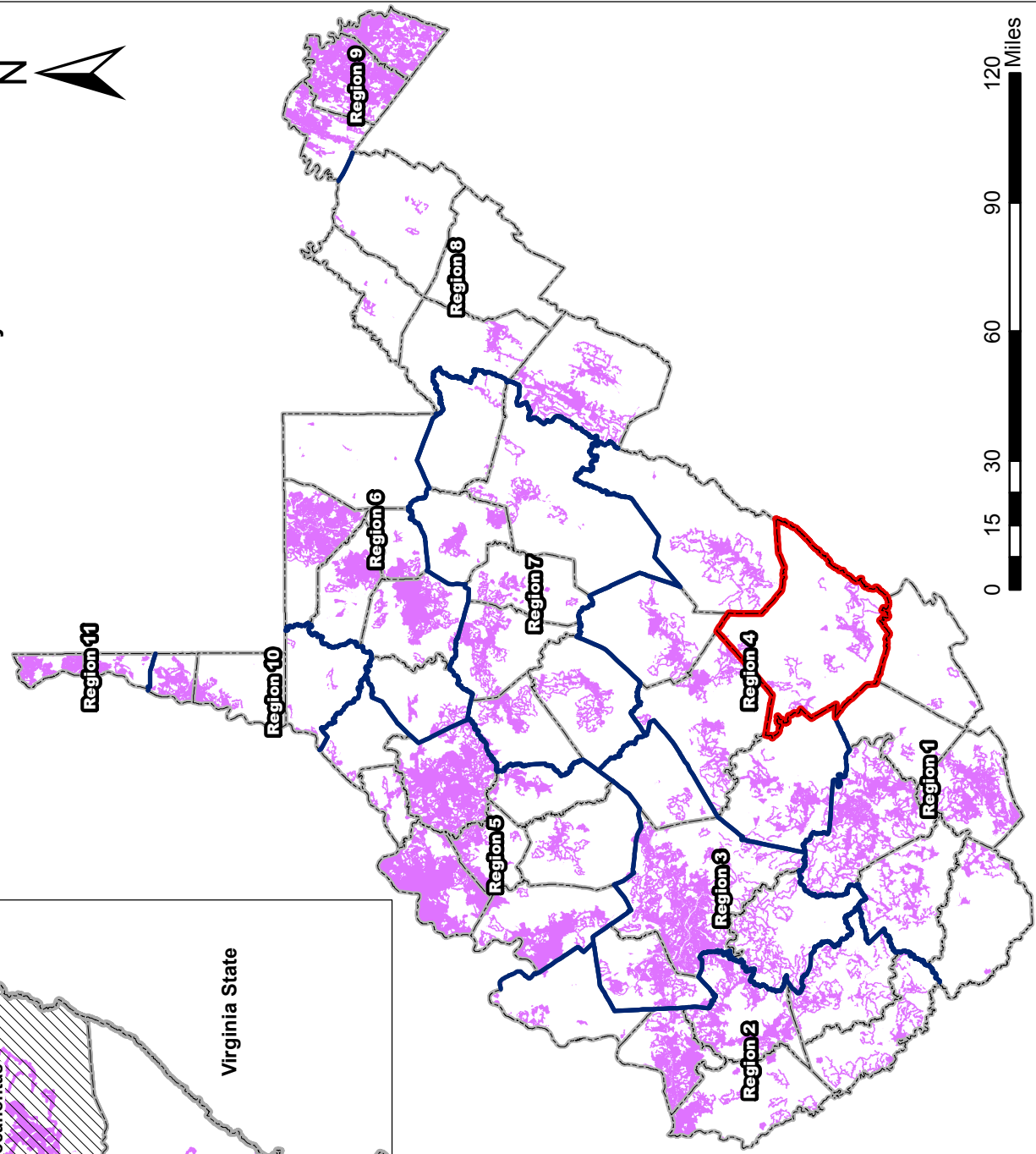
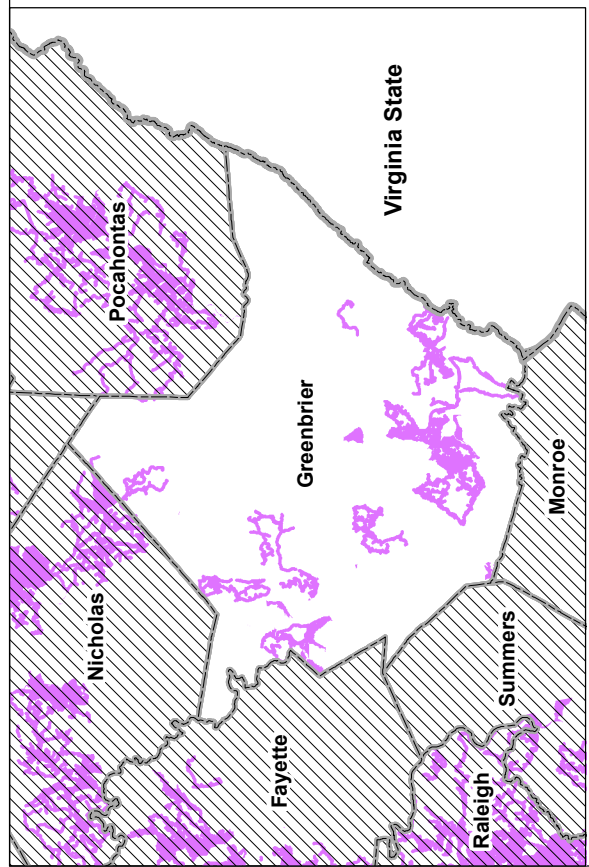





One essential modern convenience, now widely understood as an essential utility in a globalized world, is broadband access. The following 11 maps demonstrate Greenbrier County's broadband infrastructure in relation to the State's. The largest number of providers in Greenbrier County is 5 in the largest city, Lewisburg, whereas neighboring counties Pocahontas, Nicholas, Monroe, and Summers only have a maximum of 3. Fayette and Raleigh County maximums are also five. Of particular note is the distinct lack of fixed wireless, the connection of two fixed points wirelessly by radio or other links, and broadband coverage in Greenbrier County. Some of this lack can be explained by the area covered by national forest land, but in western parts of the county, the lack of broadband is conspicuous.

Map 15 shows physical cable infrastructure running from ISPs to other structures. DSL, BPL, and other copper represent the transferal system of broadband (Map 16). Map 17 shows the entire wire system, represented by physical wires, while Maps 18 and 19 show the maximum uploading and downloading speeds for the system. Map 20 shows the total number of providers, which is denser in the more economically developed areas of the State. Map 21 has fixed wireless coverage, or the connection between two fixed points wirelessly by radio or other links, and the next two maps shown the maximum uploading and downloading speeds in a given area (22 and 23). Map 24 shows the location of mobile wireless coverage, including for smartphones and tablets, and Map 25 shows areas where no broadband coverage is reported in any way.

Each of these maps shows the same pattern in Greenbrier County internet service as exhibited by WV. Internet service, specifically broadband, is non-existent in many rural areas, and instead focuses on population centers. While this may be financially wise, it deprives rural areas of an increasingly integral link to a globalized economy and society. All areas now need broadband service, and a complete inventory of these services is needed to plan for future investment in any given area.

# Broadband - Internet Cable and FTTP Coverage Greenbrier County



-  Planning Regions Line
-  Cable and FTTP
-  County Boundaries



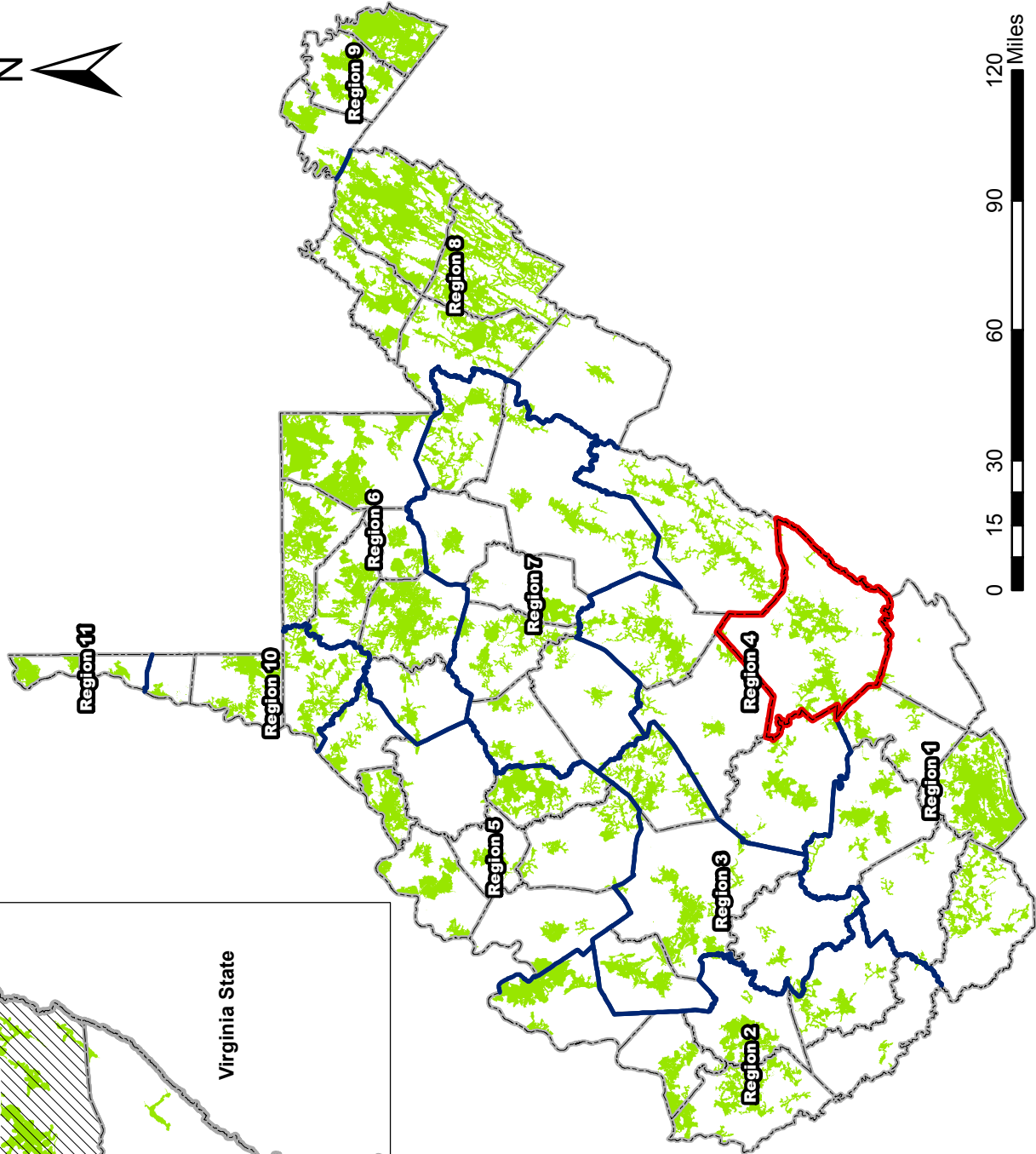
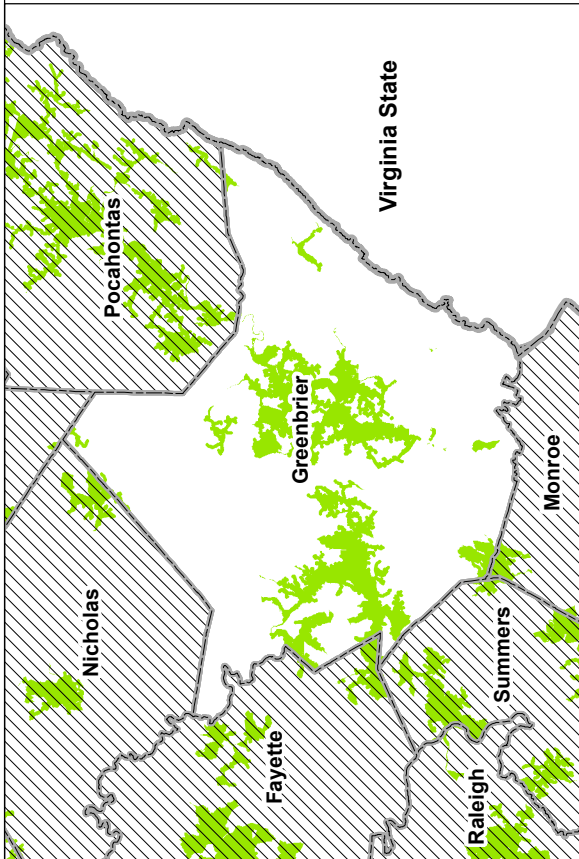
Source: West Virginia Broadband Mapping Program 2012




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# Broadband - Internet DSL, BPL, Other Copper

## Greenbrier County



-  Planning Regions Line
-  DSL, BPL, Other Copper
-  County Boundaries

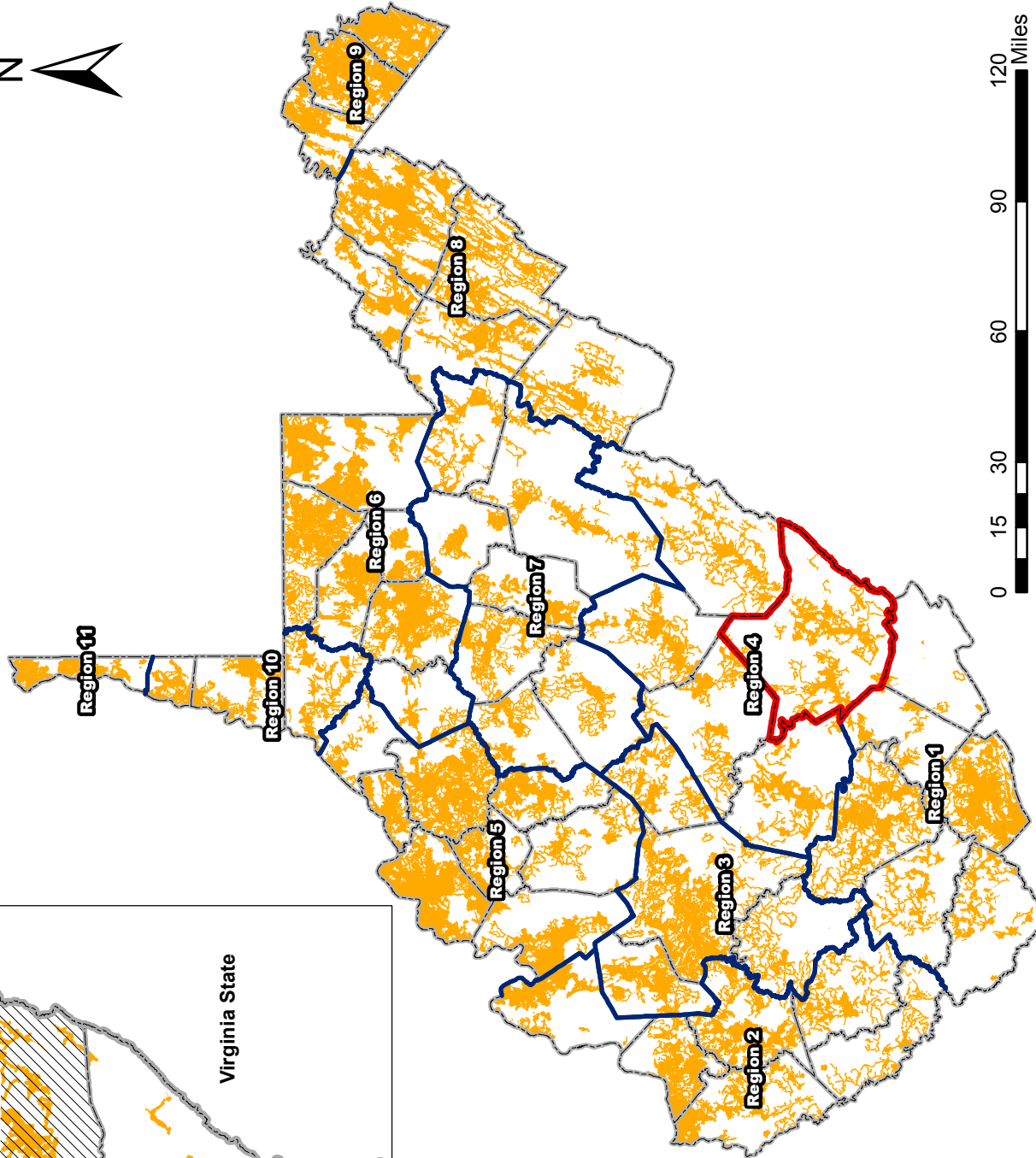
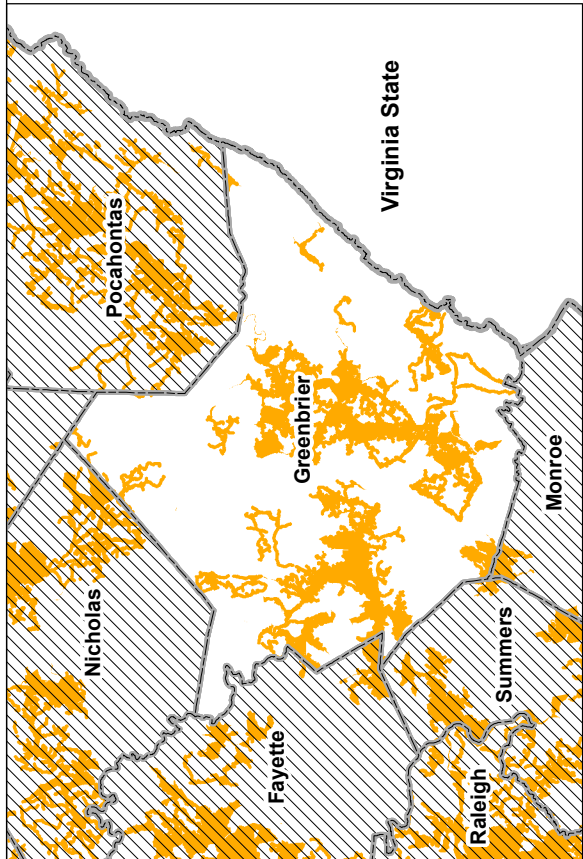
Source: West Virginia Broadband Mapping Program 2012




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# Broadband - Internet Wireline Coverage

## Greenbrier County



-  Planning Regions Line
-  Wireline Coverage
-  County Boundaries



Source: West Virginia Broadband Mapping Program 2012

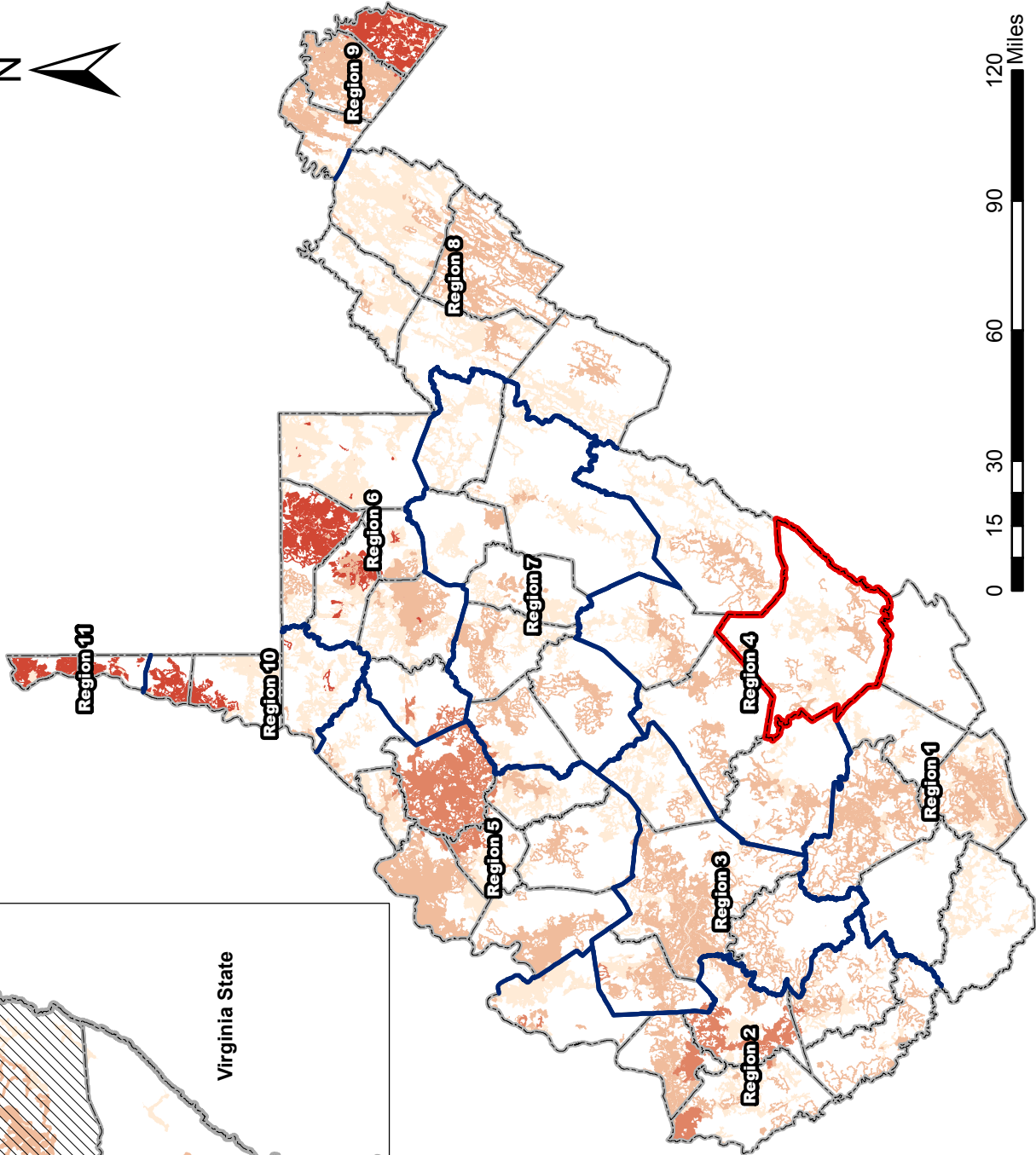
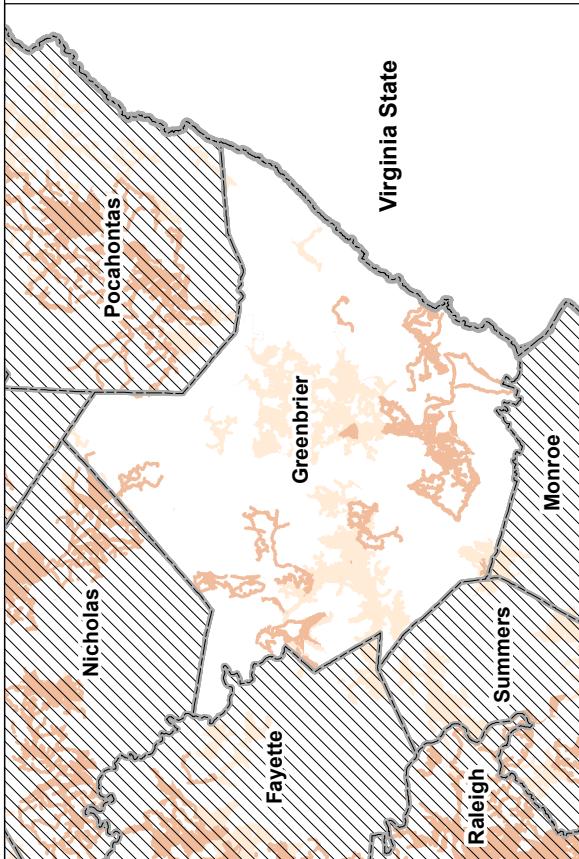
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# Broadband - Internet MaxUp Speed Wireline

## Greenbrier County



-  Planning Regions Line
-  200 - 768 kbps
-  768 kbps - 3 mbps
-  3 - 10 mbps
-  10 - 25 mbps
-  Greater than 25 mbps
-  County Boundaries

Source: West Virginia Broadband Mapping Program 2012

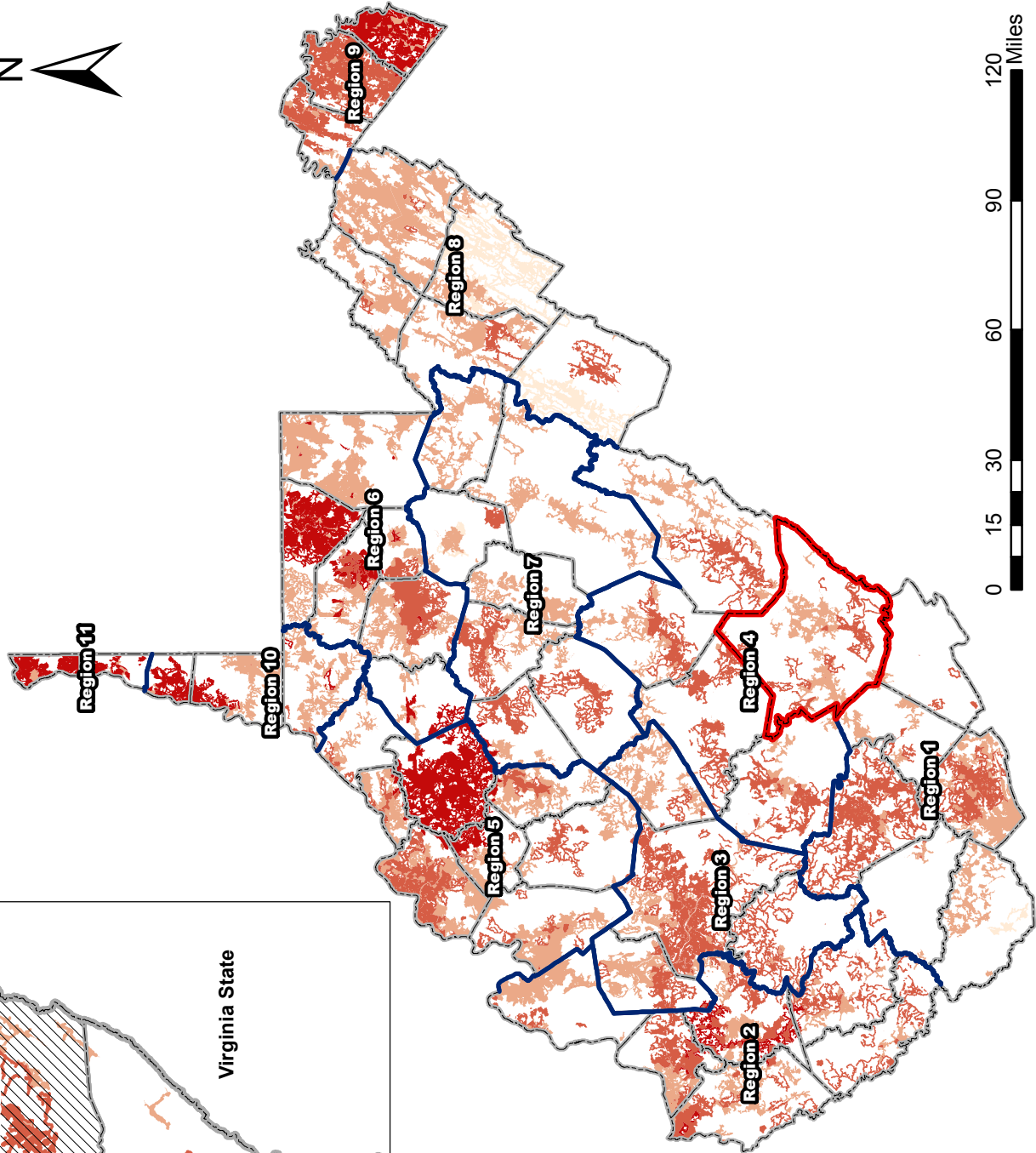
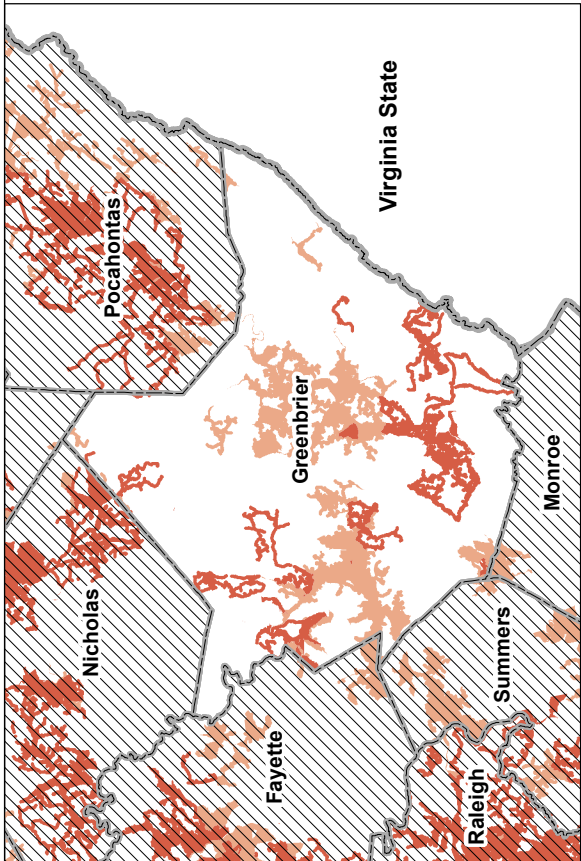
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# Broadband - Internet MaxDown Speed Wireline

## Greenbrier County



-  Planning Regions Line
-  768 kbps - 3 mbps
-  3 - 10 mbps
-  10 - 25 mbps
-  Greater than 25 mbps
-  County Boundaries



Source: West Virginia Broadband Mapping Program 2012

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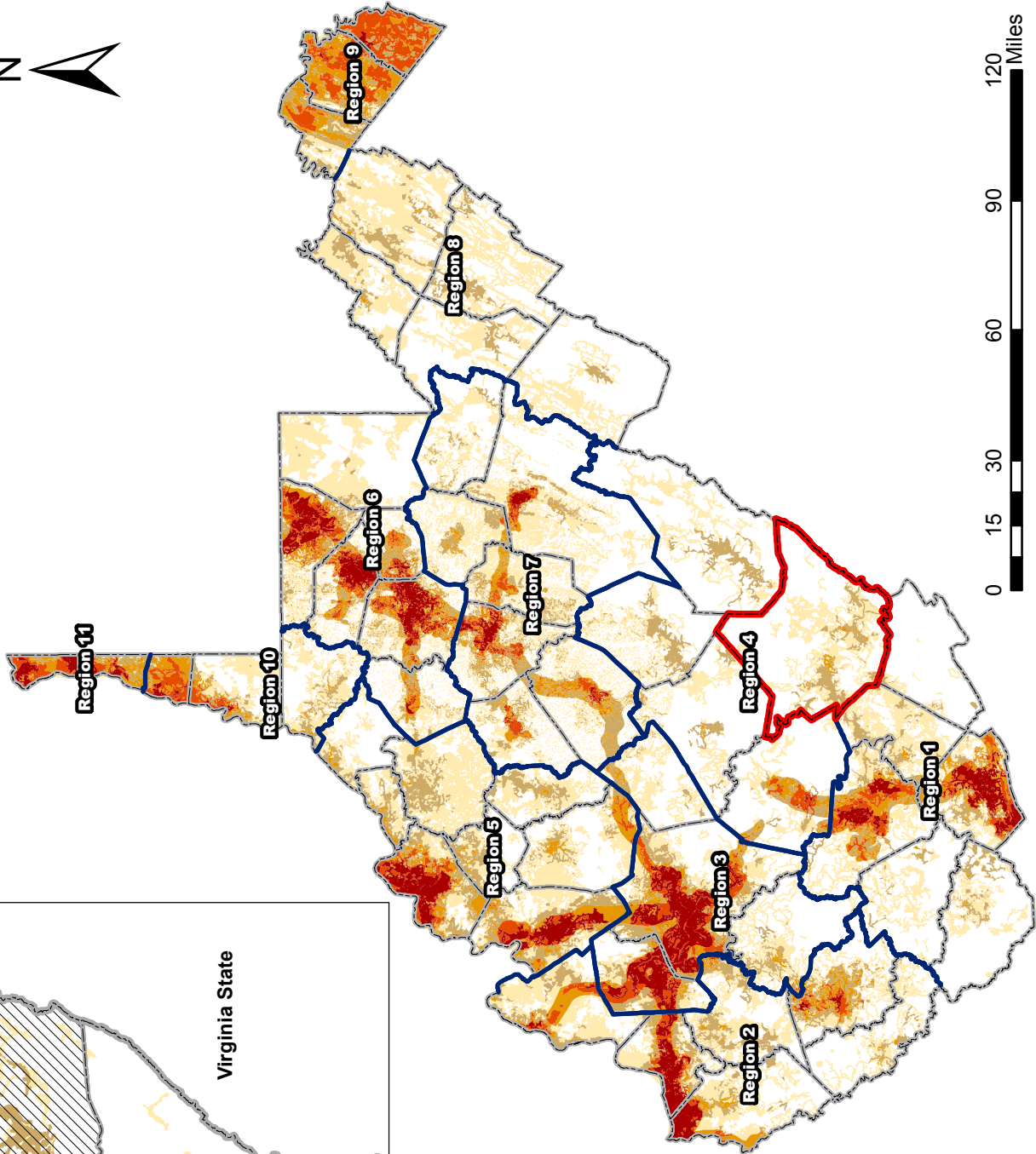
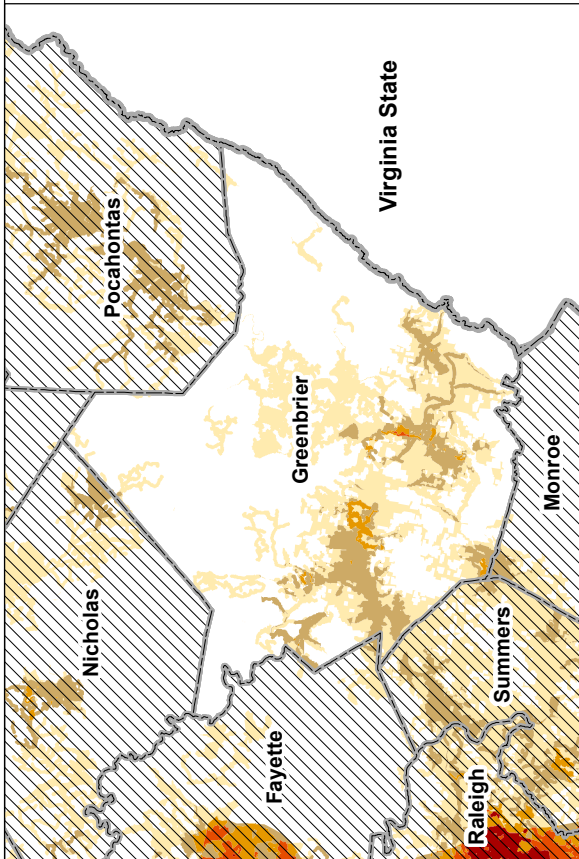


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# Broadband - Internet Total Number of Providers

## Greenbrier County



- Planning Regions Line
- 1 Provider
- 2 Providers
- 3 Providers
- 4 Providers
- 5 Providers
- County Boundaries

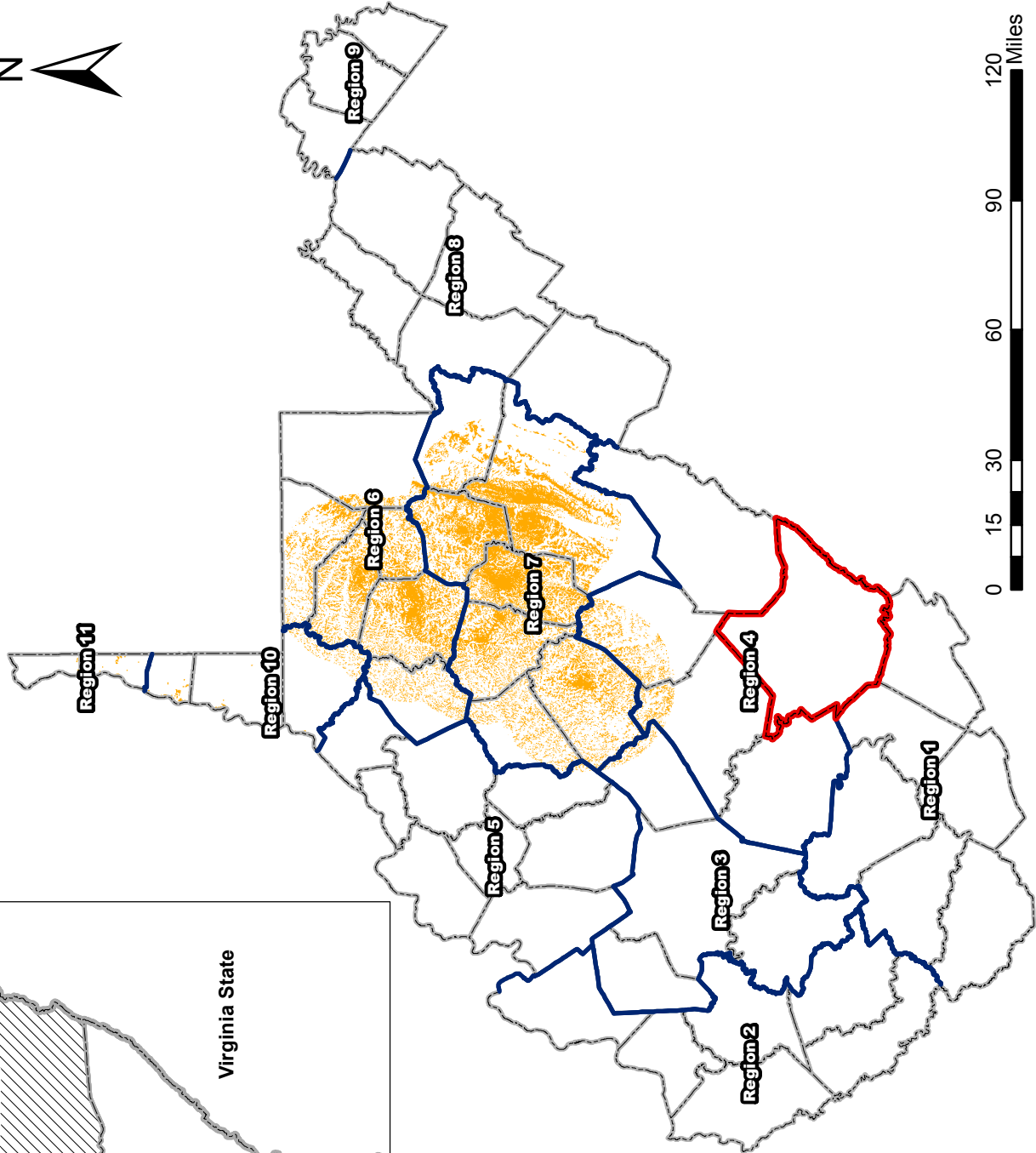
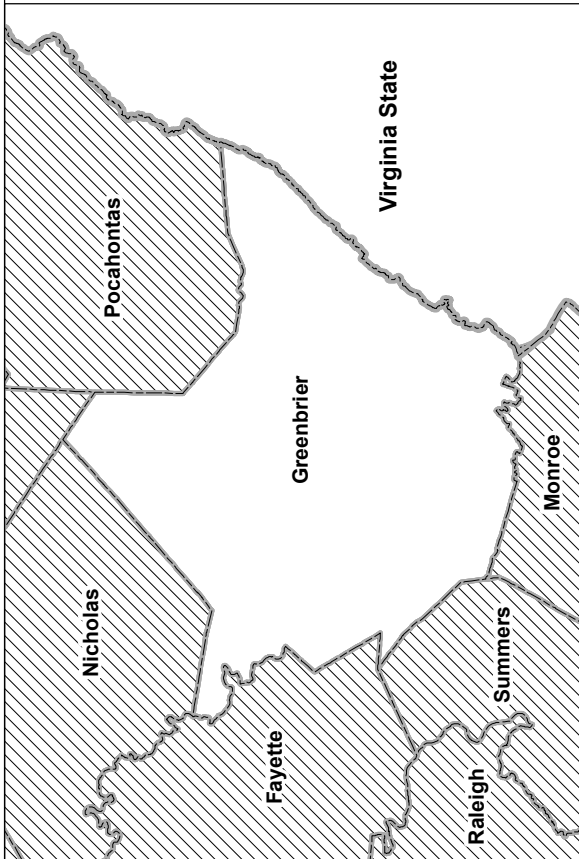
Source: West Virginia Broadband Mapping Program 2012




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# Broadband - Internet Fixed Wireless Coverage

## Greenbrier County



-  Planning Regions Line
-  Fixed Wireless
-  County Boundaries



Source: West Virginia Broadband Mapping Program 2012

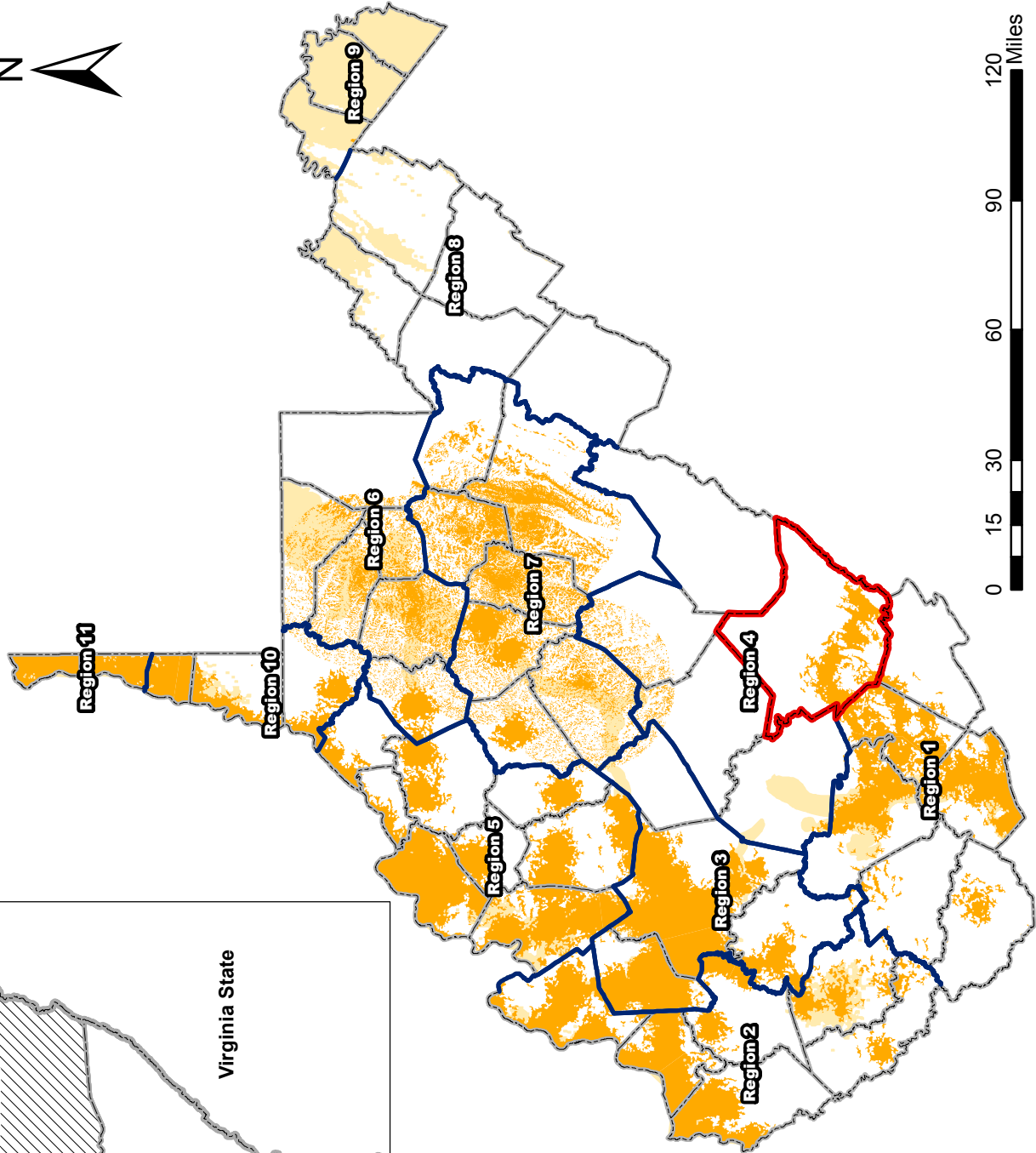
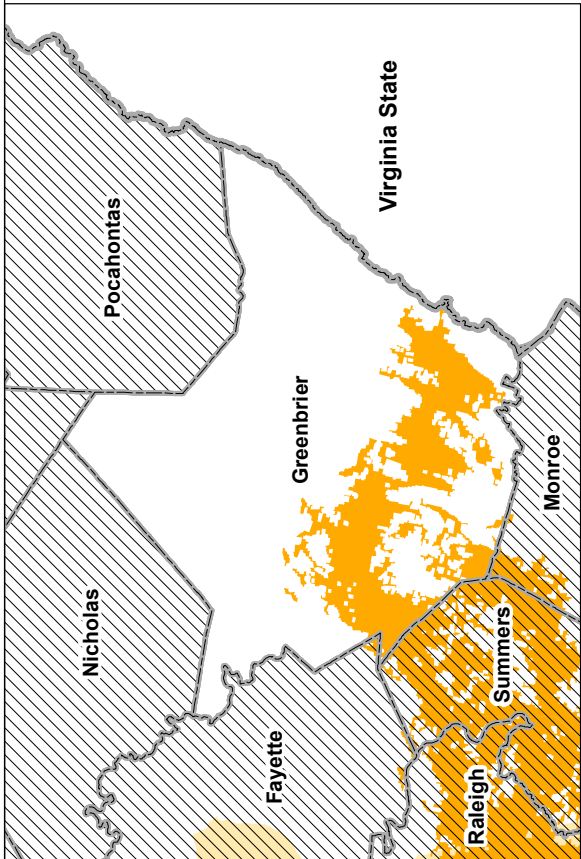
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# Broadband - Internet MaxDown Speed Wireless

Greenbrier County



-  Planning Regions Line
-  768 kbps - 3 mbps
-  3 - 10 mbps
-  County Boundaries



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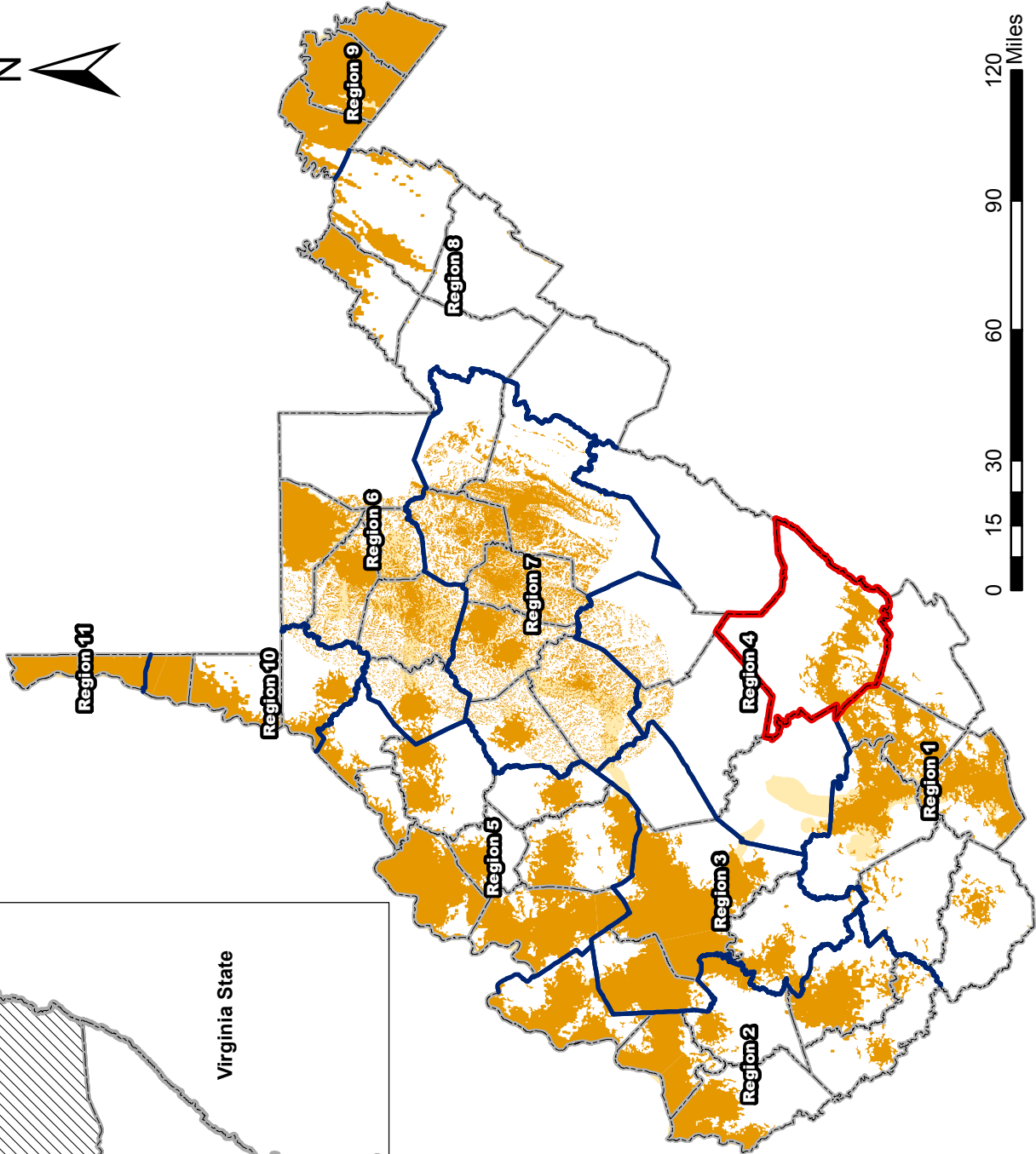
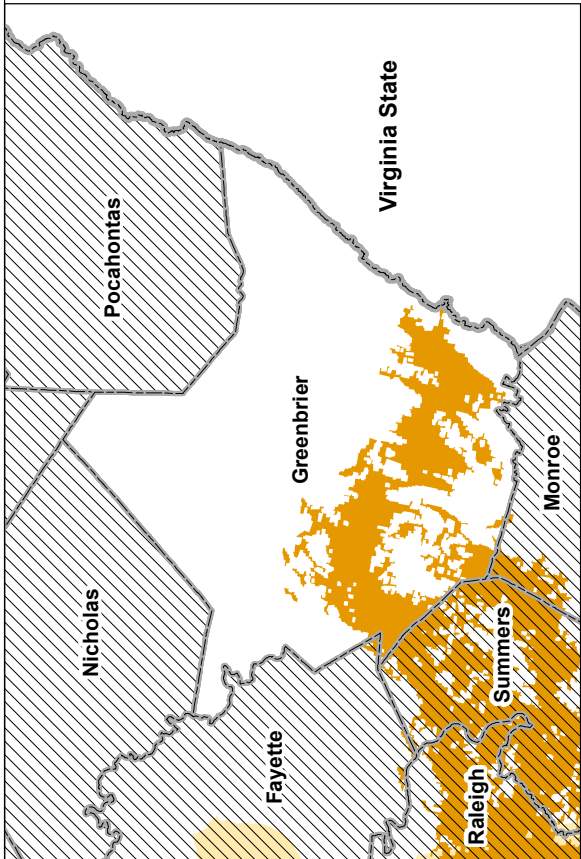
Source: West Virginia Broadband Mapping Program 2012





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# Broadband - Internet MaxUp Speed Wireless

## Greenbrier County



-  Planning Regions Line
-  200 - 768 kbps
-  768 kbps - 3 mbps
-  County Boundaries



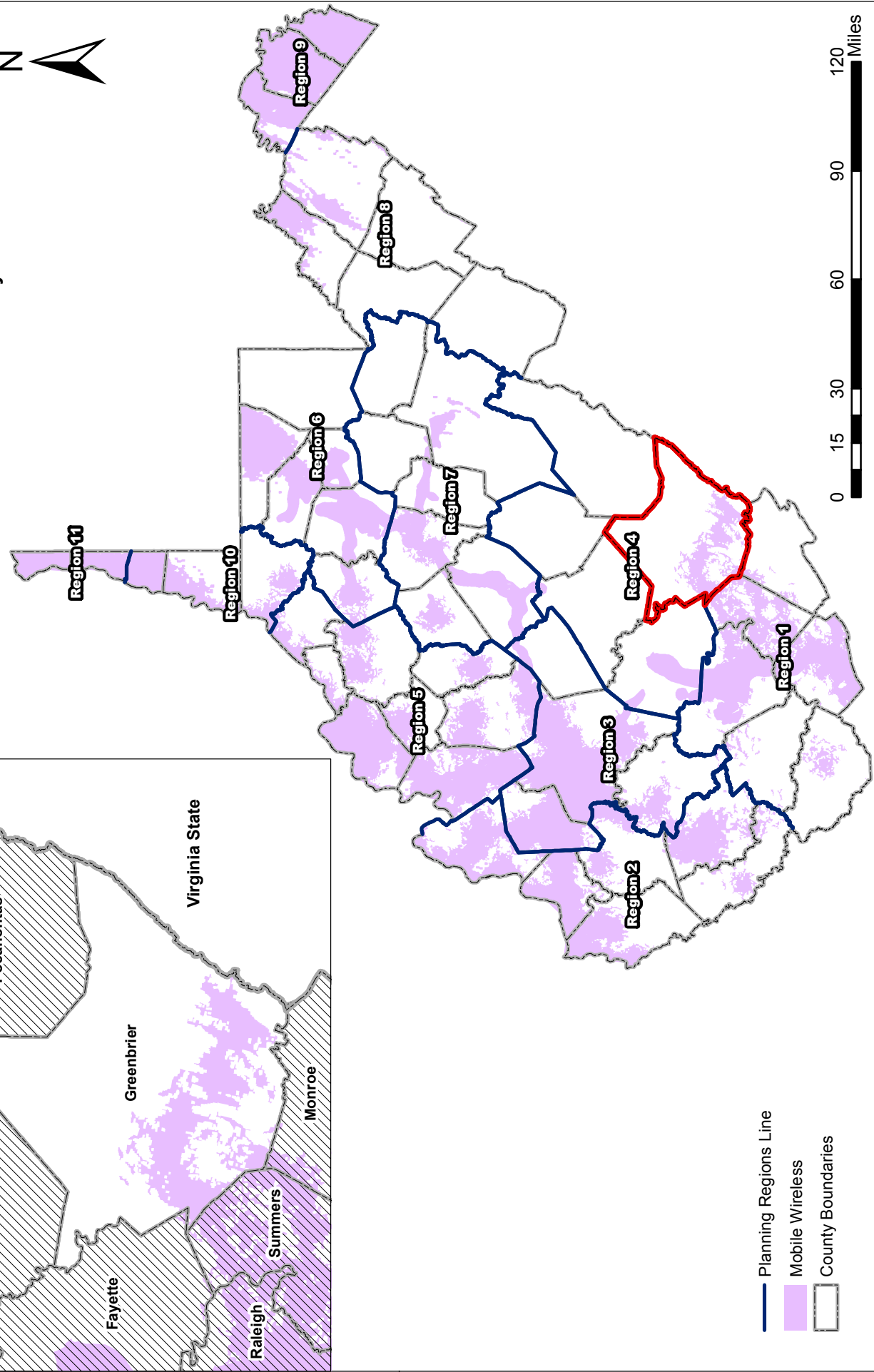
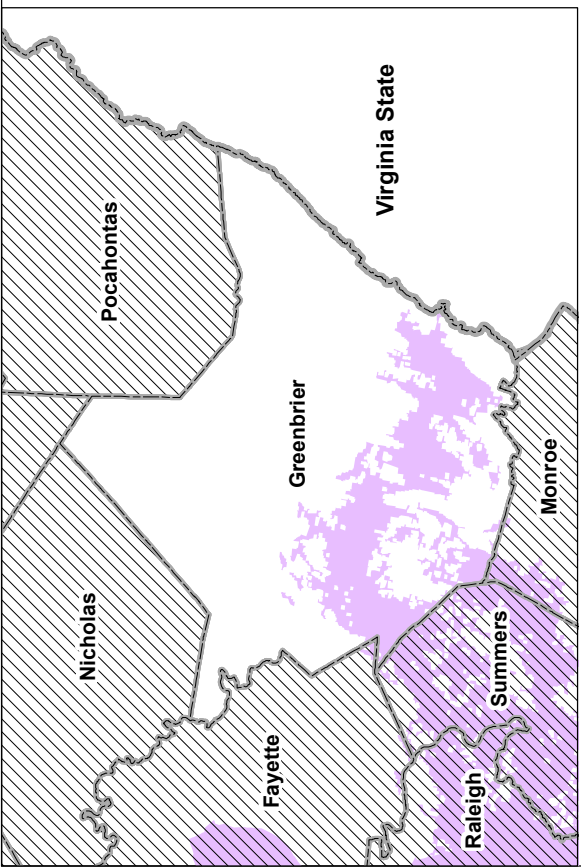
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Source: West Virginia Broadband Mapping Program 2012

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# Broadband - Internet Mobile Wireless Coverage

## Greenbrier County



-  Planning Regions Line
-  Mobile Wireless
-  County Boundaries



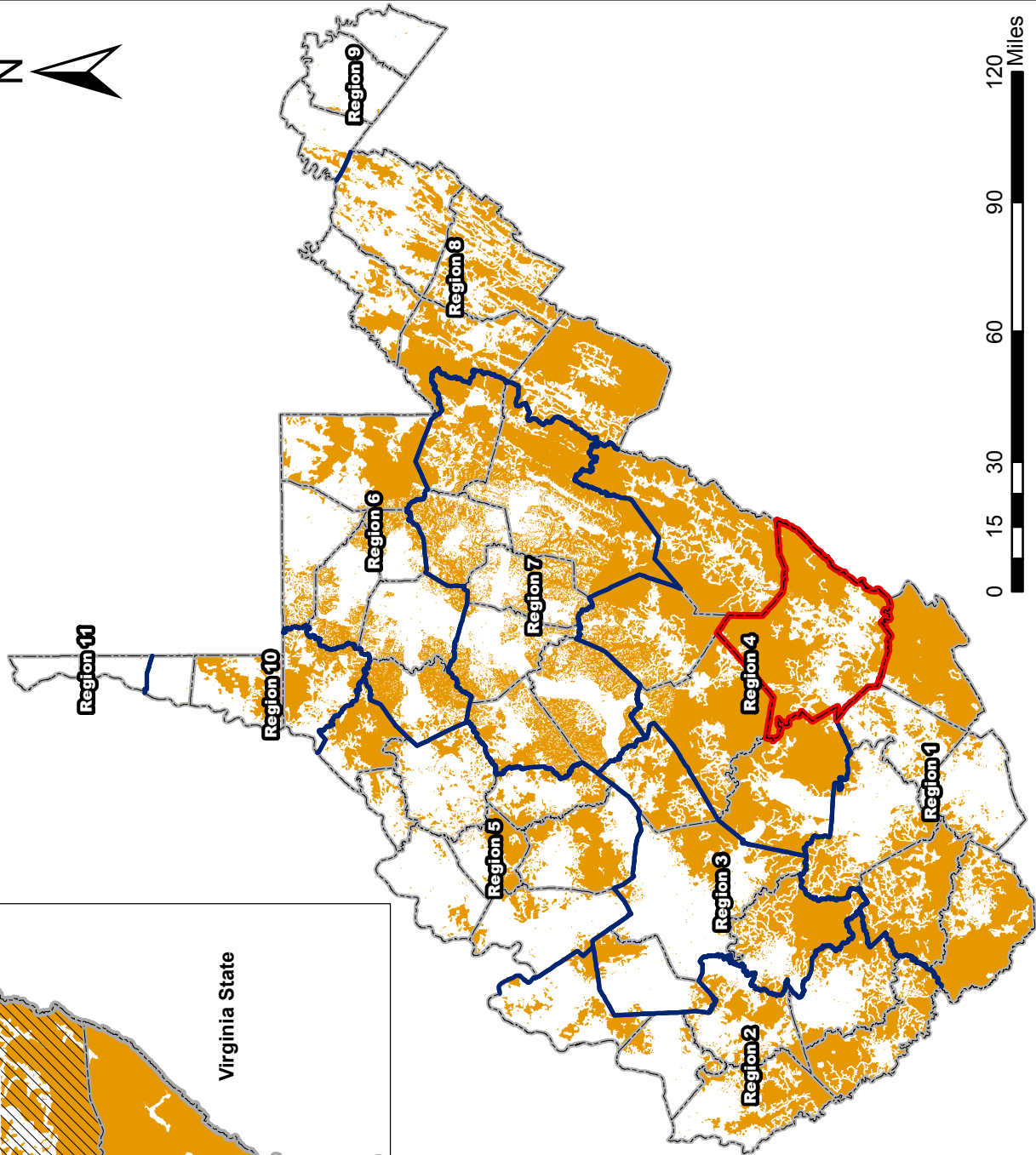
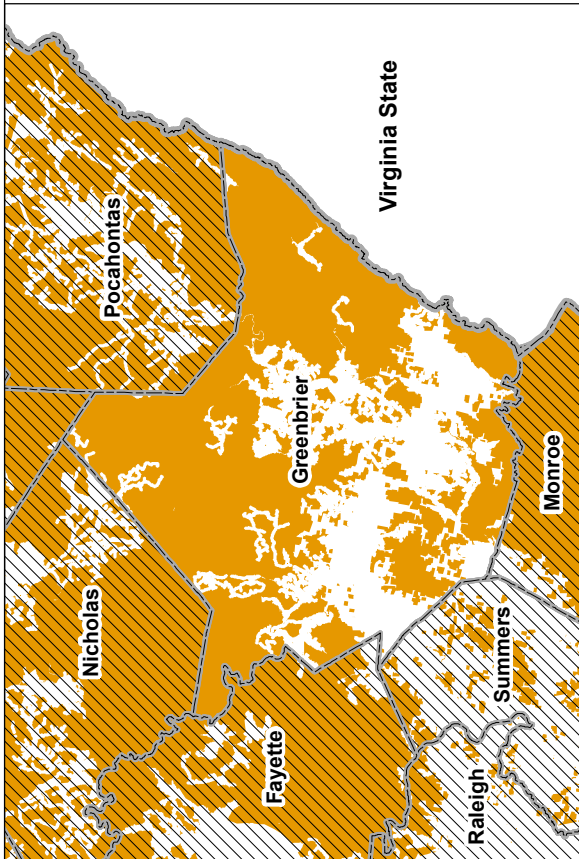
Source: West Virginia Broadband Mapping Program 2012




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# Broadband - No Broadband Coverage

## Greenbrier County



-  Planning Regions Line
-  No Coverage Reported
-  County Boundaries



Source: West Virginia Broadband Mapping Program 2012

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## **Transportation**

### *Highways*

Greenbrier County is completely crossed by Interstate 64, one of the reasons for the continued success of the county. The county is also crisscrossed by US Routes 60 and 219 as well as State Routes 20, 12, 39, 55, 63, and 92 (Map 26).

### *Rail*

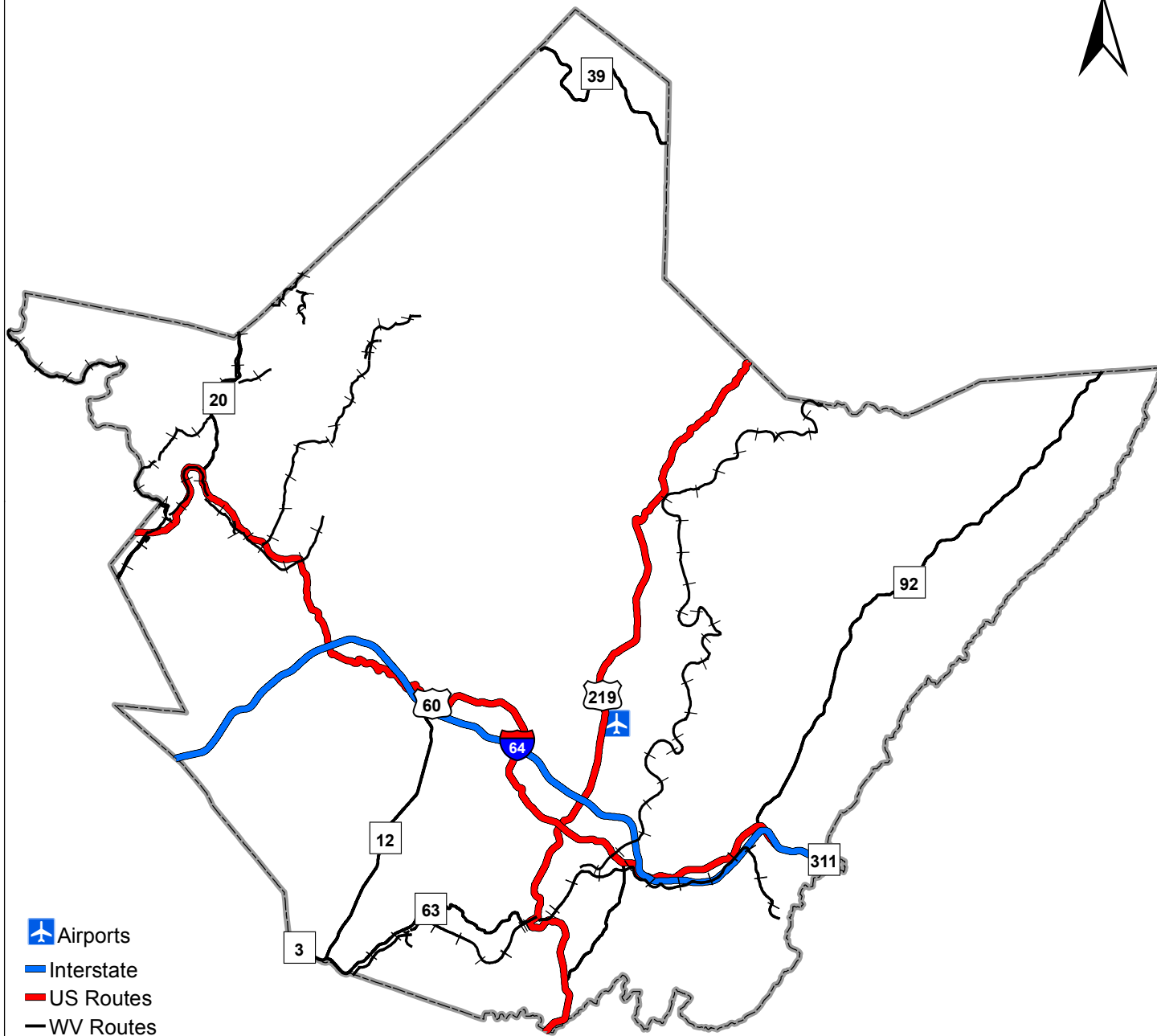
Amtrak has a service line to White Sulphur Springs and Alderson. CSX also has several tracks in the county.







### *Air*

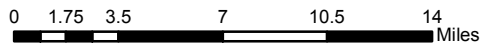
Greenbrier County has a small airport, the Greenbrier Valley Airport, a one-runway public use airport.

# Transportation

## Greenbrier County



-  Airports
-  Interstate
-  US Routes
-  WV Routes
-  Railroads
-  County Boundary



Source: Airports; United States Department of Transportation 2012, West Virginia GIS Technical Center; US Routes, West Virginia Routes, I66 Pikeville, King Coal Highway; West Virginia Department of Transportation 2012; Railroads; Rahall Transportation Institute 2012

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## **Economic Development Sites**

Greenbrier County has several economic development sites, but only one site that is built on post-mine land.

### **Beech Ridge Wind Farm**

Built by Beech Ridge Energy, LLC, the Beech Ridge Wind Farm began construction in 2009. The farm was estimated to cost \$330 million and consist of 124 turbines when completed. Due to cost and legal issues, the facility was reduced to 67 wind turbines and became operational in 2010. In 2013, Invenenergy, the parent company of Beech Ridge Energy, filed an expansion plan that would add 33 more turbines and cost \$115 million. The site, though controversial, is an excellent example of the potential use of post-mine land to continue energy production and create innovative new ways to utilize post-mine land, whatever those ways may be. Beech Ridge contributes about \$400,000 per year in revenue for the county, making it useful from both a revenue and energy standpoint.<sup>9</sup>

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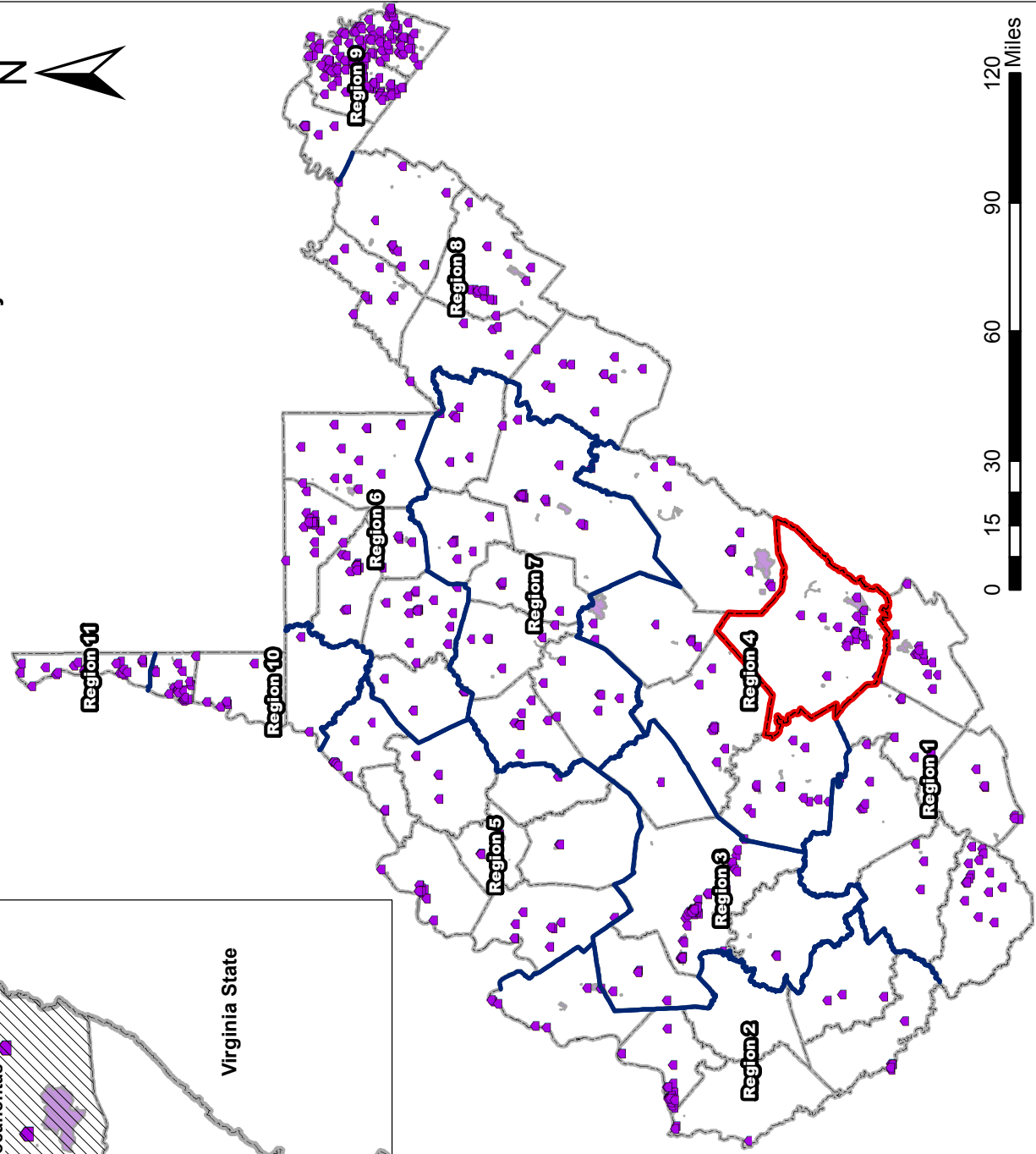
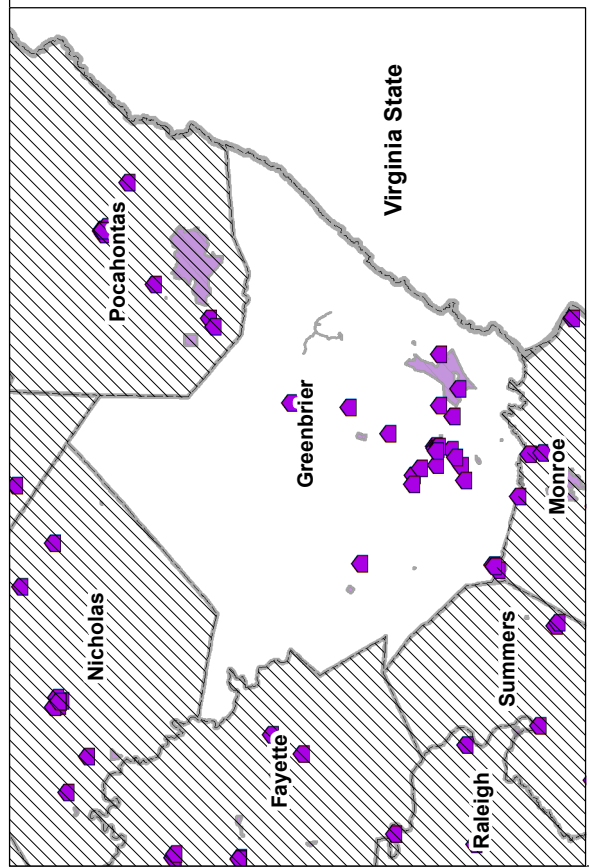
<sup>9</sup> Kasey, Pam. “Beech Ridge Energy looks to expand Greenbrier Co. wind plant.” *The State Journal*, January 10, 2013. <http://www.statejournal.com/story/20554075/beece-ridge-energy-looks-to-expand-greenbrier-co-wind-plant>





## **Historic Preservation**

Historic preservation will be essential in a county steeped in coal mining history. Greenbrier County has 43 listings in the National Register of Historic Places, including the Greenbrier (hotel), the Confederate Cemetery at Lewisburg, the Blue Sulphur Springs Pavilion, and several bridges and historic districts (Map 27). However, other historic areas have also been designated by other units. Map 28 gives a spatial position to each designated State historic piece of architecture.

# National Register of Historic Place

## Greenbrier County



-  National Register of Historic Place
-  Planning Regions Line
-  National Register of Historic Place (Area)
-  County Boundaries

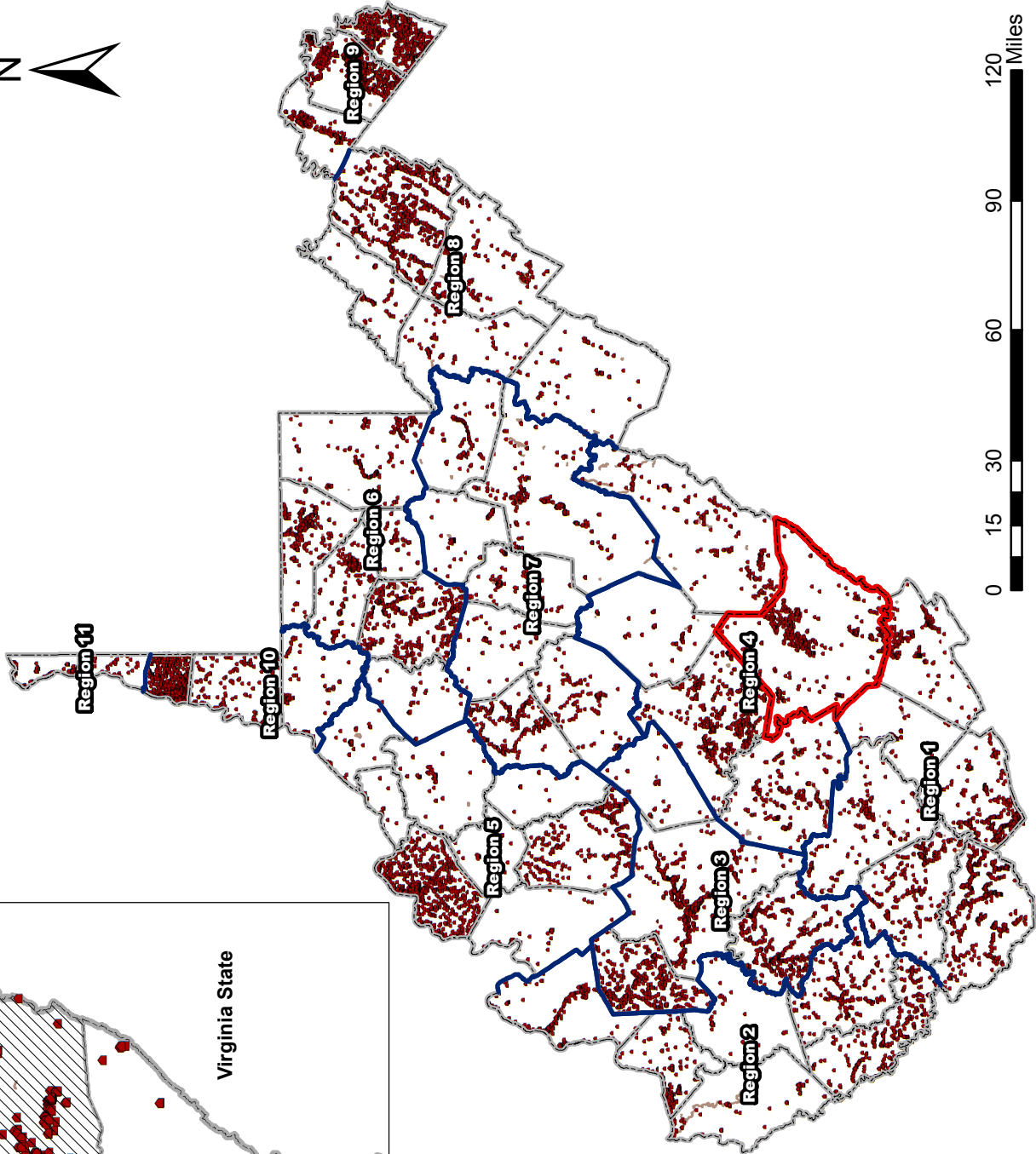
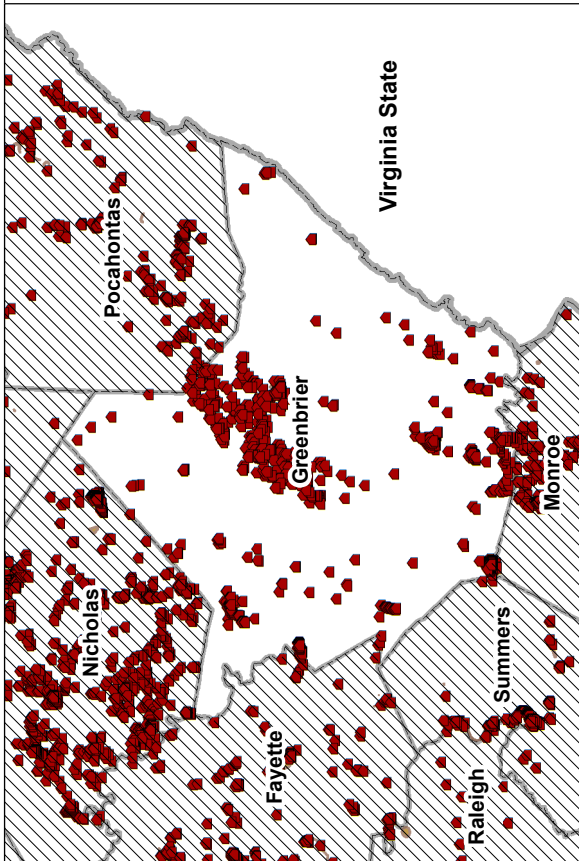
Source: West Virginia State Historic Preservation Office 2012

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# State Historic Architecture

## Greenbrier County



- State Historic Architecture
- Planning Regions Line
- State Historic Architecture (Area)
- County Boundaries

Source: West Virginia State Historic Preservation Office 2012

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## **Natural Resources, Environment, and Energy**

Particular importance should be given to the spatial positions of natural resource areas, geographic environments, and potential energy sources in a county. This serves to inform potential investors about what possibilities the land provides for production of resources and energy. Greenbrier County has several advantages in these areas that can be utilized to the advantage of the citizens.

West Virginia has an extensive wetlands inventory, because of its extensive system of lakes, streams, and rivers. Wetlands provide many environmental benefits, including housing fish, replenishing groundwater, and relaying nutrients. Greenbrier County's system is one of the most extensive, covering the entire county, and their positions are given in Map 29.

The State also possesses a respectable amount of park and forest land. Most of this land is located in the eastern portion of the State, the area which contains the main part of the Appalachian Mountain range. Greenbrier is in this area and is actually the southernmost West Virginia County in an extensive system of national forest land. The County also contains a major wildlife management area in the east and a State forest in the south (Map 30).

Air quality is a necessary environmental health benchmark that can determine the health and vitality of an area's residents. The air pollution non-attainment areas are "areas of the country where air pollution levels persistently exceed the national ambient air quality standards"<sup>10</sup> There are six full counties in West Virginia that are designated air pollution non-attainment areas, either in annual or 2006 24-hour standards as of the publication of this plan; Greenbrier County is not among them (Map 31).

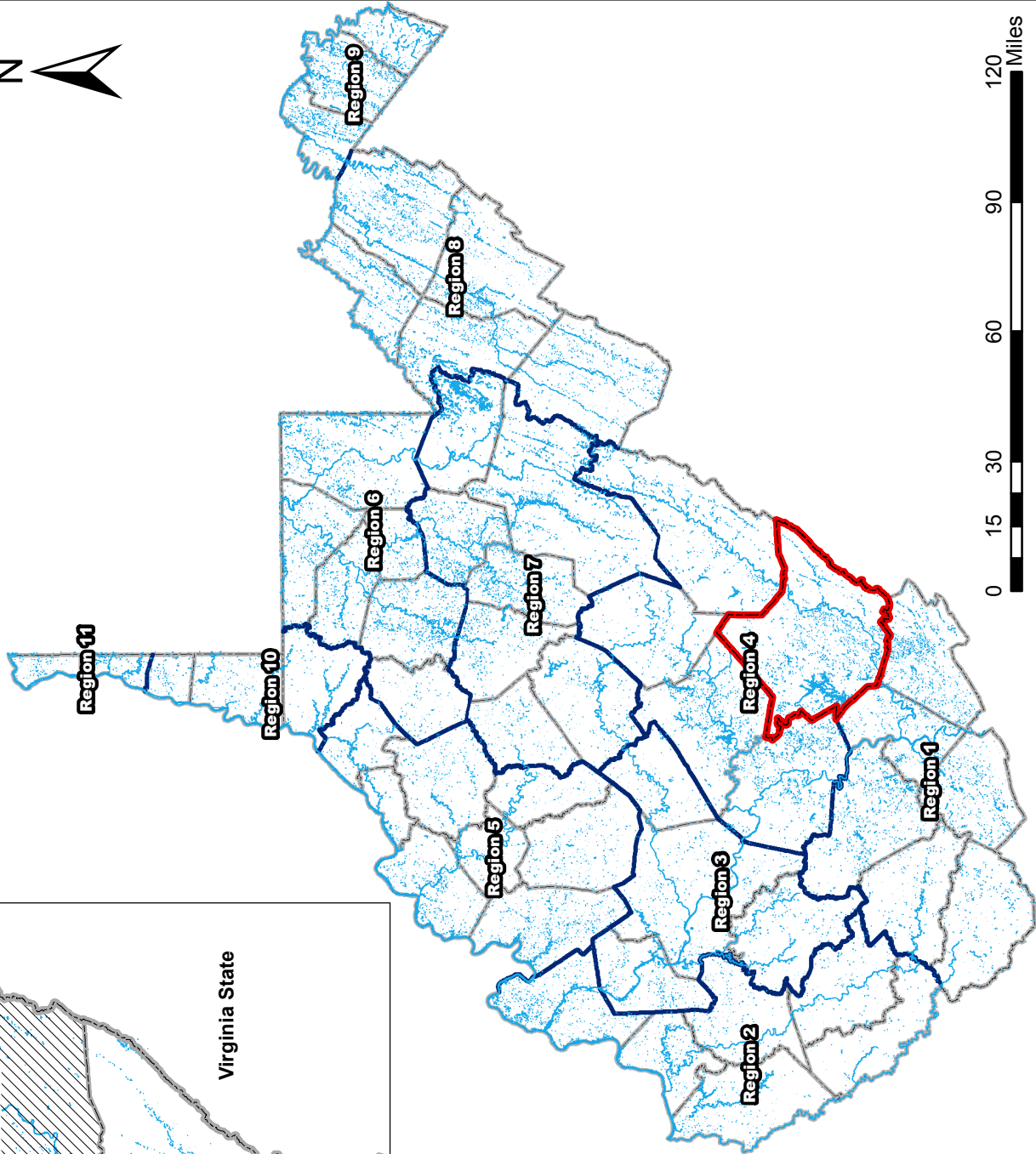
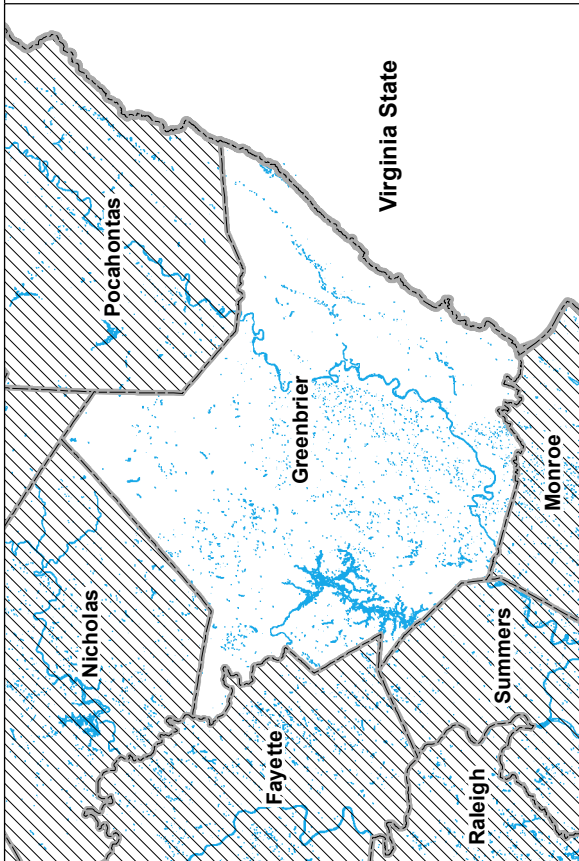
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<sup>10</sup> "The Green Book Nonattainment Areas for Criteria Pollutants," Environmental Protection Agency, Accessed March 1, 2013, <http://www.epa.gov/oaqps001/greenbk/>.



# Hydrology - National Wetlands Inventory

Greenbrier County



-  Planning Regions Line
-  National Wetlands Inventory
-  County Boundaries

Source: United States Fish and Wildlife Service 1996

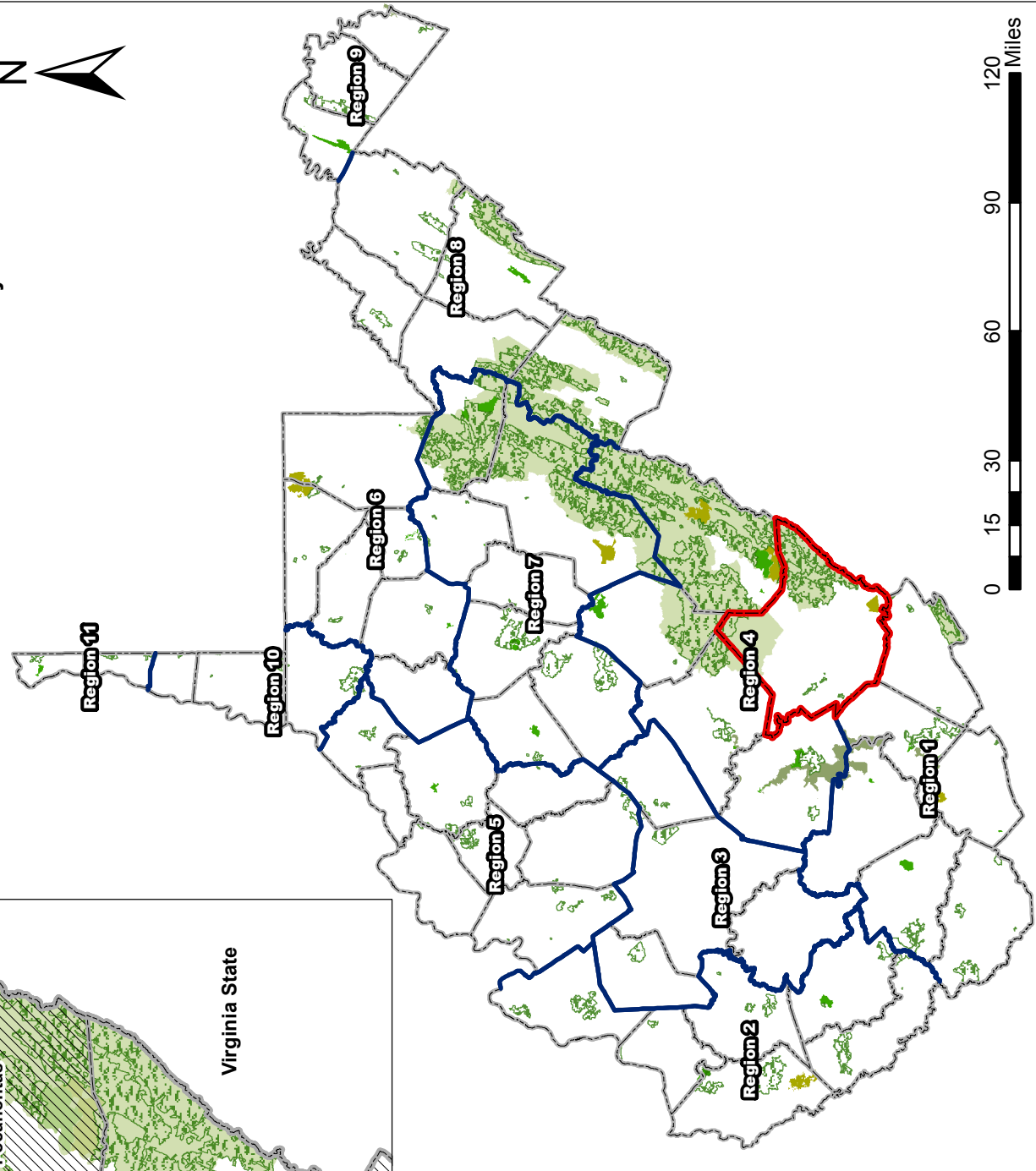
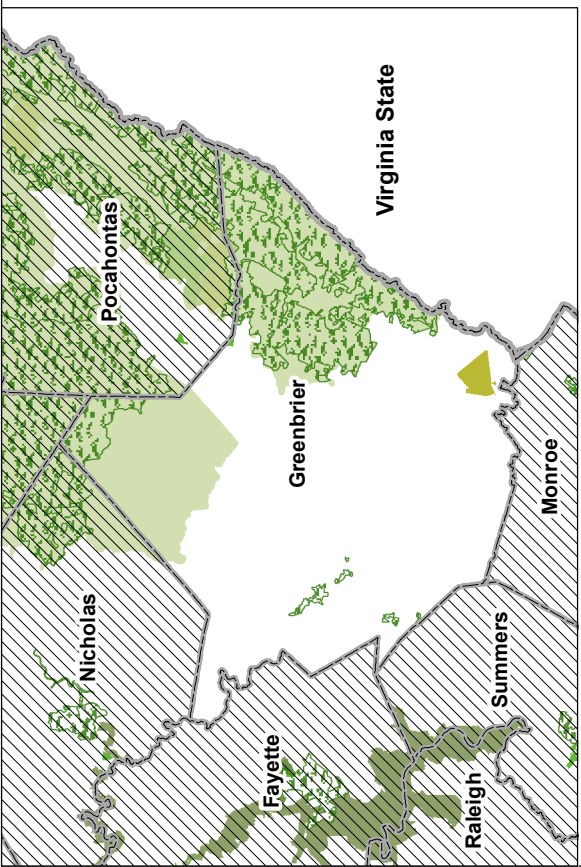
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# Public Land - Parks and Forests

## Greenbrier County



-  Planning Regions Line
-  Wildlife Management Areas
-  State Forest
-  State Park
-  National Forest
-  National Park
-  County Boundaries



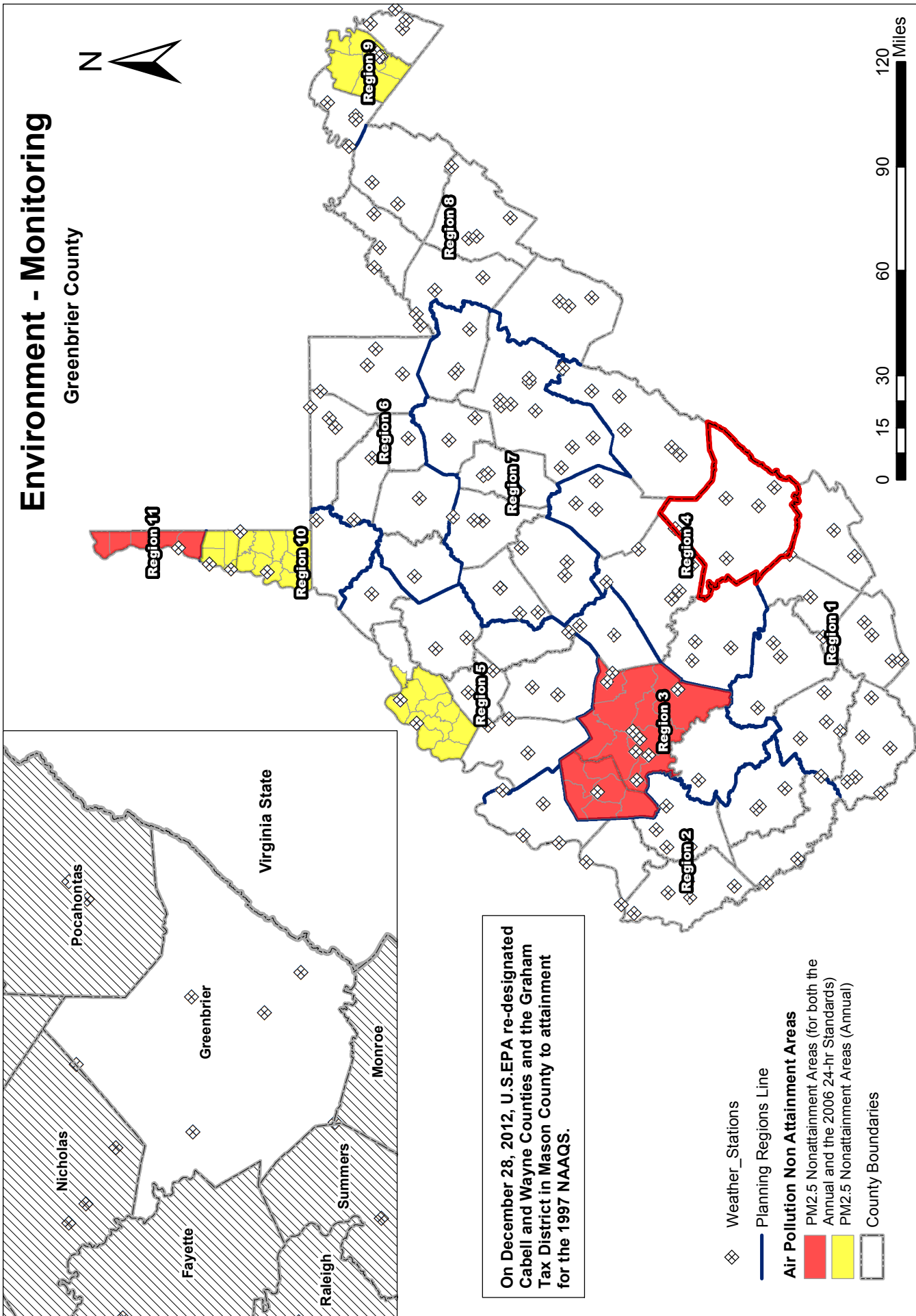
Source: Wildlife Management Areas; West Virginia Division of Natural Resources 2002; State Forest; West Virginia Division of Forestry 2004; State Park; West Virginia Division of Natural Resources; Natural Resource Analysis Center 2000; National Forest; United States Forest Service 2003; National Park; United States National Park Service 2003

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# Environment - Monitoring

## Greenbrier County



On December 28, 2012, U.S.EPA re-designated Cabell and Wayne Counties and the Graham Tax District in Mason County to attainment for the 1997 NAAQS.

- ◇ Weather\_ Stations
- Planning Regions Line
- Air Pollution Non Attainment Areas**
  - PM2.5 Nonattainment Areas (for both the Annual and the 2006 24-hr Standards)
  - PM2.5 Nonattainment Areas (Annual)
  - County Boundaries



Source: Weather Stations; National Oceanic and Atmospheric Administration 1999; Air Pollution Non Attainment Areas; West Virginia Department of Environmental Protection and United States Environmental Protection Agency.

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West Virginia's past and most likely its future are defined by energy. Besides coal, other options for energy have been investigated in the State. Gas and oil are of course the main energy staples in the nation, and West Virginia has access to this sort of energy in a number of ways. Greenbrier County however, has no oil pipelines or oil fields, and only a small section of gas pipe (Map 32). The Marcellus Shale is either too deep or unknown to permit active play in the County, and only three wells appear to be permitted (Map 33). The Marcellus Shale will continue to be a major player in West Virginia's energy layout for the foreseeable future, and as technology improves recoverability may also, but at the present time Greenbrier seems to be incapable of making big plays in these energy types.

Potential renewable energy sources were also examined. Wood byproducts are a potential energy source classified as biomass energy. Naturally it is most useful in areas with a great deal of wood products. West Virginia is one of the most forested States in the country. Greenbrier County appears to be in the median of the spectrum however, with between 75 and 82 percent of its land forested (Map 34). That is still a majority of the land, which could prove to be a valuable resource; however, it must be noticed that, as referenced above, a high amount of this wooded land is protected in national and State forests. Though several counties in West Virginia maintain the potential to produce energy by wood byproducts, and for which byproducts are readily available, Greenbrier County appears to be on the lowest end of the spectrum (Maps 35 and 36). Other potential renewable energy sources include geothermal (Map 37), solar (Map 38), and wind (Map 39). Each of these resources was examined in a recent report from the Center of Business and Economic Research at Marshall University.<sup>11</sup> None of these sources was "likely to provide fuel or electricity at a lower cost" than coal and oil. Subsidizing these resources appears to be the only way to encourage faster growth in consumption, and in some cases they still have very limited potential in West Virginia. Geothermal energy, however, appears to have great potential in certain parts of the State, as shown in Map 37, and there is a strip of Greenbrier that appears to be favorable to geothermal development. Wind energy is also major, with several areas having great potential density. Already wind is being used at the Beech Ridge Wind Farm. Benefits are not expected in the short term, however, and costs may make immediate exploitation infeasible. Still, technology is not predictable, and improvements could occur in each of these resource areas that will make generation more feasible. Efforts to monitor research in all these areas should be undertaken to make use of any potential developments.<sup>12</sup>

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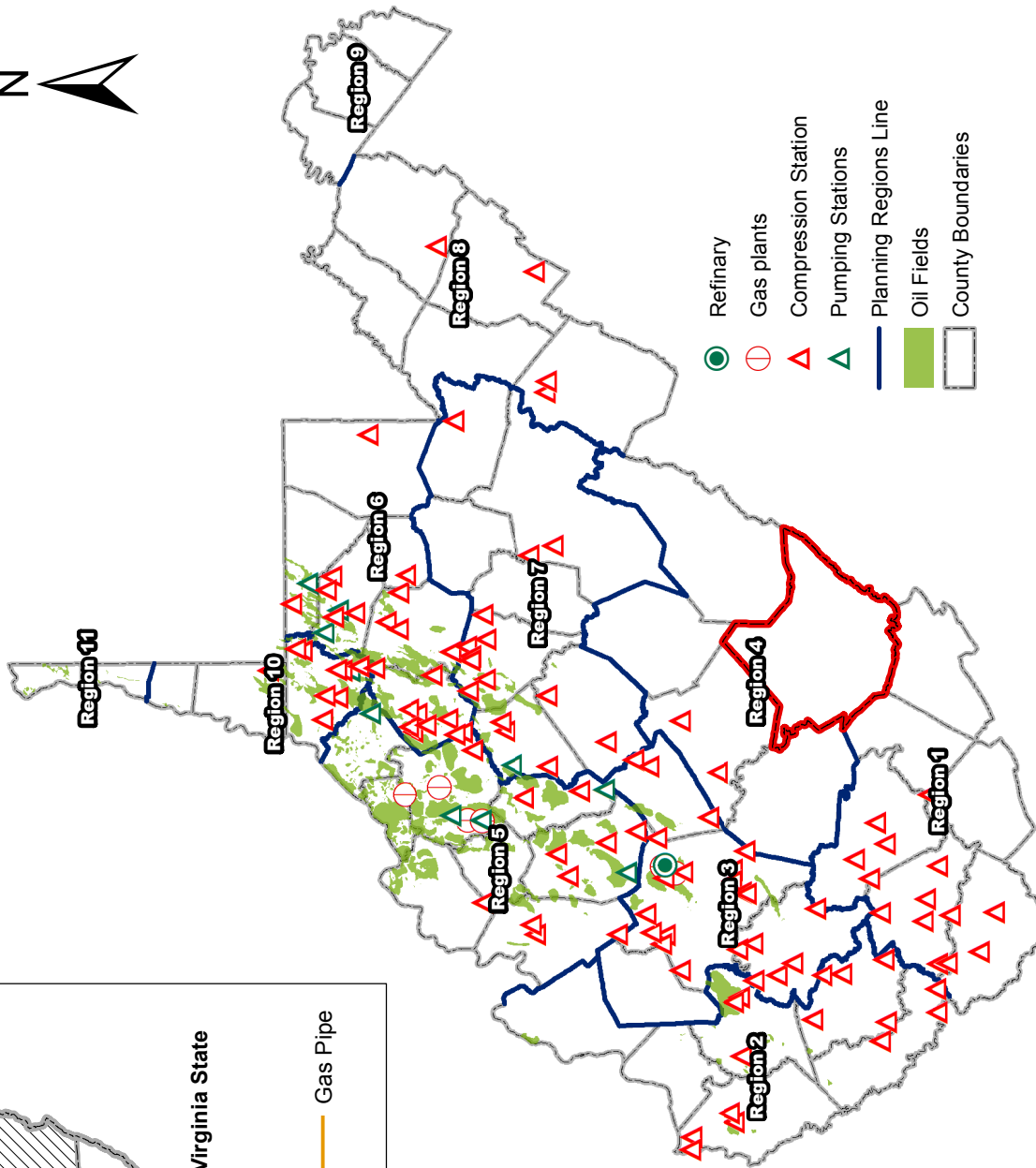
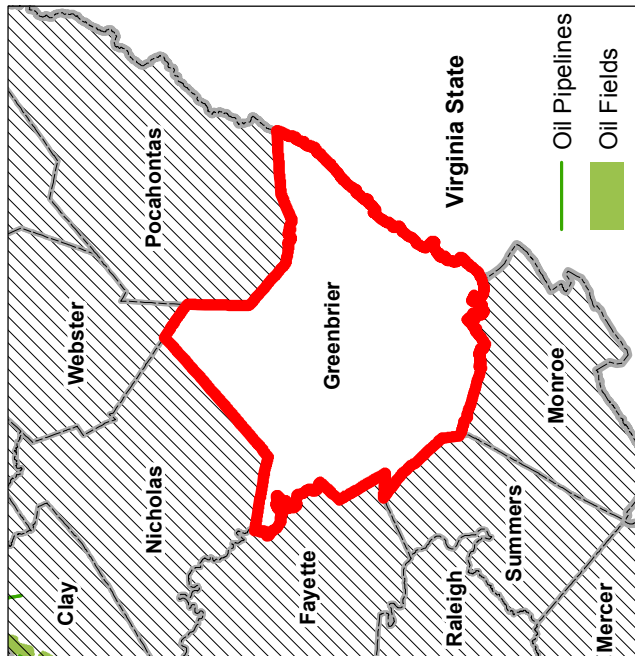
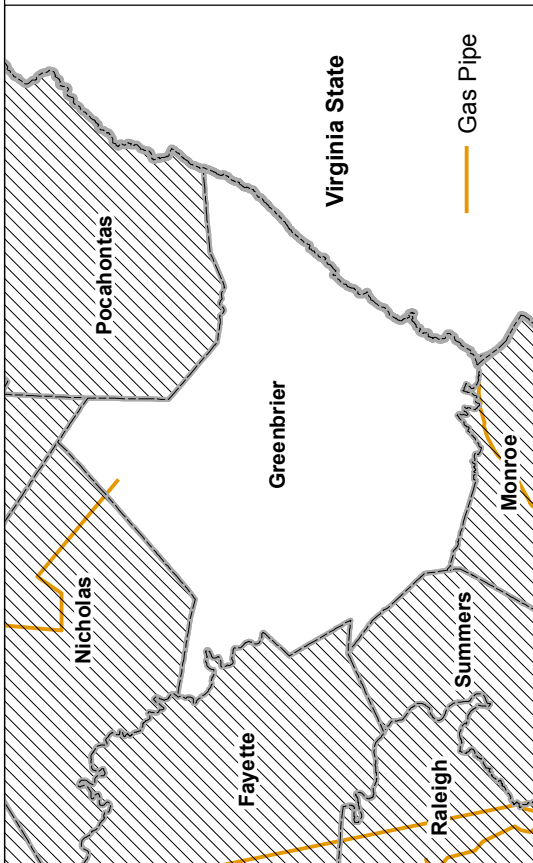
<sup>11</sup> Kent, Calvin, Risch, Christine, and Pardue, Elizabeth. *Renewable Energy Policy: Opportunities for West Virginia*. Center for Business and Economic Research, Huntington, WV (2012).

<sup>12</sup> Ibid.

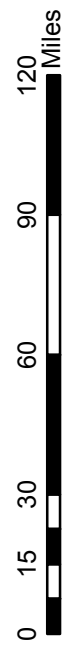


# Energy - Gas and Oil

## Greenbrier County



- Refinery
- Gas plants
- Compression Station
- Pumping Stations
- Planning Regions Line
- Oil Fields
- County Boundaries



Source: West Virginia Geological and Economic Survey 2007

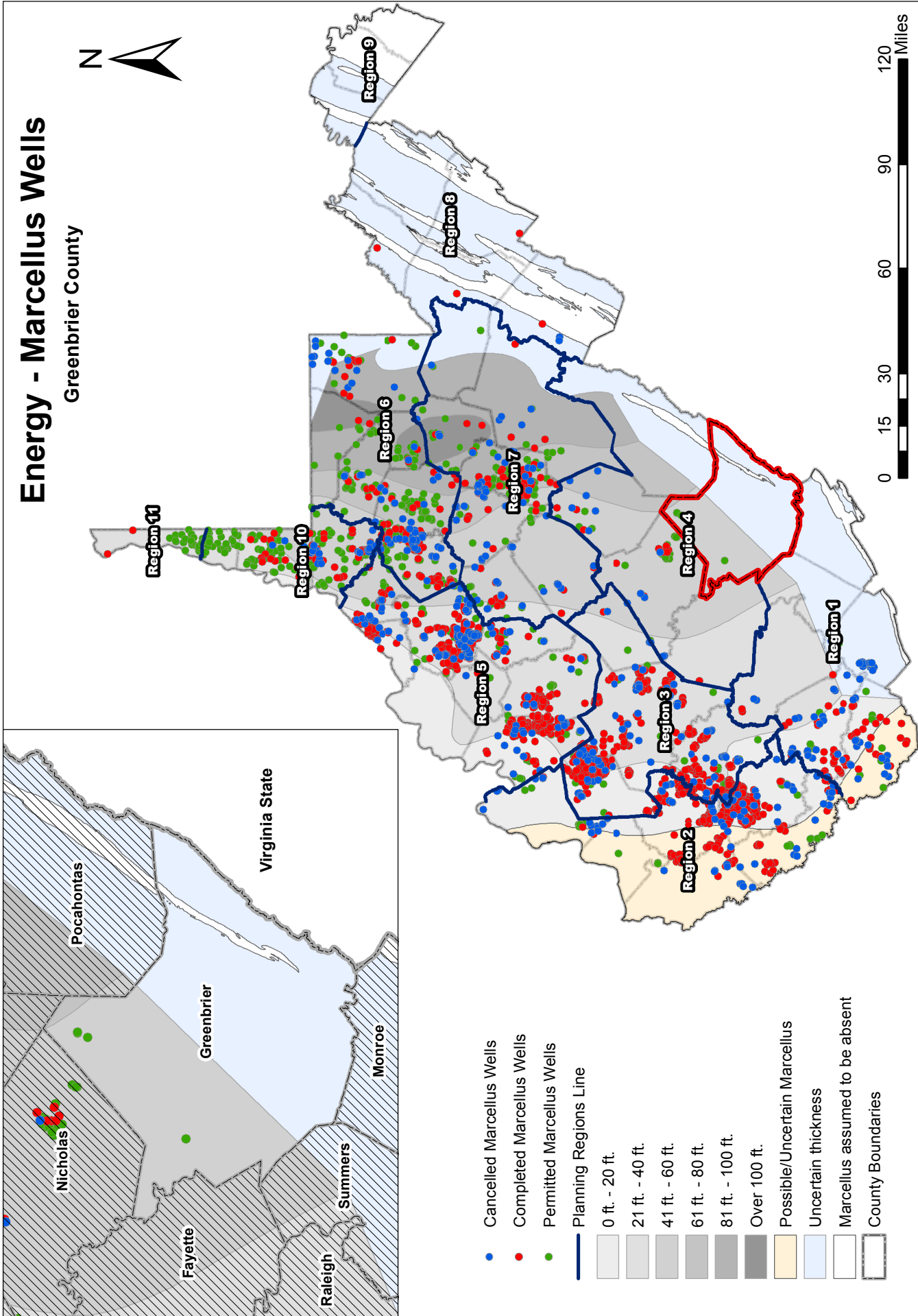
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# Energy - Marcellus Wells

## Greenbrier County



- Cancelled Marcellus Wells
- Completed Marcellus Wells
- Permitted Marcellus Wells
- Planning Regions Line
- 0 ft. - 20 ft.
- 21 ft. - 40 ft.
- 41 ft. - 60 ft.
- 61 ft. - 80 ft.
- 81 ft. - 100 ft.
- Over 100 ft.
- Possible/Uncertain Marcellus
- Uncertain thickness
- Marcellus assumed to be absent
- County Boundaries

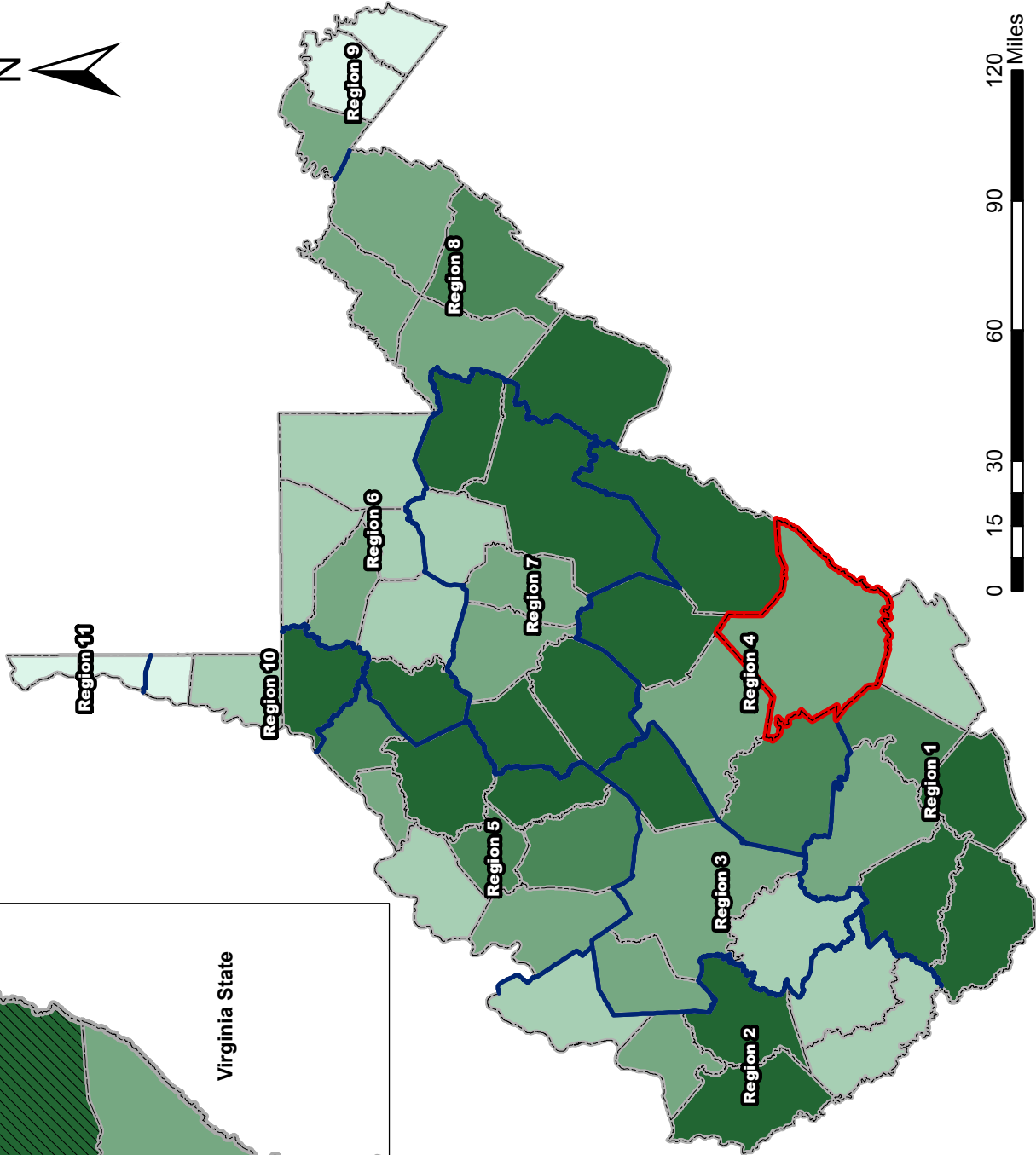
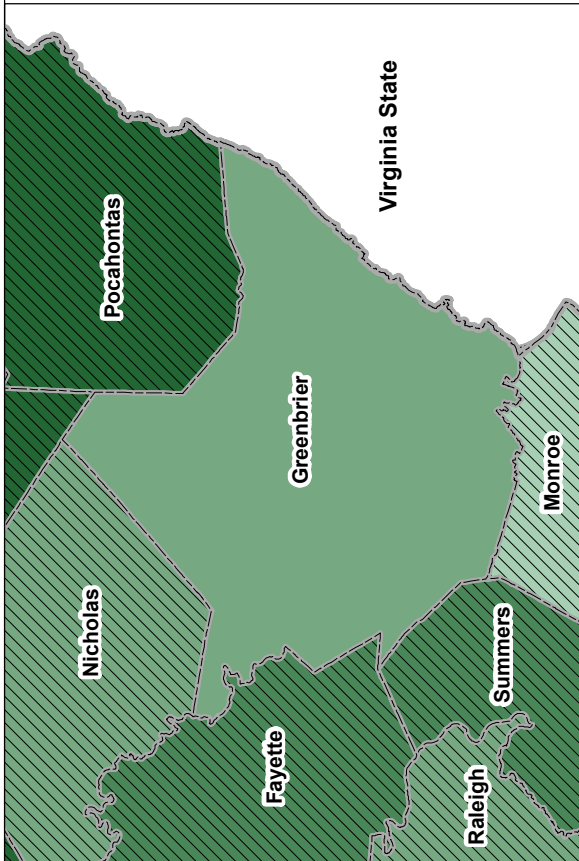
Source: West Virginia Geological and Economic Survey 2012

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# Energy - Percent Forest Coverage

Greenbrier County



- Planning Regions Line
- 45.87% - 65%
- 65.01% - 75%
- 75.01% - 82%
- 82.01% - 85%
- 85.01% - 100%
- County Boundaries

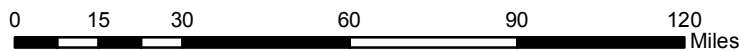
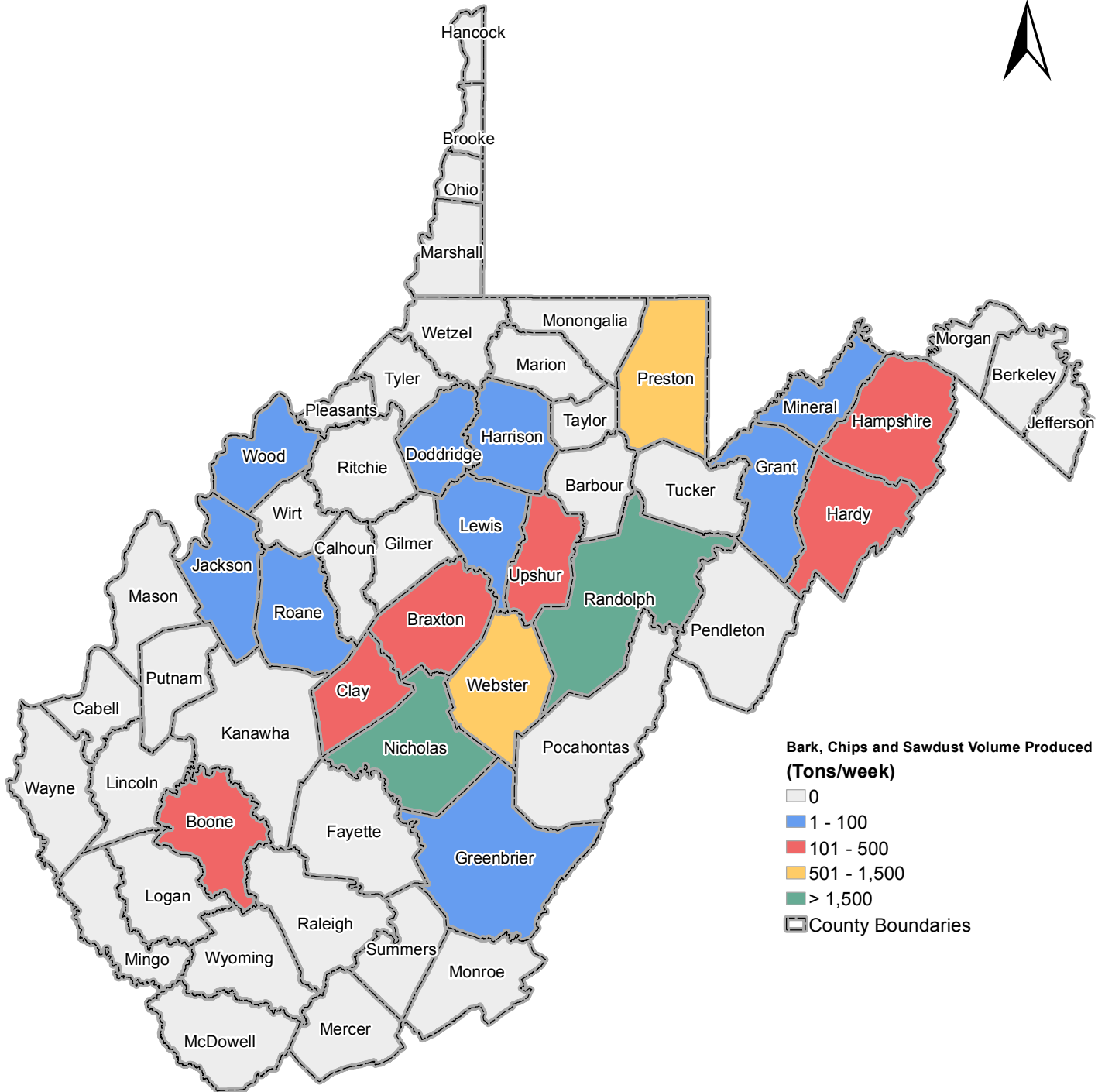
Source: Rahaal Transportation Institute 2013

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# Renewable Energy - Wood By Products

## Bark, Chip and Sawdust Volume Produced - Greenbrier County



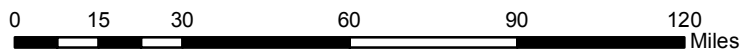
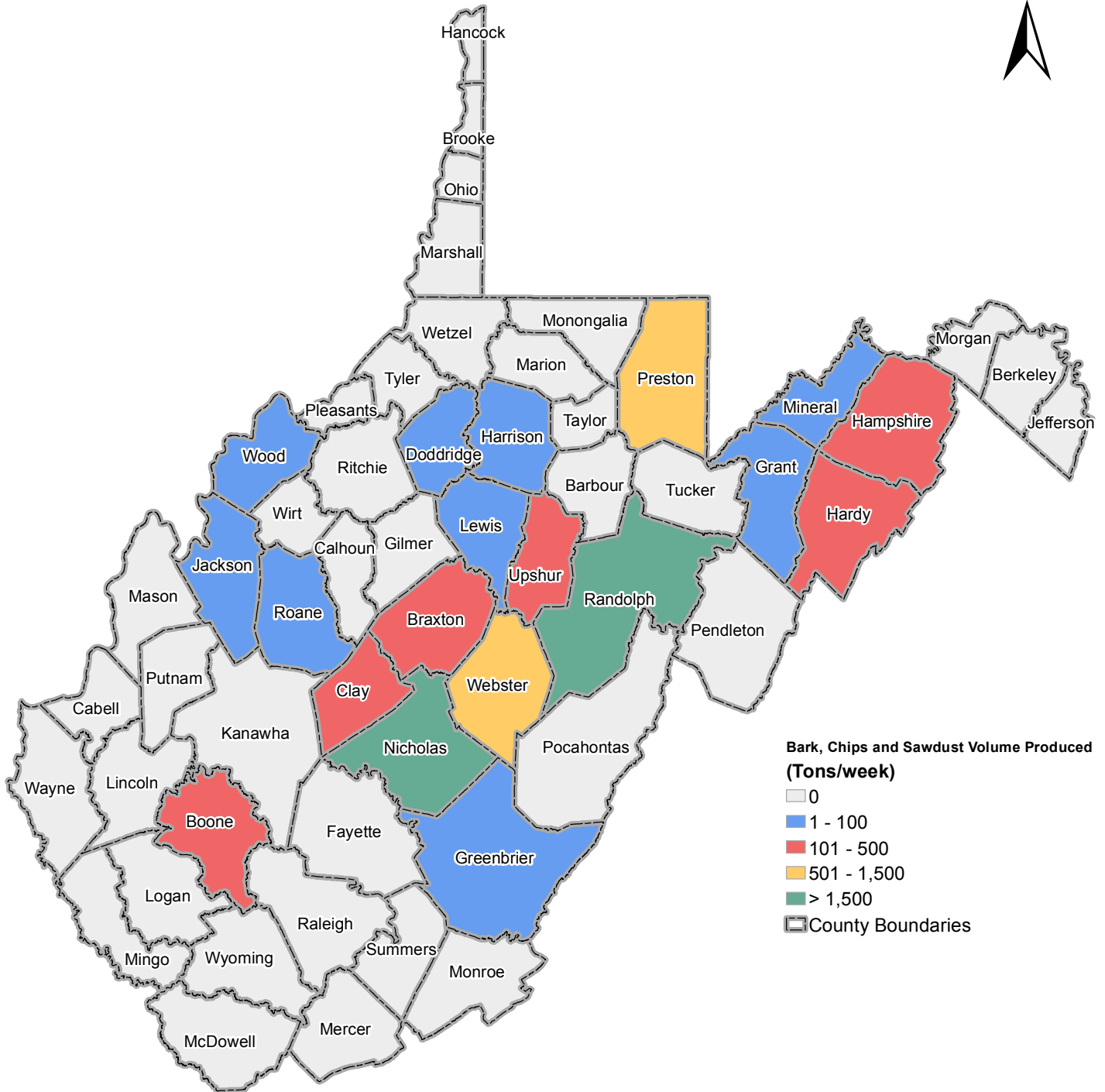
Source: Appalachian Hardwood Center 2011

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# Renewable Energy - Wood By Products

## Bark, Chip, and Sawdust Volume Available - Greenbrier County

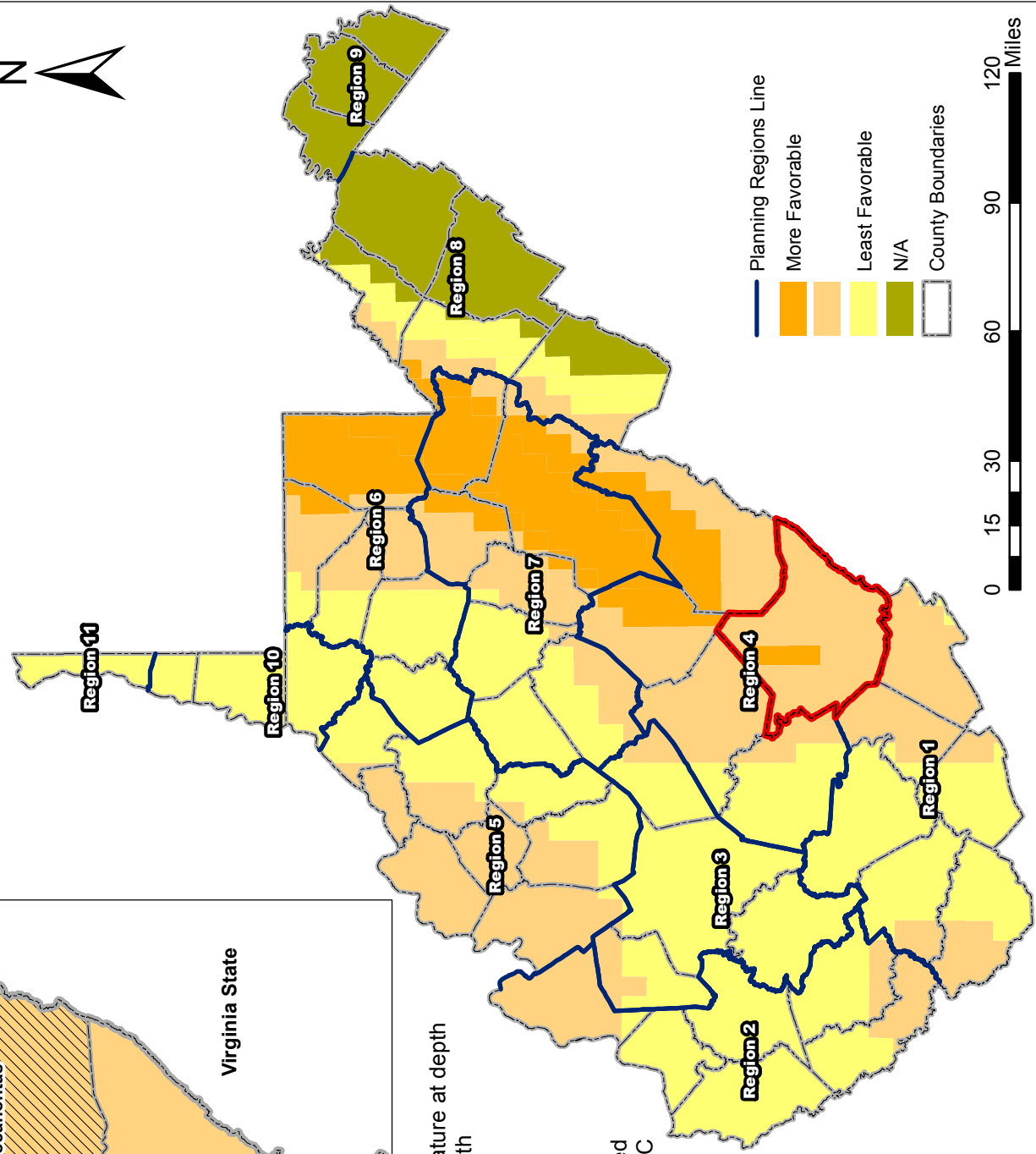
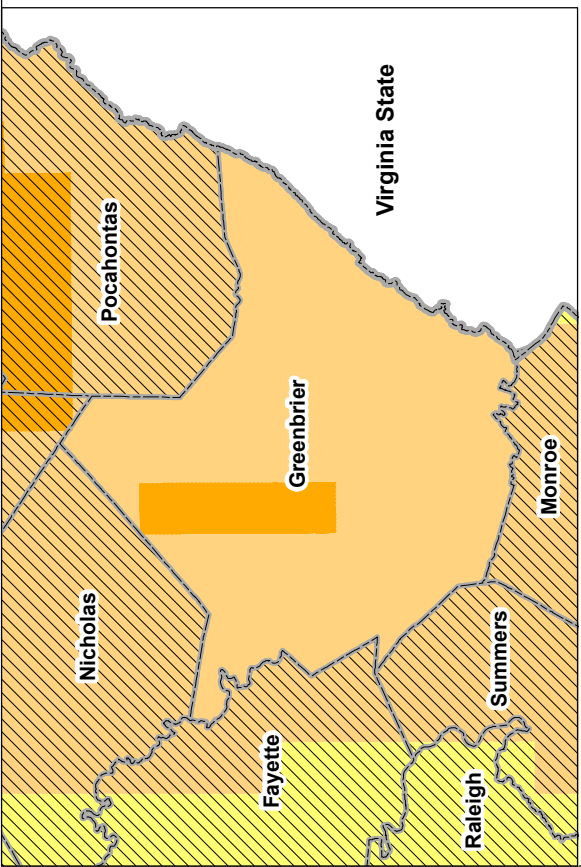


Source: Appalachian Hardwood Center 2011

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# Energy - Geothermal Resource of Greenbrier County Favorability of Deep Enhanced Geothermal Systems



– Source data for deep EGS includes temperature at depth from 3 to 10 km and analyses (for regions with temperatures  $\geq$  150 degrees C).

– Class values reflect relative favorability, with 1 being more favorable, 3 being least favorable, and "N/A" regions not having been assessed due to temperatures less than 150 degrees C at 10 km depth.

Source: National Renewable Energy Laboratory 2009

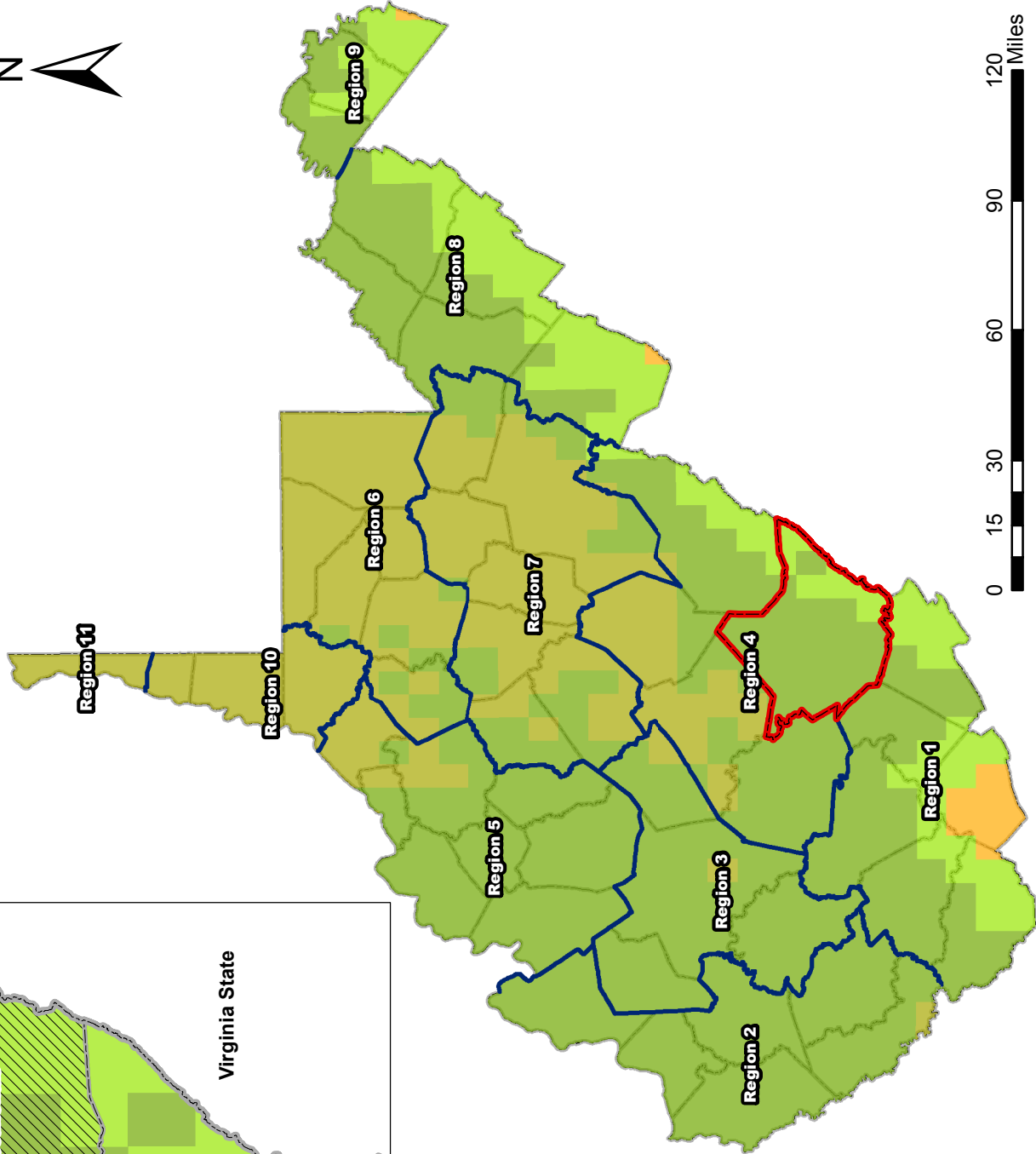
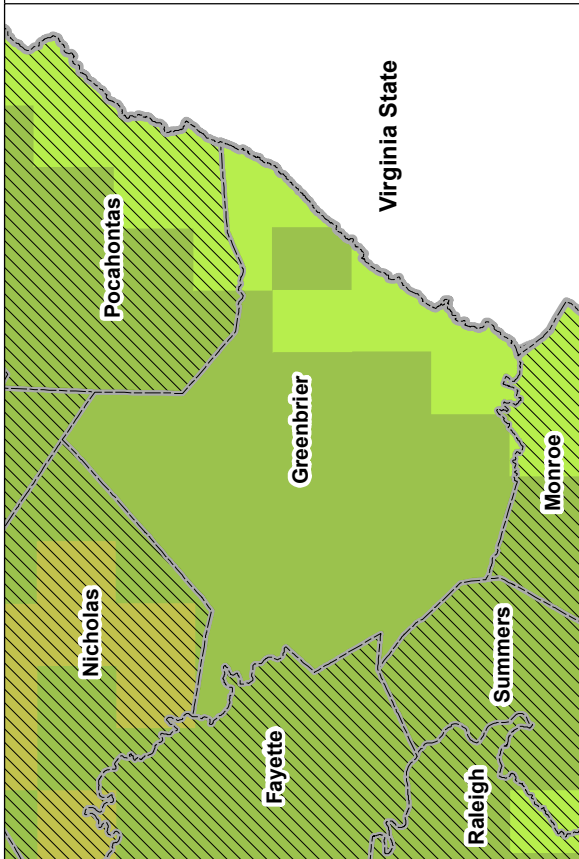
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# Solar - Renewable Energy

## Greenbrier County



— Planning Regions Line

(kWh/m<sup>2</sup>/day)

4.2 - 4.4

4.0 - 4.1

3.7 - 3.9

3.4 - 3.6

□ County Boundaries



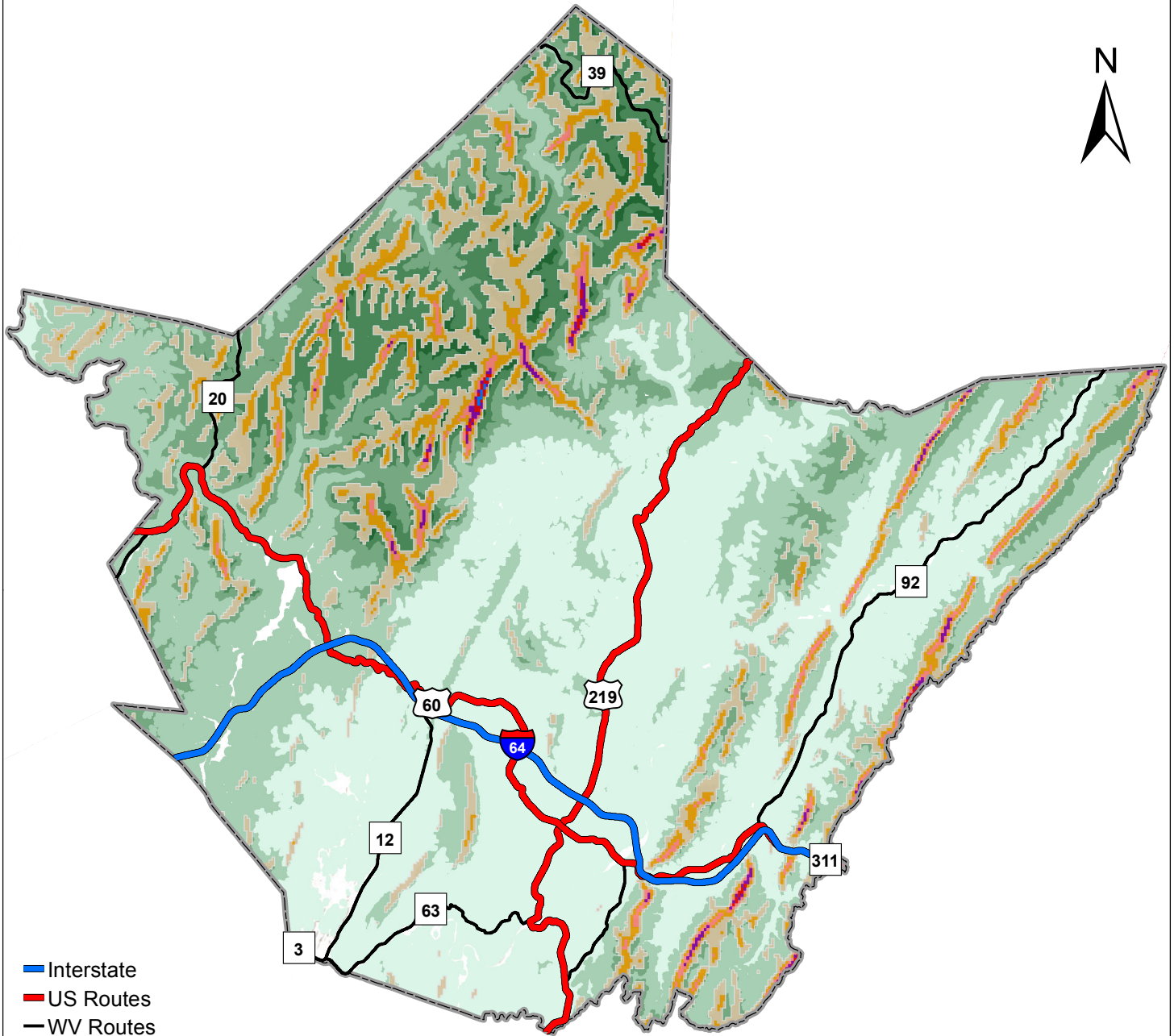
Source: National Renewable Energy Laboratory 2012

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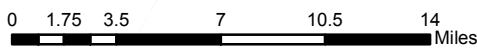
# Renewable Energy-Wind

## Greenbrier County



- Interstate
  - US Routes
  - WV Routes
- Wind Power Class Potential Density (W/m<sup>2</sup>)**
- 0 - 200 Poor
  - 200 - 300 Marginal
  - 300 - 400 Fair
  - 400 - 500 Good
  - 500 - 600 Excellent
  - 600 - 800 Outstanding
  - > 800 Superb

- Elevation (Feet)**
- 1740 - 2320
  - 2321 - 2720
  - 2721 - 3120
  - 3121 - 3600
  - 3601 - 4340
- County Boundary



Source: National Renewable Energy Laboratory 2006, United States Geological Survey n.d., ESRI, 2013

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#### IV. Land Use Smart Planning

The research team constructed a smart planning criterion that would apply to each mine site in Greenbrier. Tax Districts were utilized and labeled based on a particular land use practice that has previously been incorporated into the site. This criterion allows researchers and policymakers to determine suitability after weighing all the factors mentioned in the plan. A range of potential utilizations is given to give optimal control to policymakers and investors.

The table below (Table 2) provides the categories and their areas. The Smart Planning Map (Map 39) showcases the geographies separated by utilization.

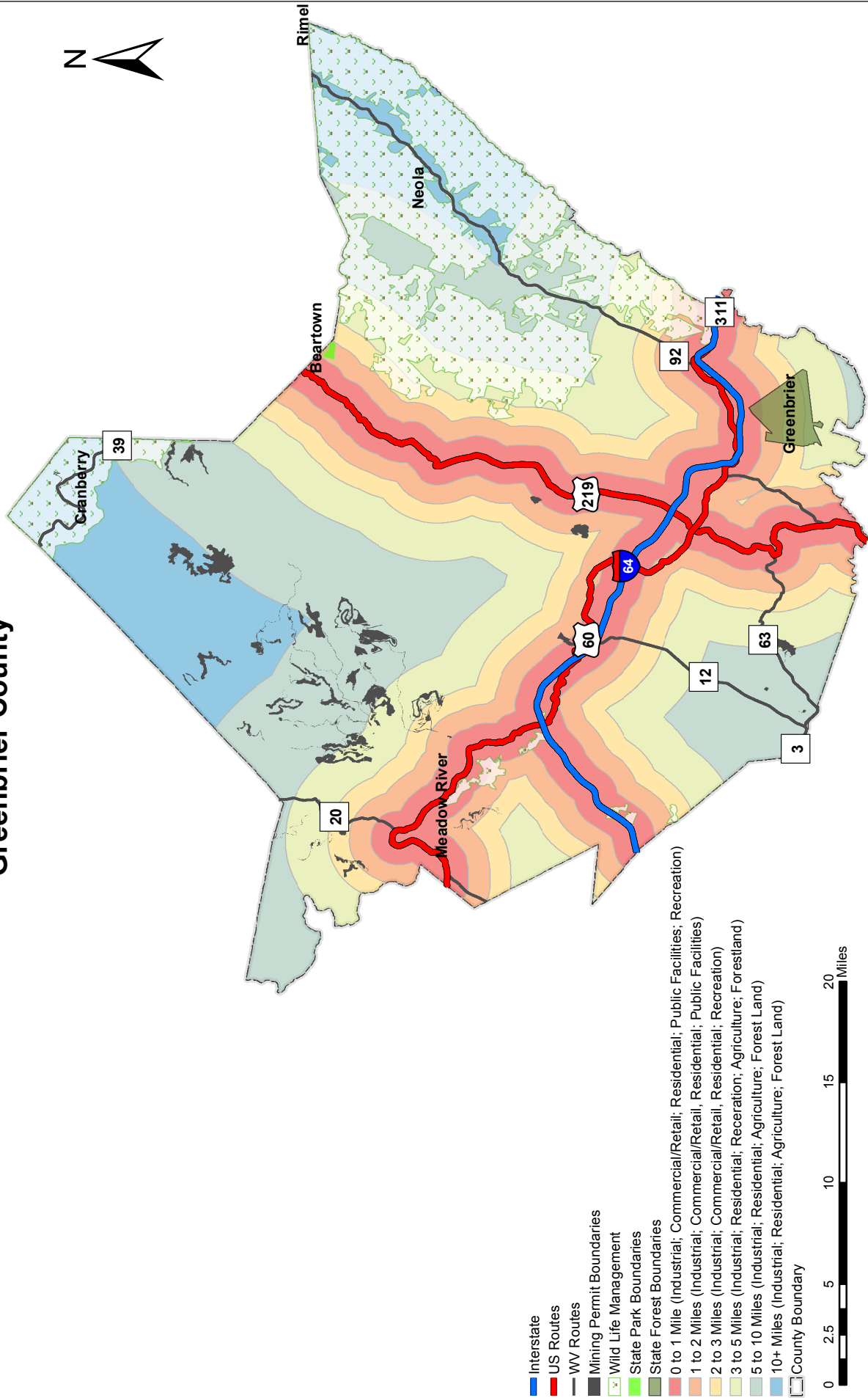
**Table 2: Smart Planning Utilizations**

<b>Name</b>	<b>Smart Planning Criteria</b>
Utilization Area 0-1 mile	Industrial, Commercial/Retail, Residential, Public Facility, Recreational
Utilization Area 1-2 miles	Industrial, Commercial/Retail, Residential, Public Facilities
Utilization Area 2-3 miles	Industrial, Commercial/Retail, Residential, Recreation
Utilization Area 3-5 miles	Industrial, Residential, Recreation, Agriculture, Forestland
Utilization Area 5-10 miles	Industrial, Residential, Agriculture, Forest Land
Utilization Area 10 miles +	Industrial, Residential, Agriculture, Forest Land

Land development or redevelopment options are determined through a review of the redevelopment authority's anticipated needs. The required infrastructure component standards are determined on a site by site basis by either the county economic development authority as designated by West Virginia Code Chapter 05B Article 2A.

# Landuse Criteria

## Greenbrier County



Data Source: Rahall Transportation Institute 2013

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## V. Site Evaluation

Once the smart planning buffers have been created, the sites available for analysis are confirmed. This evaluation provides the county with an inventory of post mine sites that are suitable for development. The evaluation consists of existing infrastructure availability, which gives the most accurate assessment of a site’s physical capabilities for investment purposes. This will encourage strategic development and evaluation.

### **Initial Data Collection:**

The consulting team collected all available data on surface mines sites located in Greenbrier County to produce an inventory of sites for analysis. The source for site information was primarily the West Virginia Department of Environment Protection (WV DEP) website, which allows permit searches by geographic location and mining type. The information provided by this source was used to develop a preliminary property database of all surface mines as well as general mapping.

According to the initial data collection there are an estimated five mine sites in the county. Some of them are active sites where mining is currently going on and other sites are in various phases of bond. The potential mining site for development is the one that is not complete released or still active. There are 5 potential mining sites for development in Greenbrier County, which are included in the following table.

**Table 1: Greenbrier County Potential Surfaces Mine Sites for Development**

Rank	Permit_ID	Permittee	Facility Name	Acres	Expiration Date	Nearest Post Office
1	S300805	Greenbrier Smokeless Coal Mining, Llc	Buck Lilly Surface Mine	167.00	12/15/2016	Rupert
2	S301507	Midland Trail Resources, Llc	Midland Trail Surf. Mine No. 1	584.82	12/21/2017	Rupert
3	S300511	South Fork Coal Company Llc	Blue Knob surface Mine No. 1	852.06	8/2/2017	Richwood
4	S013878	South Fork Coal Company Llc	unknown	308.42	6/14/2017	Richwood
5	S303393	South Fork Coal Company Llc	Lost Flats #2	393.25	2/1/2015	Williamsburg



**Site Analysis (Distance Analysis)**

Once the surface mining sites in the county were identified each of the sites were evaluated by estimating the shortest distance from the site to a specified criteria (features which are important to development). There are two types of distance calculation in this analysis: road-path and Euclidean distance. Road-path distance is the distance when travelling on an actual roadway from the site to the feature; Euclidean distance is when the distance is a straight line from the site to the feature, without the necessity of following a roadway. Following are lists of criteria used in the analysis:

- Road-path Distances:
  - Distance to nearest roadway (Interstate, Existing Highway, Proposed Highway...)
  - Distance to major airports (Tri-State, Yeager)
  - Distance to Intermodal Terminal Facility and Huntington Port
  - Distance to nearest Sewer/ Solid Waste Treatment Facility
  
- Euclidean Distances:
  - Distance to Water Lines, Sewer Lines, Power Lines and Broadband
  - Distance to Gas Pipe and Oil Pipe
  - Distance to Railroad, National Waterway Network

The following tables illustrate the results of these assessments for all of the identified sites. All distances were recorded in miles.

**Table 4: Assessment of Distances**

Rank	Permit_ID	Interstate (IS)	Name - IS	Existing Highway (EH)	Name - EH	Paved Road	Paved Road Name	Coal Express Highway
1	S300805	13.40	I64	7.47	US-60	1.48	Anjean Road	49.15
2	S301507	14.72	I64	13.95	US-219	2.11	Flynn Creek	54.15
3	S300511	24.13	I64	9.60	WV-39	0.34	Cold Knob Road	63.54
4	S013878	25.51	I64	8.32	WV-39	0.38	Cold Knob Road	64.91
5	S303393	26.69	I64	9.60	WV-39	1.61	Cold Knob Road	66.11

**Table 5: Distances from Sites to Major Airports**

Rank	Permit_ID	Permittee	Tri-State	Yeager
1	S300805	Greenbrier Smokeless Coal Mining, Llc	146.44	90.77
2	S301507	Midland Trail Resources, Llc	158.84	103.18
3	S300511	South Fork Coal Company Llc	149.47	93.19
4	S013878	South Fork Coal Company Llc	148.22	91.92
5	S303393	South Fork Coal Company Llc	149.49	93.20

**Table 6: Shortest Distances from Sites to Other Transportation Methods**

Rank	Permit_ID	Railroad (RR)	Owner (RR)	Intermodal Terminal Facility (IF)	IF-Name	National Waterway Network (Kanawha Rivers)	Huntington Port
1	S300805	1.49	NS	58.84	Vandalia Mining Corp Alloy Dock	34.54	137.10
2	S301507	4.29	NS	71.25	Vandalia Mining Corp Alloy Dock	37.54	149.53
3	S300511	4.71	NS	62.25	Vandalia Mining Corp Alloy Dock	40.46	140.18
4	S013878	5.11	NS	60.97	Vandalia Mining Corp Alloy Dock	40.07	138.92
5	S303393	6.04	XXXX	62.26	Vandalia Mining Corp Alloy Dock	41.17	140.20

**Table 7: Shortest Distances from Sites to Sewer Lines (SL) and Water Lines (WL)**

Rank	Permit_ID	Sewer Lines	Public Utility - SL	Water Lines	Public Utility - WL
1	S300805	3.85	Greenbrier County Public Service District No. 2	4.05	Rupert Municipal Water Department
2	S301507	6.40	Greenbrier County Public Service District No. 2	6.62	Rupert Municipal Water Department
3	S300511	6.99	Sewer Department City of Richwood	6.99	Richwood Water Department City of
4	S013878	5.55	Sewer Department City of Richwood	5.55	Richwood Water Department City of
5	S303393	5.31	Sewer Department City of Richwood	5.31	Richwood Water Department City of

**Table 8: Shortest Distances from Sites to Broadband and Power Lines**

Rank	Permit_ID	Broadband	Provider	Power Lines	Type	Size_kV
1	S300805	0.22	Cebridge Acquisition LLC	1.67	Sub-Transmission	Unknown
2	S301507	0.19	Cebridge Acquisition LLC	4.61	Sub-Transmission	Unknown
3	S300511	3.92	Citizens Telecommunications Company of West Virginia	4.72	Sub-Transmission	Unknown
4	S013878	4.16	Frontier West Virginia, Inc.	5.09	Sub-Transmission	Unknown
5	S303393	4.19	Frontier West Virginia, Inc.	6.36	Sub-Transmission	Unknown

**Table 9: Shortest Distances from Sites to Sewer and Solid Waste Treatment Facilities**

Rank	Permit_ID	Sewer Treatment (ST)	Facility Name (ST)	Solid Waste Treatment (SWT)	Facility Name (SWT)
1	S300805	7.70	Rupert Water Department	22.94	Midwest Disposal
2	S301507	17.26	Meadowbrook EStates	22.38	Greenbrier Co. Landfill
3	S300511	11.19	Richwood City Of	24.99	Nicholas Co. Landfill
4	S013878	9.91	Richwood City Of	23.71	Nicholas Co. Landfill
5	S303393	11.20	Richwood City Of	25.00	Nicholas Co. Landfill

**Table 10: Shortest Distances from Sites to Gas Pipe and Oil Pipe**

Rank	Permit_ID	Gas Pipe (GP)	Company Name (GP)	Oil Pipe (OP)	Company Name (OP)
1	S300805	12.76	Hope Gas, Inc.	15.88	CN
2	S301507	12.21	Hope Gas, Inc.	15.93	CN
3	S300511	4.42	Hope Gas, Inc.	8.81	CN
4	S013878	2.98	Hope Gas, Inc.	7.38	CN
5	S303393	2.81	Hope Gas, Inc.	7.21	CN

## **Suitability Model**

The suitability model for Greenbrier County is created with a weighted scoring method. The method scores options against a prioritized requirements list to determine which option best fits the selection criteria. Using a consistent list of criteria, weighted according to the importance or priority of the criteria to the organization, a comparison of similar “products” can be completed. If numerical values are assigned to the criteria priorities (**weighting**) and the ability of the product to meet a specific criterion (**scoring**), a “score” can be derived. By summing the score (**total score**), the product most closely meeting the criteria can be determined.

Criteria are chosen and weighted based on published Land Use Master Plans (LUMPs) for several counties in West Virginia, our own research on the existing conditions in Greenbrier County and expert advice about important factors to site development.<sup>13</sup> Then, scores for each site are given by comparing the closest distance from the site to all factors within given distance thresholds. There are three sets of scores in this suitability model: **absolute scores**, **relative scores** and the **total score**.

*Absolute scores* are given by comparing certain distance thresholds with the results of GIS Distance Analysis. Thresholds are determined mainly based on the researcher’s experience, characteristics of the considered criteria and the priority given to the criteria. For example, if the closest distance from a site to an interstate ranges from 5 to 10 miles, the site will be given 7 points for the Interstate Criteria. Absolute scores will directly affect the site selection. Different score categories may result in significant change in the cost of investment, and will thus impact the county’s decisions.

*Relative scores*, on the other hand, depend solely on the closest distances of sites to relative criteria features. Initially, statistical values will be computed according to distance values from all sites to a certain factor (criteria), including min, quartile 1 – Q1, quartile 2 – Q2, quartile 3 – Q3, and max. Then, distance values will be classified into four groups and given the scores shown in Table 13 (below). This score set is used to sharpen difference between all sites in a certain category and therefore aid the decision maker. For example, two sites may have the same absolute score (in the same range of miles) but may fall in different statistical groups. Then the two sites will have different relative scores.

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<sup>13</sup> Joseph, M. (2006). A Decision-Support Model of Land Suitability Analysis for the Ohio Lake Erie Balanced Growth Program. EcoCity Cleveland.



The total score is a combination of weights, absolute scores, and relative scores. The following equation is used to calculate the total score of a certain studied site:

$$\text{Total score of site A} = \sum (\text{absolute score} \times \text{relative score} \times \text{weight})_{ci} / 10 \quad (\text{ci: criteria i})$$

Sites with higher total scores reveal a higher chance of being developed. Total score will vary according to a combination of three components: weights, absolute scores, and relative scores. In this report, total scores are calculated by the linear equation indicating that all components are treated equally.

### 1. Weighting

Table 11 prioritizes post-mining land-use criteria for surface coal mining site selection in Greenbrier County. Criteria weights are assigned on a one-to-ten scale. According to Joseph, utilities (power, water, and sewer) and road networks are considered more important factors to development. Therefore, those factors receive higher weights (7-10) in the suitability model. On the other hand, decision-makers are less affected by factors such as airports, national waterways, and ports. Those factors may be good supplements but do not critically change the investments.

**Table 11: Weighting Sites Selection Criteria**

No	Criteria	Weight
1	Interstate	8
2	Existing Highway	8
3	Proposed Highway	9
4	Yeager Airport	3
5	Tri-State Airport	3
6	National Waterway Network Ports	5
7	Sewer Treatment Facilities	7
8	Solid Waste Treatment Facilities	8
9	National Waterway Network	4
10	Intermodal Terminal Facilities	6
11	Sewer Lines	8
No	Criteria	Weight
12	Railroads	5
13	Water Lines	10
14	Power Lines	10
15	Gas Pipes	6
16	Pipe Lines	6
17	Broadband	9

## 2. Scoring

### 2.1 Absolute Scores:

The shorter the distance to a feature from a site, the higher absolute score the site receives. Table 12 describes the thresholds and score categories for each criterion, ranging from 1 to 10. In order to achieve a better comparison between sites, the score scale is evenly distributed between five distance groups (1-3-5-7-10).

As mentioned above, thresholds are mainly defined based on researcher experience, traveling method from a site to the features (road-path vs. Euclidean), and characteristic of criteria (type of feature, priority, and density). For example, distance thresholds for “Solid Waste Treatment Facilities” are much smaller than ones for “Intermodal Terminal Facilities”. Initially, Solid Waste This is because treatment facilities are much denser than intermodal terminal facilities. In addition, solid waste facilities are considered more important in site selection (weight: 8 vs. 6).

**Table 12: Absolute Scoring System**

Absolute Score		10	7	5	3	1
Criteria (Distances in miles)	Existing Highway	0 - 5	5 - 10	10 - 15	15 - 20	> 20
	Proposed Highway	0 - 5	5 - 10	10 - 15	15 - 20	> 20
	Intermodal Terminal Facilities	0 - 10	10 - 20	20 - 30	30 - 40	> 40
	Interstate	0 - 5	5 - 14	14 - 22	22 - 30	> 30
	National Waterway Network Ports	0 - 30	30 - 50	50 - 70	70 - 90	> 90
	Sewer Treatment Facilities	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	Solid Waste Treatment Facilities	0 - 5	5 - 14	14 - 22	22 - 30	> 30
	Tri-State Airport	0 - 30	30 - 50	50 - 70	70 - 90	> 90
	Yeager Airport	0 - 30	30 - 50	50 - 70	01 - 90	> 90
	Broadband	0 - 0.5	0.5 - 2	2 - 3	3 - 4	> 4
	Gas Pipe (Natural Gas)	0 - 0.5	0.5 - 1.5	1.5 - 2	2 - 2.5	> 2.5
	National Network Waterway	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	Power Lines	0 - 0.5	0.5 - 1.5	1.5 - 2	2 - 2.5	> 2.5
	Pipe Lines (Oil)	0 - 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 1	> 1
	Railroads	0 - 1	1 - 3	3 - 4	4 - 5	> 5
Sewer Lines	0 - 1	1 - 3	3 - 4	4 - 5	> 5	
Water Lines	0 - 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 1	> 1	

2.2 Relative Scores:

Table 13 shows four statistical groups and their relative scores in the Greenbrier County land suitability model. The total number of coal mining sites will be equally distributed in each group. The relative score differs from the absolute score in two ways. First, thresholds for relative scores are derived only from real distances from the sites to the features (criteria). It is not affected by personal opinion and does not consider either traveling method or nature of criteria.

**Table 13: Relative Scoring System**

		<b>Threshold (Distances in miles)</b>				
		<b>Min - Q1</b>	<b>Q1 - Q2</b>	<b>Q2 - Q3</b>	<b>Q3 - Max</b>	
		10	7.5	5	2.5	
<b>No</b>	<b>Criteria</b>	<b>Min</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Max</b>
1	Interstate	7.47	13.95	7.90	9.60	11.78
2	Existing Highway	49.15	66.11	51.65	63.54	65.51
3	Proposed Highway	58.84	71.25	59.91	62.25	66.76
4	Yeager Airport	13.40	26.69	14.06	24.13	26.10
5	Tri-State Airport	137.10	149.53	138.01	140.18	144.86
6	National Waterway Network Ports	7.70	17.26	8.80	11.19	14.23
7	Sewer Treatment Facilities	22.38	25.00	22.66	23.71	24.99
8	Solid Waste Treatment Facilities	146.44	158.84	147.33	149.47	154.17
9	National Waterway Network	90.77	103.18	91.34	93.19	98.19
10	Intermodal Terminal Facilities	0.19	4.19	0.21	3.92	4.18
11	Sewer Lines	2.81	12.76	2.89	4.42	12.49
12	Railroads	34.54	41.17	36.04	40.07	40.81
13	Water Lines	1.67	6.36	3.14	4.72	5.73
14	Power Lines	7.21	15.93	7.29	8.81	15.90
15	Gas Pipes	1.49	6.04	2.89	4.71	5.57
16	Pipe Lines	3.85	6.99	4.58	5.55	6.70
17	Broadband	4.05	6.99	4.68	5.55	6.81

### 3. Greenbrier County's Suitability Model:

Table 14 shows the total scores of all studied sites in Greenbrier County. Site No-1 (Permit ID = S300805) has the highest score of 388.00. The sites with higher total scores suggest better opportunities for development. Results in Table 14 are also plotted in the bar chart (Figure 15) for better visualization. Among 5 potential development sites of Greenbrier County, it is easy to notice to see all the sites and determine that Sites No 1 and 2 are the most suitable sites for investment.

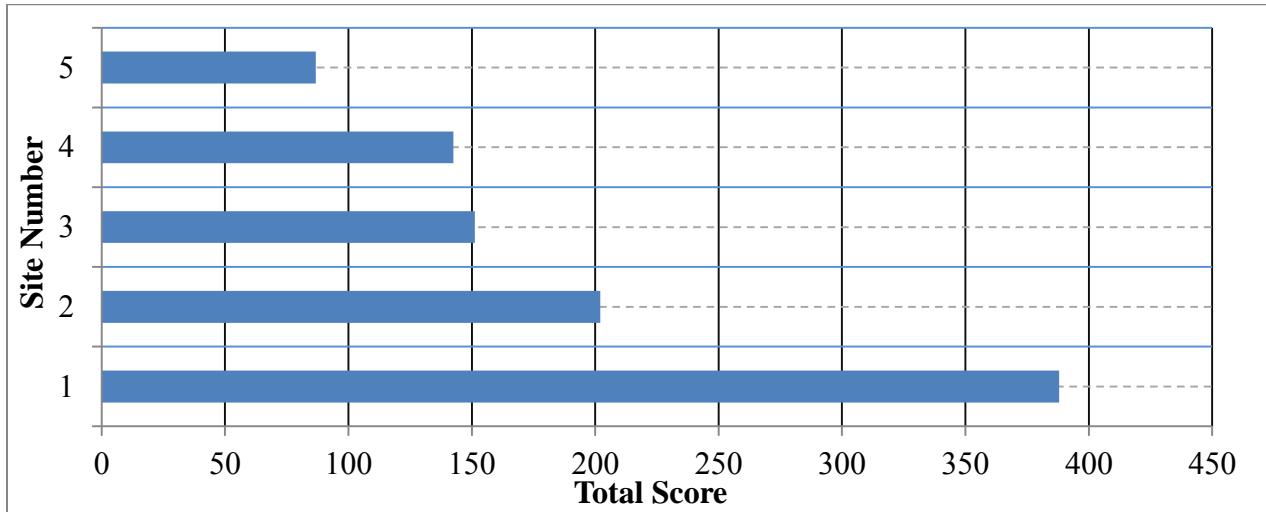
Certainly, any change in weight values or the scoring system will result in different output and may change the decision. For better analysis and decision making, the dynamic suitability model, which allows modification in criteria's weights, thresholds and scores is available for distribution through RTI's Geospatial Program.

Besides a distance analysis, a suitability model for Greenbrier is supported by demographic data as well as two additional analyses which are retail location density and workforce analysis (shown on Table 15 and Map 41 below). The best decision will be made with careful consideration of the suitability analysis as well as the demographic and economic information.

**Table 14: Total score of all surface coal mining sites in Greenbrier County**

No	Permittee	Permit_ID	Score
1	Greenbrier Smokeless Coal Mining, Llc	S300805	388.00
2	Midland Trail Resources, Llc	S301507	202.00
3	South Fork Coal Company Llc	S300511	151.25
4	South Fork Coal Company Llc	S013878	142.50
5	South Fork Coal Company Llc	S303393	86.75

**Figure 15: Greenbrier County’s Suitability Model (Total Score of Each Surface Coal Mining Site)**



**Work Force Analysis**

A work force analysis estimates total employment and unemployment within a certain distance, providing potential labor sources if an investment is made on the site. According to Gary Langer, the average one-way commute time is 26 minutes or 16 miles.<sup>14</sup> It is reasonable to consider unemployment within 15 miles of the site as an upper limit for a potential employer. This data set does not provide a skill set analysis however; therefore employers may not find the labor skills they need. This dataset provides the pool of labor resources from which to choose.

**Table 15: Number of employment and unemployment within radius of 5, 10 and 15 miles from the site**

Rank	Permit_ID	Emp_05	Unemp_05	Emp_10	Unemp_10	Emp_15	Unemp_15
1	S300805	374	40	2149	361	4708	817
2	S301507	389	41	2165	254	5475	857
3	S300511	350	37	1162	122	2368	267
4	S013878	344	37	990	105	2023	228
5	S303393	347	37	911	96	1831	199

<sup>14</sup> Gary Langer, “Poll: Traffic in the United States,” ABC News Online, February 13, 2005, Accessed March 1, 2013, <http://abcnews.go.com/Technology/Traffic/story?id=485098&page=1>.

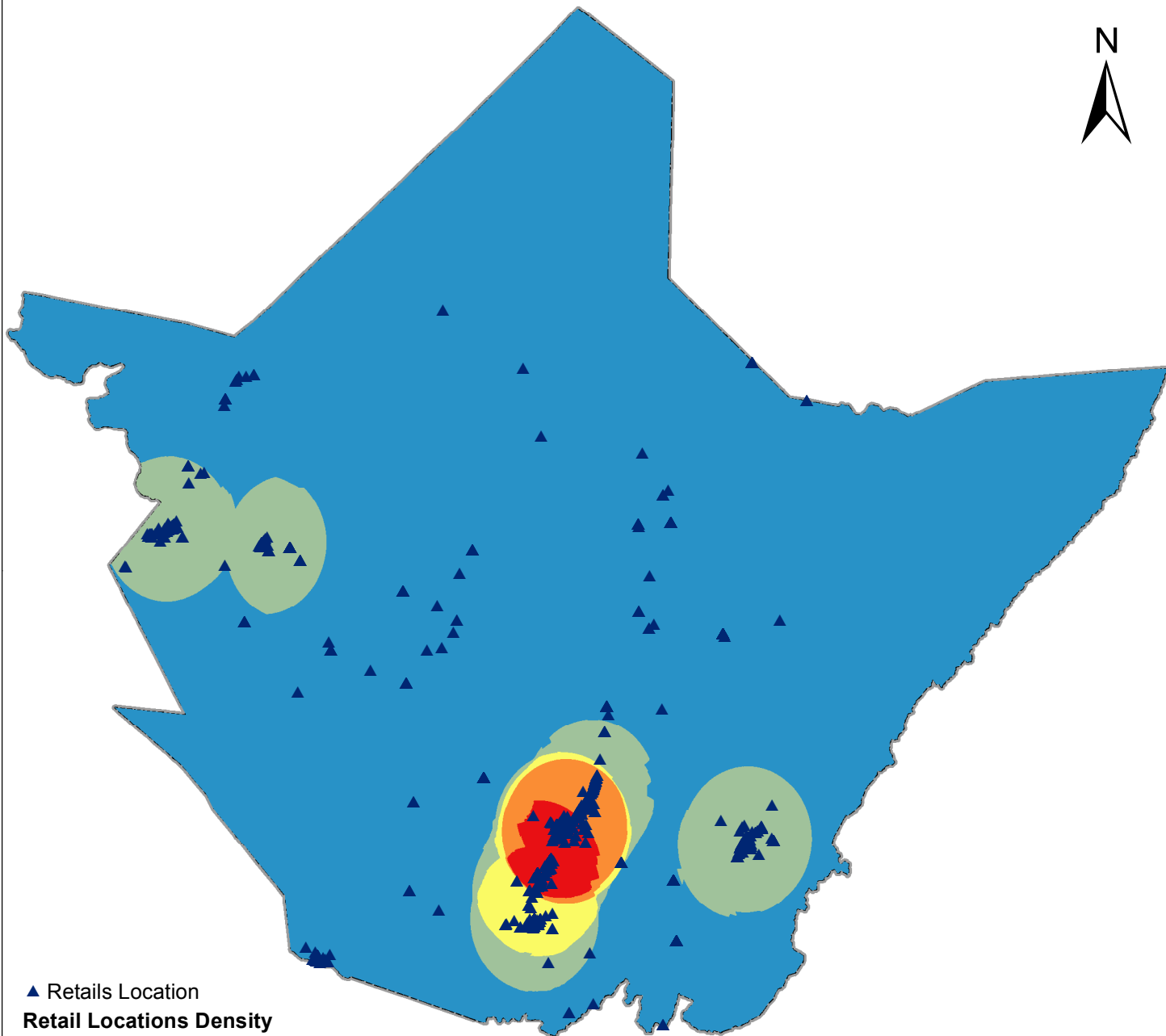


### **Retail Location Analysis**

A retail location analysis is a hot spot analysis which depicts a number of retailers within 25 square miles of any certain location in the county (Map 41). The result, as shown on the map, is displayed in blue-to-red color for retail's density from low to high. Normally, the area with a high density of retailers indicates an already developed and populated community which possibly has the highest opportunity as well as the heaviest competition. The areas with low retail density showcase where population is lowest, but also where competition is lowest and which may provide retail opportunities.

# Retail Location Density

## Greenbrier County



▲ Retail Location

### Retail Locations Density

Search Area = 25 Square Miles

■ 0 < Retail Density < 3

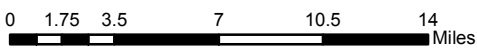
■ 3 < Retail Density < 8

■ 8 < Retail Density < 16

■ 16 < Retail Density < 25

■ 25 < Retail Density < 32

□ County Boundary



Source: ESRI 2011

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## **V. Conclusion**

Greenbrier County has endured several adverse shocks in the past decade, including the general national recession and the bankruptcy of the Greenbrier Resort. Due to several factors including a well-diversified economy and active entrepreneurs and individuals, wages have been steadily growing in the county and the jobless rate has been manageable. However, post-mine land use has not been very active, and this plan could be useful in furthering Greenbrier's growth despite the small inventory of mine sites.

This plan has identified and displayed the five post-mine sites that are available for development. These sites have the integral tools that researchers have shown can assist in spatial development. Though success is not guaranteed, this overview combined with careful strategic planning can bring about the changes in the trends that are necessary for Greenbrier County to thrive. Already this is being done with the Beech Ridge Wind Farm and the continued development of the tourist industry, but more can and should be done.

Through a site distance analysis and complete demographic calculation, this plan provides the most comprehensive understanding of the economic State of Greenbrier County and the potential of its land. By analyzing specific infrastructures and demographics, policymakers can begin attracting investors to post-mine sites, and continue the process of developing the economy. This plan provides strategic information, the choice as to how to utilize this information belongs with the administrators and people of the county.