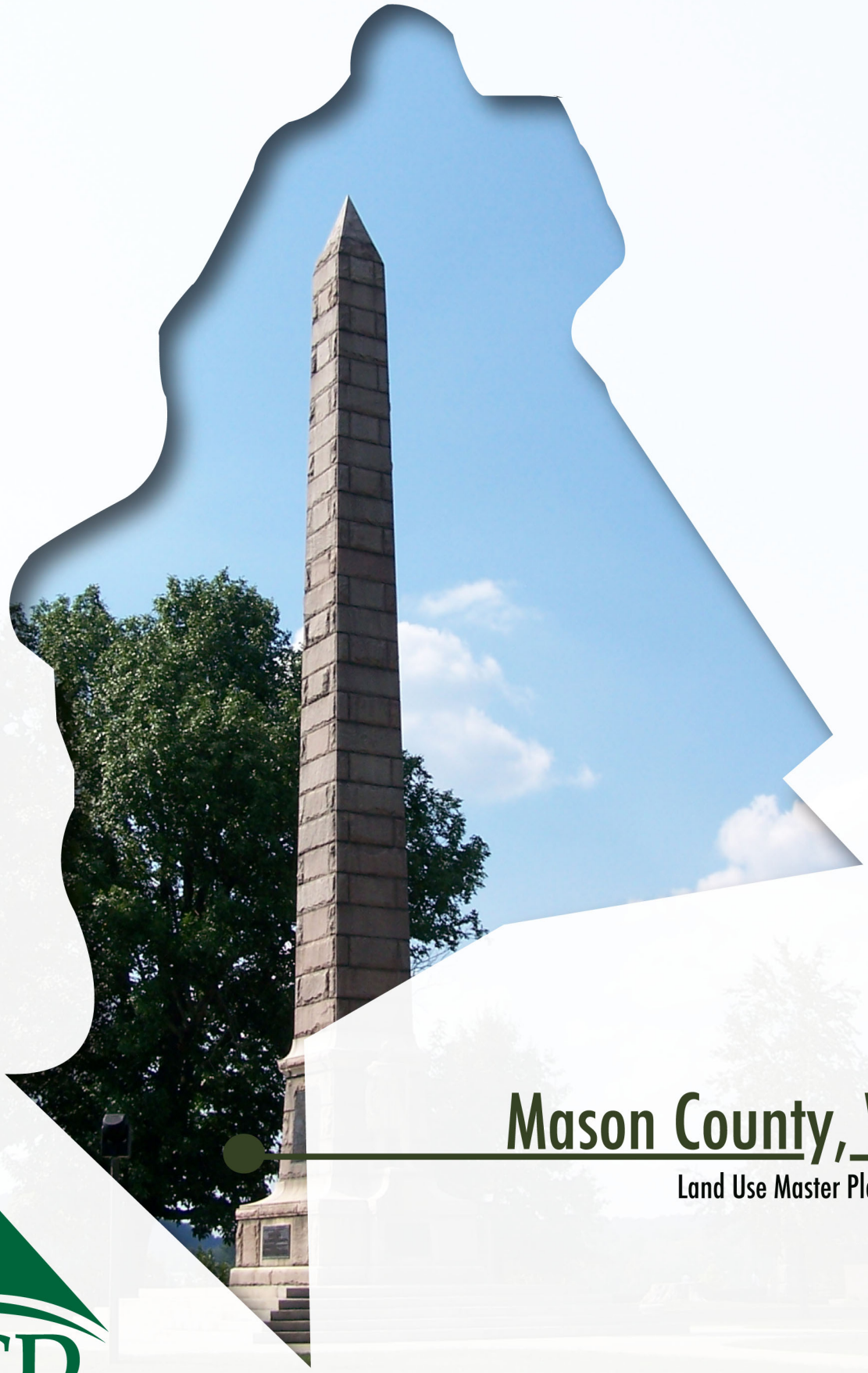

Mason County, WV

Land Use Master Plan 2015

OCCD

Office of Coalfield Community Development
WV Division of Energy

Photo: Point Pleasant Battle Monument at Tu-Endie-Wei State Park. - Brian M. Powell

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Executive Summary

This Land Use Master Plan (LUMP) conveys information on Mason County's current demographic and geographic status. This plan will be used to evaluate the potential of post-mine sites for development, and evaluate Mason 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 Mason County's development goals. The Nick J. Rahall Appalachian Transportation Institute (RTI) coordinates with the Office of Coalfield Community Development to provide this essential information. There are no major post-mine developments in Mason County. This plan will help Mason take advantage of its post-mine sites to spur development.

Mason County's population has fluctuated since the 1980s, experiencing decline through the early 2000s and then increasing through 2013. The County's median age and age distribution are average for the State, indicative of a population capable of productivity in the labor force. The population is projected to decrease through 2030.

Employment consists mainly of Education and Health Services; Government; and Trade, Transportation, and Utilities. Government and Education and Health Services are the major wage contributors. Mason County total wages have been on the rise since the mid-1990s, but with declines from 2012 to 2013. However increases in the Government and Education and Health Services sectors are largely keeping this decrease manageable. Of particular note is the amount of income, as opposed to wages, derived from government transfers. In 2013, approximately 35 percent of Mason County income is from government transfers. Mason 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.

Mason County's total enrollment fluctuated from the 2002-2003 to the 2012-2013 school years but experienced a sharp decline from 2012-2013 to 2013-2014. The County's dropout rate also experienced overall decline from the 2005-2006 to 2012-2013 school years. Approximately 18 percent of Mason County residents 25 and over do not have a high school diploma.

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 consideration in any development strategy. Mason County has no interstate, one U.S. Routes, and four State Routes. The County does have some rail presence, and hosts no local airports.

Mason County also has 10 historic sites in the National Register and several pieces of historic architecture designated by the State.

Historic preservation can be a basis for tourism, cultural identity, and community cohesion.

This plan also reviews energy and environmental issues in Mason County. The environment of the County should be considered in an overall development strategy. Mason County is not heavily forested and does not produce wood by-products, but does have a few scattered areas of state parks and wildlife management areas. Mason County is also not on the list of air pollution non-attainment areas, which is positive. Mason County has a small number of completed Marcellus Shale wells, as well as several more that are permitted, and has a higher favorability for enhanced geothermal drilling, particularly in the eastern portion of the County. However, Mason appears to have very little potential among wind and solar renewable energy resources.

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 Mason County. The researchers identified sites in areas that fit the County's unique geographic, demographic, and economic position. The researchers combined a distance analysis using a scoring system based on distance to certain essential utilities and features. These scores were summed and plotted. 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 top five sites within a view of the County.

The tables below are comprehensive comparisons between the top five post-mine lands for potential development Tables A, B and C compare results between the top five potential development sites, as determined by suitability analysis of all post-mine lands in the County. In Table A, distances for each variable are compared between sites to give an idea of the more suitable site for specific criterion under consideration. For example, if we want to identify the site located closest to power lines, the distance measurements from each site to the nearest power line is listed in Table A.

Table B shows the total weighted score. The mining sites considered as the best candidates for potential redevelopment are the five with the highest total weighted score.

Table C illustrates how each criterion contributes to the final total score and the importance of the weights. A scale of values, based on ideal distances for each criteria, is used to calculate the total Absolute score. The Relative scale is calculated by comparing each site in relationship to others instead of set distances. Because of the assumption that one criterion may be more important than others (different weights), the rank order of the sites absolute and relative scores can change once the weights for each criteria are mathematically applied. A high or low value in a heavily weighted criteria can dramatically raise or lower a sites total weighted score.

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

Suitability Ranking	1	2	3	4	5	Weight
Broadband	0.02	0.77	1.18	1.39	0.79	**9**
Gas Pipes	2.19	5.42	4.61	4.27	5.89	**6**
National Waterway Network	3.23	1.55	2.42	2.64	2.22	**4**
Pipe Lines	9.22	12.30	11.26	10.81	12.56	**6**
Power Lines	0.16	2.44	1.12	0.64	2.35	**10**
Railroads	0.01	0.85	1.42	1.67	0.87	**5**
Sewer Lines	3.62	1.45	1.28	1.46	0.80	**8**
Water Lines	0.03	0.03	0.25	0.02	0.24	**10**
Existing Highway	0.34	0.85	1.42	1.64	1.44	**8**
Intermodal Terminal Facilities	53.56	54.11	52.95	52.33	54.64	**6**
Interstate	37.12	39.26	38.11	37.49	39.80	**8**
National Waterway Network Ports	44.07	48.15	47.66	47.88	48.67	**5**
Sewer Treatment Facilities	3.62	0.99	2.48	2.93	1.67	**7**
Solid Waste Treatment Facilities	4.06	6.25	5.08	4.47	6.78	**8**
Tri-state Airport	52.57	56.65	56.17	56.39	57.18	**3**
Yeager Airport	57.18	57.73	56.58	55.96	58.27	**3**

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

Suitability Ranking	1	2	3	4	5	Weight
Broadband	90	63	31.5	15.75	47.25	9
Gas Pipes	18	3	4.5	6	1.5	6
National Waterway Network	7	40	30	14	40	4
Pipe Lines	6	3	4.5	6	1.5	6
Power Lines	100	7.5	52.5	70	15	10
Railroads	50	50	17.5	8.75	37.5	5
Sewer Lines	10	42	56	28	80	8
Water Lines	100	75	17.5	100	50	10
Existing Highway	80	80	60	20	40	8
Intermodal Terminal Facilities	4.5	3	6	6	1.5	6
Interstate	8	4	6	8	2	8
National Waterway Network Ports	35	17.5	35	26.25	8.75	5
Sewer Treatment Facilities	12.25	70	52.5	24.5	70	7
Solid Waste Treatment Facilities	80	28	42	80	14	8
Tri-state Airport	15	7.5	15	11.25	3.75	3
Yeager Airport	11.25	7.5	15	15	3.75	3
Total Weighted Score	627	501	445.5	439.5	416.5	

Table C: Absolute/Relative score comparison between top five sites for potential development

Suitability Ranking	1	2	3	4	5	Weight
Broadband	10	7	7	7	7	9
Gas Pipes	3	1	1	1	1	6
National Waterway Network	7	10	10	7	10	4
Pipe Lines	1	1	1	1	1	6
Power Lines	10	3	7	7	3	10
Railroads	10	10	7	7	10	5
Sewer Lines	5	7	7	7	10	8
Water Lines	10	10	7	10	10	10
Existing Highway	10	10	10	10	10	8
Intermodal Terminal Facilities	1	1	1	1	1	6
Interstate	1	1	1	1	1	8
National Waterway Network Ports	7	7	7	7	7	5
Sewer Treatment Facilities	7	10	10	7	10	7
Solid Waste Treatment Facilities	10	7	7	10	7	8
Tri-state Airport	5	5	5	5	5	3
Yeager Airport	5	5	5	5	5	3
Total Absolute Score	102	95	93	93	98	

Suitability Ranking	1	2	3	4	5	Weight
Broadband	10	10	5	2.5	7.5	**9**
Gas Pipes	10	5	7.5	10	2.5	**6**
National Waterway Network	2.5	10	7.5	5	10	**4**
Pipe Lines	10	5	7.5	10	2.5	**6**
Power Lines	10	2.5	7.5	10	5	**10**
Railroads	10	10	5	2.5	7.5	**5**
Sewer Lines	2.5	7.5	10	5	10	**8**
Water Lines	10	7.5	2.5	10	5	**10**
Existing Highway	10	10	7.5	2.5	5	**8**
Intermodal Terminal Facilities	7.5	5	10	10	2.5	**6**
Interstate	10	5	7.5	10	2.5	**8**
National Waterway Network Ports	10	5	10	7.5	2.5	**5**
Sewer Treatment Facilities	2.5	10	7.5	5	10	**7**
Solid Waste Treatment Facilities	10	5	7.5	10	2.5	**8**
Tri-state Airport	10	5	10	7.5	2.5	**3**
Yeager Airport	7.5	5	10	10	2.5	**3**
Total Relative Score	132.5	107.5	122.5	117.5	80	

Tables A, B and C compare results between the top five potential development sites, as determined by suitability analysis of all post-mine lands in the county. In Table A, distances for each variable are compared between sites to give an idea of the more suitable site for specific criterion under consideration. For example, if we want to identify the site located closest to power lines, the distance measurements from each site to the nearest power line is listed in Table A.

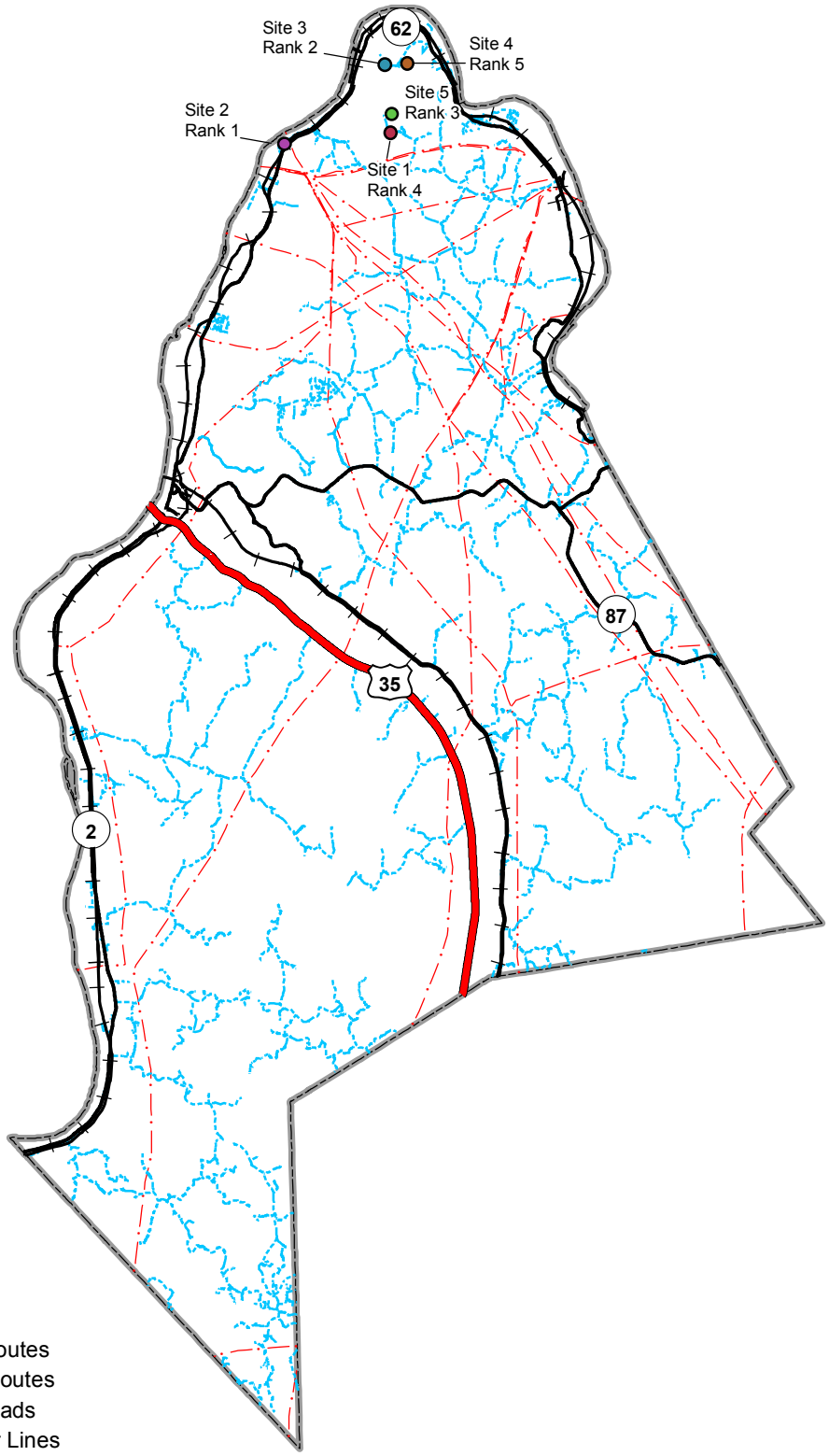
Table C illustrates how each criterion contributes to the final total score and the importance of the weights. A scale of values, based on ideal distances for each criteria, is used to calculate the total Absolute score. The Relative scale is calculated by comparing each site in relationship to others instead of set distances. Because of the assumption that one criterion may be more important than others (different weights), the rank order of the sites absolute and relative scores can change once the weights for each criteria are mathematically applied. A high or low value in a heavily weighted criteria can dramatically raise or lower a sites total weighted score.

Table B shows the total weighted score. The mining sites considered as the best candidates for potential redevelopment are the five with the highest total weighted score.

Map A

Sites for Potential Development by Rank

Mason County



Source: Rahall Transportation Institute Analysis 2015

0 1.75 3.5 7 10.5 14 Miles

Site's General Info.

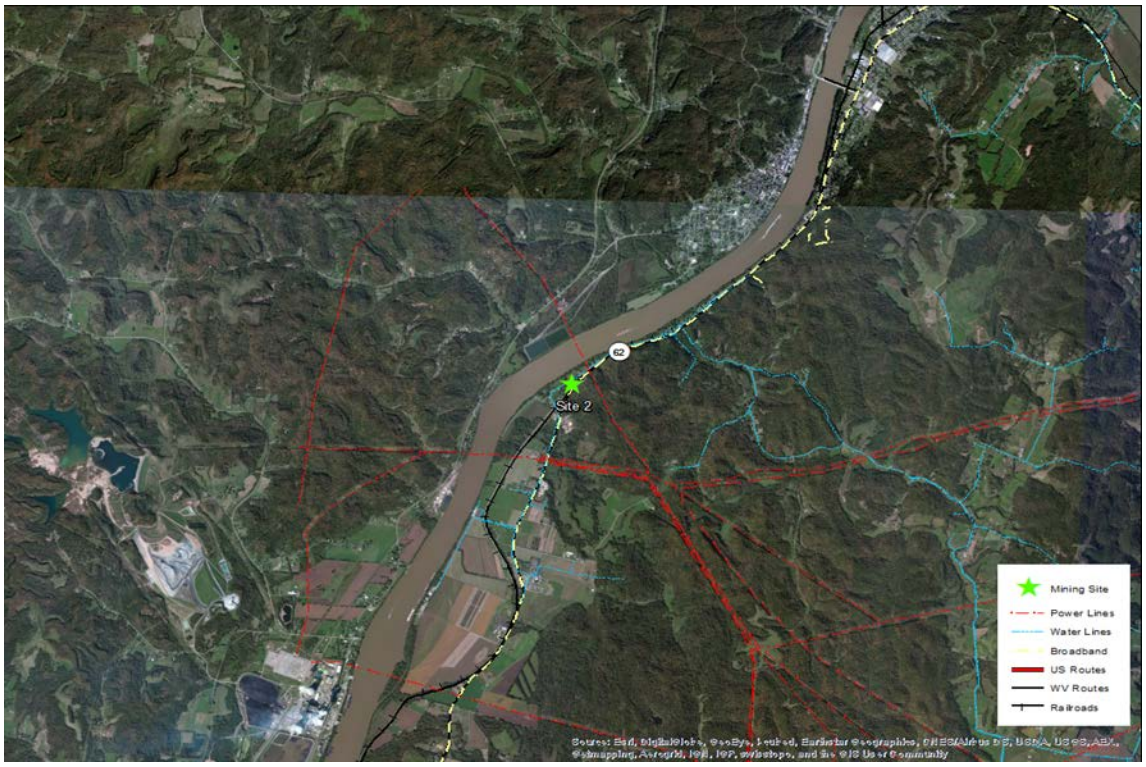
Permittee	Sycamore Coal Co
Facility Name	N/A
Permit ID	S002484
Issue Date	5/3/1984
Expiration Date	5/3/1989
Current Acres	20
Lat	38° 58'34.0000"
Long	82° 4'46.0000"
Nearest Post Office	Unknown

Site Number	**2**
Suitability Ranking	**1**
Total Score	**627**

Distance Analysis Results

Broadband	0.02
Gas Pipes	2.19
National Waterway Network	3.23
Pipe Lines	9.22
Power Lines	0.16
Railroads	0.01
Sewer Lines	3.62
Water Lines	0.03
Existing Highway	0.34
Intermodal Terminal Facilities	53.56
Interstate	37.12
National Waterway Network Ports	44.07
Sewer Treatment Facilities	3.62
Solid Waste Treatment Facilities	4.06
Tri-state Airport	52.57
Yeager Airport	57.18

Site number 2 should be the first choice for potential development. It scores high in many of the most heavily weighted features: Power Lines (0.16 mi.), Water Lines (0.03 mi.), and is close to Broadband (0.02 mi.). This site is close to an Existing Highways (0.03 mi.).



Site's General Info.

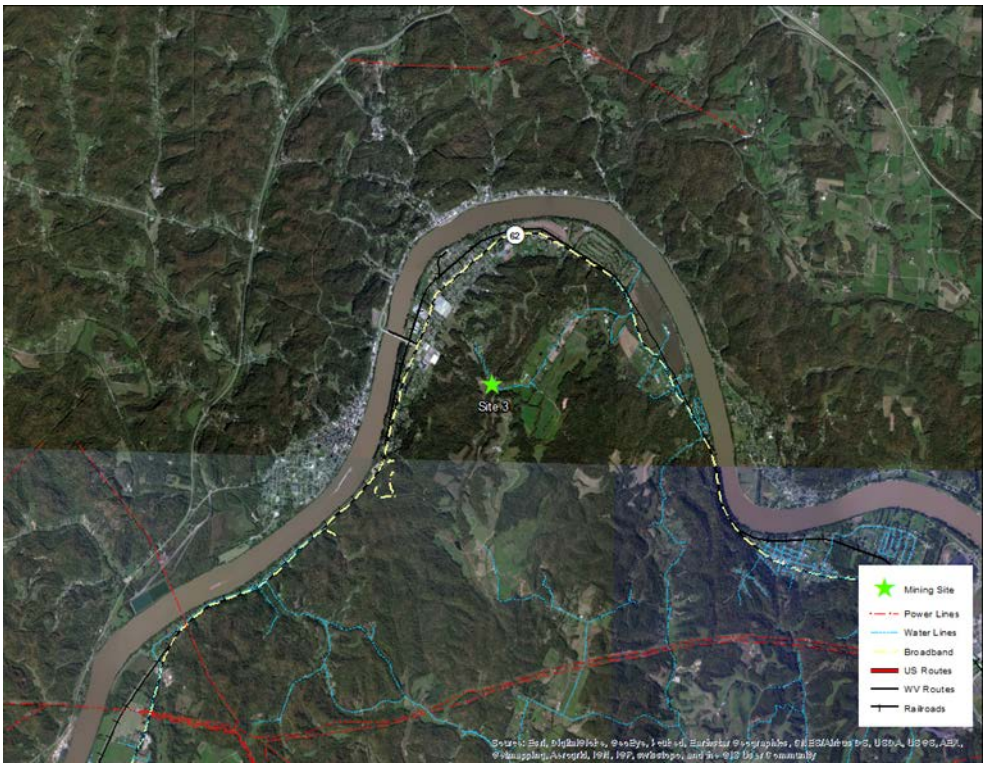
Permittee	Sycamore Coal Co
Facility Name	N/A
Permit ID	S005985
Issue Date	6/27/1985
Expiration Date	6/27/1990
Current Acres	20
Lat	39° 0'27.0000"
Long	82° 1'28.0000"
Nearest Post Office	Unknown

Site Number	**3**
Suitability Ranking	**2**
Total Score	**501**

Distance Analysis Results

Broadband	0.77
Gas Pipes	5.42
National Waterway Network	1.55
Pipe Lines	12.30
Power Lines	2.44
Railroads	0.85
Sewer Lines	1.45
Water Lines	0.03
Existing Highway	0.85
Intermodal Terminal Facilities	54.11
Interstate	39.26
National Waterway Network Ports	48.15
Sewer Treatment Facilities	0.99
Solid Waste Treatment Facilities	6.25
Tri-state Airport	56.65
Yeager Airport	57.73

Site number 3 has the second highest score in the suitability model. The site is located close to transportation features: Railroads (0.85 mi.) and Existing Highway (0.85 mi.). It is relatively close to Power Lines (0.34 mi.) and Broadband (0.77), which makes the site to be a good place for future development.



Site's General Info.

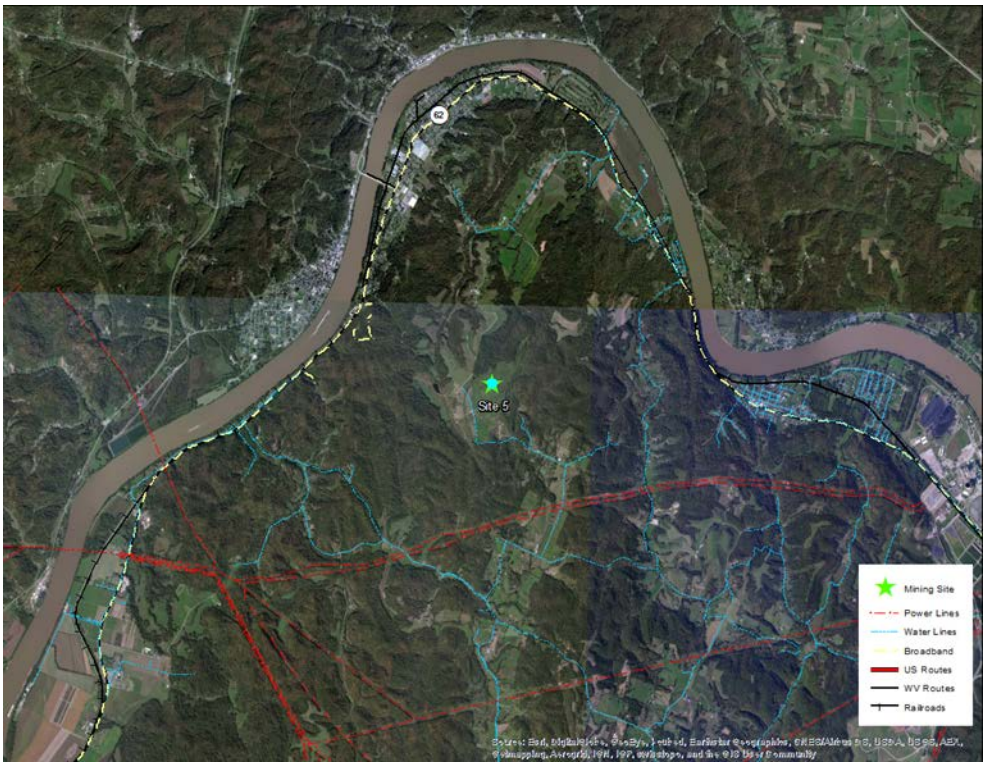
Permittee	Raven Hocking Coal Corp
Facility Name	N/A
Permit ID	S600486
Issue Date	6/10/1986
Expiration Date	6/10/2001
Current Acres	270
Lat	38° 59'19.0000"
Long	82° 1'12.0000"
Nearest Post Office	Hartford

Site Number	**5**
Suitability Ranking	**3**
Total Score	**445.5**

Distance Analysis Results

Broadband	1.18
Gas Pipes	4.61
National Waterway Network	2.42
Pipe Lines	11.26
Power Lines	1.12
Railroads	1.42
Sewer Lines	1.28
Water Lines	0.25
Existing Highway	1.42
Intermodal Terminal Facilities	52.95
Interstate	38.11
National Waterway Network Ports	47.66
Sewer Treatment Facilities	2.48
Solid Waste Treatment Facilities	5.08
Tri-state Airport	56.17
Yeager Airport	56.58

Site number 5 is listed as the third suitable site for post-mine land development. It is close to both Sewer Lines (1.28 mi.) and Water Lines (0.29 mi.). This site ranks average or better in nearly all criteria. The low scores for Broadband and Water Lines are its main disadvantage.



Site's General Info.

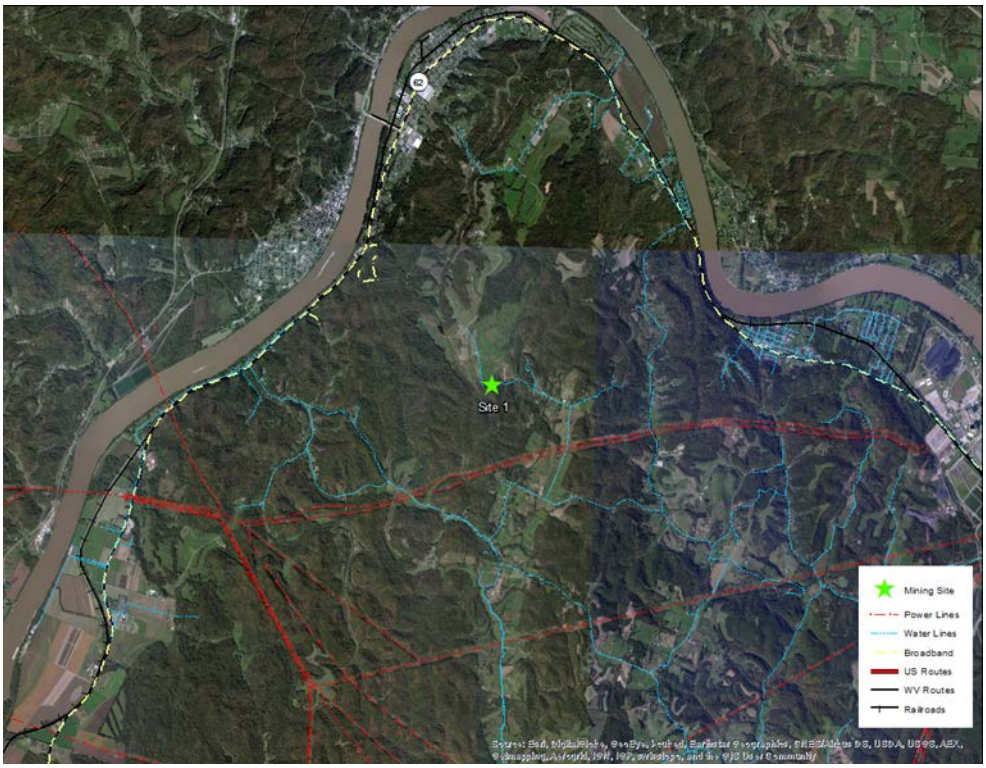
Permittee	Raven Hocking Coal Corp
Facility Name	N/A
Permit ID	S001785
Issue Date	3/6/1985
Expiration Date	3/6/1995
Current Acres	111.2
Lat	38° 58'53.0000"
Long	82° 1'14.0000"
Nearest Post Office	Unknown

Site Number	**1**
Suitability Ranking	**4**
Total Score	**439.5**

Distance Analysis Results

Broadband	1.39
Gas Pipes	4.27
National Waterway Network	2.64
Pipe Lines	10.81
Power Lines	0.64
Railroads	1.67
Sewer Lines	1.46
Water Lines	0.02
Existing Highway	1.64
Intermodal Terminal Facilities	52.33
Interstate	37.49
National Waterway Network Ports	47.88
Sewer Treatment Facilities	2.93
Solid Waste Treatment Facilities	4.47
Tri-state Airport	56.39
Yeager Airport	55.96

Site number 1 is ranked as the fourth suitable site for post-mine land development in the county. The advantages of the site are its relative proximity to utilities, Water Lines (0.02 mi.) and Power Lines (0.64 mi.). The main disadvantage is the great distance to Broadband (1.39 mi.).



Site's General Info.

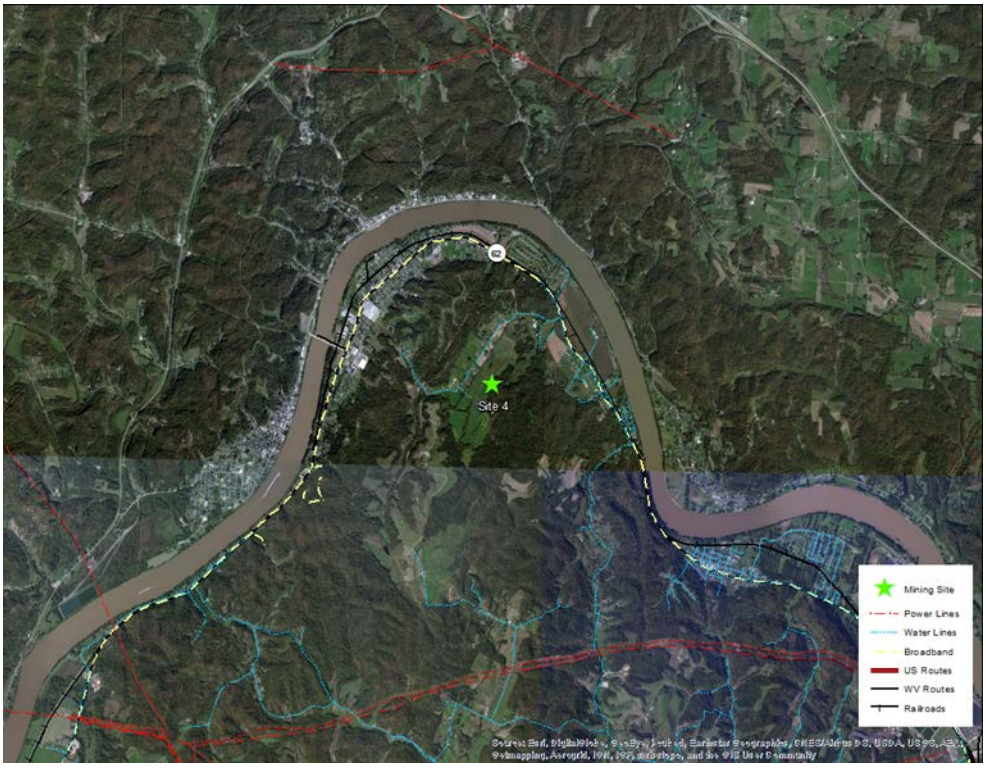
Permittee	Raven Hocking Coal Corp
Facility Name	N/A
Permit ID	S601986
Issue Date	10/8/1986
Expiration Date	10/8/1991
Current Acres	24
Lat	39° 0'30.0000"
Long	82° 0'43.0000"
Nearest Post Office	Unknown

Site Number	**4**
Suitability Ranking	**5**
Total Score	**416.5**

Distance Analysis Results

Broadband	0.79
Gas Pipes	5.89
National Waterway Network	2.22
Pipe Lines	12.56
Power Lines	2.35
Railroads	0.87
Sewer Lines	0.80
Water Lines	0.24
Existing Highway	1.44
Intermodal Terminal Facilities	54.64
Interstate	39.80
National Waterway Network Ports	48.67
Sewer Treatment Facilities	1.67
Solid Waste Treatment Facilities	6.78
Tri-state Airport	57.18
Yeager Airport	58.27

Site number 4 has the fifth highest score in the suitability model for its relative close distance to Water Lines (0.24 mi.), Sewer Lines (0.80 mi.). The distance from the site to other important criteria, such as Broadband (0.79mi.) and Railroad Facilities (0.87 mi.), are also below average adding to the sites overall score.



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 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 Mason County. Mason County's economy is comprised mainly of employment and activities in the Education and Health Services, Government, and Trade, Transportation, and Utilities sectors. The resulting combination has led to a constant increase in total wages. However, this has not translated to a complete success, as the population continues to fluctuate (with expected declines in the next 15 years) and employment diversification is limited. This plan will put focus on these issues, encouraging an analysis of the range of options available to policymakers, including land use planning.

This plan, including both the demographic and post-mine site analysis, requires data gathered from professional, secondary sources. Every attempt has been made to verify the accuracy of this data. However, the datasets are subject to differing methodologies, third-party error, and changes in time. Any and all information should be verified for accuracy.

II. Planning Area

Mason County was formed in 1804 from a part of Kanawha County, 59 years before West Virginia became a state. It was named for the statesman George Mason. Although the permanent settlement of Mason County did not begin until after the Revolution, the economy was both thriving and varied by the mid-19th century. Time, oil and natural gas, sand a gravel quarries, and coal mines all contributed to this prosperity. Throughout the 20th century, industry continued to develop with the electric power industry becoming a major employer post-World War II.[1]

III. Existing Conditions

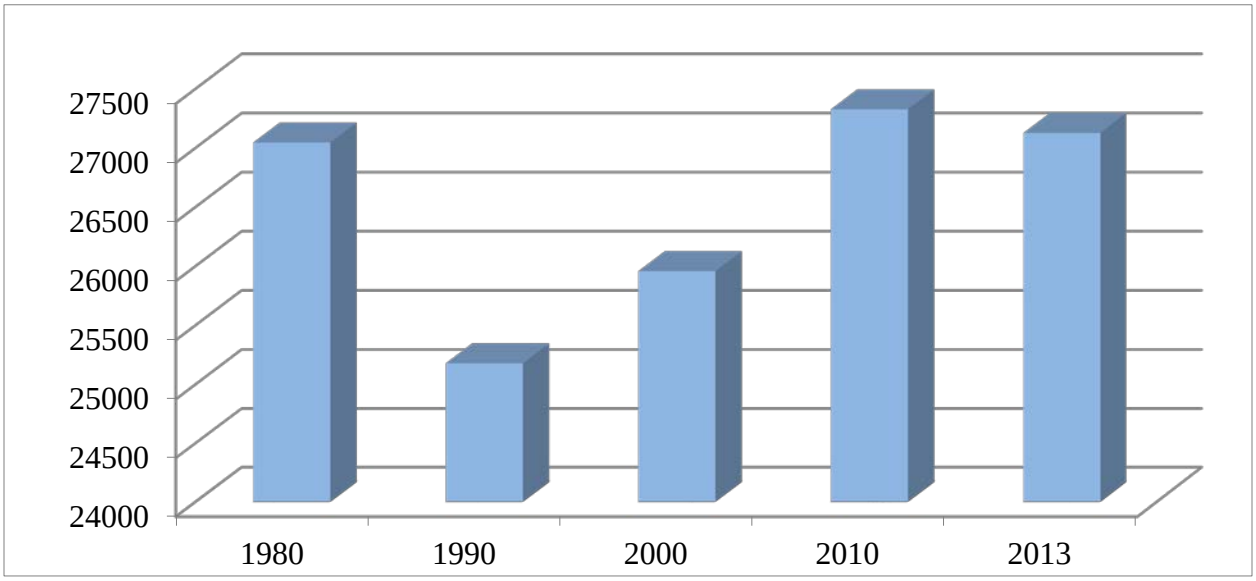
This information will provide a background understanding of the demographic trends in the County. This base information is meant to provide overall detail on Mason County's status as it stands. Part IV will deal with possible future site development information, to be considered with the demographic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

[1] Thorn, Arline R. "Mason County." e-WV: The West Virginia Encyclopedia. 03 June 2013. Web. 11 March 2015.

Population

The population of Mason County in 2013 was 27,126 according to Stats Indiana, ranking it 23rd in county population among the 55 counties in West Virginia.[2] The decennial censuses show that Mason County lost population from 1980 to 1990, resumed growth from 1990 through 2010, and lost population by 2013.

Figure 1: Census Populations for Mason County



Source: Stats Indiana, USA Counties in Profile

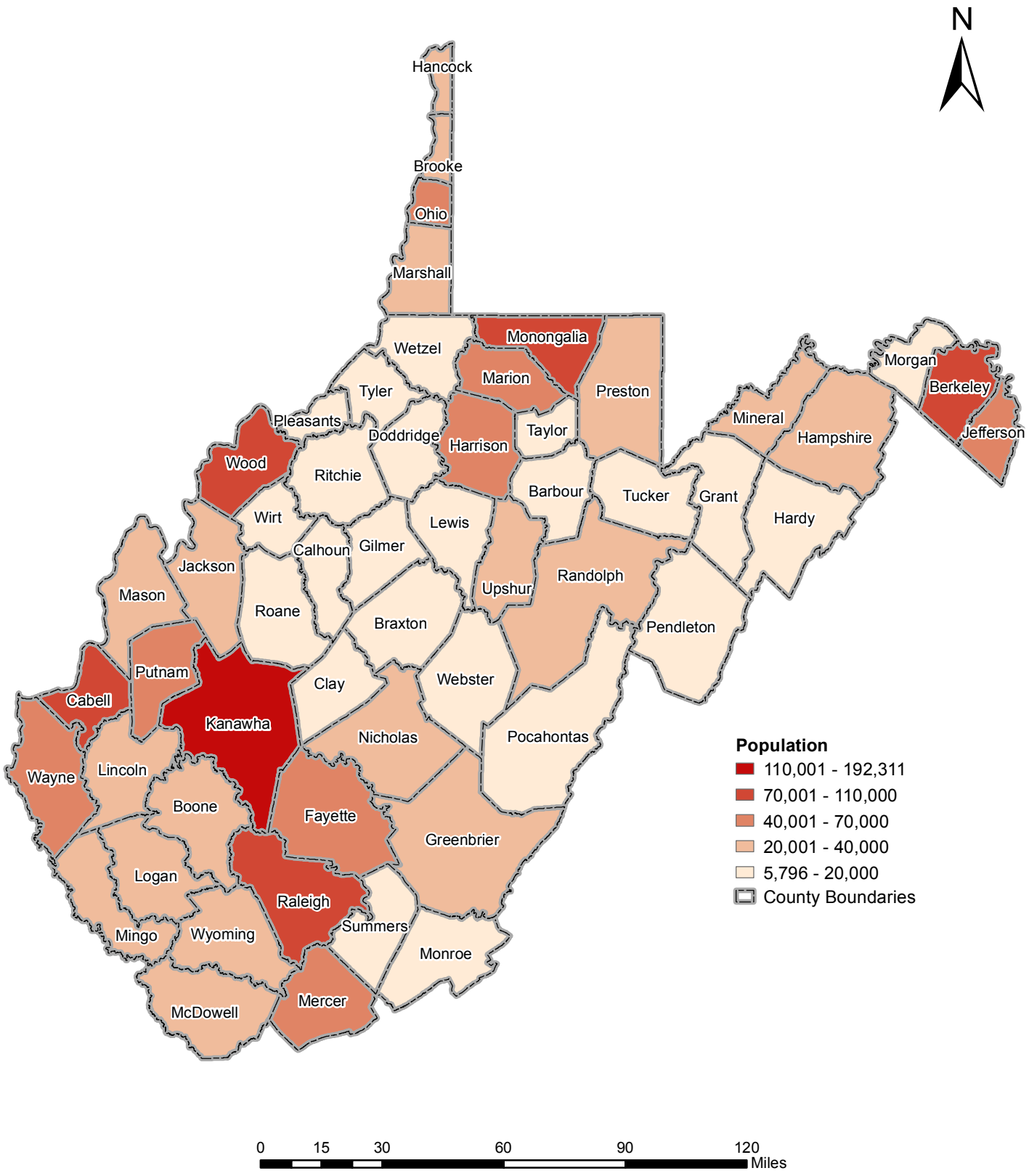
Map 1 illustrates the Mason County population compared to West Virginia overall. Mason County's population is average compared to the rest of the state.

[2] U.S. Census Bureau, "2013 American Community Survey 5-year Estimates," Accessed January 19, 2015, www.factfinder2.census.gov

Map 1

Demographic

Population



Source: U.S. Census Bureau, 2009-2013 American Community Survey

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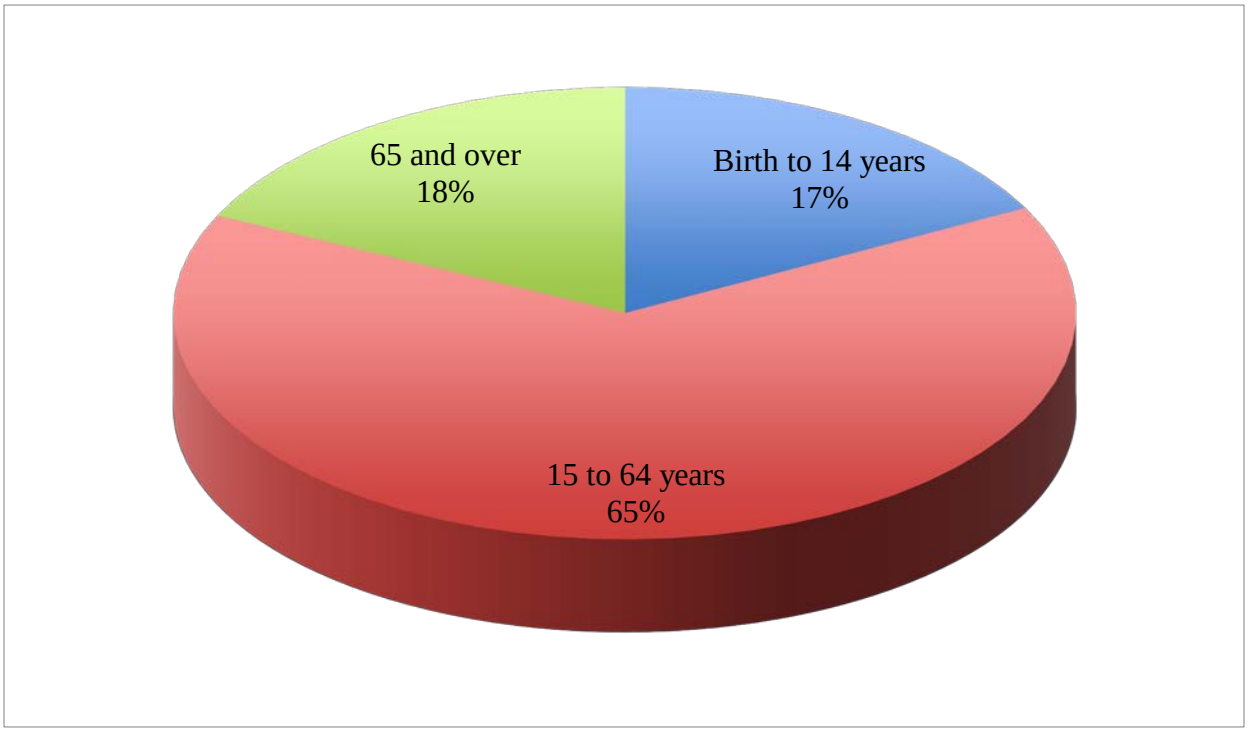
According to the ACS, above 23 percent of Mason County residents are 60 years of age and over, while nearly 17 percent are between 5 and 17 years of age and nearly 6 percent are below the age of 5. Approximately 5,642 people (or 21 percent) are of retirement age. The median age in Mason is 43, which is very near the median age of the State (Map 2). The majority of the population is of prime working age, as denoted in Figure 2.

Figure 2: Mason County Age Breakdown

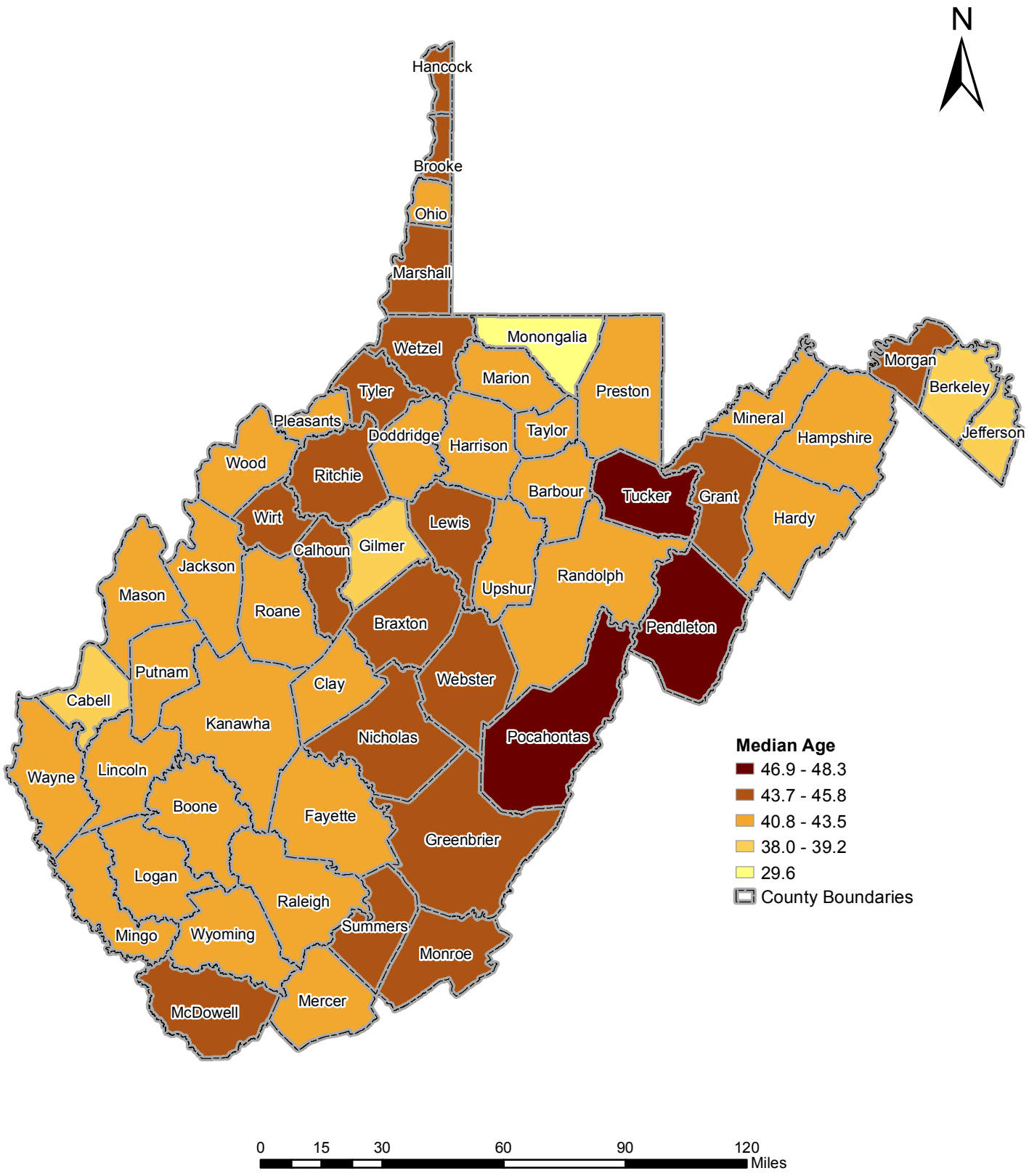


Source: 2013 American Community Survey 5-Year Estimate Calculation

Map 2

Demographic

Median Age



Source: U.S. Census Bureau, 2009-2013 American Community Survey

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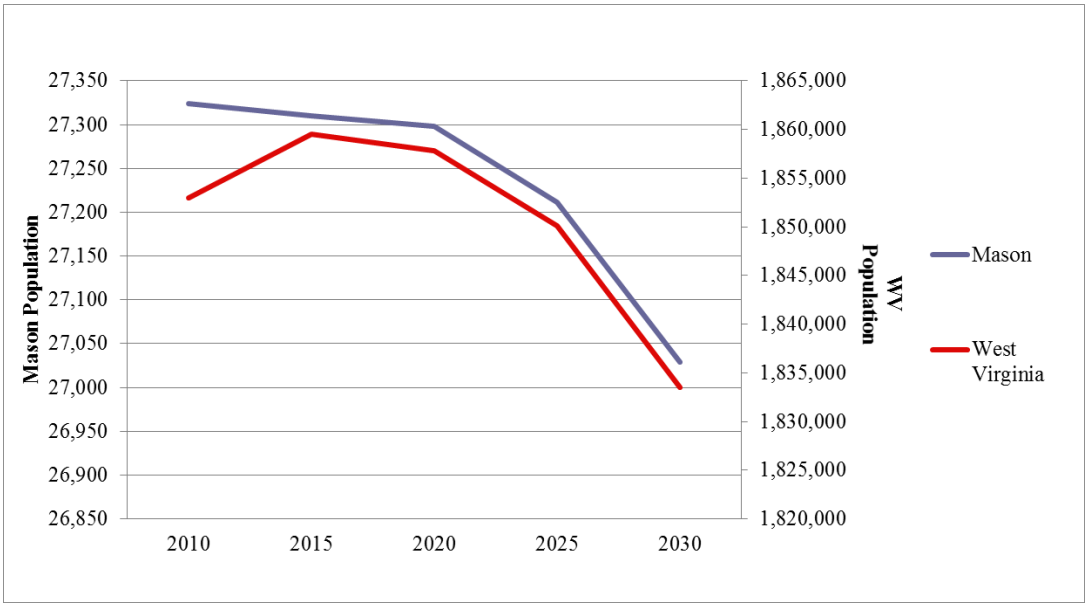
The Bureau of Business and Economic Research at West Virginia University projects a 1.09 percent decrease in the Mason County population between 2010 and 2030, which is slightly higher than the projected decline of the West Virginia population.[3] The model for the projection is based on past population patterns and statistics, and should not be taken as permanent. The projected decrease follows a period of population volatility from the 1980s through 2013.

Figure 3: Population Projections



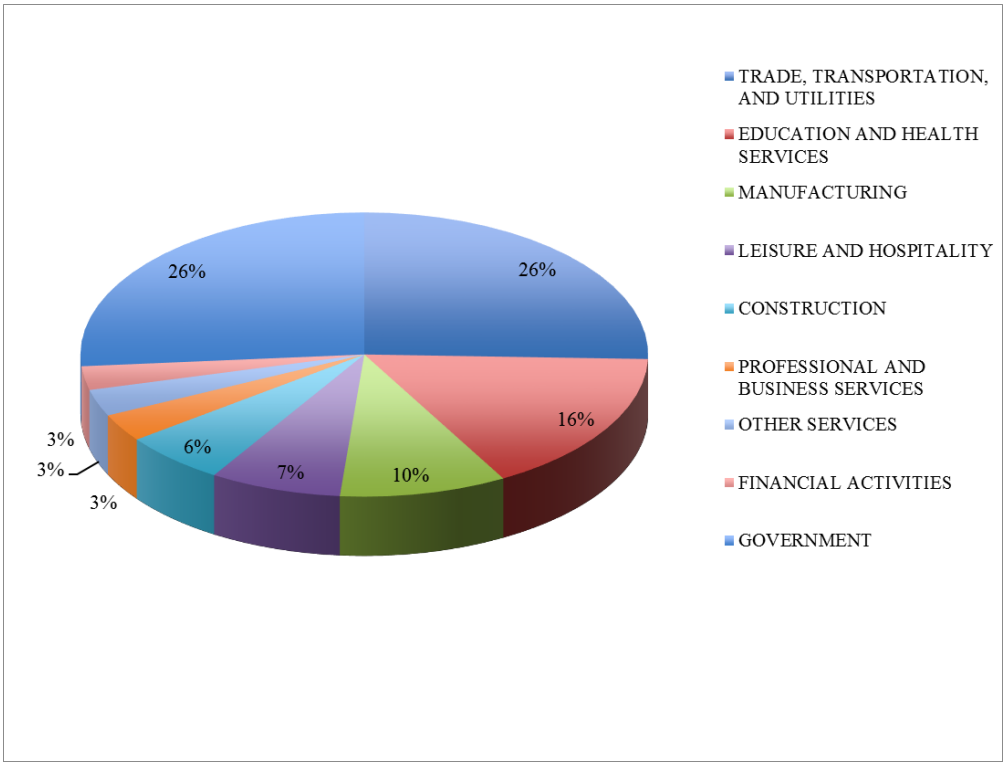
Source: WVU Bureau of Business and Economic Research

[3] Christiadi, Deskins, J. and Lego, B. "Population Trends in West Virginia through 2030." Bureau of Business and Economic Research, College of Business and Economics, West Virginia University, Morgantown, WV (March 2014).

Employment

Workforce West Virginia has a complete dataset on employment numbers and wages. The total number of employed in 2013 was 6,238. Approximately 16 percent of wage earners in Mason County worked in in Education and Health Services and approximately 26 percent worked in Government. Along with Leisure and Hospitality (26 percent), these three industries comprise approximately two-thirds of Mason County's total employment, suggesting a less-diversified mix of industry employment.

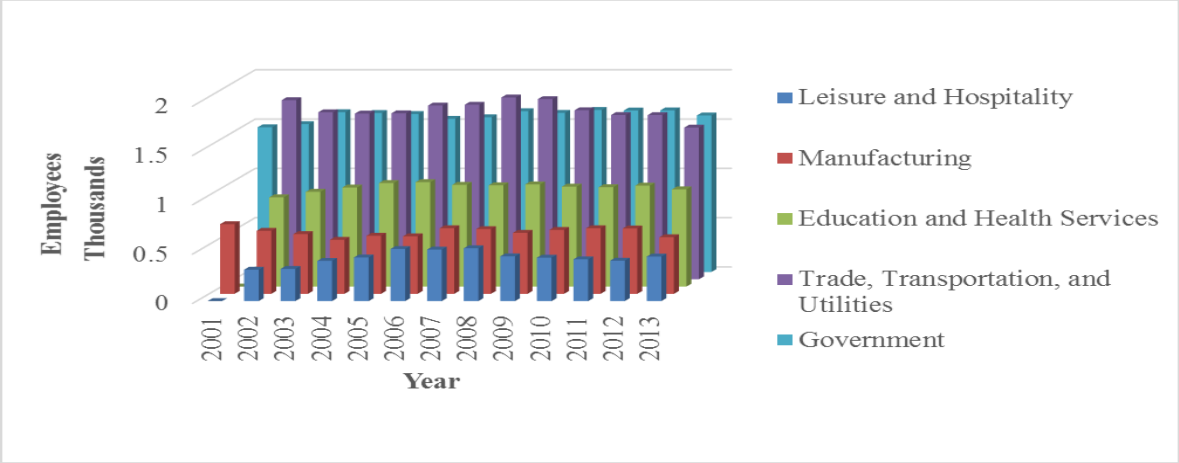
Figure 4: 2013 Mason County Employment



Source: Workforce West Virginia

The current top five sectors have generally been the top five employers over the past decade in Mason County. Leisure and Hospitality has seen the largest growth (of approximately 42 percent since 2001). Employment in Government experienced an increase of roughly 8 percent over this time period. Education and Health Services also grew by 9 percent. Trade, Transportation, and Utilities and Manufacturing sectors experienced declines of 15 percent and 19 percent respectively.

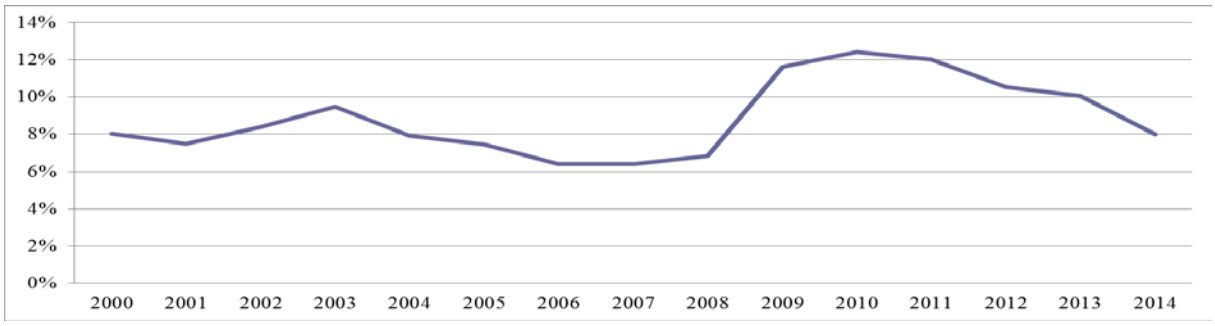
Figure 5: Mason County Employment by 5 Sectors 2001-2012



Source: Workforce West Virginia

The civilian labor force in the County is one of the most interesting statistics when determining potential investors. As Map 3 shows, Mason's participation rate is about average compared to other counties in the State. One component of the labor force, the unemployment rate, shows some volatility from the early 2000s to 2008. As with most areas, Mason experienced a sudden increase in the unemployment rate in 2008 (Figure 6). Unemployment has been slowly falling since peaking in 2010. Note that 2013 data is used for this graph and map, as the data for Workforce West Virginia and the Census Bureau did not match because the most recent data has not been seasonally adjusted.

Figure 6: Mason County Unemployment Rate

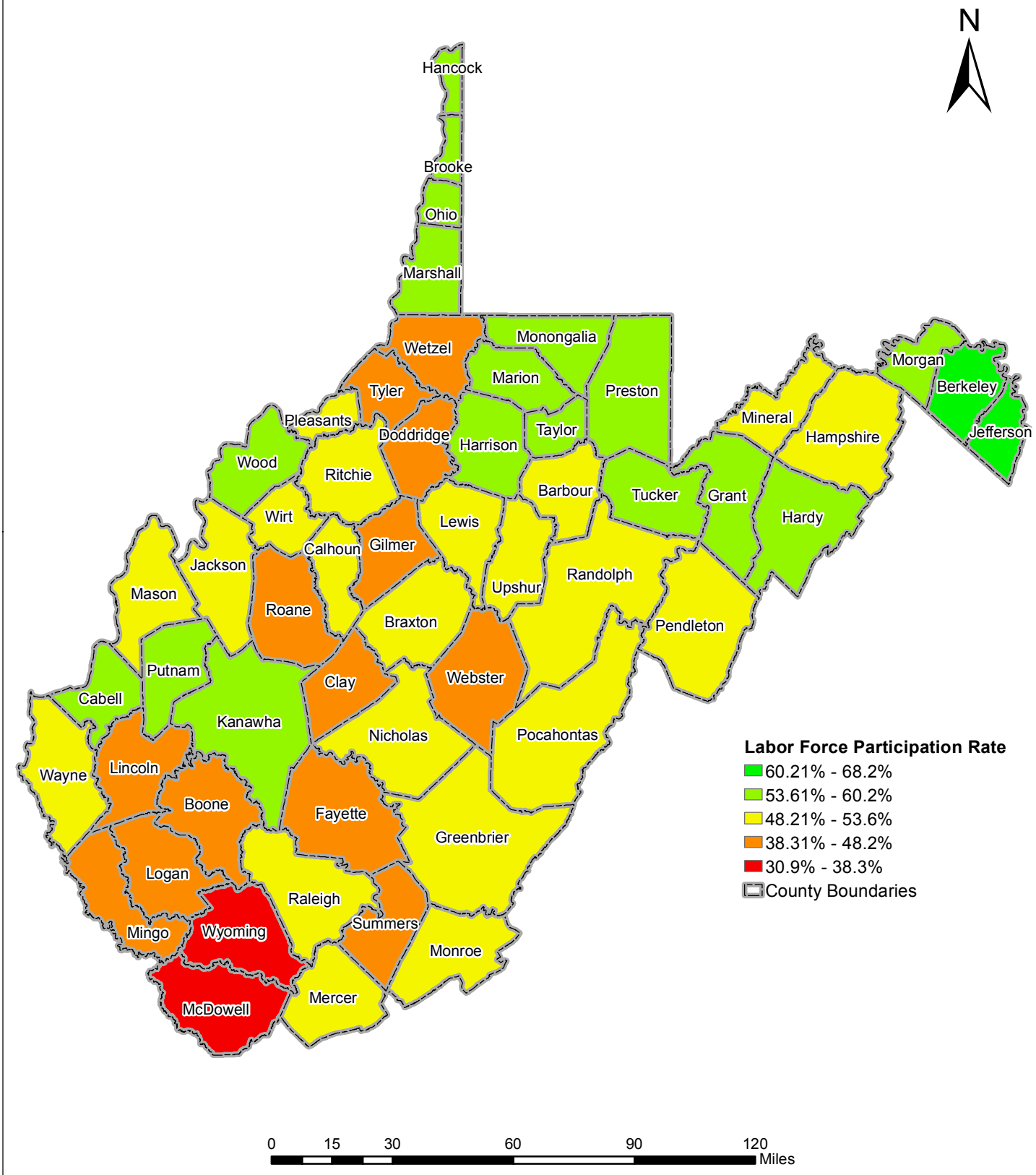


Source: Workforce West Virginia

Map 3

Demographic

Labor Force Participation Rate



Source: U.S. Census Bureau, 2009-2013 American Community Survey

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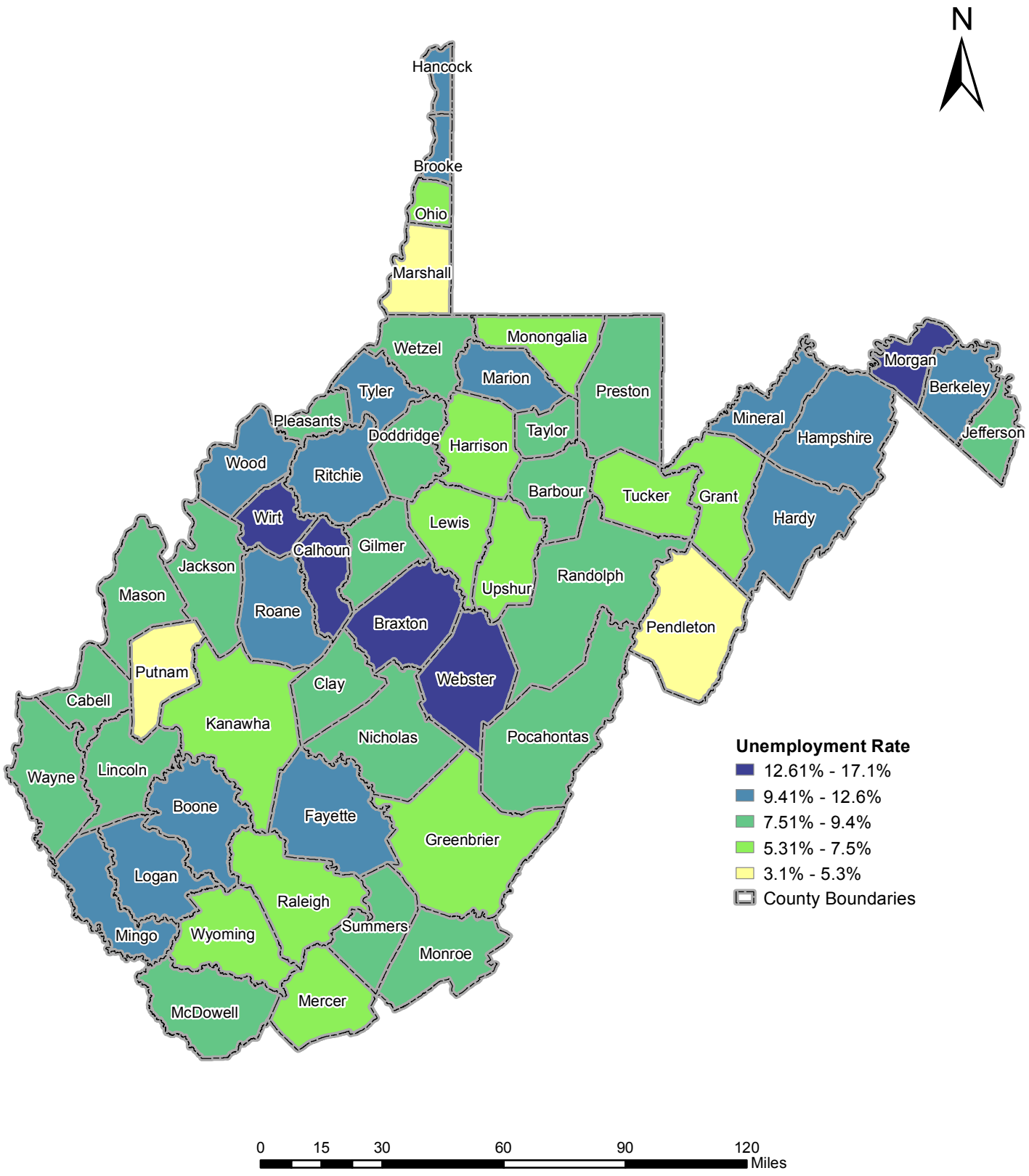
Map 4

Demographic

Unemployment Rate



Source: U.S. Census Bureau, 2009-2013 American Community Survey

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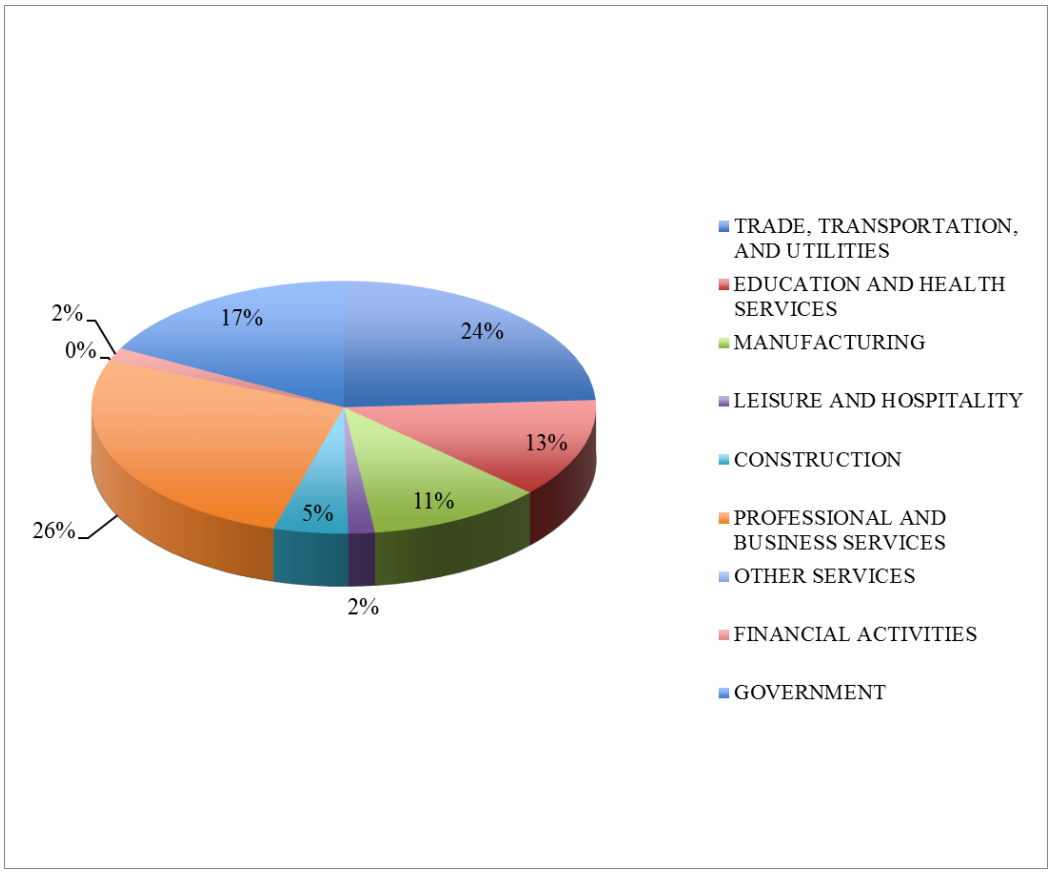
Wages and Income

Mason County's wage contributors vary widely in the level of contribution. The highest, Leisure and Hospitality, is because the sector is one of the highest employing and earning sectors in the County (Figure 7). Government is next because of the sheer size of the sector in the County, followed by Education and Health Services. As with employment, wages in other sectors in Mason County make up much smaller portions.

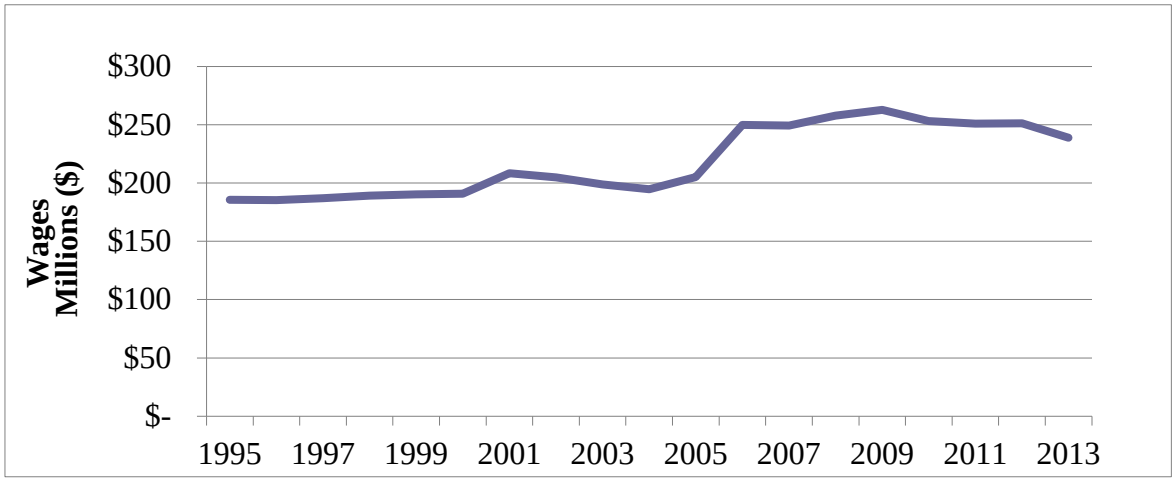
Figure 7: 2013 Mason County Total Wages



Source: Workforce West Virginia

Historically, wages for Mason County have shown a tendency to rise, though there was some stagnation in the late 90s and early 2000s. Mason County experienced relatively steady employment growth, allowing for wages to rise despite recession and cost-cutting factors that led to an increase in unemployment in other sectors. Figure 8 shows total wages for Mason County, which have consistently experienced increase in the early 2000s.

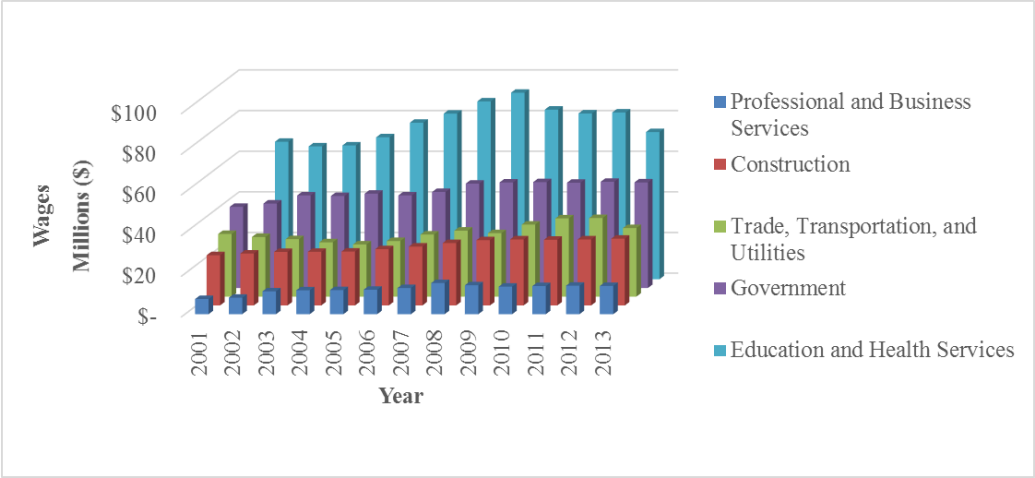
Figure 8: Mason County Total Wages 1995-2013



Source: Workforce West Virginia

Figure 9 confirms the general trend in wages and that most of the top sectors grew throughout the decade. Wages in the Education and Health Services sector experienced a decline since 2010. Wages in the Government sector experienced relatively steady growth throughout 2001-2013. Construction and Trade, Transportation, and Utilities have also experienced steady growth, except for a brief period of volatility in the mid 2000's from Trade, Transportation, and Utilities.

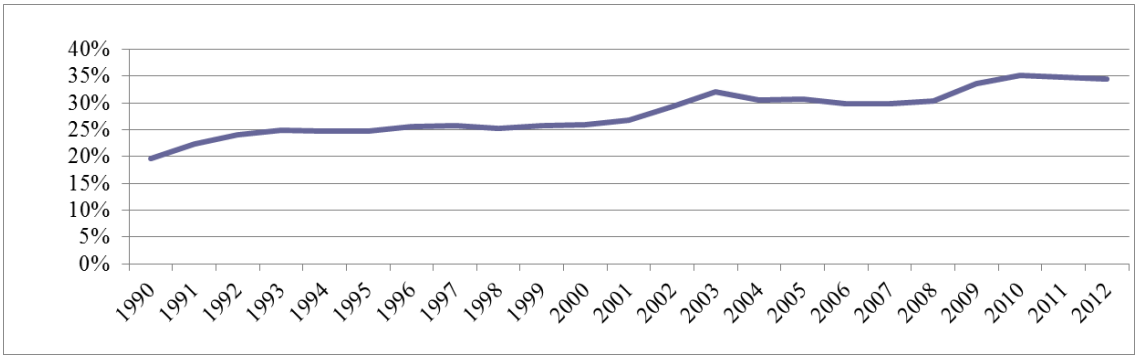
Figure 9: Mason County Total Wages by 5 Sectors 2001-2012



Source: Workforce West Virginia

In most American counties, one would find that the majority of income for people stems from wages. In West Virginia, 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. In Mason County, wages for all employment exceeded $238 million.[4] By comparison, income for the County was larger, exceeding $737 million in 2013.[5] Though there are many components to income other than work earnings, 35 percent of total Mason County income is derived from government transfers. Government transfers accounted for about 98 percent of total transfers in Mason County, dwarfing transfers from private institutions such as charities. Government transfers have consistently contributed between 19 and 35 percent of income over the past 20 years. This does not count the wages for government workers. This number is similar to many other counties in West Virginia, and is not the worst nor the best ratio in the State.

Figure 10: Government Transfers as a Percentage of Income for Mason County



Source: U.S. Bureau of Economic Analysis

The total personal income of Mason County is therefore made up of 35 percent government transfers. Compared to the State, Mason County has an above average ratio of government transfers to personal income. According to the BEA, per capita income was $35,533 for Mason County in 2013. Annual net earnings, or income from work, is displayed in Map 5, and Mason is ranked among the median tier in earned income in West Virginia.

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. Mason County appears to be at the lowest end of the spectrum. The number of establishments may be misleading, as the Education and Health Services and Government sectors are typically characterized by a small number of firms.

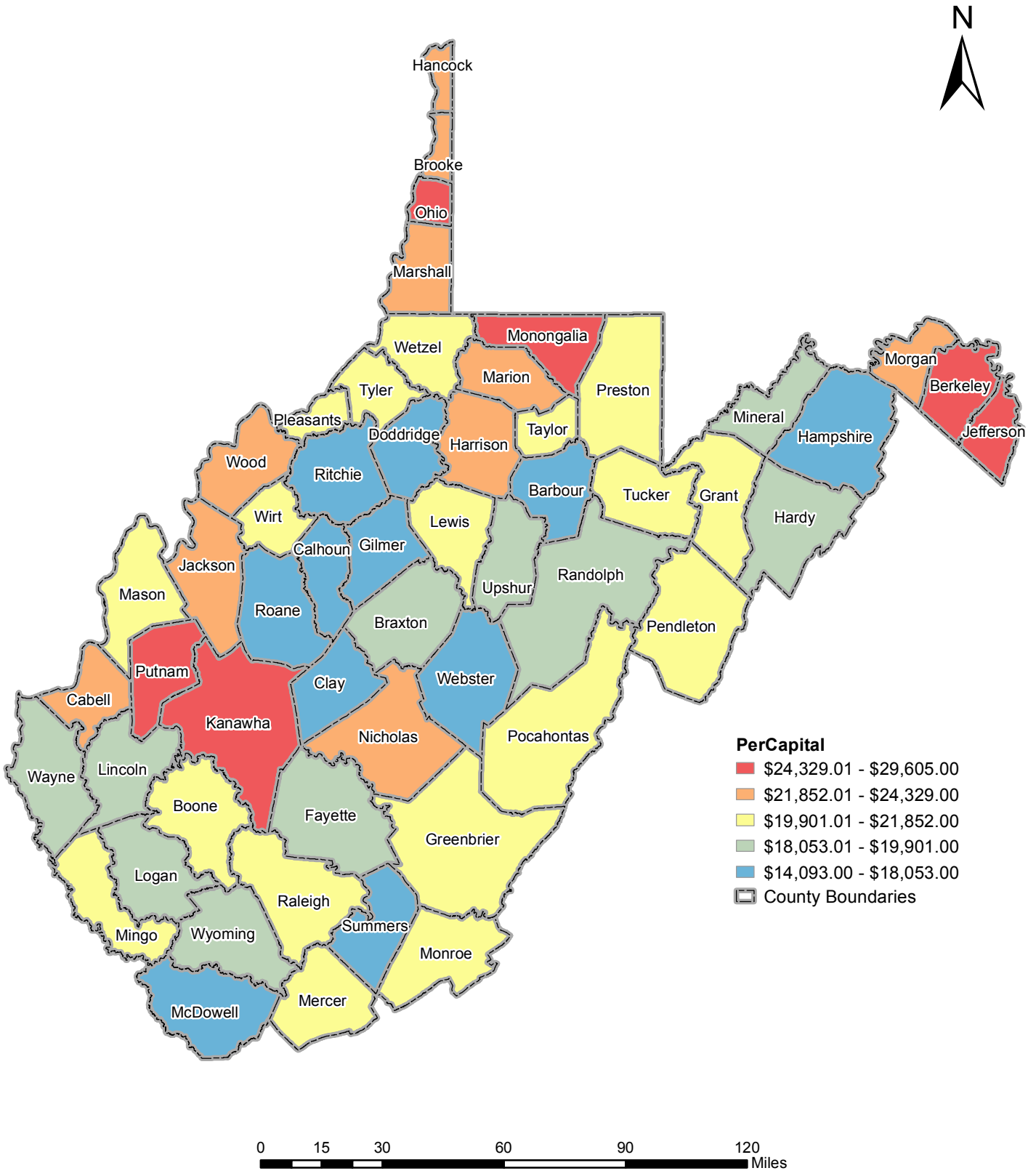
[4] "Employment and Wages – 2013, Mason County," Workforce West Virginia, Accessed January 18, 2015, http://www.workforcewv.org/lmi/EW2011/ew11x059.htm

[5] "Tables CA 04 and CA 35 analysis," Bureau of Economic Analysis, Regional Economic Accounts, Local Area Person Income and Employment, Accessed January 18, 2015, http://www.bea.gov/regional/index.htm.

Map 5

Demographic

Per Capita Annual Net Earning



Source: U.S. Census Bureau, 2009-2013 American Community Survey

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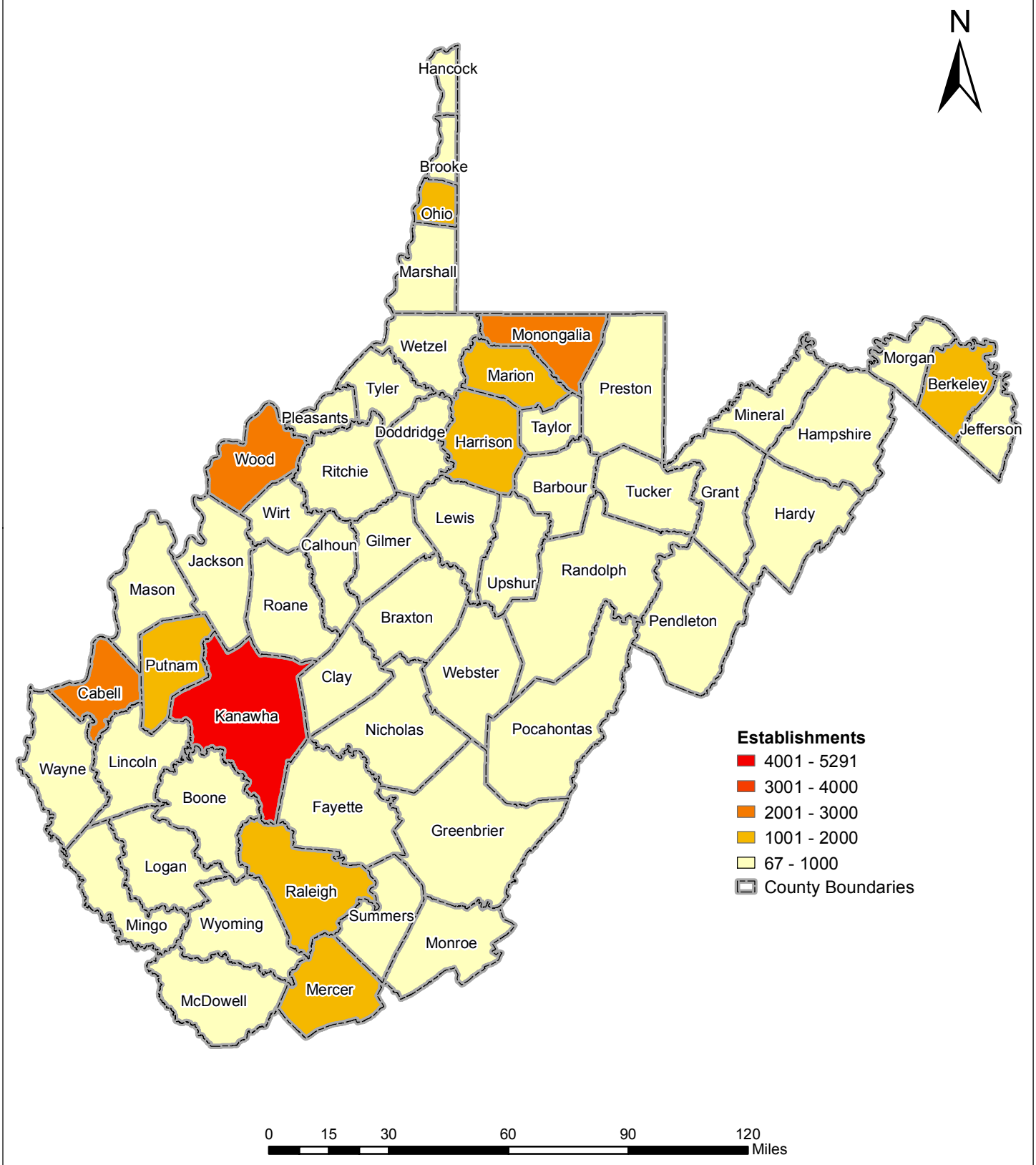
Map 6

Demographic

Number of Establishments



Source: U.S. Census Bureau, 2011

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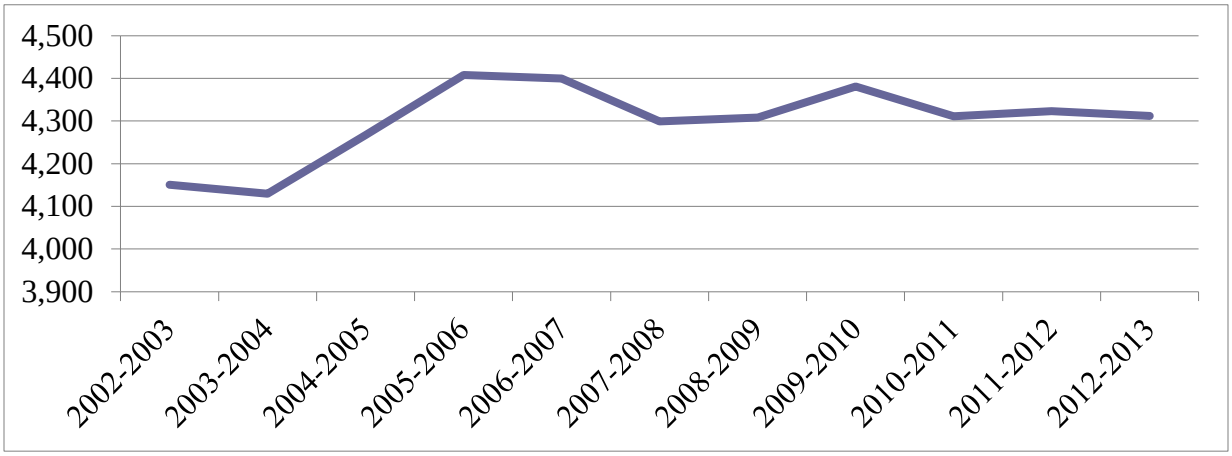
Education

Mason County has three high schools, one middle schools, and six elementary schools of the 2013-2014 school year.[6] Mason County 2nd month school enrollment exhibited an overall increase from in the early 2000s, experiencing periods of volatility throughout. Mason County's 2nd month enrollment is above average for the State (Map 7).

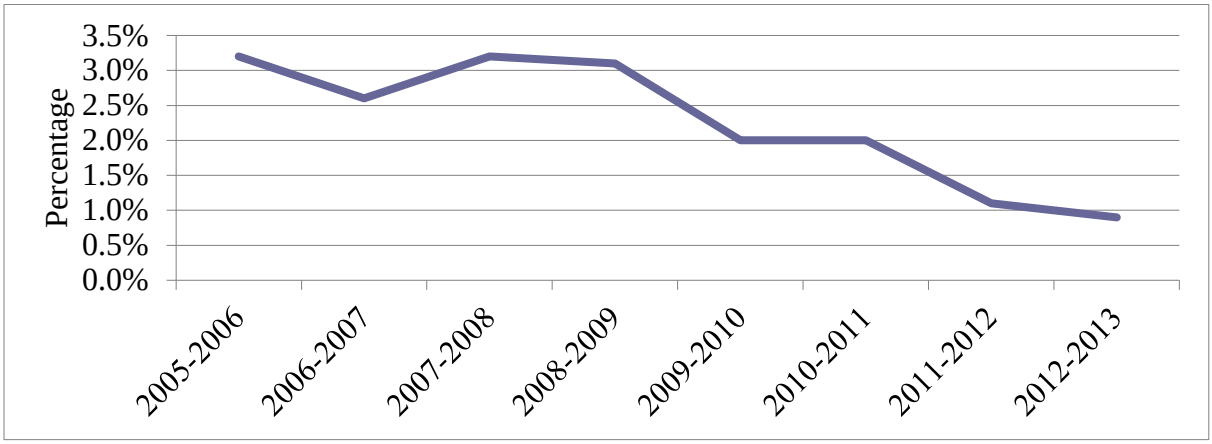
Figure 11: Mason County School Enrollment



Source: WVEIS

The West Virginia Education Information System (WVEIS) also has dropout rates for the school years from 2005-2006 to 2012-2013. 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 7th grade as well. Dropout rates experienced periods of increase and decline until the 2010-2011 school year, when dropouts fell consistently for the two subsequent time periods (Figure 12).

Figure 12: Mason County Dropout Rate



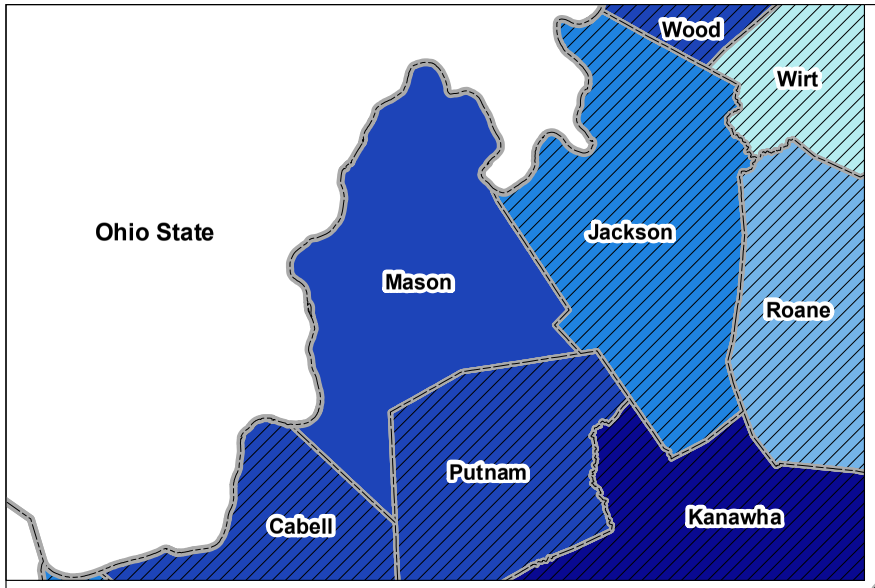
Source: WVEIS

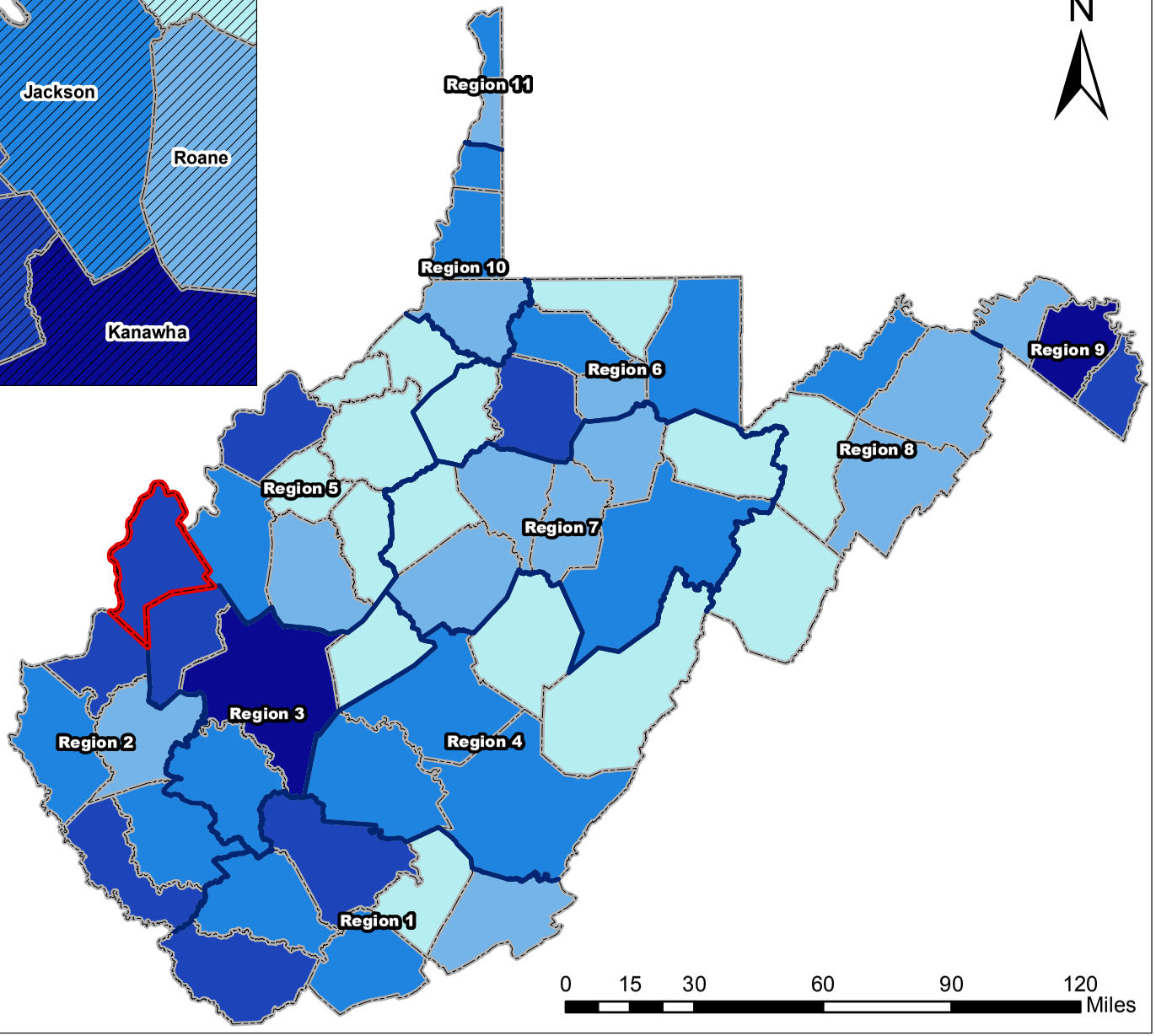
[6] "School Profiles," West Virginia Education Information System, West Virginia Department of Education, Accessed March 9, 2015, http://wveis.k12.wv.us/nclb/profiles/.

Map 8 shows each county's dropout rate. Mason County currently has an average dropout rate. Maps 9 and 10 show the total graduates and the graduation rate by county. In Mason, total graduates and graduation rates are average for the State. Mason County's ten schools' locations are noted in Map 11. Not coincidentally, the major schools are located on the main roads in the County. The largest school by attendance is Point Pleasant High School. The significance of the locations of these schools is the access to major transportation routes. The schools 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

Mason County





N

Planning Regions Line
904 - 1978
1979 - 3832
3833 - 7412
7413 - 13259
13260 - 27936
County Boundaries

0 15 30 60 90 120
Miles

Source: West Virginia Department of Education 2015

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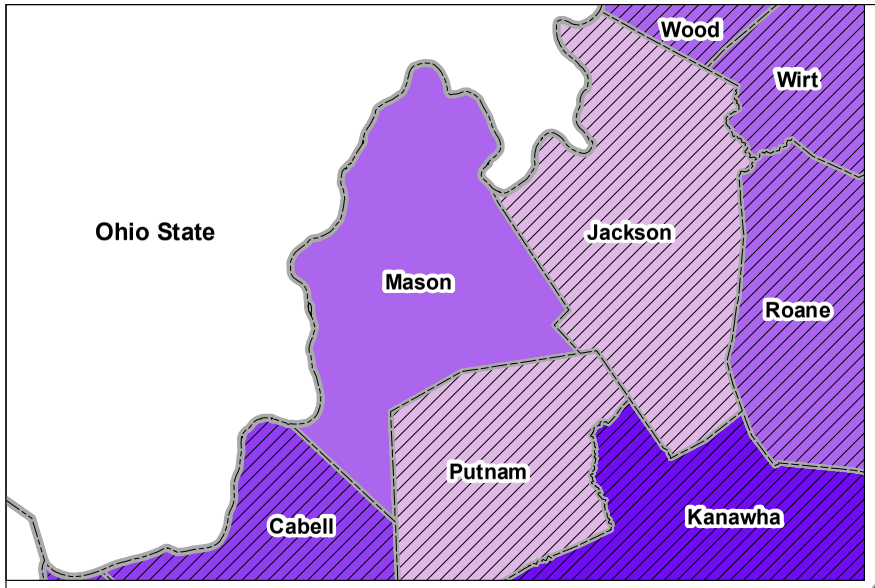
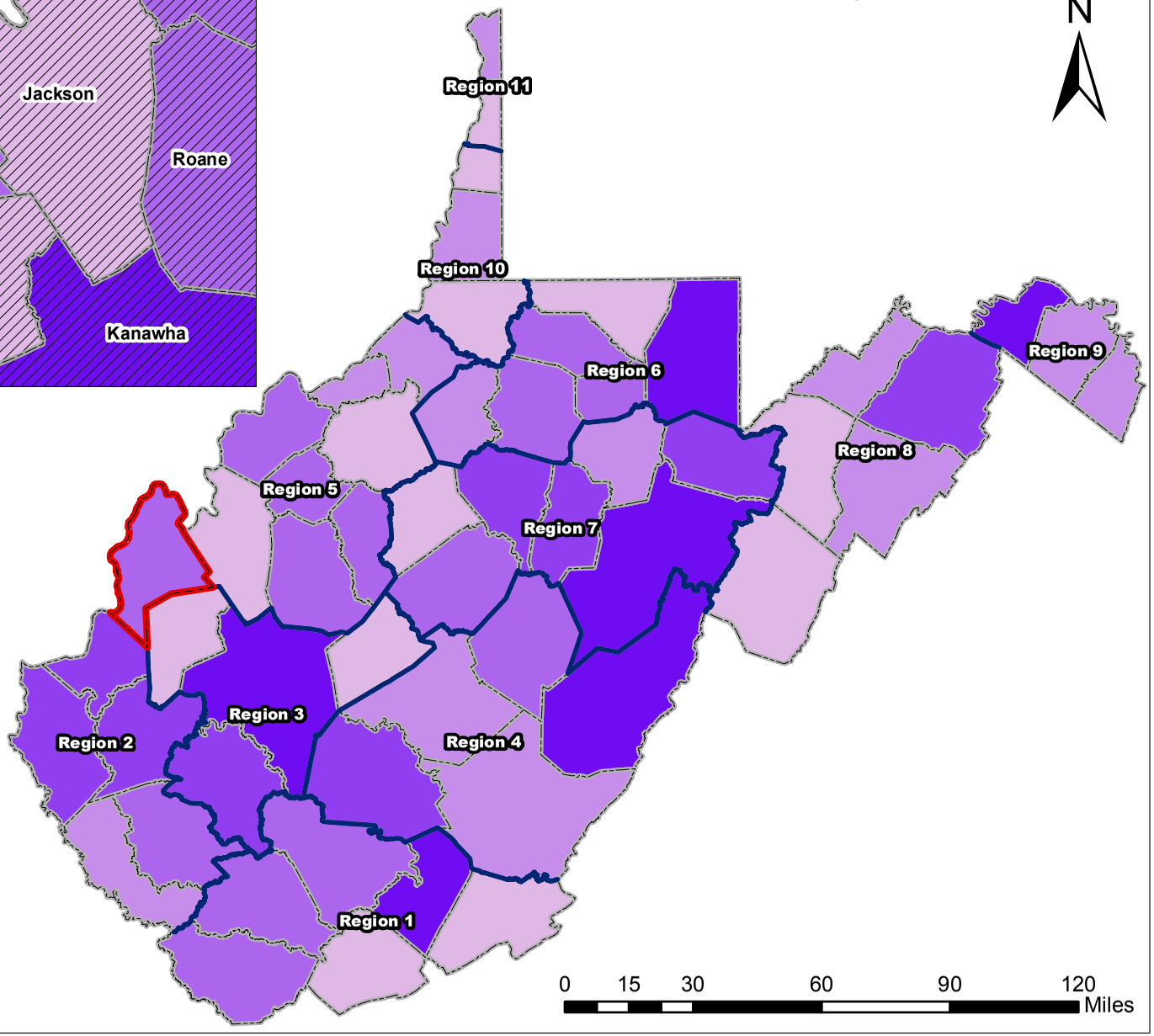
NCLB - Dropout Rate

Mason County





Planning Regions Line
0.05% - 0.60%
0.61% - 1.00%
1.10% - 1.50%
1.60% - 2.00%
2.10% - 3.00%
County Boundaries

Source: West Virginia Department of Education 2015

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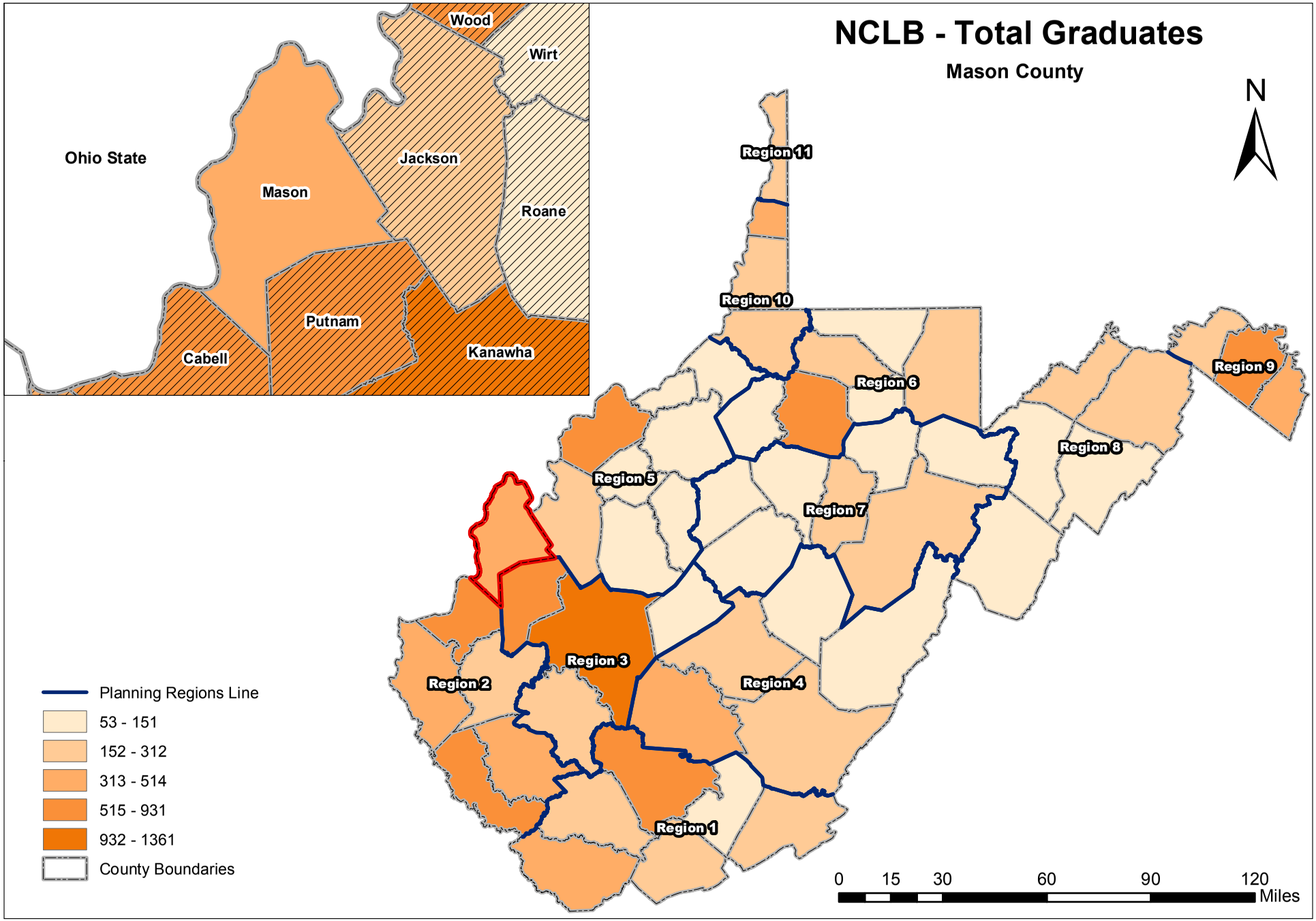
NCLB - Total Graduates

Mason County



Source: West Virginia Department of Education 2014

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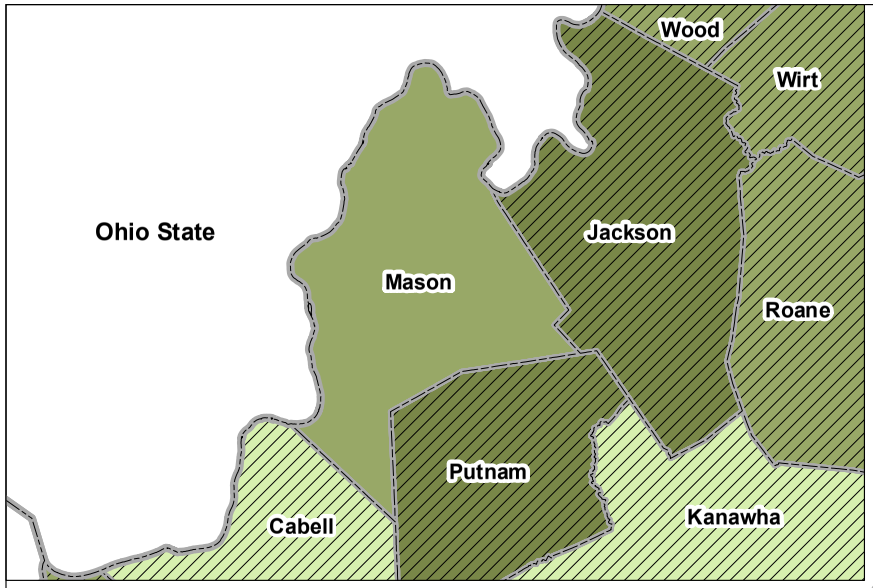
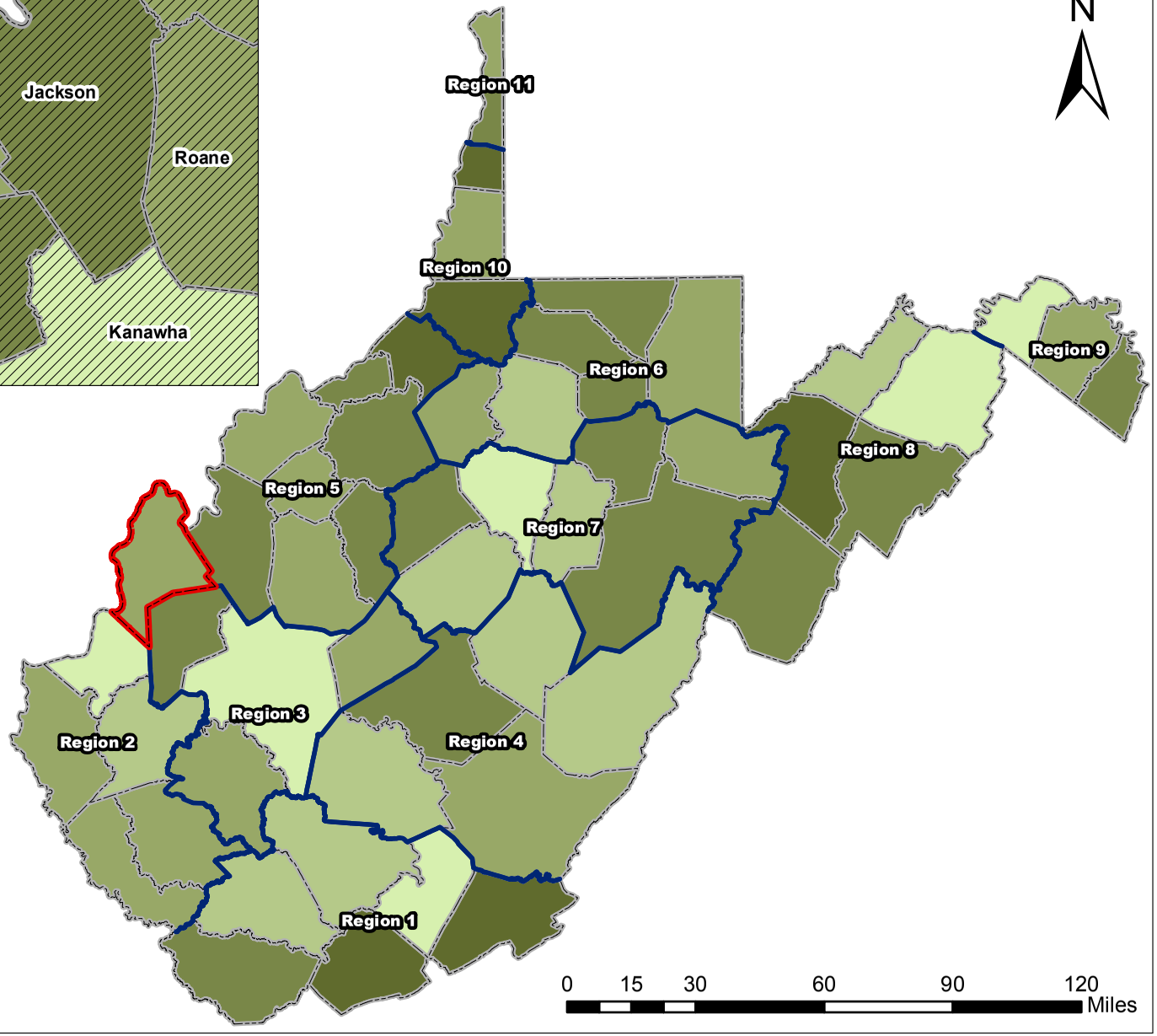
NCLB - Graduates Rate

Mason County





N

Planning Regions Line
74.75% - 78.70%
78.71% - 82.80%
82.81% - 87.16%
87.17% - 90.45%
90.46% - 96.11%
County Boundaries

0 15 30 60 90 120
Miles

Source: West Virginia Department of Education 2015

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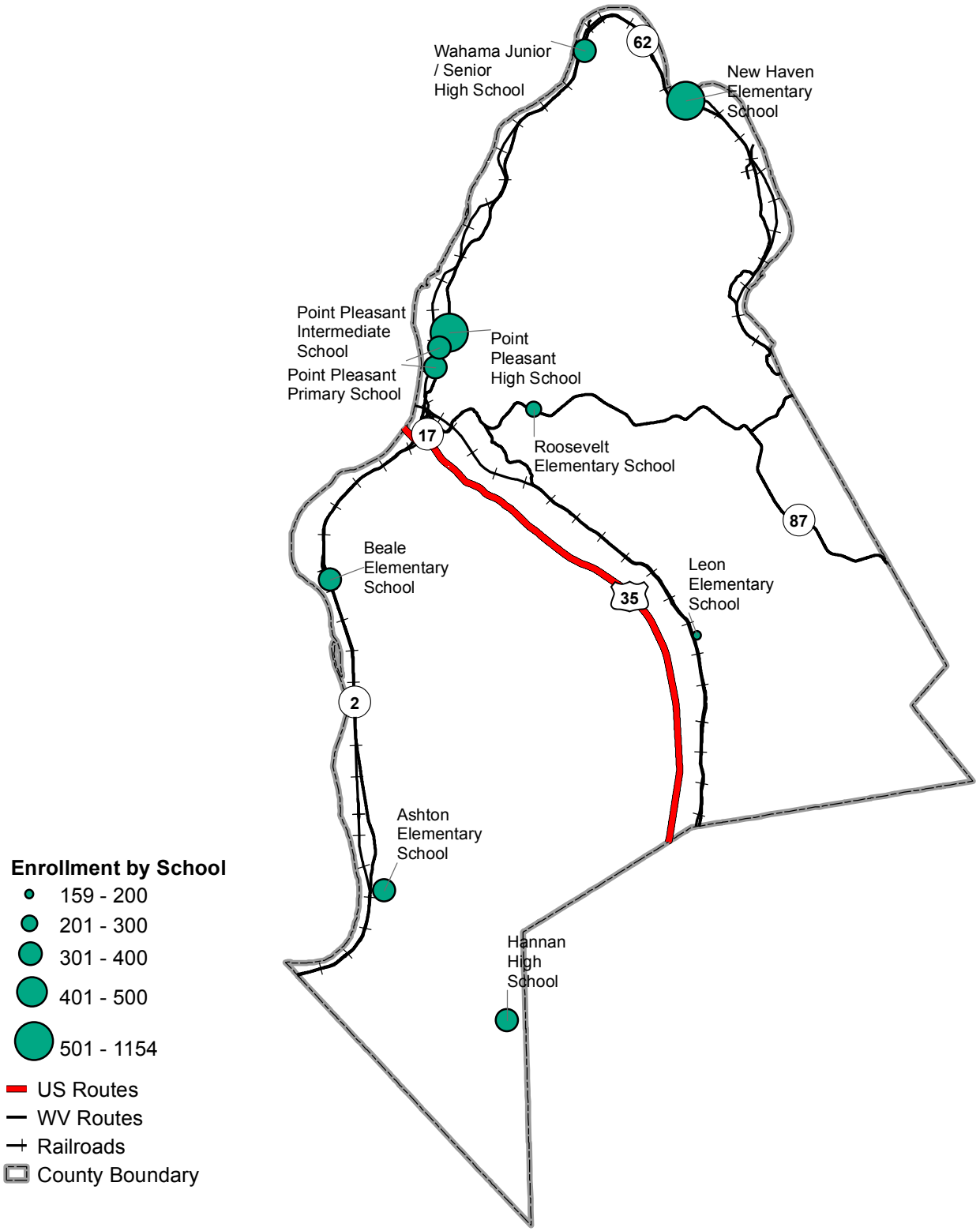
Map 11

Total Attendance by School - 2015

Mason County



Source: West Virginia Department of Education 2015

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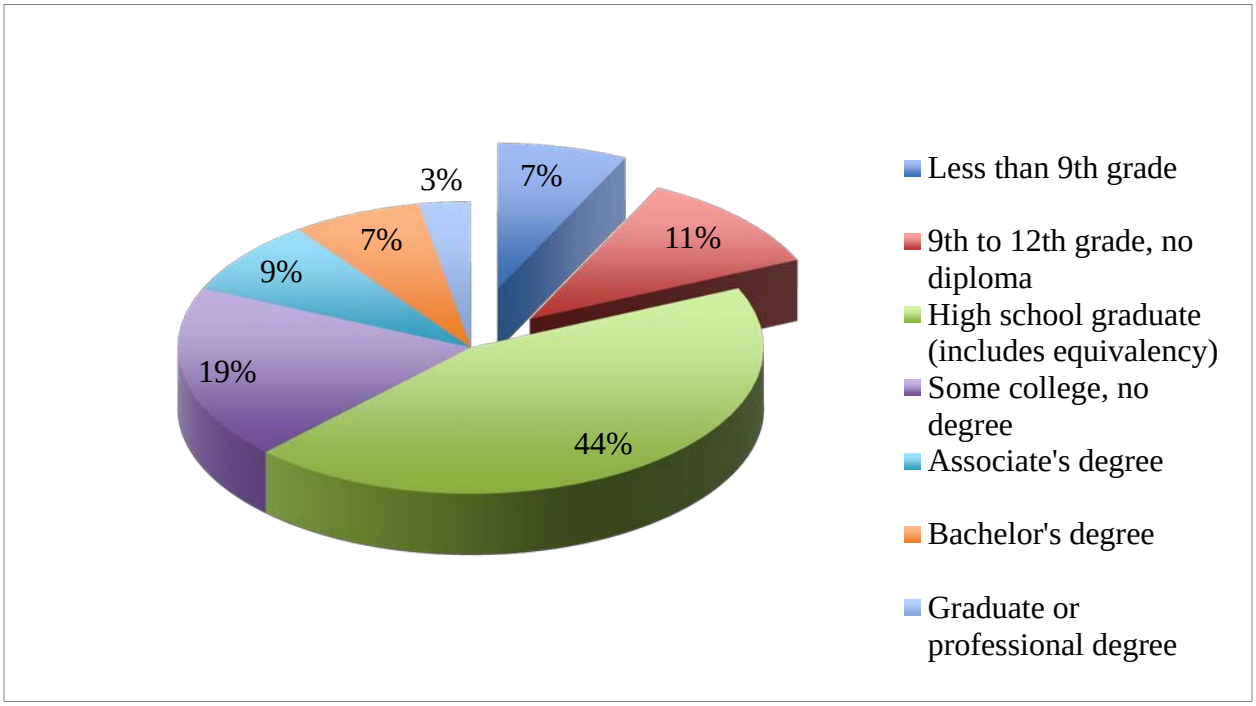
The ACS also maintains data on the educational attainment of the population that is 25 years and over. In Mason County, 44 percent of these residents have a high school diploma or equivalent. Approximately 18 percent have less than a high school diploma. This is a rather high number and particularly concerning when the relationship between education and jobs is considered.

Figure 13: Mason County Educational Attainment



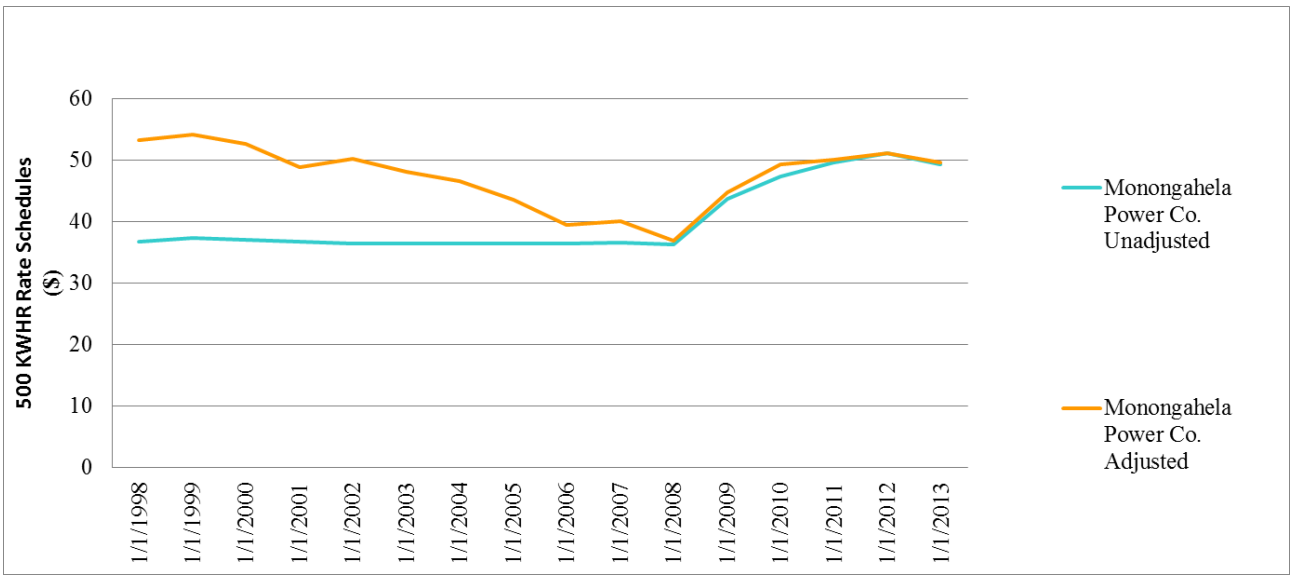
Source: 2013 American Community Survey 5-Year Estimates

Utilities and Infrastructure

Mason County has 23 utility companies according to the West Virginia Public Service Commission (PSC). Economic development depends on infrastructure, and Mason County has several providers of water and sewer, two major providers of electricity (Monongahela Power Company and Harrison Rural Electrification Association, Inc.), and one electric wholesaler (American Bituminous Power Partners, L.P.).

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 from 1998 to 2013. The adjusted and unadjusted prices are provided in Figure 14.

Figure 14: Power Company Prices



Source: West Virginia Public Service Commission and U.S. Bureau of Labor Statistics

The graph shows that electricity rates steadily decreased in real terms through 2008 and remained fairly constant with adjustment. Both adjusted and unadjusted prices have increased since 2008. Many possible factors contributed to this rise, including the increased costs of energy and the increased demand. Map 12 also shows the distribution of power lines, plants, and substations within West Virginia and Mason County.

The two other utilities of particular importance are water and sewer. Table 1 displays water and sewer metered rates for the providers of those services. They are all public services with varying rates and categories. Mason County has 16 public 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 one post-closure solid waste transfer station in Mason County.

Table 1: Mason County Water and Sewer Rates

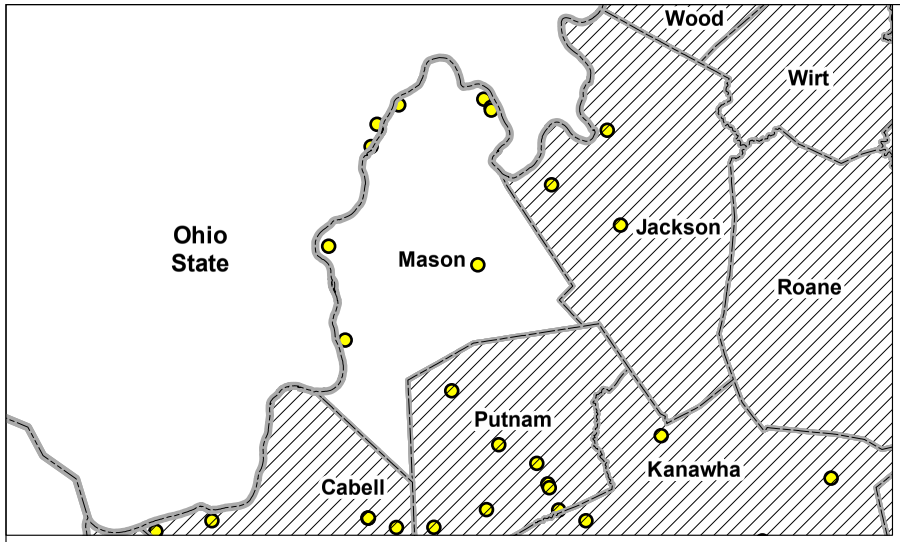
Town of Mason Water Department	
Water Rates	
First 2,000 gallons per month	$6.77 per 1,000 gallons
Next 8,000 gallons per month	$4.96 per 1,000 gallons
Next 40,000 gallons per month	$2.26 per 1,000 gallons
All Over 50,000 gallons per month	$1.70 per 1,000 gallons
Town of Hartford Water Department	
Water Rates	
First 2,000 gallons used per month	$ 7.81 per 1,000 gallons
Next 13,000 gallons used per month	$ 4.78 per 1,000 gallons
Over 15,000 gallons used per month	$ 3.46 per 1,000 gallons
Available for commercial and industrial water service	
First 2,000 gallons used per month	$ 9.36 per 1,000 gallons
Next 13,000 gallons used per month	$ 5.34 per 1,000 gallons
Over 15,000 gallons used per month	$ 3.59 per 1,000 gallons
Town of New Haven (Municipal Water Department)	
Water Rates	
There is no tariff available, only details	
City of Point Pleasant	
Water Rates	
First 2,000 gallons used per month	$3.35 per 1,000 gallons
Next 23,000 gallons used per month	$2.82 per 1,000 gallons
Next 75,000 gallons used per month	$2.55 per 1,000 gallons
Next 100,000 gallons used per month	$1.80 per 1,000 gallons
All Over 200,000 gallons used per month	$0.95 per 1,000 gallons
Cottageville Public Service District	
Water Rates	
First 3,000 gallons used per month	$6.05 per 1,000 gallons
Next 3,000 gallons used per month	$5.56 per 1,000 gallons
Next 4,000 gallons used per month	$4.98 per 1,000 gallons
All Over 10,000 gallons used per month	$3.93 per 1,000 gallons

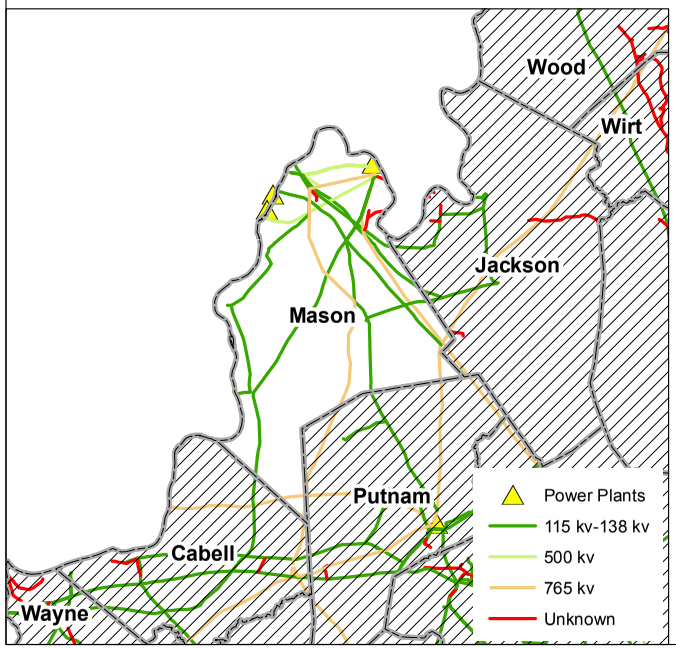
Mason County Public Service District	
Water Rates	
First 6,000 gallons bimonthly	$9.46 per 1,000 gallons
Next 14,000 gallons bimonthly	$6.92 per 1,000 gallons
Next 20,000 gallons bimonthly	$6.33 per 1,000 gallons
Next 60,000 gallons bimonthly	$4.98 per 1,000 gallons
All Over 100,000 gallons bimonthly	$4.59 per 1,000 gallons
Town of Hartford	
Sewer Rates	
First 2,000 gallons used per month	$15.06 per 1,000 gallons
All Over 2,000 gallons used per month	$15.06 per 1,000 gallons
Town of New Haven (Municipal Sewer System)	
Sewer Rates	
First 2,000 gallons used per month	$10.77 per 1,000 gallons
Next 3,000 gallons used per month	$10.24 per 1,000 gallons
Next 5,000 gallons used per month	$9.64 per 1,000 gallons
Next 10,000 gallons used per month	$9.39 per 1,000 gallons
Next 30,000 gallons used per month	$9.28 per 1,000 gallons
All over 50,000 gallons used per month	$8.69 per 1,000 gallons
City of Point Pleasant	
Sewer Rates	
First 3,000 gallons used per month	$9.80 per month
All Over 3,000 gallons used per month	$9.00 per month
Town of Leon	
Sewer Rates	
First 3,000 gallons used per month	$11.00 per 1,000 gallons
Second 7,000 gallons used per month	$10.00 per 1,000 gallons
All Over 10,000 gallons used per month	$5.50 per 1,000 gallons
City of Point Pleasant	
Sewer Rates	
First 3,000 gallons used per month	$9.80 per month
All Over 3,000 gallons used per month	$9.00 per month
Mason County Public Service District	
Sewer Rates	
First 3,000 gallons used per month	$12.21 per 1,000 gallons
Next 3,000 gallons used per month	$1 1.10 per 1,000 gallons
All over 6,000 gallons used per month	$ 8.88 per 1,000 gallons
Town of Mason Sewer Department	
Sewer Rates	
First 2,000 gallons used per month	$10.81 per 1,000 gallons
Next 8,000 gallons used per month	$ 8.47 per 1,000 gallons
Next 40,000 gallons used per month	$ 3.85 per 1,000 gallons
Next 50,000 gallons used per month	$ 3.08 per 1,000 gallons

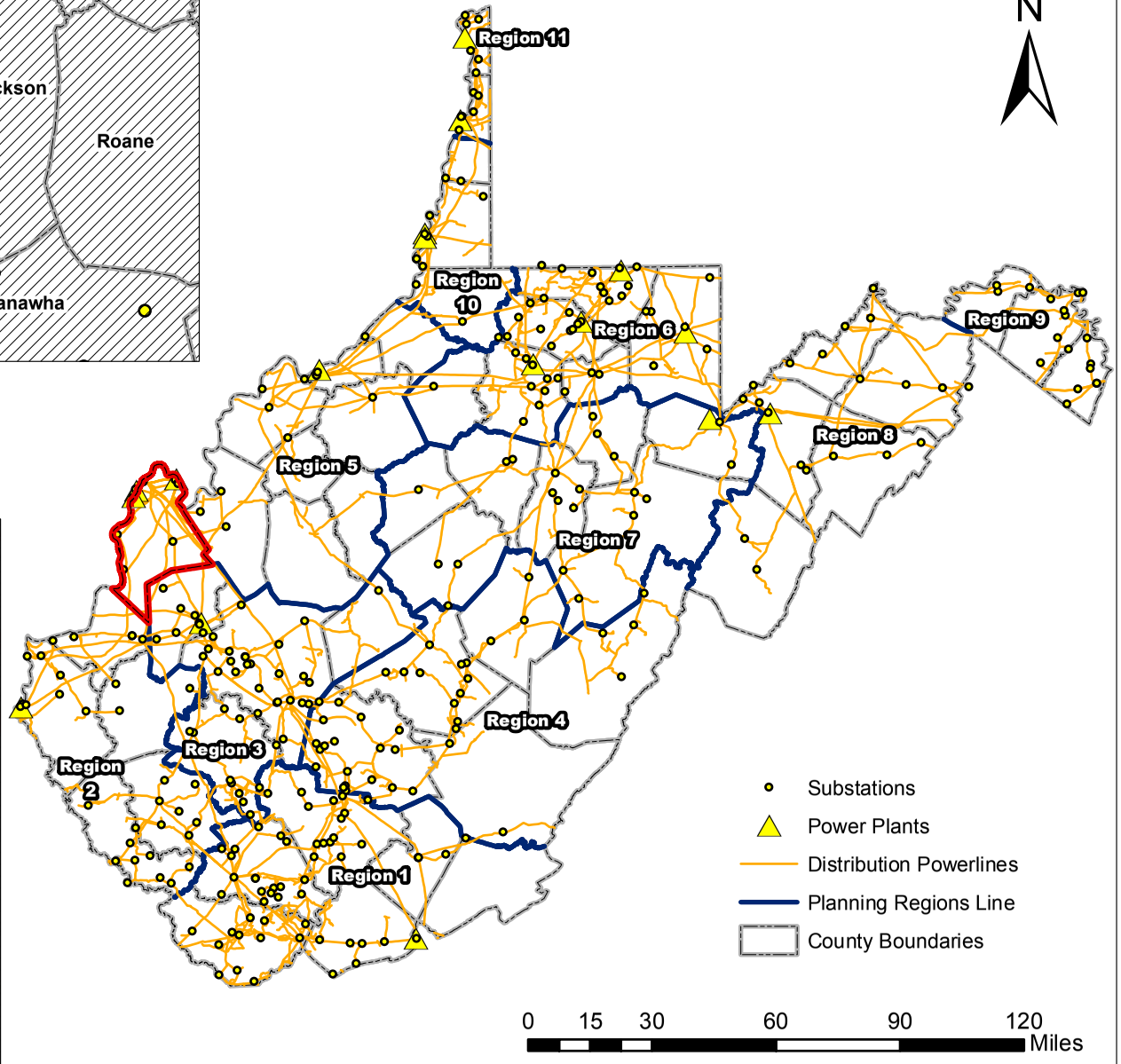
West Virginia-American Water Company	
Water Rates	
First 1,500 gallons used per month at the minimum charge	
Next 28,500 gallons used per month	$10,291 1 per 1,000 gallons
Next 870,000 gallons used per month	$6.7770 per 1,000 gallons
Next 8,100,000 gallons used per month	$4.9308 per 1,000 gallons
All over 9,000,000 gallons used per month	$3.2074 per 1,000 gallons
Gallipolis Ferry Water Association, Inc.	
Water Rates	
First 3,000 gallons used per month	$4.79 per 1,000 gallons
Next 3,000 gallons used per month	$4.19 per 1,000 gallons
Next 4,000 gallons used per month	$3.79 per 1,000 gallons
Next 10,000 gallons used per month	$3.29 per 1,000 gallons
Over 20,000 gallons used per month	$2.99 per 1,000 gallons
J-2-Y-35 Water Association, Inc.	
Water Rates	
There is no tariff available, only details	

Utilities - Electricity

Mason County







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

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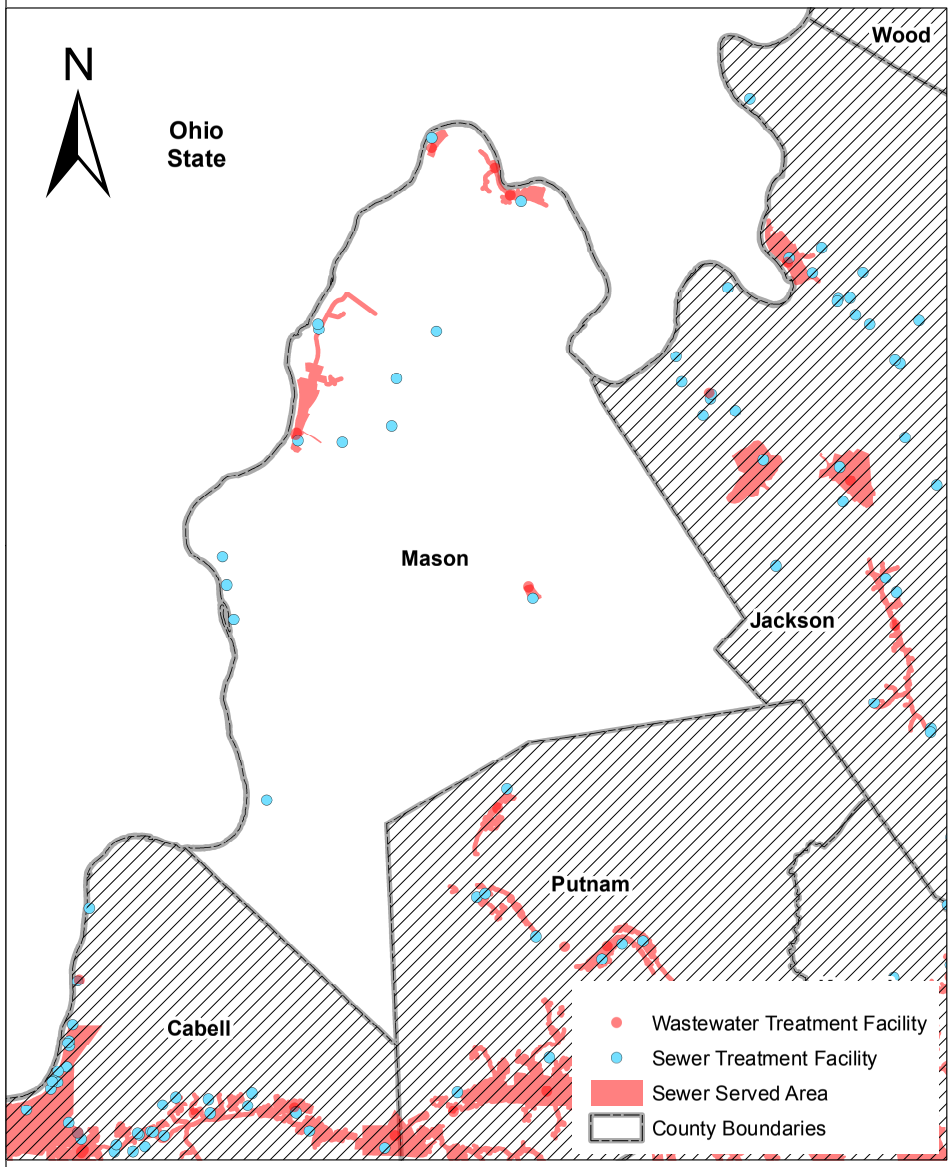
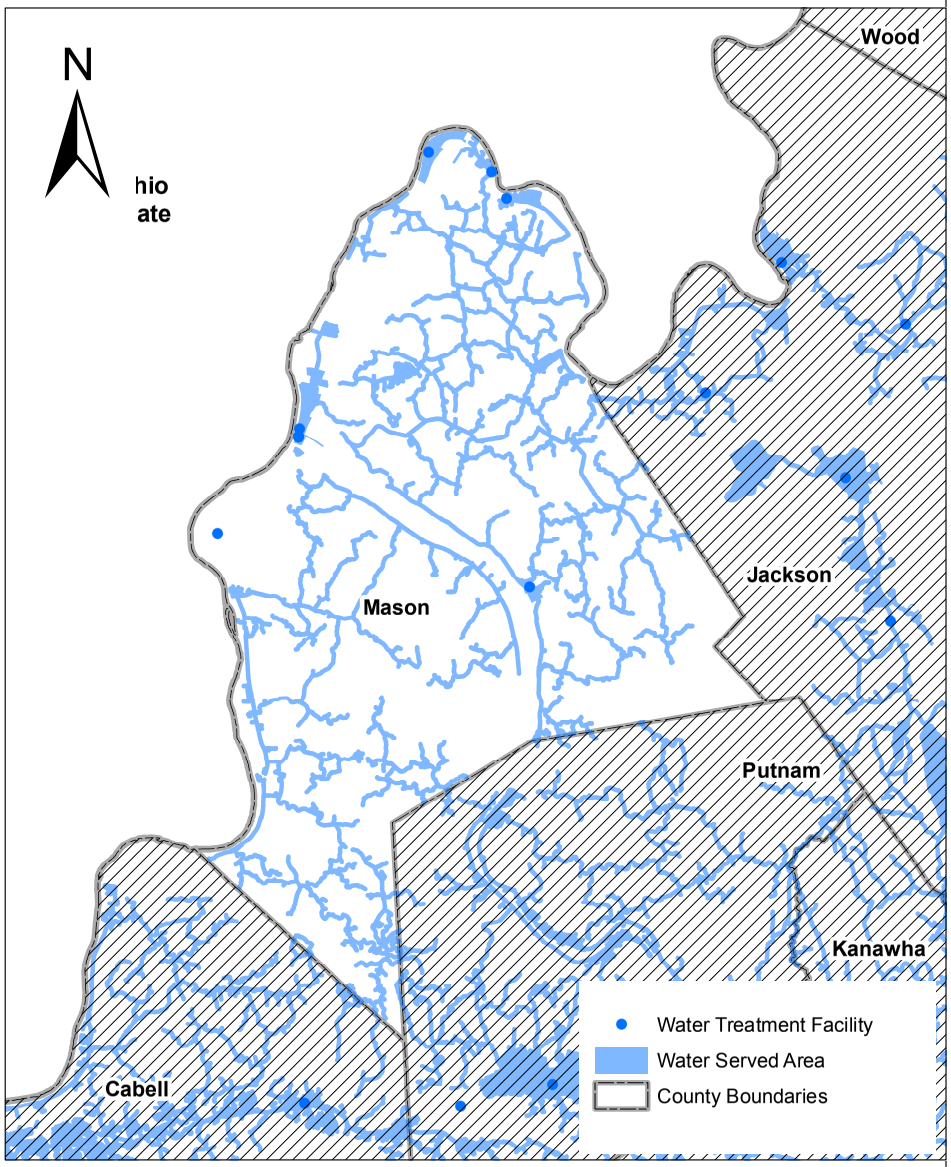
Utilities - Water and Sewer

Mason County





0 15 30 60 90 120
Miles

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

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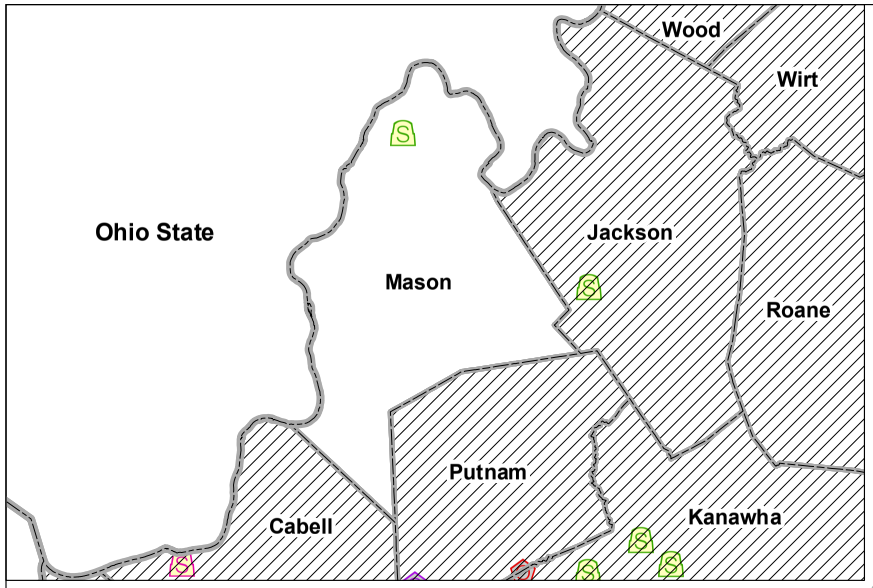
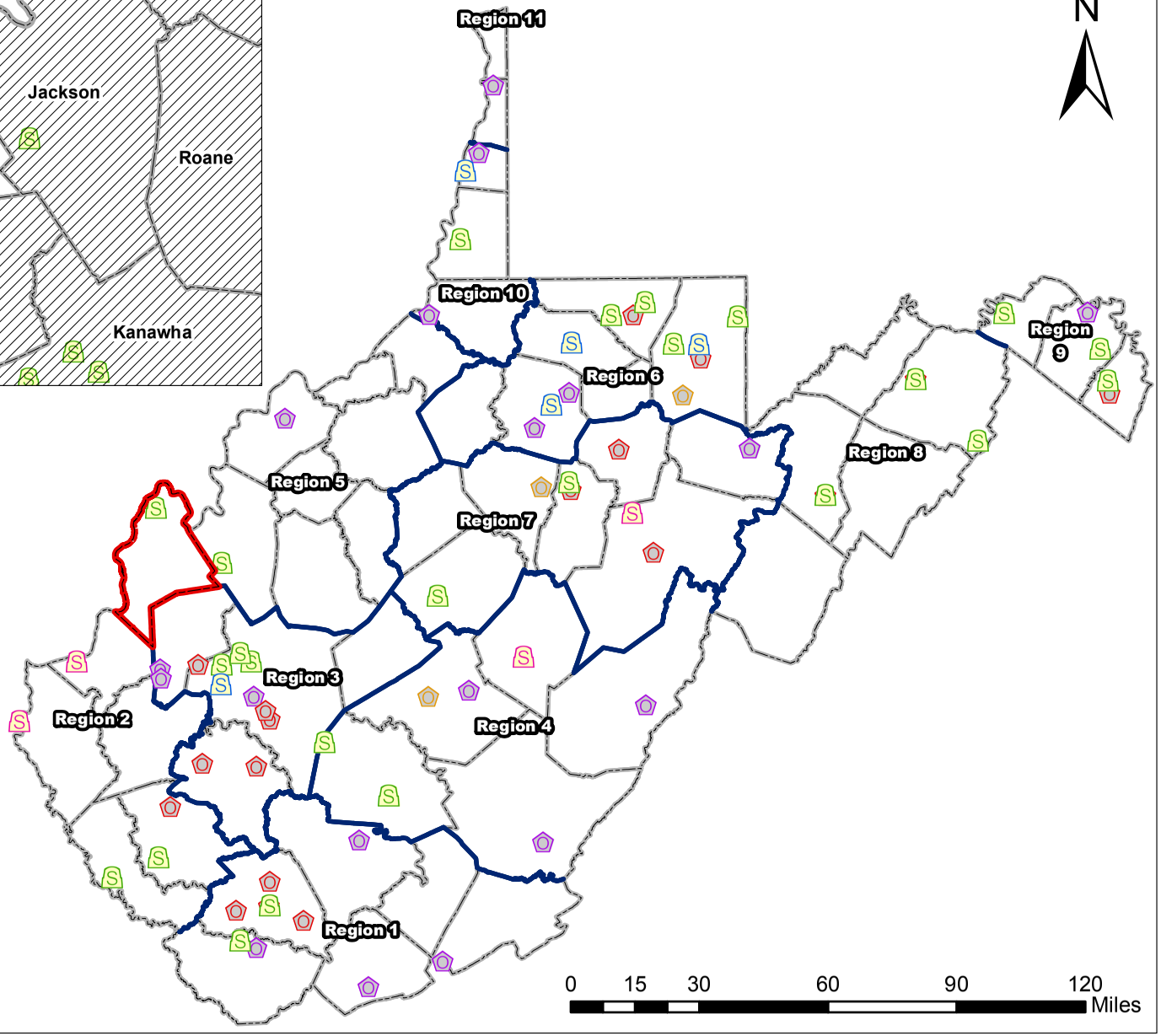
Utility - Solid Waste Facility

Mason County





N

Non Operational Facility

- Post-closure status
- Closure status
- A non LCAP** facility

Operational Facility

- Operational landfill
- Solid waste transfer station
- Operational tire monofill
- Planning Regions Line
- County Boundaries

** Landfill Closure Assistance Program

0 15 30 60 90 120 Miles

Source: West Virginia Solid Waste Management Board 2012

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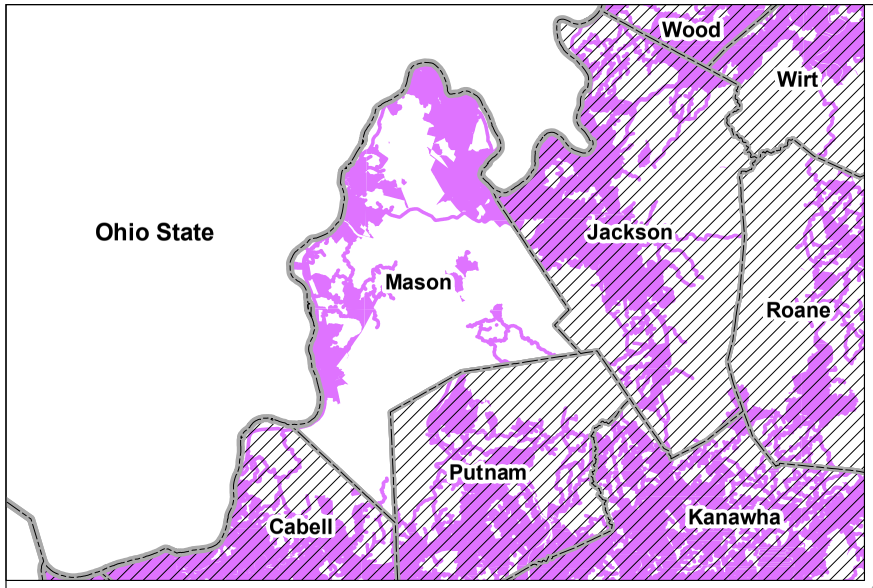
One essential modern convenience, now widely understood as an essential utility in a globalized world, is broadband access. The following 11 maps demonstrate Mason County's broadband infrastructure in relation to the State's. The largest number of providers in Mason County is five, which are most densely concentrated in the northern and eastern parts of the County. Of particular note is the lack of fixed wireless, the presence of greater than 10 mbps of wireless speed across most of the County, mostly contiguous mobile wireless coverage, and limited areas where no broadband coverage is reported.

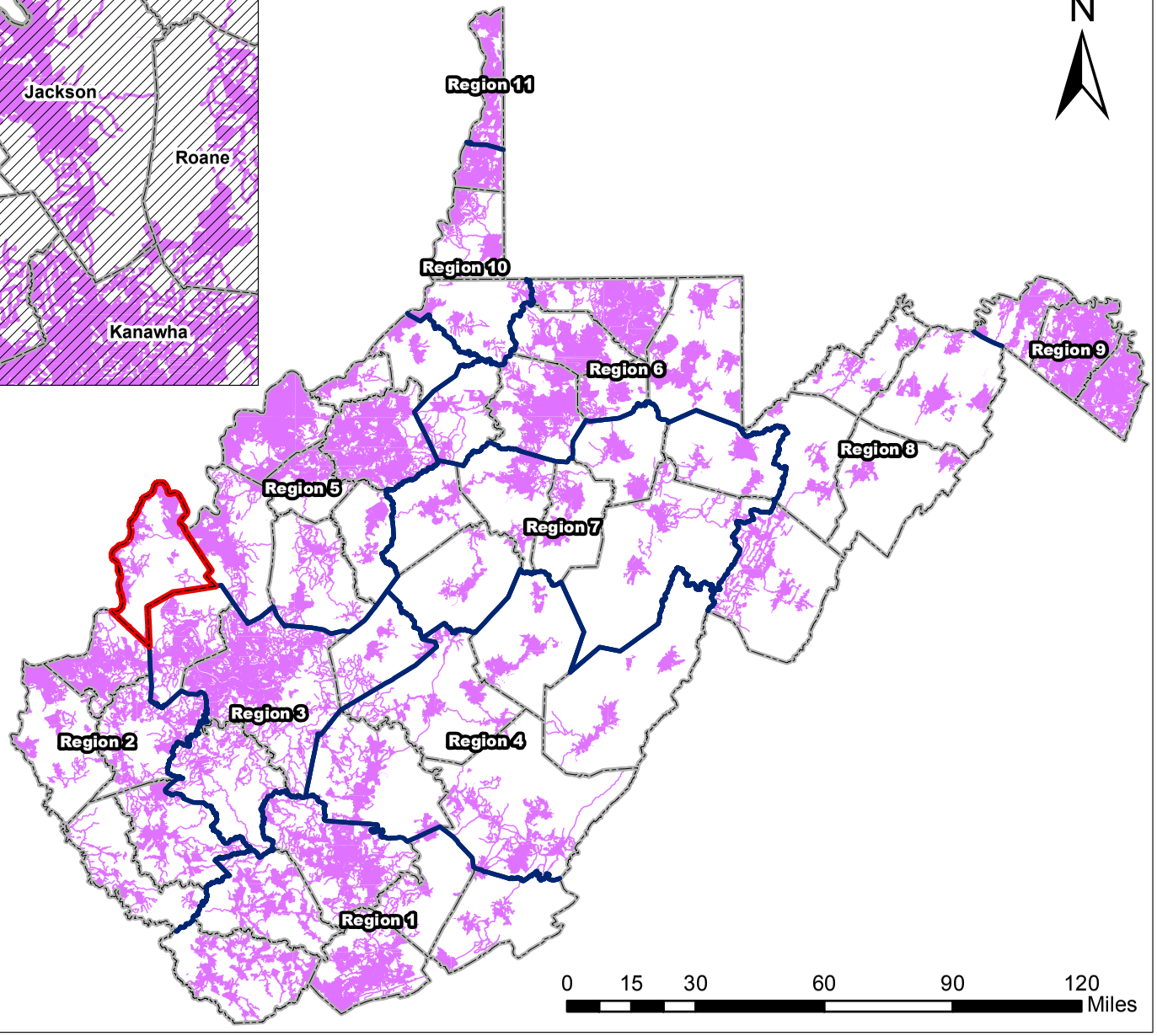
Map 15 shows physical cable infrastructure running from ISPs to other structures. DSL, BPL, and other copper represent the transferal system of broadband (Map 16). Map 17 shows the entire wire system, represented by physical wires, while Maps 18 and 19 show the maximum uploading and downloading speeds 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 show 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 Mason County internet service as exhibited by West Virginia. 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. Note also that the map data is for 2014, the most recent map available. Changes have been made in recent years, thanks to broadband expansion programs encouraged by the State.

Broadband - Internet Cable and FTTP Coverage

Mason County





N

Planning Regions Line
Cable and FTTP
County Boundaries

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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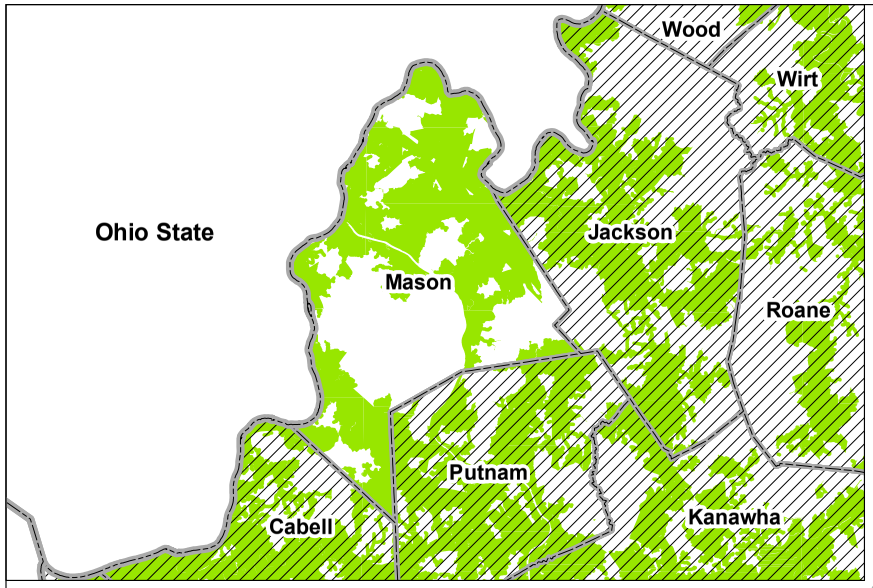
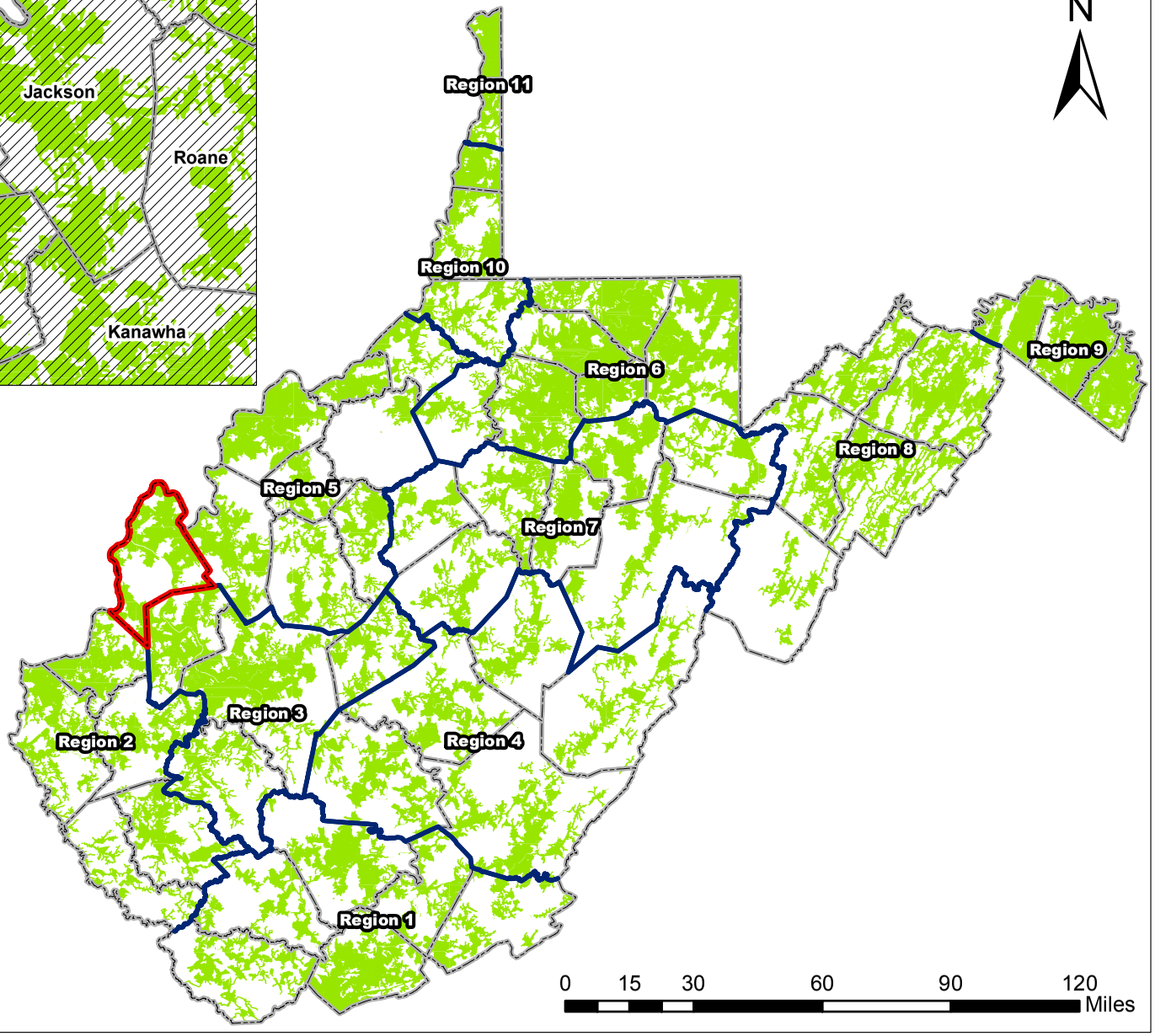
Broadband - Internet DSL, BPL, Other Copper

Mason County





N

Planning Regions Line

DSL, BPL, Other Copper

County Boundaries

0 15 30 60 90 120 Miles

Source: West Virginia Broadband Mapping Program 2014

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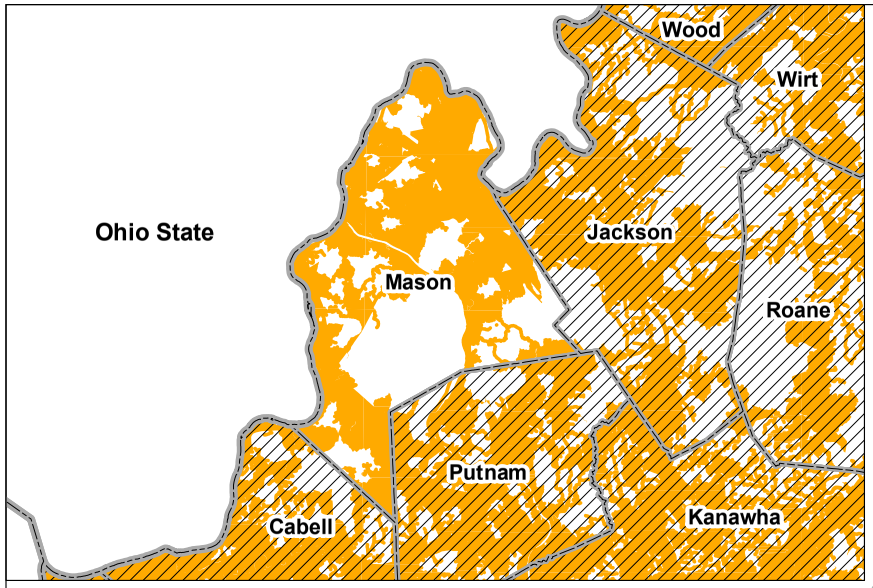
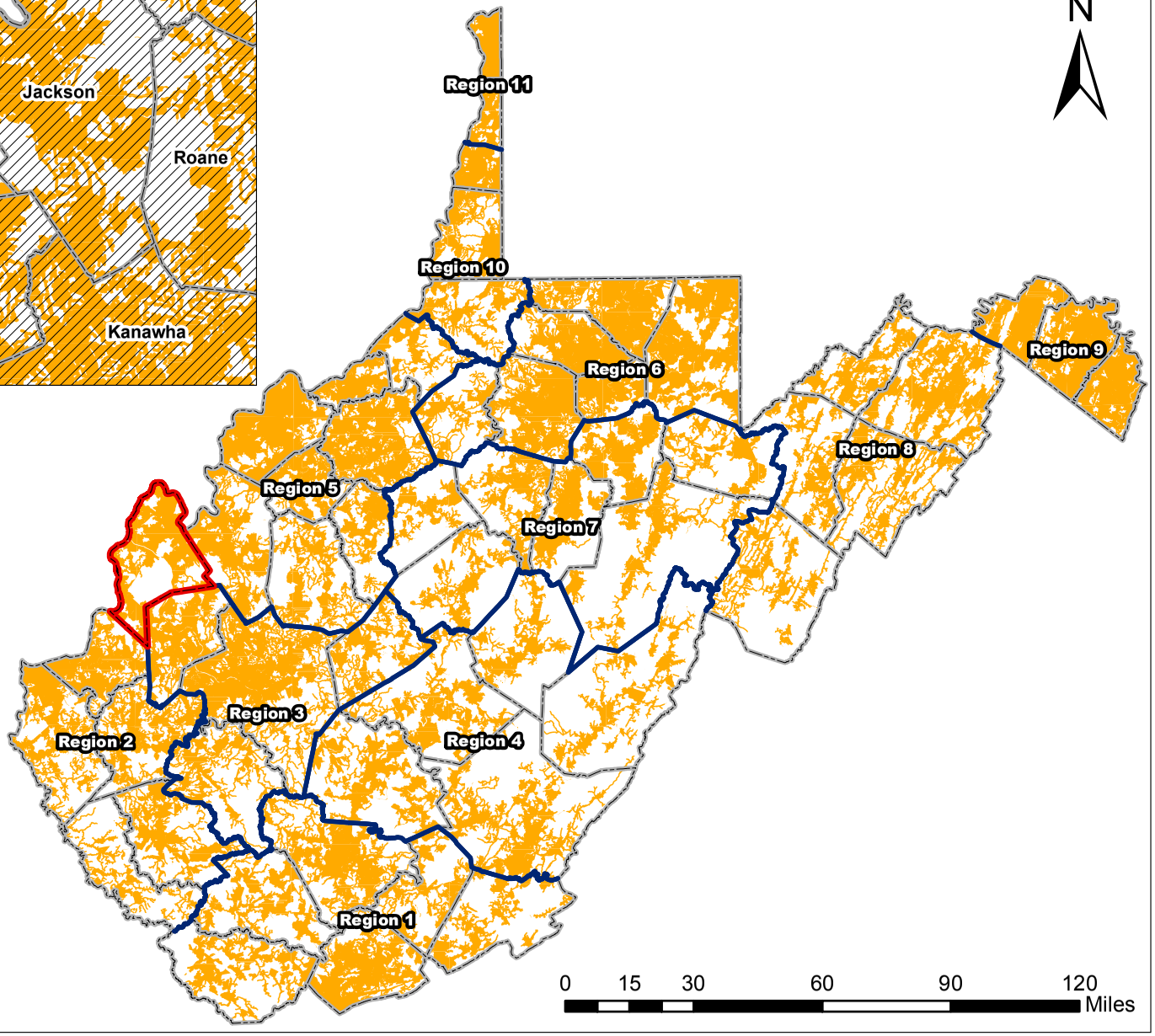
Broadband - Internet Wireline Coverage

Mason County





N

Planning Regions Line
Wireline Coverage
County Boundaries

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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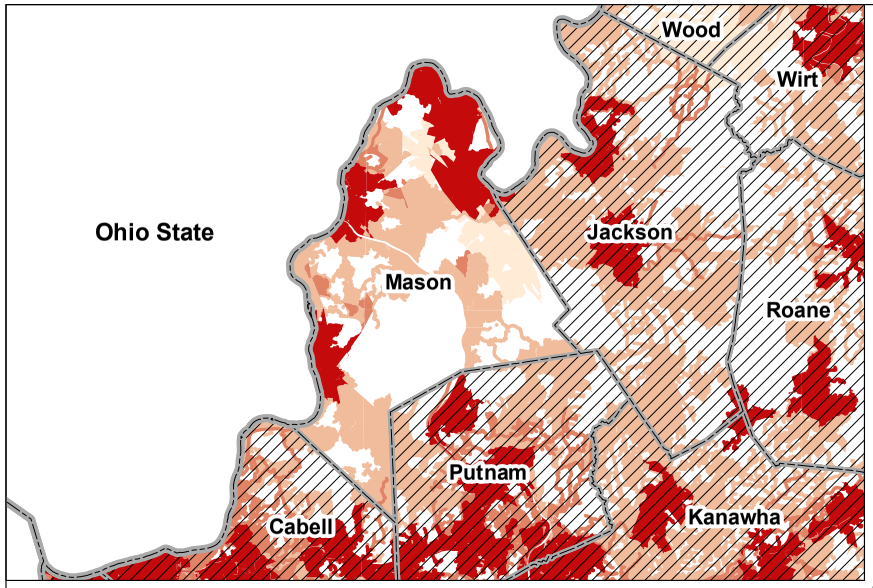
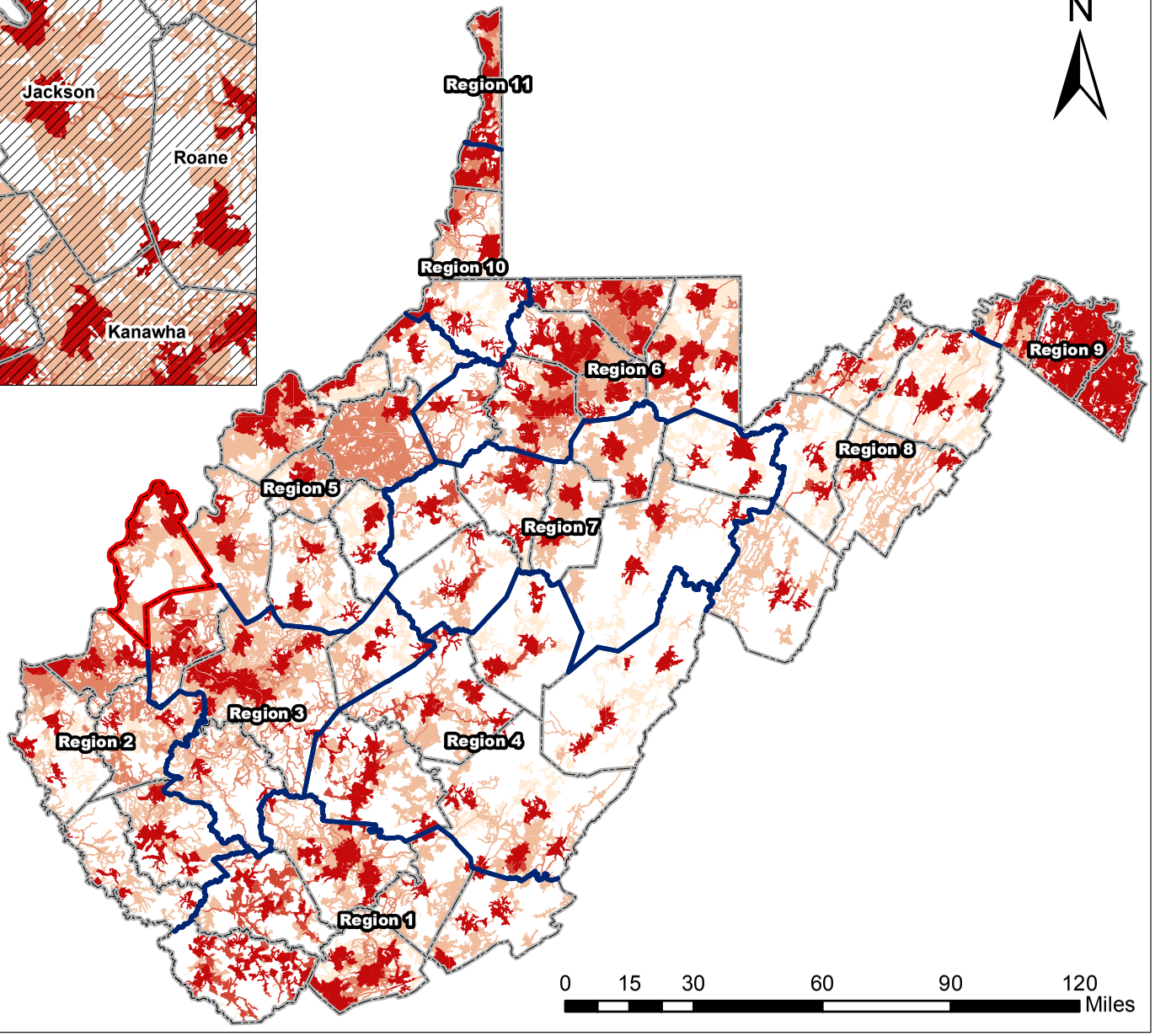
Broadband - Internet MaxUp Speed Wireline

Mason County





N

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

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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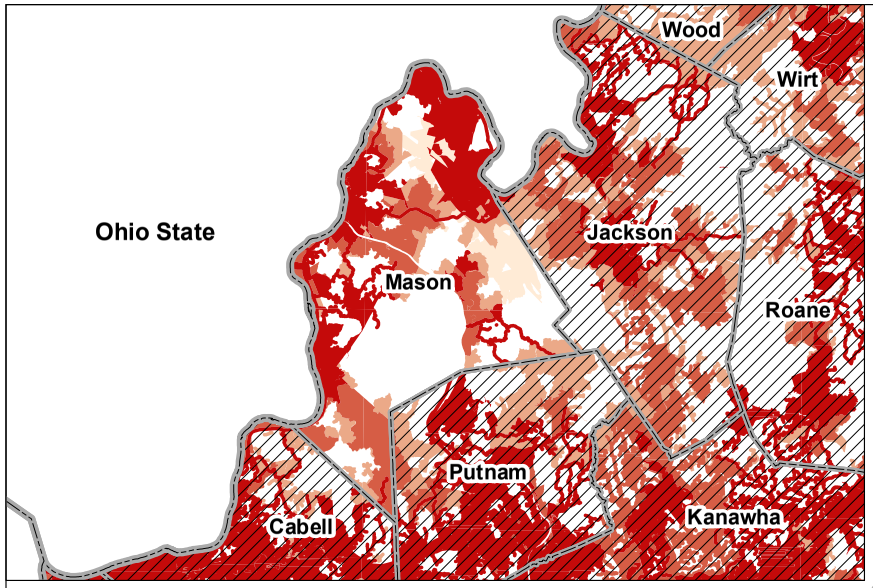
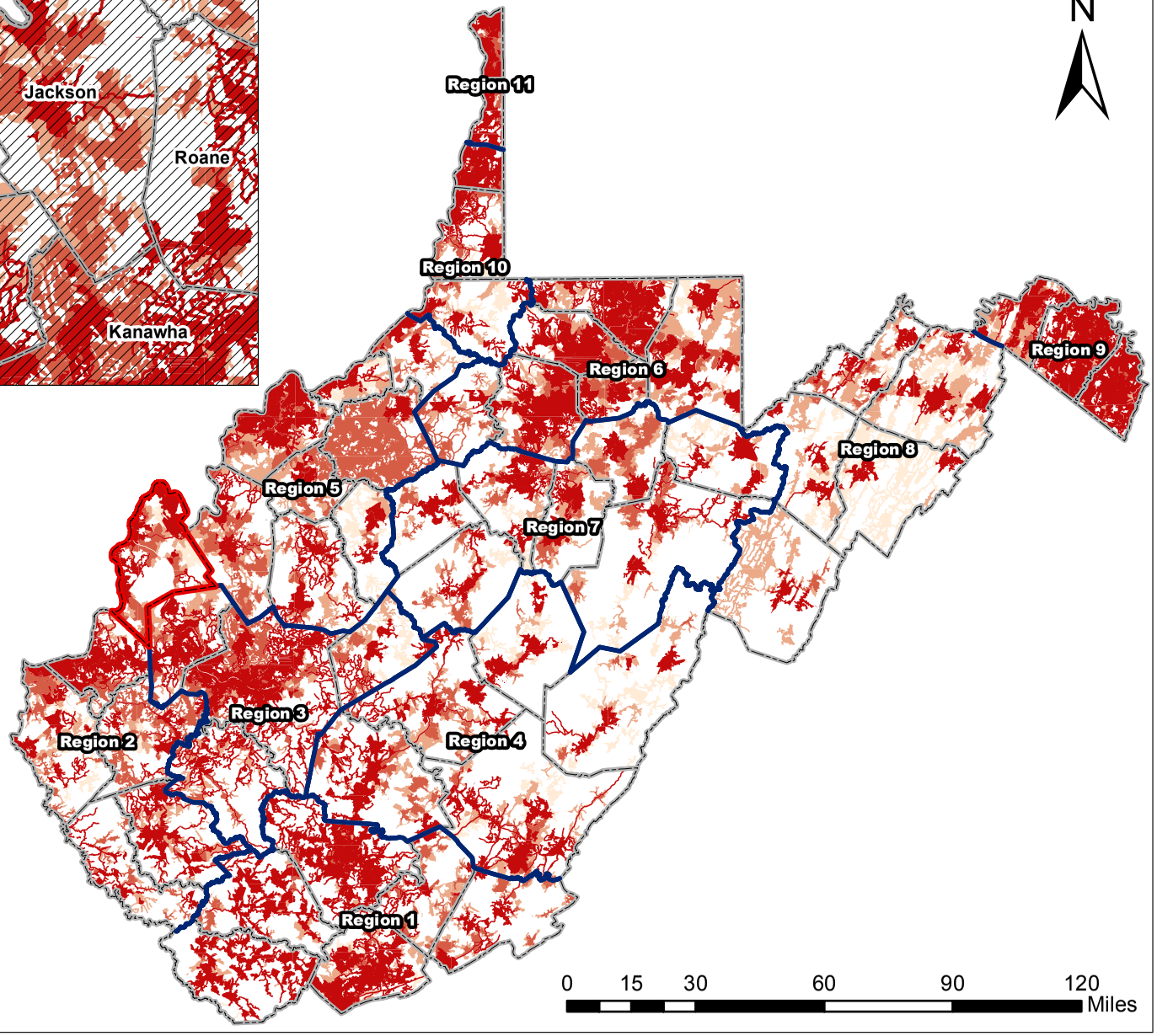
Broadband - Internet MaxDown Speed Wireline

Mason County





Source: West Virginia Broadband Mapping Program 2014

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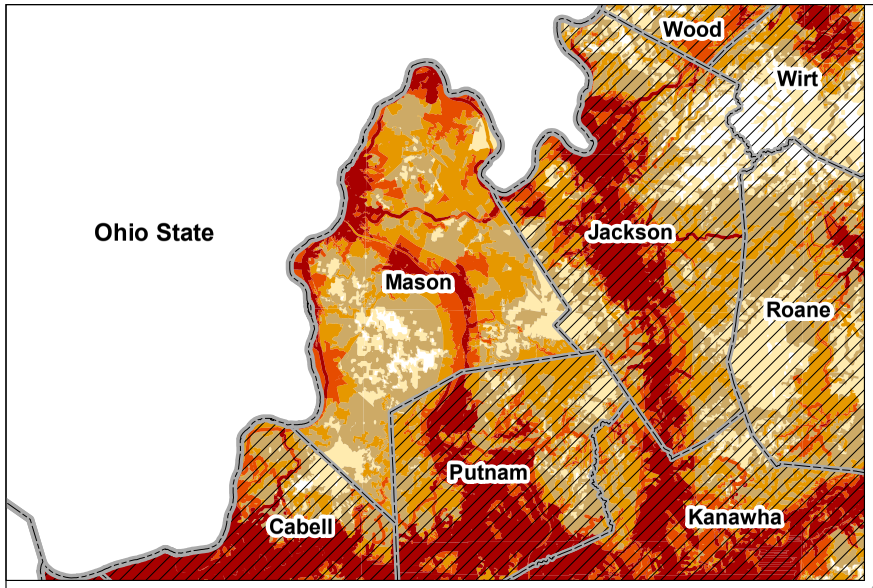
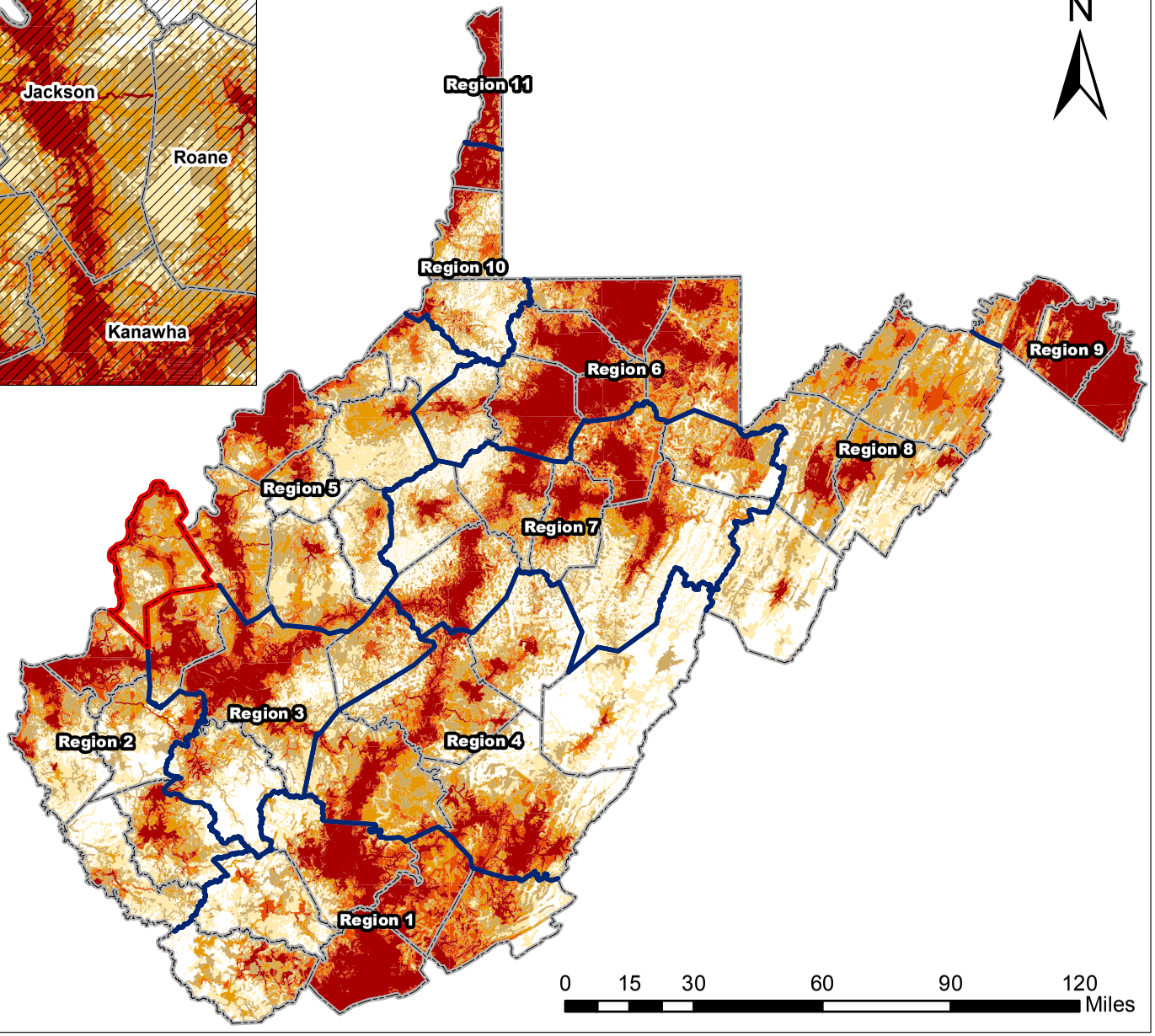
Broadband - Internet Total Number of Providers

Mason County





N

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

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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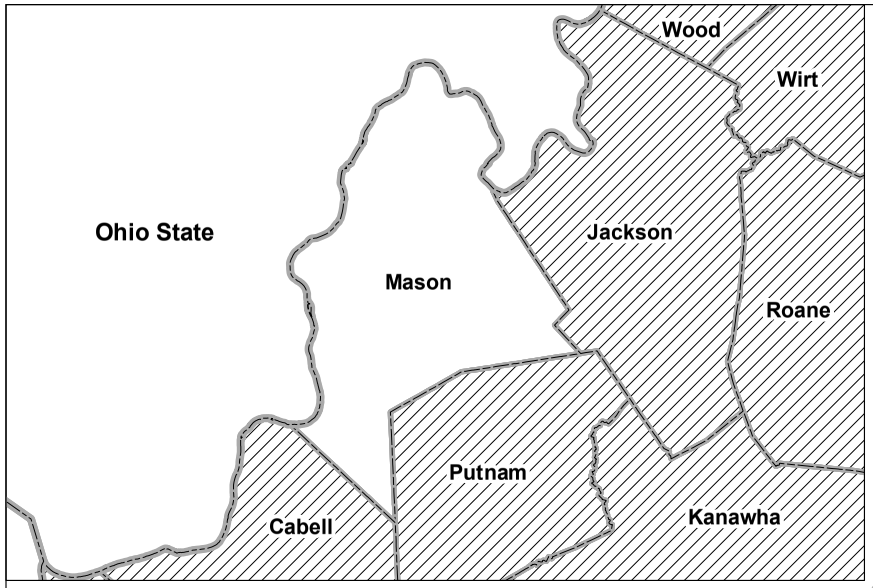
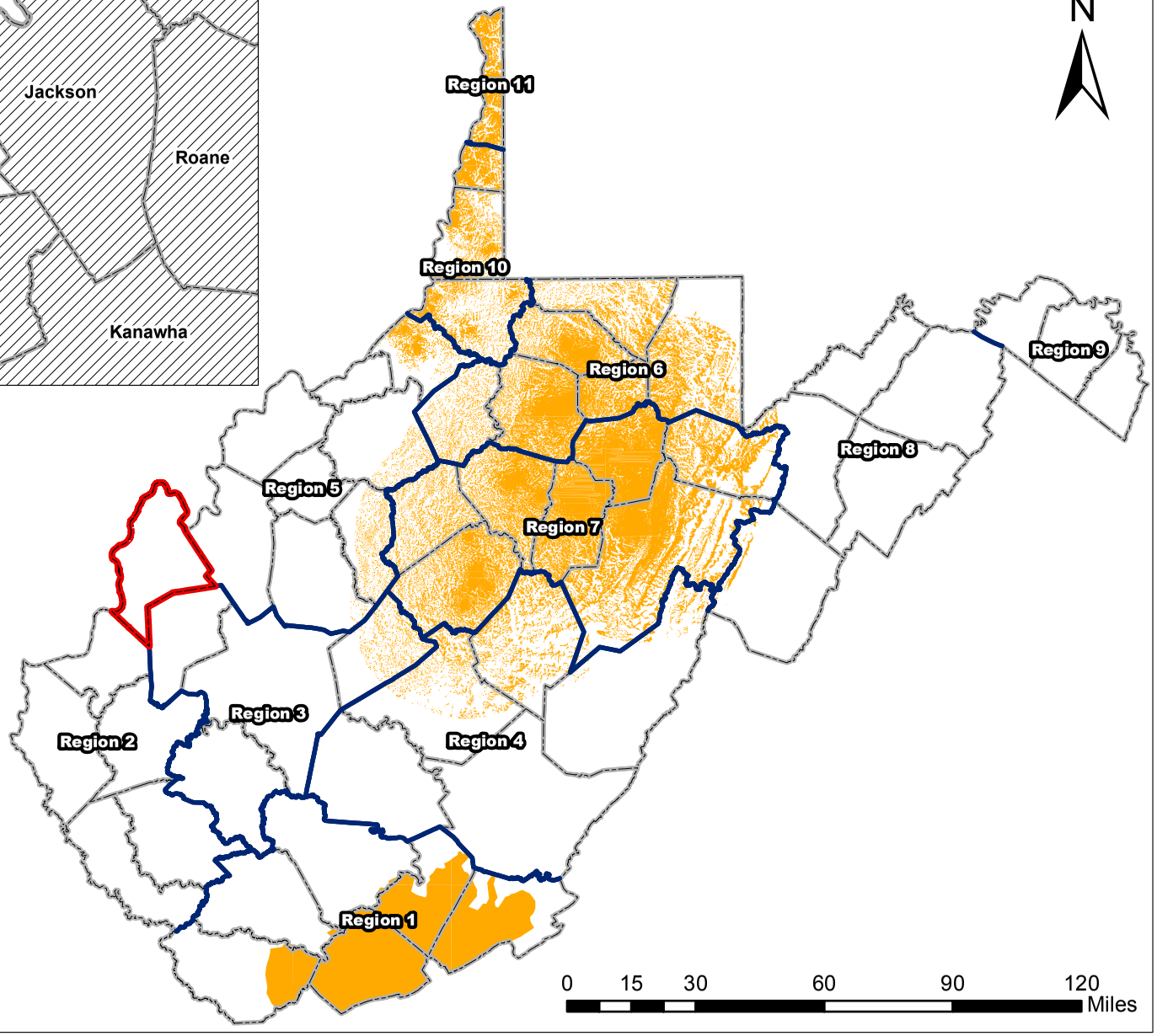
Broadband - Internet Fixed Wireless Coverage

Mason County





Source: West Virginia Broadband Mapping Program 2014

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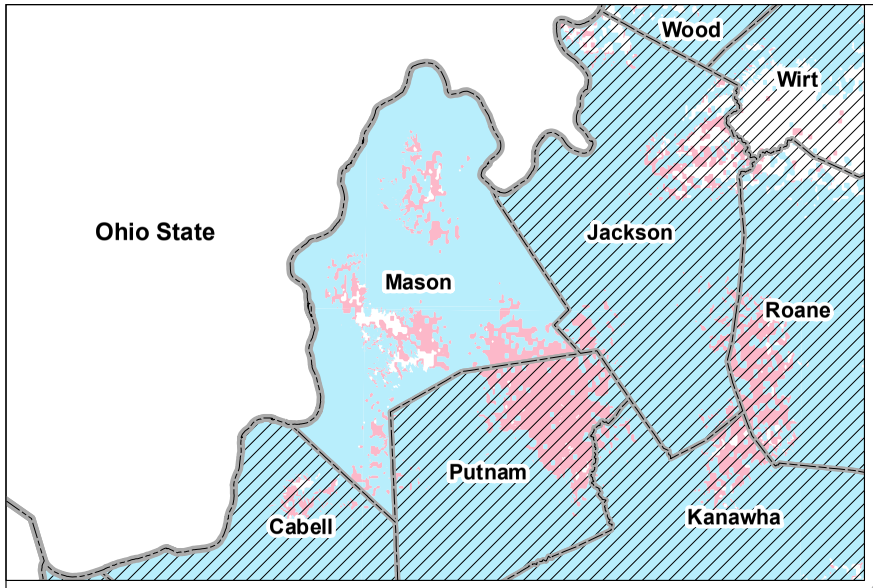
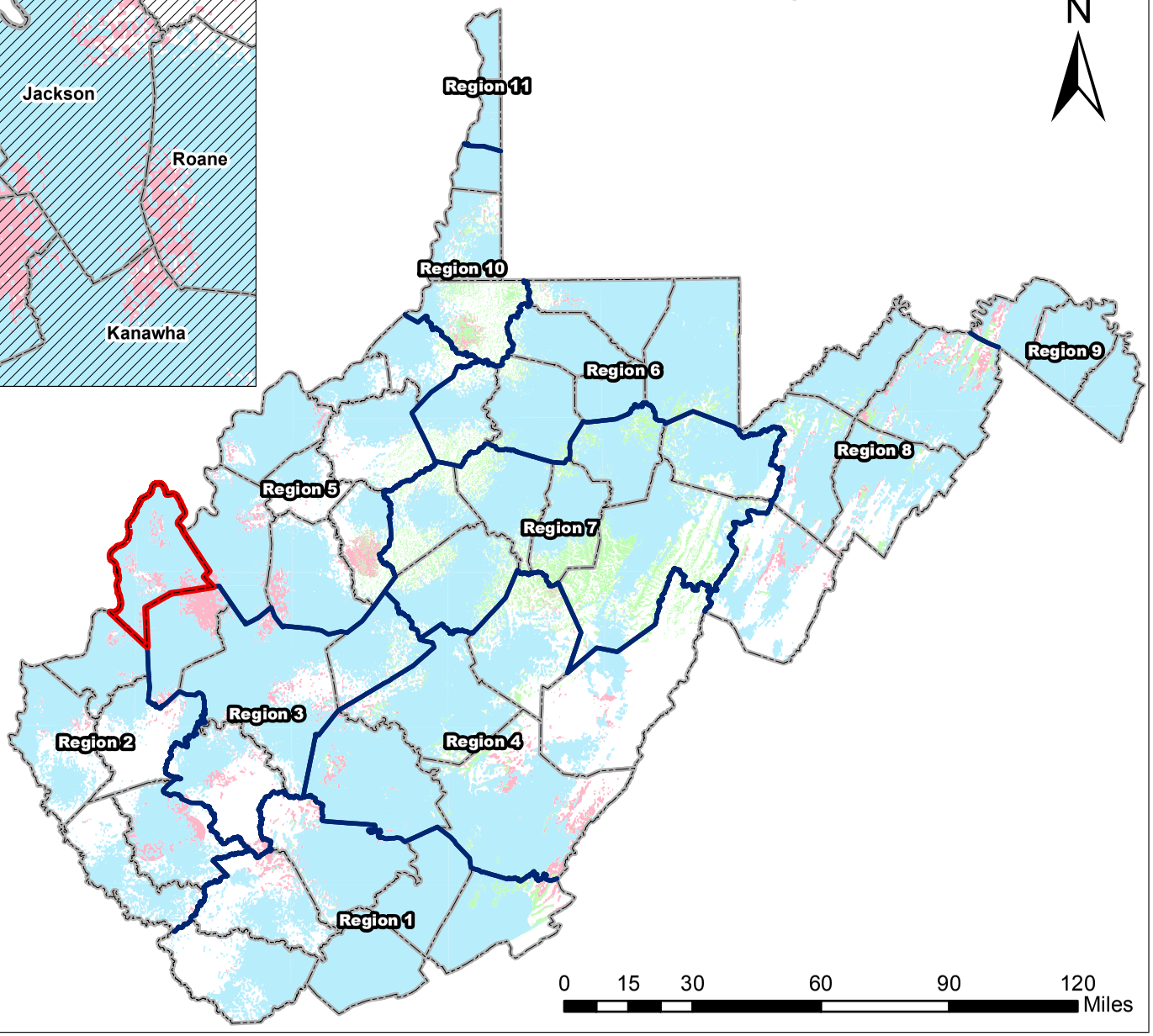
Broadband - Internet MaxDown Speed Wireless

Mason County





N

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

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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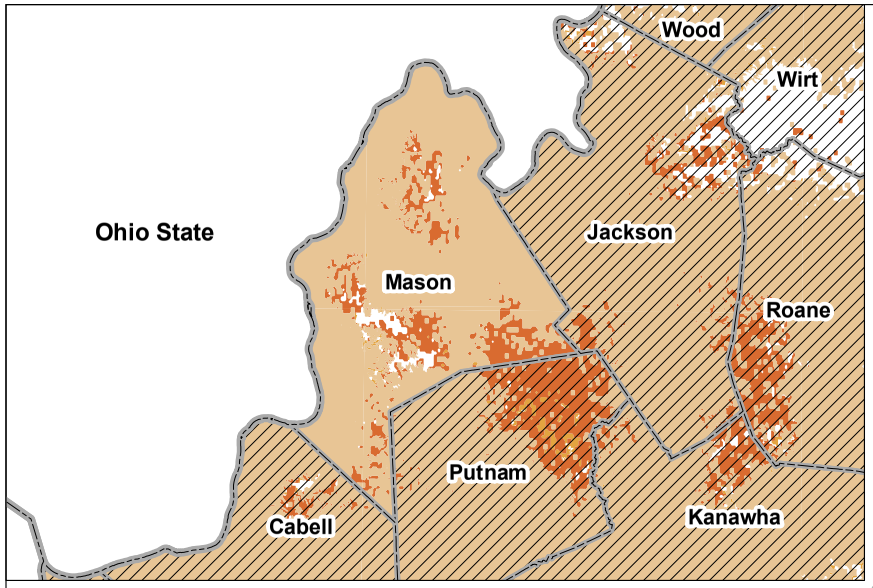
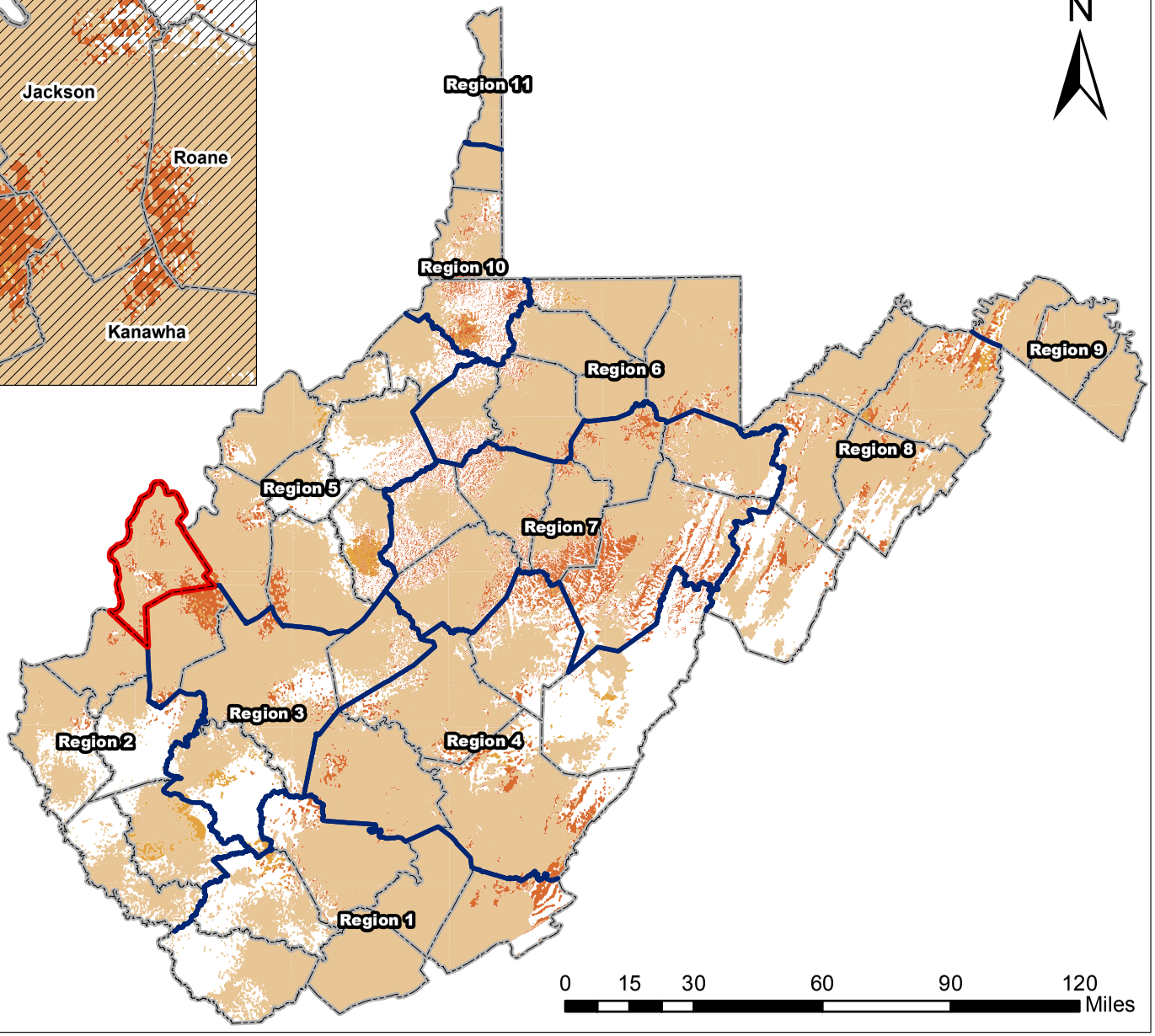
Broadband - Internet MaxUp Speed Wireless

Mason County





N

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

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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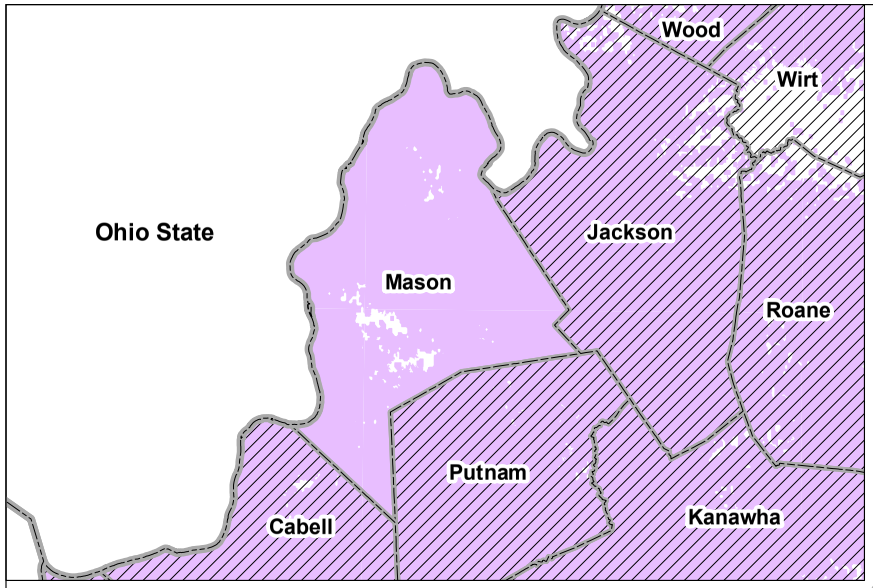
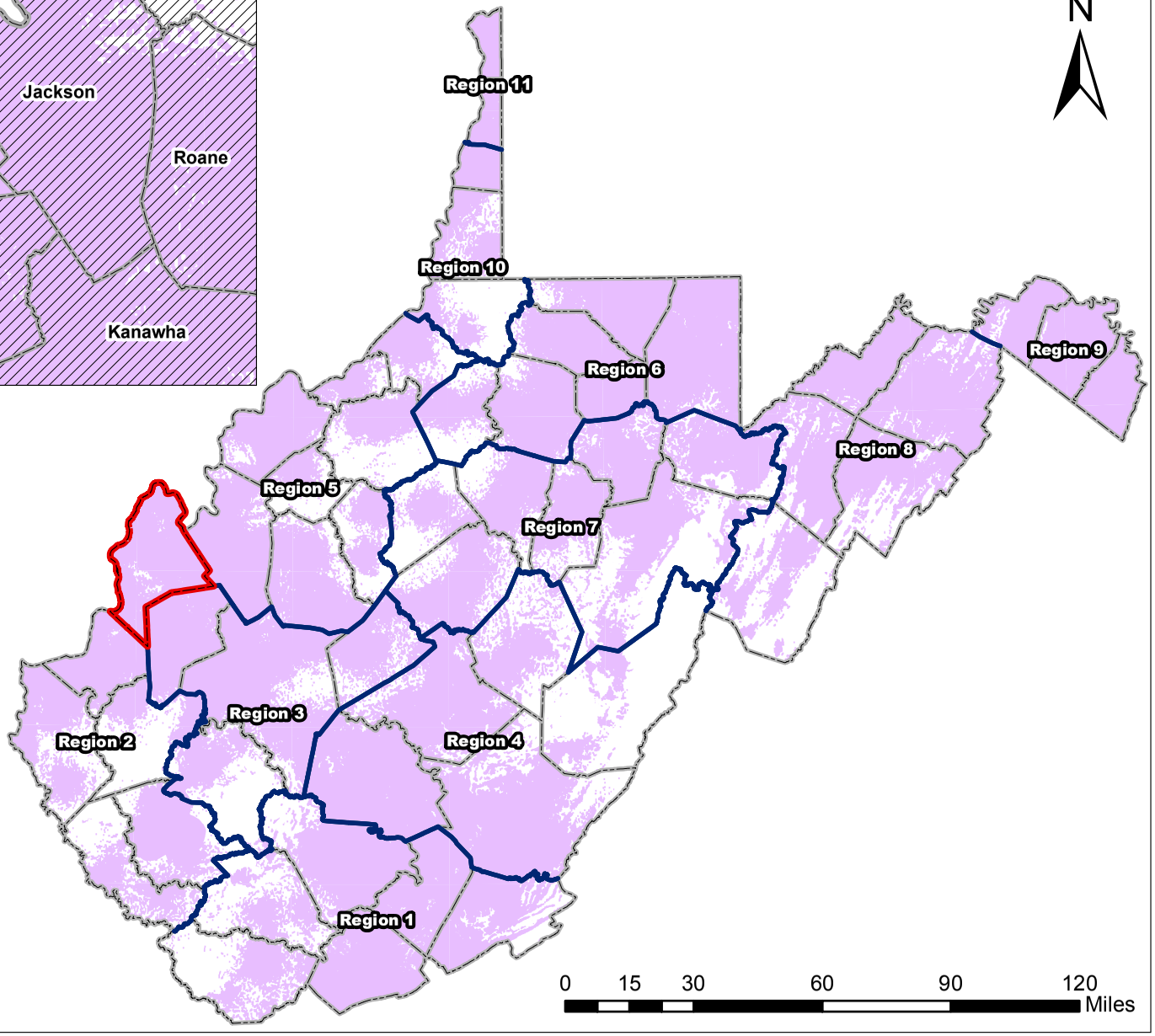
Broadband - Internet Mobile Wireless Coverage

Mason County





Planning Regions Line
Mobile Wireless
County Boundaries

Source: West Virginia Broadband Mapping Program 2014

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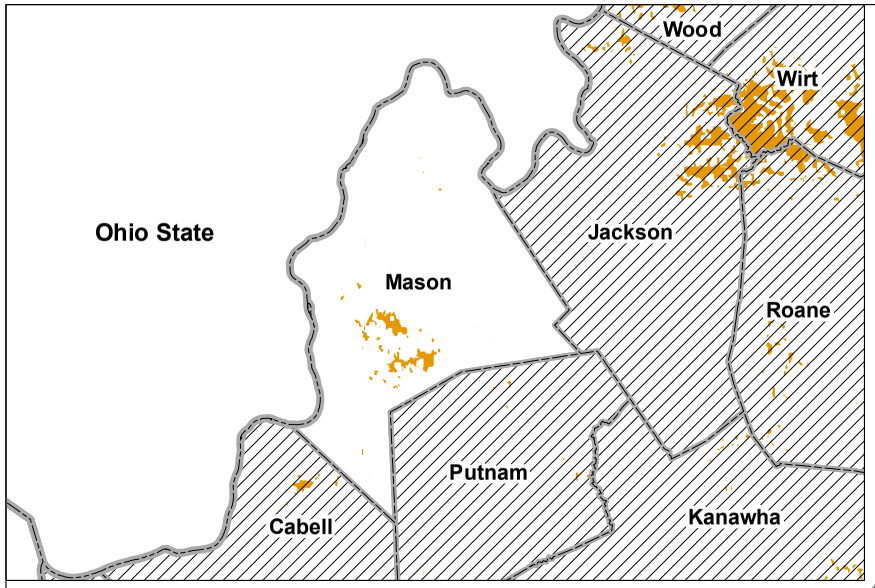
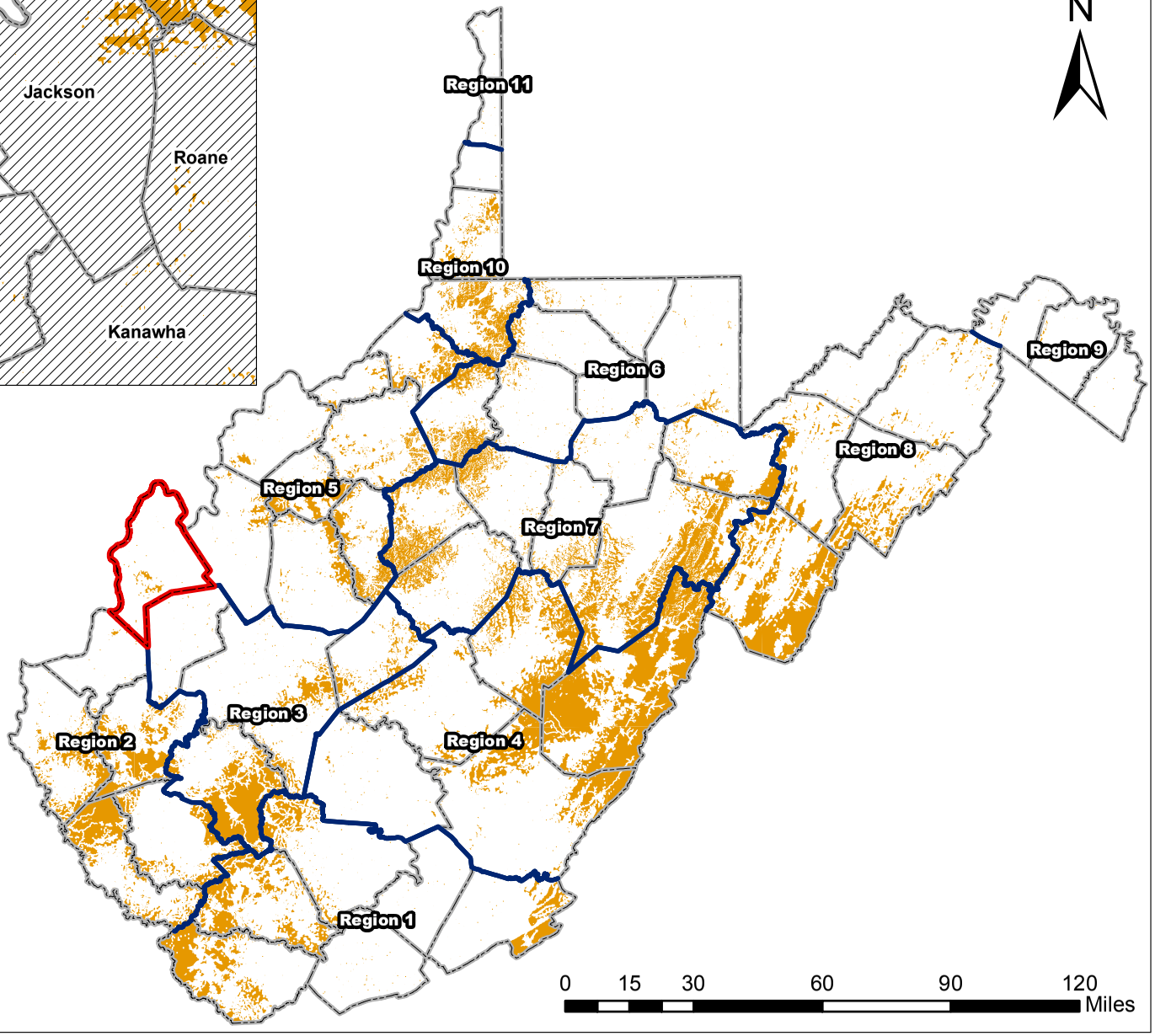
Broadband - No Broadband Coverage

Mason County





N

Planning Regions Line
No Coverage Reported
County Boundaries

0 15 30 60 90 120
Miles

Source: West Virginia Broadband Mapping Program 2014

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Transportation

Highways

Mason County has no interstate presence, one U.S. route—Route 35, and State Routes 2, 17, 62, and 87 (Map 26).

Rail

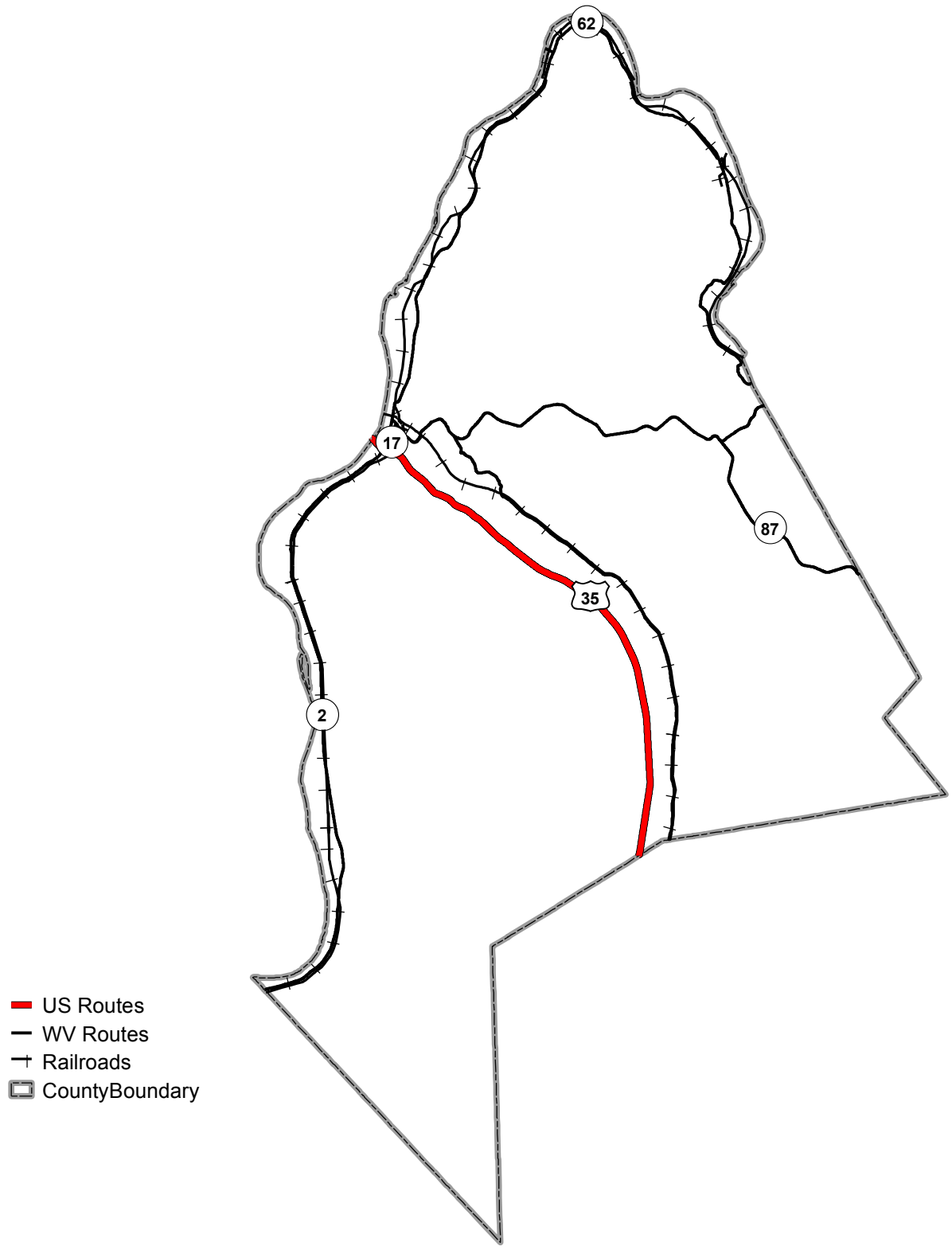
Mason County has a rail system present in the western and central portions of the County.

Air

Mason County has no airports.

Transportation

Mason County



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

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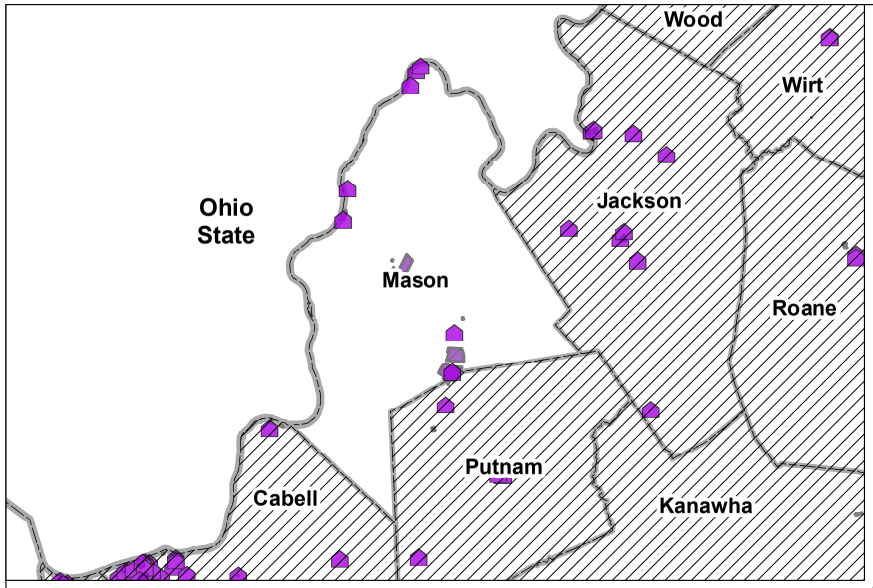
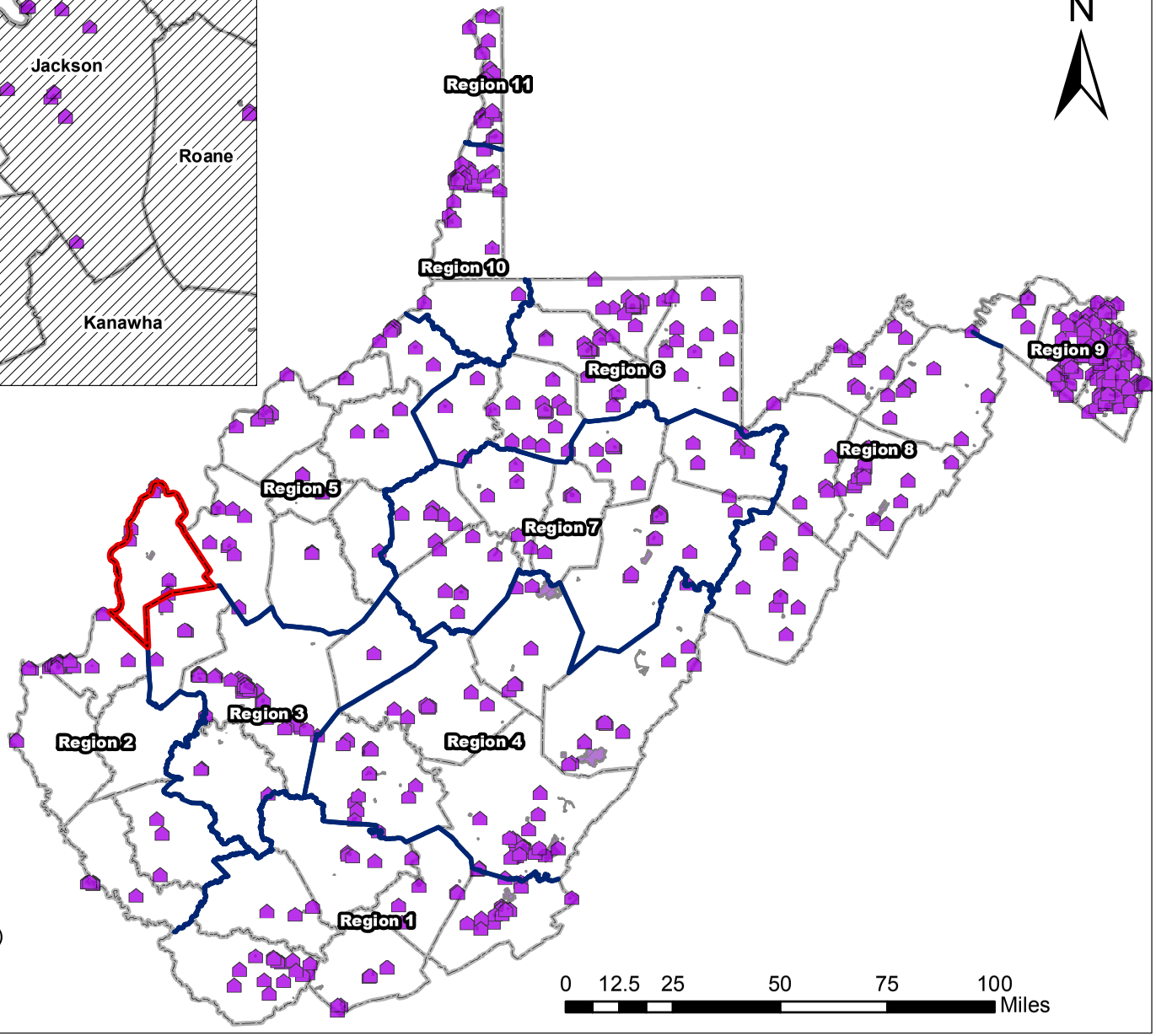
Current Post-Mine Economic Development Sites
Mason County has no major developments on its post-mine sites.

Historic Preservation
Historic preservation will be essential in a county steeped in coal mining history. Mason County has 10 listings in the National Register of Historic Places. There are a number of historic buildings in the County mostly built in the early 1900s that exemplify certain building styles popular at the time.(Map 27). Other historic areas have been designated by West Virginia. Map 28 gives a spatial position to each designated State historic piece of architecture.

National Register of Historic Place

Mason County





N

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

0 12.5 25 50 75 100
Miles

Source: West Virginia State Historic Preservation Office 2014

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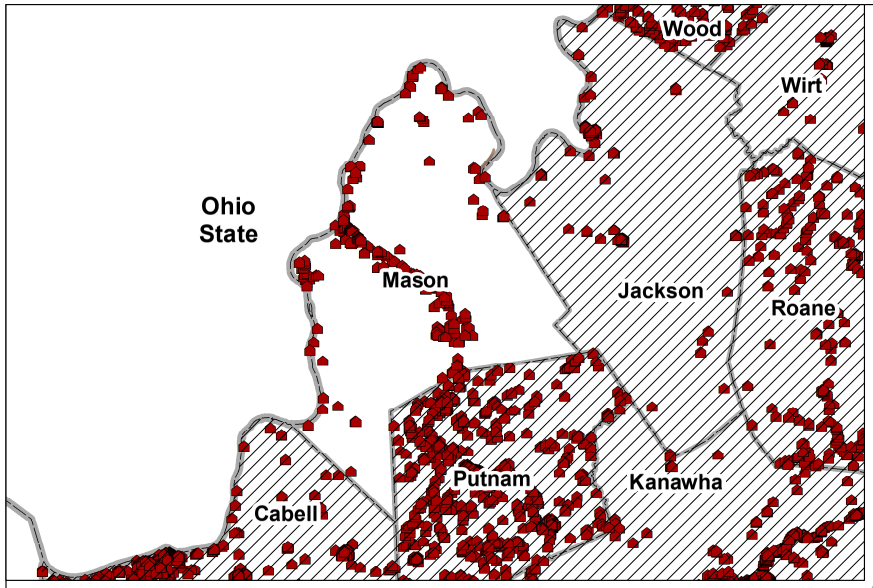
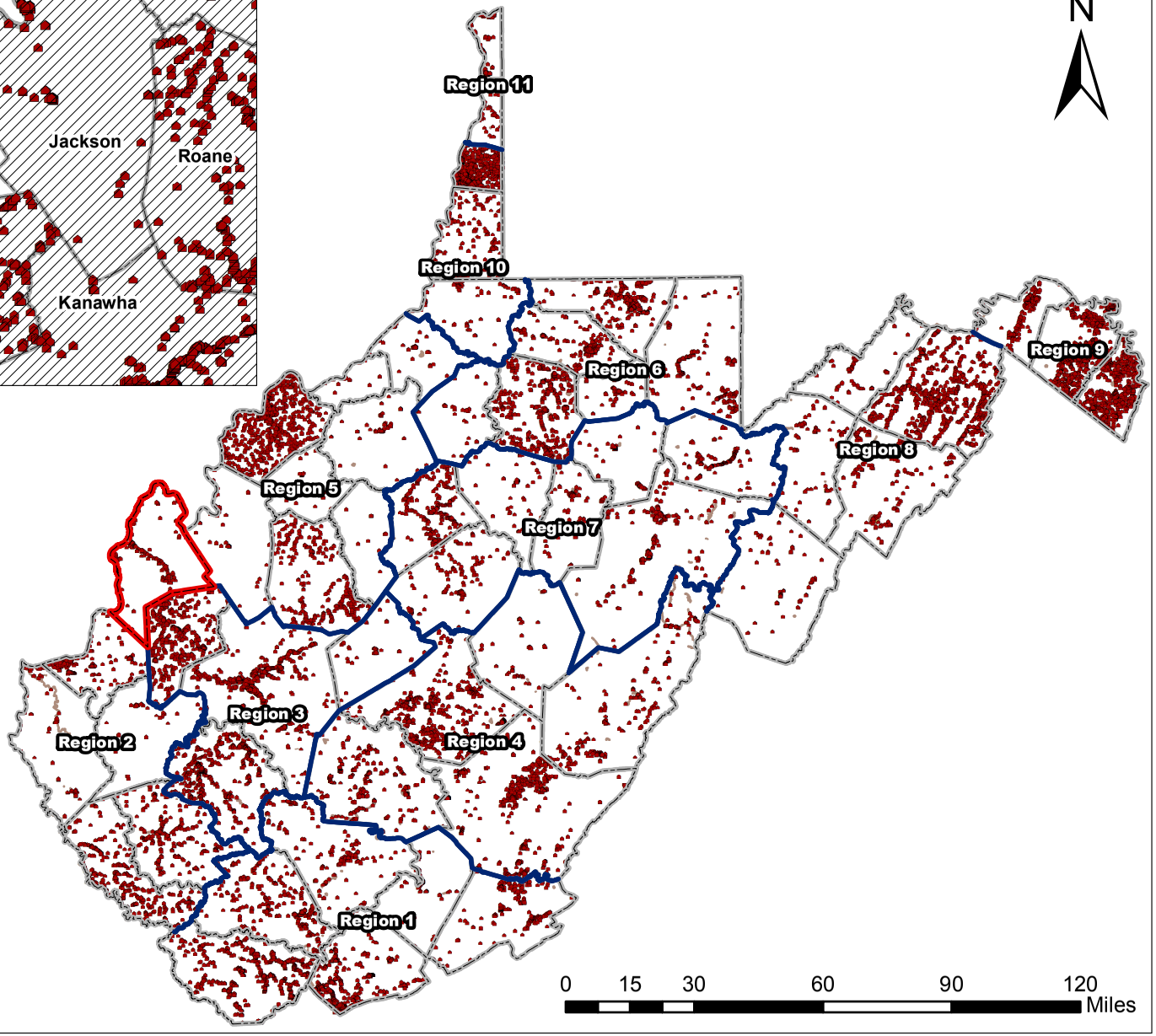
State Historic Architecture

Mason County





N

State Historic Architecture

Planning Regions Line

State Historic Architecture (Area)

County Boundaries

0 15 30 60 90 120

Miles

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 resources in a county. This serves to inform potential investors about what possibilities the land provides for production of resources and energy. Mason 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. Mason's wetland inventory is clustered and sporadic throughout the County (Map 29).

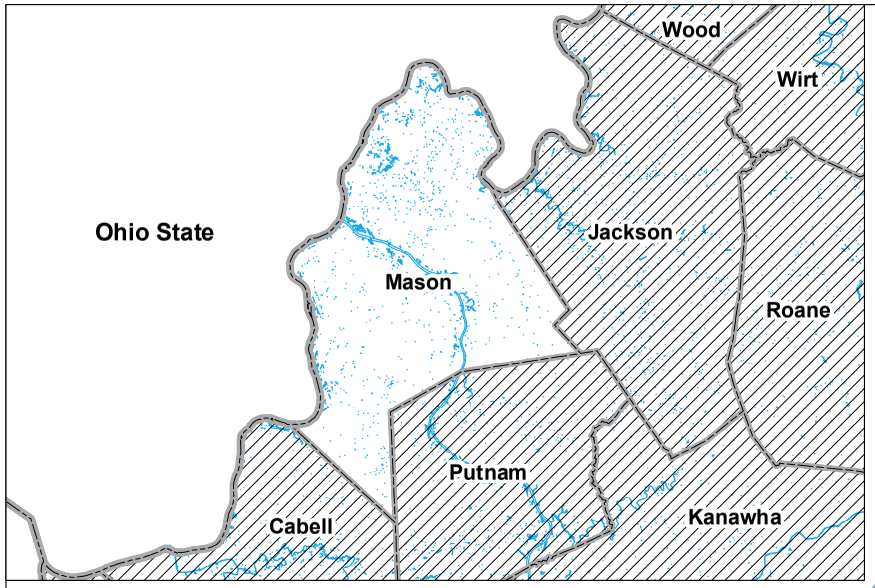
The State also possesses a respectable amount of park and forest land. Most of this land is located in the eastern portion of the State, the area that contains the main part of the Appalachian Mountain range. Mason County contains a few wildlife management areas (Map 30).

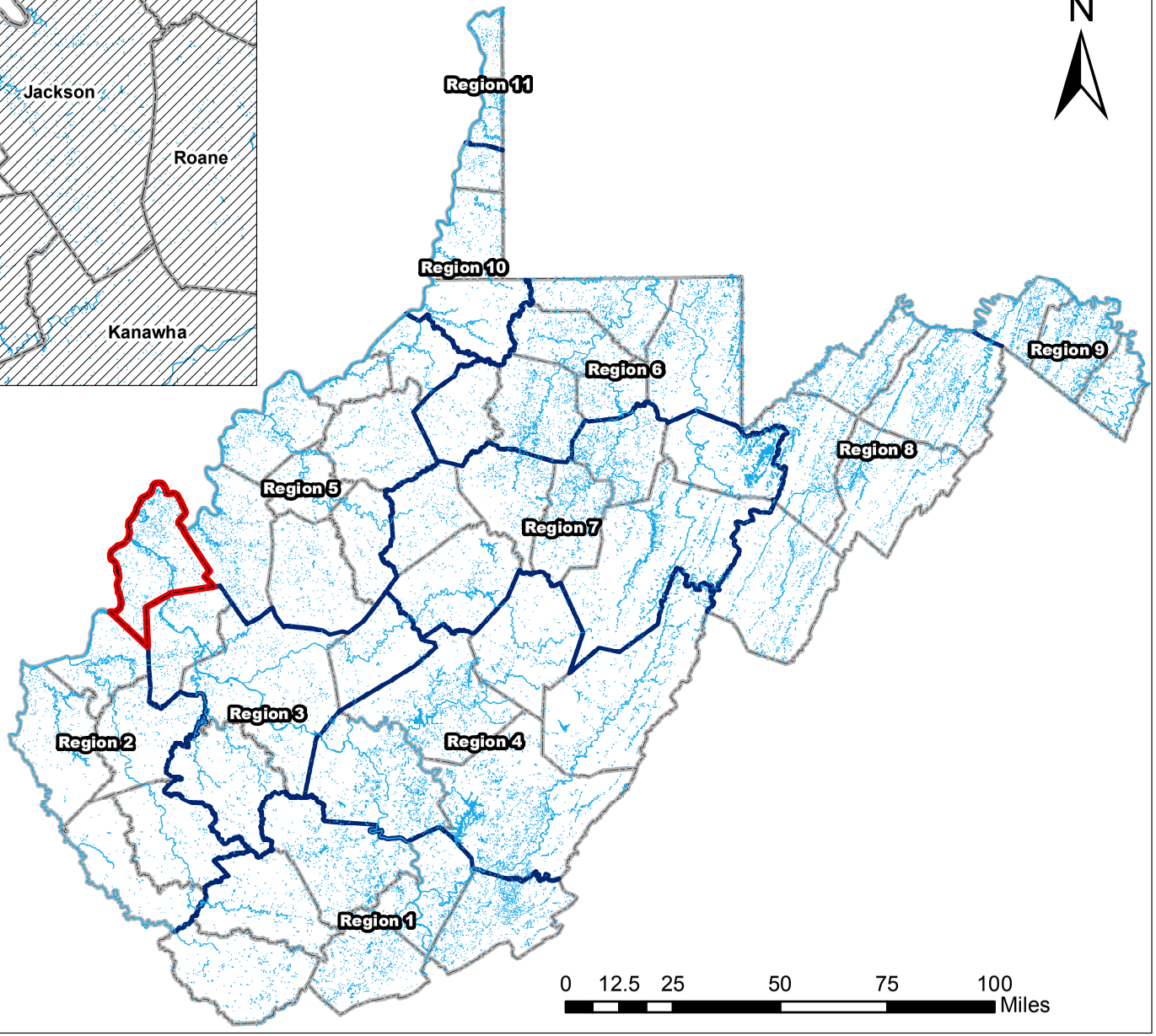
Air quality is a necessary environmental health benchmark that can determine the health and vitality of an area's residents. The air pollution non-attainment areas are "areas of the country where air pollution levels persistently exceed the national ambient air quality standards."[7] There are six full 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; Mason County is not among them (Map 31).

[7] "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

Mason County





N

Planning Regions Line

National Wetlands Inventory

County Boundaries

0 12.5 25 50 75 100 Miles

Source: United States Fish and Wildlife Service 1996

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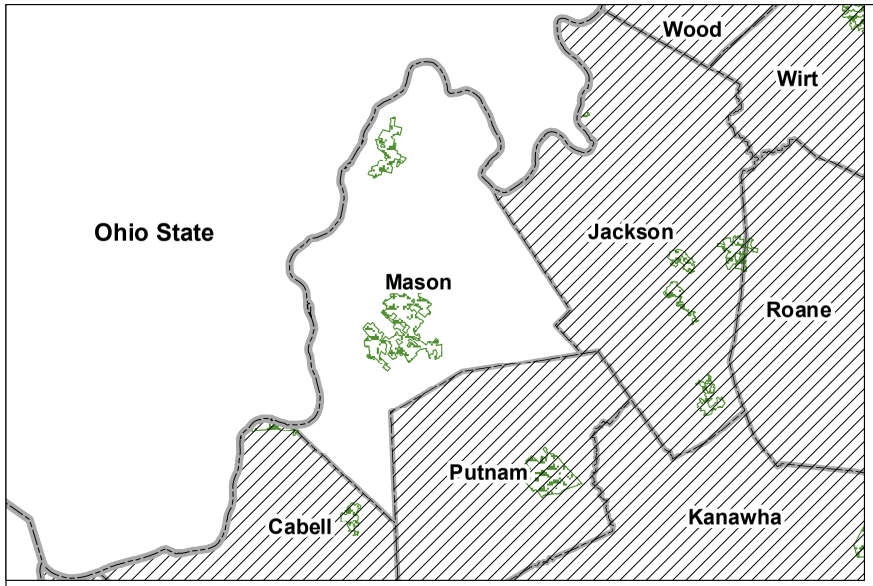
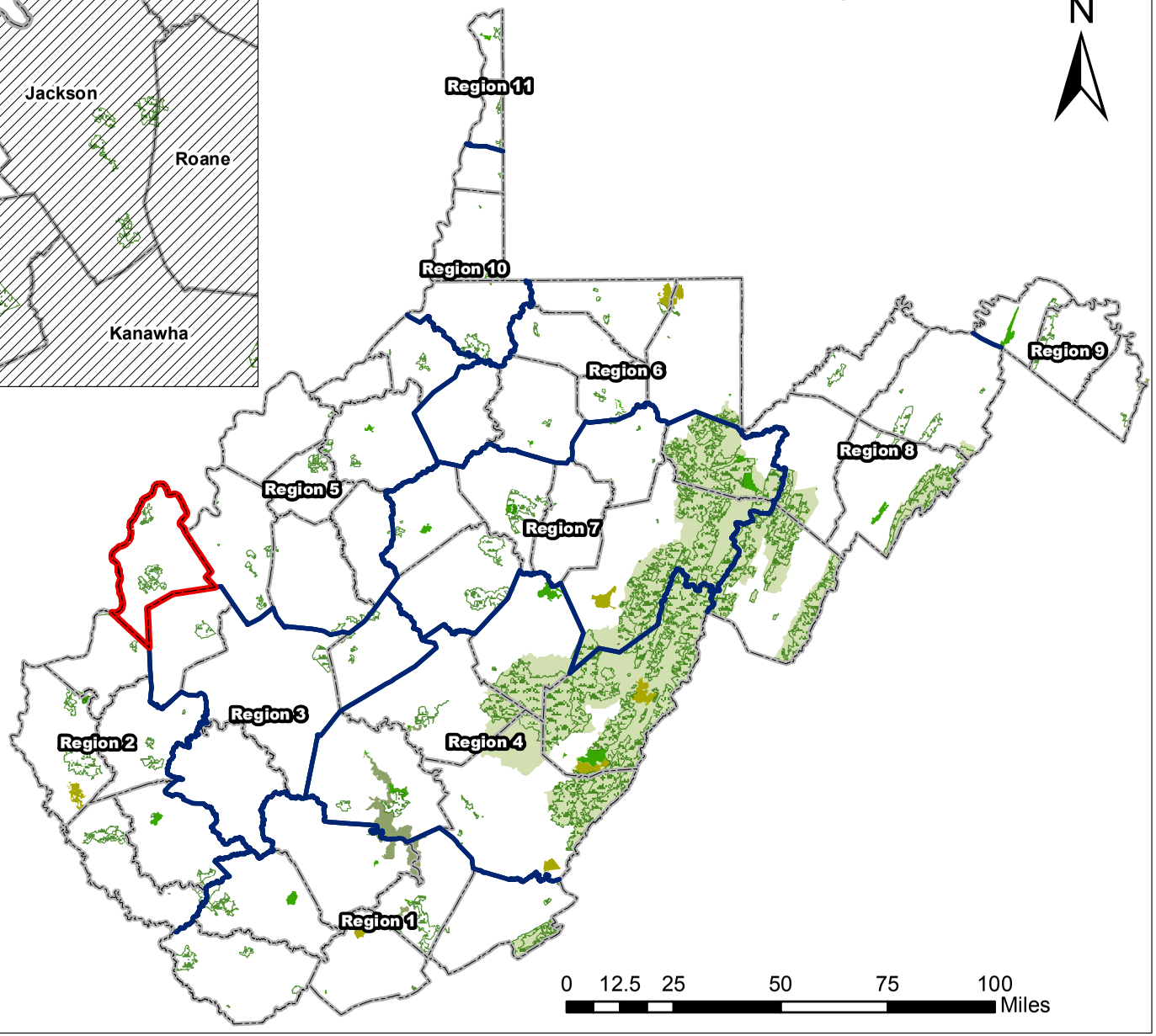
Public Land - Parks and Forests

Mason County





N

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

0 12.5 25 50 75 100
Miles

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 2005; National Park; United States National Park Service 2003

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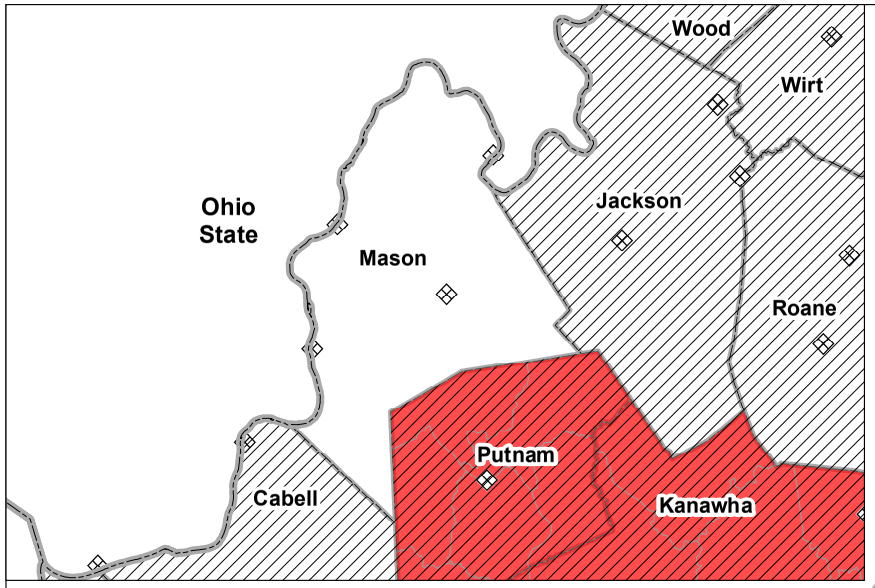
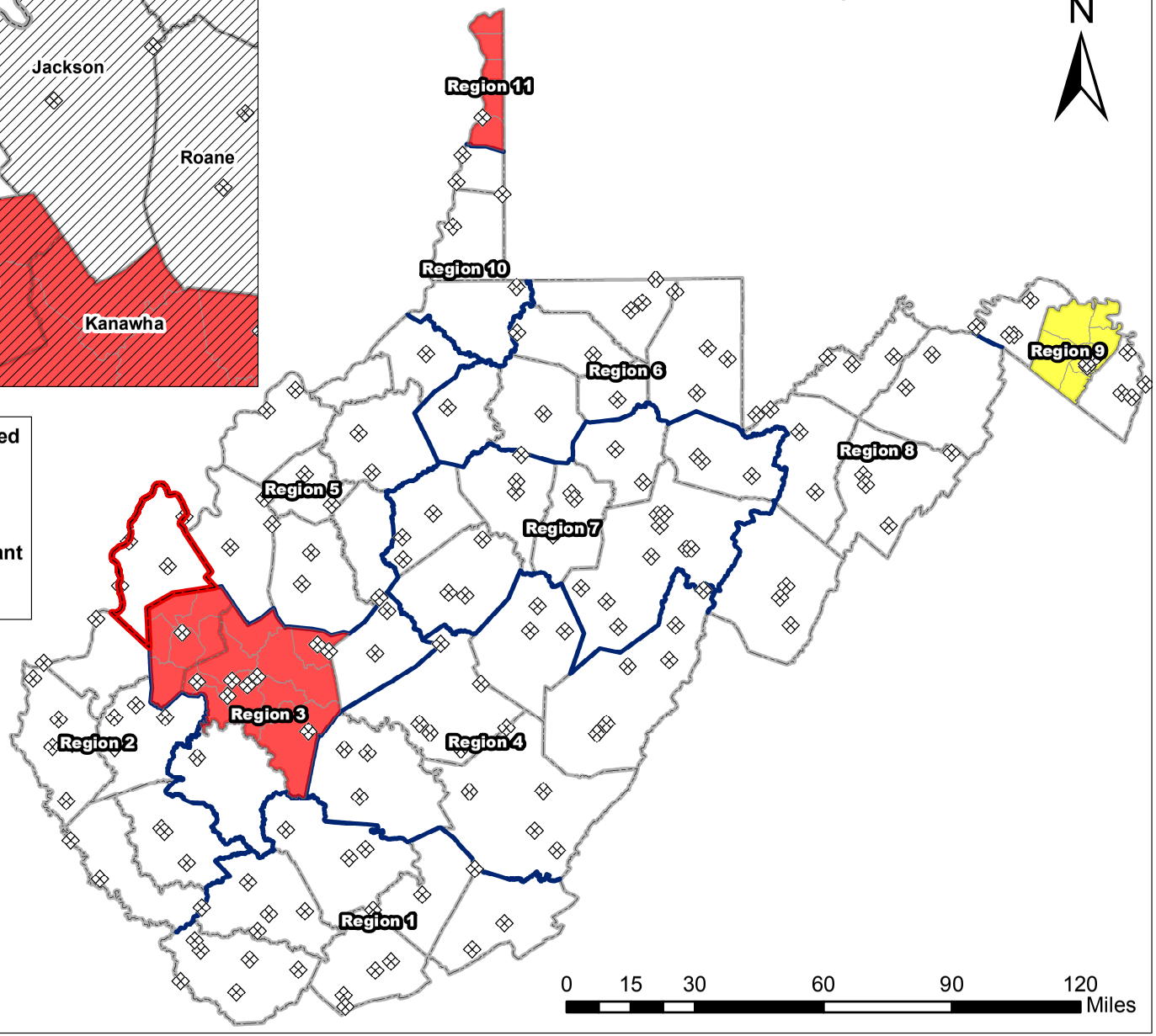
Environment - Monitoring

Mason 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.
+ September , 2013, U.S.EPA re-designated Wood, Marshall and Ohio Counties and the Grant Tax District in Pleasants County to attainment for the 1997 NAAQS.

N

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

0 15 30 60 90 120 Miles

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, 2013

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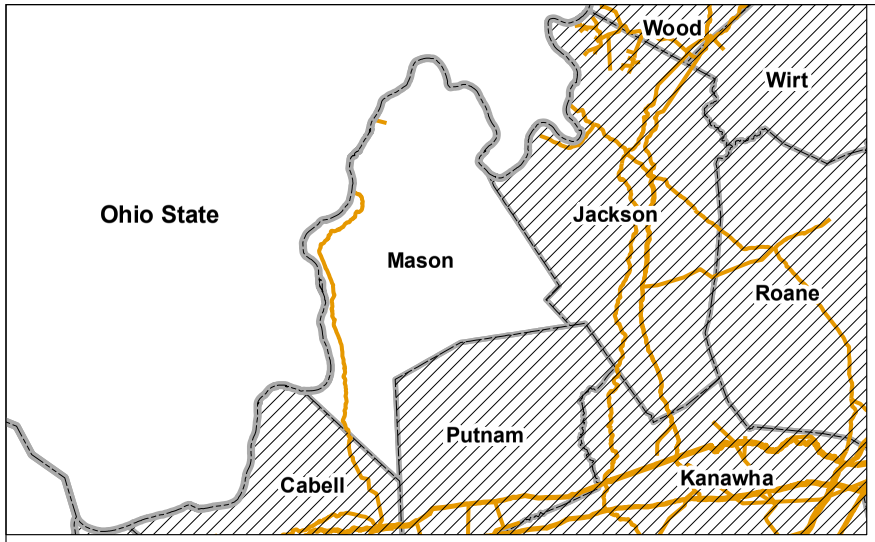
West Virginia's past and most likely its future are defined by energy. Besides coal, other options for energy have been investigated in the State. Gas and oil are of course the main energy staples in the nation, and West Virginia has access to this energy in a number of ways. Mason County has gas pipelines that run through the County, but no oil or oil pipeline presence (Map 32). Mason County does have play in the Marcellus shale, with a small number of completed and larger number of permitted wells (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.

Potential renewable energy sources were also examined. Wood by-products 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. Mason County appears to be among the least forested counties in West Virginia (Map 34), possibly explaining why the County has no current activity in the production of wood by-products (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.[8] 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 appears to have great potential in certain parts of the State, as shown in Map 37, and Mason appears to have a favorable potential for enhanced geothermal systems throughout most of the County. The potential for wind development in the County is less favorable but opportunities may lie in solar. 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.[9]

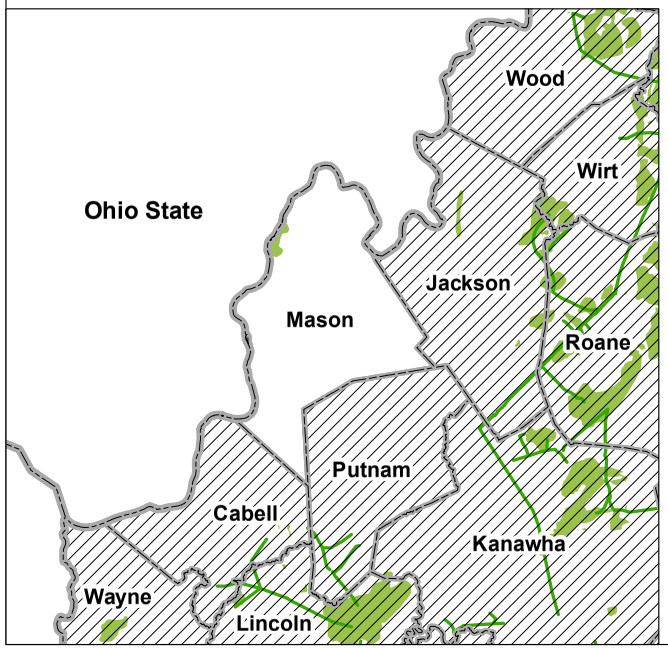
[8] Kent, Calvin, Risch, Christine, and Pardue, Elizabeth. *Renewable Energy Policy: Opportunities for West Virginia.* Center for Business and Economic Research, Huntington, WV (2012).
[9] *Ibid*.

Energy - Gas and Oil

Mason County

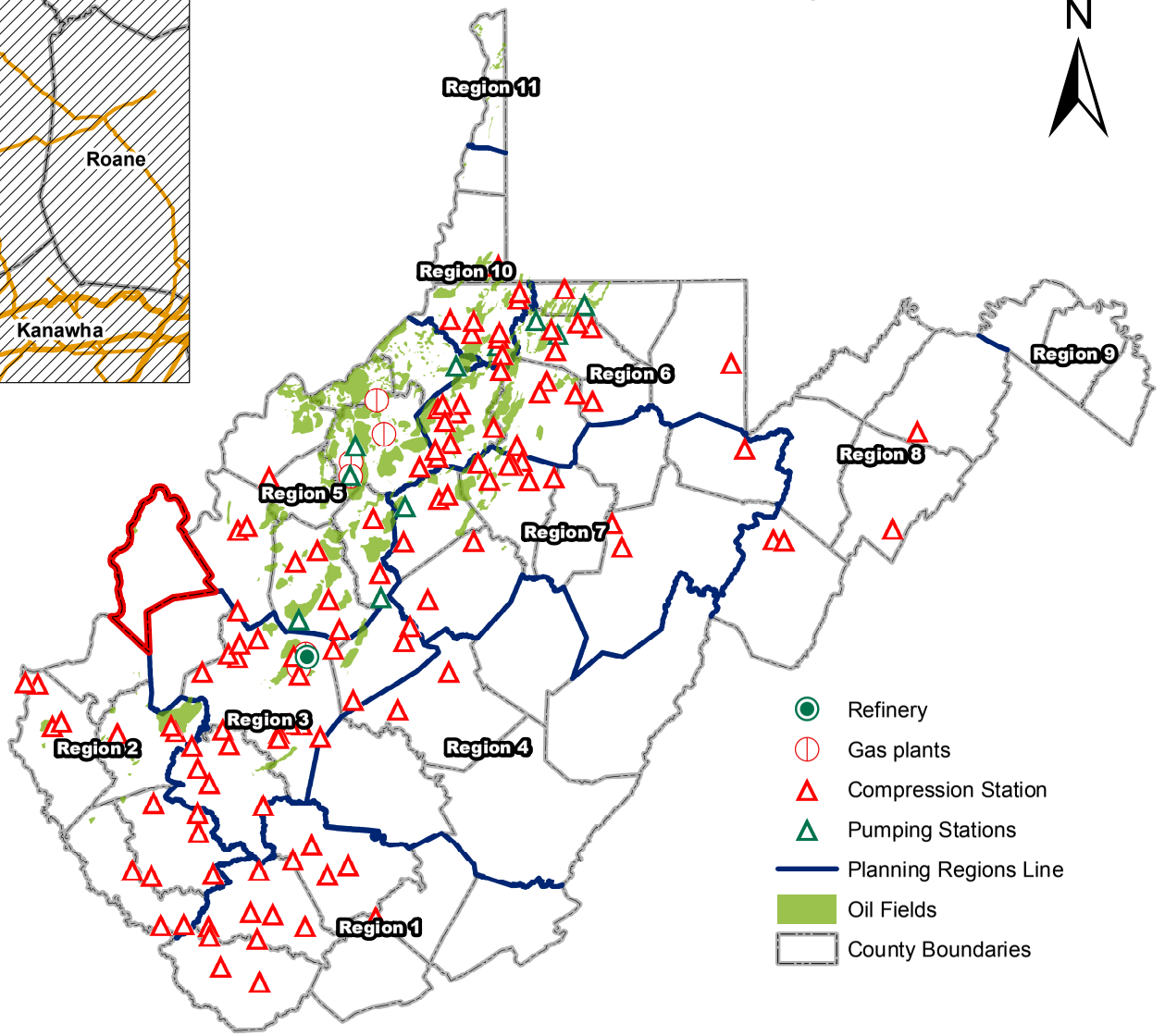


Gas Pipe



Oil Pipelines

Oil Fields



N

Refinery

Gas plants

Compression Station

Pumping Stations

Planning Regions Line

Oil Fields

County Boundaries

0 15 30 60 90 120 Miles

Source: West Virginia Geological and Economic Survey 2007

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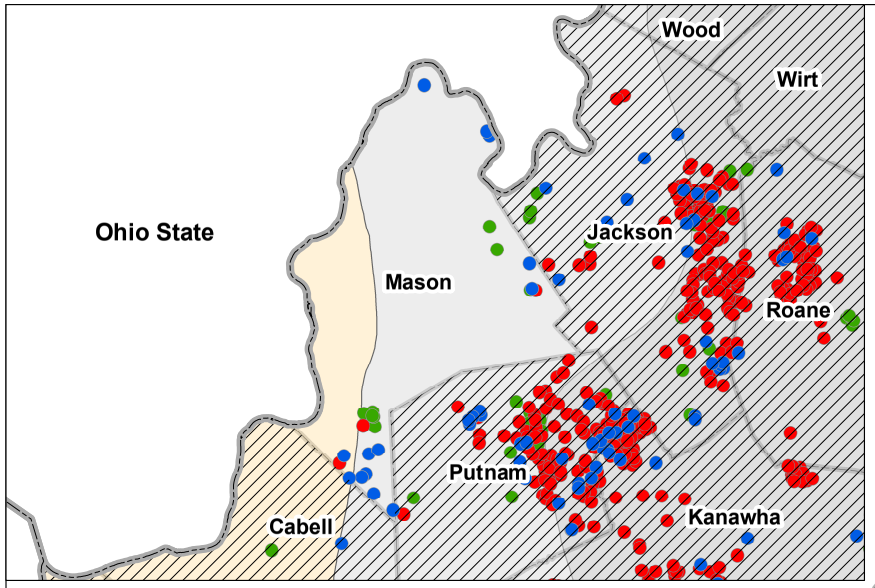
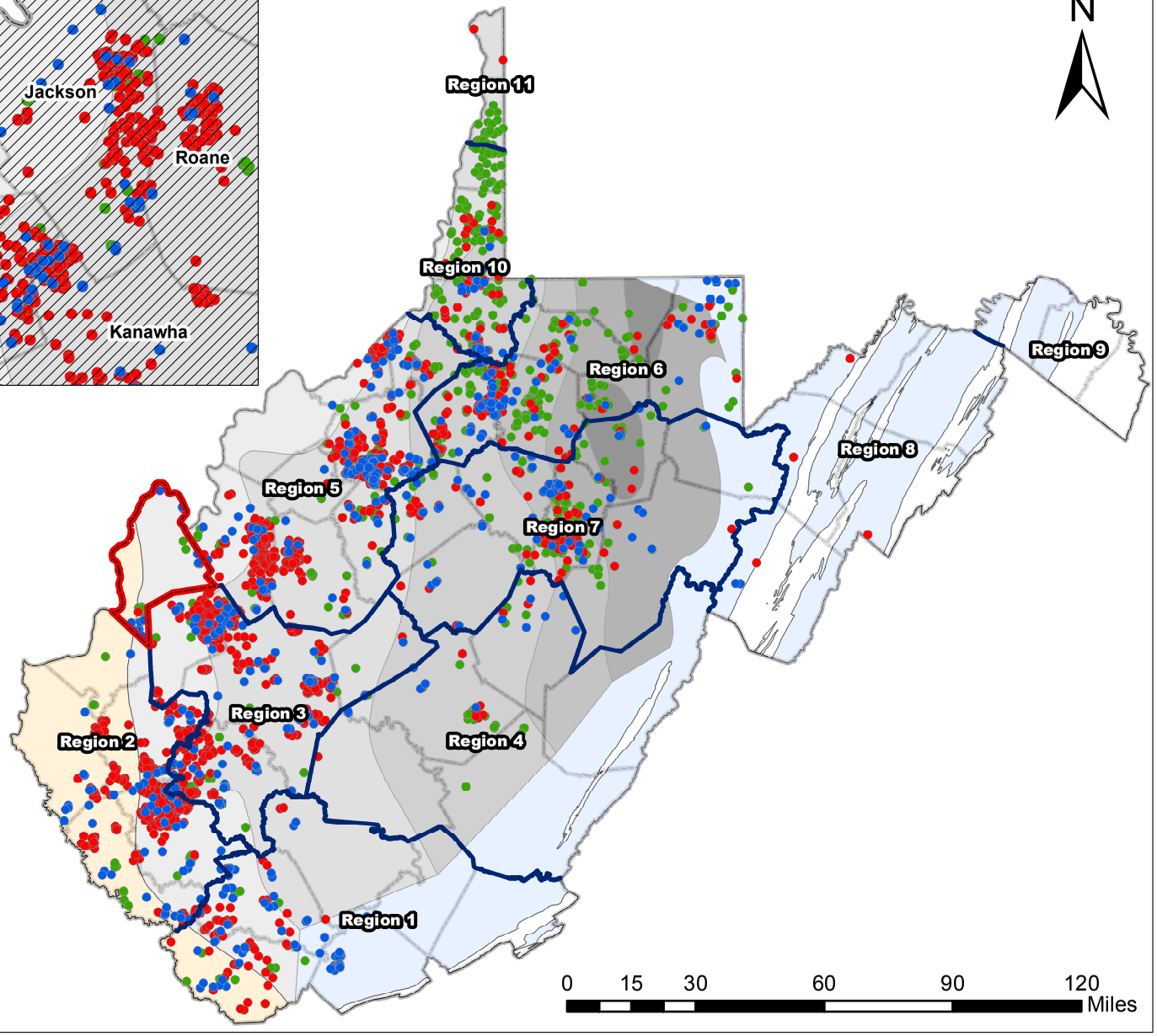
Energy - Marcellus Wells

Mason 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

N

0 15 30 60 90 120 Miles

Source: West Virginia Geological and Economic Survey 2014

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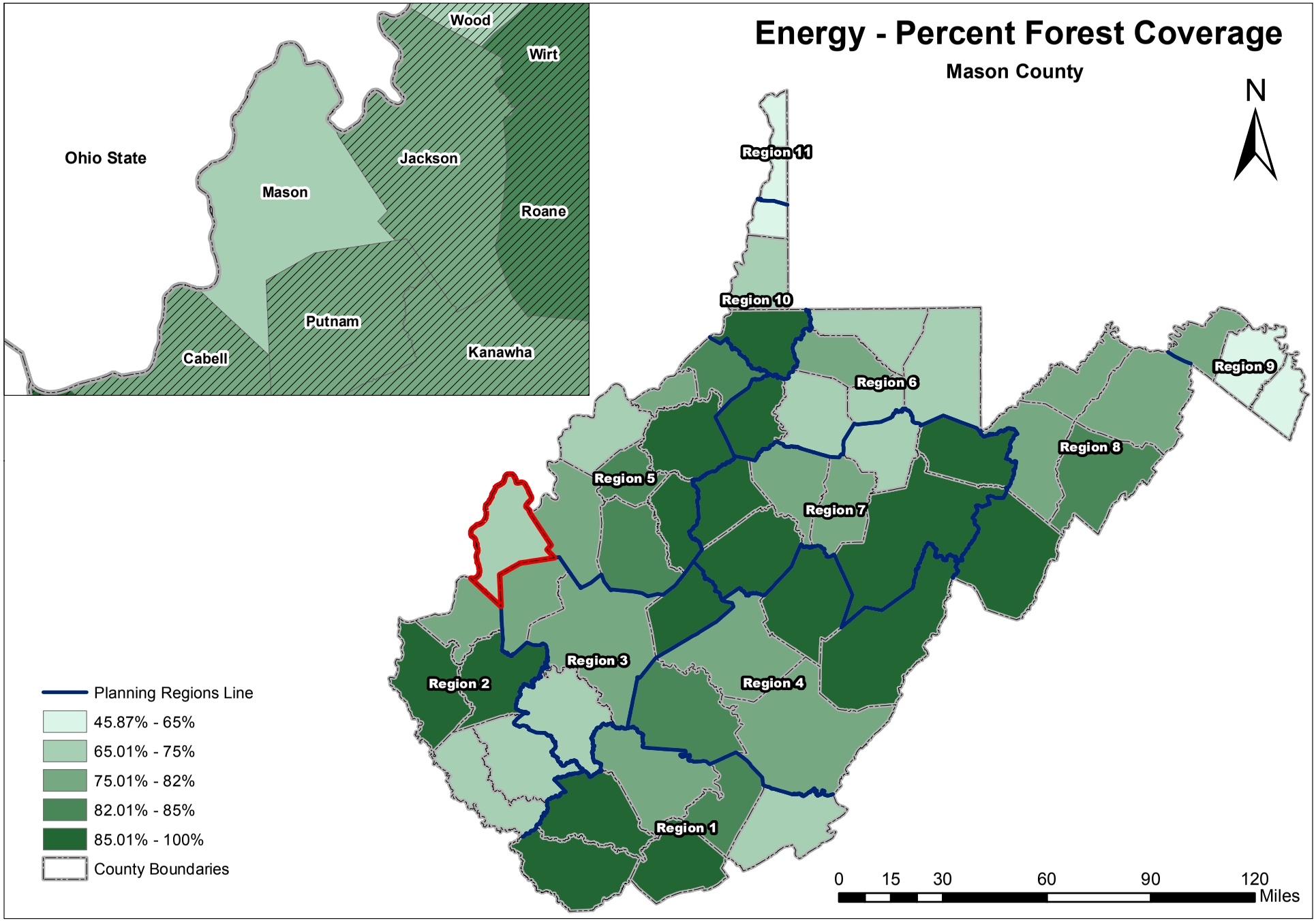
Energy - Percent Forest Coverage

Mason County



Source: Rahall Transportation Institute 2013

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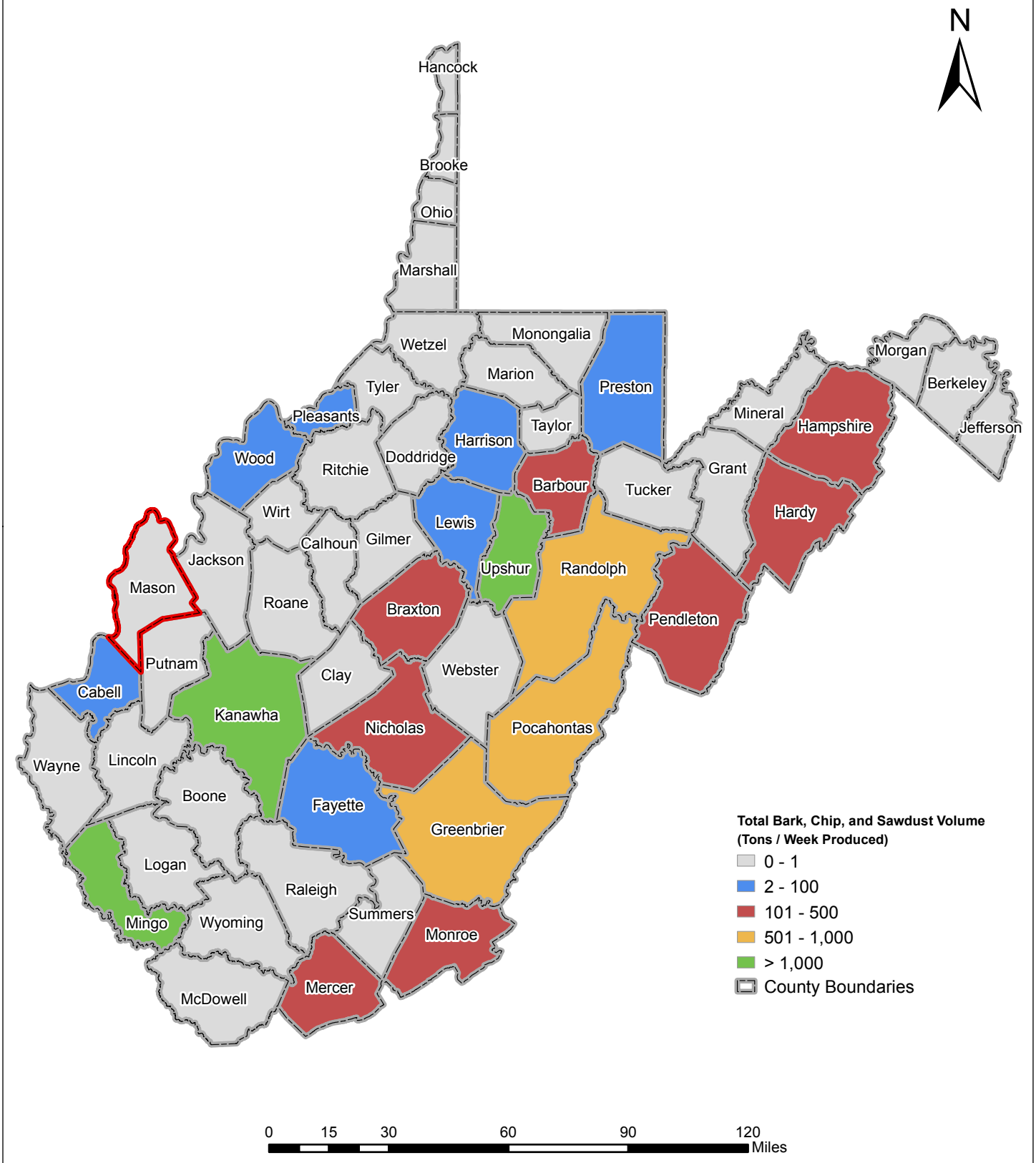
Map 35

Renewable Energy - Wood By Products

Bark, Chip, and Sawdust Volume Produced - Mason County



Source: West Virginia Division of Forestry 2014

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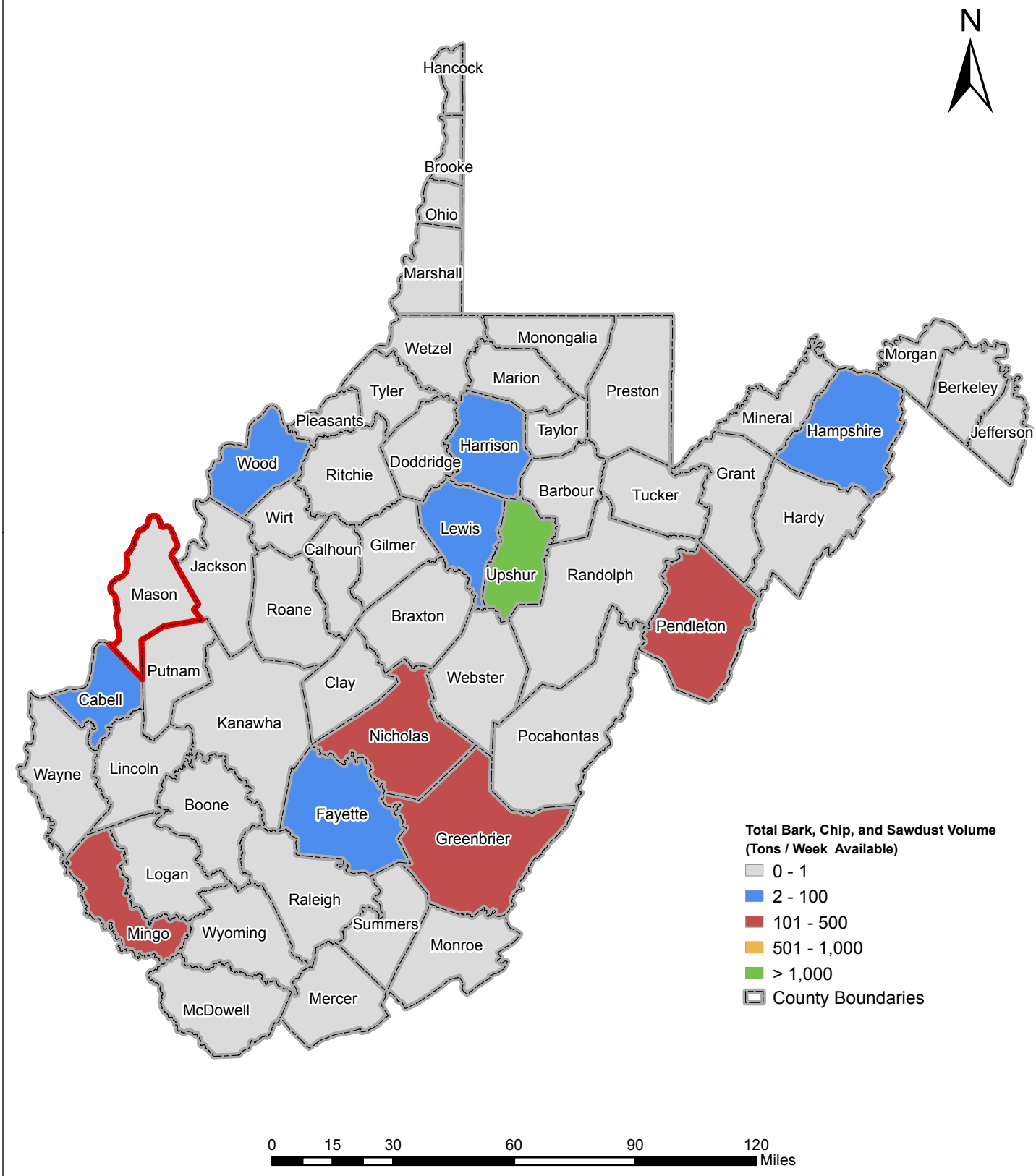
Map 36

Renewable Energy - Wood By Products

Bark, Chip, and Sawdust Volume Available - Mason County



Source: West Virginia Division of Forestry 2014

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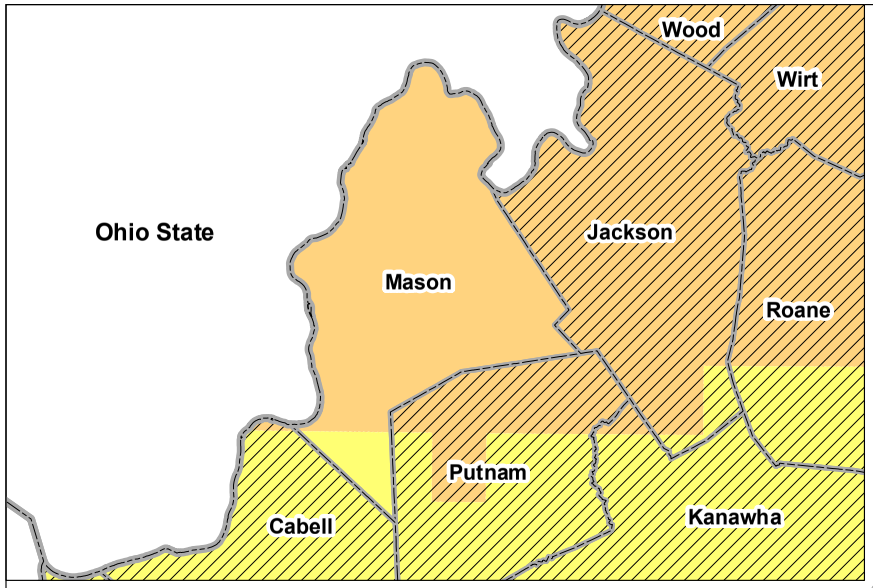
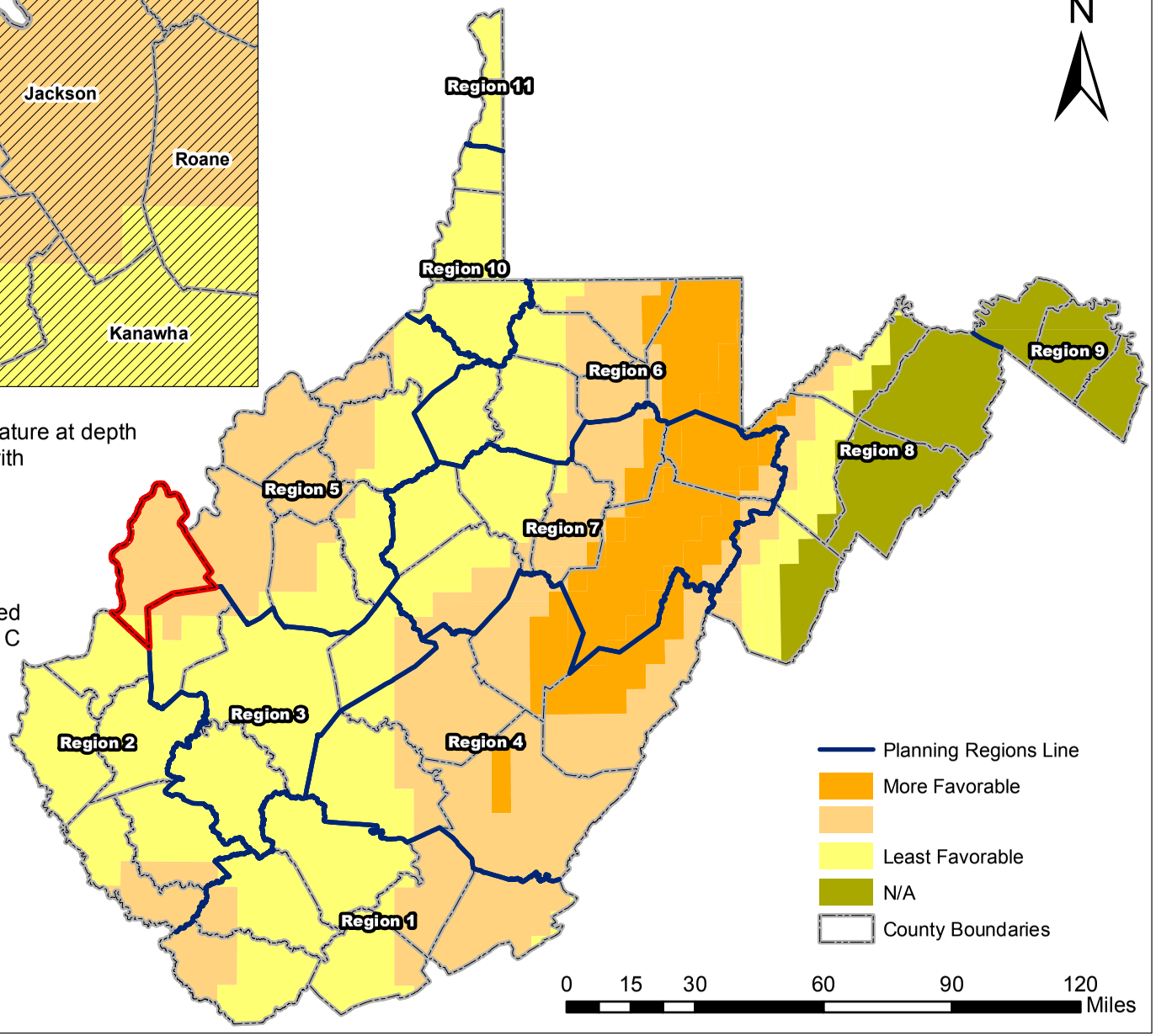
Energy - Geothermal Resource of Mason County

Favorability of Deep Enhanced Geothermal Systems



_ Source data for deep EGS includes temperature at depth from 3 to10 km and analyses (for regions with temperatures >= 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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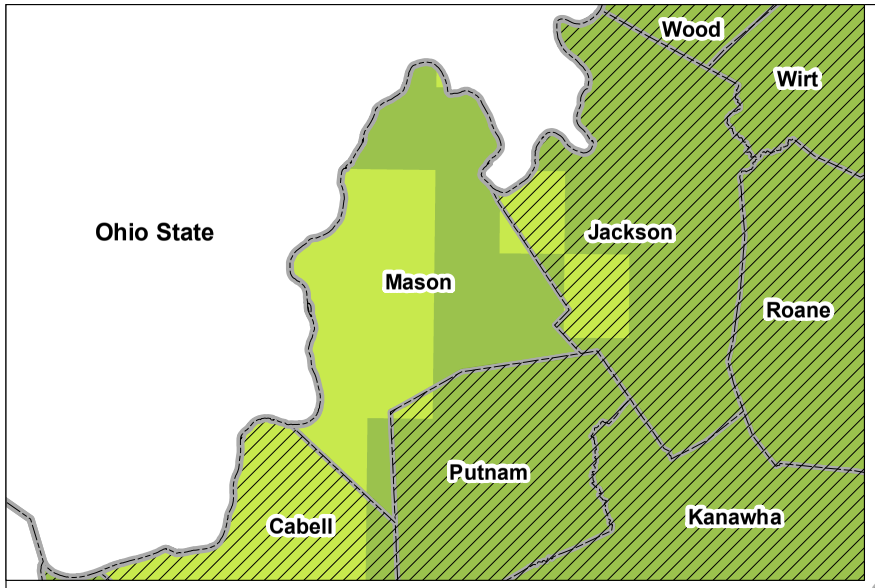
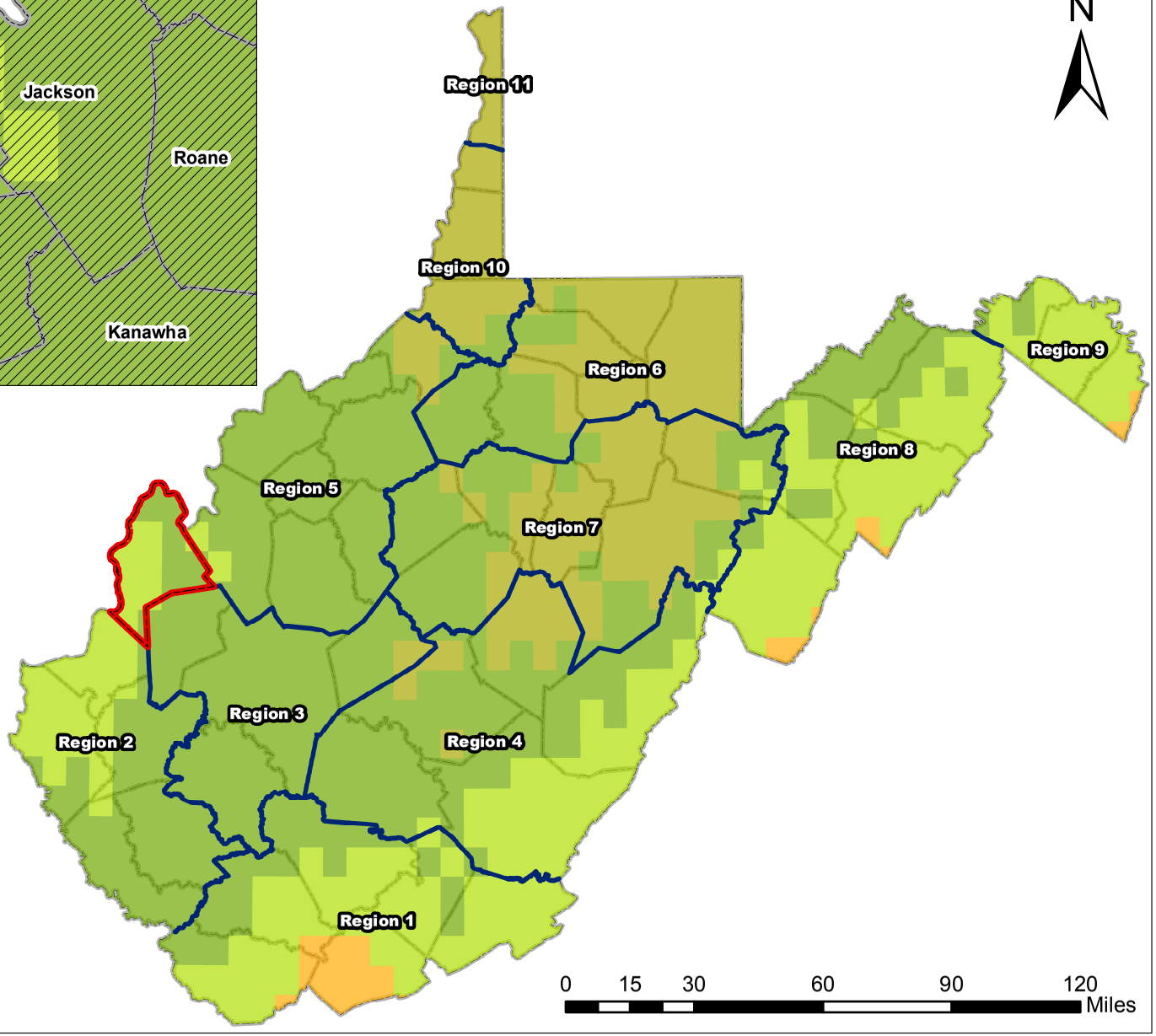
Solar - Renewable Energy

Mason County





N

Planning Regions Line

(kWh/m2/day)

- 4.2 - 4.4
- 3.9 - 4.1
- 3.7 - 3.8
- 3.4 - 3.6

County Boundaries

0 15 30 60 90 120 Miles

Source: National Renewable Energy Laboratory 2012

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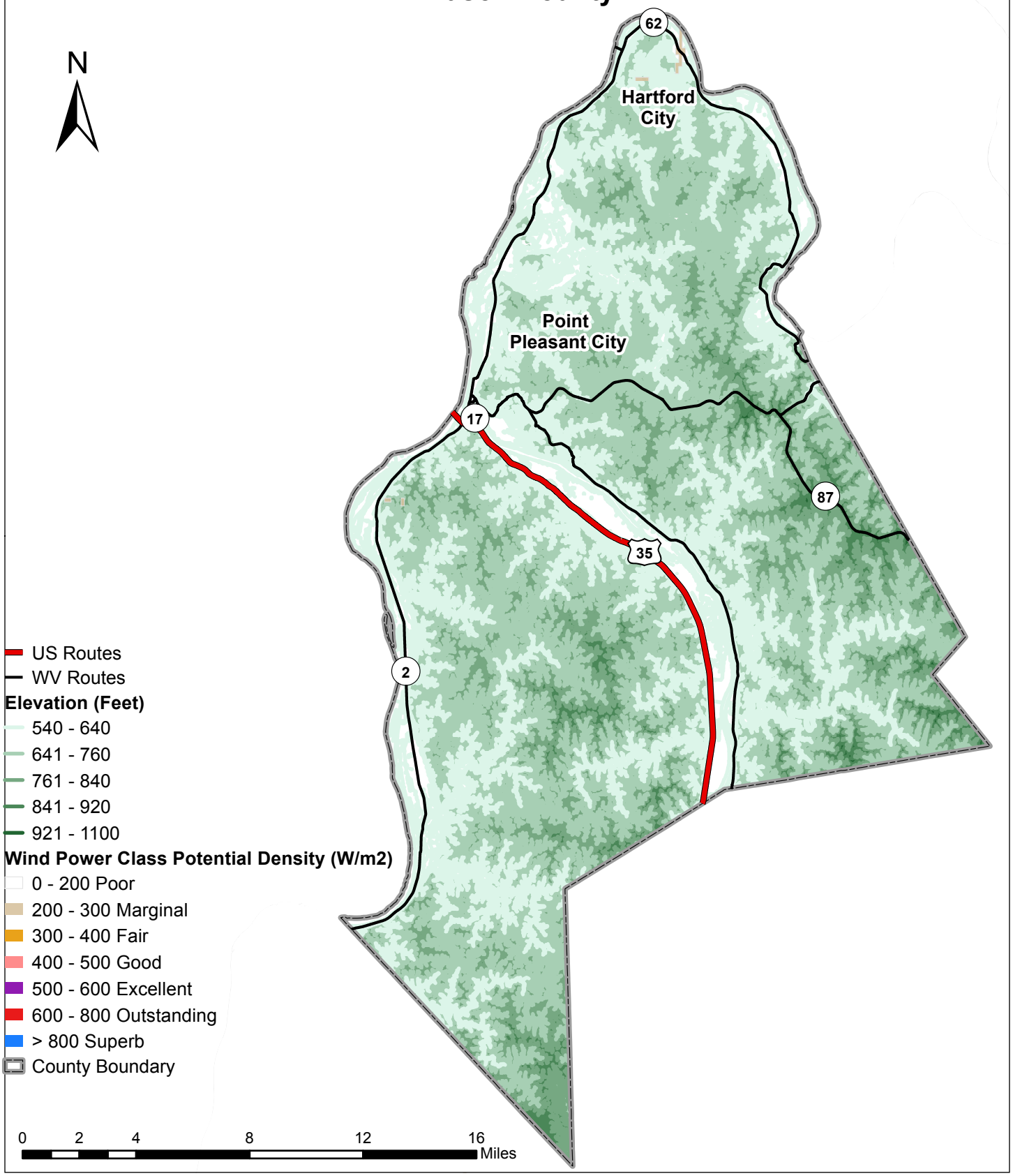
Map 39

Renewable Energy-Wind

Mason County



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 Mason. 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 40) showcases the geographies separated by utilization.

Table 2: Smart Planning Utilizations

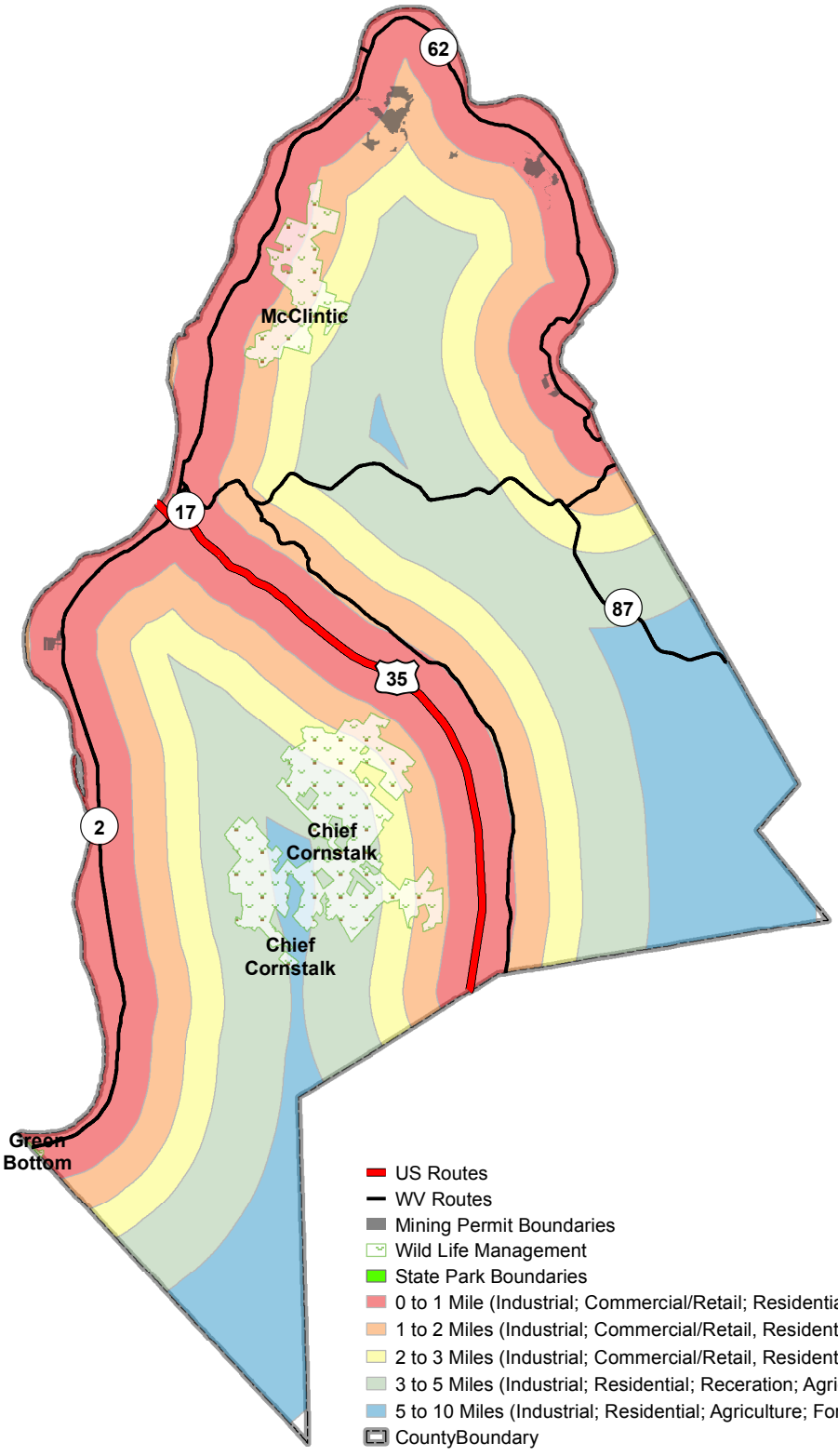
Name	Smart Planning Criteria
Utilization Area 0-1 mile	Industrial, Commercial/Retail, Residential, Public Facility, Recreational
Utilization Area 1-2 miles	Industrial, Commercial/Retail, Residential, Public Facilities
Utilization Area 2-3 miles	Industrial, Commercial/Retail, Residential, Recreation
Utilization 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 the county economic development authority as designated by West Virginia Code Chapter 05B Article 2A.

Map 40

Landuse Criteria

Mason County



Source: Rahall Transportation Institute 2015

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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 Mason 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.

The WV DEP permit database acts as a general clearinghouse for information, but is not infallible. The data is often updated by third-party sources, which increases the margin of error for site location. Because of this, the actual attributes being measured may not be at the distance stated because the mine site is not actually in the location given. The WV DEP has sought to minimize those errors, and RTI attempts to maintain the reliability of the measurements by observing their locations when mapping. RTI does not ensure the reliability of the site location or distances to the attributes. Any and all information should be verified for accuracy.

The initial data collection revealed all the mine sites in the County. Together, the team put together 5 sites for analysis. All of the sites and their distance attributes are listed below.

Table 3: Mason County Potential Surface Mine Sites for Development

Site No	Permitee	Permit ID	Facility Name	Acres	Issue Date	Expiration Date
1	RAVEN HOCKING COAL CORP	S001785	NA	111.2	3/6/1985	3/6/1995
2	SYCAMORE COAL CO	S002484	NA	20	5/3/1984	5/3/1989
3	SYCAMORE COAL CO	S005985	NA	20	6/27/1985	6/27/1990
4	RAVEN HOCKING COAL CORP	S601986	NA	24	10/8/1986	10/8/1991
5	RAVEN HOCKING COAL CORP	S600486	NA	270	6/10/1986	6/10/2001

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 and Existing Highway)
  - Distance to major airports (Tri-State, Yeager)
  - Distance to Intermodal Terminal Facility, National Waterway Network and Network 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

The following tables illustrate the results of road-path and Euclidean distance assessments for all of the identified sites for given criteria. All distances were recorded in miles.

Table 4: Assessment of Distances

Site No	Permit ID	Interstate (IS)	Sign - IS	Existing Highway (EH)	Sign - EH	Paved Road	Paved Road Name
1	S001785	37.49	I64	1.64	S62	0.01	Forglesong Road
2	S002484	37.12	I64	0.34	S62	0.02	WV 62
3	S005985	39.26	I64	0.85	U33	0.03	Forglesong Road
4	S601986	39.80	I64	1.44	U33	0.19	Left Fork Of Hanging Rock
5	S600486	38.11	I64	1.42	S62	0.19	Forglesong Road

Table 5: Shortest Distances from Sites to Airports

Site No	Permit ID	Tri-State Airport	Yeager Airport
1	S001785	56.39	55.96
2	S002484	52.57	57.18
3	S005985	56.65	57.73
4	S601986	57.18	58.27
5	S600486	56.17	56.58

Table 6: Shortest Distances from Sites to Other Transportation Methods

Site No	Permit ID	Railroad	IF	Intermodal Facility (IF) Name	NW	National Waterway (NW) Name	NP	Network Port (NP) Name
1	S001785	1.67	52.33	Martin Marietta Aggts: Charleston	2.64	OHIO RIVER	47.88	HUNTINGTON
2	S002484	0.01	53.56	Martin Marietta Aggts: Charleston	3.23	OHIO RIVER	44.07	HUNTINGTON
3	S005985	0.85	54.11	Martin Marietta Aggts: Charleston	1.55	OHIO RIVER	48.15	HUNTINGTON
4	S601986	0.87	54.64	Martin Marietta Aggts: Charleston	2.22	OHIO RIVER	48.67	HUNTINGTON
5	S600486	1.42	52.95	Martin Marietta Aggts: Charleston	2.42	OHIO RIVER	47.66	HUNTINGTON

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

Site No	Permit ID	Dist - SL	Utility (SL)	Dist - WL	Utility (WL)
1	S001785	1.46	Town of Hartford	0.02	Mason County Public Service District
2	S002484	3.62	City of Point Pleasant	0.03	Mason County Public Service District
3	S005985	1.45	Town of Hartford	0.03	Mason County Public Service District
4	S601986	0.80	Town of Hartford	0.24	Mason County Public Service District
5	S600486	1.28	Town of Hartford	0.25	Mason County Public Service District

Table 8: Shortest Distances from Sites to Broadband (BB) and Power Lines (PL)

Site No	Permit ID	Dist - BB	Provider (BB)	Dist - PL	Type (PL)	Size_kV
1	S001785	1.39	Frontier West Virginia, Inc.	0.64	Transmission	500
2	S002484	0.02	Community Antenna Service, Inc.	0.16	Transmission	115-138
3	S005985	0.77	Community Antenna Service, Inc.	2.44	Transmission	500
4	S601986	0.79	Community Antenna Service, Inc.	2.35	Transmission	500
5	S600486	1.18	Frontier West Virginia, Inc.	1.12	Transmission	500

Table 9: Shortest Distances from Sites to Sewer (SW) and Solid Waste (SD) Treatment Facilities

Site No	Permit ID	Dist - SW	Facility (SW)	Dist - SD	Facility (SD)
1	S001785	2.93	MASON TOWN OF	4.47	ERO Landfill
2	S002484	3.62	MASON TOWN OF	4.06	ERO Landfill
3	S005985	0.99	MASON TOWN OF	6.25	ERO Landfill
4	S601986	1.67	MASON TOWN OF	6.78	ERO Landfill
5	S600486	2.48	MASON TOWN OF	5.08	ERO Landfill

Table 10: Shortest Distances from Sites to Gas Pipe (GP) and Oil Pipe (OP)

Site No	Permit ID	Dist - GP	Company Gas Pipe	Dist - OP	Company Oil Pipeline
1	S001785	4.27	Columbia Gas Transmission Corp.	10.81	CL
2	S002484	2.19	Columbia Gas Transmission Corp.	9.22	CL
3	S005985	5.42	Columbia Gas Transmission Corp.	12.30	CL
4	S601986	5.89	Columbia Gas Transmission Corp.	12.56	CS
5	S600486	4.61	Columbia Gas Transmission Corp.	11.26	CL

Suitability Model

The suitability model for Mason 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 researcher, 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, RTI's own research on the existing conditions in Mason County and expert advice about important factors to site development. Then, scores for each site are given by comparing the closest distance from the site to all factors within given distance thresholds. There are four 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 existing highway ranges from 2.5 to 5 miles, the site will be given 7 points for the Existing Highways 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 differences 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.

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:

$$\textbf{Total score of site A} = \sum \textbf{(absolute score x relative score x weight)}_{ci} \textbf{ / 10} \qquad \textbf{(ci: criteria i)}$$

Sites with higher total scores reveal a higher chance of being developed. Total scores will vary according to a combination of four components: weights, absolute scores, and relative scores.

1. Weighting

Table 11 prioritizes post-mining land-use criteria for surface coal mining site selection in Mason 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	Broadband	9
2	Gas Pipes	6
3	National Waterway Network	4
4	Oil Pipelines	6
5	Power Lines	10
6	Railroads	5
7	Sewer Lines	8
8	Water Lines	10
9	Existing Highway	8
10	Intermodal Terminal Facilities	6
11	Interstate	8
12	National Waterway Network Ports	5
13	Sewer Treatment Facilities	7
14	Solid Waste Treatment Facilities	8
15	Tri-State Airport	3
16	Yeager Airport	3

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 previously, 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 "Existing Highway" are much smaller than ones for "Solid Waste Treatment Facilities". This is because highways are denser than solid waste treatment facilities. Both, however, have the same weights.

Table 12: Absolute Scoring System

Absolute Score		**10**	**7**	**5**	**3**	**1**
Criteria (Miles)	Broadband	0 - 0.5	0.5 - 2	2 - 3	3 - 4	> 4
	Gas Pipes	0 - 0.5	0.5 - 1.5	1.5 - 2	2 - 2.5	> 2.5
	National Waterway Network	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	Oil Pipelines	0 - 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 1	> 1
	Power Lines	0 - 0.5	0.5 - 1.5	1.5 - 2	2 - 2.5	> 2.5
	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
	Existing 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	70 - 90	> 90

2.2 Relative Scores:

Table 13 shows four statistical groups and their relative scores in the Mason 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). Second, it is not affected by personal opinion and does not consider either traveling method or nature of criteria.

Table 13: Relative Scoring System

	Threshold (Distances in miles)	**Min - Q1**	**Q1 - Q2**	**Q2 - Q3**	**Q3 – Max**
	Relative Score	10	7.5	5	2.5

No.	**Criteria**	**Min**	**Q1**	**Q2**	**Q3**	**Max**
1	Broadband	0.02	0.77	0.79	1.18	1.39
2	Gas Pipes	2.19	4.27	4.61	5.42	5.89
3	National Waterway Network	1.55	2.22	2.42	2.64	3.23
4	Oil Pipelines	9.22	10.81	11.26	12.30	12.56
5	Power Lines	0.16	0.64	1.12	2.35	2.44
6	Railroads	0.01	0.85	0.87	1.42	1.67
7	Sewer Lines	0.80	1.28	1.45	1.46	3.62
8	Water Lines	0.02	0.03	0.03	0.24	0.25
9	Existing Highway	0.34	0.85	1.42	1.44	1.64
10	Intermodal Terminal Facilities	52.33	52.95	53.56	54.11	54.64
11	Interstate	37.12	37.49	38.11	39.26	39.80
12	National Waterway Network Ports	44.07	47.66	47.88	48.15	48.67
13	Sewer Treatment Facilities	0.99	1.67	2.48	2.93	3.62
14	Solid Waste Treatment Facilities	4.06	4.47	5.08	6.25	6.78
15	Tri-state Airport	52.57	56.17	56.39	56.65	57.18
16	Yeager Airport	55.96	56.58	57.18	57.73	58.27

3. Mason County's Suitability Model:

Table 13 shows the total scores of all studied sites in Mason County. Site 2 (Permit ID = S002484) has the highest score of 627. 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 analyzed potential development sites of Mason County, it is easy to notice the top five sites and determine the most suitable sites for investment.

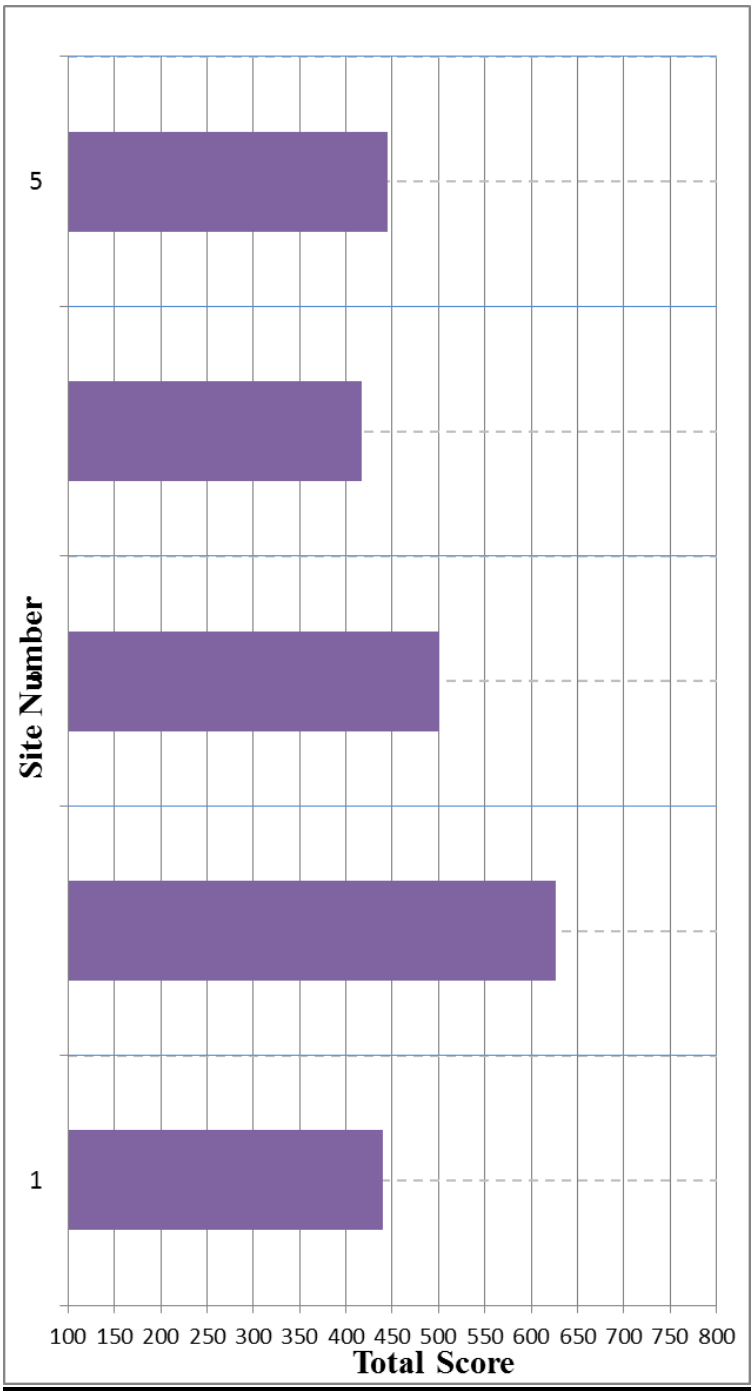
Certainly, any change in weight values or the scoring system will result in different output and may change the decision. For better analysis and decision-making, the dynamic suitability model, which allows modification in criteria's weights, thresholds and scores is available for distribution through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

Besides a distance analysis, a suitability model for Mason is supported by demographic data as well as two additional analyses, which are workforce analysis and retail location density (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 Mine Sites in Mason County

Site No	Permitee	Permit ID	Score
1	RAVEN HOCKING COAL CORP	S001785	439.5
2	SYCAMORE COAL CO	S002484	627
3	SYCAMORE COAL CO	S005985	501
4	RAVEN HOCKING COAL CORP	S601986	416.5
5	RAVEN HOCKING COAL CORP	S600486	445.5

Figure 15: Mason 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. 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: Employment and Unemployment within 5-, 10- and 15-mile Radii from the Site

Site No	Permit ID	Emp_05	Unemp_05	Emp_10	Unemp_10	Emp_15	Unemp_15
1	S001785	1,718	155	4,832	354	6,649	548
2	S002484	1,386	139	4,995	366	6,738	561
3	S005985	1,225	113	3,834	290	6,128	481
4	S601986	1,213	109	3,568	275	6,108	479
5	S600486	1,602	146	4,588	336	6,498	528

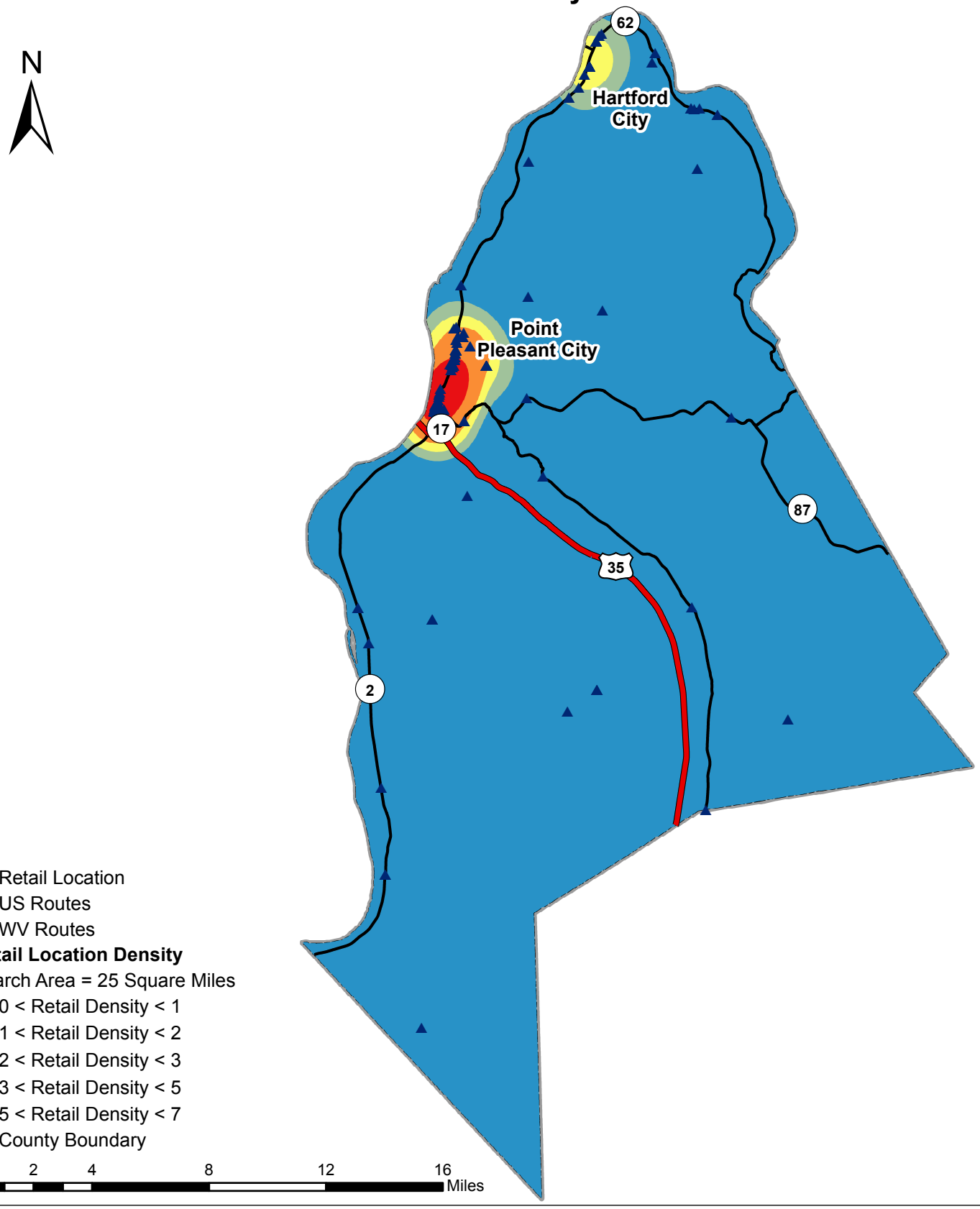
Retail Location Analysis

A retail location analysis is a hot spot analysis that 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.

Map 41

Retail Location Density

Mason County



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VI. Conclusion

Although among the smaller and more-rural counties in West Virginia, Mason County is well-positioned for economic stability. Several sectors, including Trade, Transportation and Utilities have proven to be progressive for the County in recent years in terms of employment and wages. However, a large portion of Mason County's total personal income is derived from government transfers. Coupled with limited diversification among its sectors and an aging population, attention is needed to ensure that the County will grow and thrive. This plan could be useful in that respect by assisting Mason County in creating a development plan using their post-mine sites.

This plan has identified and displayed the five post-mine sites that are most suitable 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 Mason County to thrive.

Through a site distance analysis and complete demographic calculation, this plan provides the most comprehensive understanding of the economic state of Mason 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.