

Boone County

Land Use Master Plan 2014



Photo: The Boone County Courthouse in Madison, West Virginia (Taken by Tim Kiser)

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Executive Summary

This Land Use Master Plan (LUMP) conveys information on Boone County's current demographic and geographic status. This plan will be used to evaluate the potential of post-mine sites for development, and evaluate Boone 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 Boone 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. Two major post-mine developments in Boone County include the Alpha Natural Resources Regional Headquarters and the Hatfield-McCoy Trail System. This plan will help Boone take advantage of its other post-mine sites in just as varied a manner.

Boone County has continually lost population since 1980. The county's median age and age distribution are average for the state, and indicate a population capable of productivity in the labor force. The population is also projected to decrease past 2030.

Employment consists mainly of Natural Resources and Mining; Government Services; Trade, Transportation, and Utilities; and Professional and Business Services. Government and natural resources are the major wage contributors: Government due to the sheer size of the

sector in Boone County, and natural resources and mining because of sector size and the relatively high wages. Even as Boone County total wages have been on the rise, the labor force is only about half of the working-age population. Of particular note is the amount of income, as opposed to wages, derived from government transfers. Thirty-three percent of Boone County income is from government transfers. Boone 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.

Boone County's total enrollment was rising until 2010-2011, when the recession began to penetrate Boone County's economy and the population continued to fall. Boone County's dropout rate is about average for the state. Just over a quarter of Boone 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 issue in any development strategy. Boone County has no interstate, one US Route, and no airport. Its rail system, because of Boone's status as a coal generating county, is extensive, and most of the county is in close proximity to

the Yeager and Tri-State airports. However, development in this plan gives high priority to the US Route and railroads.

Boone County also has four 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 Boone County. The environment of the county should be considered in an overall development strategy. Boone County is not heavily forested but has a few designated recreational areas and counterintuitively has a vibrant wood byproduct industry. Boone County is also not on the list of air pollution non-attainment areas, which is positive. Boone County has several completed and permitted Marcellus Shale wells, but appears to have very little potential in the most popular renewable energy resources: solar, wind, and geothermal.

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 Boone County. The researchers, after consultation with Kris Mitchell, the director of the Boone County Community and Economic Development Corporation, 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, which were approved by the development director, and a reference score in which certain sites were "referenced" as already possessing development attributes such as relationships with the owners and existing plans for site development. 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. In table A, and table B, distances and total scores are compared, providing an idea of the more suitable site under a considered criterion. For example, if we want to look for a site which is located closest to power lines, the answer is site ranking #3, permit ID

S504090. However, if we wanted the site closest to an existing highway, the best site is site ranking #1, permit ID S502799.

Table C explains how each criterion contributes to the final total score and importance of the weights. Because of the assumption that one criterion may be more important than others through differing weights, the site with higher absolute and

relative scores is still able to receive a smaller total score than the others. Site ranking #4 is a good explanation of this situation. Site #4 has smaller absolute and relative scores compared to site #5. Still, site #4 receives higher total score because the distances from this site to major criteria (with weights from 9-10) are shorter than the other.

Table A: Distances Comparison Between Top Five Sites for Potential Development

Suitability Ranking	1	2	3	4	5	Weight
Existing Highway	1.92	4.92	4.64	3.03	2.60	10
Sewer Treatment Facilities	2.80	1.07	0.78	3.91	3.48	10
Solid Waste Treatment Facilities	5.60	9.88	9.60	6.71	6.27	10
Sewer Lines	6.00	9.94	9.65	7.11	6.68	7
Railroads	2.23	3.07	2.78	3.33	2.90	5
Water Lines	2.24	0.80	0.51	3.34	2.91	10
Power Lines	0.89	1.08	0.79	2.00	1.57	10
Gas Pipes	2.83	4.79	5.06	3.93	3.50	6
Oil Pipes	2.06	0.85	0.57	0.67	2.73	6
Broadband	0.57	0.01	0.01	0.07	0.31	9

Table B: Total Score Comparison Between Top Five Sites for Potential Development

Suitability Ranking	1	2	3	4	5	Weight
Existing Highway	100	52.5	25	70	70	10
Sewer Treatment Facilities	70	100	100	52.5	52.5	10
Solid Waste Treatment Facilities	70	52.5	70	70	70	10
Sewer Lines	7	5.25	7	7	7	7
Railroads	26.25	12.5	26.25	12.5	26.25	5
Water Lines	35	100	100	12.5	17.5	10
Power Lines	100	70	100	35	52.5	10
Gas Pipes	31.5	21	7.5	21	31.5	6
Oil Pipes	15	15	45	30	10.5	6
Broadband	22.5	90	90	90	45	9
Weighted Score	477.25	518.75	570.75	400.5	382.75	
Reference Score	200	100				
Total score	677.25	618.75	570.75	400.5	382.75	

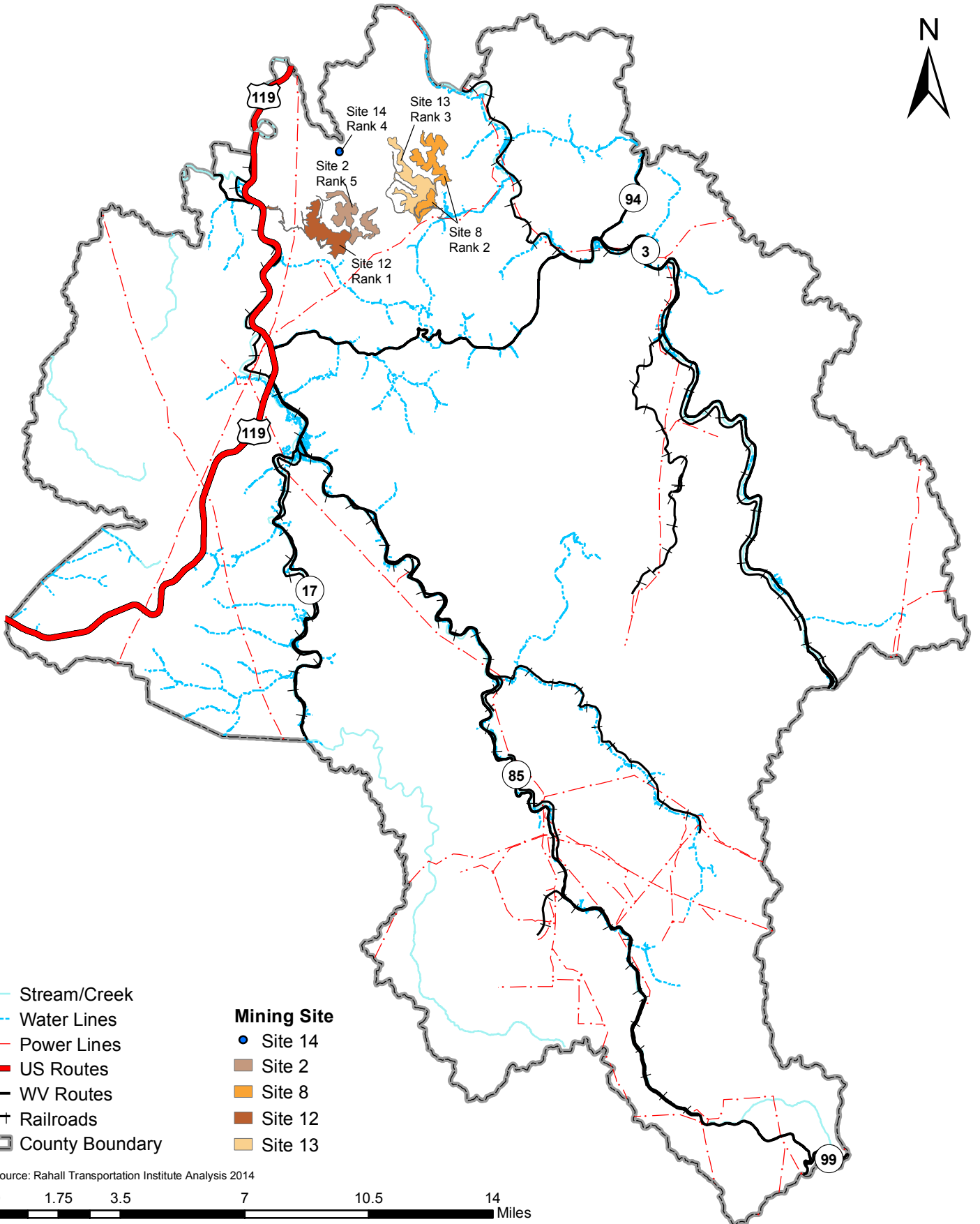
Table C: Absolute/Relative Score Comparison Between Top Five Sites for Potential Development

Suitability Ranking	1	2	3	4	5	Weight
Existing Highway	10	7	5	7	7	10
Sewer Treatment Facilities	7	10	10	7	7	10
Solid Waste Treatment Facilities	7	7	7	7	7	10
Sewer Lines	1	1	1	1	1	7
Railroads	7	5	7	5	7	5
Water Lines	7	10	10	5	7	10
Power Lines	10	7	10	7	7	10
Gas Pipes	7	7	5	7	7	6
Oil Pipes	10	10	10	10	7	6
Broadband	10	10	10	10	10	9
Total Absolute Score	76	74	75	66	67	

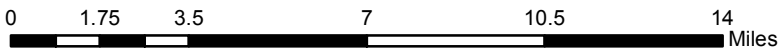
Suitability Ranking	1	2	3	4	5	Weight
Existing Highway	10	7.5	5	10	10	10
Sewer Treatment Facilities	10	10	10	7.5	7.5	10
Solid Waste Treatment Facilities	10	7.5	10	10	10	10
Sewer Lines	10	7.5	10	10	10	7
Railroads	7.5	5	7.5	5	7.5	5
Water Lines	5	10	10	2.5	2.5	10
Power Lines	10	10	10	5	7.5	10
Gas Pipes	7.5	5	2.5	5	7.5	6
Oil Pipes	2.5	2.5	7.5	5	2.5	6
Broadband	2.5	10	10	10	5	9
Total Relative Score	75	75	82.5	70	70	

Top Five Sites for Potential Development

Boone County



Source: Rahall Transportation Institute Analysis 2014



Site's General Info

Permittee	Coyote Coal Co Llc
Facility Name	Hewitt Creek Surface Mine No.
Permit ID	S502799
Issue Date	37610
Expiration Date	43089
Current Acres	560
Lat	38° 8'19.0000"
Long	81° 48'35.0000"
Nearest Post Office	unknown

Site Number	12
Suitability Ranking	1
Total Score	677.25

Distance Analysis Results

Existing Highway	1.92
Sewer Treatment Facilities	2.80
Solid Waste Treatment Facilities	5.60
Sewer Lines	6.00
Railroads	2.23
Water Lines	2.24
Power Lines	0.89
Gas Pipes	2.83
Oil Pipes	2.06
Broadband	0.57

Site number 12 should be the first choice for potential development. Even though the distance from the site to water lines and power lines are just about average, the site still has the highest total since it is located quite close to several other major criteria such as gas pipes (2.83 miles) and existing highways (1.92 miles). It also has the highest reference score.



Site's General Info

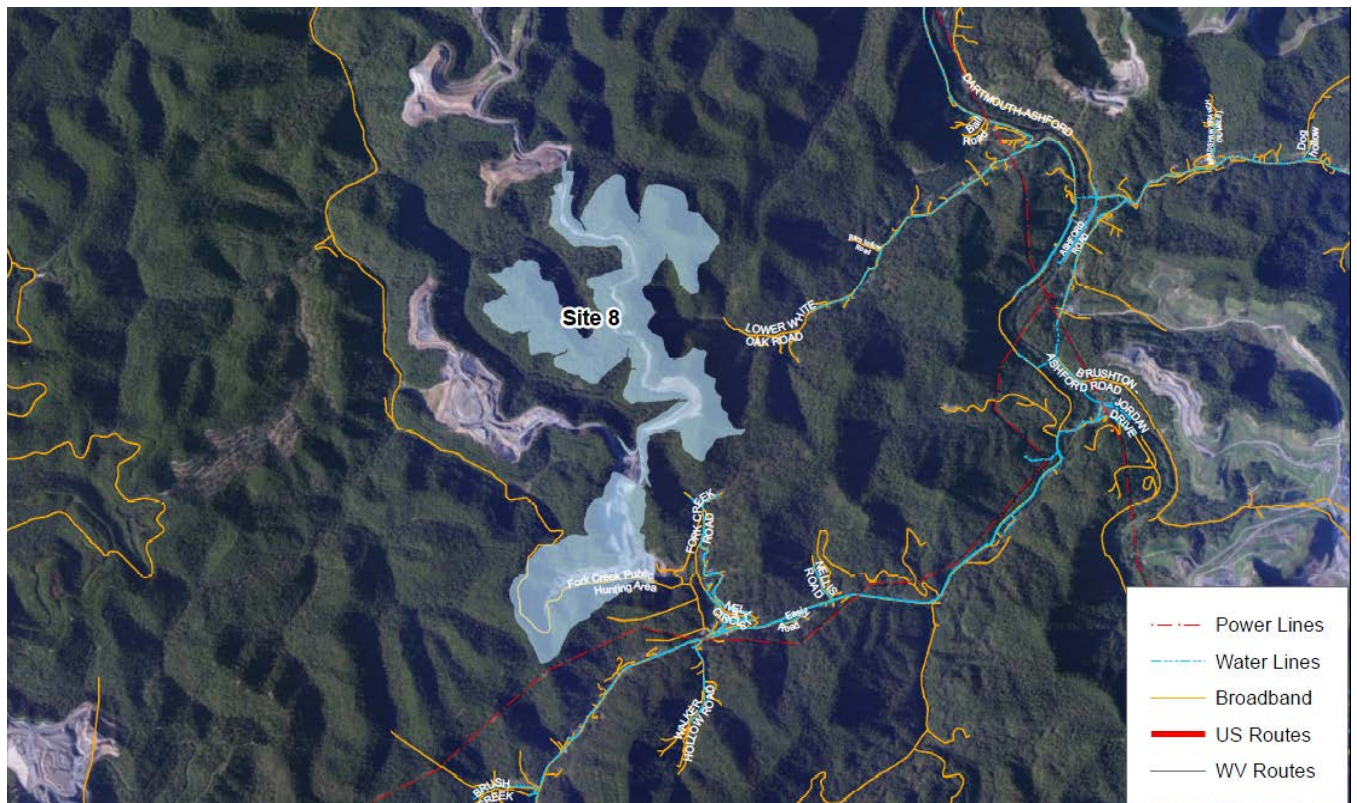
Permittee	Coal River Mining, Llc
Facility Name	Surface Mine 7
Permit ID	S501609
Issue Date	40365
Expiration Date	42191
Current Acres	666.71
Lat	38° 10'14.0000"
Long	81° 45'4.0000"
Nearest Post Office	Nellis, WV

Site Number	8
Suitability Ranking	2
Total Score	618.75

Distance Analysis Results

Existing Highway	4.92
Sewer Treatment Facilities	1.07
Solid Waste Treatment Facilities	9.88
Sewer Lines	9.94
Railroads	3.07
Water Lines	0.80
Power Lines	1.08
Gas Pipes	4.79
Oil Pipes	0.85
Broadband	0.01

Site number 8 has the second highest score in the suitability model. The site is located close to utility features such as broadband (0.01 miles), water lines (0.80 miles) and sewer treatment facilities (1.07 miles), which makes the site a good place for a future residential area. The only disadvantage is the higher distance to transportation networks. The site has the second highest reference score.



Site's General Info

Permittee	Loadout, Llc
Facility Name	Nellis Mine
Permit ID	S504090
Issue Date	34262
Expiration Date	43393
Current Acres	542.74
Lat	38° 9'38.0000"
Long	81° 45'45.0000"
Nearest Post Office	NELLIS

Site Number	13
Suitability Ranking	3
Total Score	570.75

Distance Analysis Results

Existing Highway	5.64
Sewer Treatment Facilities	0.78
Solid Waste Treatment Facilities	9.60
Sewer Lines	9.65
Railroads	2.78
Water Lines	0.51
Power Lines	0.79
Gas Pipes	5.06
Oil Pipes	0.57
Broadband	0.01

Site number 13 is listed as the third suitable site for post-mine land development. The site is fairly close to several important criteria. It is only 0.79 miles from a Power Line (10 pts. in the suitability model) and 0.01 miles from broadband (9 Pts.). A large advantage of this site is the smallest distance to water lines. Even though the site has above average distance to exiting highway (10 pts) and railroad (5 pts.), short distances to other factors still make it a good choice for development.



Site's General Info

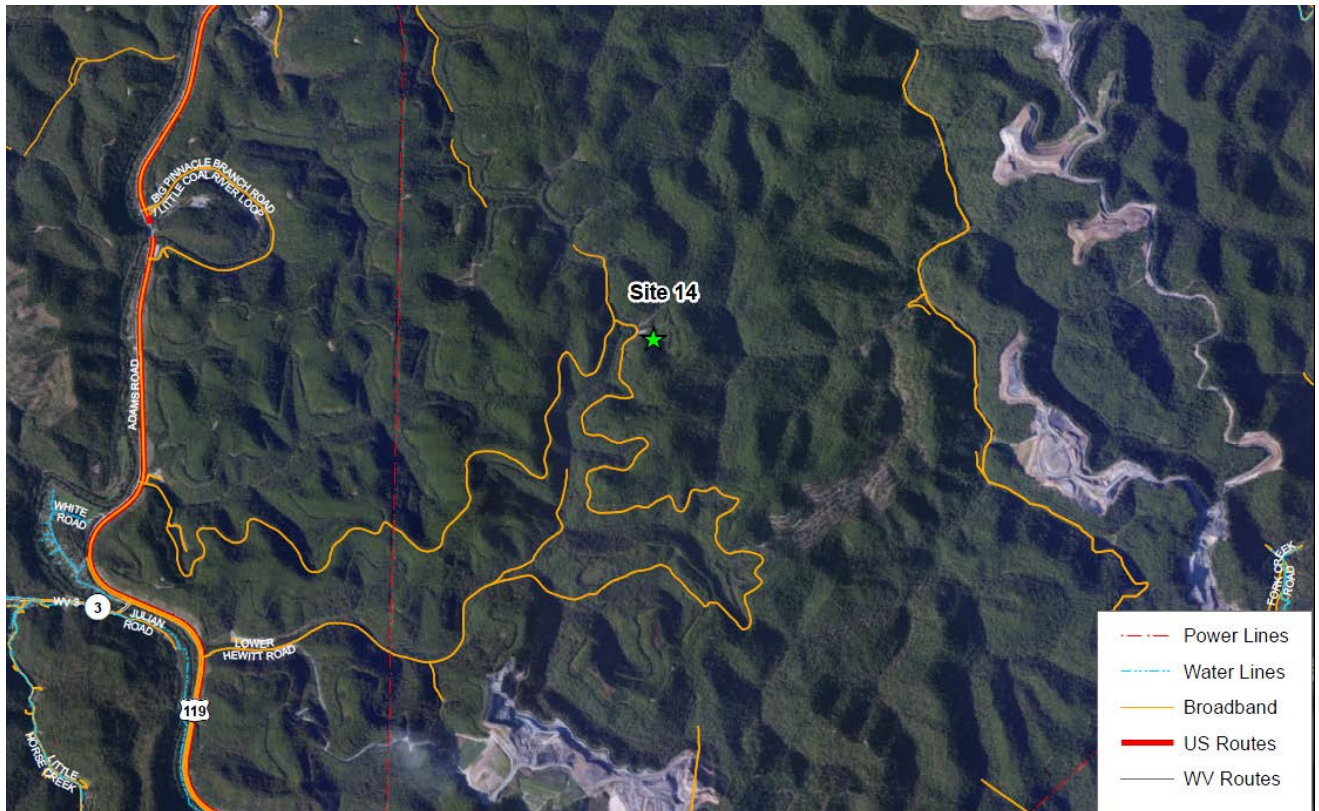
Permittee	Coal River Mining, Llc
Facility Name	Surface Mine No. 9
Permit ID	S500812
Issue Date	41526
Expiration Date	43352
Current Acres	1705
Lat	38° 10'28.0000"
Long	81° 48'11.0000"
Nearest Post Office	Julian

Site Number	14
Suitability Ranking	4
Total Score	400.5

Distance Analysis Results

Existing Highway	3.03
Sewer Treatment Facilities	3.91
Solid Waste Treatment Facilities	6.71
Sewer Lines	7.11
Railroads	3.33
Water Lines	3.34
Power Lines	2.00
Gas Pipes	3.93
Oil Pipes	0.67
Broadband	0.07

Site number 14 is ranked as the fourth suitable site for post-mine land development in the county. There are a few advantages to the site including short distances to Oil Pipes (0.67 miles) and Broadband (0.07 miles). However, the Railroad distance is 3.33 miles far from the site's center (5 pts).



Site's General Info

Permittee	Coyote Coal Co Llc
Facility Name	Buck Fork Surface Mine
Permit ID	S500511
Issue Date	40982
Expiration Date	42808
Current Acres	452.1
Lat	38° 8'54.0000"
Long	81° 47'42.0000"
Nearest Post Office	NELLIS

Site Number	2
Suitability Ranking	5
Total Score	382.75

Distance Analysis Results

Existing Highway	2.60
Sewer Treatment Facilities	3.48
Solid Waste Treatment Facilities	6.27
Sewer Lines	6.68
Railroads	2.90
Water Lines	2.91
Power Lines	1.57
Gas Pipes	3.50
Oil Pipes	2.73
Broadband	0.31

Site number 2 has the fifth highest score in the suitability model for its relatively close distances to several criteria including Existing Highways (2.60 miles), Solid Waste Treatment Facilities (6.27), Sewer Lines (6.68 miles), and Gas Pipes (3.50 miles). All of those criteria receive high absolute points. The distances from the site to other important criteria, such as Sewer Treatment Facilities, Water Lines and Power Lines, are also above average.



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 Boone County. Boone County's economy is typical of coalfield counties, with Government, Natural Resources, and Trade, Transportation, and Utilities making up the bulk of employment and wages. 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 decrease, age, and lack varied job opportunities. A sharp decline in the Natural Resources and Mining sector, leading to a significant drop in wages and employment in 2012, showcases the economy's overdependence on this sector. 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

Boone County was formed in 1847, 16 years before West Virginia became a state. It was named for Daniel Boone, twice United States Secretary of State and a Senator from Massachusetts. The county had, and has, vast natural resources that were used during the Industrial Age. As with many of the coalfield counties, the boom from natural resource extraction brought people and money to the area, but through the Great Depression and the withdrawal of many natural resource industries, Boone began to slip. Some indications show a recovery in the natural resources sector, but other indications reveal troubled times.¹

¹ Adkins, John E., "Boone County," *The West Virginia Encyclopedia*, Accessed March 24, 2014, <http://www.wvencyclopedia.org/articles/609>.

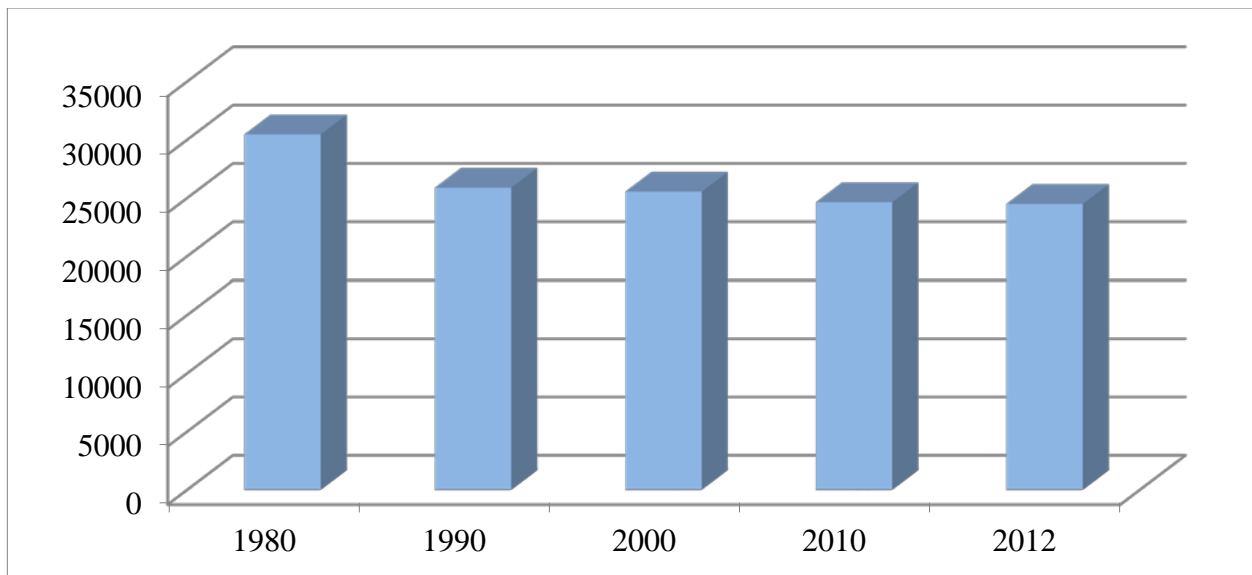
III. Existing Conditions

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

Population

The population of Boone County in 2012 was 24,478 according to the 2012 American Community Survey (ACS) 5-year estimates, ranking it 26th in county population among the 55 counties in West Virginia.² The decennial censuses show that Boone County has slowly but steadily lost population. The trend has slowed since the drop between 1980 and 1990, but continues into the current analysis year.

Figure 1: Census Populations for Boone County

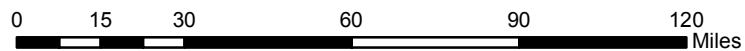
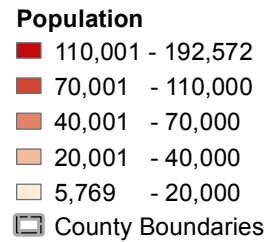
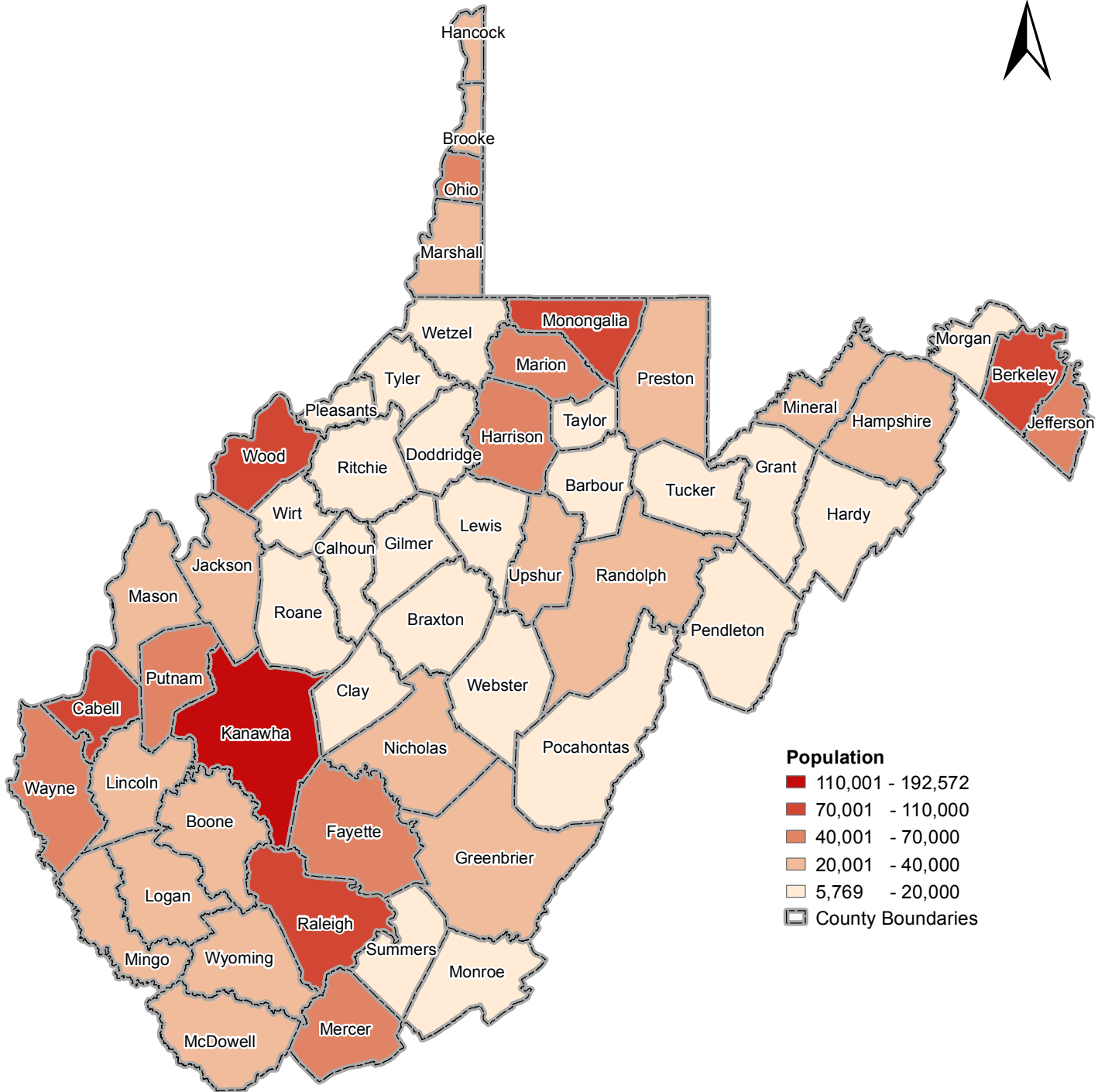


Source: Stats Indiana, USA Counties in Profile

Map 1 illustrates the Boone County population compared to West Virginia overall. Boone is in the middle of the spectrum, its population boosted due to its proximity to the cities of Beckley and Charleston in Raleigh and Kanawha.

² United States Census Bureau, "2012 American Community Survey 5-year Estimates," Accessed April 20, 2013, www.factfinder2.census.gov

Demographic Population



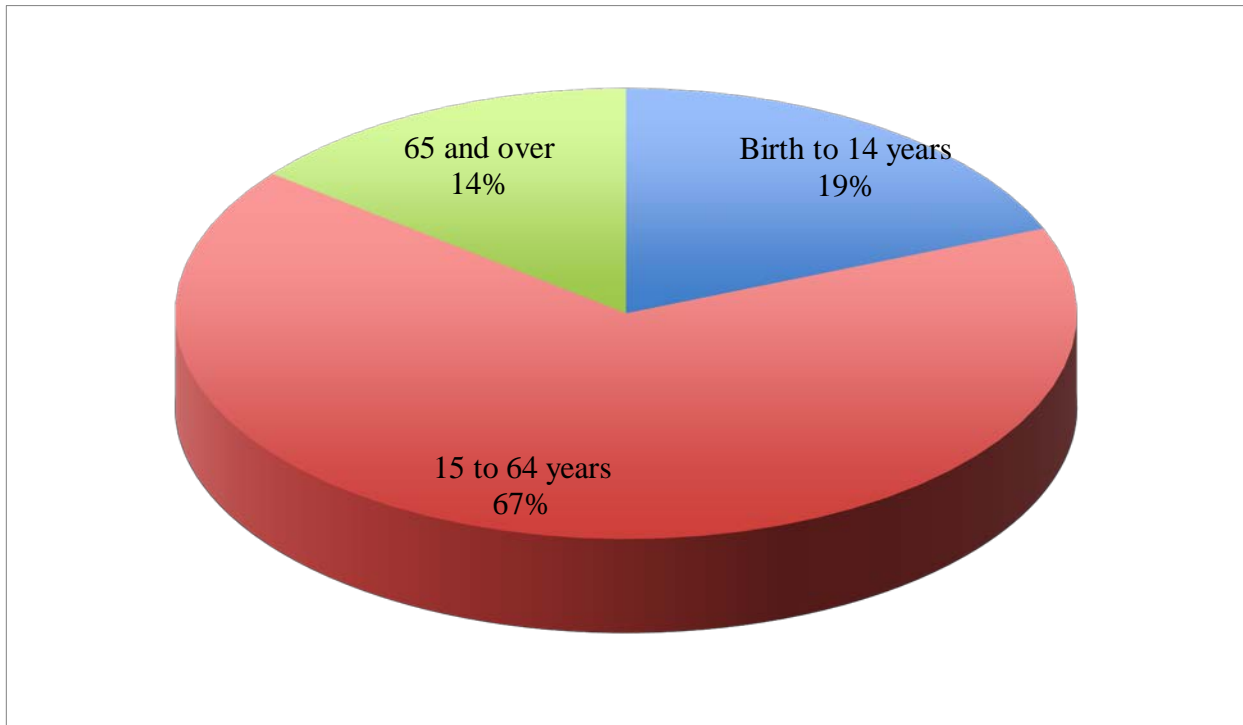
Source: U.S. Census Bureau, 2008-2012 American Community Survey

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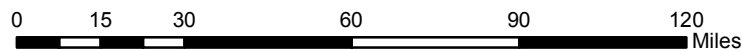
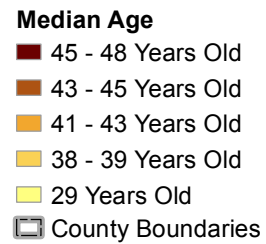
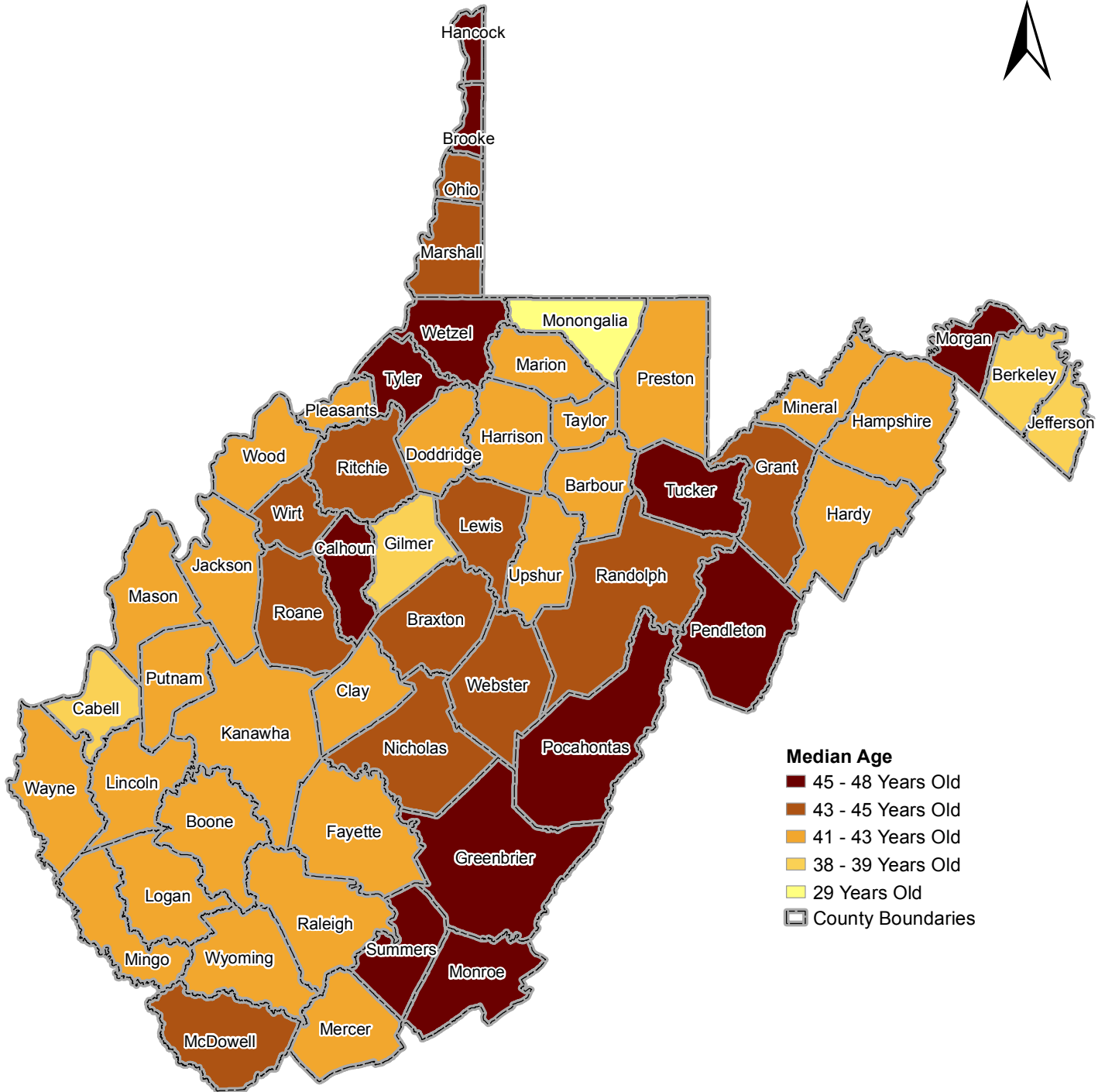
According to the ACS, just over 21 percent of Boone County residents are 60 years of age and over, while almost 19 percent are between 5 and 17 years of age and just over 6 percent are below the age of 5. Approximately 5,000 people are of retirement age. The median age in Boone is 41.2, which is very 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: Boone County Age Breakdown



Source: 2012 American Community Survey 5-Year Estimate Calculation

Demographic Median Age



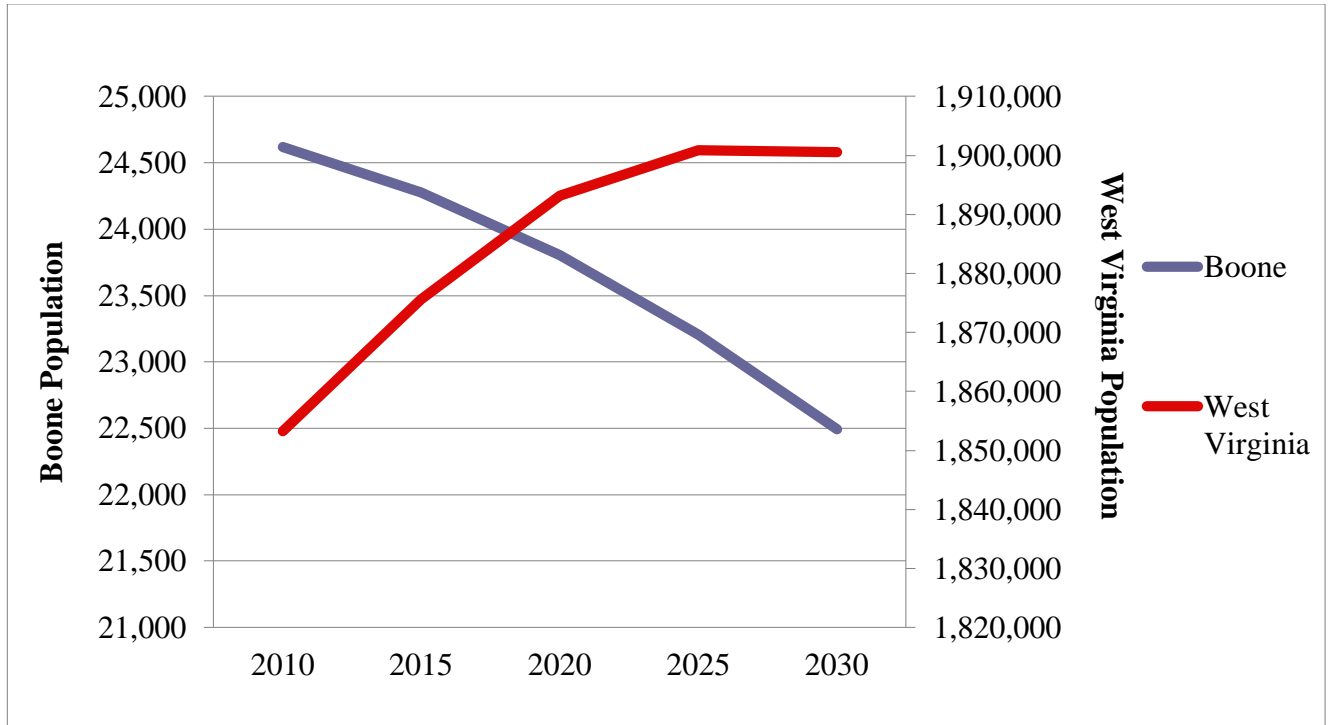
Source: U.S. Census Bureau, 2008-2012 American Community Survey

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The Bureau of Business and Economic Research at West Virginia University projects an 8.6 percent decrease in the Boone County population between 2010 and 2030, which is significantly different from the projected growth of West Virginia.³ The model for the projection is based on past population patterns and statistics, and should not be taken as permanent. The projected decrease is derived from the consistent decrease from 1980 to 2012 and the lack of any noticeable increase in between these census and ACS years.

Figure 3: Population Projections



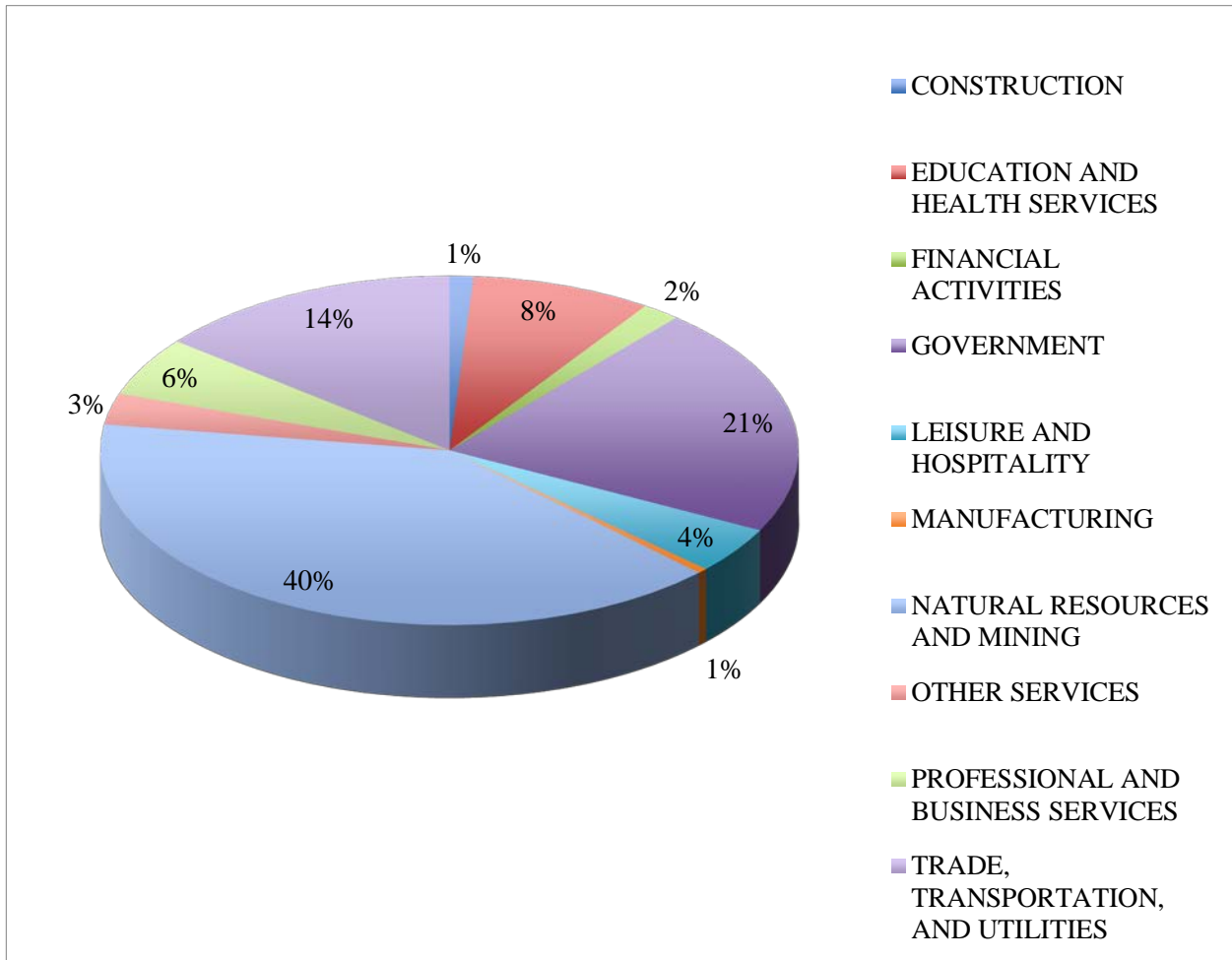
Source: WVU Bureau of Business and Economic Research

Employment

Workforce WV has a complete dataset on employment numbers and wages. The total number of employed in 2012 was 7,946. Approximately 40 percent of wage earners in Boone County worked in in Natural Resources and Mining and just over a fifth worked in Government. Boone County’s employment mix is consistent with several other coal counties, comprised of Natural Resources, Government, and Trade, Transportation, and Utilities. This mix is fairly diversified, but recession, coal company cost cutting, and political whims are all great risks to future prosperity.

³ Christiadi. “Population Projection for West Virginia Counties.” Bureau of Business and Economic Research, College of Business and Economics, West Virginia University, Morgantown, WV (August 2011).

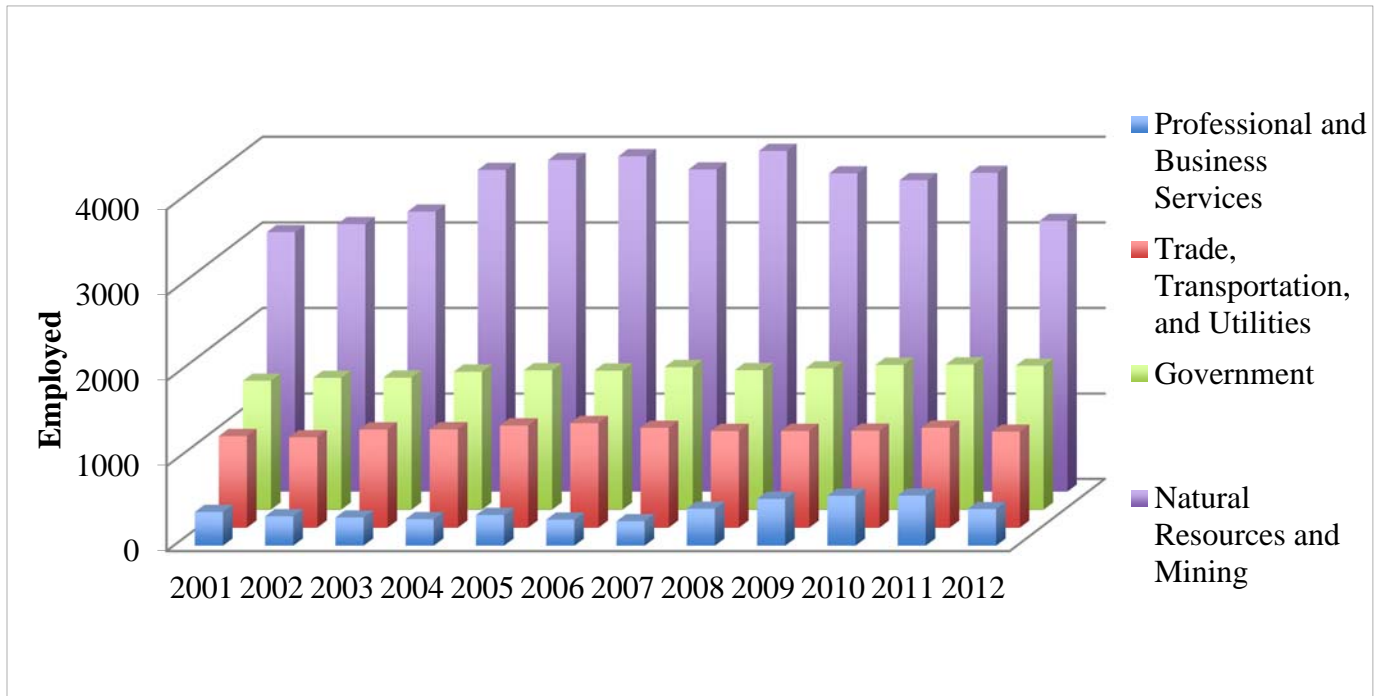
Figure 4: 2012 Boone County Employment



Source: Workforce WV

Four sectors have been the major contributors to employment throughout the past decade: Natural Resources and Mining; Government; Trade, Transportation and Utilities; and Professional and Business Services. Natural Resources and Mining has consistently been the highest employer, while Government has been consistently second. Though Education and Health Services in 2012 contributed slightly more to employment than Professional and Business Services, wages in the Education and Health Services sector are not high enough to contribute to economic activity in the same way that wages in the Professional Services sector can.

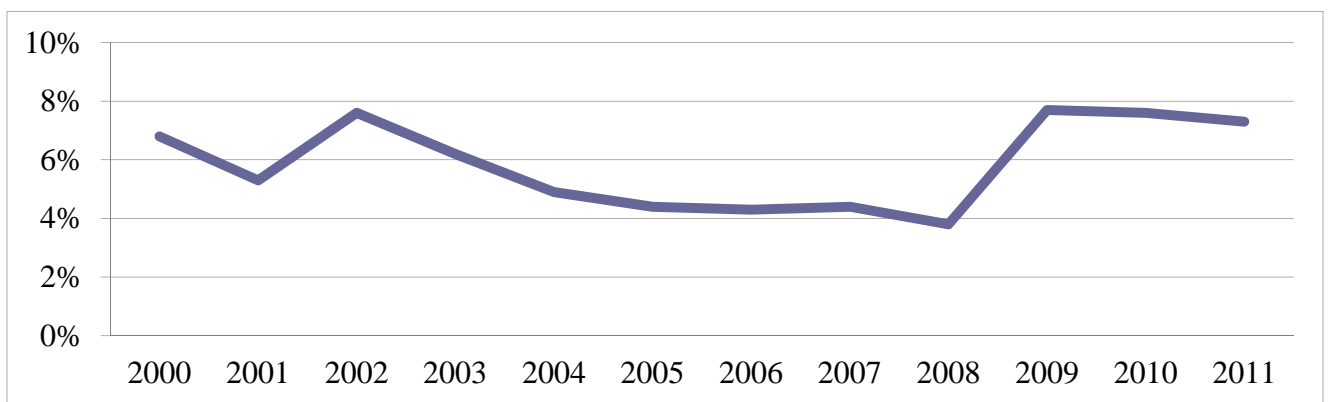
Figure 5: Boone County Employment by 4 Sectors 2001-2012



Source: Workforce WV

The civilian labor force in the county is one of the most interesting statistics when determining potential investors. As Map 3 shows, Boone’s participation rate is at the lower end of the scale. This is a condition many coalfield counties face. Despite a small rise from the national economic contraction in 2002, unemployment was decreasing until the recession in 2008 and natural resource sector cost cutting around the same period. (Figure 6). Unemployment has slowly been falling, and in 2011 was about average compared to the state. Note that 2011 data is used for this graph and map, as the data for Workforce WV and the Census Bureau did not match because the most recent data has not been seasonally adjusted.

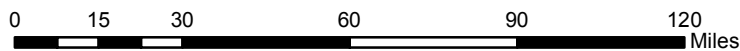
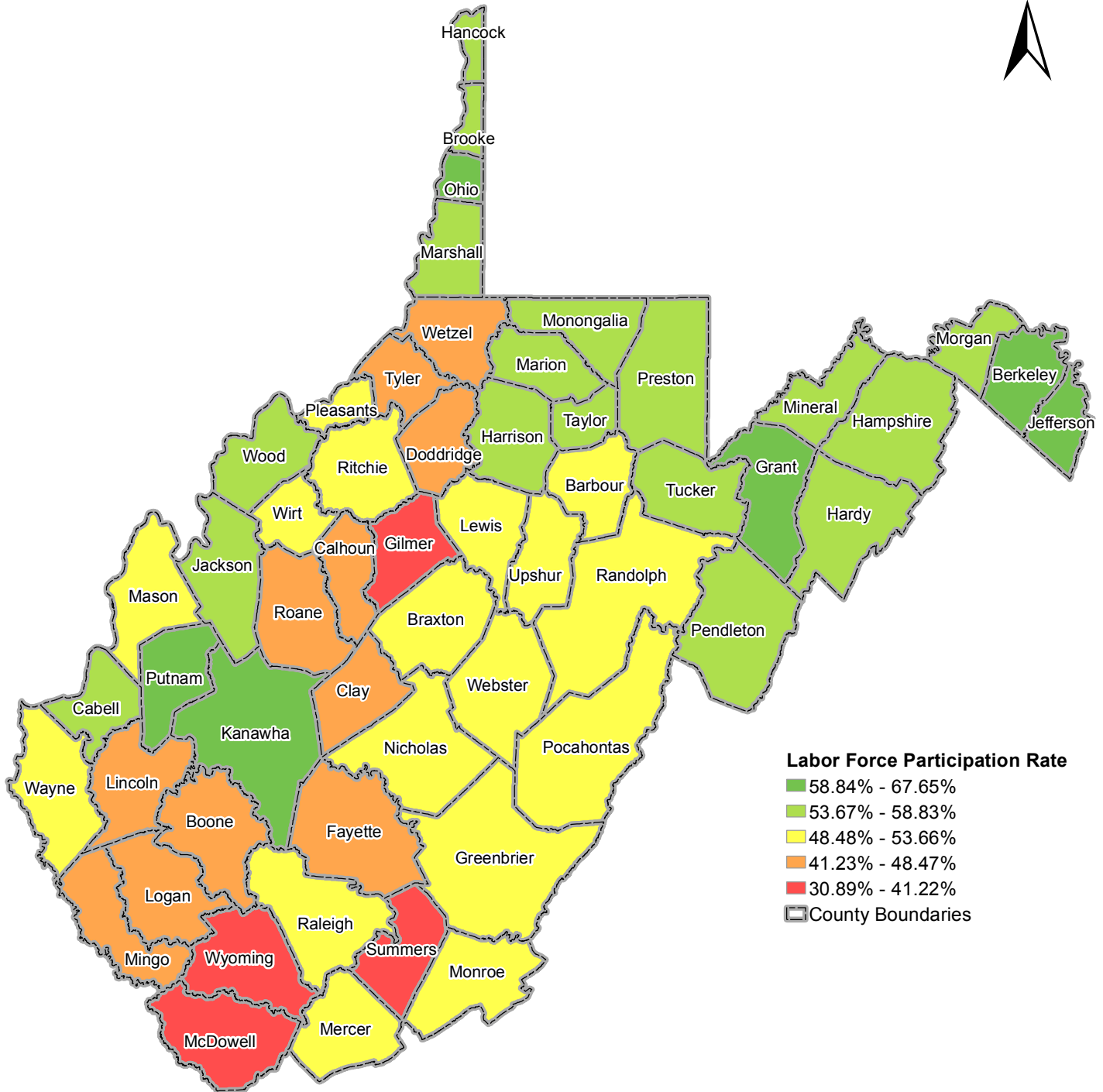
Figure 6: Boone County Unemployment Rate



Source: Workforce WV

Demographic

Labor Force Participation Rate

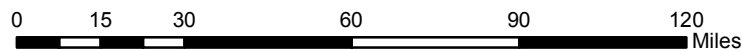
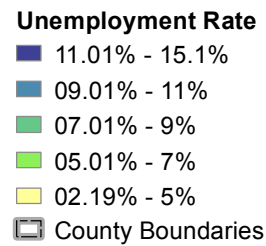
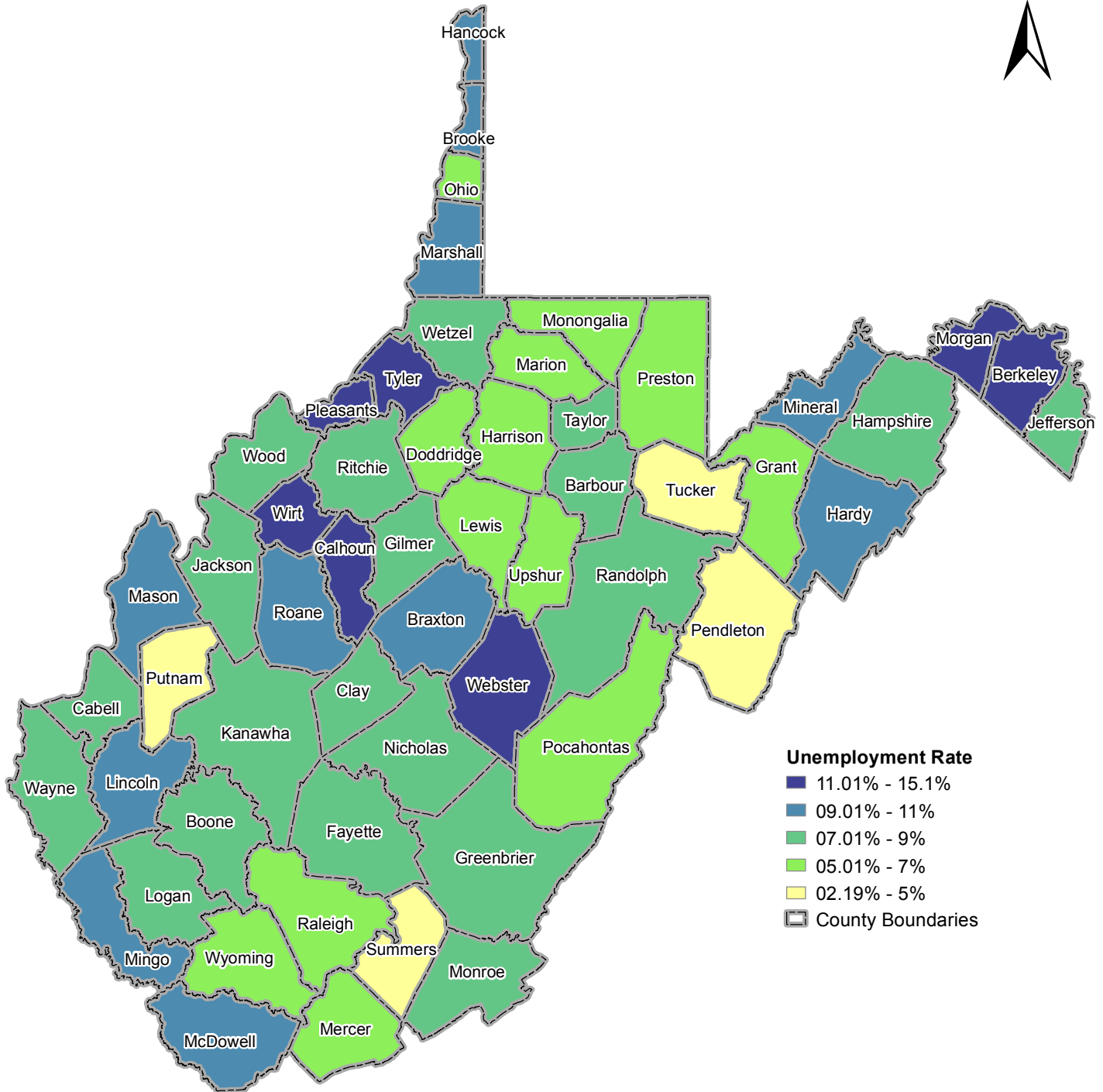


Source: U.S. Census Bureau, 2008-2012 American Community Survey

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Demographic Unemployment Rate



Source: U.S. Census Bureau, 2007-2011 American Community Survey

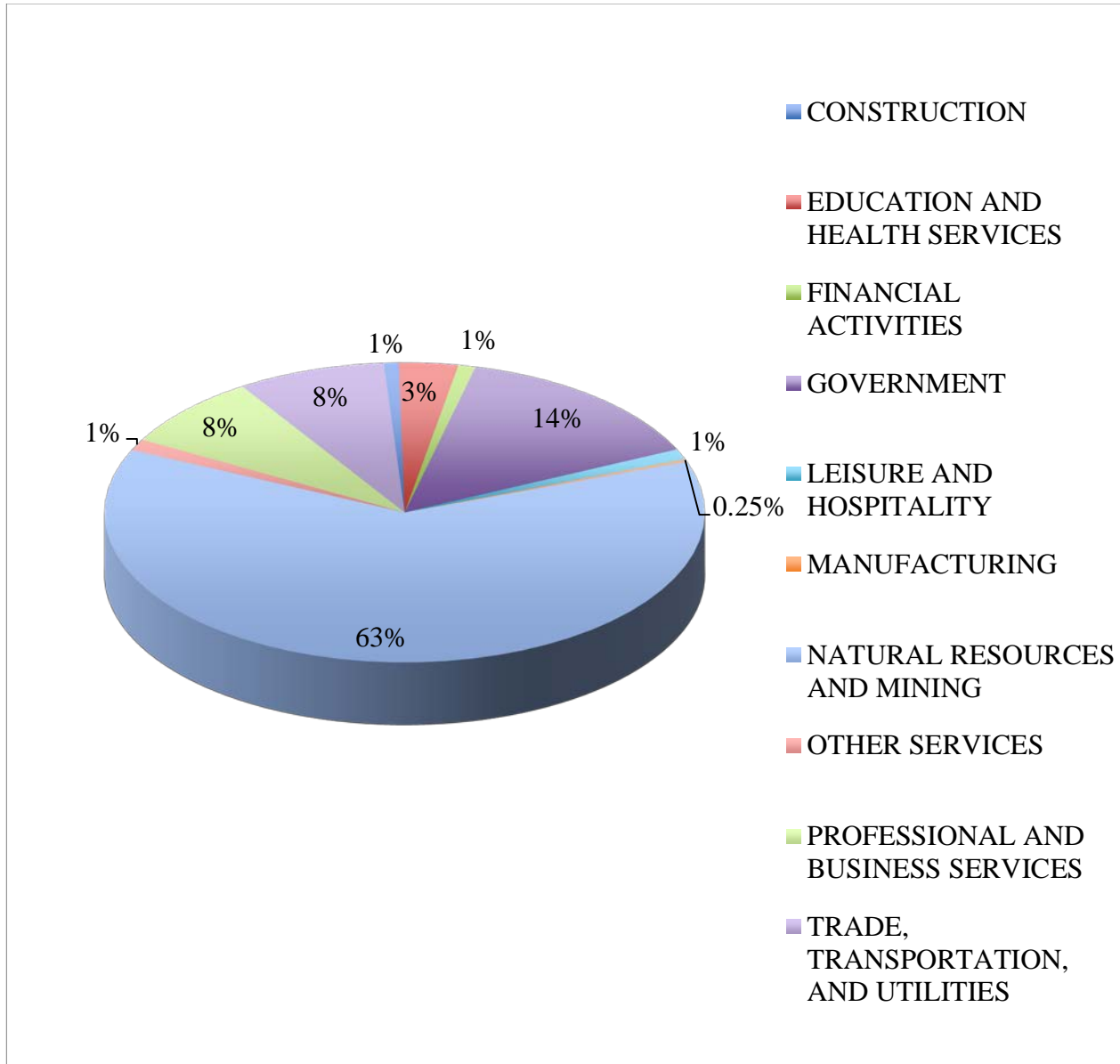
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Wages and Income

Boone County's wage contributors vary widely in the level of contribution. The highest, Natural Resources and Mining, is because the sector is the highest employing and one of the highest earning sectors in the county (Figure 7). Government is next because of the sheer size of the sector in the county, and the other sectors that are the main four employers are the next two highest wage contributors.

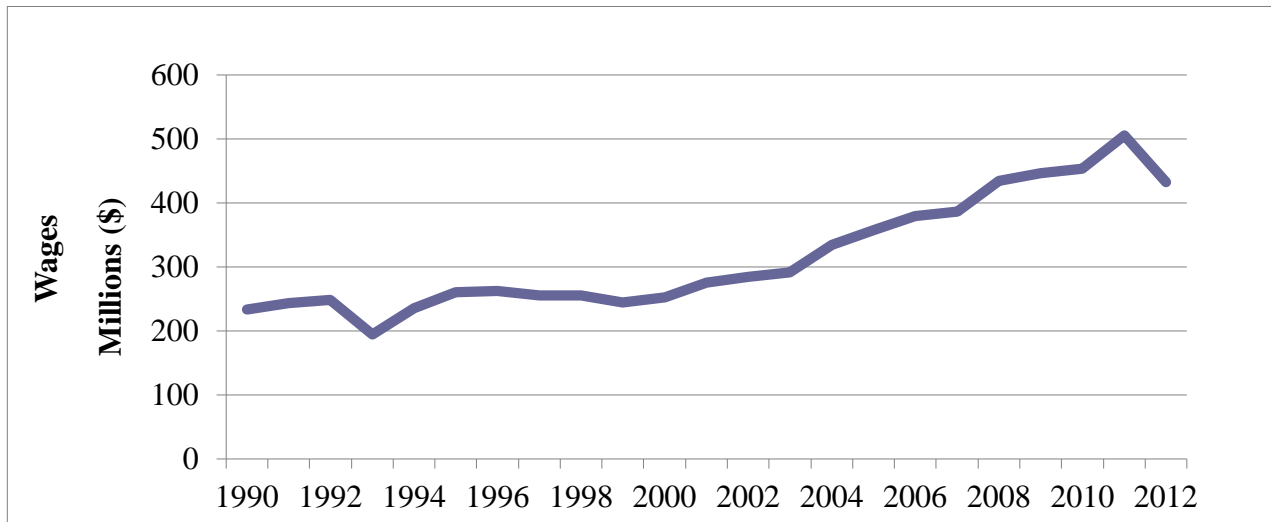
Figure 7: 2012 Boone County Total Wages



Source: Workforce WV

Historically, wages for Boone County have shown a tendency to rise, though there was some stagnation in the late 90s and early 2000s. Boone County has managed to keep many of its support activities for mining and government jobs, 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 Boone County, which have consistently shown an upward trajectory until 2011, when unemployment spiked. The employment situation is not inherently sustainable, as it is based on two very finite resources: resources to extract, and political acceptance of government spending, which affects wages.

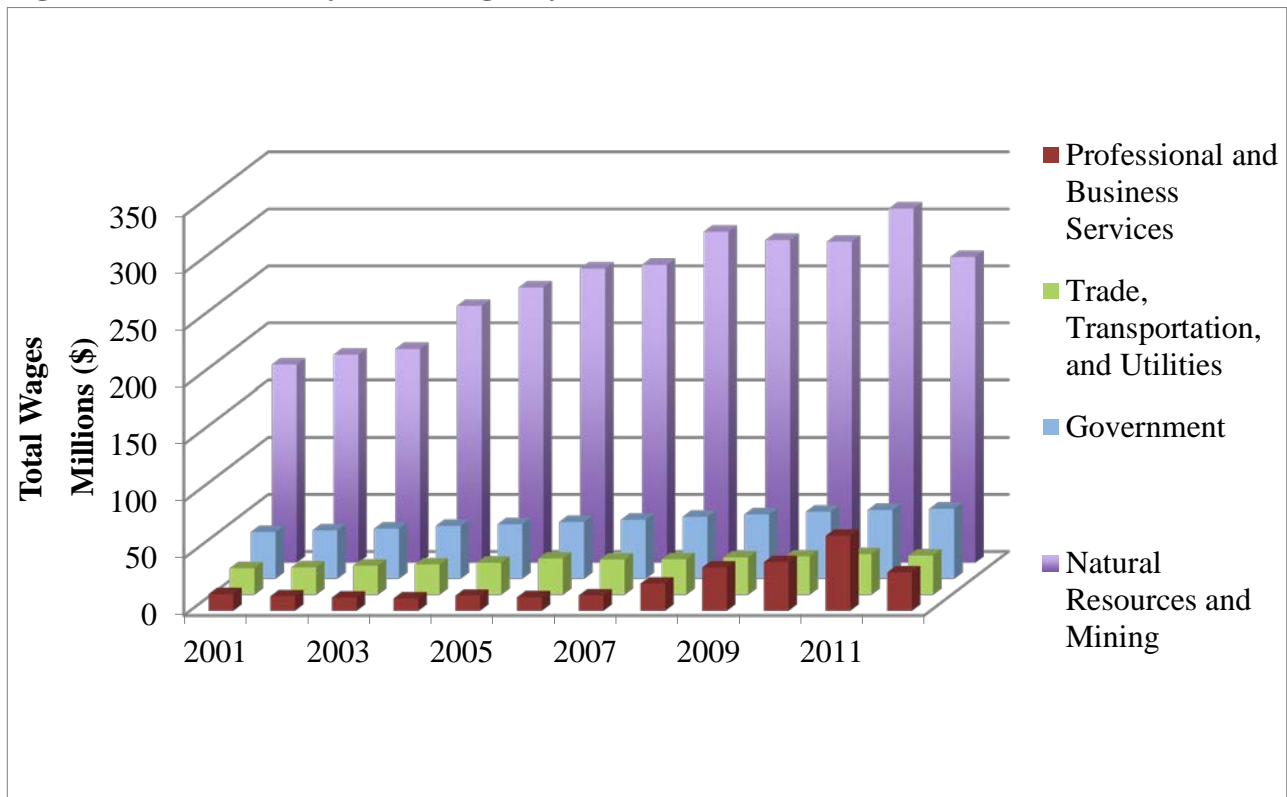
Figure 8: Boone County Total Wages 1990-2012



Source: Workforce WV

Figure 9 confirms the general trend in wages, also showcasing the dominance of two major sectors. Natural Resources and Mining has always been the major sector in Boone County, and the costs of its predominance in the employment and wage portfolio, and the natural resource sectors general decline, are evident, especially the sharp decline in 2011.

Figure 9: Boone County Total Wages by 4 Sectors 2001-2012



Source: Workforce WV

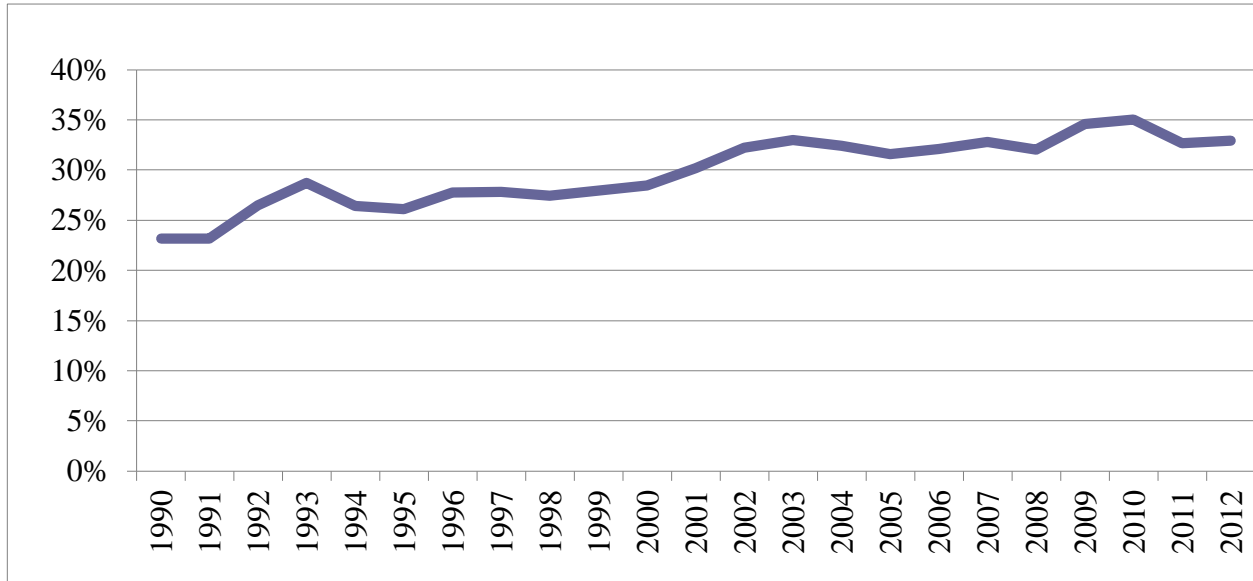
In most American counties, one would find that the majority of income for people stems from wages. In West Virginia, however, an important distinction must be made between income and wages. Income is the total receipt of earnings resulting from any economic activity, while wages are derived from actual work in an employed setting. Therefore, dividends from stockholdings are considered income, but not wages. The distinction is necessary in the case of Boone County because in 2012, Boone County wages were \$432 million for all industries.⁴ Income for the County was larger (around \$752 million). Though there are many components to income other than work earnings, 33 percent of total Boone County income is derived from government transfers.⁵ Government transfers accounted for about 95 percent of total transfers to Boone County, dwarfing transfers from private institutions such as charities. Government transfers have consistently contributed between a fifth and a third to income over the past 20 years. This does

⁴ “Employment and Wages – 2012, Boone County,” Workforce WV, Accessed February 13, 2014, <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 February 13, 2014, <http://www.bea.gov/regional/index.htm>.

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 Boone County

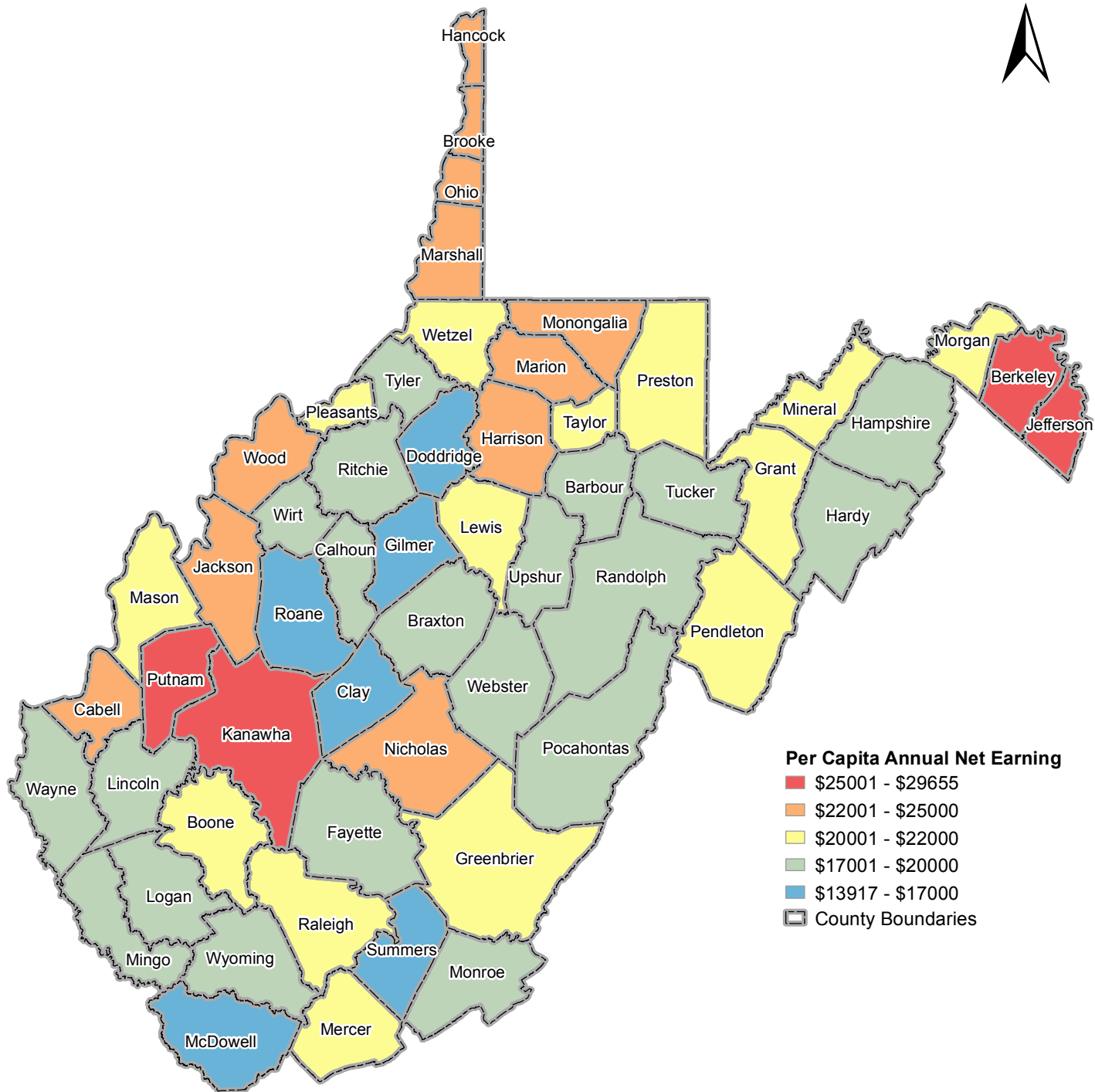


Source: United States Bureau of Economic Analysis

The total personal income of Boone County is therefore made up of 33 percent government transfers. Boone County has close to an average ratio of government transfers. According to the BEA, per capita income was \$30,736 for Boone County in 2012. Annual net earning, or income from work, is displayed in Map 5, and Boone is ranked average in earned income in West Virginia.

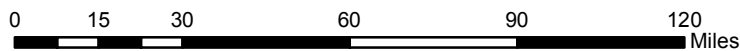
Another measure of economic health is the number of establishments that do business in the area. Map 6 shows the number of establishments in each county in West Virginia. Boone County appears to be at the lowest end of the spectrum. The number of establishments may be misleading, as the natural resources sector and government services are characterized by a small number of firms.

Demographic Per Capita Annual Net Earning



Per Capita Annual Net Earning

- \$25001 - \$29655
- \$22001 - \$25000
- \$20001 - \$22000
- \$17001 - \$20000
- \$13917 - \$17000
- County Boundaries



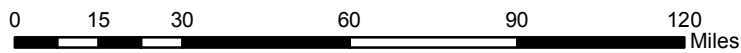
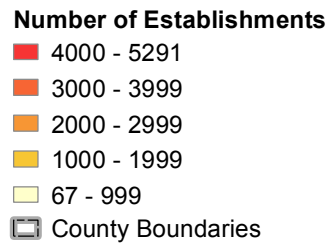
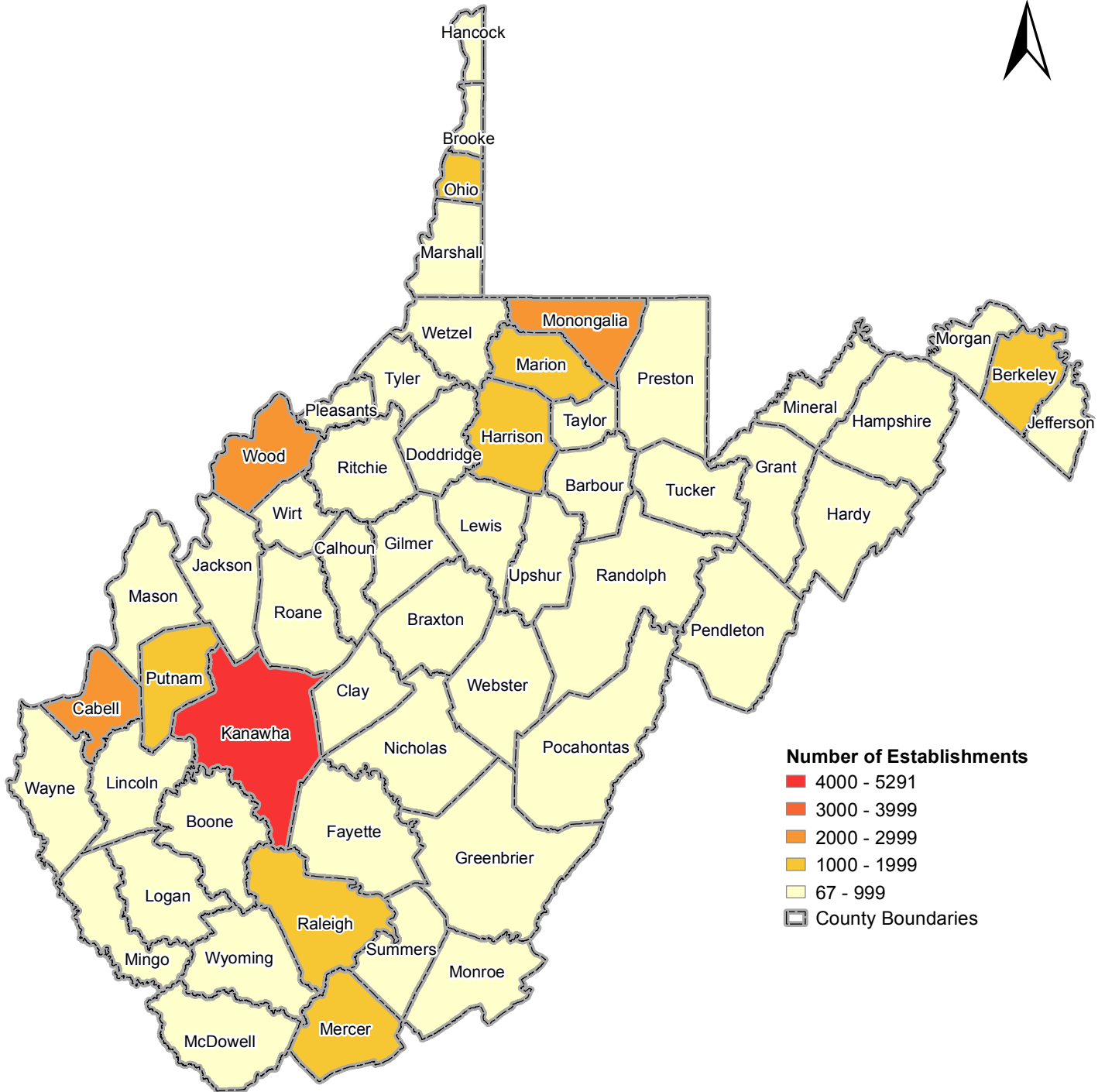
Source: U.S. Census Bureau, 2008-2012 American Community Survey

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Demographic

Number of Establishments



Source: U.S. Census Bureau, 2011

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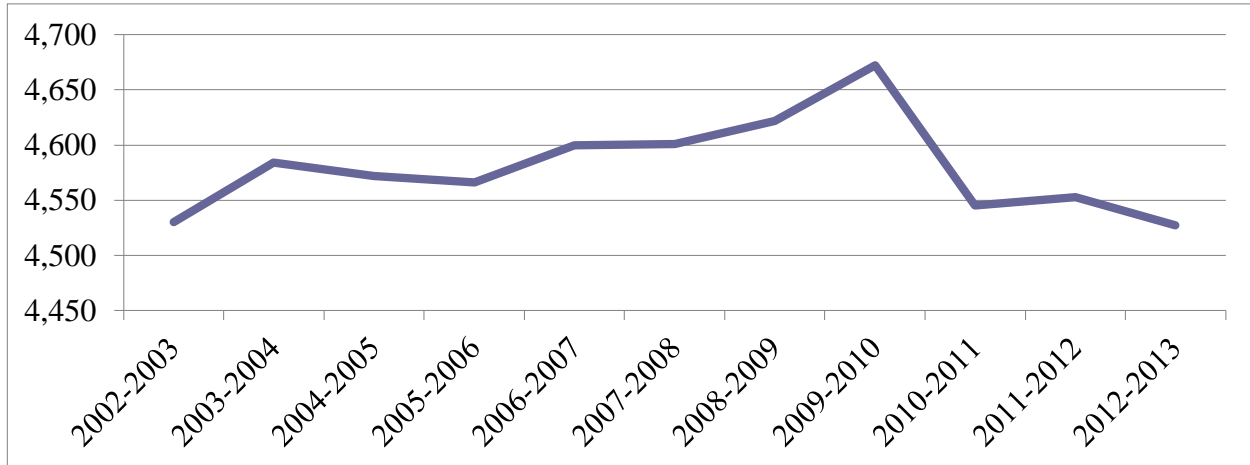


Education

Boone County has three high schools, two middle schools, and 10 elementary schools as of the 2012-2013 school year.⁶

Boone County 2nd month school enrollment showed a consistent increase until the 2010-2011 school year, when it saw a major decrease coinciding with the economic troubles of the time. Still, Boone County's 2nd month enrollment is average for the state (Map 7).

Figure 11: Boone County School Enrollment

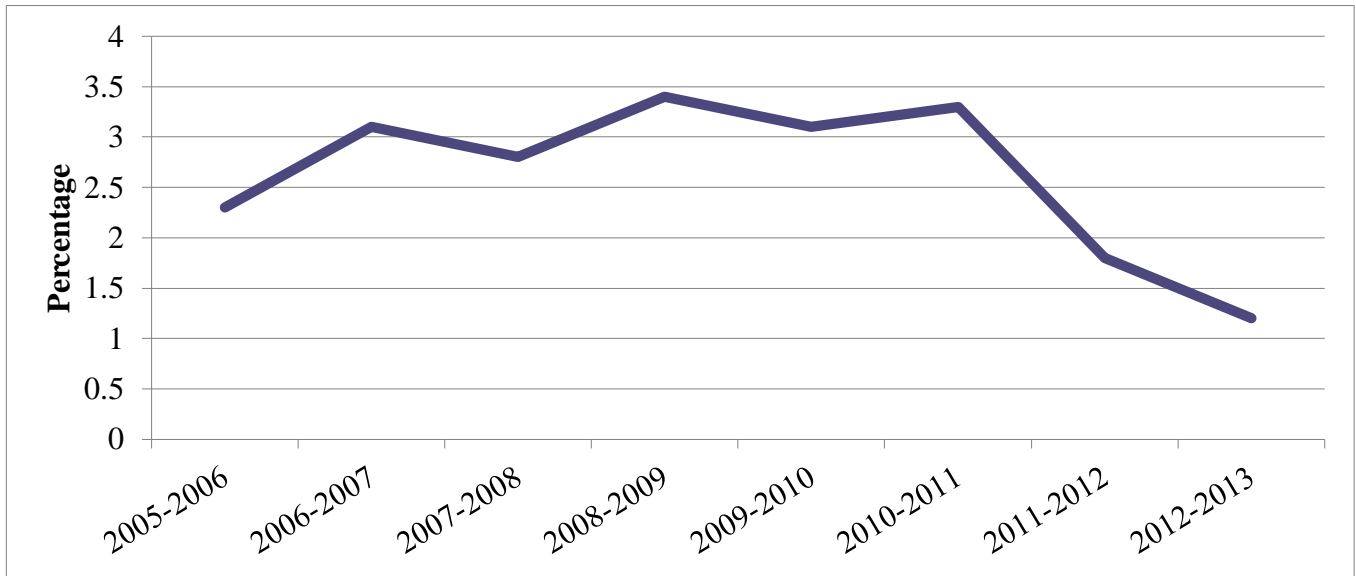


Source: WVEIS

The West Virginia Education Information System (WVEIS) also has dropout rates for the school years from 2005 to 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 followed no particular pattern until 2010, when the full effects of the recession depressed job opportunities for local non-graduates, encouraging them not to drop out (Figure 12).

⁶ "School Profiles," West Virginia Education Information System, West Virginia Department of Education, Accessed February 13, 2014, http://wveis.k12.wv.us/nclb/profiles/c_profile.cfm?cn=043.

Figure 12: Boone County Dropout Rate

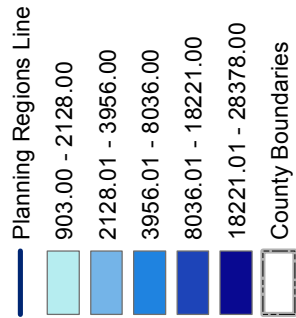
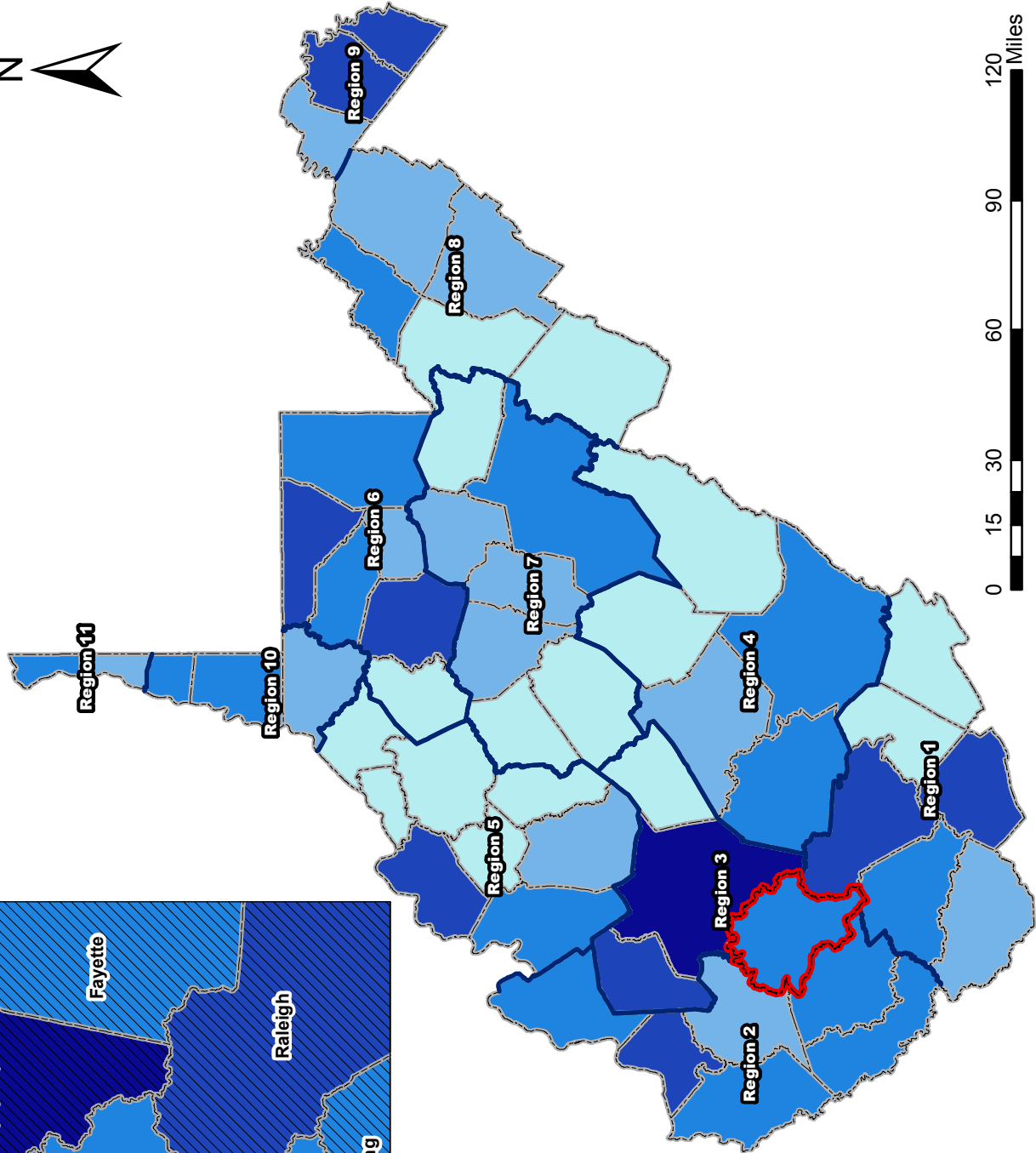
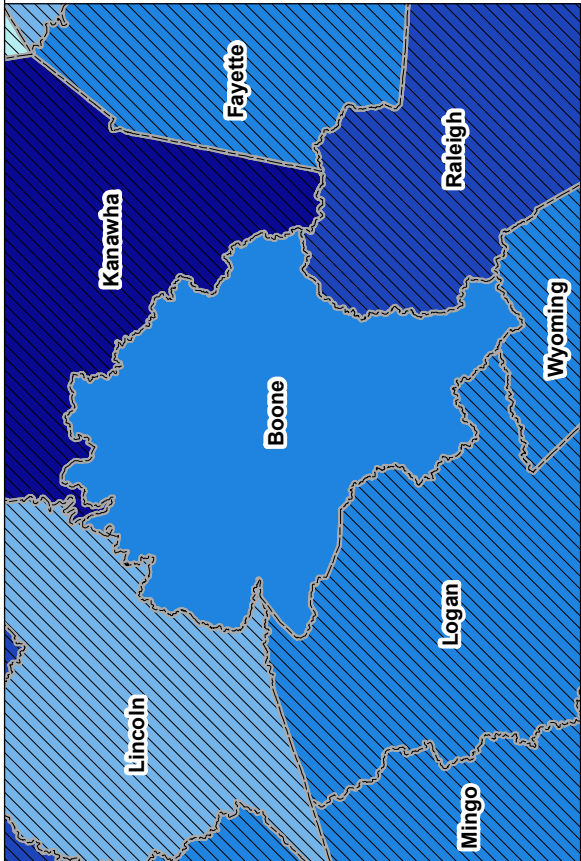


Source: WVEIS

Map 8 shows each county's dropout rate. Boone County currently has an average dropout rate. Maps 9 and 10 show the total graduates and the graduation rate by county, both of which are just below average for the state. Boone County's 15 schools' locations are noted in Map 11. Not coincidentally, the major schools are located on the main roads in the county. The largest schools by attendance in the county are Madison Elementary and Middle Schools. 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

Boone County



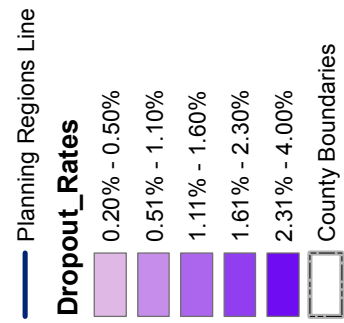
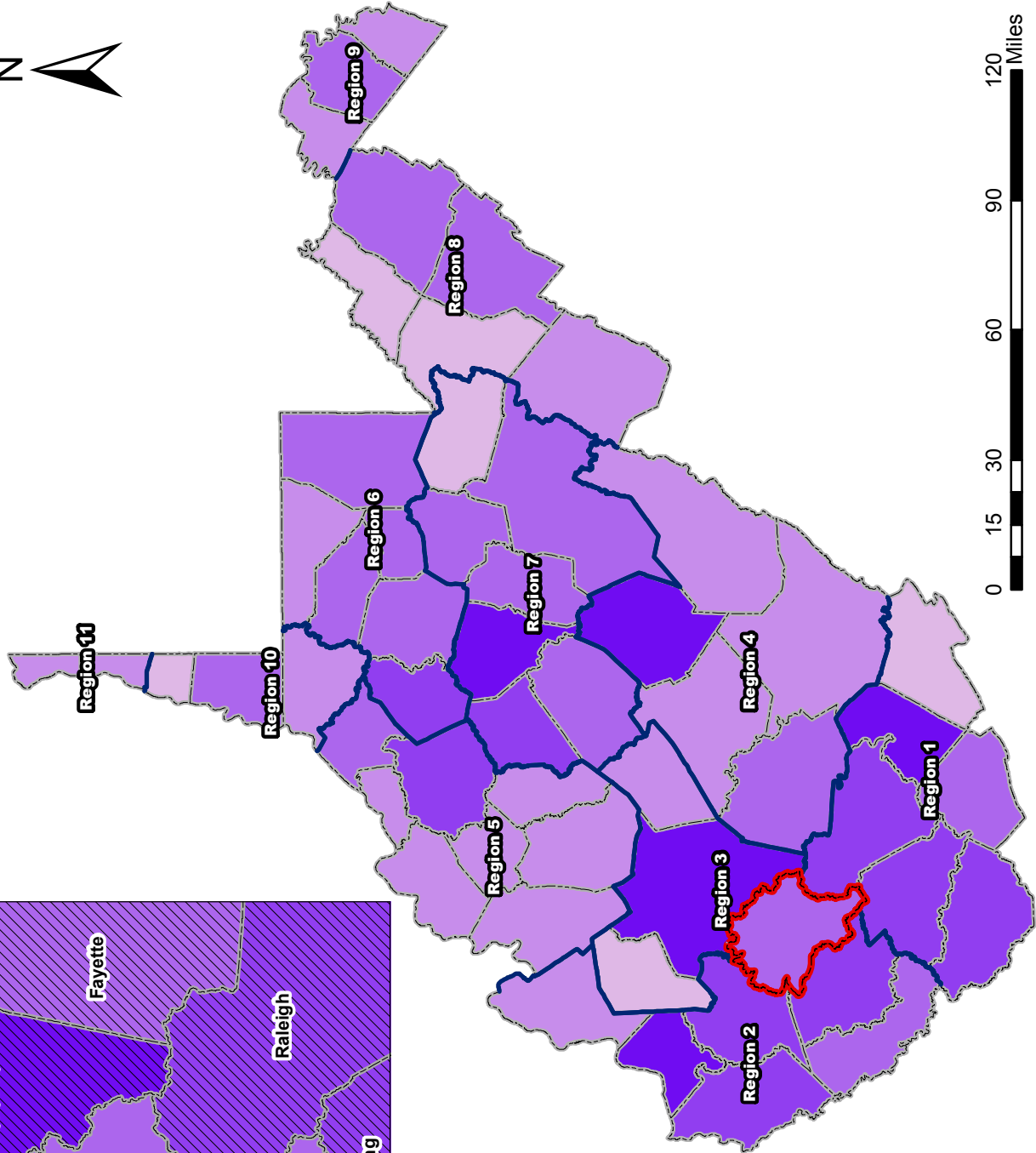
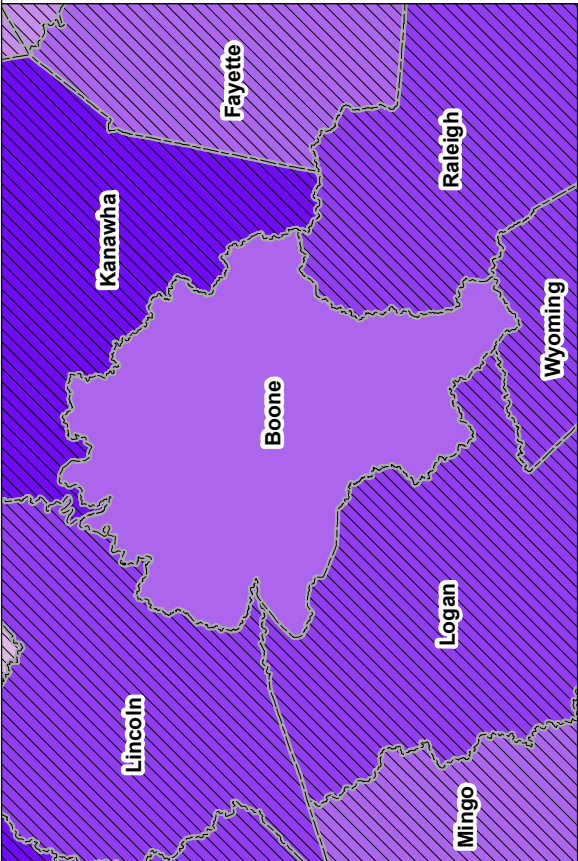
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Source: West Virginia Department of Education 2014

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NCLB - Dropout Rate

Boone County

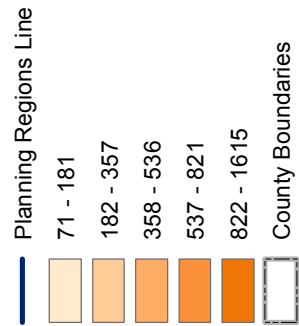
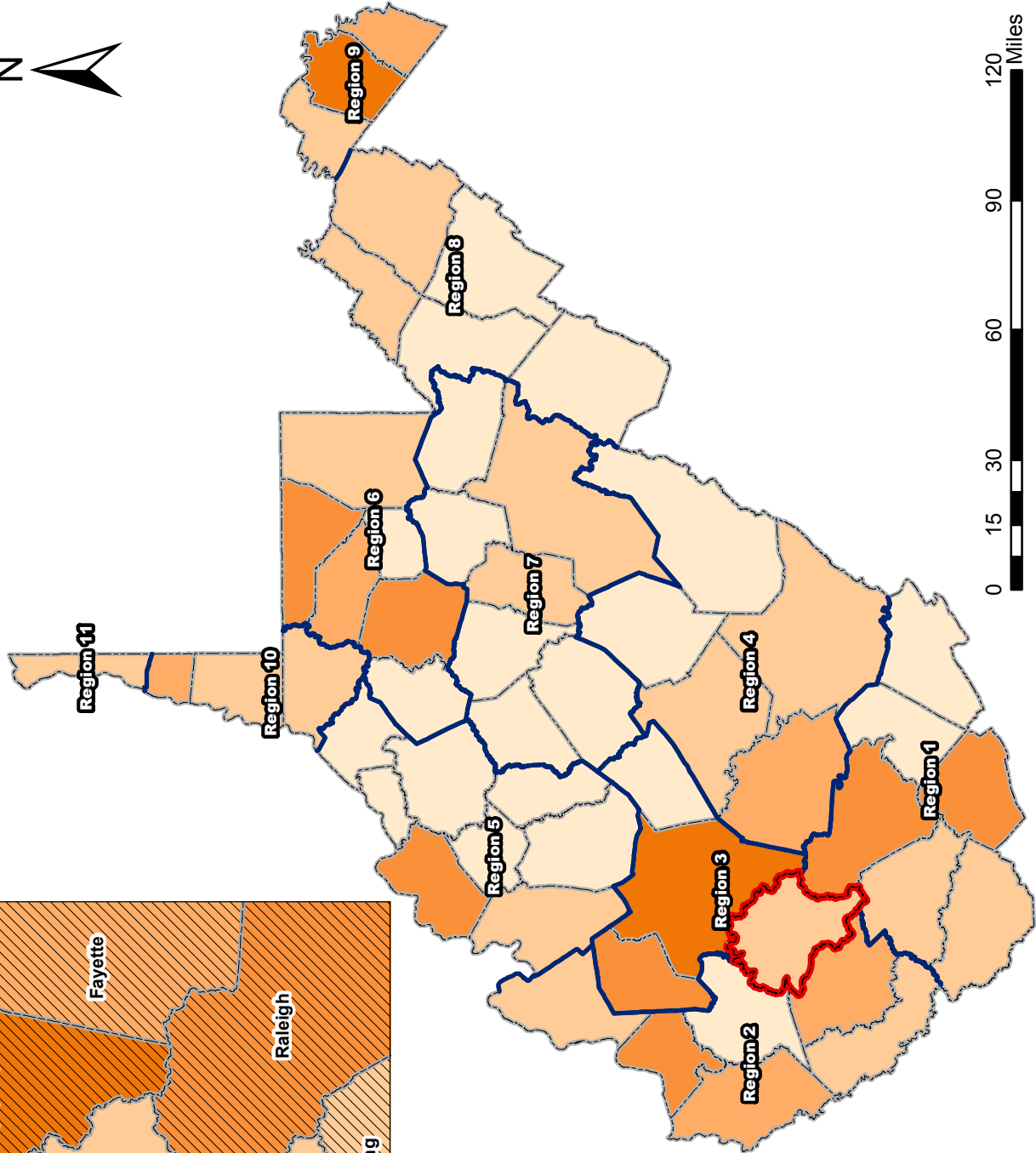
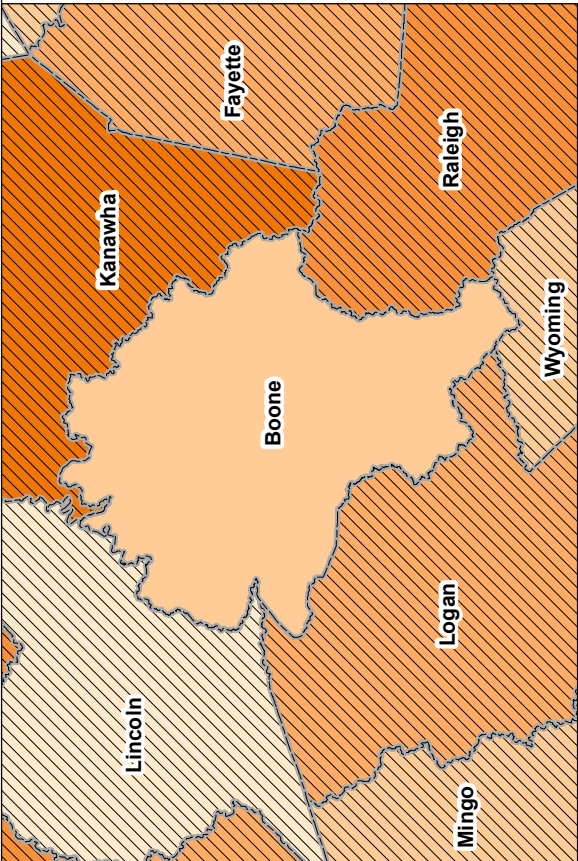


Source: West Virginia Department of Education 2014

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NCLB - Total Graduates

Boone County



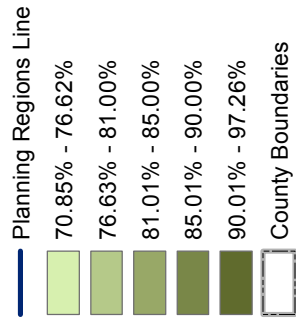
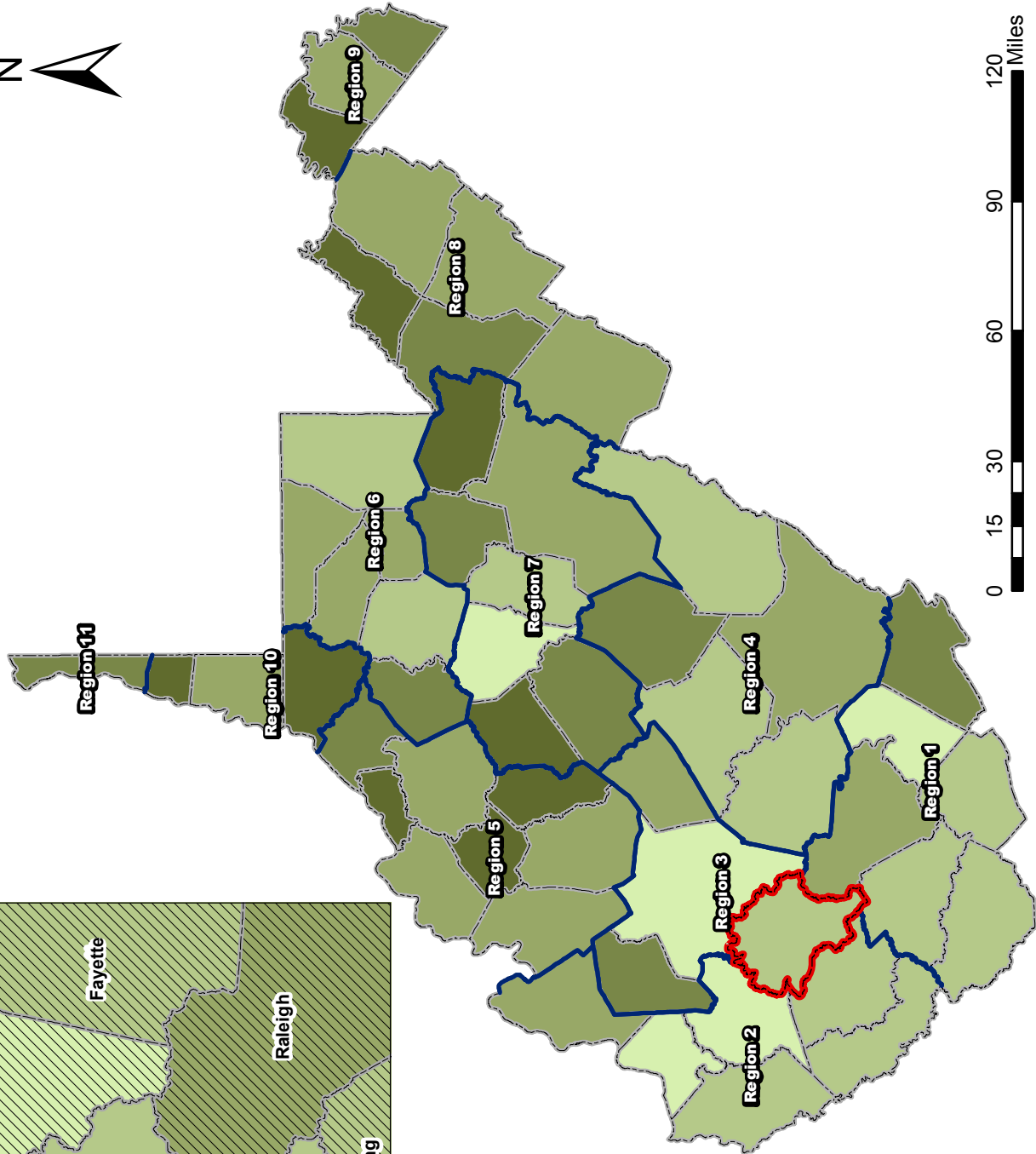
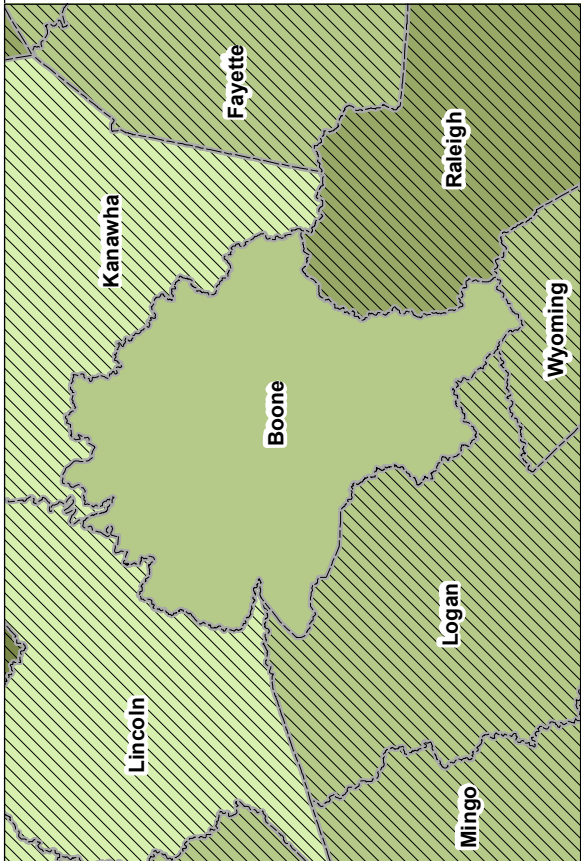
Source: West Virginia Department of Education 2013

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NCLB - Graduates Rate

Boone County

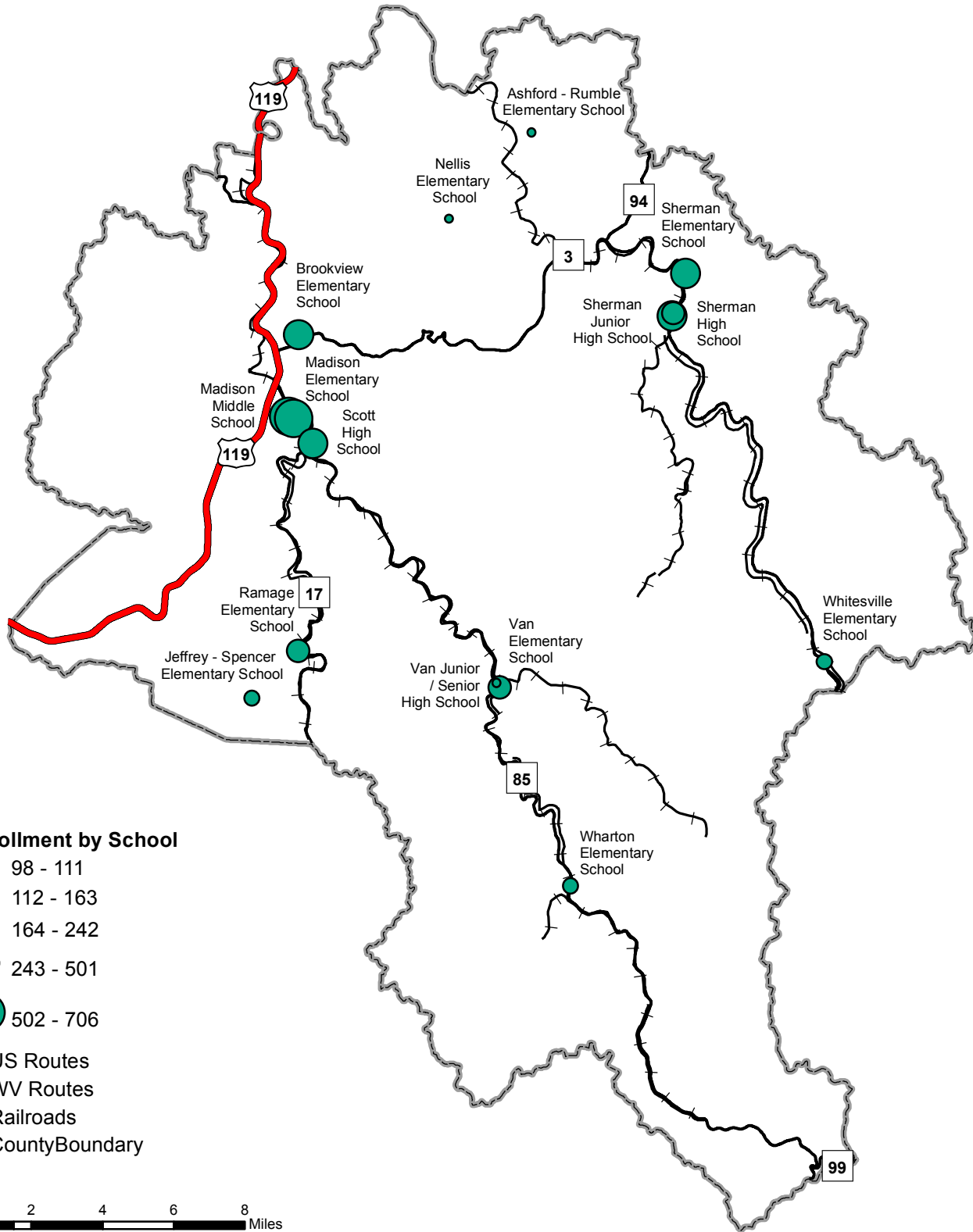


Source: West Virginia Department of Education 2014

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Total Attendance by School - 2014

Boone County



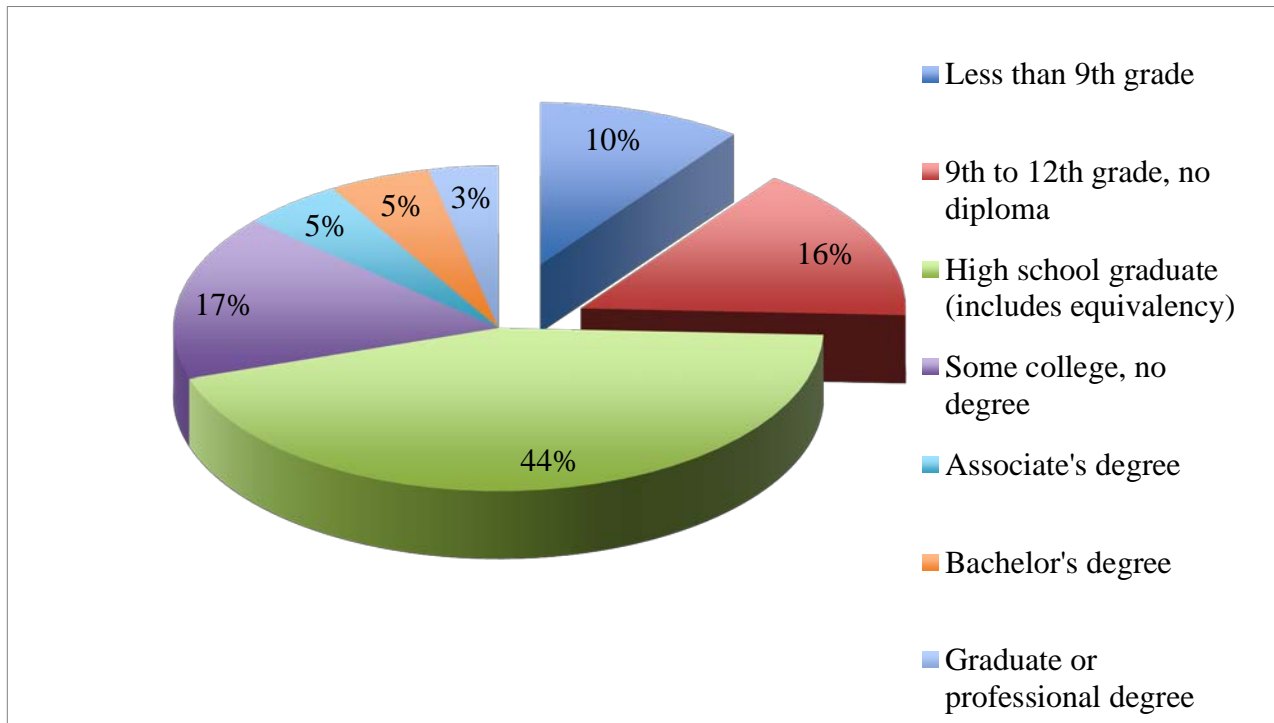
Source: West Virginia Department of Education 2014

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The ACS also maintains data on the educational attainment of the population that is 25 years and over. Forty-four percent of these residents have a high school diploma or equivalent. However, 26 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: Boone County Educational Attainment



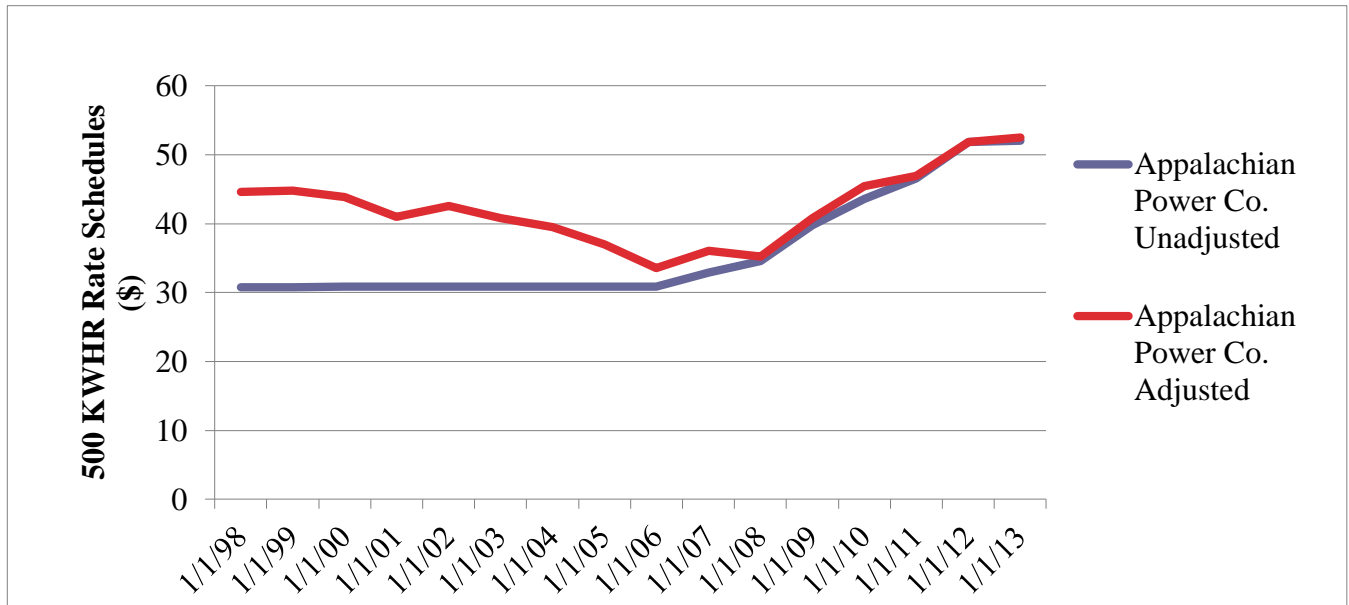
Source: 2012 American Community Survey 5-Year Estimates

Utilities and Infrastructure

Boone County has 12 utility companies according to the West Virginia Public Service Commission (PSC). Economic development depends on infrastructure, and Boone County has several providers of water and sewer, and one provider of electricity. Appalachian Power Company provides residential, industrial, and large-capacity service to Boone County.

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 2012. The adjusted and unadjusted prices are provided in Figure 14.

Figure 14: Power Company Prices



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

The graph shows that electricity rates steadily decreased in real terms through 2006 and remained fairly constant with adjustment. Both adjusted and unadjusted prices have increased since 2006. Many possible factors contributed to this rise, including the increased costs of energy and the increased demand. Map 12 also shows the distribution of power lines, plants, and substations within West Virginia and Boone 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. Boone County has 2 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 two solid waste transfer stations in Boone County.

Table 1: Boone County Water and Sewer Rates

Boone County Public Service District	
Water Rates	
First 1500 gallons used per month	Minimum charge based on meter size
Next 28500 gallons used per month	10.29 per 1000 gallons
Next 870000 gallons used per month	6.77 per 1000 gallons
Next 8100000 gallons used per month	4.93 per 1000 gallons
All Over 9000000 gallons used per month	3.20 per 1000 gallons
Sewer Rates	
First 3000 gallons used per month	12.26 per 1000 gallons
Next 3000 gallons used per month	11.06 per 1000 gallons

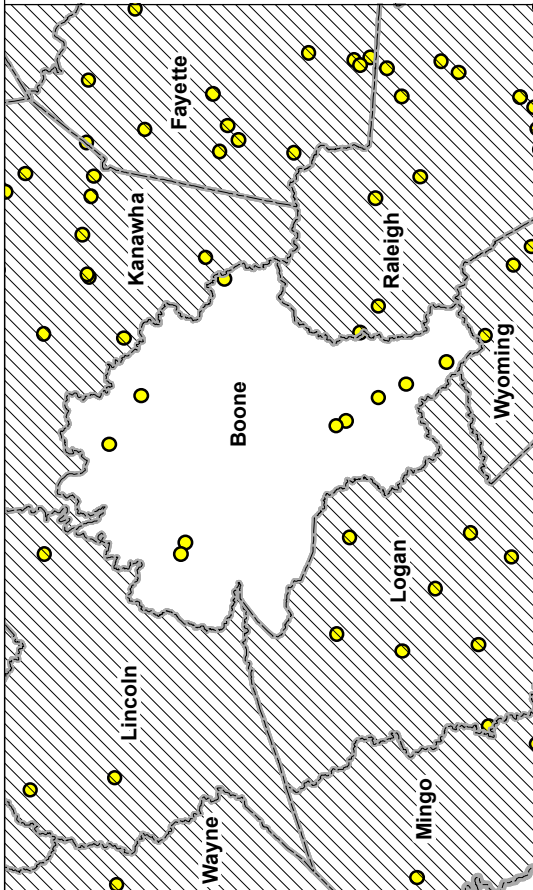
Next 4000 gallons used per month	10.48 per 1000 gallons
Next 10000 gallons used per month	7.91 per 1000 gallons
Over 20000 gallons used per month	7.00 per 1000 gallons
Boone-Raleigh Public Service District	
Water Rates	
All gallons used per month	7.71 per 1000 gallons
Sewer Rates	
All gallons used per month	10.79 per 1000 gallons

A private water company, West Virginia American Water Company, also services Boone County. The general service rates are listed in the table below, and are rounded to the nearest cent.

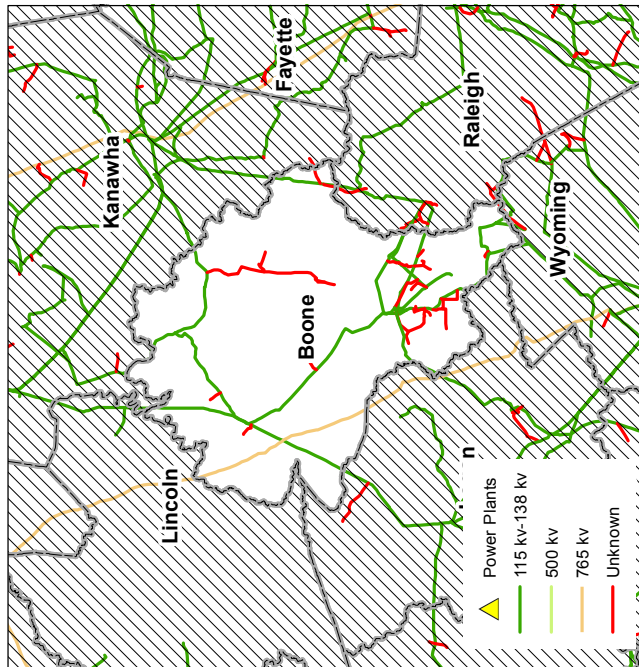
West Virginia American Water Company	
First 1500 gallons used per month	Minimum charge based on meter size
Next 28500 gallons used per month	9.61 per 1000 gallons
Next 870000 gallons used per month	6.33 per 1000 gallons
Next 81000000 gallons used per month	4.61 per 1000 gallons
All Over 9000000 gallons used per month	3.00 per 1000 gallons

Utilities - Electricity

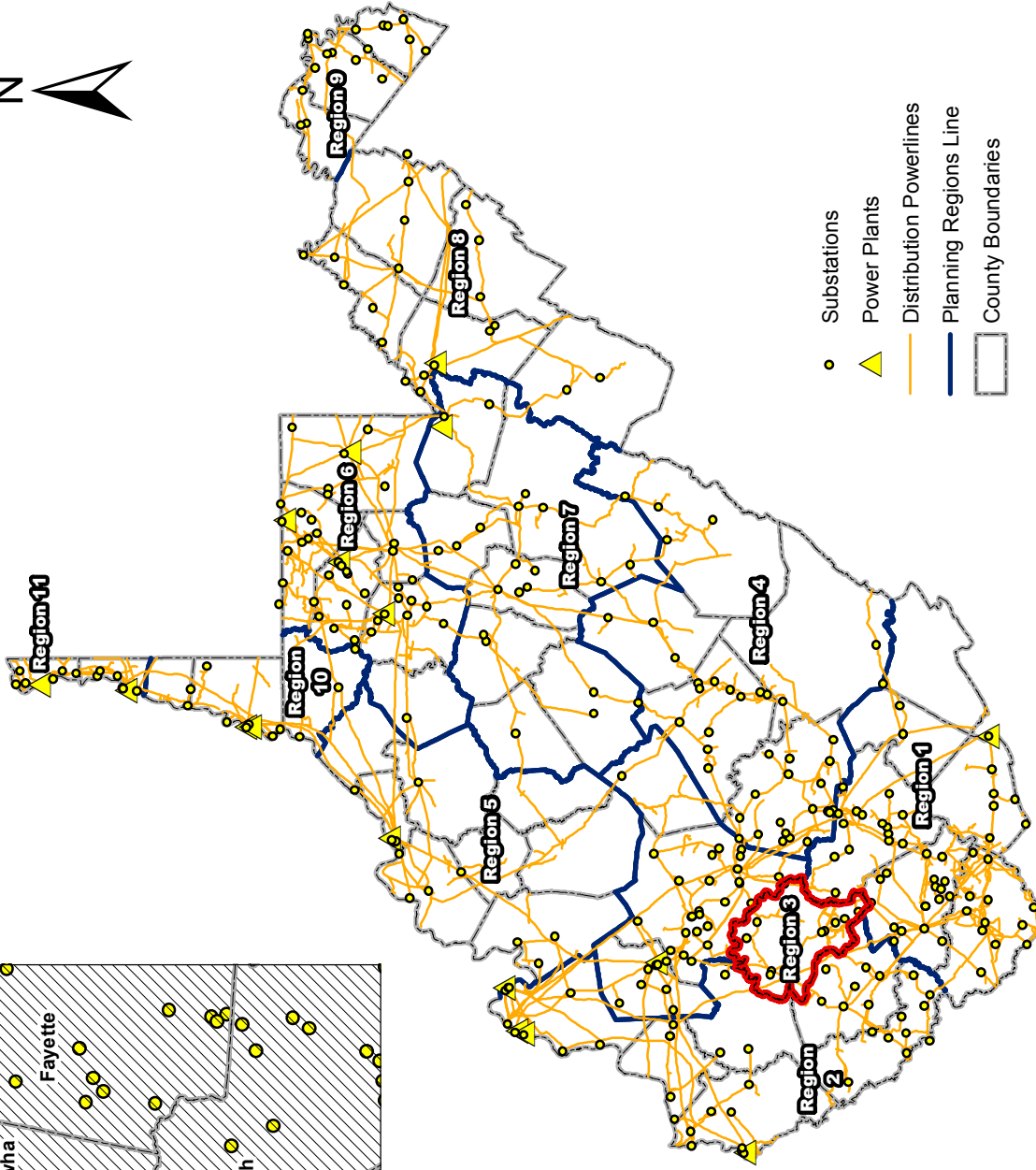
Boone County



● Electricity Substations



▲ Power Plants
 115 kv-138 kv
 500 kv
 765 kv
 Unknown



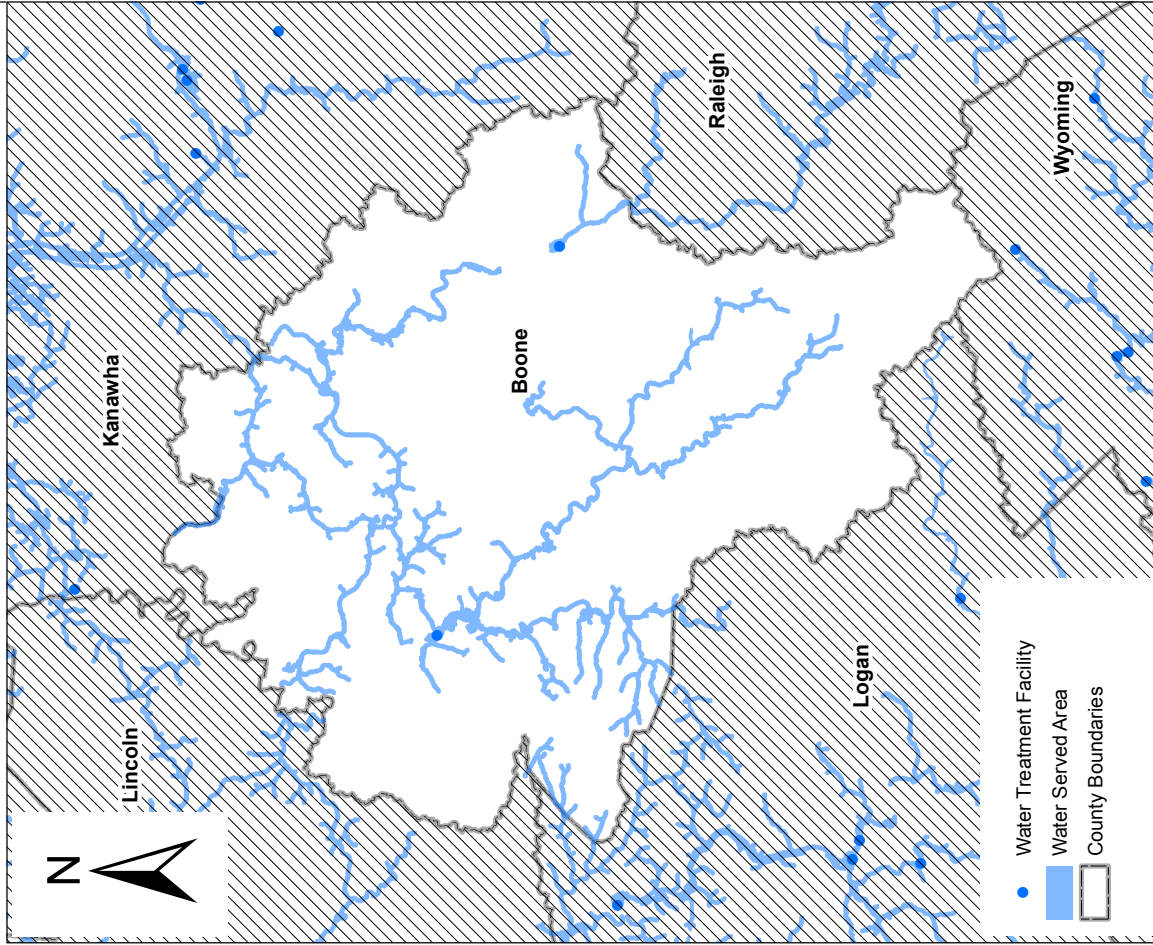
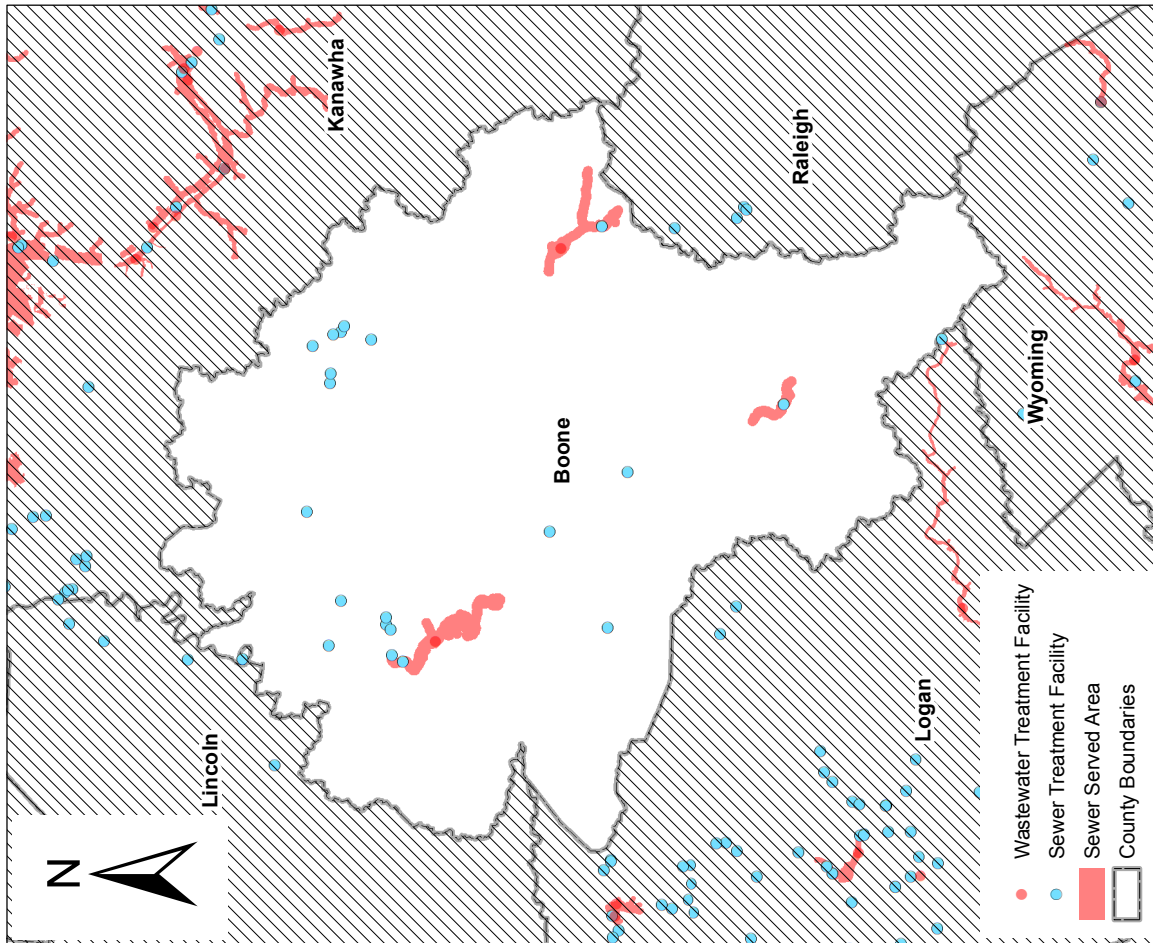
Source: West Virginia Division of Natural Resources, Statewide Addressing and Mapping 2008

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Utilities - Water and Sewer

Boone County



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

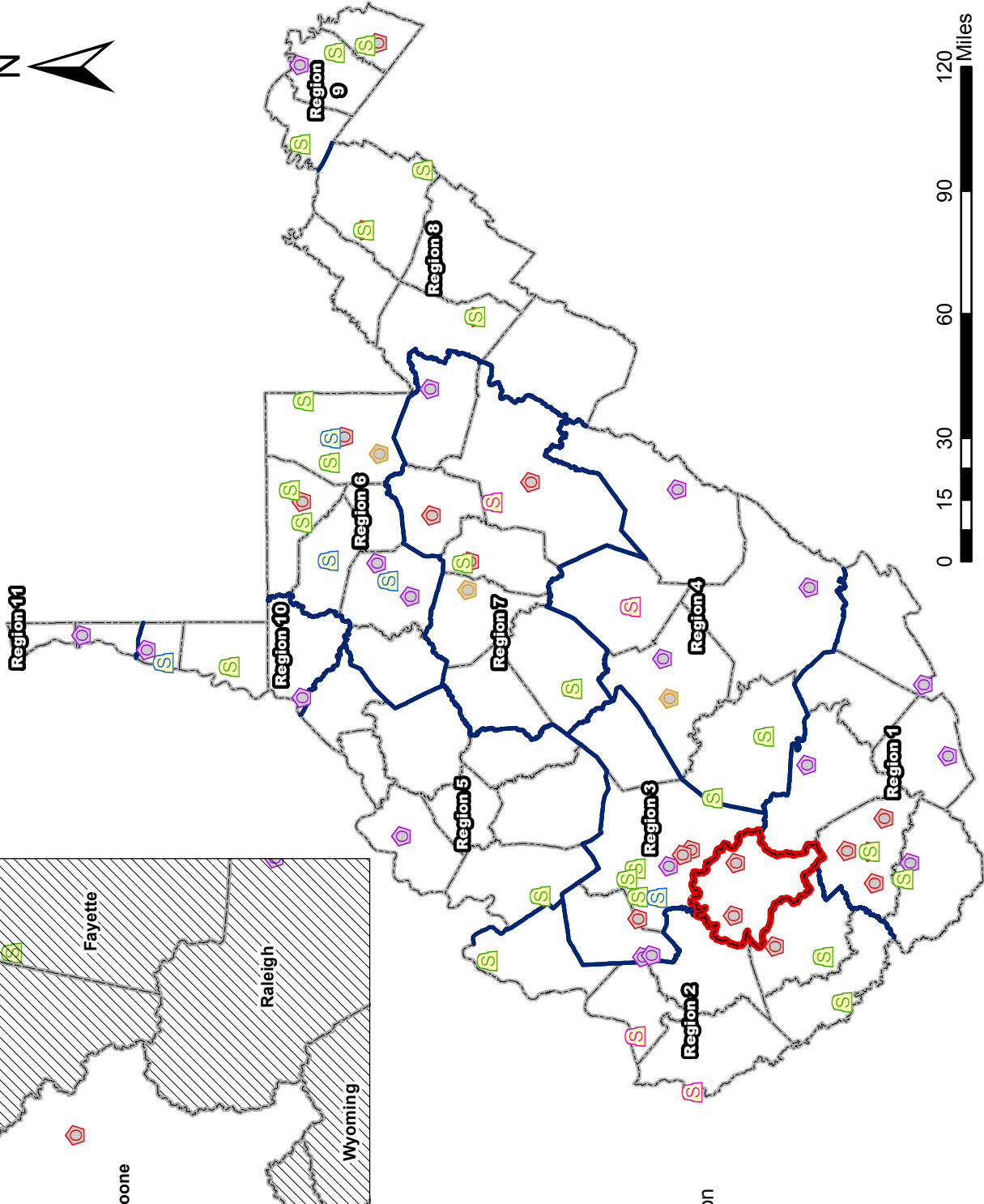
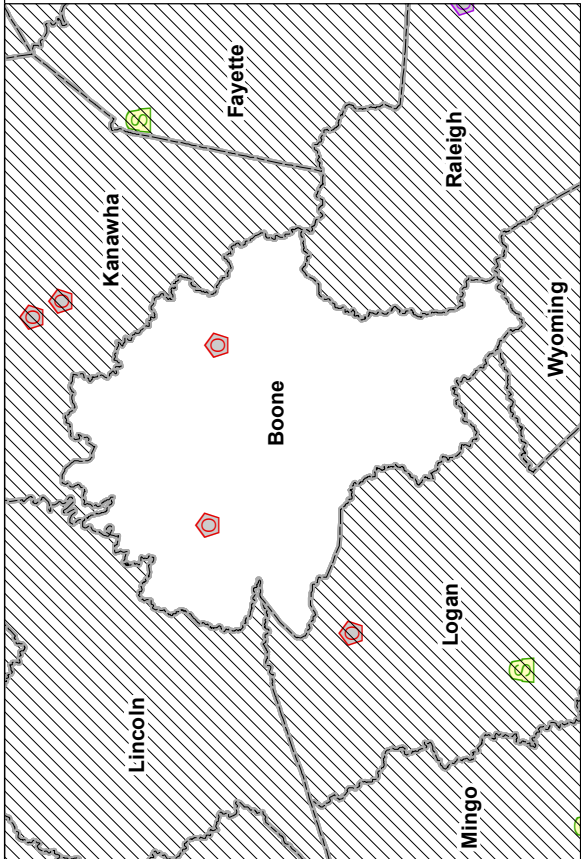
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Utility - Solid Waste Facility

Boone County



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



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Source: West Virginia Solid Waste Management Board 2012

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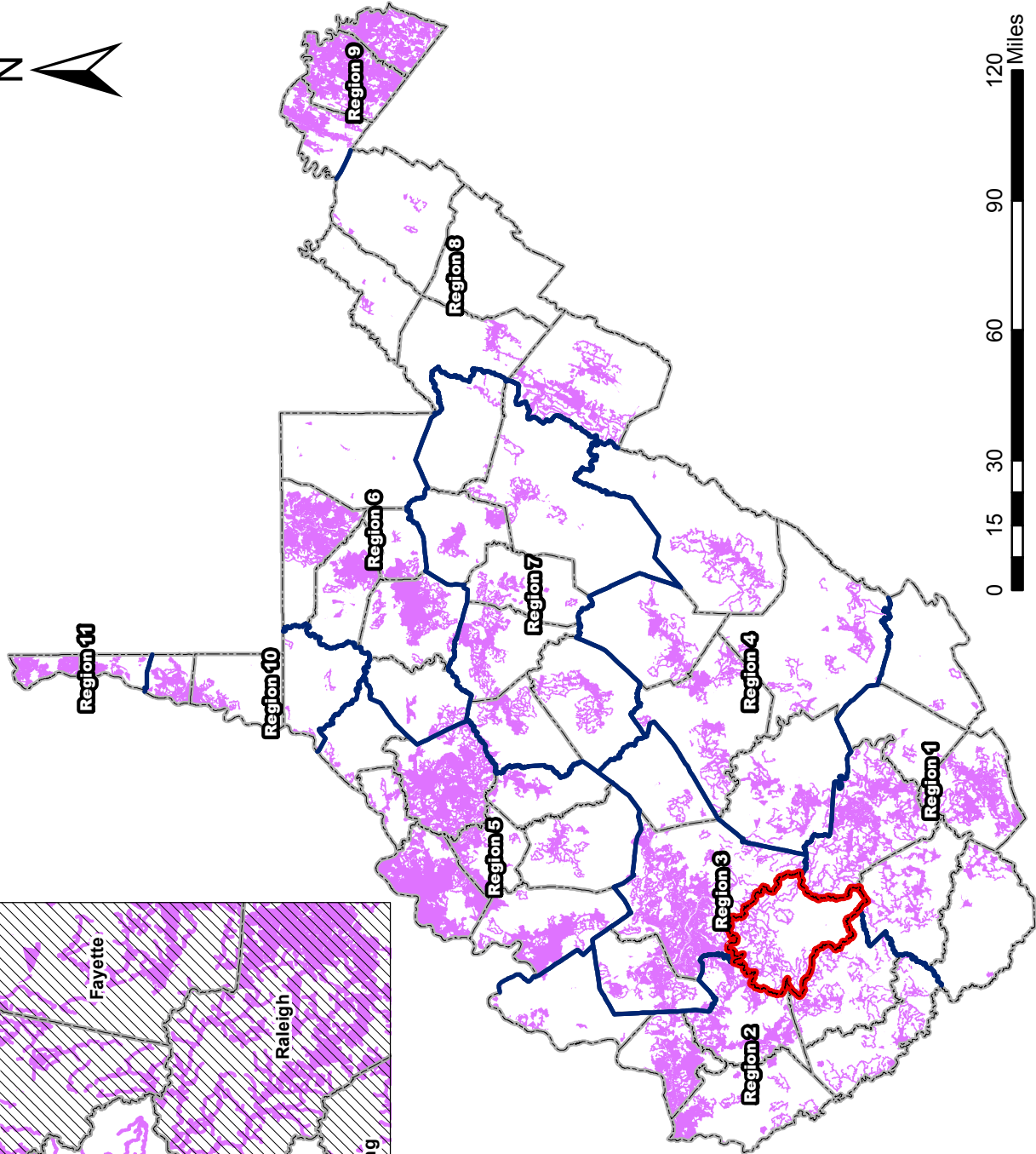
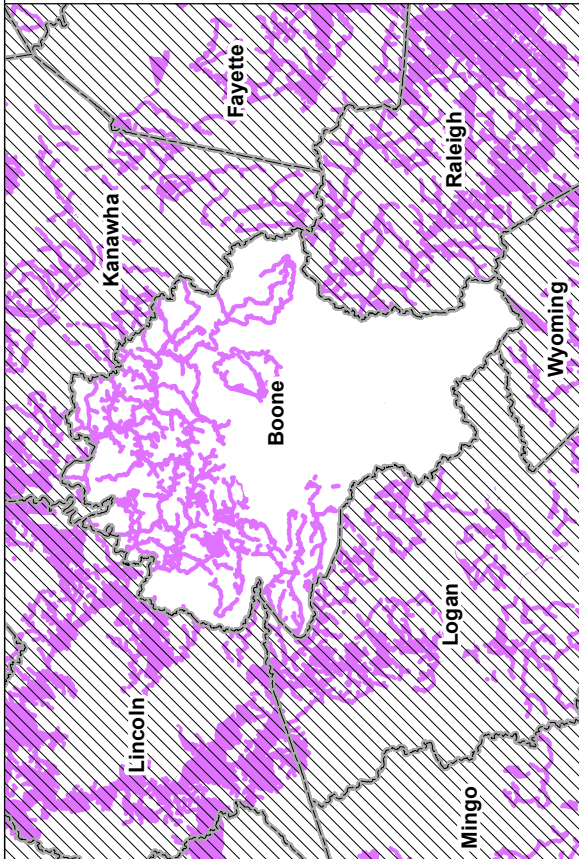
One essential modern convenience, now widely understood as an essential utility in a globalized world, is broadband access. The following 11 maps demonstrate Boone County's broadband infrastructure in relation to the State's. The largest number of providers in Boone County is 3 in areas with higher population density than the rest of the county. Boone County broadband infrastructure closely resembles other coalfield counties. Of particular note is the lack of fixed wireless, the connection of two fixed points wirelessly by radio or other links, and the rather large swaths of area without broadband coverage. The lack of broadband is extensive, part of a pattern of rural counties not containing broadband access.




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 Boone County internet service as exhibited by WV. Internet service, specifically broadband, is non-existent in many rural areas, and instead focuses on population centers. While this may be financially wise, it deprives rural areas of an increasingly integral link to a globalized economy and society. All areas now need broadband service, and a complete inventory of these services is needed to plan for future investment in any given area. Note also that the map data is for 2012, the most recent map available. Changes have been made since that time, thanks to broadband expansion programs encouraged by the state.

Broadband - Internet Cable and FTTP Coverage

Boone County



-  Planning Regions Line
-  Cable and FTTP
-  County Boundaries

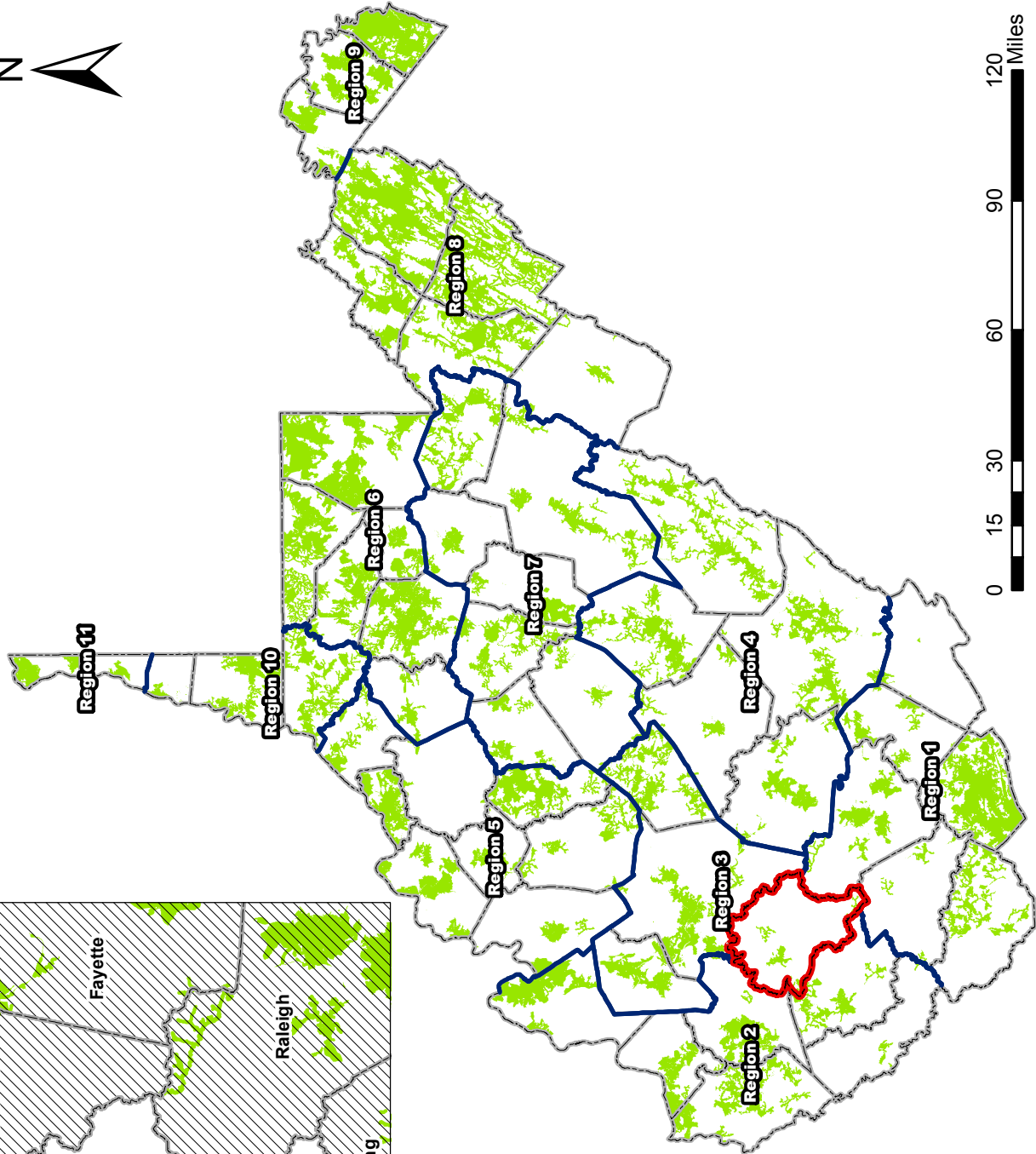
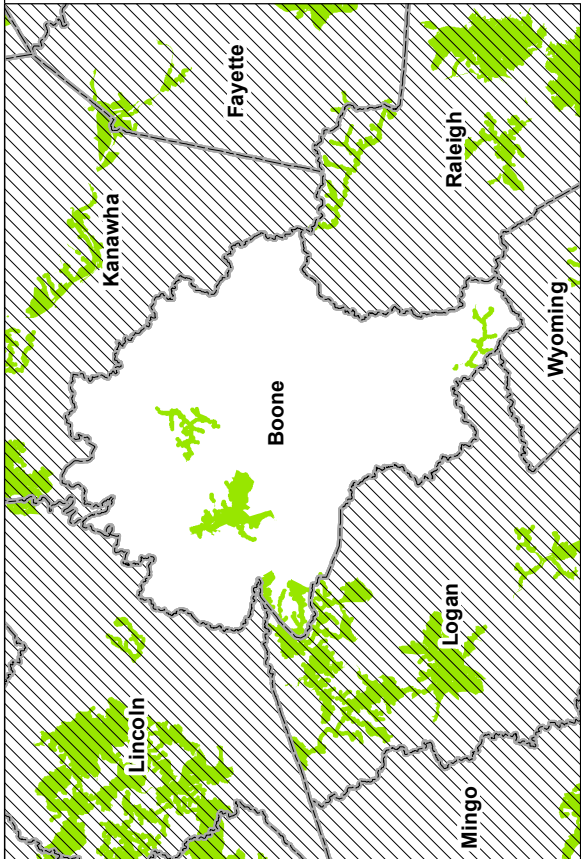
Source: West Virginia Broadband Mapping Program 2012




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Broadband - Internet DSL, BPL, Other Copper

Boone County



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

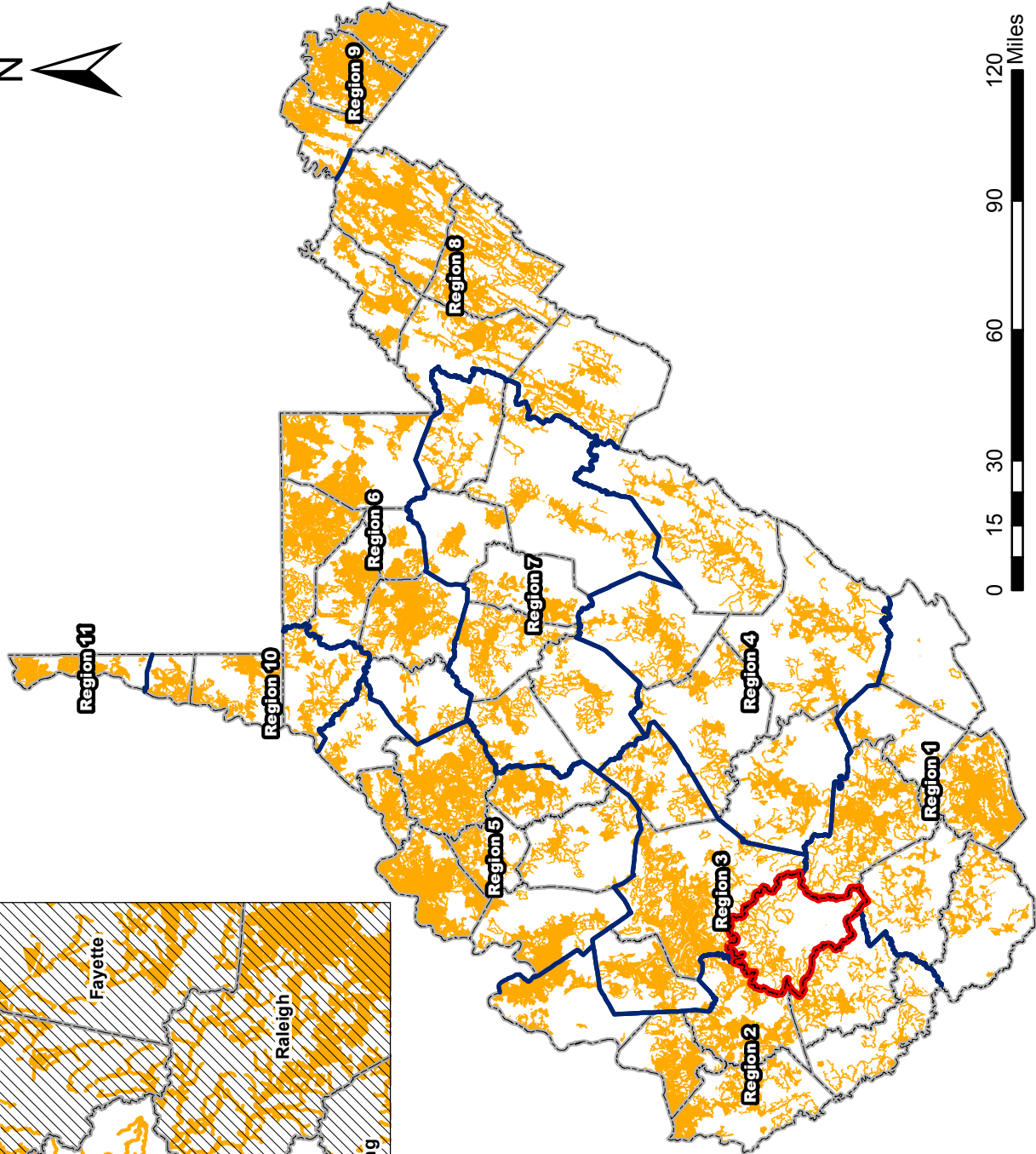
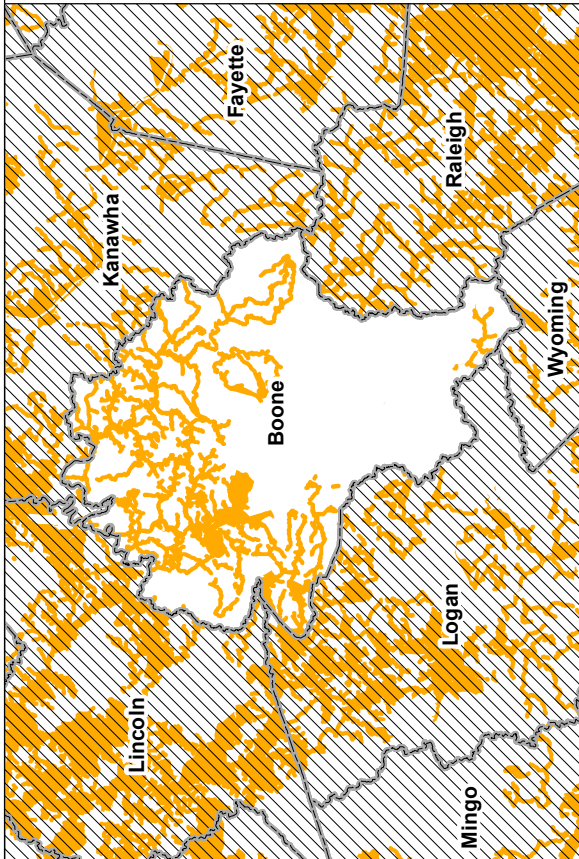
Source: West Virginia Broadband Mapping Program 2012




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Broadband - Internet Wireline Coverage

Boone County



-  Planning Regions Line
-  Wireline Coverage
-  County Boundaries

Source: West Virginia Broadband Mapping Program 2012

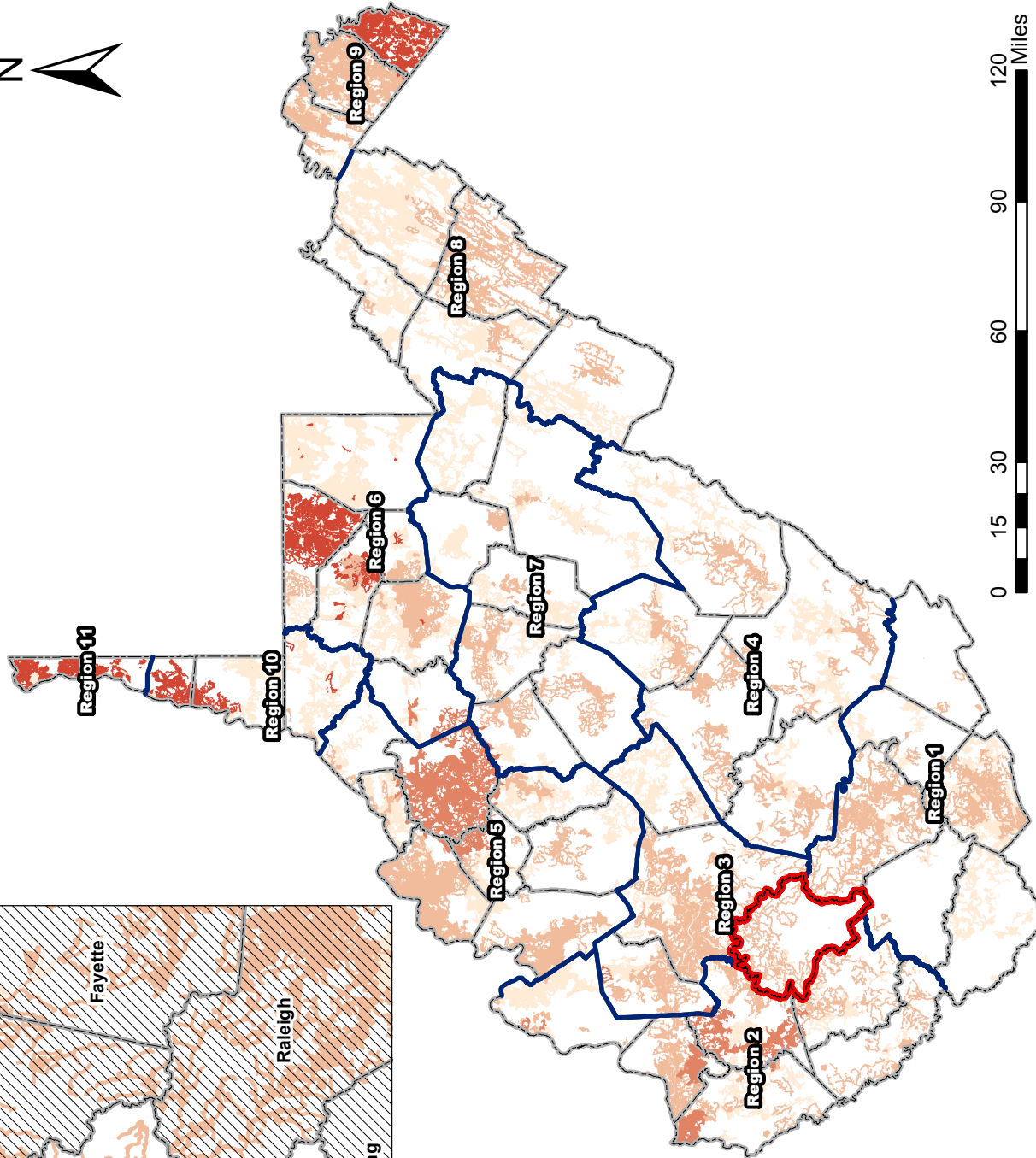
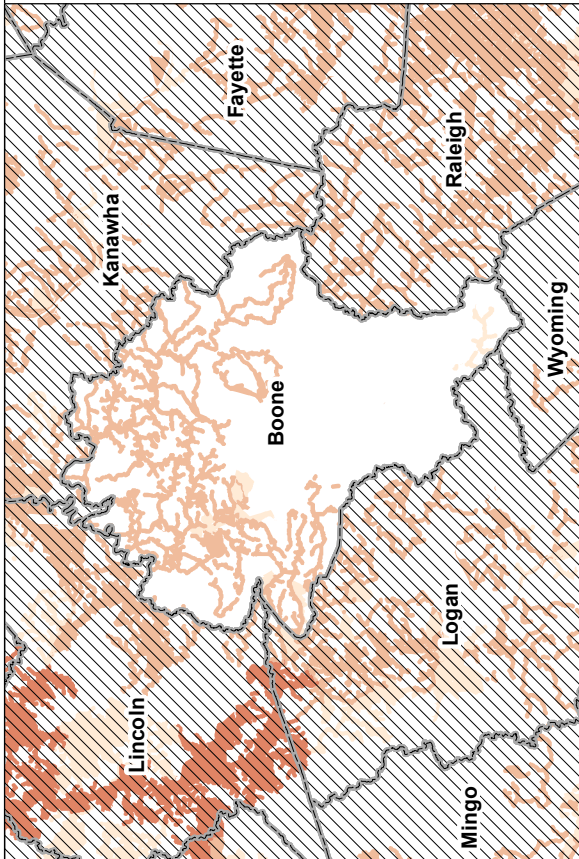
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Broadband - Internet MaxUp Speed Wireline

Boone County



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



Source: West Virginia Broadband Mapping Program 2012

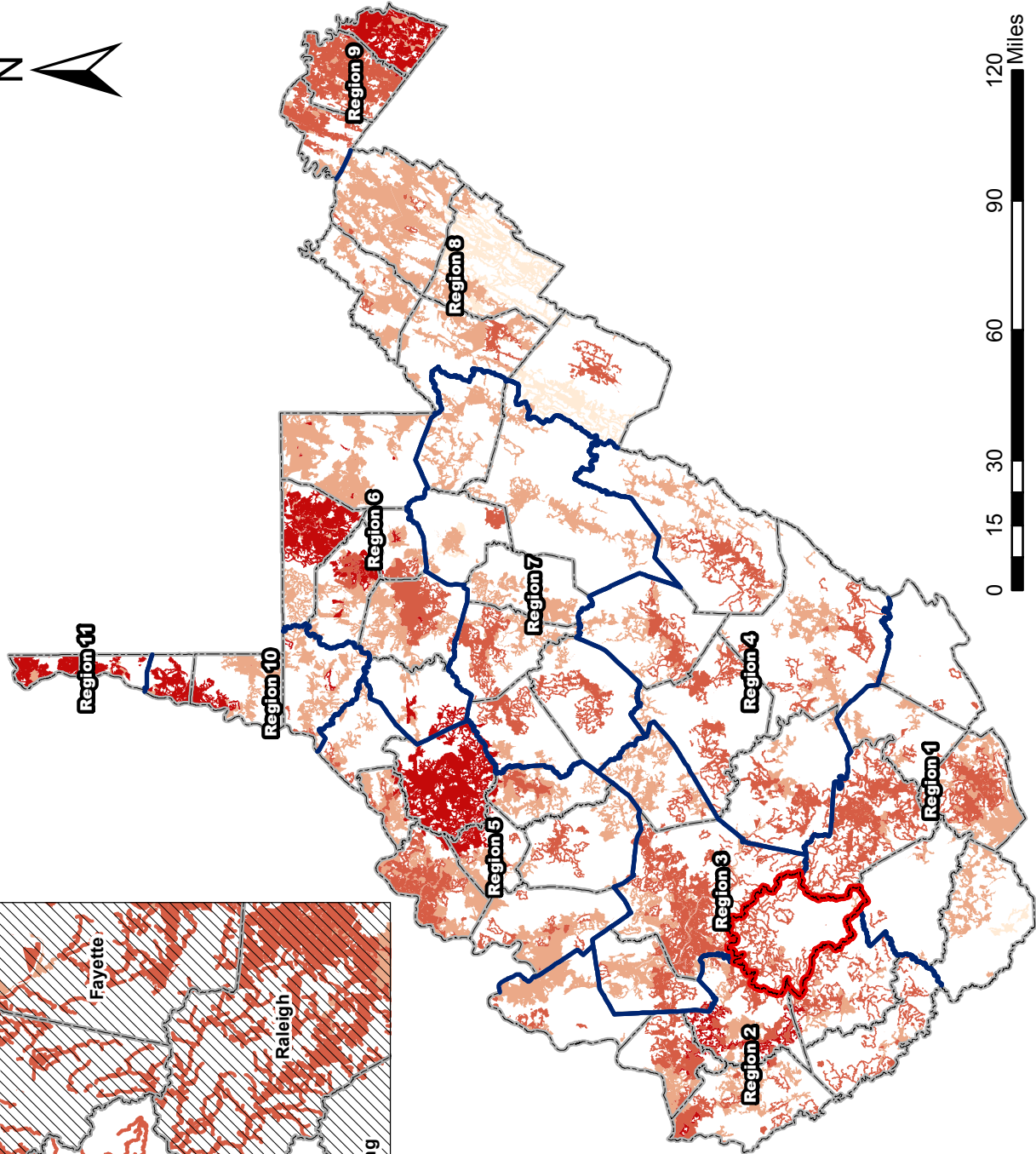
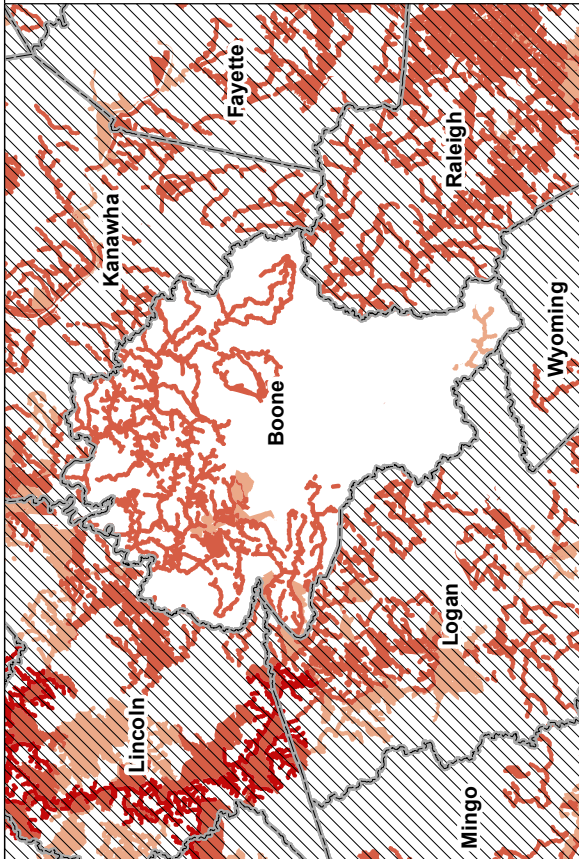
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Broadband - Internet MaxDown Speed Wireline

Boone County



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



Source: West Virginia Broadband Mapping Program 2012

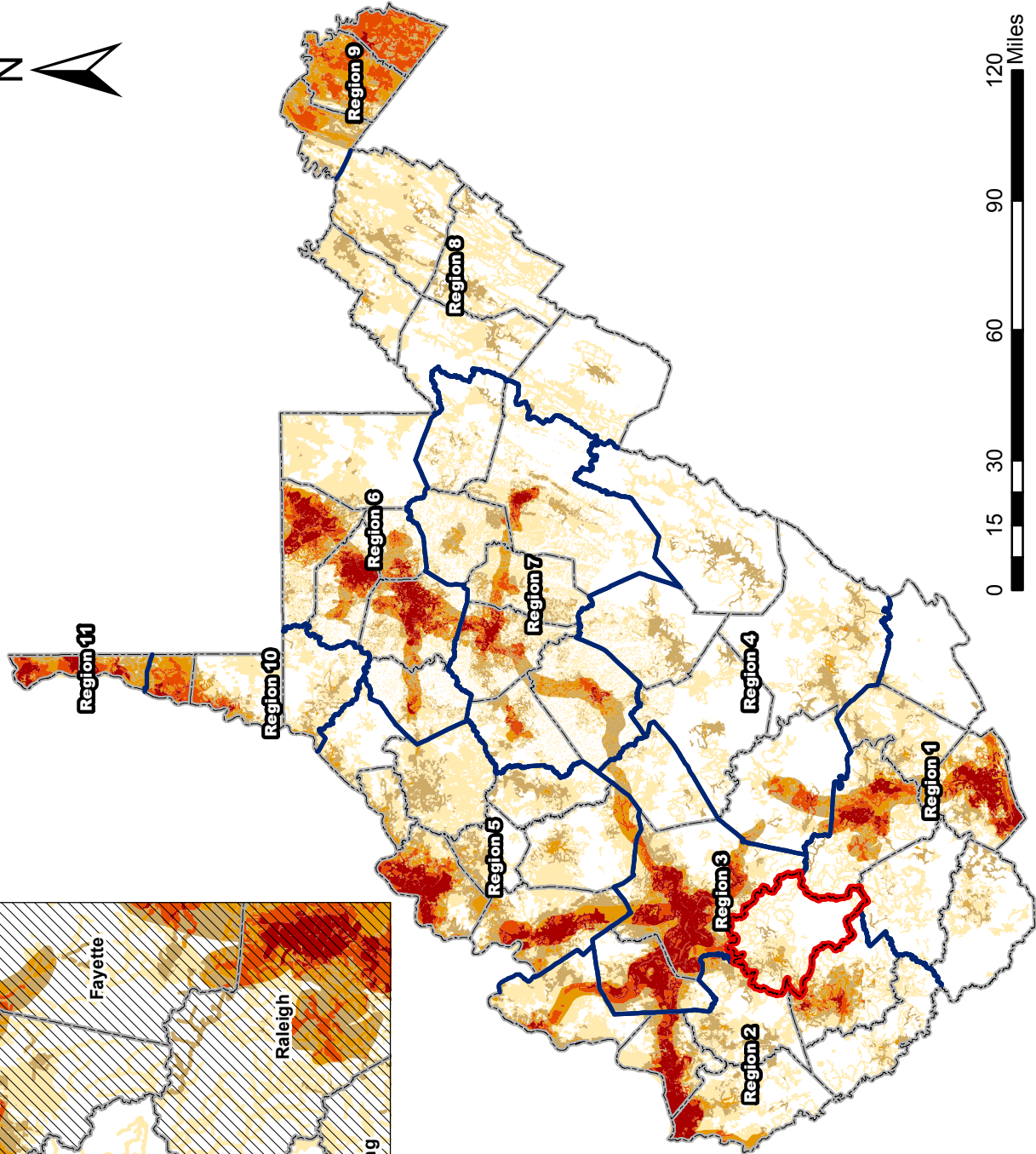
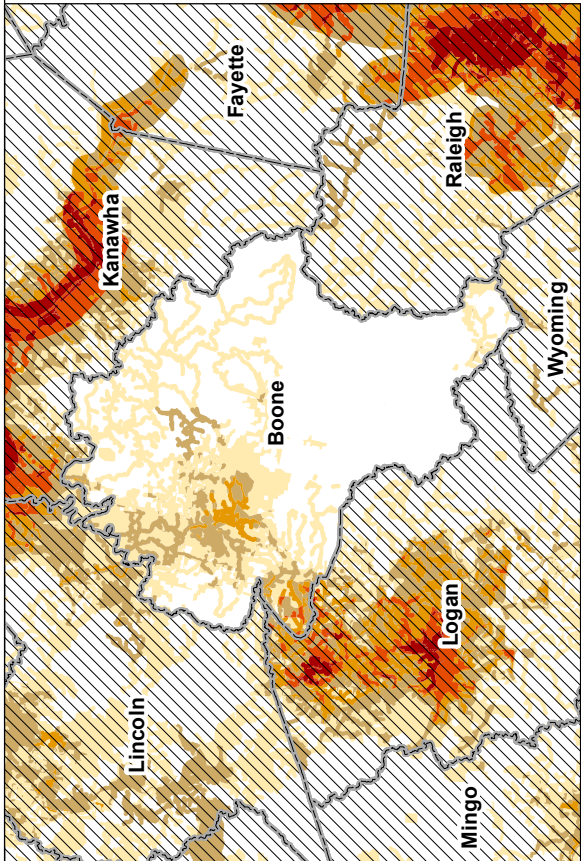
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Broadband - Internet Total Number of Providers

Boone County



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

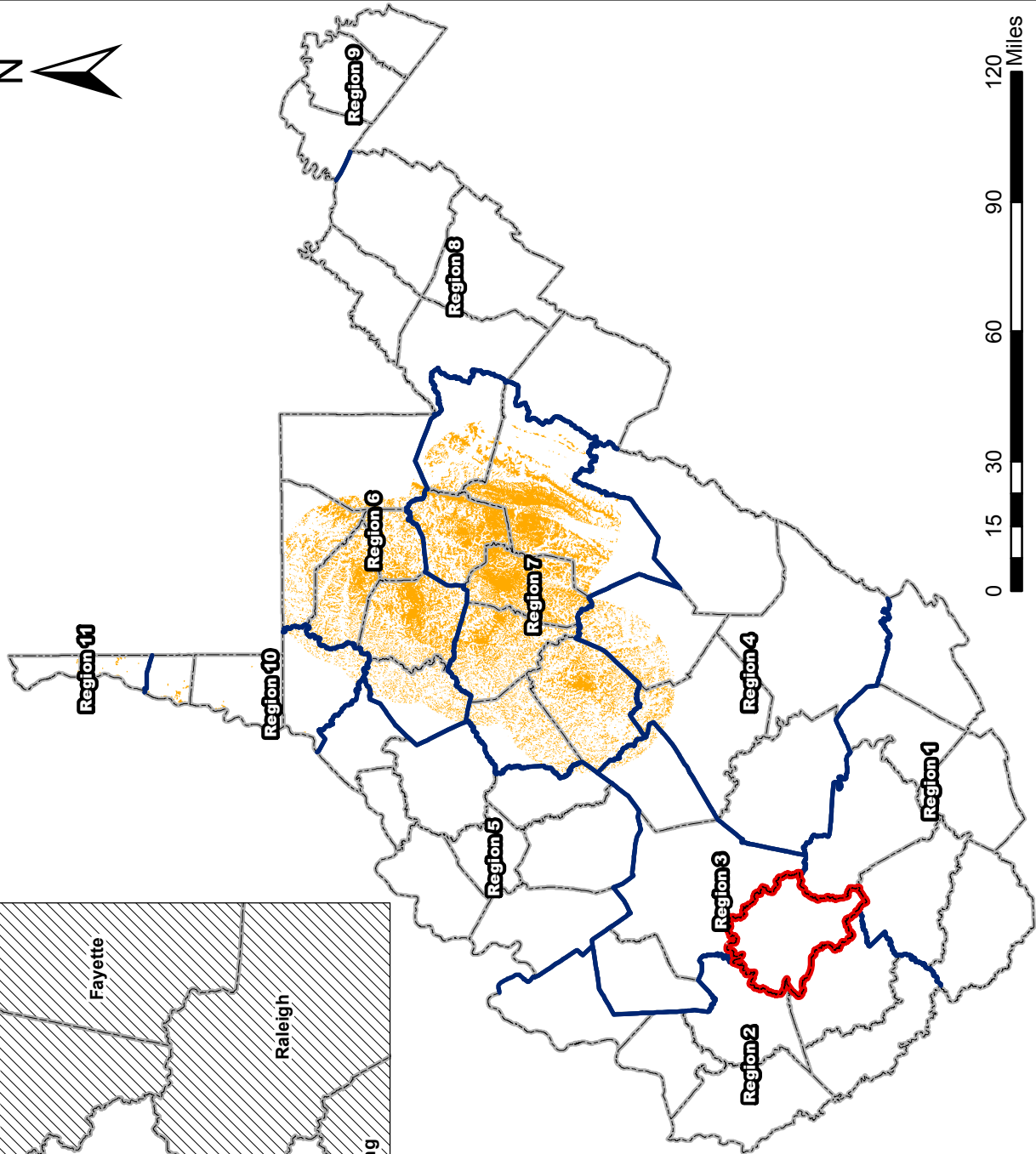
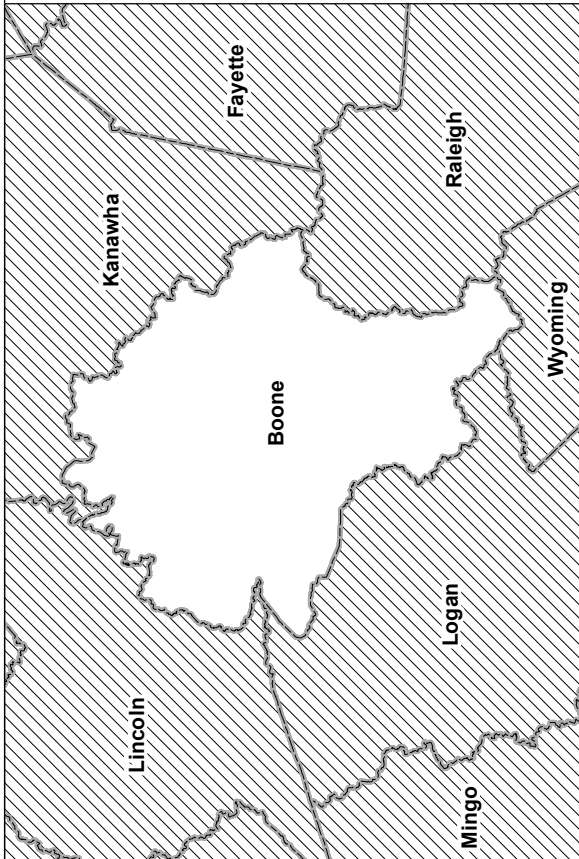
Source: West Virginia Broadband Mapping Program 2012




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Broadband - Internet Fixed Wireless Coverage

Boone County



-  Planning Regions Line
-  Fixed Wireless
-  County Boundaries



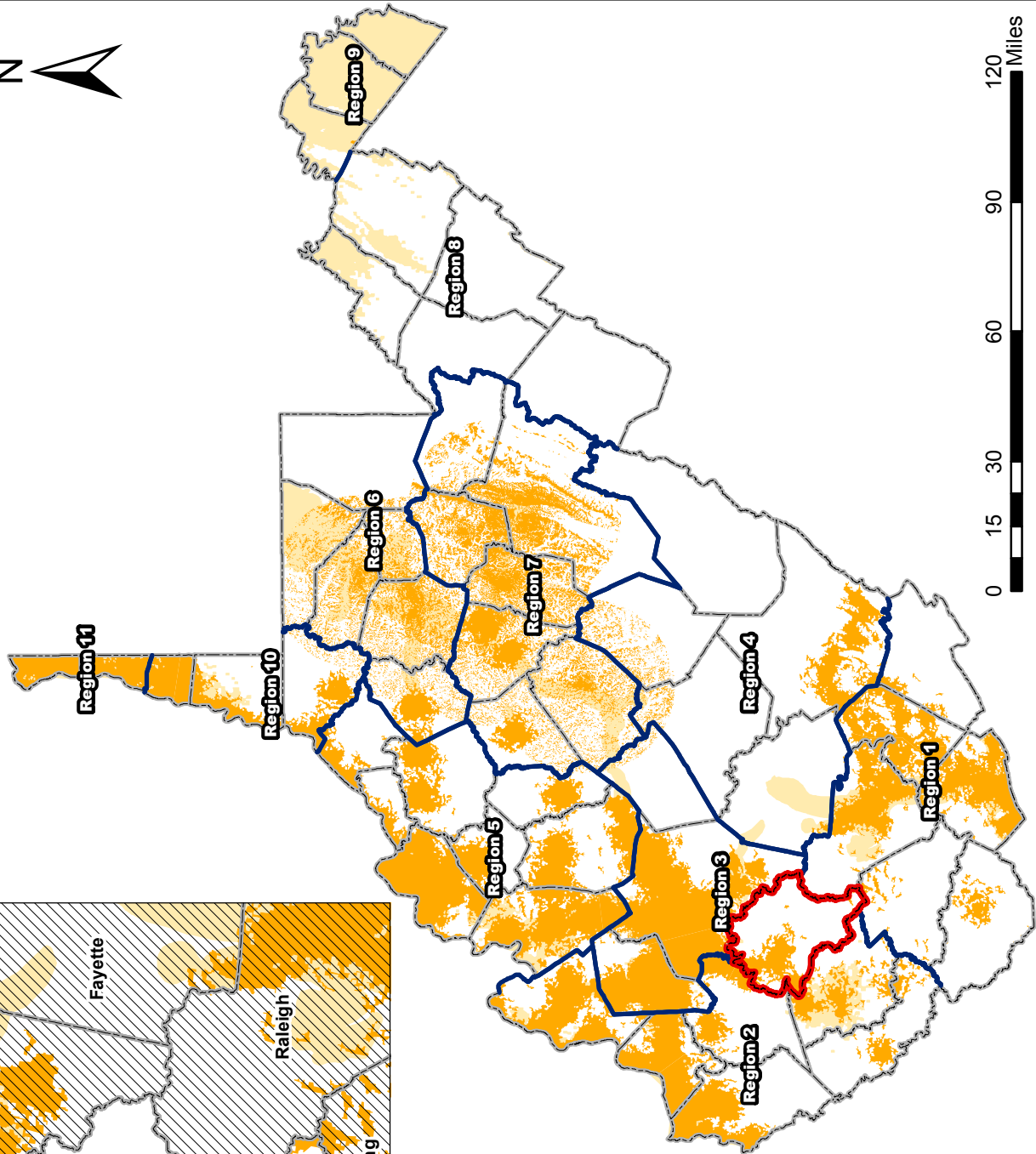
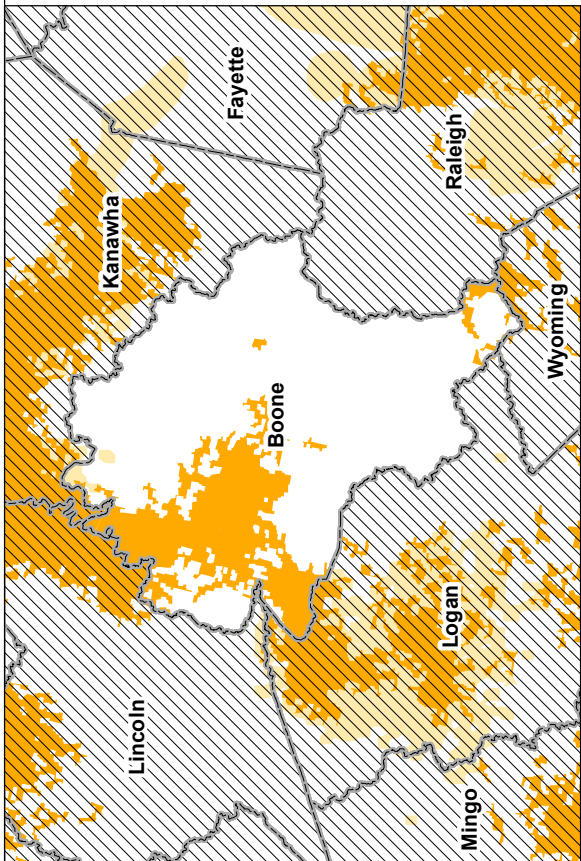
Source: West Virginia Broadband Mapping Program 2012





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Broadband - Internet MaxDown Speed Wireless

Boone County



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



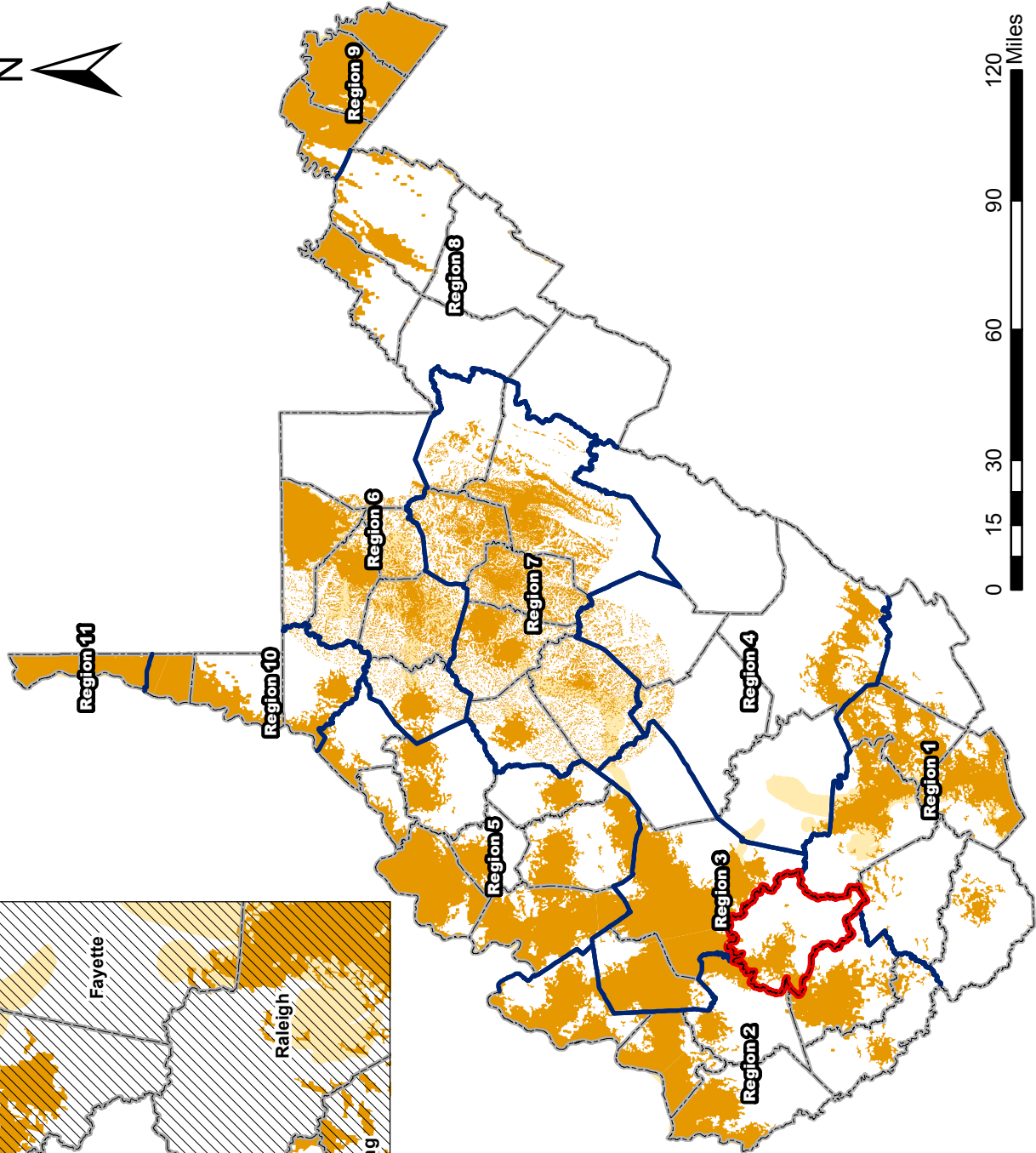
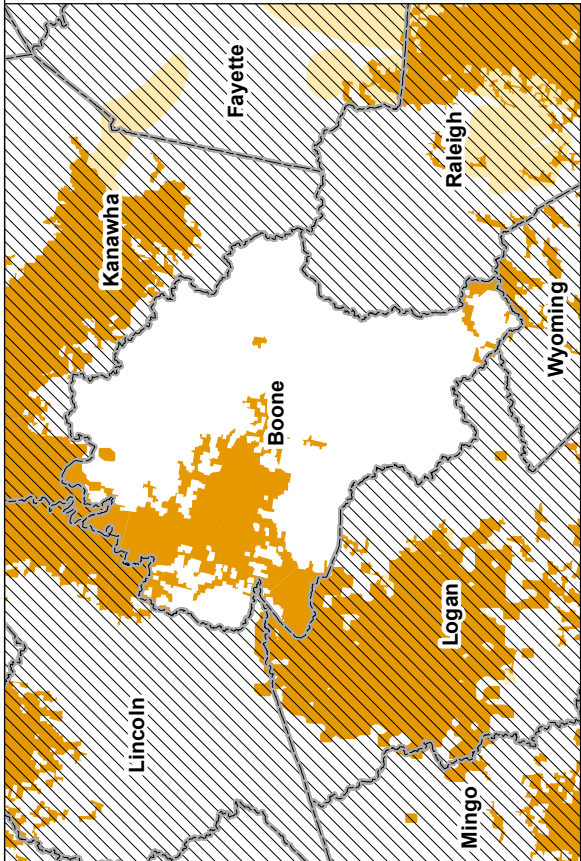
Source: West Virginia Broadband Mapping Program 2012





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Broadband - Internet MaxUp Speed Wireless

Boone County



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

Source: West Virginia Broadband Mapping Program 2012

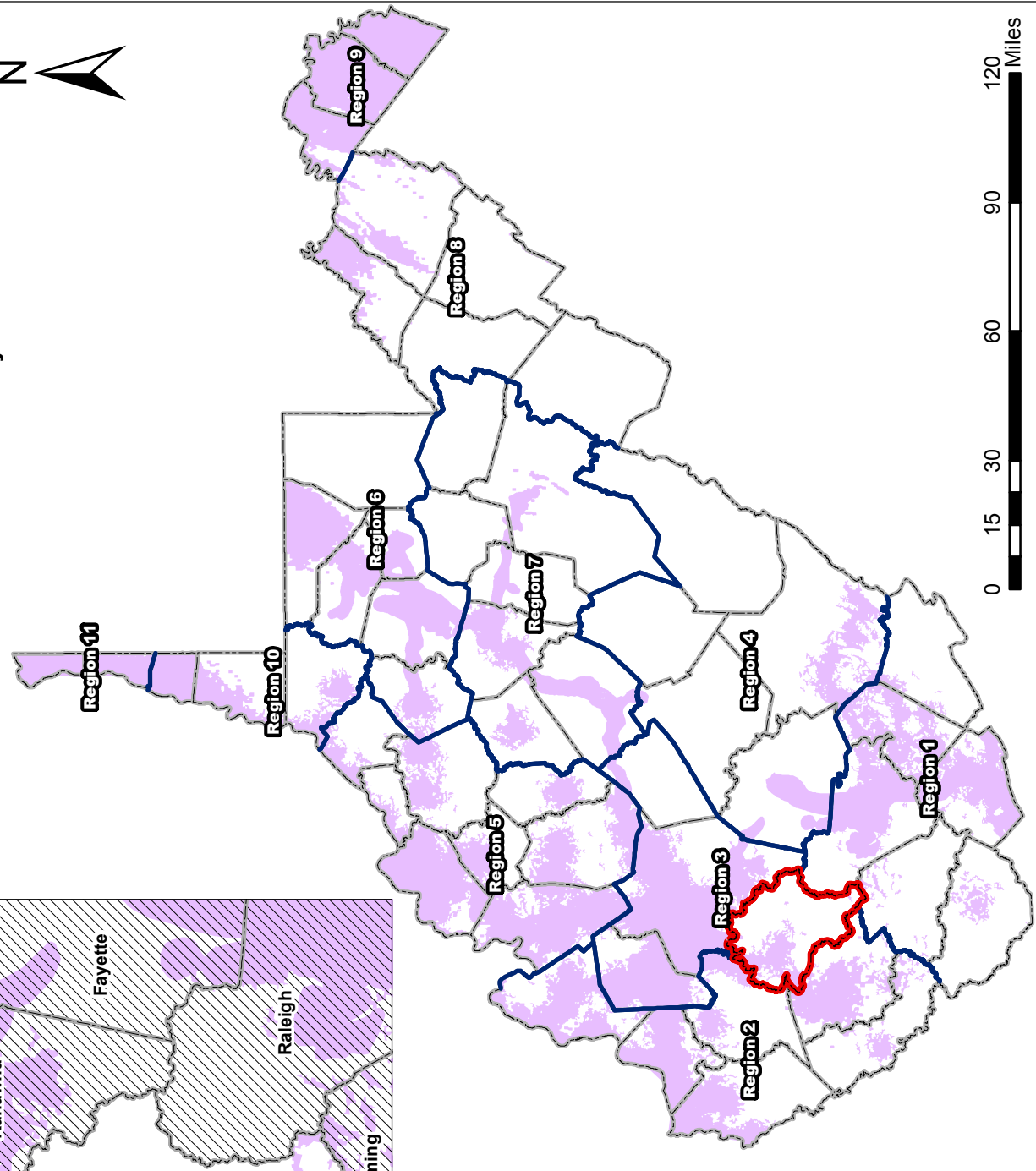
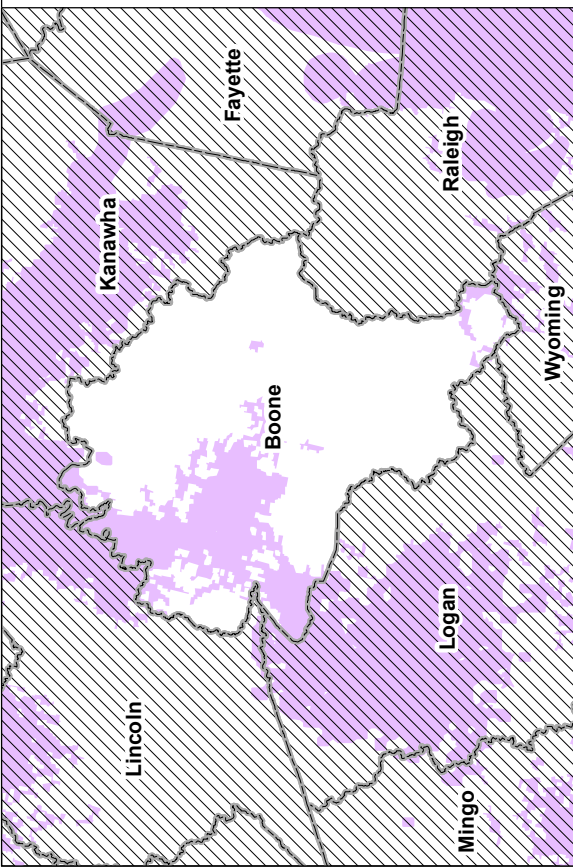
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Broadband - Internet Mobile Wireless Coverage

Boone County



-  Planning Regions Line
-  Mobile Wireless
-  County Boundaries

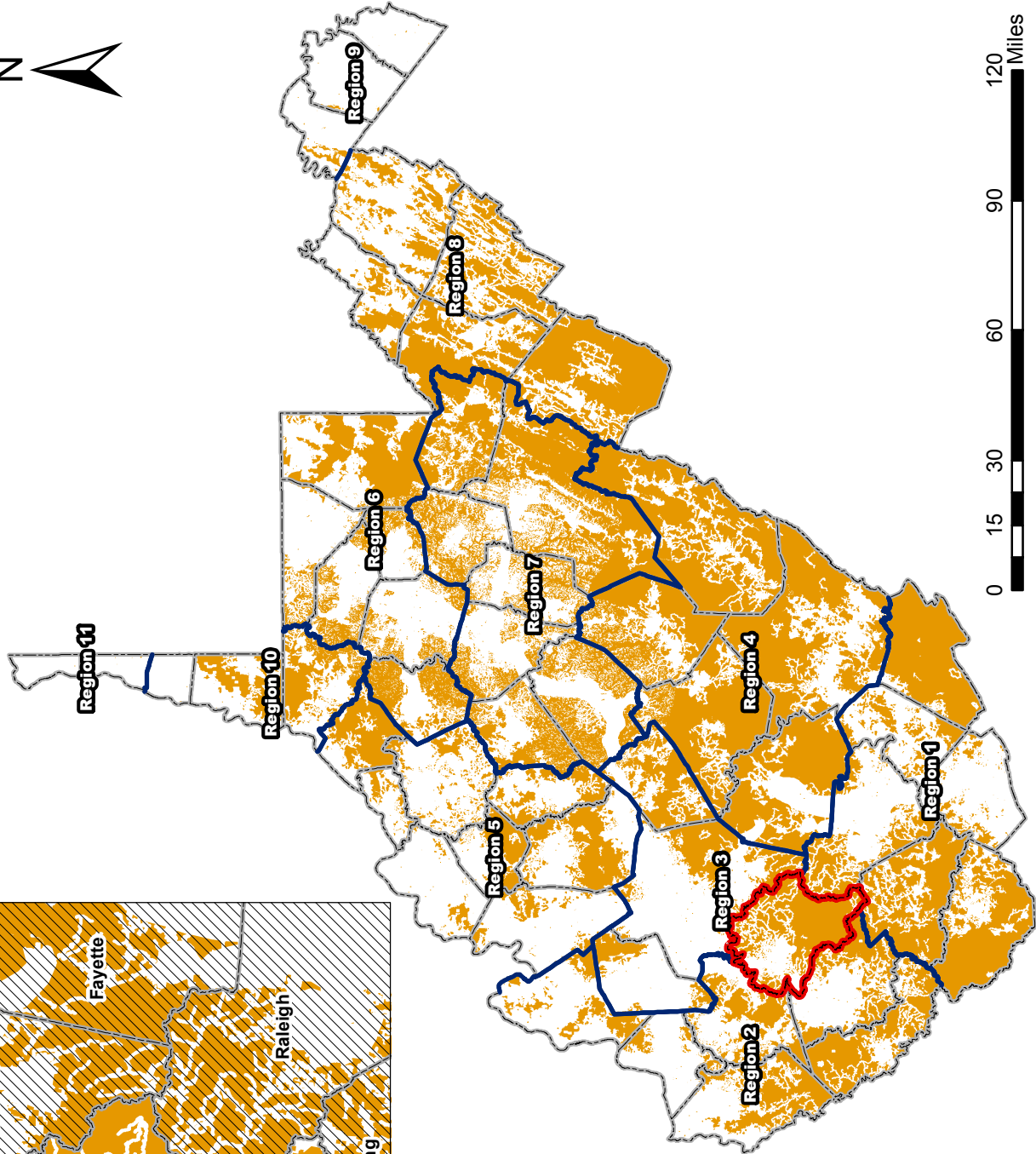
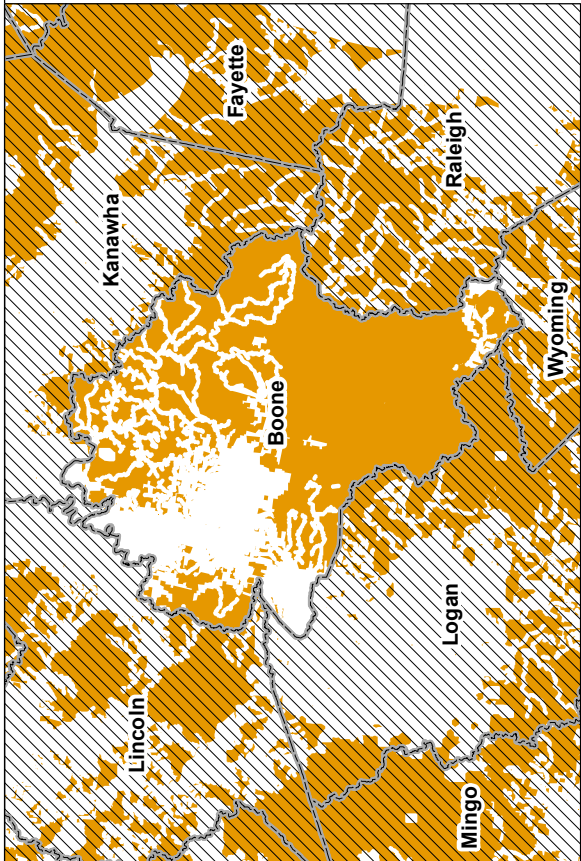
Source: West Virginia Broadband Mapping Program 2012




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Broadband - No Broadband Coverage

Boone County



-  Planning Regions Line
-  No Coverage Reported
-  County Boundaries



Source: West Virginia Broadband Mapping Program 2012

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Transportation

Highways

Boone County has no interstate, one US route, Route 119, and State Routes 3, 17, 85, 94, and 99 (Map 26).

Rail

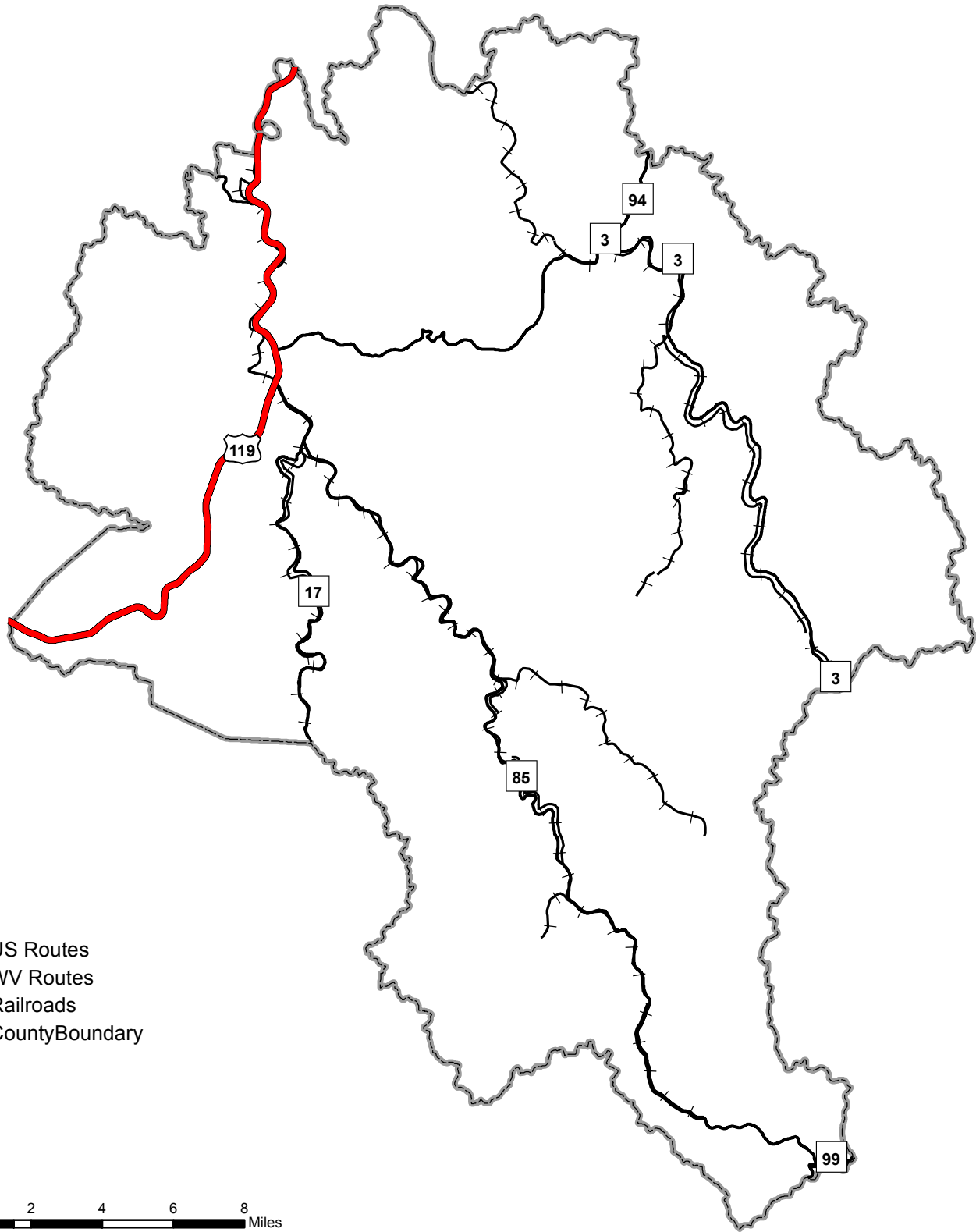
Boone County has an extensive rail system to complement its natural resource activities.

Air

Boone County has no airports. It is, however, close in proximity to Charleston and the Yeager Airport.

Transportation

Boone County



- US Routes
- WV Routes
- Railroads
- County Boundary

0 1 2 4 6 8 Miles

Source: 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

Boone County has two major developments on its post-mine sites. This is an encouraging sign showcasing interest in post-mine land development, and the diversity in both developments signifies the varying interests that post-mine land can be utilized to attract.

Massey Energy Regional Headquarters

Massey Energy has consistently been Boone County's largest employer. In 2008, the company built a 51,000 square-foot four-story building off of Corridor G, a major highway route that traverses Boone County. Construction and development utilized a massive partnership between county developers, administrators, service providers, and Massey Energy itself. Property taxes generated over \$120,000 dollars annually, and the building contained 120 employees. In 2011, Massey Energy was sold to Alpha Natural Resources, but the building is still used as a regional headquarters.⁷

Hatfield-McCoy Trail System

Hatfield-McCoy Trails is a multi-county trail system in West Virginia known nationally for its off-highway vehicle trails. The trail is named after a famous feuding family that fought after the Civil War. Opening in 2000, the trails have expanded tremendously, and in 2006 generated an economic impact of 7.7 million dollars for the State of West Virginia. Boone County has over 100 miles of these trails, insuring that a large portion of the impact is in Boone County. The trail system adapts to the mining character of Boone County and consistently adjusts trails to run on post-mine land.⁸

⁷ "Boone County Events," Boone County Community and Economic Development Corporation, Accessed April 10, 2014, <http://www.boonecountywv.org/news.php>.

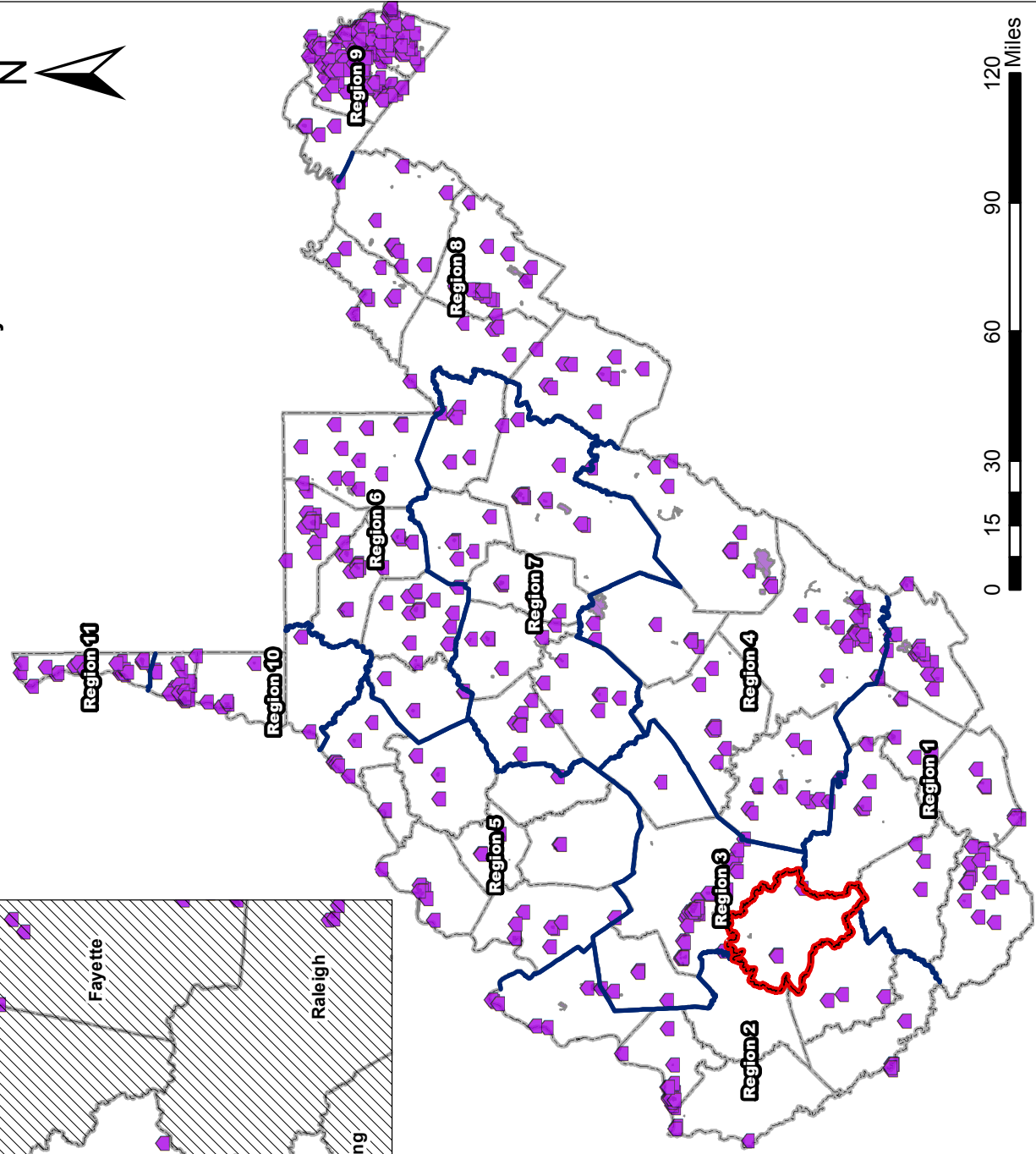
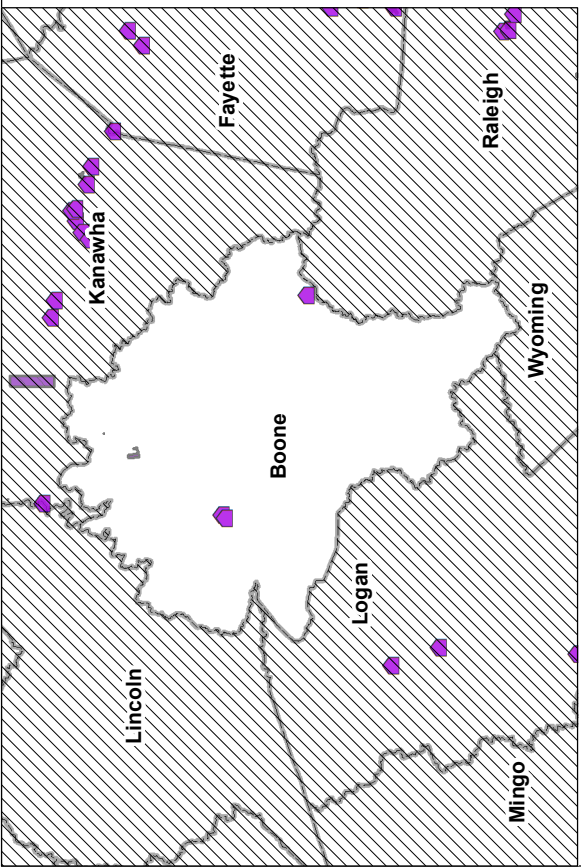
⁸ Center for Business and Economic Research. "The Economic Impact of the Hatfield-McCoy Trail System in West Virginia." Prepared for the Hatfield-McCoy Regional Recreation Authority, Huntington, WV (2012).





Historic Preservation

Historic preservation will be essential in a county steeped in coal mining history. Boone County has four listings in the National Register of Historic Places. There are a number of historic buildings in the County mostly built in the 1920s and 30s 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

Boone County



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



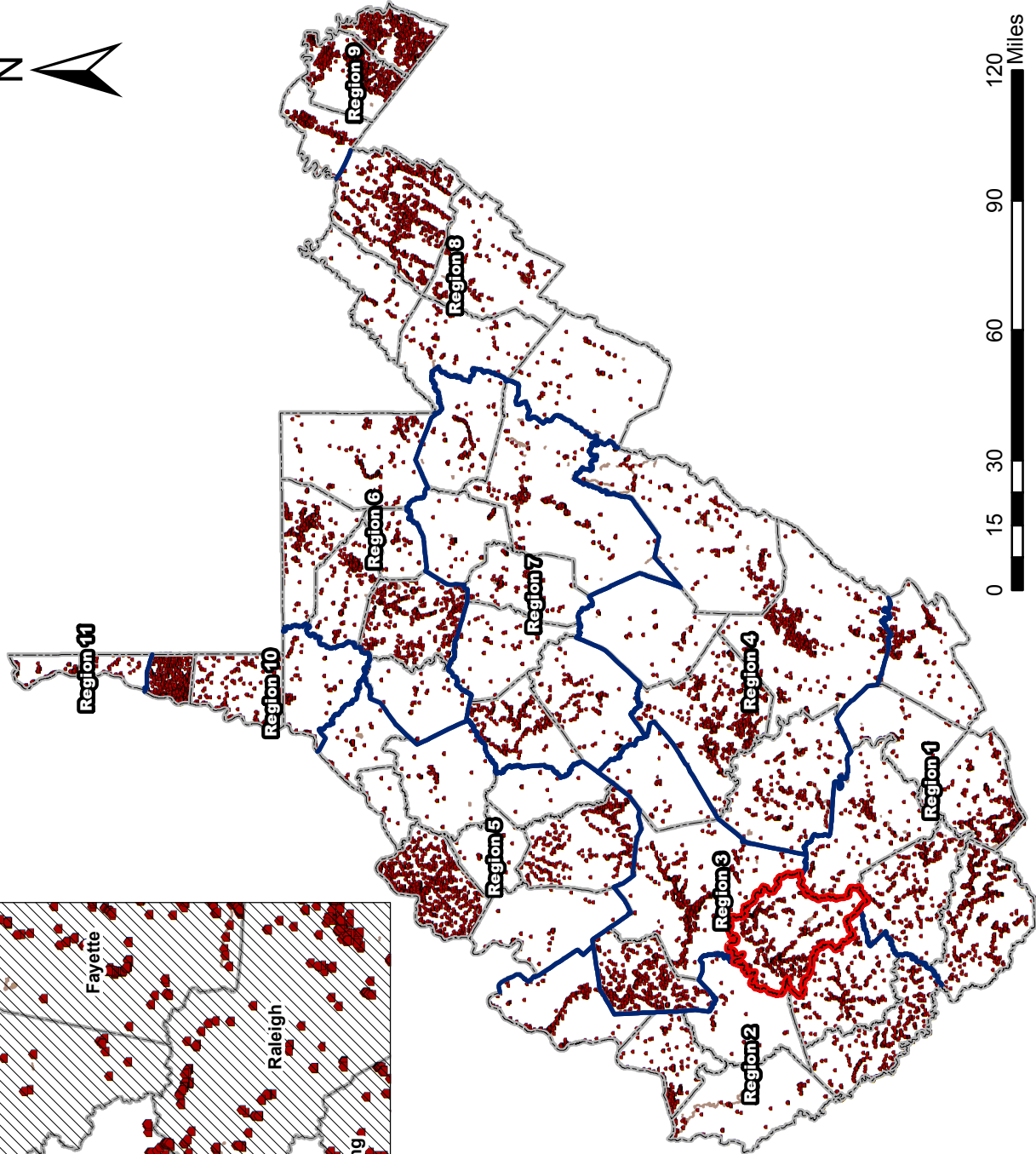
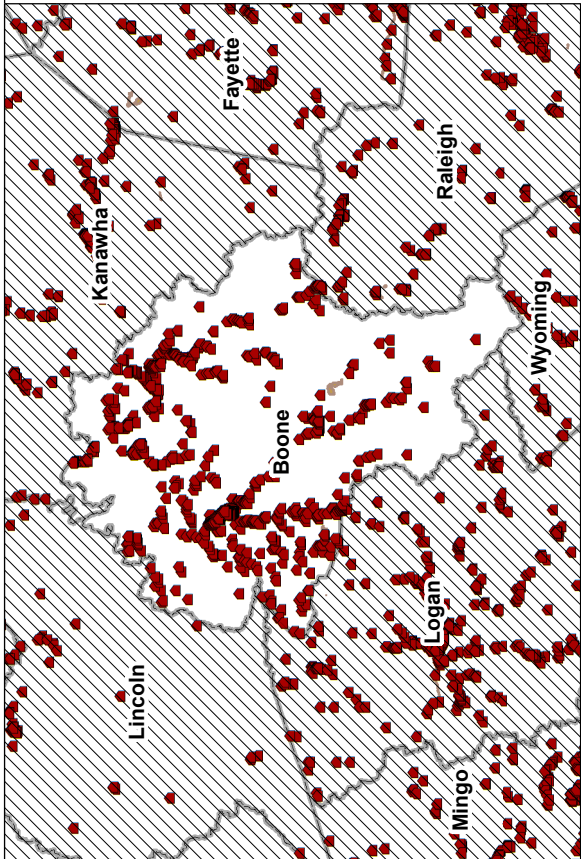
Source: West Virginia State Historic Preservation Office 2014

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State Historic Architecture

Boone County



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

Source: West Virginia State Historic Preservation Office 2012

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Natural Resources, Environment, and Energy

Particular importance should be given to the spatial positions of natural resource areas, geographic environments, and potential energy resources in a county. This serves to inform potential investors about what possibilities the land provides for production of resources and energy. Boone 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. Boone County's system is not very extensive, but does have two major lines of wetlands (Map 29).

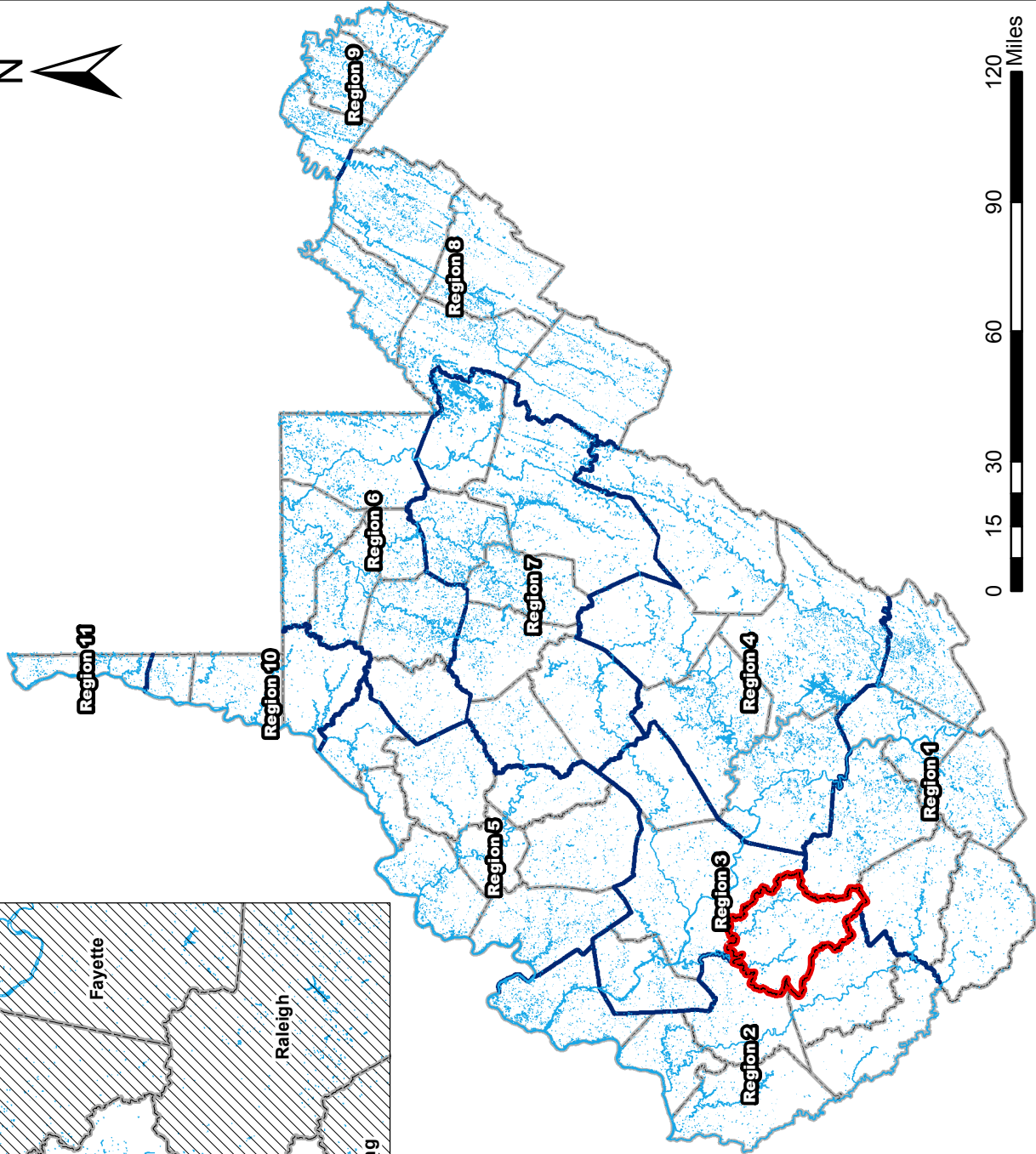
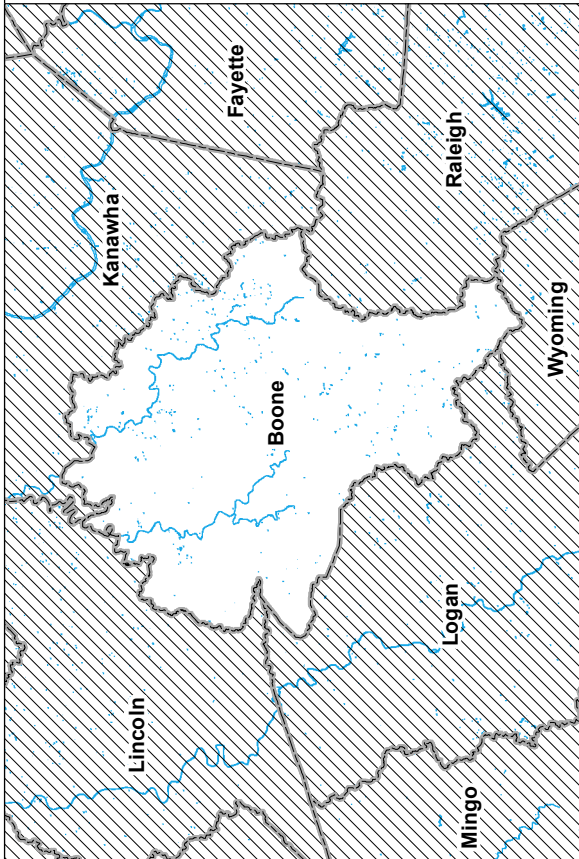
The State also possesses a respectable amount of park and forest land. Most of this land is located in the eastern portion of the State, the area that contains the main part of the Appalachian Mountain range. Boone contains no national or state parks and no official wildlife management areas, but still possesses some recreational 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."⁹ 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; Boone County is not among them (Map 31).

⁹ "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

Boone County



-  Planning Regions Line
-  National Wetlands Inventory
-  County Boundaries



Source: United States Fish and Wildlife Service 1996

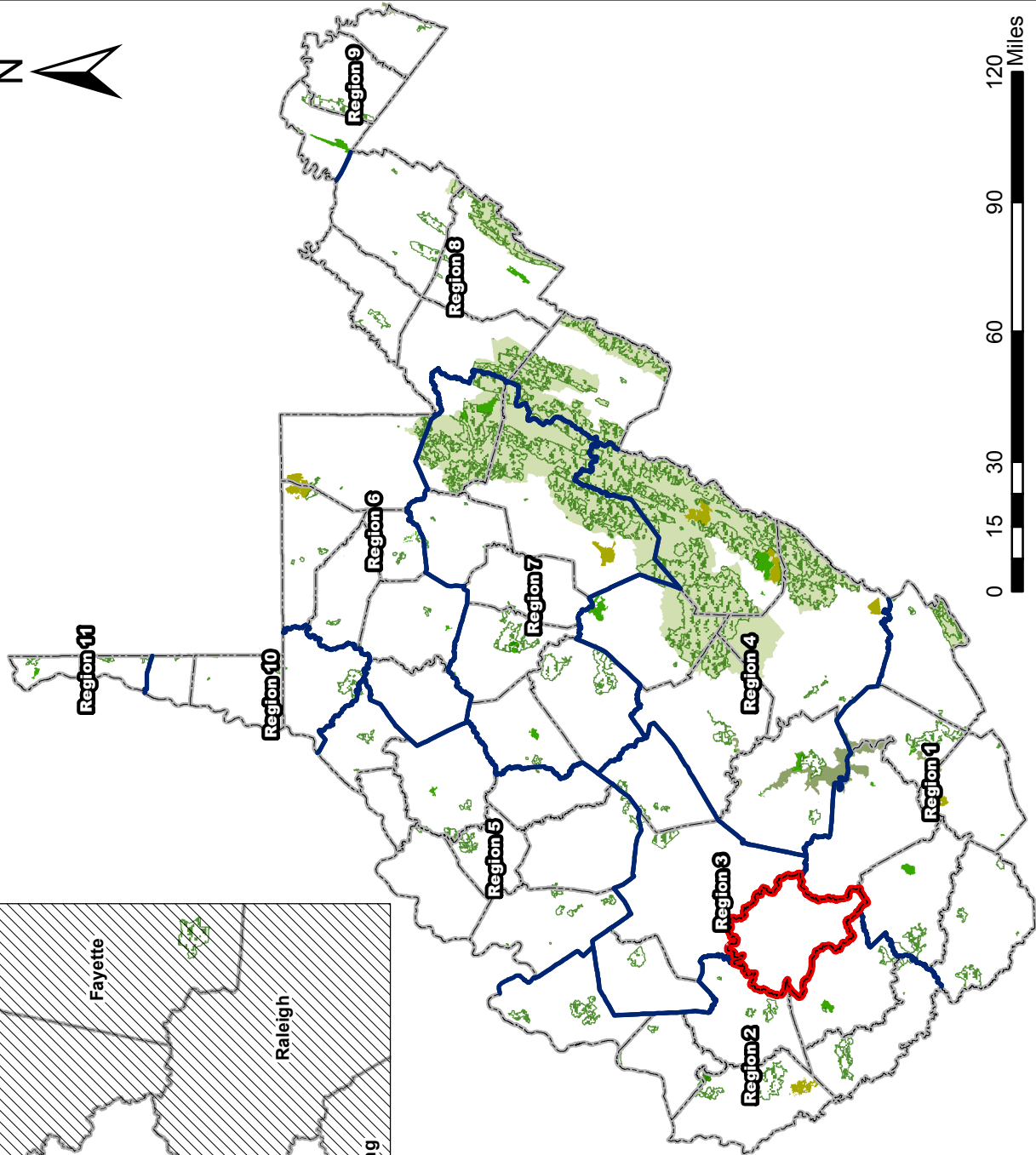
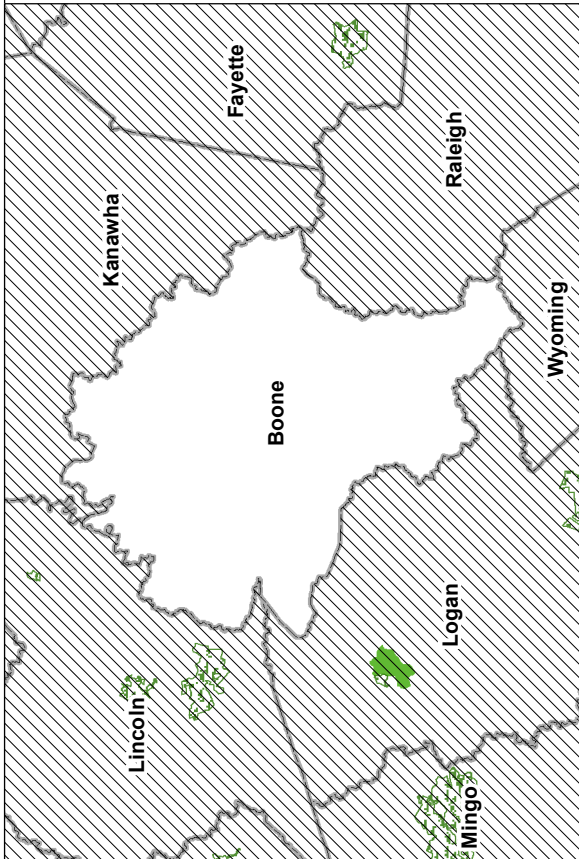
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Public Land - Parks and Forests

Boone County



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



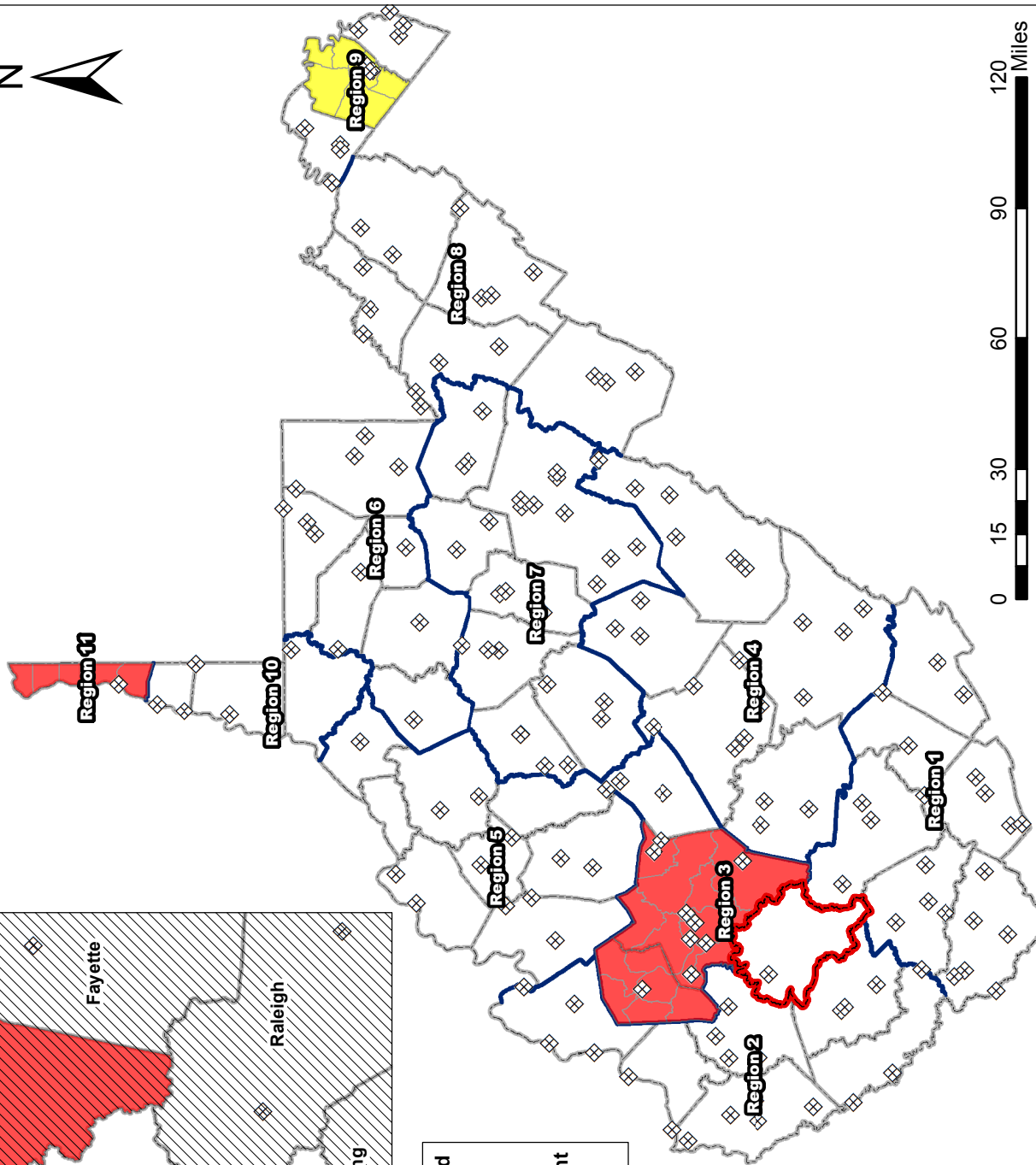
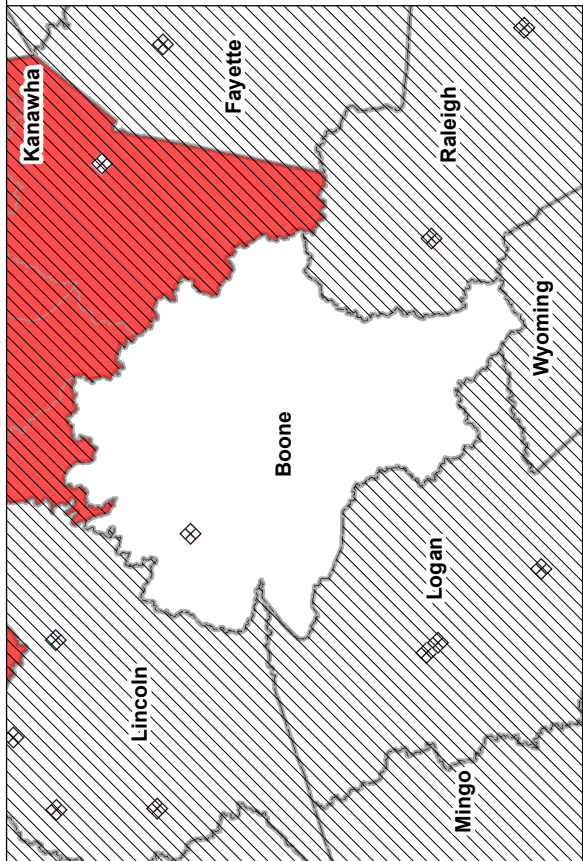
Source: Wildlife Management Areas; West Virginia Division of Natural Resources 2002; State Forest; West Virginia Division of Forestry 2004; State Park; West Virginia Division of Natural Resources; National Resource Analysis Center 2000; National Forest; United States Forest Service 2003; National Park;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

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Environment - Monitoring

Boone 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.

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

Source: Weather Stations; National Oceanic and Atmospheric Administration 1999; Air Pollution Non Attainment Areas; West Virginia Department of Environmental Protection and United States Environmental Protection Agency, 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. Boone County has a small oil field in the east, and oil and gas pipelines run through the county, but there is no extensive play in these industries (Map 32). Boone County does have play in the Marcellus shale, with a number of completed and 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. Boone County has developed its current system to meet current energy needs.

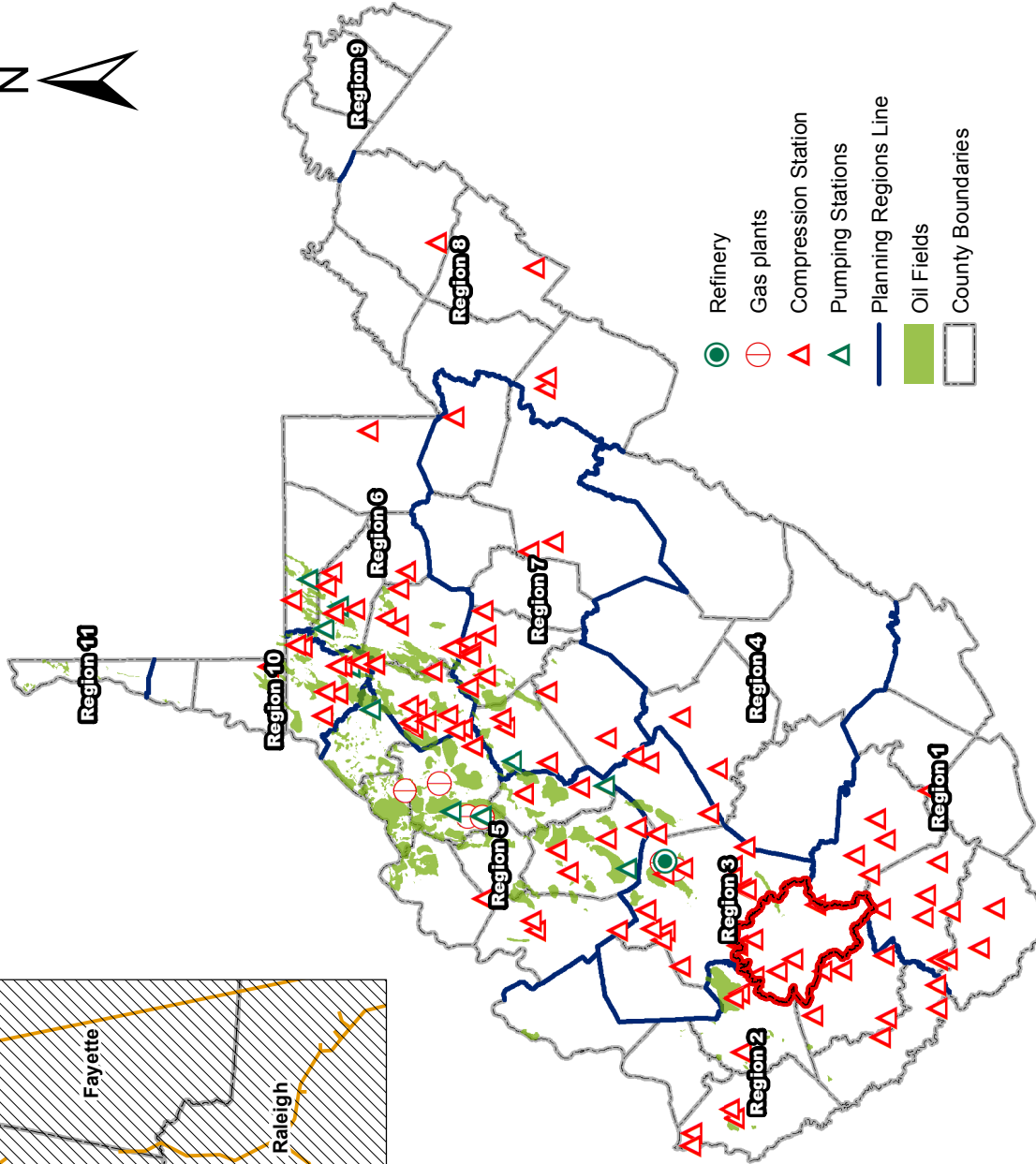
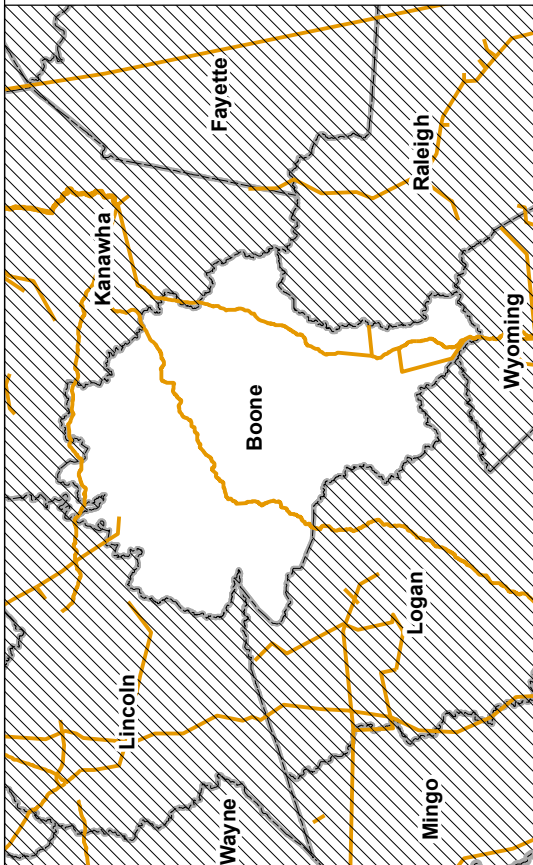
Potential renewable energy sources were also examined. Wood byproducts are a potential energy source classified as biomass energy. Naturally it is most useful in areas with a great deal of wood products. West Virginia is one of the most forested States in the country. Boone County appears to be one of the least forested counties in West Virginia (Map 34). As the maps show, however, Boone is one of the major players in energy production of wood byproducts (Maps 35 and 36). This indicates that Boone is utilizing high productivity from a resource in which it does not have a comparative advantage on other West Virginia counties, though it may have a national comparative advantage. 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.¹⁰ 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, but Boone appears to be one of the counties least favorable for development. Boone County does not appear to be a favorable location for solar development or wind development. 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.¹¹

¹⁰ Kent, Calvin, Risch, Christine, and Pardue, Elizabeth. *Renewable Energy Policy: Opportunities for West Virginia*. Center for Business and Economic Research, Huntington, WV (2012).

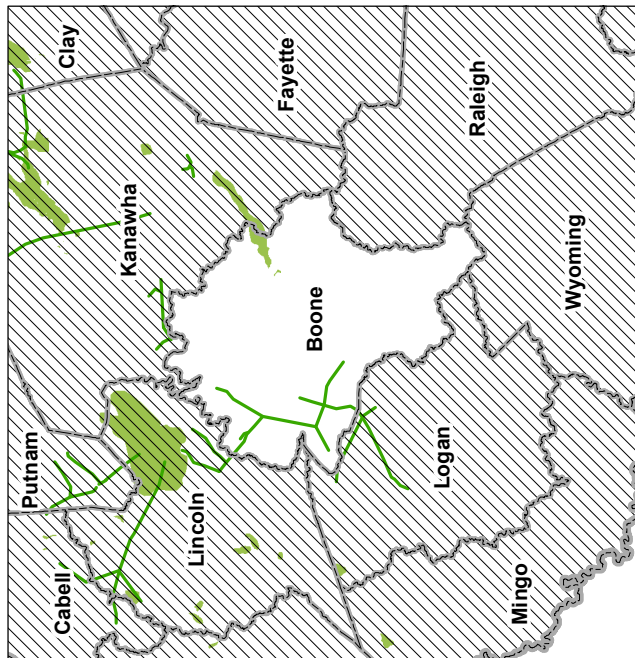
¹¹ Ibid.

Energy - Gas and Oil

Boone County



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



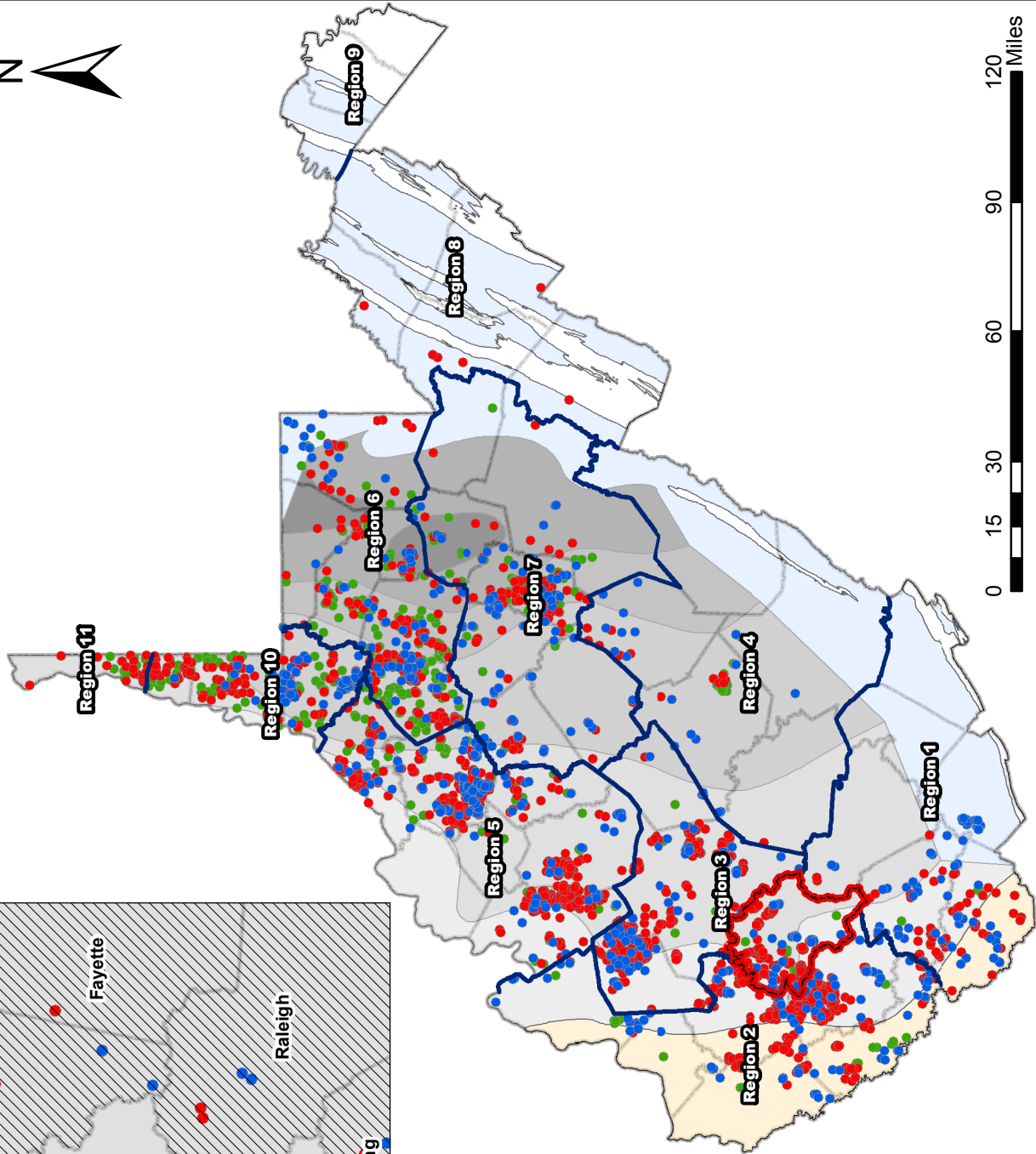
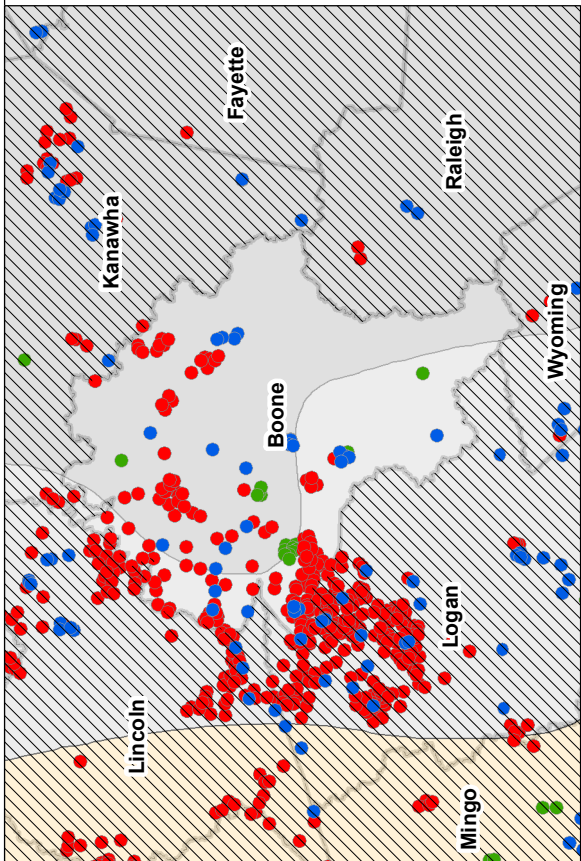
Source: West Virginia Geological and Economic Survey 2007

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Energy - Marcellus Wells

Boone County



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

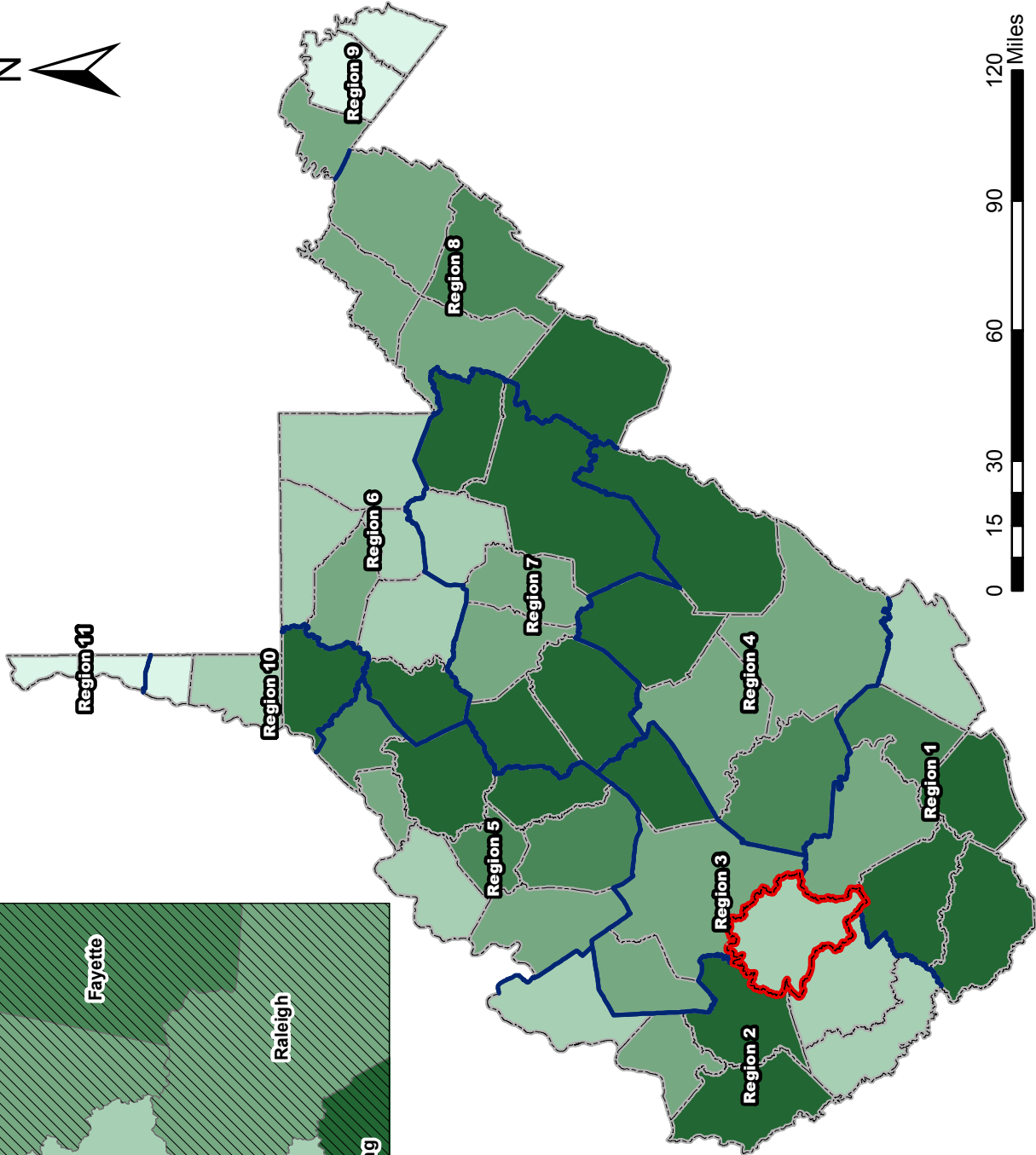
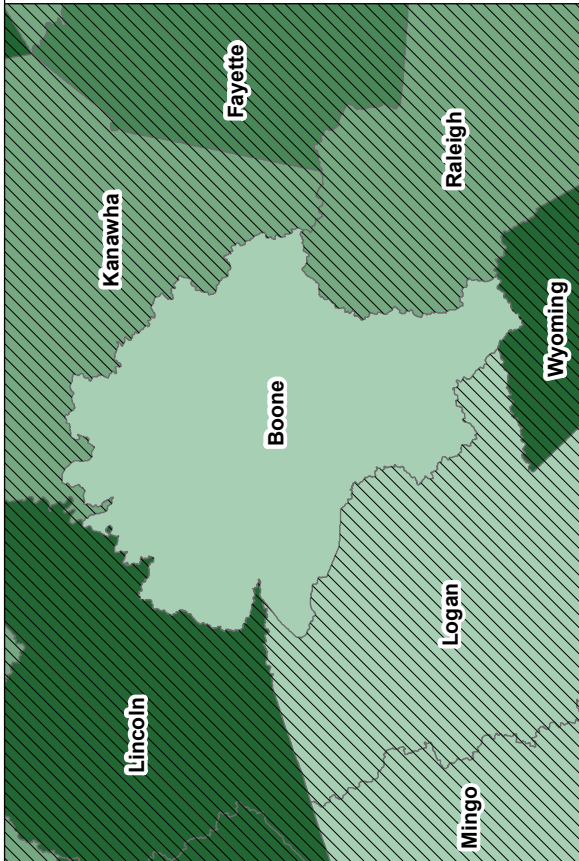


Source: West Virginia Geological and Economic Survey 2013

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Energy - Percent Forest Coverage

Boone County



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

Source: Rahaal Transportation Institute 2013

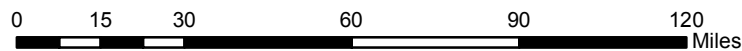
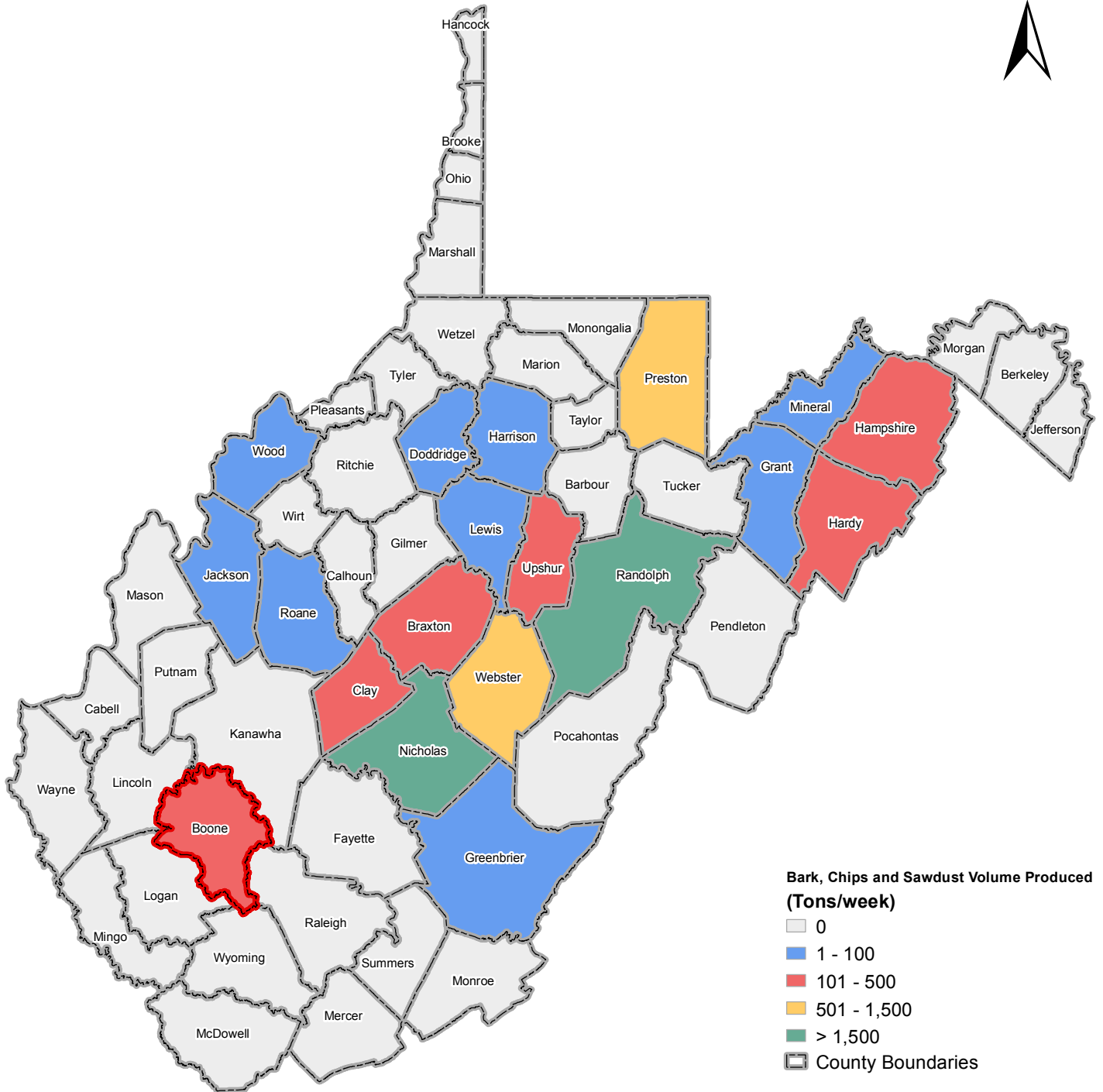
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www.rjraiti.org

Renewable Energy - Wood By Products

Bark, Chip and Sawdust Volume Produced - Boone County



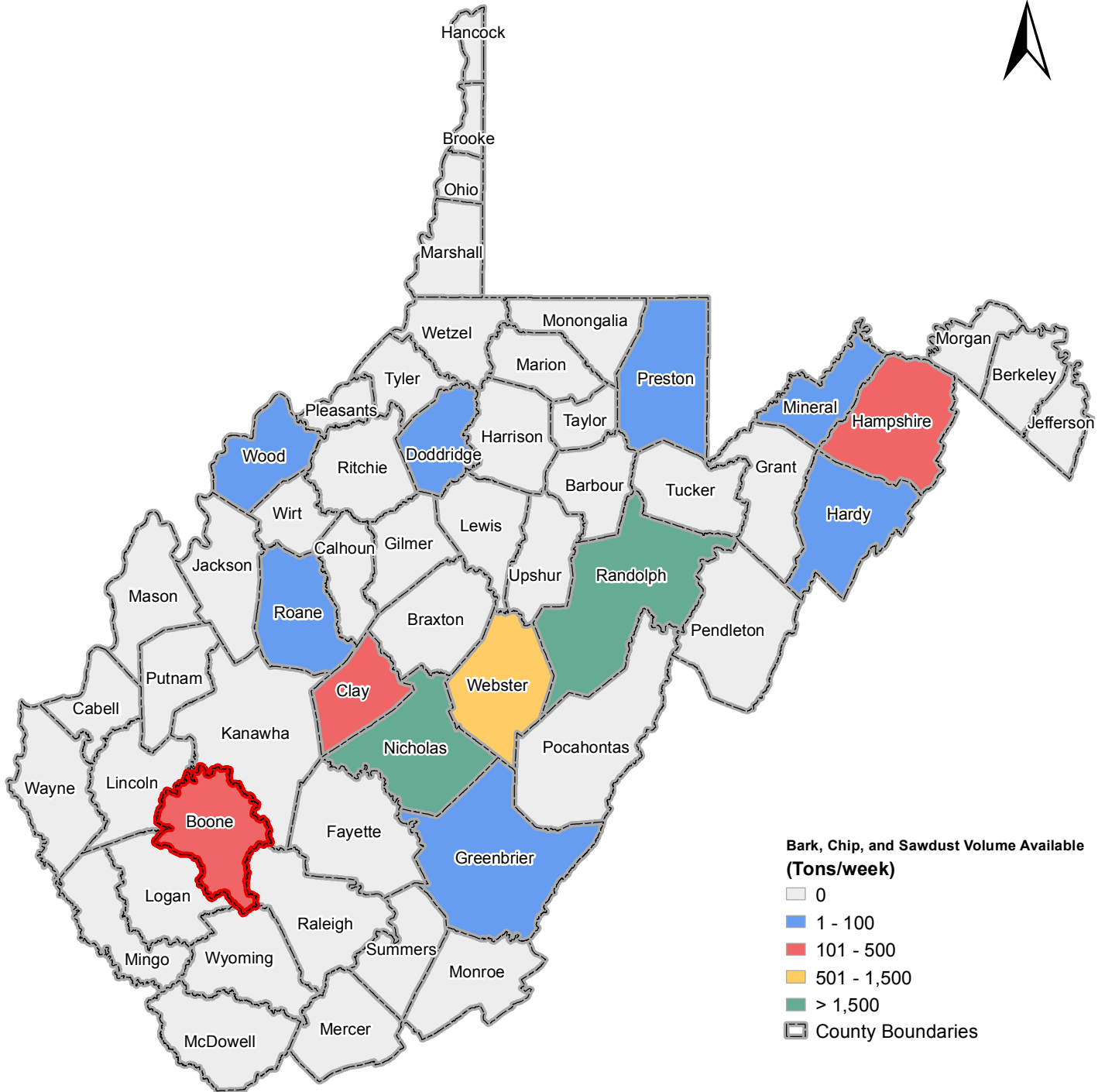
Source: Appalachian Hardwood Center 2011

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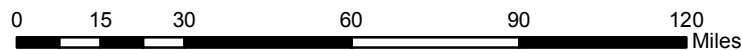
Renewable Energy - Wood By Products

Bark, Chip, and Sawdust Volume Available - Boone County



Bark, Chip, and Sawdust Volume Available (Tons/week)

- 0
- 1 - 100
- 101 - 500
- 501 - 1,500
- > 1,500
- County Boundaries

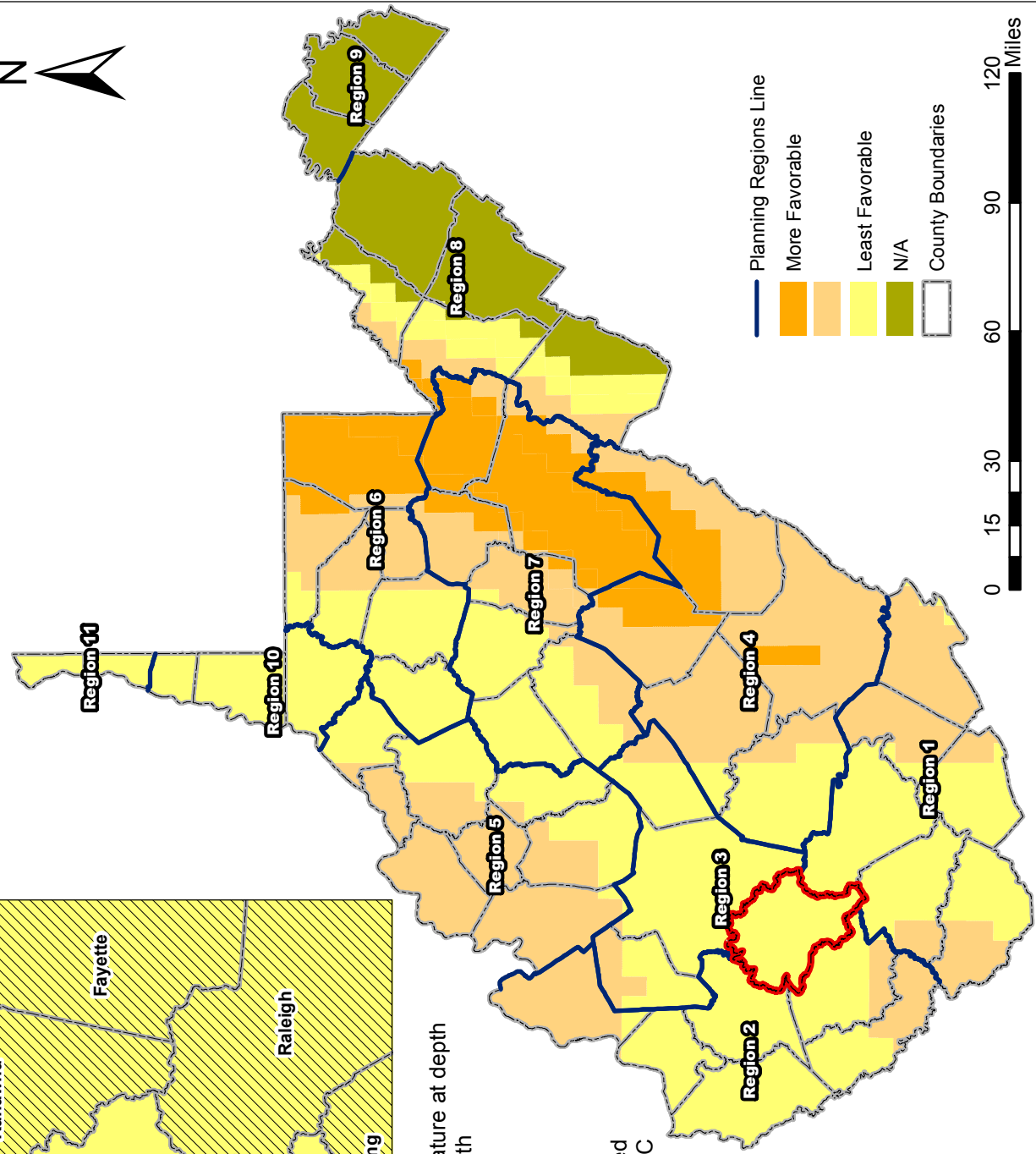
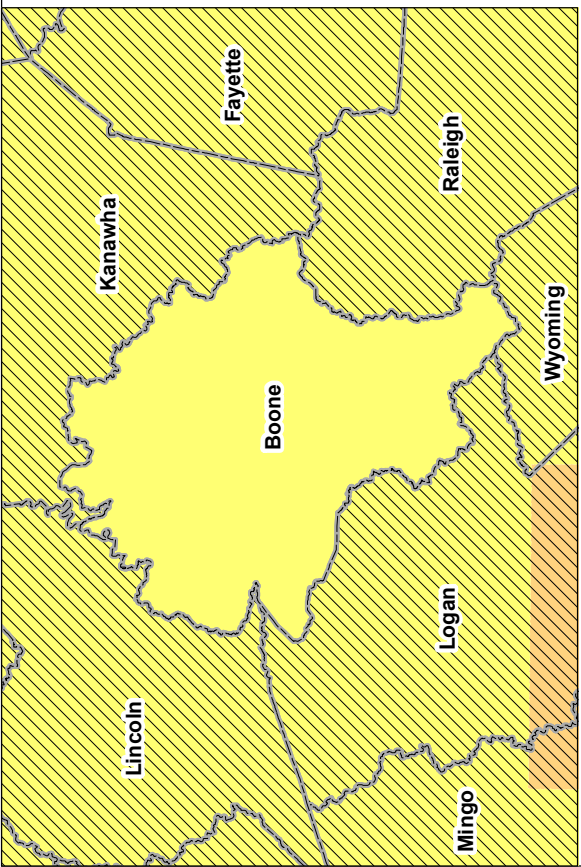


Source: Appalachian Hardwood Center 2011

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Energy - Geothermal Resource of Boone County Favorability of Deep Enhanced Geothermal Systems



- Planning Regions Line
- More Favorable
- Least Favorable
- N/A
- County Boundaries

- Source data for deep EGS includes temperature at depth from 3 to 10 km and analyses (for regions with temperatures \geq 150 degrees C).
- Class values reflect relative favorability, with 1 being more favorable, 3 being least favorable, and "N/A" regions not having been assessed due to temperatures less than 150 degrees C at 10 km depth.

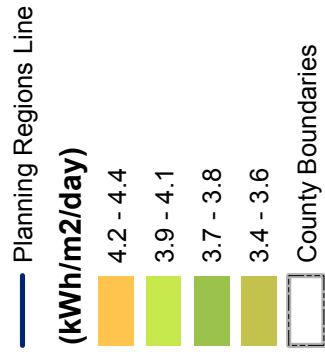
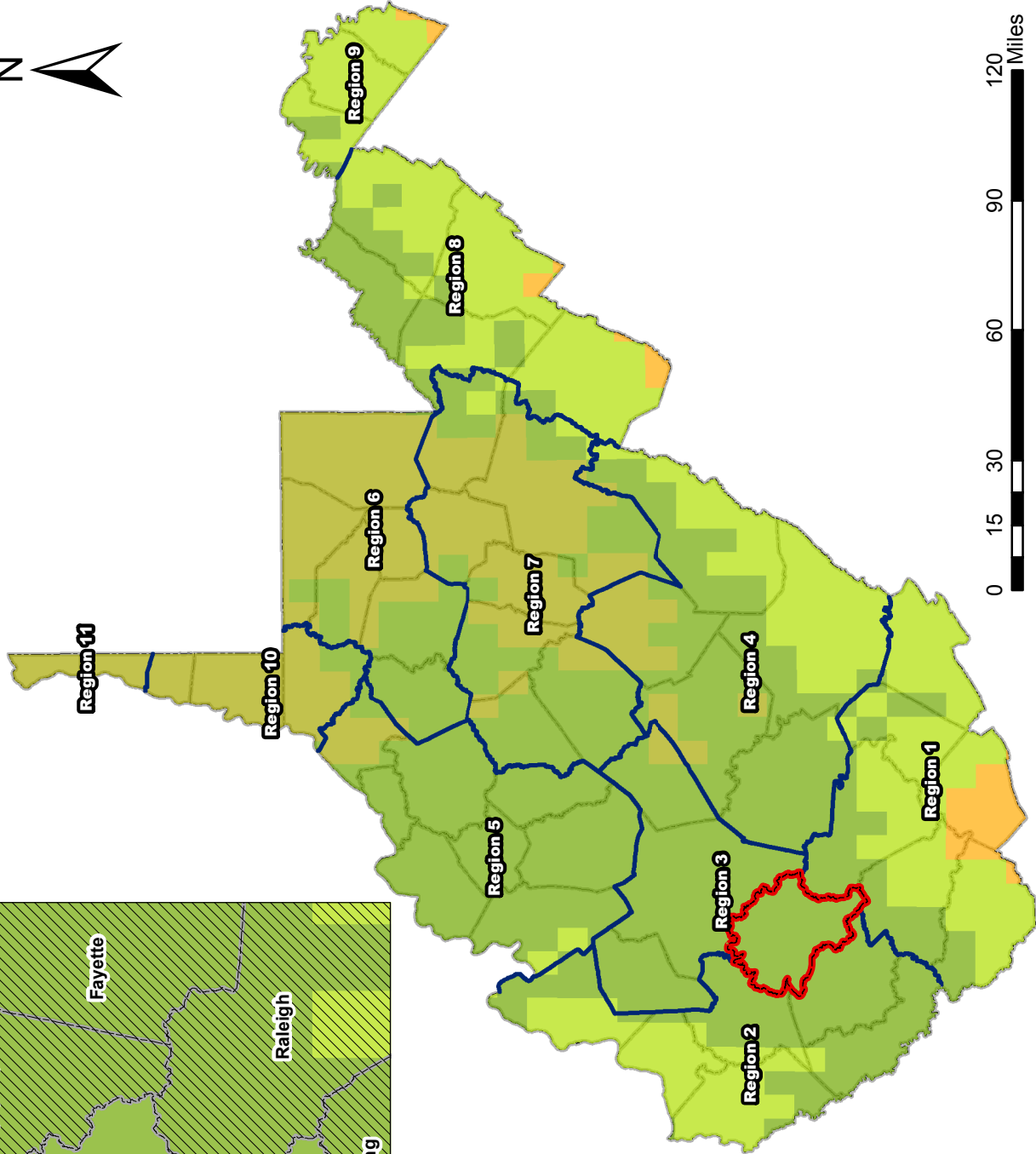
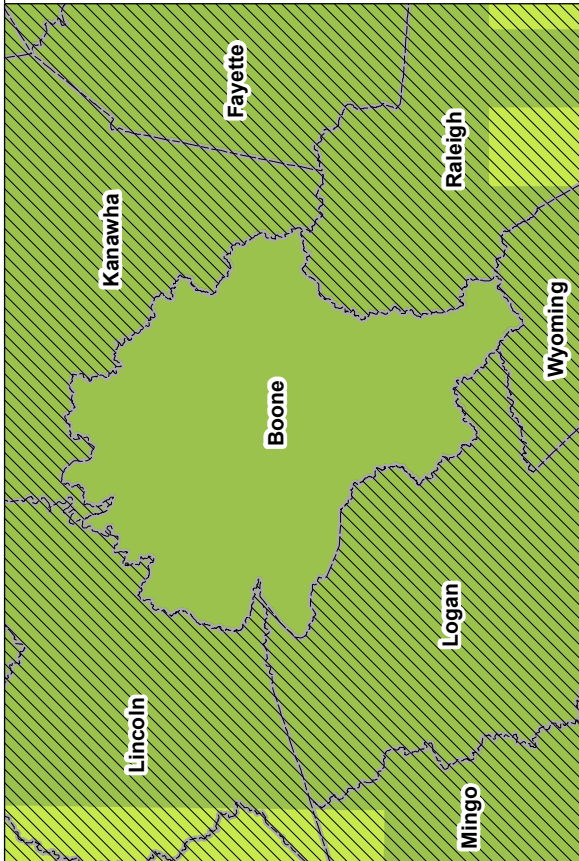


Source: National Renewable Energy Laboratory 2009

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Solar - Renewable Energy

Boone County



Source: National Renewable Energy Laboratory 2012

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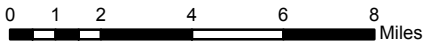


Renewable Energy-Wind

Boone County



- US Routes
- WV Routes
- Elevation (Feet)**
- 620 - 1260
- 1261 - 1720
- 1721 - 2160
- 2161 - 2620
- 2621 - 3520
- Wind Power Class Potential Density (W/m²)**
- 0 - 200 Poor
- 200 - 300 Marginal
- 300 - 400 Fair
- 400 - 500 Good
- 500 - 600 Excellent
- 600 - 800 Outstanding
- > 800 Superb
- County Boundary



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

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IV. Land Use Smart Planning

The research team constructed a smart planning criterion that would apply to each mine site in Boone. 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.

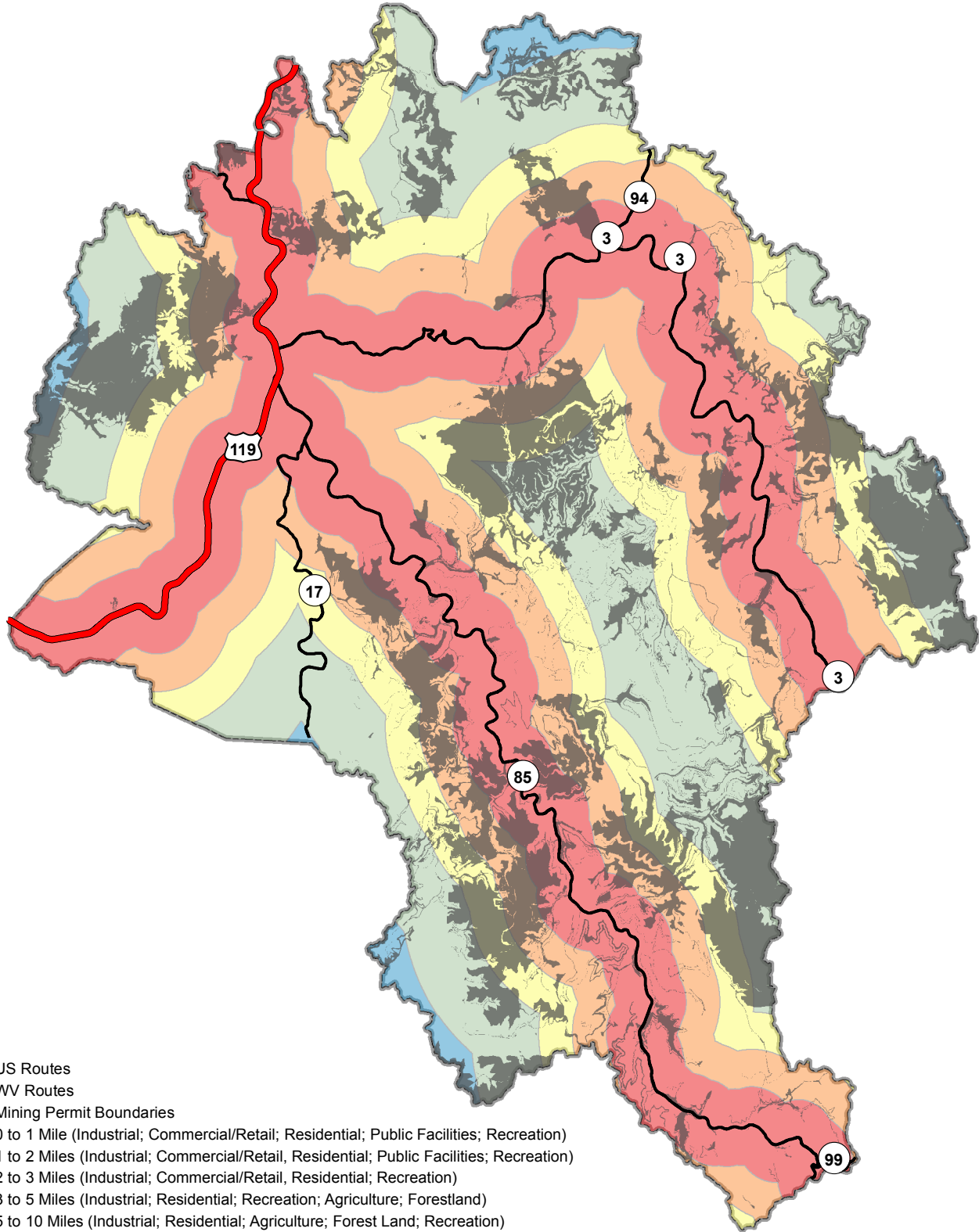
Table 2: Smart Planning Utilizations

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, Recreation
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, Recreation
Utilization Area 10 miles +	Industrial, Residential, Agriculture, Forest Land

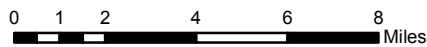
Land development or redevelopment options are determined through a review of the redevelopment authority’s anticipated needs. The required infrastructure component standards are determined on a site by site basis by the county economic development authority as designated by West Virginia Code Chapter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

Landuse Criteria

Boone County



- █ US Routes
- WV Routes
- Mining Permit Boundaries
- 0 to 1 Mile (Industrial; Commercial/Retail; Residential; Public Facilities; Recreation)
- 1 to 2 Miles (Industrial; Commercial/Retail, Residential; Public Facilities; Recreation)
- 2 to 3 Miles (Industrial; Commercial/Retail, Residential; Recreation)
- 3 to 5 Miles (Industrial; Residential; Recreation; Agriculture; Forestland)
- 5 to 10 Miles (Industrial; Residential; Agriculture; Forest Land; Recreation)
- CountyBoundary



Source: Rahall Transportation Institute 2014

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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, and a reference score, which is determined by preexisting plans of development for a site. This will encourage strategic development and evaluation.

Initial Data Collection:

The consulting team collected all available data on surface mines sites located in Boone 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. The researchers collaborated with Kris Mitchell, the director of the Boone County Community and Economic Development Corporation, to narrow the sites based on Boone County’s unique geographical, economic, and demographic needs. For example, the site analysis was narrowed on infrastructure, as utilizing an analysis with interstates as a top scoring attribute made no sense because Boone County has no interstate. It was also recommended that the researchers provide a “reference” score, as Boone County and its economic development director possess existing relationships that make some sites, S502799 and S501609 specifically, primed for development. Together, the team put together 14 sites for analysis. All of the sites and their distance attributes are listed below.

Table 3: Boone County Potential Surface Mine Sites for Development

Site No.	Permittee	PermitID	Facility Name	Acres	Issue Date	Expiration Date
1	Pritchard Mining Co. Inc.	S300796	Fourmile Fk Surface Mine	810	3/6/1997	3/6/2017
2	Coyote Coal Co LLC	S500511	Buck Fork Surface Mine	452.1	3/14/2012	3/14/2017

Site No.	Permittee	PermitID	Facility Name	Acres	Issue Date	Expiration Date
3	Raven Crest Contracting LLC	S500608	Boone North #5 Surface Mine	724.48	9/3/2009	9/3/2014
4	Coal River Mining, LLC	S500609	Mine 5Aa	84.83	3/4/2010	3/4/2015
5	Raven Crest Contracting Llc	S500803	Boone North No. 2 Surface Mine	902.61	10/14/2004	10/14/2014
6	Raven Crest Contracting Llc	S500906	Boone North #3 Surface Mine	255	12/5/2006	12/5/2016
7	Raven Crest Contracting Llc	S501007	Rich Fork Surface Mine	154.98	3/20/2008	3/20/2018
8	Coal River Mining, Llc	S501609	Surface Mine 7	666.71	7/6/2010	7/6/2015
9	Raven Crest Contracting Llc	S501701	Boone North No. 1 Surface Mine	641.47	8/9/2002	8/9/2017
10	Covington Coal Company Llc	S501702	Bull Creek Surface Mine	375.7	10/16/2003	10/16/2018
11	Coal River Mining, Llc	S502301	Locust Fork Surface Mine	379.49	6/9/2004	6/9/2014
12	Coyote Coal Co Llc	S502799	Hewitt Creek Surface Mine No.	560	12/20/2002	12/20/2017
13	Loadout, Llc	S504090	Nellis Mine	542.74	10/20/1993	10/20/2018
14	Coal River Mining, Llc	S500812	Surface Mine No. 9	1705	9/9/2013	9/9/2018

Site Analysis (Distance Analysis)

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

- Road-path Distances:
 - Distance to nearest roadway (Interstate, Existing Highway, and Proposed Highway)
 - Distance to major airports (Tri-State, Yeager)
 - Distance to Intermodal Terminal Facility and Huntington Port
 - Distance to nearest Sewer/ Solid Waste Treatment Facility

- Euclidean Distances:
 - Distance to Water Lines, Sewer Lines, Power Lines and Broadband
 - Distance to Gas Pipe and Oil Pipe
 - Distance to Railroad, National Waterway Network

In the case of Boone County, several of the above factors were deleted to account for the unique geography and needs of the county. 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.	Permitee	PermitID	Existing Highway (EH)	Sign - EH
1	PRITCHARD MINING COMPANY, INC.	S300796	1.72	S94
2	COYOTE COAL CO LLC	S500511	2.60	US119
3	RAVEN CREST CONTRACTING LLC	S500608	13.33	US119
4	COAL RIVER MINING, LLC	S500609	8.60	US119
5	RAVEN CREST CONTRACTING LLC	S500803	13.43	US119
6	RAVEN CREST CONTRACTING LLC	S500906	4.29	S94
7	RAVEN CREST CONTRACTING LLC	S501007	3.55	S94
8	COAL RIVER MINING, LLC	S501609	4.92	S3
9	RAVEN CREST CONTRACTING LLC	S501701	5.61	S94
10	COVINGTON COAL COMPANY LLC	S501702	5.10	S94
11	COAL RIVER MINING, LLC	S502301	10.04	US119
12	COYOTE COAL CO LLC	S502799	1.92	US119

Site No.	Permitee	PermitID	Existing Highway Dist_(EH)	Sign - EH
13	LOADOUT, LLC	S504090	5.64	S3
14	COAL RIVER MINING, LLC	S500812	3.03	US119

Table 5: Shortest Distances from Sites to Other Transportation Methods

Site No	PermitID	Dist – Railroad (RR)	Owner (RR)
1	S300796	5.64	CSXT
2	S500511	2.90	CSXT
3	S500608	1.24	CSXT
4	S500609	6.76	CSXT
5	S500803	1.34	CSXT
6	S500906	3.81	CSXT
7	S501007	3.07	CSXT
8	S501609	3.07	CSXT
9	S501701	1.86	CSXT
10	S501702	1.35	CSXT
11	S502301	8.20	CSXT
12	S502799	2.23	CSXT
13	S504090	2.78	CSXT
14	S500812	3.33	CSXT

Table 6: Shortest Distances from Sites to Sewer Lines (SL) and Water Lines (WL)

Site No.	PermitID	Dist_SL	Public Utility - SL	Dist_WL	Public Utility - WL
1	S300796	17.49	Boone County Public Service District (Sewer)	1.56	West Virginia-American Water Company
2	S500511	6.68	Boone County Public Service District (Sewer)	2.91	West Virginia-American Water Company
3	S500608	11.69	Boone County Public Service District (Sewer)	1.56	West Virginia-American Water Company
4	S500609	13.62	Boone County Public Service District (Sewer)	4.47	West Virginia-American Water Company
5	S500803	11.79	Boone County Public Service District (Sewer)	1.06	West Virginia-American Water Company
6	S500906	15.90	Boone County Public Service District (Sewer)	1.47	West Virginia-American Water Company
7	S501007	15.16	Boone County Public Service District (Sewer)	0.73	West Virginia-American Water Company
8	S501609	9.94	Boone County Public Service District (Sewer)	0.80	West Virginia-American Water Company
9	S501701	13.95	Boone County Public Service District (Sewer)	1.08	West Virginia-American Water Company
10	S501702	13.44	Boone County Public Service District (Sewer)	0.57	West Virginia-American Water Company
11	S502301	15.06	Boone County Public Service District (Sewer)	5.92	Lincoln Public Service District
12	S502799	6.00	Boone County Public Service District (Sewer)	2.24	West Virginia-American Water Company
13	S504090	9.65	Boone County Public Service District (Sewer)	0.51	West Virginia-American Water Company
14	S500812	7.11	Boone County Public Service District (Sewer)	3.34	West Virginia-American Water Company

Table 7: Shortest Distances from Sites to Broadband (BB) and Power Lines (PL)

Site No	PermitID	Dist- (BB)	Provider (BB)	Dist - (PL)	Type (PL)	Size_kV
1	S300796	0.59	Cebridge Acquisition LLC	5.77	Transmission	115-138
2	S500511	0.31	Cebridge Acquisition LLC	1.57	Sub-Transmission	Unknown
3	S500608	0.11	Cebridge Acquisition LLC	1.10	Transmission	115-138
4	S500609	0.76	Cebridge Acquisition LLC	4.77	Transmission	115-138
5	S500803	0.13	Cebridge Acquisition LLC	1.20	Transmission	115-138
6	S500906	0.27	Cebridge Acquisition LLC	4.29	Transmission	115-138
7	S501007	0.08	Cebridge Acquisition LLC	3.54	Transmission	115-138
8	S501609	0.01	Cebridge Acquisition LLC	1.08	Transmission	115-138
9	S501701	0.04	Cebridge Acquisition LLC	2.33	Transmission	115-138
10	S501702	0.23	Cebridge Acquisition LLC	1.82	Transmission	115-138
11	S502301	0.80	Cebridge Acquisition LLC	6.21	Transmission	115-138
12	S502799	0.57	Cebridge Acquisition LLC	0.89	Sub-Transmission	Unknown
13	S504090	0.01	Cebridge Acquisition LLC	0.79	Transmission	115-138
14	S500812	0.07	Cebridge Acquisition LLC	2.00	Transmission	115-138

Table 8: Shortest Distances from Sites to Sewer Treatment (ST) and Solid Waste Treatment Facilities (SD)

Site No.	PermitID	Dist- ST	Facility Name (ST)	Dist- SD	Facility Name (SD)
1	S300796	6.08	DBA VALLEY VISTA RENTAL	13.02	Boone County #2
2	S500511	3.48	Donald R. Kuhn Juvenile Center	6.27	Boone County #1
3	S500608	3.25	DBA VALLEY VISTA RENTAL	10.34	Boone County #2

Site No.	PermitID	Dist-ST	Facility Name (ST)	Dist-SD	Facility Name (SD)
4	S500609	4.75	Nellis Elem. School	13.56	Boone County #1
5	S500803	3.34	DBA VALLEY VISTA RENTAL	10.44	Boone County #2
6	S500906	7.03	Nellis Elem. School	14.34	Boone County #2
7	S501007	6.29	Nellis Elem. School	13.60	Boone County #2
8	S501609	1.07	Nellis Elem. School	9.88	Boone County #1
9	S501701	5.08	Nellis Elem. School	13.90	Boone County #1
10	S501702	4.57	Nellis Elem. School	13.39	Boone County #1
11	S502301	6.19	Nellis Elem. School	15.01	Boone County #1
12	S502799	2.80	Donald R. Kuhn Juvenile Center	5.60	Boone County #1
13	S504090	0.78	Nellis Elem. School	9.60	Boone County #1
14	S500812	3.91	Donald R. Kuhn Juvenile Center	6.71	Boone County #1

Table 9: Shortest Distances from Sites to Gas Pipe and Oil Pipe

Site No	PermitID	Dist - GP	Company Name (Gas Pipe)	Dist - OP	Company Name (PL)
1	S300796	0.06	Dominion Transmission Inc.	0.07	CN
2	S500511	3.50	Columbia Gas Transmission Corp.	2.73	C
3	S500608	5.12	Dominion Transmission Inc.	0.84	C
4	S500609	2.47	Dominion Transmission Inc.	0.23	C
5	S500803	5.23	Dominion Transmission Inc.	0.39	C
6	S500906	0.26	Dominion Transmission Inc.	0.27	CN
7	S501007	6.36	Dominion Transmission Inc.	0.19	C
8	S501609	4.79	Dominion Transmission Inc.	0.85	C
9	S501701	0.72	Dominion Transmission Inc.	0.73	I
10	S501702	4.64	Dominion Transmission Inc.	1.26	C
11	S502301	0.48	Dominion Transmission Inc.	0.28	UC

Site No	PermitID	Dist - GP	Company Name (Gas Pipe)	Dist - OP	Company Name (PL)
12	S502799	2.83	Columbia Gas Transmission Corp.	2.06	C
13	S504090	5.06	Dominion Transmission Inc.	0.57	C
14	S500812	3.93	Dominion Transmission Inc.	0.67	C

Suitability Model

The suitability model for Boone 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 Boone County and expert advice about important factors to site development.¹² 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**, **reference 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 12 (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.

¹² Joseph, M. *A Decision-Support Model of Land Suitability Analysis for the Ohio Lake Erie Balanced Growth Program*. EcoCity Cleveland. (2006).

Reference score is a score that indicates an existing relationship to develop a particular site. Boone County has been actively involved in acquiring mining company partners in order to develop post-mine sites. Because of this, the county and the companies now mining the sites have already approved two of the mine sites for development. The existence of a public-private partnership is important to this plan and the analysis, as the goal is to encourage such planning and investment ideas. This relationship does not affect the other scores, and is scaled only by the existing relationship between the county and the owner of the site.

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

$$\text{Total score of site A} = \text{reference} + \sum (\text{absolute score} \times \text{relative score} \times \text{weight})_{ci} / 10$$

(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, relative scores, and the reference score.

1. Weighting

Table 10 prioritizes post-mining land-use criteria for surface coal mining site selection in Boone 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. For the Boone County model, certain criteria were eliminated because it was determined that they were not useful in evaluating Boone County’s investment position. These criteria include interstates, airports, waterway networks, and intermodal facilities.

Table 10: Weighting Sites Selection Criteria

No	Criteria	Weight
1	Existing Highway	10
2	Sewer Treatment Facilities	10
3	Solid Waste Treatment Facilities	10
4	Broadband	9
5	Gas Pipes	6

6	Power Lines	10
7	Pipe Lines	6
8	Railroads	5
9	Sewer Lines	7
10	Water Lines	10

2. Scoring

2.1 Absolute Scores:

The shorter the distance to a feature from a site, the higher absolute score the site receives. Table 11 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 11: Absolute Scoring System

Absolute Score		10	7	5	3	1
Criteria (Distances in miles)	Existing Highway	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	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
	Broadband	0 - 1	1 - 3	3 - 4	4 - 5	> 5
	Gas Pipe (Natural Gas)	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	Power Lines	0 - 1	1 - 3	3 - 4	4 - 5	> 5
	Pipe Lines	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	Railroads	0 - 1	1 - 3	3 - 4	4 - 5	> 5
	Sewer Lines	0 - 1	1 - 3	3 - 4	4 - 5	> 5
	Water Lines	0 - 1	1 - 3	3 - 4	4 - 5	> 5

2.2 Relative Scores:

Table 12 shows four statistical groups and their relative scores in the Boone 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 12: 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	Existing Highway	1.72	3.16	5.01	7.86	13.43
2	Sewer Treatment Facilities	0.78	3.27	4.24	5.83	7.03
3	Solid Waste Treatment Facilities	5.60	9.67	11.73	13.59	15.01
4	Broadband	0.01	0.08	0.18	0.51	0.80
5	Gas Pipes	0.06	1.16	3.71	4.99	6.36
6	Power Lines	0.79	1.12	1.91	4.10	6.21
7	Pipe Lines	0.07	0.27	0.62	0.85	2.73
8	Railroads	1.24	1.95	2.98	3.69	8.20
9	Sewer Lines	6.00	9.72	12.62	14.78	17.49
10	Water Lines	0.51	0.86	1.51	2.75	5.92

2.3 Reference Score

The reference score is a binary choice between an existing reference, or relationship, and no existing reference. Therefore, it is summed into the total score after the distance analysis. The distance criterion in the final part of the model is scaled to the hundreds, so the reference score is also scaled to the hundreds. This allows the model to accept varying scores for varying existing references based on how active those references are. The two known sites with reference scores are S502799 and S501609.

3. Boone County's Suitability Model:

Table 13 shows the total scores of all studied sites in Boone County. Site No-12 (Permit ID = S502799) has the highest score of 677.25. The sites with higher total scores suggest better opportunities for development. Results in Table 13 are also plotted in the bar chart (Figure 15) for better visualization. Among 14 analyzed potential development sites of Boone County, it is easy to notice the top 5 sites and determine the most suitable sites for investment.

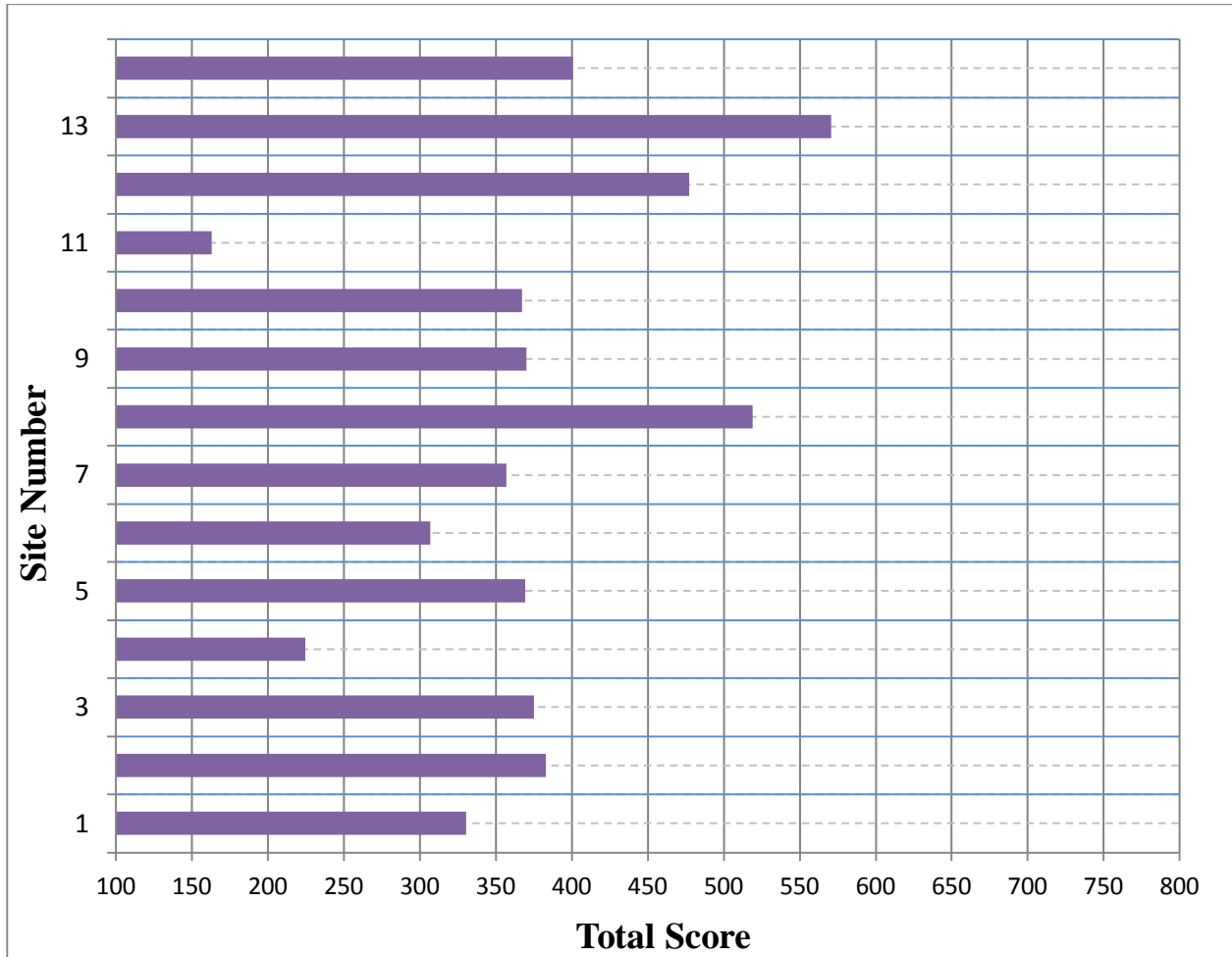
Certainly, any change in weight values or the scoring system will result in different output and may change the decision. For better analysis and decision-making, the dynamic suitability model, which allows modification in criteria's weights, thresholds and scores is available for distribution through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

Besides a distance analysis, a suitability model for Boone is supported by demographic data as well as two additional analyses, which are workforce analysis and retail location density (shown on Table 14 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 13: Total Score of Mine Sites in Boone County

Site No.	Permittee	PermitID	Score
1	PRITCHARD MINING COMPANY, INC.	S300796	330.5
2	COYOTE COAL CO LLC	S500511	382.75
3	RAVEN CREST CONTRACTING LLC	S500608	375.25
4	COAL RIVER MINING, LLC	S500609	224.75
5	RAVEN CREST CONTRACTING LLC	S500803	369.25
6	RAVEN CREST CONTRACTING LLC	S500906	307
7	RAVEN CREST CONTRACTING LLC	S501007	356.75
8	COAL RIVER MINING, LLC	S501609	618.75
9	RAVEN CREST CONTRACTING LLC	S501701	370
10	COVINGTON COAL COMPANY LLC	S501702	367
11	COAL RIVER MINING, LLC	S502301	163
12	COYOTE COAL CO LLC	S502799	677.25
13	LOADOUT, LLC	S504090	570.75
14	COAL RIVER MINING, LLC	S500812	400.5

Figure 15: Boone 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.¹³ 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.

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

Table 14: Employment and unemployment within radius of 5, 10 and 15 miles from the site

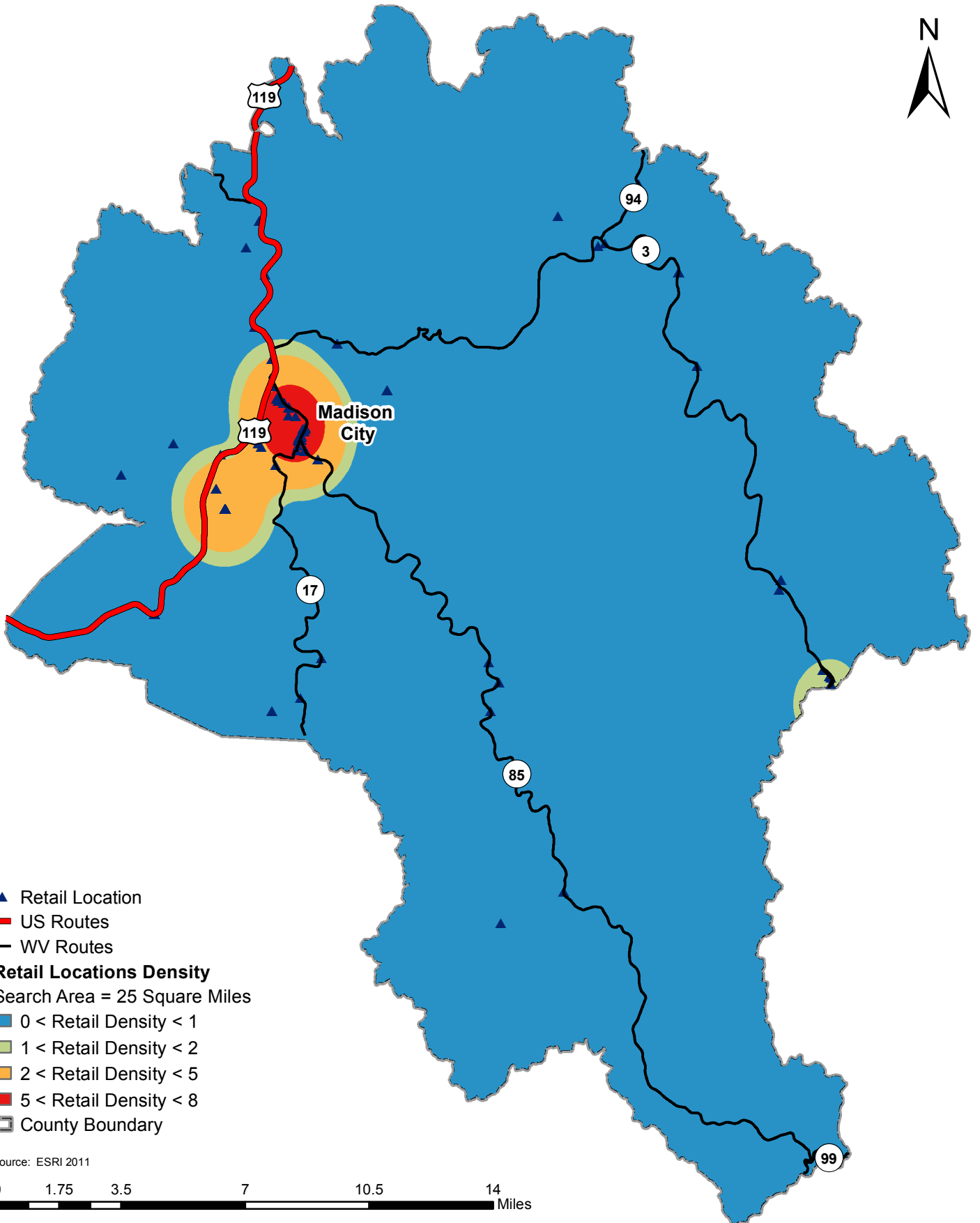
Rank	Permit_ID	Emp_05	Unemp_05	Emp_10	Unemp_10	Emp_15	Unemp_15
1	S300796	555	46	2283	220	5291	546
2	S500511	1306	140	5458	711	8436	1290
3	S500608	1351	132	4032	373	8893	1177
4	S500609	1082	87	3659	407	7792	1083
5	S500803	1372	132	4262	407	8910	1212
6	S500906	714	57	2529	238	6253	727
7	S501007	764	65	2719	256	6471	736
8	S501609	1411	117	5356	634	8833	1319
9	S501701	809	66	2706	259	6733	799
10	S501702	920	76	2944	282	7239	880
11	S502301	809	78	3297	397	7134	1006
12	S502799	1362	155	5508	738	8407	1291
13	S504090	1405	116	5214	609	8822	1309
14	S500812	996	105	4260	520	7752	1141

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.

Retail Location Density

Boone County



VI. Conclusion

Boone County is one of the most rural counties in West Virginia. Due to government services and the growth of natural resource jobs, wages have been steadily growing in the county. Boone County is also using its natural resources to produce a major renewable energy resource: wood byproducts. However, government services and mining jobs may not continue to be stable, aging and educational issues persist, and cutbacks in the natural resource sector may hamper economic growth. This plan could be useful in assisting Boone 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 Boone County to thrive.

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