

Ohio County, WV

Land Use Master Plan 2015



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Executive Summary

This Land Use Master Plan (LUMP) conveys information on Ohio County's current demographic and geographic status. This plan will be used to evaluate the potential of post-mine sites for development, and evaluate Ohio 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 Ohio 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. One major post-mine developments in Ohio County include The Highlands. This plan will help Ohio take advantage of its other post-mine sites in just as varied a manner.

Ohio County's population has been in decline since the 1980s. The County's median age and age distribution are average for the State, indicative of a population capable of productivity in the labor force. The population is projected to decrease through 2030.

Employment consists mainly of Education and Health Services; Trade, Transportation, and Utilities; and Government. Education and Health Services and Trade, Transportation, and Utilities are the major wage contributors. Ohio County total wages have been on the rise since the mid-1990s, with increases in the Trade, Transportation, and Utilities sector largely driving this increase. Of particular note is the amount of

income, as opposed to wages, derived from government transfers. In 2013, approximately 28 percent of Ohio County income is from government transfers. Ohio 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.

Ohio County experienced a large dip in school enrollment in the past decade, but has largely recovered. The County's dropout rate also experienced sharp decline beginning in the 2009-2010 school year. Approximately 9 percent of Ohio County residents 25 and over do not have a high school diploma.

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

Transportation is an important consideration in any development strategy. Ohio County has two interstates, two U.S. Routes, and four State Routes. The County does have some rail presence, and hosts one local airport.

Ohio County also has 50 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 Ohio County. The environment of the County should be considered in an overall development strategy. Ohio County is not heavily forested and does not produce wood by-products, and only has one small wildlife management area. Ohio County is also not on the list of air pollution non-attainment areas, which is positive. Ohio County has no completed Marcellus Shale wells, but many permitted ones. However, Ohio appears to have very little potential among geothermal, wind, and solar renewable energy resources.

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

Site analysis is integral to this report. Researchers identified all the post mine sites given certain criteria for Ohio County. The researchers identified sites in areas that fit the County's unique geographic, demographic, and economic position. The researchers combined a distance analysis using a scoring system based on distance to certain essential utilities and features. These

scores were summed and plotted. A workforce analysis was conducted to determine available labor within certain radii for each site, and a retail analysis was conducted to determine which areas had the most retail activity.

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

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

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

Table C illustrates how each criterion contributes to the final total score and the importance of the weights. A scale of values, based on ideal distances for each criteria, is used to calculate the total Absolute score. The Relative scale is calculated by comparing each site in relationship to others instead of set distances. Because of the assumption that

one criterion may be more important than others (different weights), the rank order of the sites absolute and relative scores can change once the weights for each criteria are mathematically applied. A high or low value

in a heavily weighted criteria can dramatically raise or lower a sites total weighted score.

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

Suitability Ranking	1	2	3	4	5	Weight
Broadband	0.49	1.04	0.47	0.45	1.10	9
Gas Pipes	0.88	0.36	0.04	0.55	1.53	6
National Waterway Network	6.76	6.27	6.23	6.74	7.54	4
Pipe Lines	2.70	3.10	2.28	1.82	3.07	6
Power Lines	0.27	0.63	0.18	0.64	0.74	10
Railroads	8.07	7.74	7.09	7.79	7.47	5
Sewer Lines	5.96	6.58	6.61	5.82	5.91	8
Water Lines	0.00	0.14	0.27	0.05	0.01	10
Existing Highway	1.94	2.39	2.69	3.20	0.92	8
Intermodal Terminal Facilities	17.46	18.08	19.76	18.91	16.61	6
Interstate	6.68	6.20	6.16	6.66	7.47	8
Sewer Treatment Facilities	0.82	0.65	2.70	3.20	0.85	7
Solid Waste Treatment Facilities	2.14	2.82	1.68	0.83	3.79	8

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

Suitability Ranking	1	2	3	4	5	Weight
Broadband	45	15.75	45	67.5	15.75	9
Gas Pipes	31.5	60	60	31.5	15	6
National Waterway Network	15	20	20	15	6	4
Pipe Lines	3	1.5	3	4.5	1.5	6
Power Lines	100	52.5	100	52.5	35	10
Railroads	1.25	2.5	5	1.25	2.5	5
Sewer Lines	4	2	2	6	4	8
Water Lines	100	75	35	75	100	10
Existing Highway	80	60	40	40	80	8
Intermodal Terminal Facilities	42	21	10.5	21	42	6
Interstate	42	56	56	42	28	8
Sewer Treatment Facilities	70	70	24.5	12.25	52.5	7
Solid Waste Treatment Facilities	60	40	60	80	20	8
Total Weighted Score	593.75	476.25	461	448.5	402.25	

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

Suitability Ranking	1	2	3	4	5	Weight
Broadband	10	7	10	10	7	9
Gas Pipes	7	10	10	7	5	6
National Waterway Network	5	5	5	5	3	4
Pipe Lines	1	1	1	1	1	6
Power Lines	10	7	10	7	7	10
Railroads	1	1	1	1	1	5
Sewer Lines	1	1	1	1	1	8
Water Lines	10	10	7	10	10	10
Existing Highway	10	10	10	10	10	8
Intermodal Terminal Facilities	7	7	7	7	7	6
Interstate	7	7	7	7	7	8
Sewer Treatment Facilities	10	10	7	7	10	7
Solid Waste Treatment Facilities	10	10	10	10	10	8
Total Absolute Score	89	86	86	83	79	

Suitability Ranking	1	2	3	4	5	Weight
Broadband	5	2.5	5	7.5	2.5	9
Gas Pipes	7.5	10	10	7.5	5	6
National Waterway Network	7.5	10	10	7.5	5	4
Pipe Lines	5	2.5	5	7.5	2.5	6
Power Lines	10	7.5	10	7.5	5	10
Railroads	2.5	5	10	2.5	5	5
Sewer Lines	5	2.5	2.5	7.5	5	8
Water Lines	10	7.5	5	7.5	10	10
Existing Highway	10	7.5	5	5	10	8
Intermodal Terminal Facilities	10	5	2.5	5	10	6
Interstate	7.5	10	10	7.5	5	8
Sewer Treatment Facilities	10	10	5	2.5	7.5	7
Solid Waste Treatment Facilities	7.5	5	7.5	10	2.5	8
Total Relative Score	97.5	85	87.5	85	75	

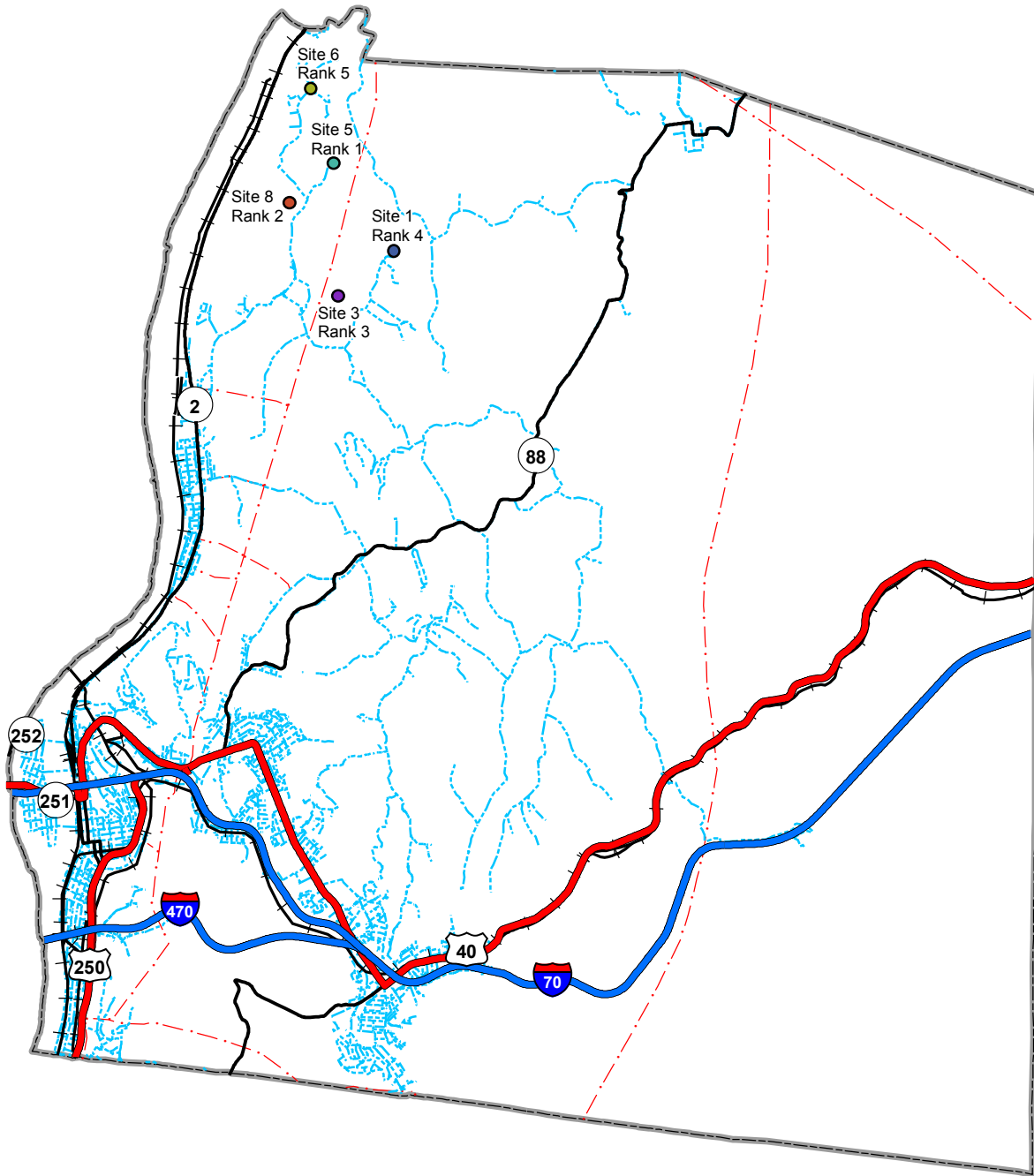
Tables A, B and C compare results between the top five potential development sites, as determined by suitability analysis of all post-mine lands in the county. In Table A, distances for each variable are compared between sites to give an idea of the more suitable site for specific criterion under consideration.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

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

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

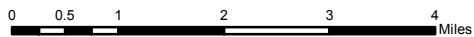
Top Five Sites for Potential Development

Ohio County



- | | | |
|--------------------|-------------|-----------------|
| Mining Site | Interstate | US Routes |
| Site 5 | WV Routes | Railroads |
| Site 8 | Water Lines | Power Lines |
| Site 3 | | County Boundary |
| Site 1 | | |
| Site 6 | | |

Source: Rahall Transportation Institute Analysis 2015



Site's General Info.

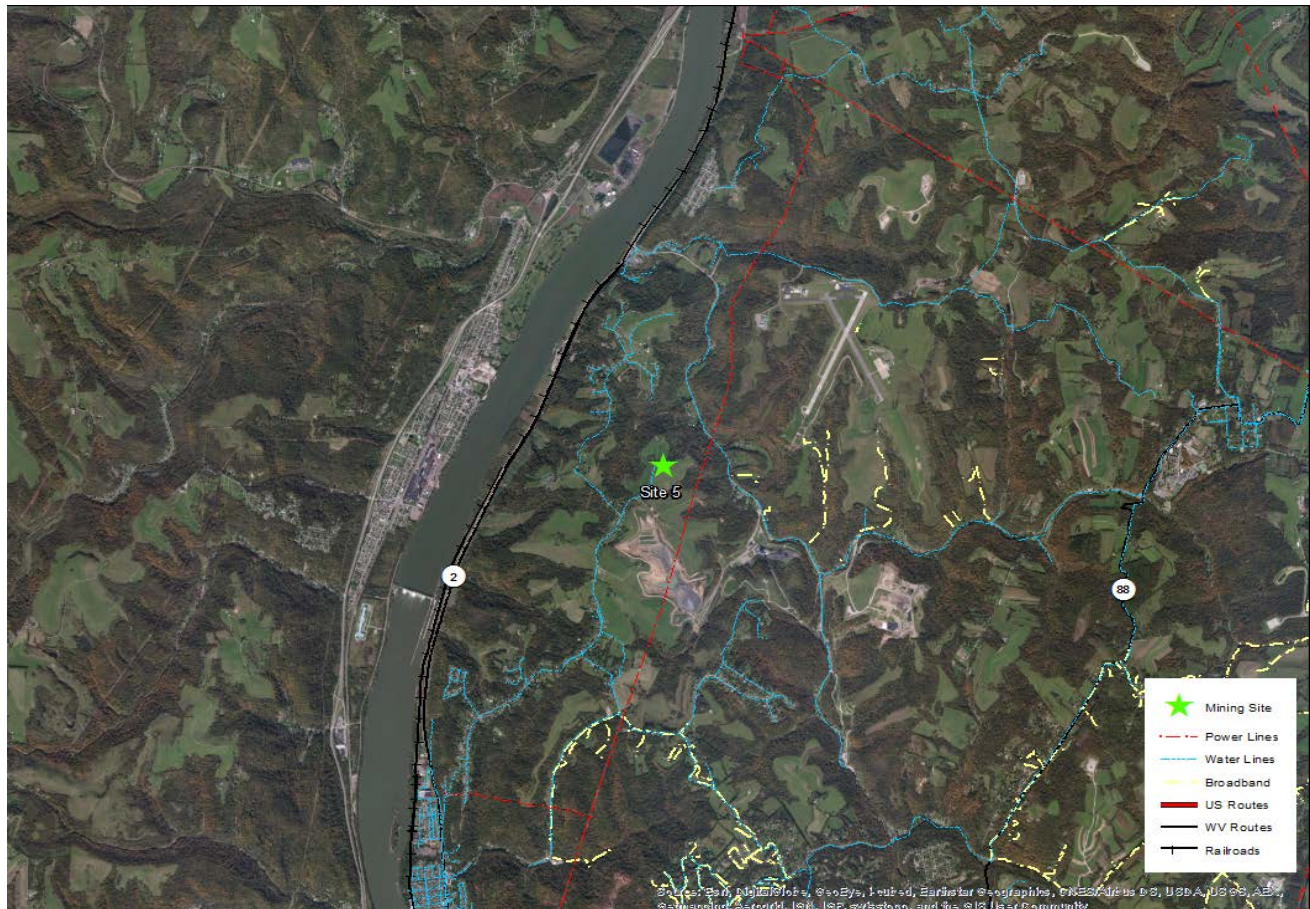
Permittee	Rayle Coal Co.
Facility Name	N/A
Permit ID	S009984
Issue Date	12/18/1984
Expiration Date	12/18/1994
Current Acres	N/A
Lat	40° 9'48.0000"
Long	80° 40'14.0000"
Nearest Post Office	Unknown

Site Number	5
Suitability Ranking	1
Total Score	593.75

Distance Analysis Results

Broadband	0.49
Gas Pipes	0.88
National Waterway Network	6.76
Pipe Lines	2.70
Power Lines	0.27
Railroads	8.07
Sewer Lines	5.96
Water Lines	0.00
Existing Highway	1.94
Intermodal Terminal Facilities	17.46
Interstate	6.68
Sewer Treatment Facilities	0.82
Solid Waste Treatment Facilities	2.14

Site number 5 should be the first choice for potential development. It scores high in several of the heavily weighted criteria, such as Power Lines (0.27 mi.), Water Lines (0.00 mi.). This site is close to Broadband (0.49 mi.) and Existing Highways (1.94 mi.).



Site's General Info.

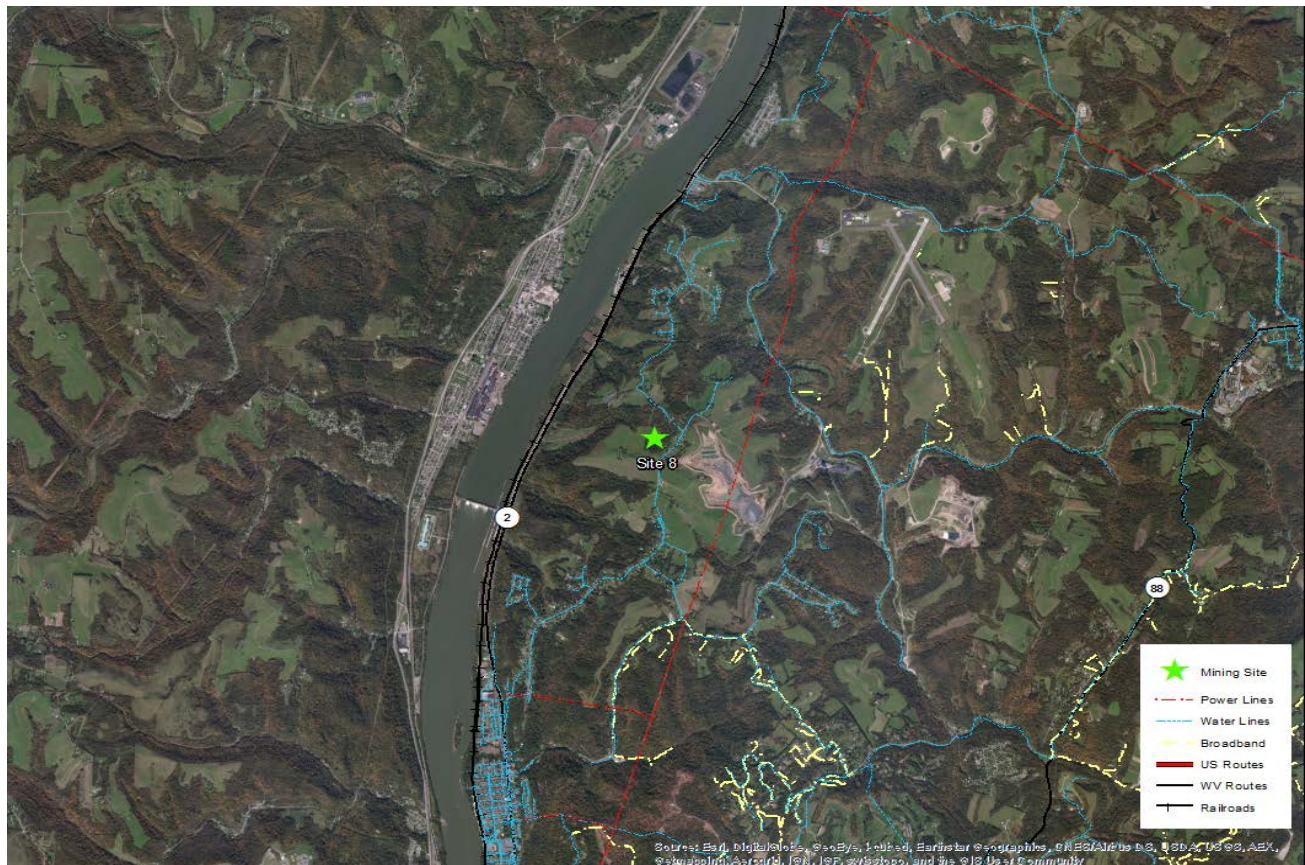
Permittee	Rayle Coal Co.
Facility Name	N/A
Permit ID	S100891
Issue Date	2/21/1992
Expiration Date	2/21/1997
Current Acres	149.7
Lat	40° 9'27.0000"
Long	80° 40'48.0000"
Nearest Post Office	Unknown

Site Number	8
Suitability Ranking	2
Total Score	476.25

Distance Analysis Results

Broadband	1.04
Gas Pipes	0.36
National Waterway Network	6.27
Pipe Lines	3.10
Power Lines	0.63
Railroads	7.74
Sewer Lines	6.58
Water Lines	0.14
Existing Highway	2.39
Intermodal Terminal Facilities	18.08
Interstate	6.20
Sewer Treatment Facilities	0.65
Solid Waste Treatment Facilities	2.82

Site number 8 has the second highest score in the suitability model. The site is located close to utility features such as Water Lines (0.14 mi.), Gas Pipes (0.36 mi.) and Power Lines (0.63 mi.), which makes the site to be a good place for future development.



Site's General Info.

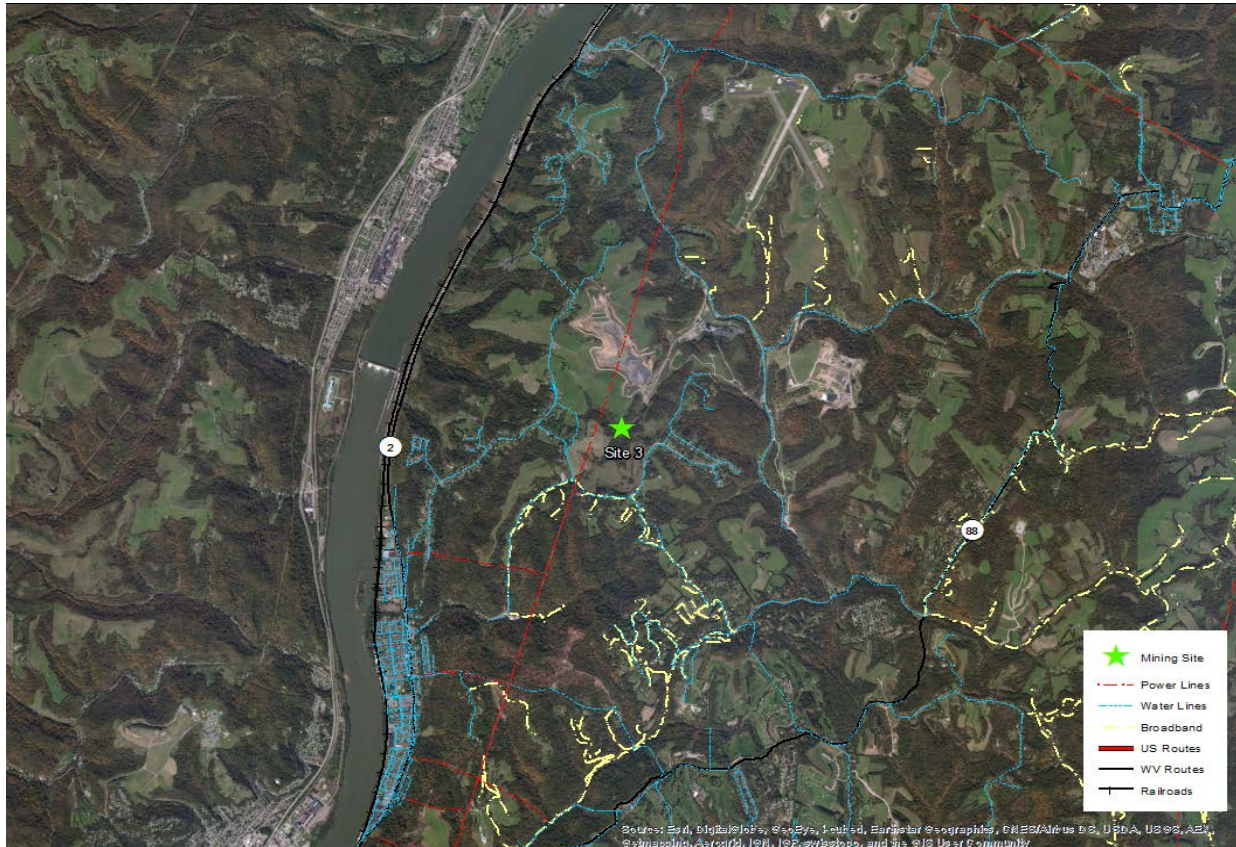
Permittee	Rayle Coal Co.
Facility Name	N/A
Permit ID	S103187
Issue Date	10/1/1987
Expiration Date	10/1/1997
Current Acres	201
Lat	40° 8'38.0000"
Long	80° 40'10.0000"
Nearest Post Office	Unknown

Site Number	3
Suitability Ranking	3
Total Score	461

Distance Analysis Results

Broadband	0.47
Gas Pipes	0.04
National Waterway Network	6.23
Pipe Lines	2.28
Power Lines	0.18
Railroads	7.09
Sewer Lines	6.61
Water Lines	0.27
Existing Highway	2.69
Intermodal Terminal Facilities	19.76
Interstate	6.16
Sewer Treatment Facilities	2.70
Solid Waste Treatment Facilities	1.68

Site number 3 is listed as the third suitable site for post-mine land development. The site is fairly close to several important criteria. It is close to Gas Pipes (0.04 mi.), Water Lines (0.27 mi.) and Power Lines (0.18 mi.). This site has a higher than average distance to Sewer Lines (6.61 mi.) and Intermodal Facilities (19.76 mi.).



Site's General Info.

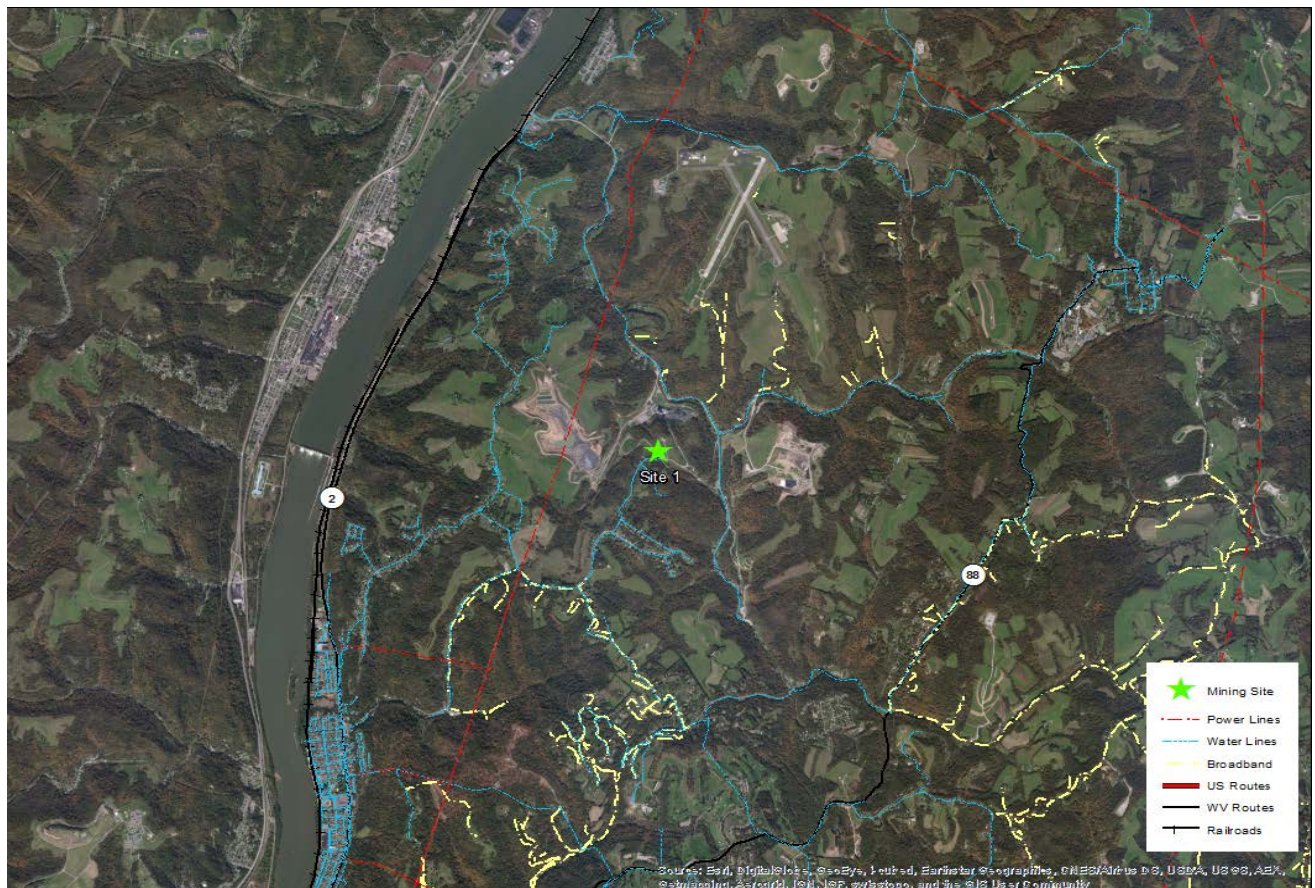
Permittee	Rayle Coal Co.
Facility Name	N/A
Permit ID	S101988
Issue Date	9/16/1988
Expiration Date	9/16/1998
Current Acres	15.2
Lat	40° 9'2.0000"
Long	80° 39'27.0000"
Nearest Post Office	Unknown

Site Number	1
Suitability Ranking	4
Total Score	448.5

Distance Analysis Results

Broadband	0.45
Gas Pipes	0.55
National Waterway Network	6.74
Pipe Lines	1.82
Power Lines	0.64
Railroads	7.79
Sewer Lines	5.82
Water Lines	0.05
Existing Highway	3.20
Intermodal Terminal Facilities	18.91
Interstate	6.66
Sewer Treatment Facilities	3.20
Solid Waste Treatment Facilities	0.83

Site number 1 is ranked as the fourth suitable site for post-mine land development in the county. The advantages of the site are its relative proximity to utilities, Gas Pipes (0.55 mi.) and Power Lines (0.64 mi.), and the close distance to Broadband (0.45 mi.). The main disadvantage is the greater distance to transportation facilities.



Site's General Info.

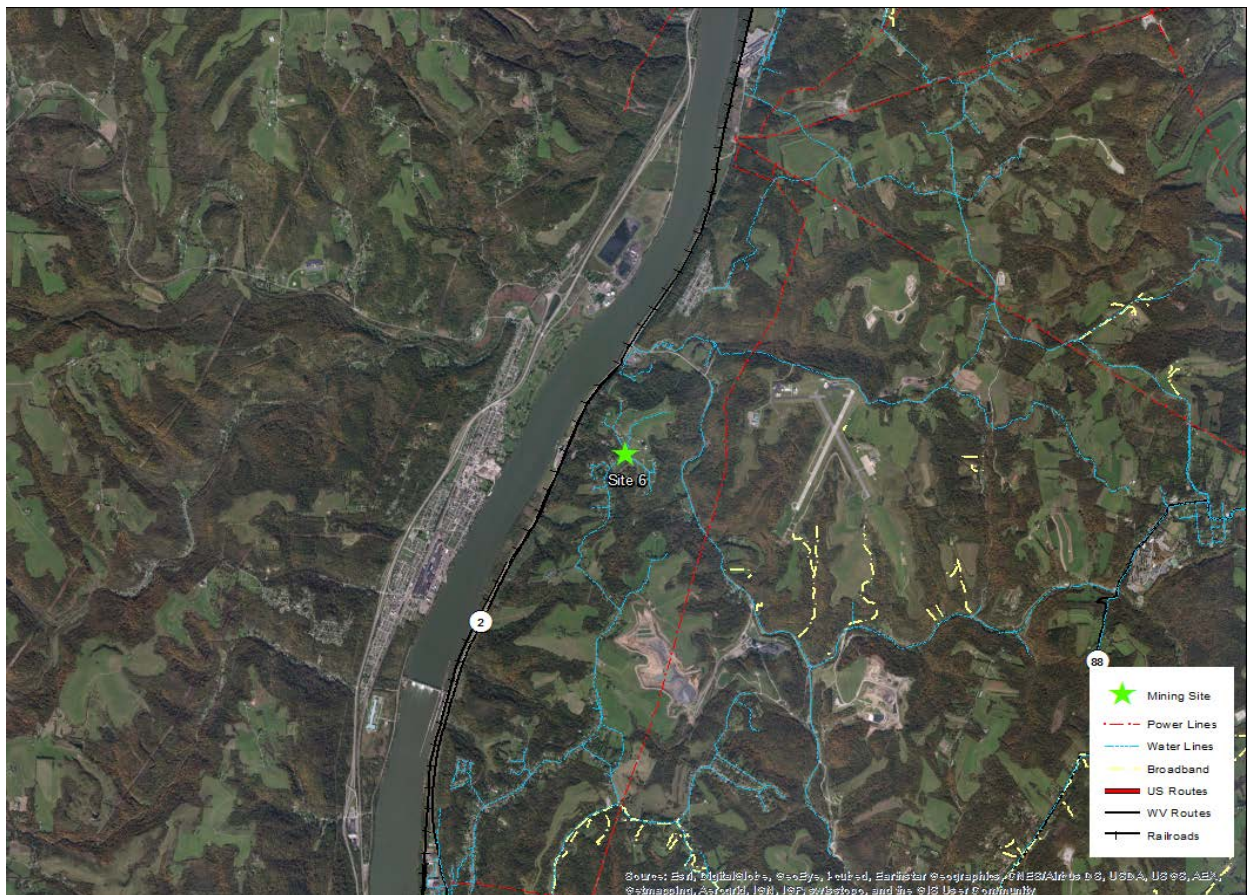
Permittee	Rayle Coal Co.
Facility Name	N/A
Permit ID	S000179
Issue Date	1/8/1979
Expiration Date	1/8/1984
Current Acres	N/A
Lat	40° 10'27.0000"
Long	80° 40'32.0000"
Nearest Post Office	Unknown

Site Number	6
Suitability Ranking	5
Total Score	402.25

Distance Analysis Results

Broadband	1.10
Gas Pipes	1.53
National Waterway Network	7.54
Pipe Lines	3.07
Power Lines	0.74
Railroads	7.47
Sewer Lines	5.91
Water Lines	0.01
Existing Highway	0.92
Intermodal Terminal Facilities	16.61
Interstate	7.47
Sewer Treatment Facilities	0.85
Solid Waste Treatment Facilities	3.79

Site number 6 has the fifth highest score in the suitability model for its close distance to Water Lines (0.03 mi.), a heavily weighted criteria. The distance from the site to other important criteria, such as Broadband (1.10 mi.) and Power Lines (0.74 mi.), are above average, reducing the sites overall score.



I. Introduction

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

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

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

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

This plan provides information and analysis specifically for Ohio County. Ohio County's economy is comprised mainly of employment and activities in the Education and Health Services, Trade, Transportation, and Utilities, and Government sectors. The resulting combination has led to a constant increase in total wages. However, this has not translated to a complete success, as the population continues to decline substantially. 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

Ohio County was first formed in 1776, originally one of the first counties in Virginia west of the Alleghenies. The county, once covering 1,400 square miles, now covers 108.9. Ohio County is named after the river that borders it to the west. The river has been essential to the economy of this county since its inception. The industrial economy in the county peaked in the first half of the 20th century. Since then, the population has been declining. In plans to diversify the economy, developments like shopping centers are beginning to sprout up in Ohio County. Currently, the Education and Health Services sector is the largest employer in the county.¹

III. Existing Conditions

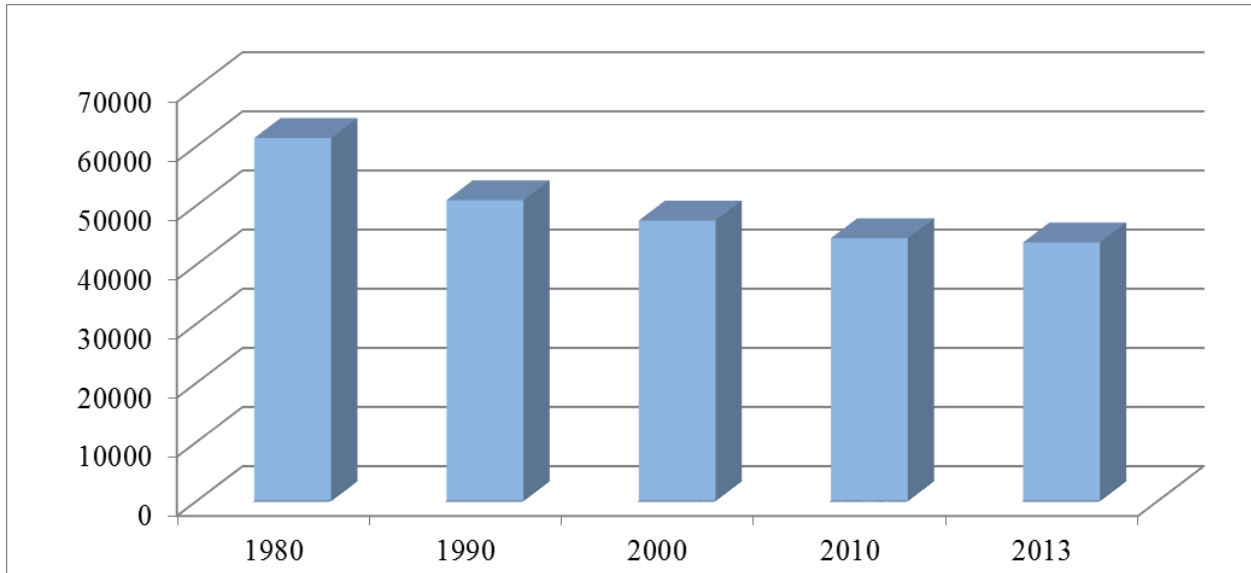
This information will provide a background understanding of the demographic trends in the County. This base information is meant to provide overall detail on Ohio County's status as it stands. Part IV will deal with possible future site development information, to be considered with the demographic data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

¹ Daddysman, James W. 2013. "Ohio County." e-WV: The West Virginia Encyclopedia. Accessed March 9, 2015.

Population

The population of Ohio County in 2013 was 43,727 according to Stats Indiana, ranking it 13th in county population among the 55 counties in West Virginia.² The decennial censuses show that Ohio County has been losing populations since at least 1980.

Figure 1: Census Populations for Ohio County

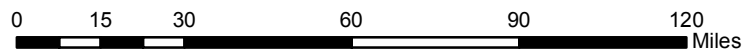
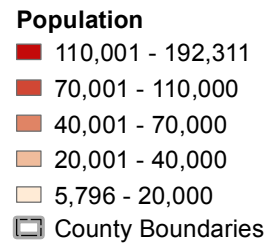
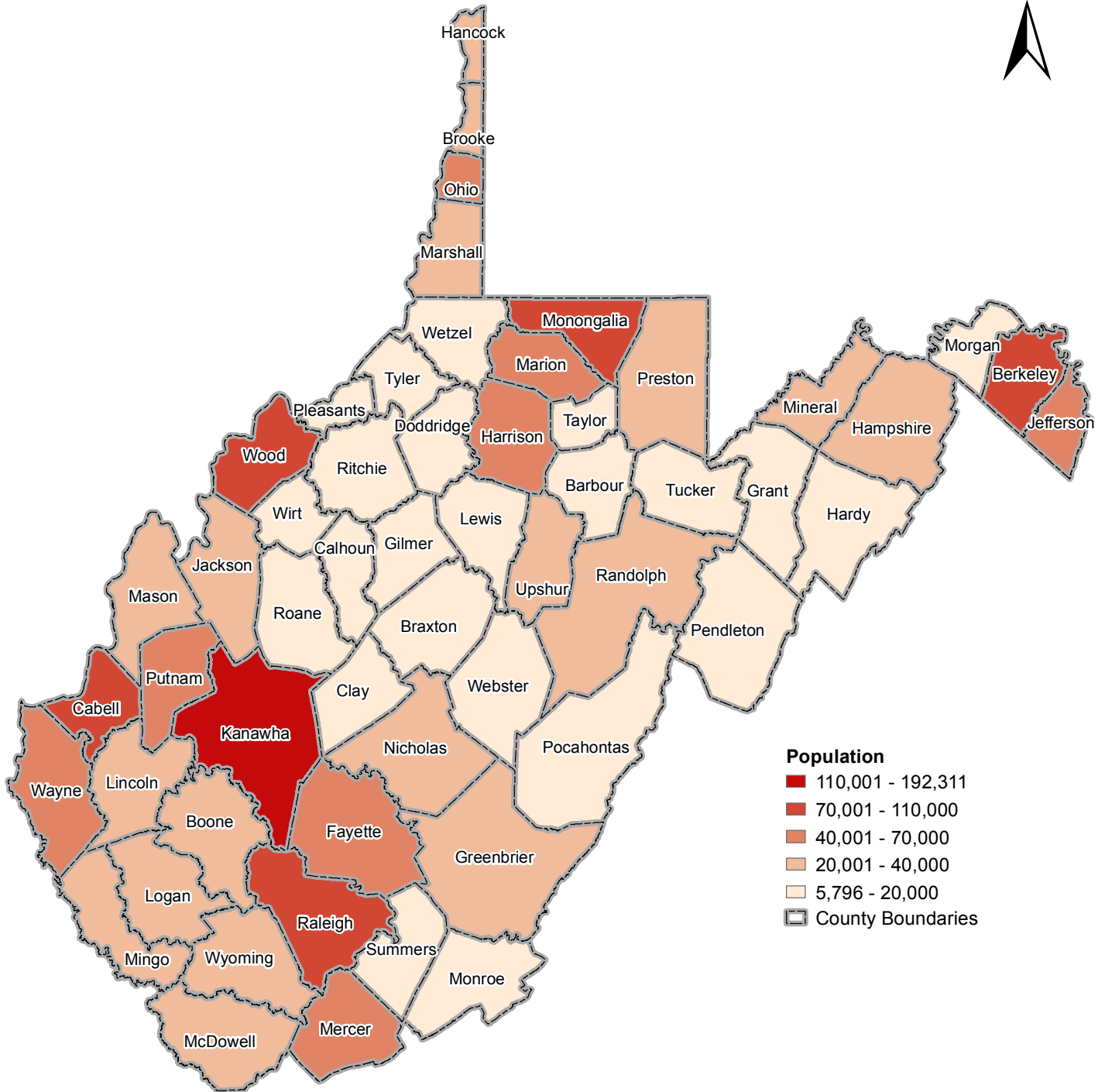


Source: Stats Indiana, USA Counties in Profile

Map 1 illustrates the Ohio County population compared to West Virginia overall. Ohio is one of the counties with considerable population.

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

Demographic Population

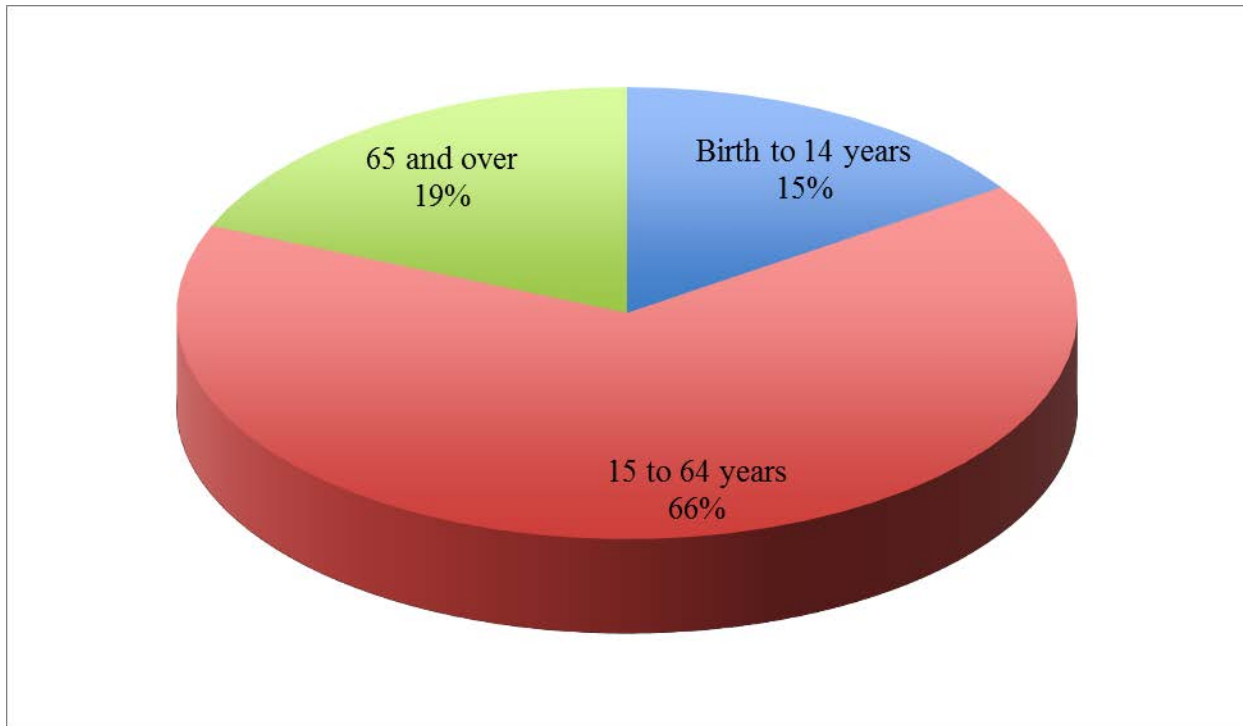


Source: U.S. Census Bureau, 2009-2013 American Community Survey

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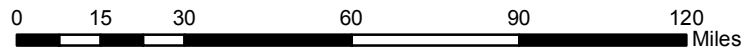
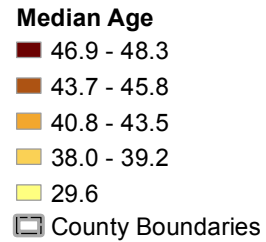
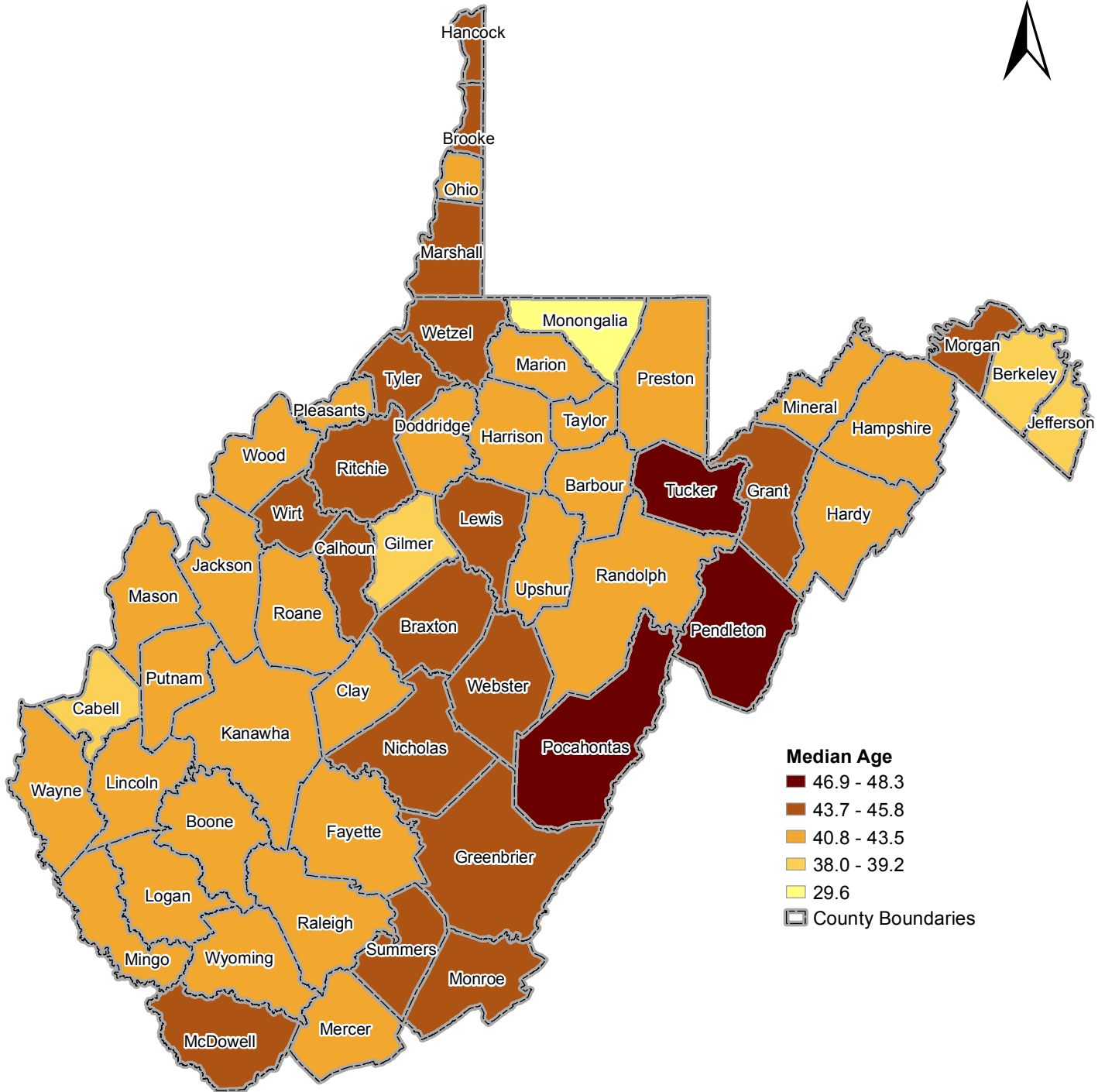
According to the ACS, over 25 percent of Ohio County residents are 60 years of age and over, while about 14 percent are between 5 and 17 years of age and just over 5 percent are below the age of 5. Approximately 10,057 people (or 23 percent) are of retirement age. The median age in Ohio is 43, which is very near the median age of the State (Map 2). The majority of the population is of prime working age, as denoted in Figure 2.

Figure 2: Ohio County Age Breakdown



Source: 2013 American Community Survey 5-Year Estimate Calculation

Demographic Median Age



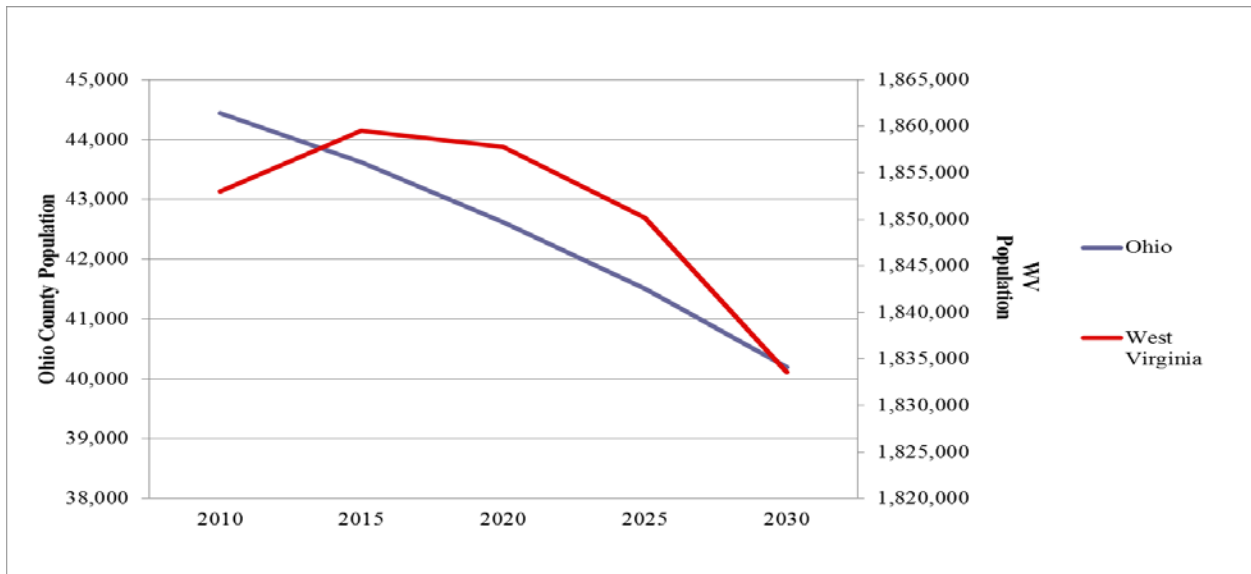
Source: U.S. Census Bureau, 2009-2013 American Community Survey

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The Bureau of Business and Economic Research at West Virginia University projects a 10.55 percent decrease in the Ohio County population between 2010 and 2030, which is considerably higher than the projected decline of the West Virginia population.³ The model for the projection is based on past population patterns and statistics, and should not be taken as permanent. The projected decrease follows a period of population volatility from the 1980s through 2013.

Figure 3: Population Projections



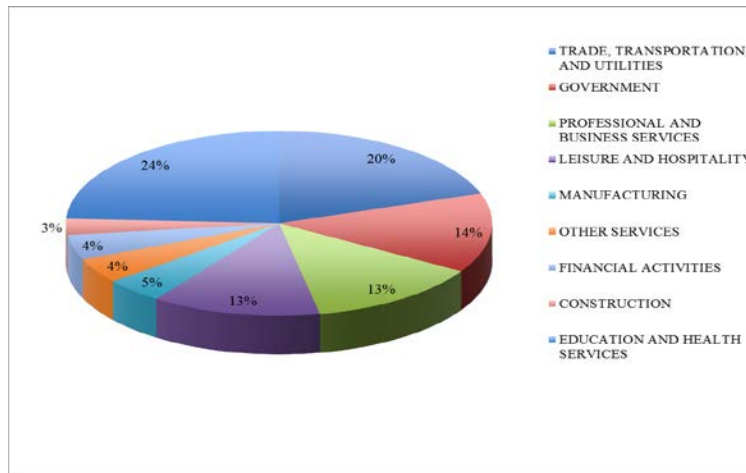
Source: WVU Bureau of Business and Economic Research

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

Employment

Workforce West Virginia has a complete dataset on employment numbers and wages. The total number of employed in 2013 was 29,547. Approximately 24 percent of wage earners in Ohio County worked in Education and Health Services and approximately 20 percent worked Trade, Transportation, and Utilities. Along with Government, these three industries comprise approximately half of Ohio County’s total employment, suggesting a more diverse mix of industry employment than seen in other West Virginia counties.

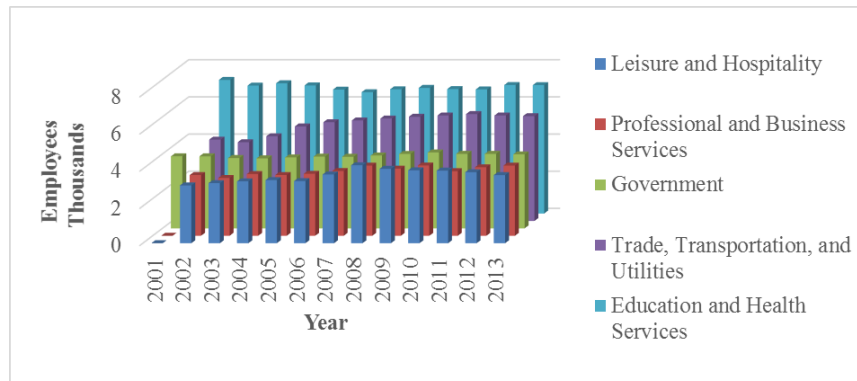
Figure 4: 2013 Ohio County Employment



Source: Workforce West Virginia

The current top five sectors have generally been the top five employers over the past decade in Ohio County. Trade, Transportation, and Utilities has seen the largest growth (of approximately 29 percent since 2002). Education and Health Services has fluctuated, but has seen an overall decline of 4 percent. Leisure and Hospitality has seen an 18 percent increase, while both Government and Professional and Business Services have not changed much.

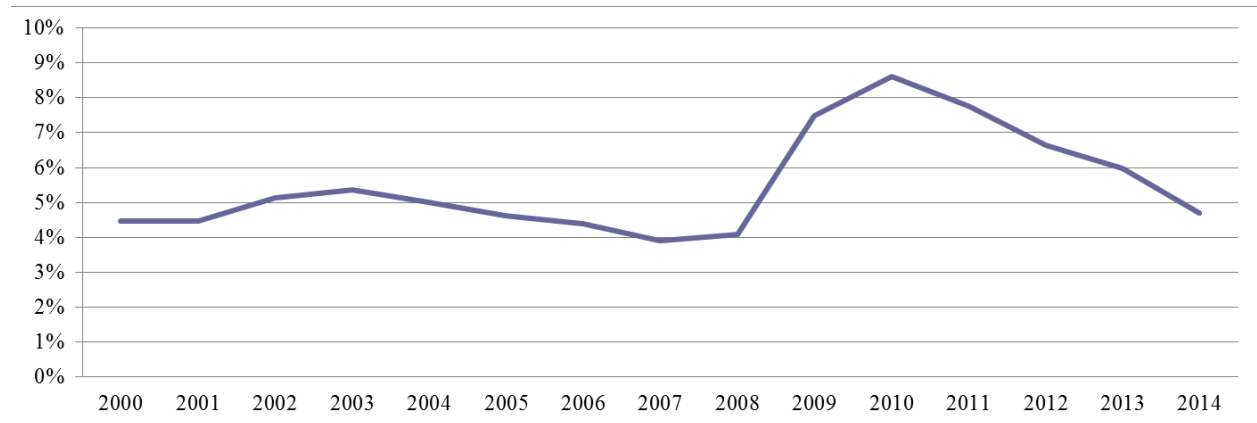
Figure 5: Ohio County Employment by 5 Sectors 2001-2012



Source: Workforce West Virginia

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

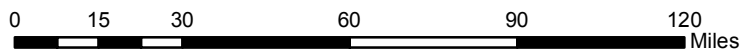
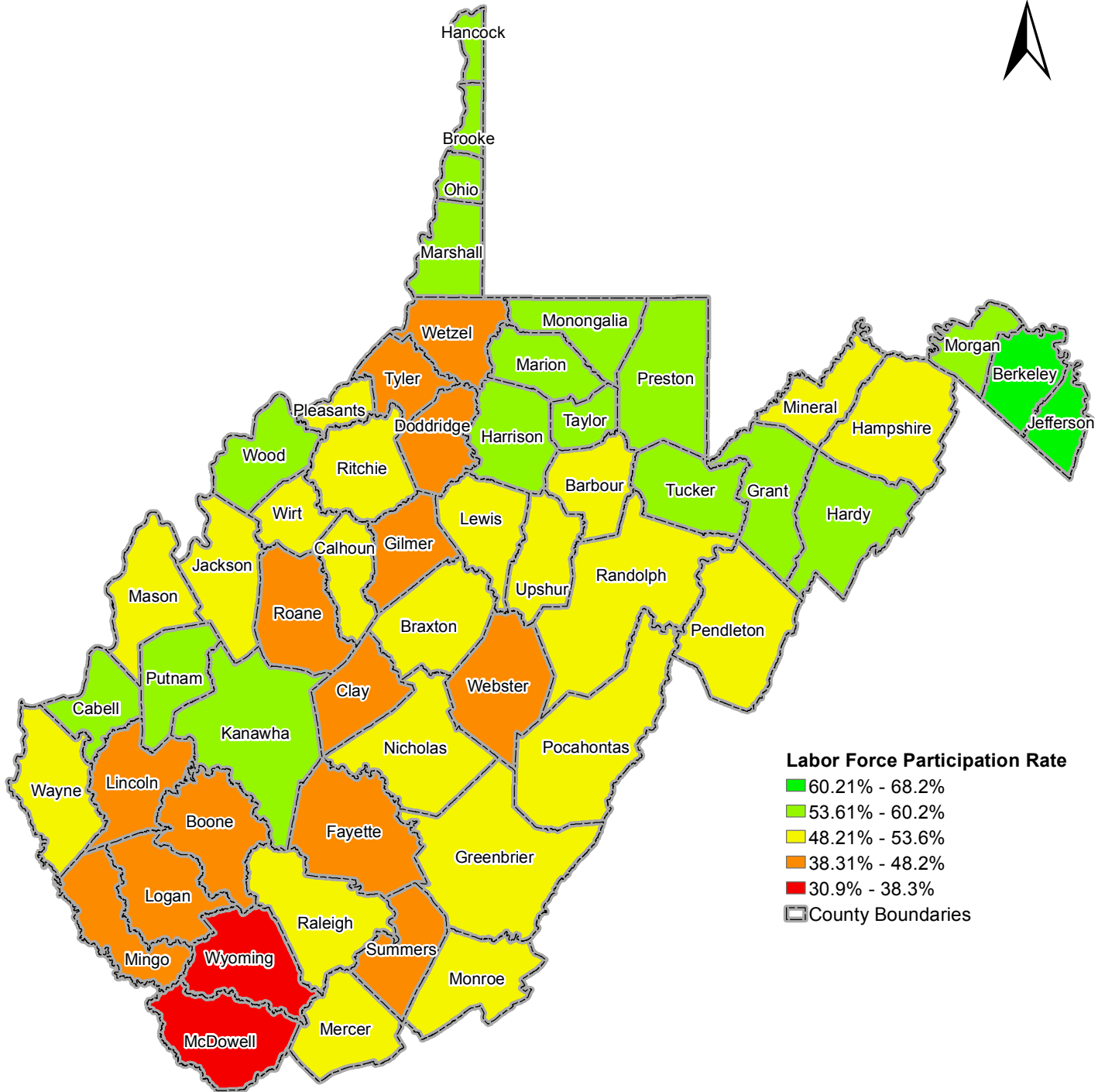
Figure 6: Ohio County Unemployment Rate



Source: Workforce West Virginia

Demographic

Labor Force Participation Rate

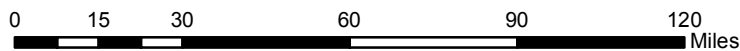
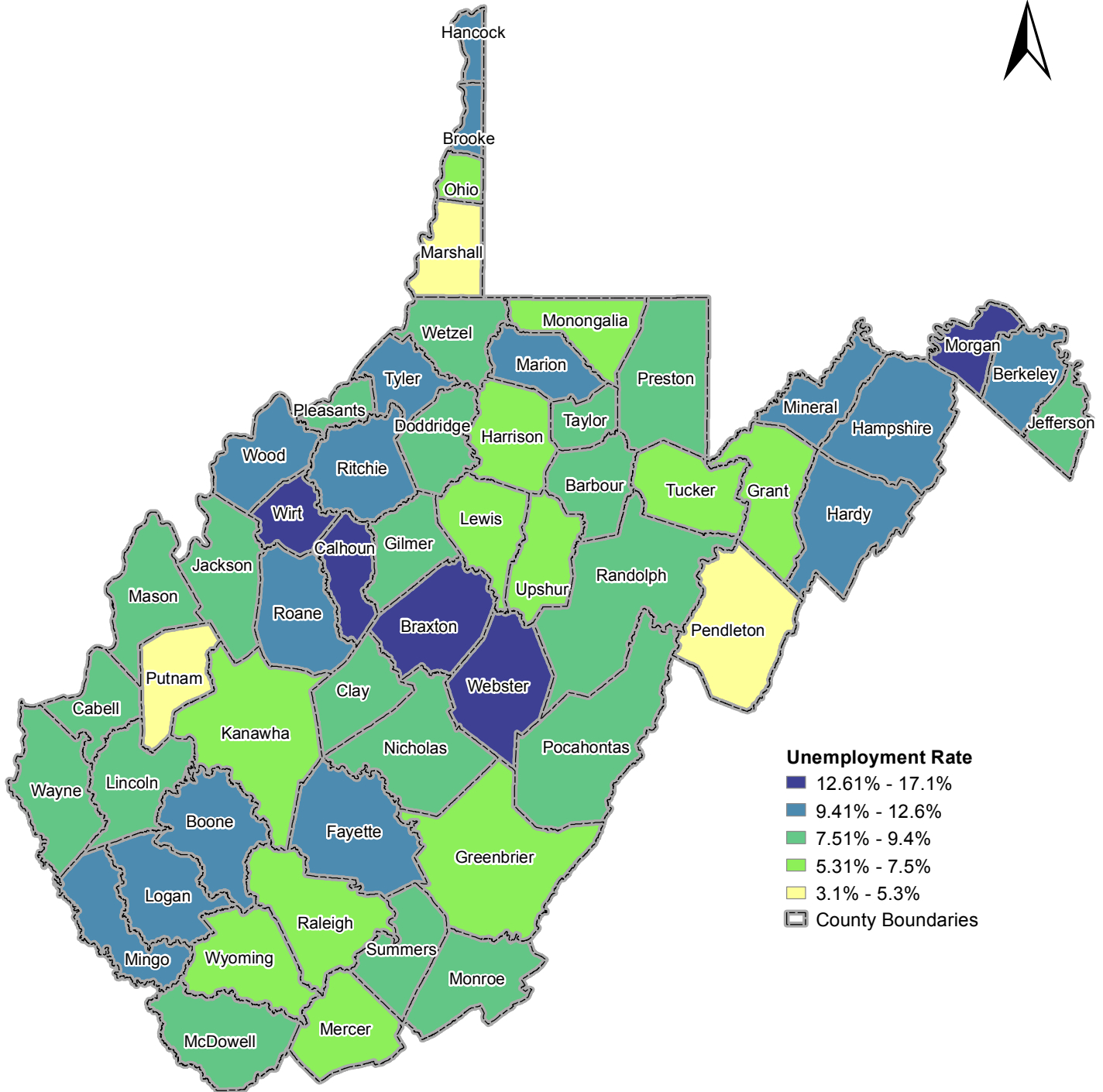


Source: U.S. Census Bureau, 2009-2013 American Community Survey

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Demographic Unemployment Rate



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

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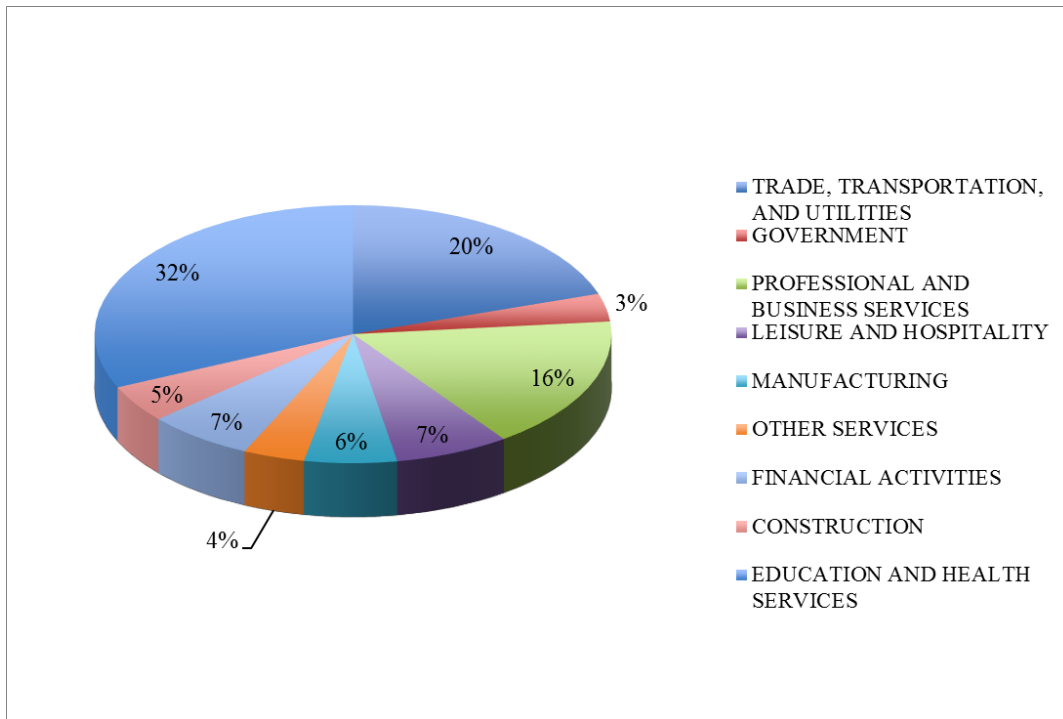


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Wages and Income

Ohio County's wage contributors vary widely in the level of contribution. The highest, Education and Health Services, is because the sector is the highest employing and one of the highest earning sectors in the county (Figure 7). Trade, Transportation, and Utilities is next because of the sheer size of the sector in the county, followed by Professional and Business Services. Contrary to levels of employment, wages in other sectors in Ohio County make up much smaller portions.

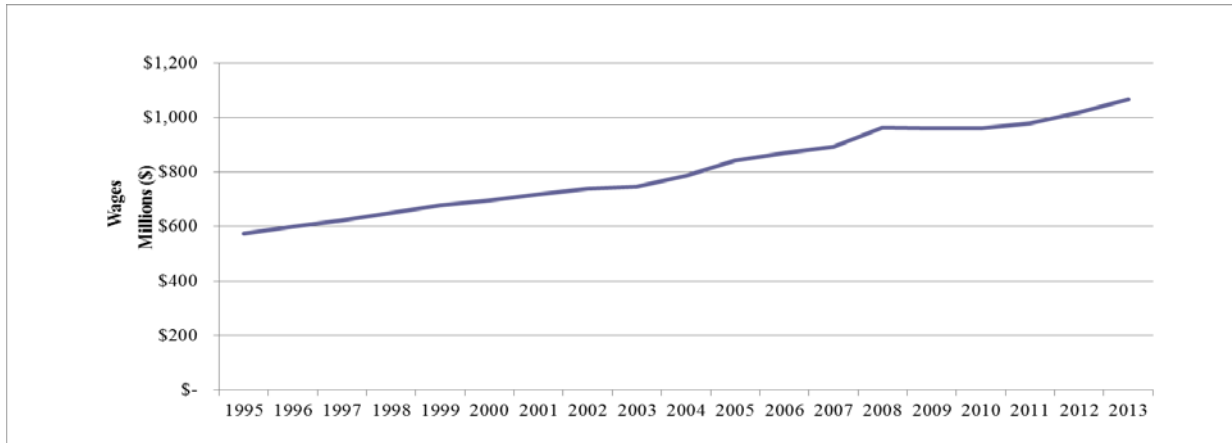
Figure 7: 2013 Ohio County Total Wages



Source: Workforce West Virginia

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

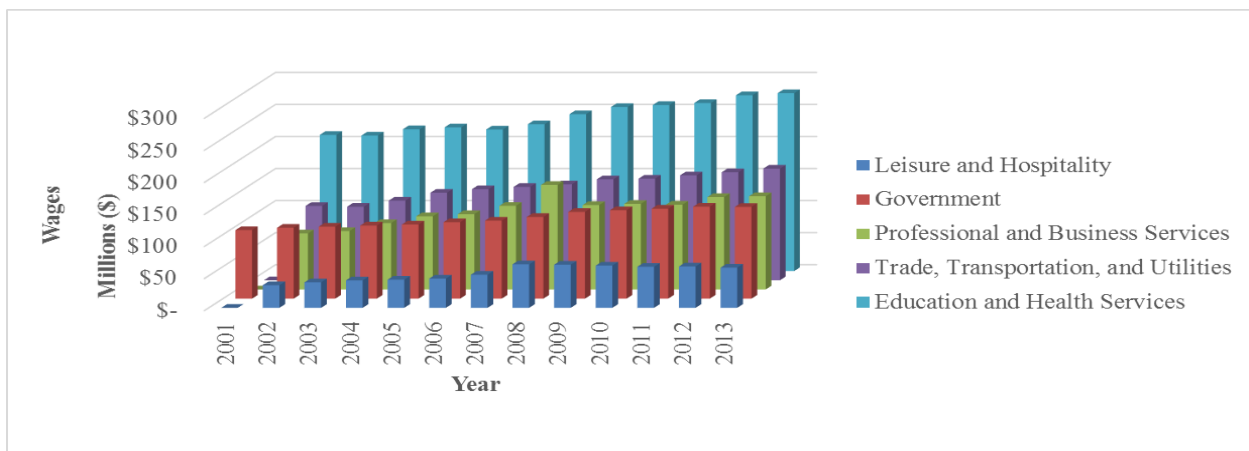
Figure 8: Ohio County Total Wages 1995-2013



Source: Workforce West Virginia

Figure 9 confirms the general trend in wages and that most of the top sectors grew throughout the decade. Wages in the Professional and Business Services sector experienced a spike in 2009 followed by a decrease to previous levels. Wages in the Education and Health Services and Trade, Transportation, and Utilities sectors have experienced general upward trends. Wages in the Leisure and Hospitality sector experienced slight volatility, increasing and decreasing multiple times over this time period.

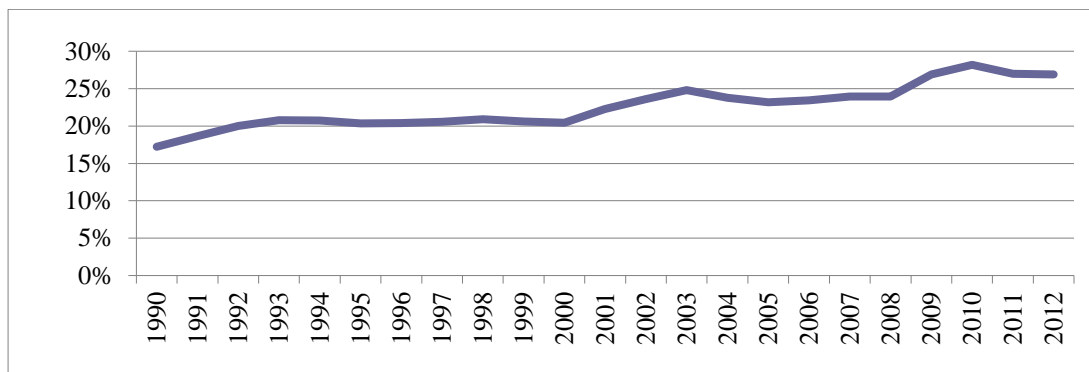
Figure 9: Ohio County Total Wages by 5 Sectors 2001-2012



Source: Workforce West Virginia

In most American counties, one would find that the majority of income for people stems from wages. In West Virginia, however, an important distinction must be made between income and wages. Income is the total receipt of earnings resulting from any economic activity, while wages are derived from actual work in an employed setting. Therefore, dividends from stockholdings are considered income, but not wages. In Ohio County, wages for all employment exceeded \$1 billion.⁴ By comparison, income for the county was larger, exceeding \$1.7 billion in 2013.⁵ Though there are many components to income other than work earnings, 26 percent of total Ohio County income is derived from government transfers. Government transfers accounted for about 98 percent of total transfers in Ohio County, dwarfing transfers from private institutions such as charities. Government transfers have consistently contributed between a 17 and 28 percent of income over the past 20 years. This does not count the wages for government workers. This number is similar to many other counties in West Virginia, and is not the worst nor the best ratio in the State.

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



Source: U.S. Bureau of Economic Analysis

The total personal income of Ohio County is therefore made up of 26 percent government transfers. According to the BEA, per capita income was \$39,020 for Ohio County in 2013. Annual net earnings, or income from work, is displayed in Map 5, and Ohio is ranked among the highest tier in earned income in West Virginia.

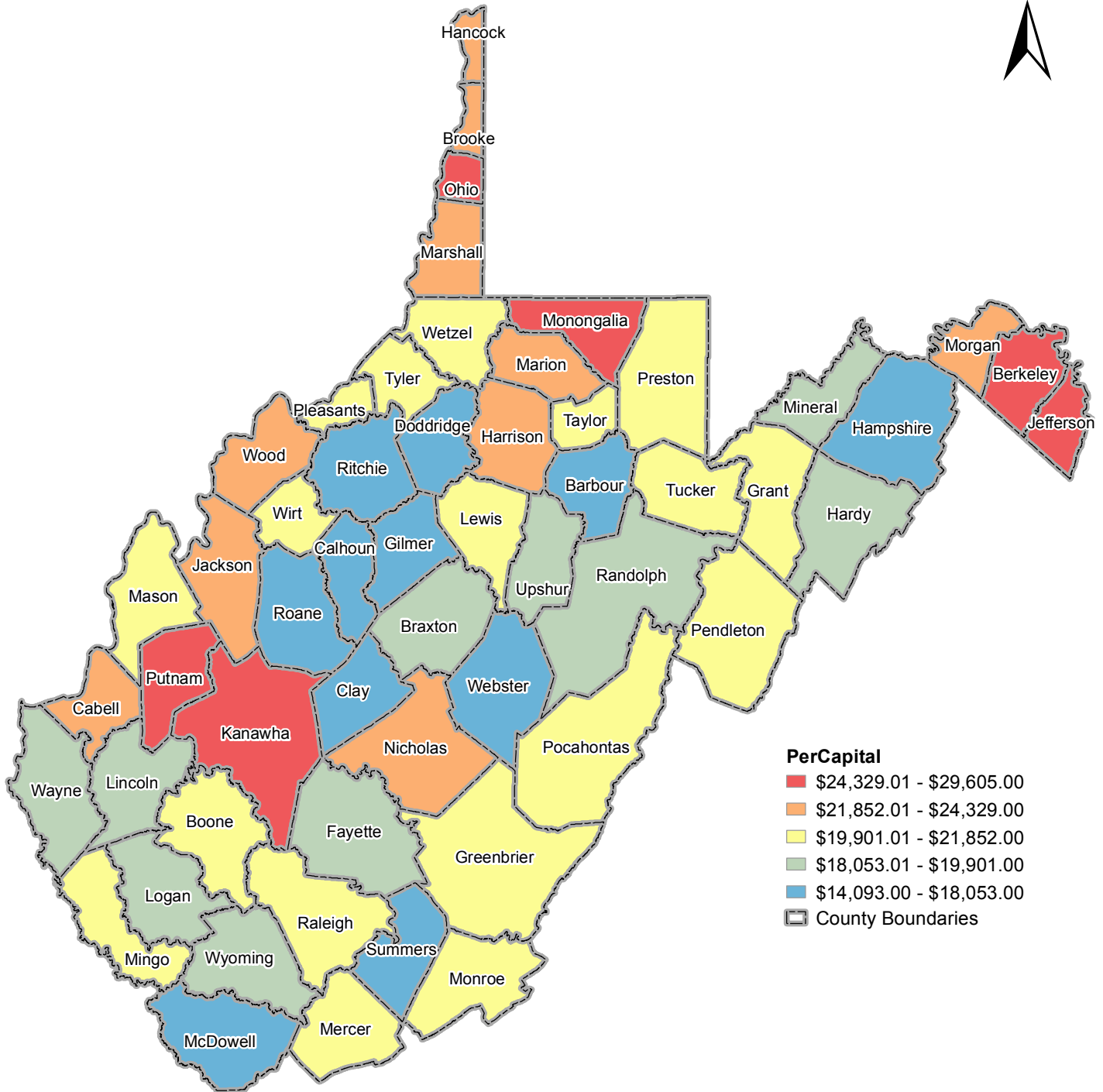
Another measure of economic health is the number of establishments that do business in the area. Map 6 shows the number of establishments in each county in West Virginia. Ohio County appears to be at the lower, but not the lowest, end of the spectrum. The number of establishments may be misleading, as the Education and Health Services sector is typically characterized by a small number of firms.

⁴ “Employment and Wages – 2013, Ohio County,” Workforce West Virginia, Accessed January 18, 2015, <http://www.workforcewv.org/lmi/EW2011/ew11x059.htm>

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

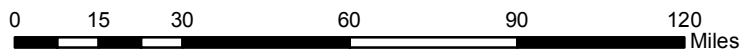
Demographic

Per Capita Annual Net Earning



PerCapital

	\$24,329.01 - \$29,605.00
	\$21,852.01 - \$24,329.00
	\$19,901.01 - \$21,852.00
	\$18,053.01 - \$19,901.00
	\$14,093.00 - \$18,053.00
	County Boundaries



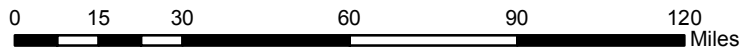
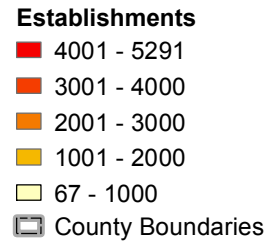
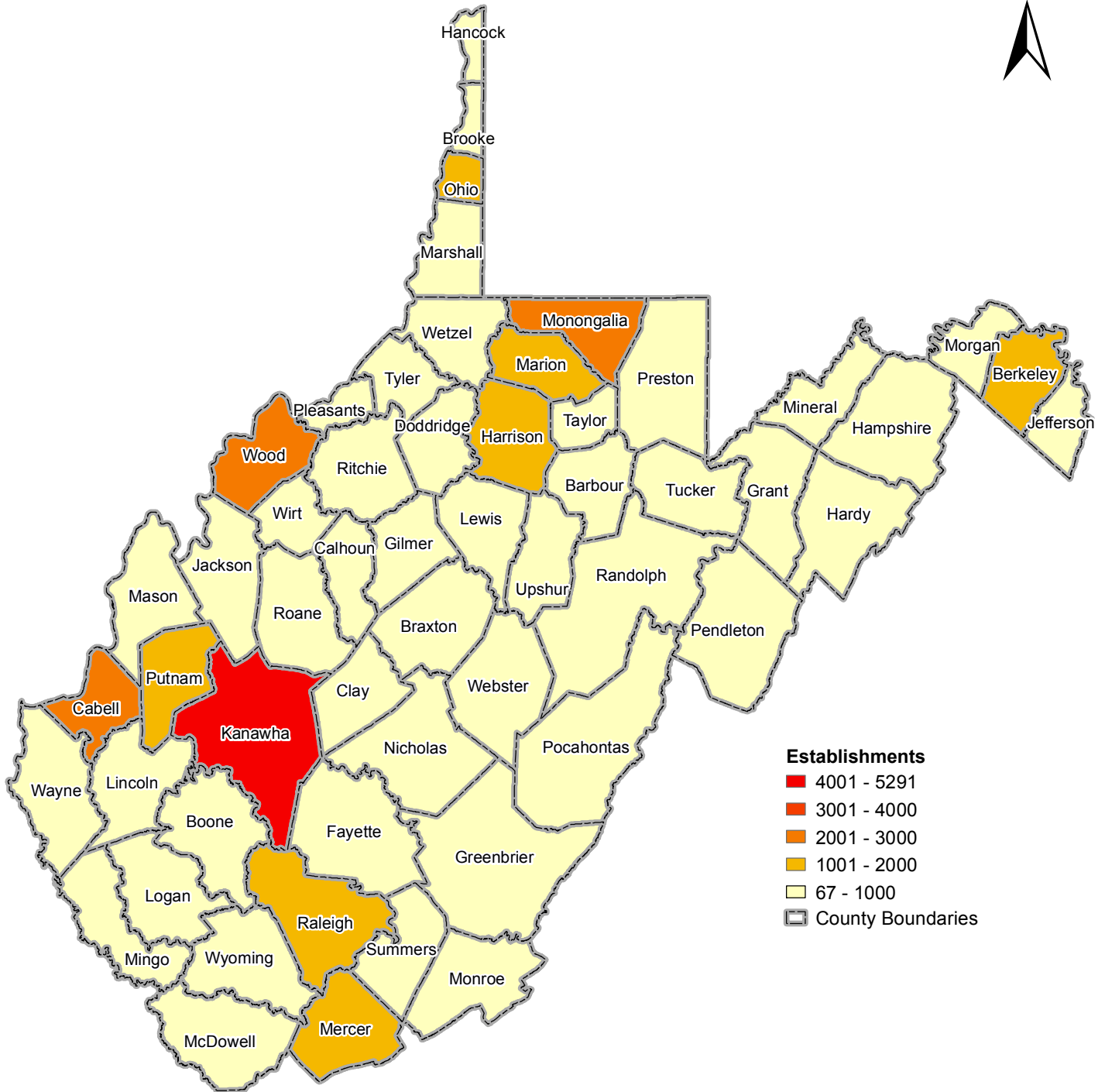
Source: U.S. Census Bureau, 2009-2013 American Community Survey

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Demographic

Number of Establishments



Source: U.S. Census Bureau, 2011

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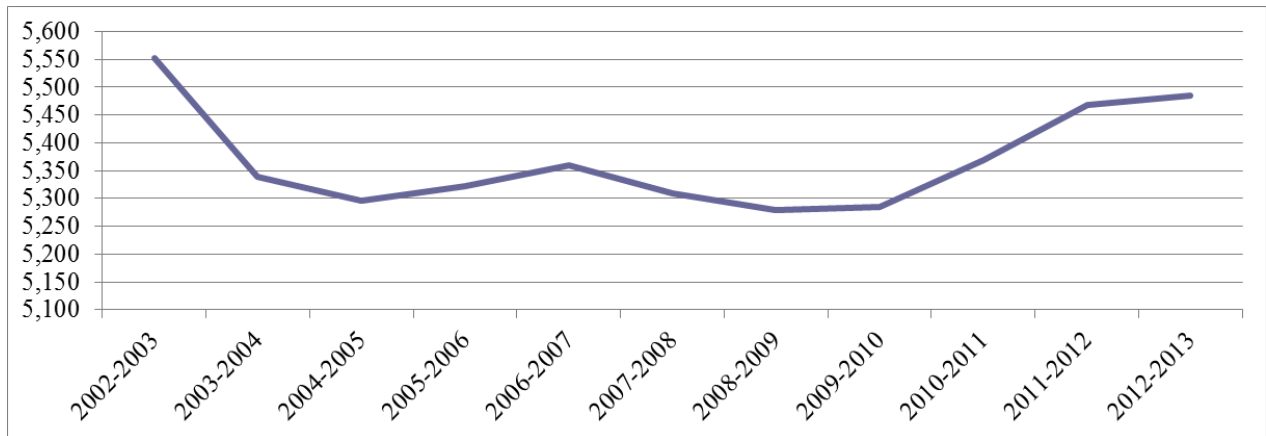


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Education

Ohio County has one high school, three middle schools, eight elementary schools and one combined elementary and middle school as of the 2013-2014 school year.⁶ Ohio County 2nd month school enrollment exhibited a dip beginning in the early 2000s, but has since recovered. Ohio County's 2nd month enrollment is average for the State (Map 7).

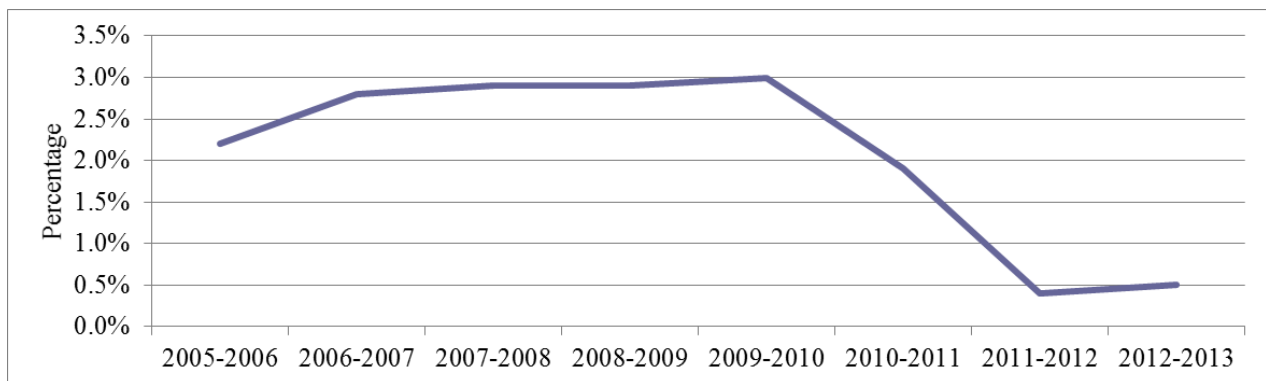
Figure 11: Ohio County School Enrollment



Source: WVEIS

The West Virginia Education Information System (WVEIS) also has dropout rates for the school years from 2005-2006 to 2012-2013. Dropout rates for grades 7-12, which showcase the most likely time for school dropouts, do not follow the total enrollment statistic, as total enrollment is computed with the grades below 7th grade as well. Dropout rates dove beginning in 2009 and have since remained low (Figure 12).

Figure 12: Ohio County Dropout Rate



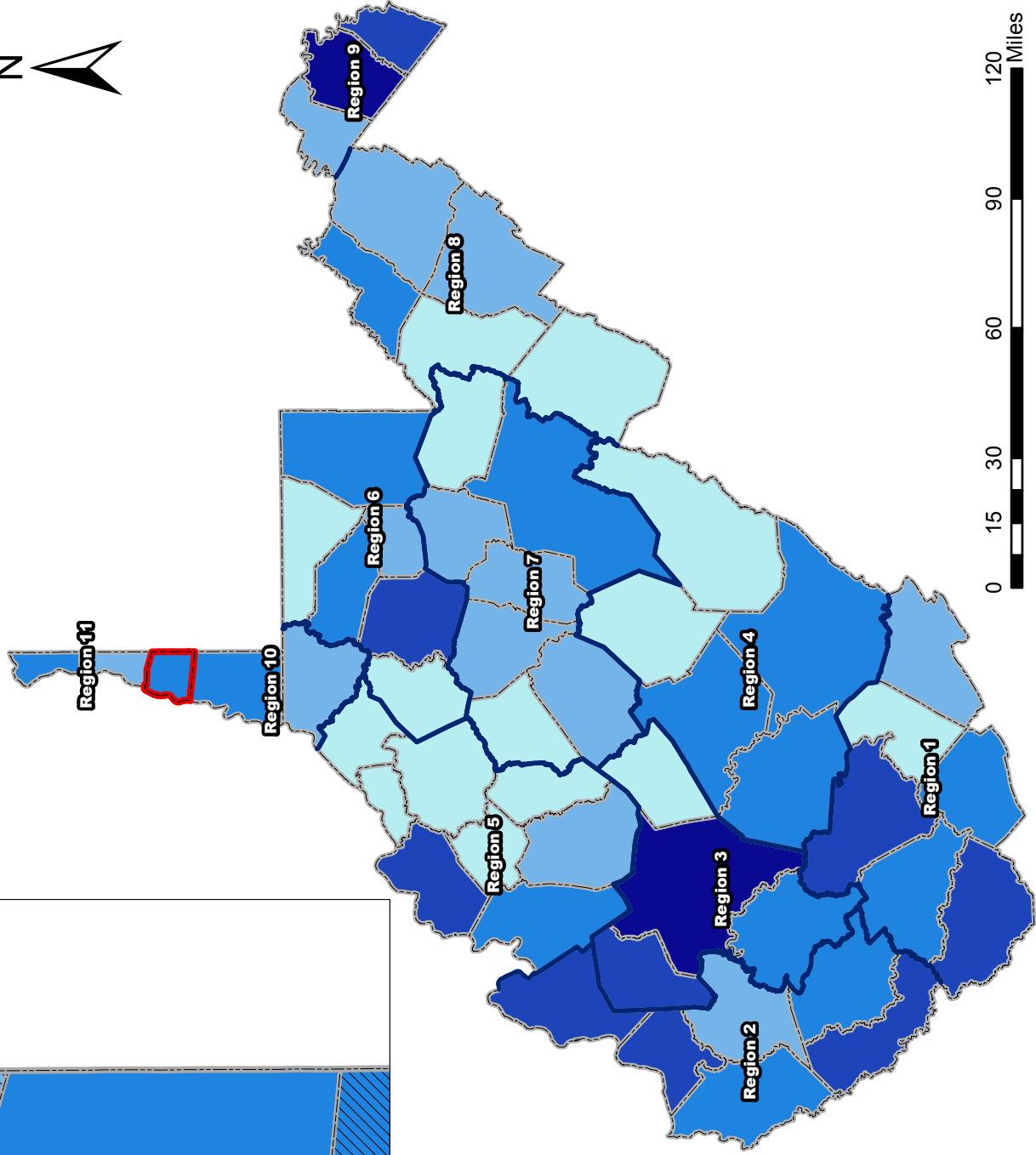
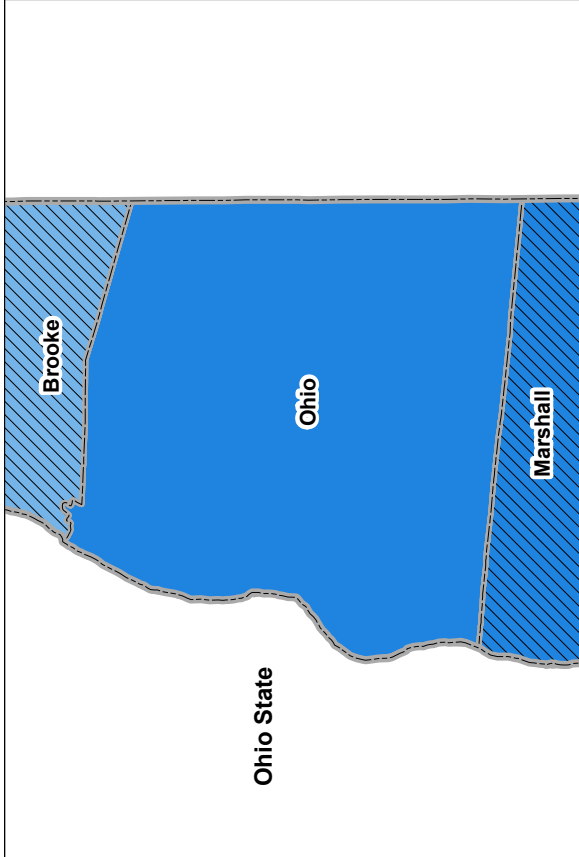
Source: WVEIS

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

Map 8 shows each county's dropout rate. Ohio County currently has one of the lowest dropout rates in the state. Maps 9 and 10 show the total graduates and the graduation rate by county. In Ohio, total graduates are average for the state, while graduation rates are slightly above average. Ohio County's twelve schools' locations are noted in Map 11. Not coincidentally, the major schools are located near the main roads in the county. The largest school by attendance in the County is Wheeling Park High School. The significance of the locations of these schools is the access to major transportation routes. The schools appear to be built in order for parents and students to maintain steady access, which is important to discourage dropping out and to maintain attendance levels.

NCLB - Second Month Enrollment

Ohio County



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

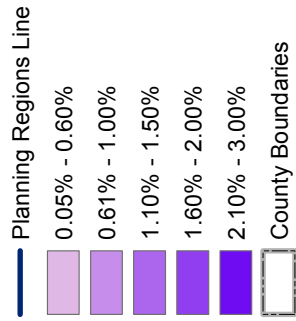
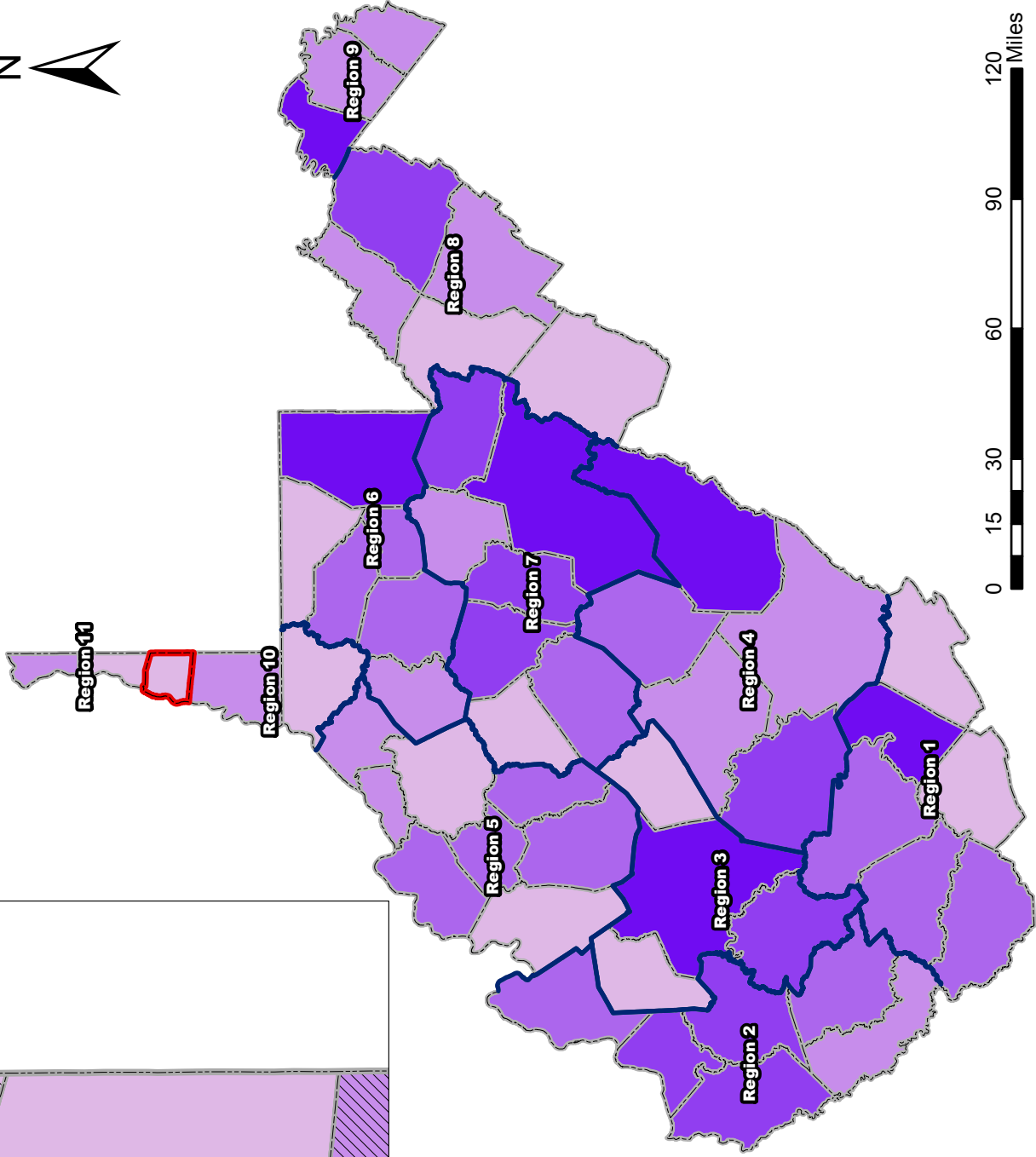
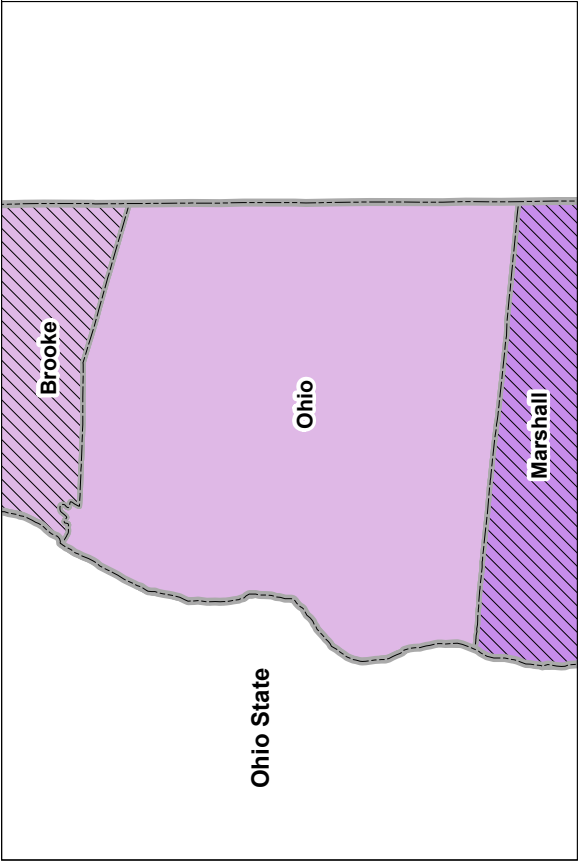
Source: West Virginia Department of Education 2015

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NCLB - Dropout Rate

Ohio County



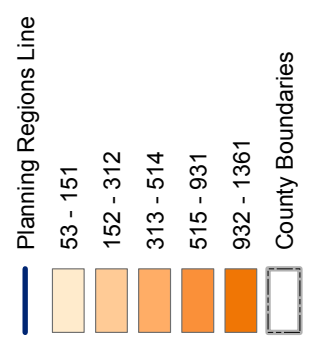
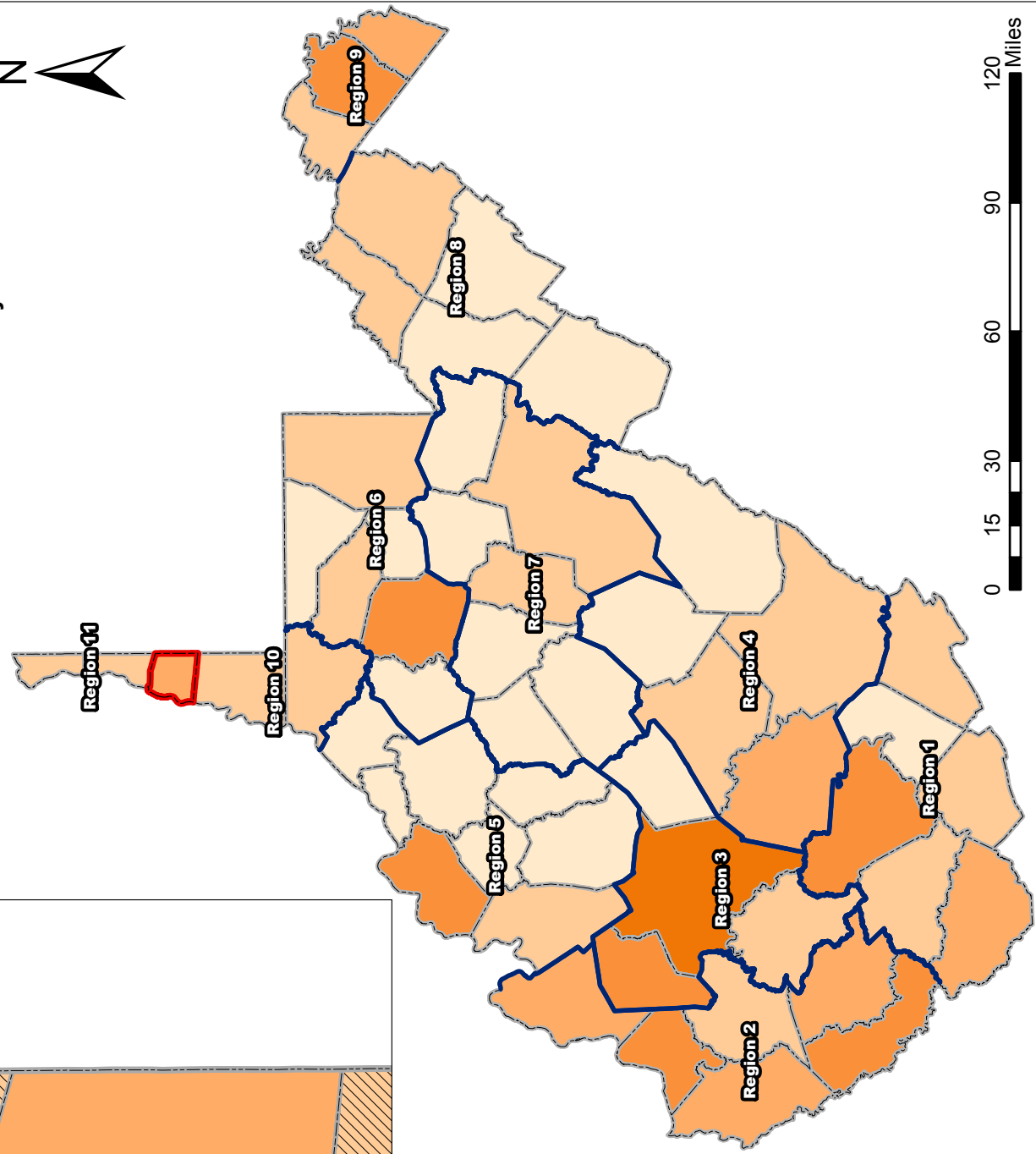
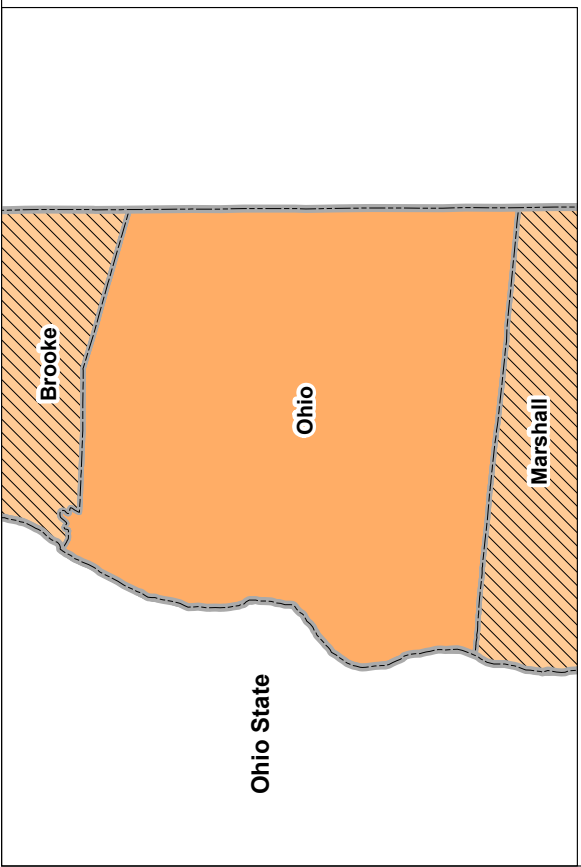
Source: West Virginia Department of Education 2015

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NCLB - Total Graduates

Ohio County



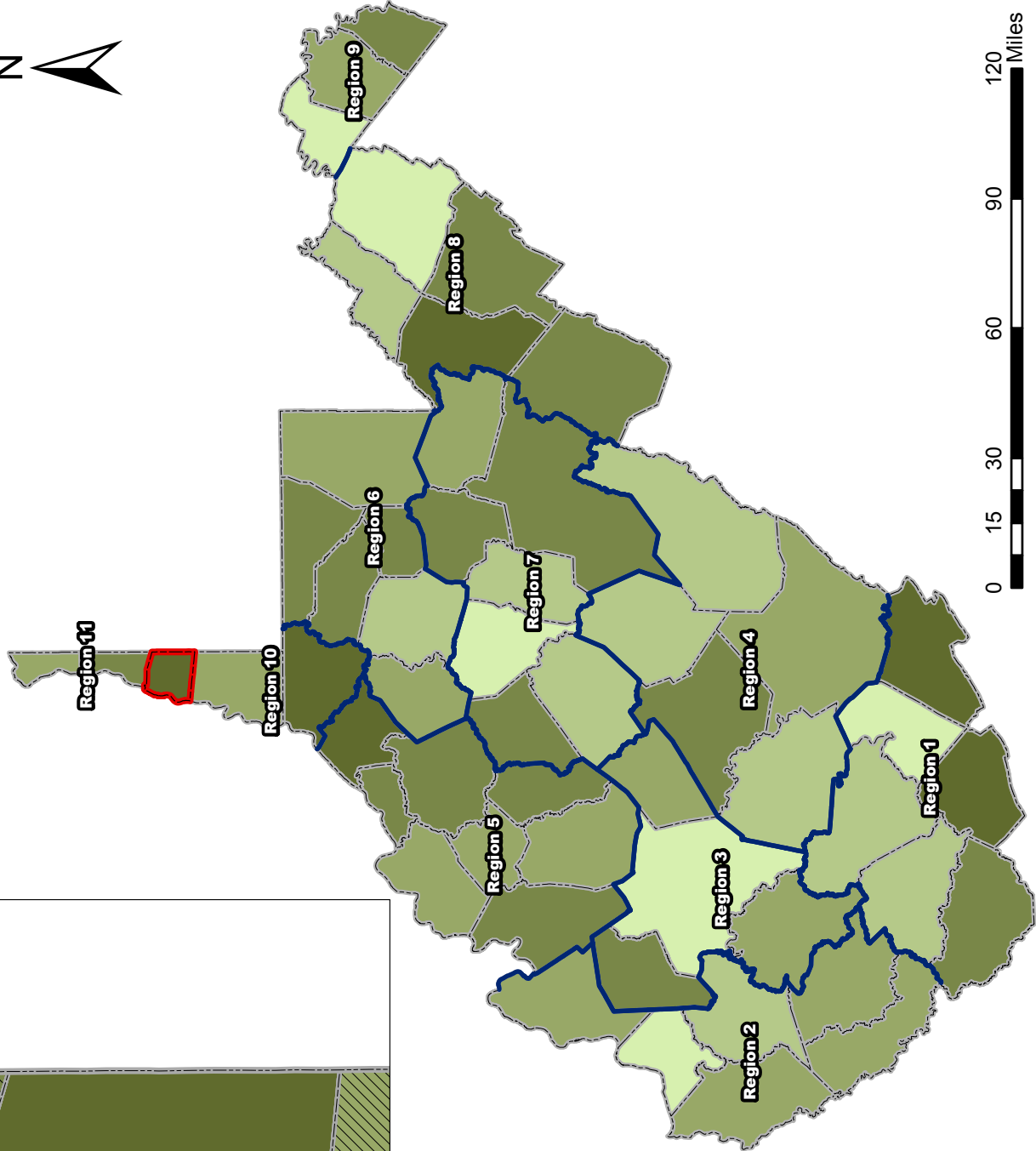
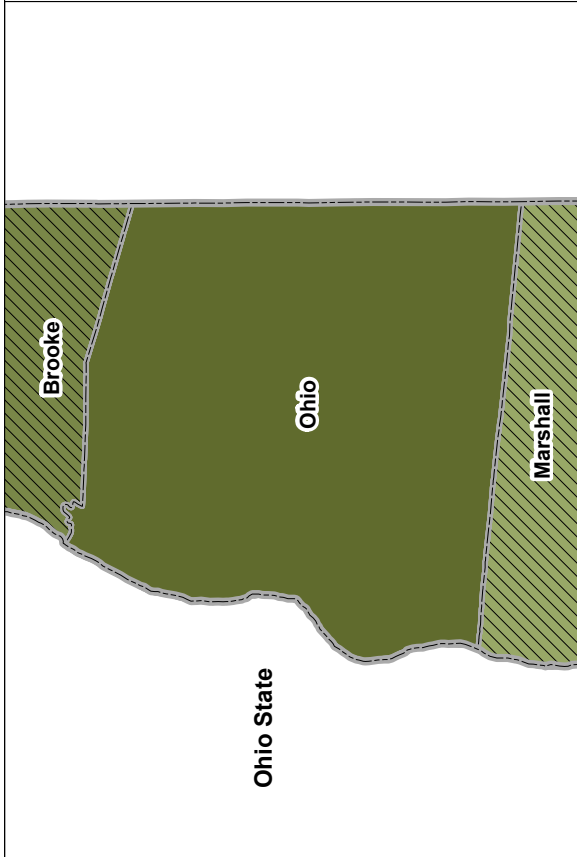
Source: West Virginia Department of Education 2014

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NCLB - Graduates Rate

Ohio County



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

Source: West Virginia Department of Education 2015

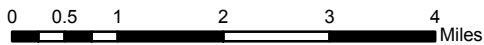
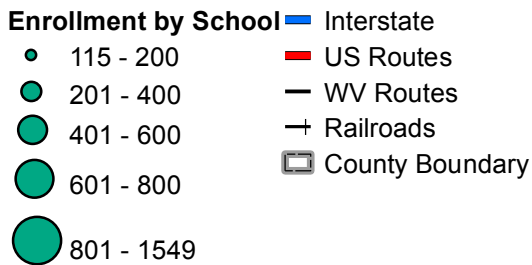
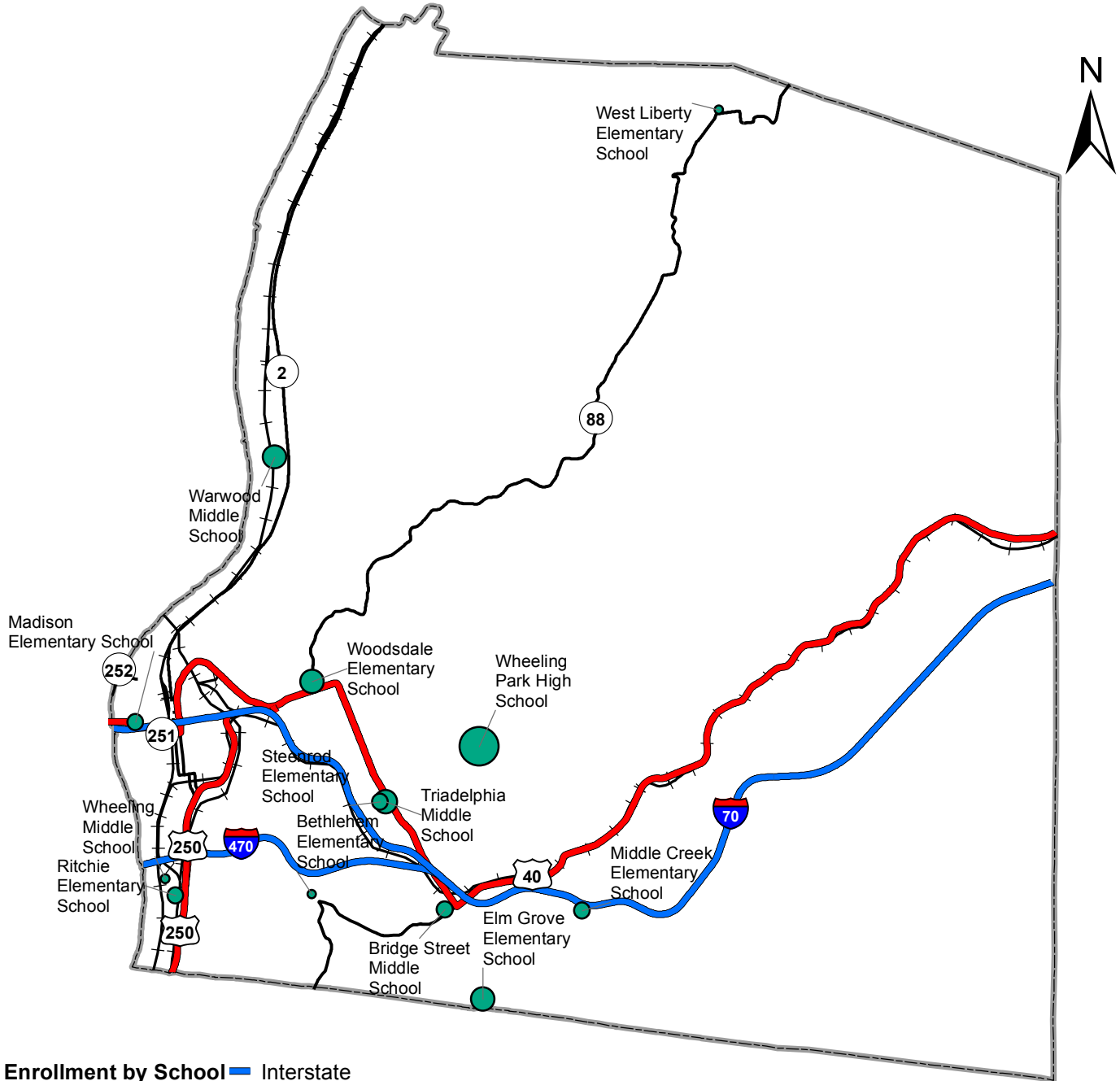
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Total Attendance by School - 2015

Ohio County



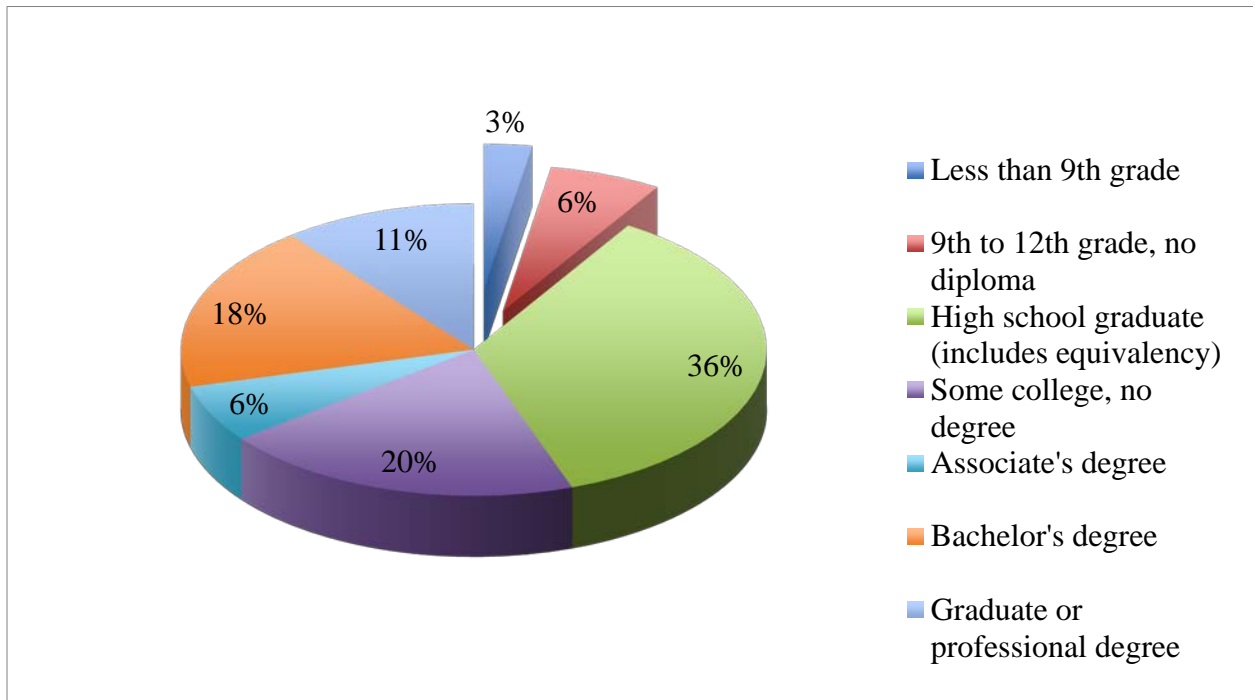
Source: West Virginia Department of Education 2015

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The ACS also maintains data on the educational attainment of the population that is 25 years and over. In Ohio County, 36 percent of these residents have a high school diploma or equivalent. Approximately 9 percent have less than a high school diploma. This is a rather low number compared to many other counties.

Figure 13: Ohio County Educational Attainment



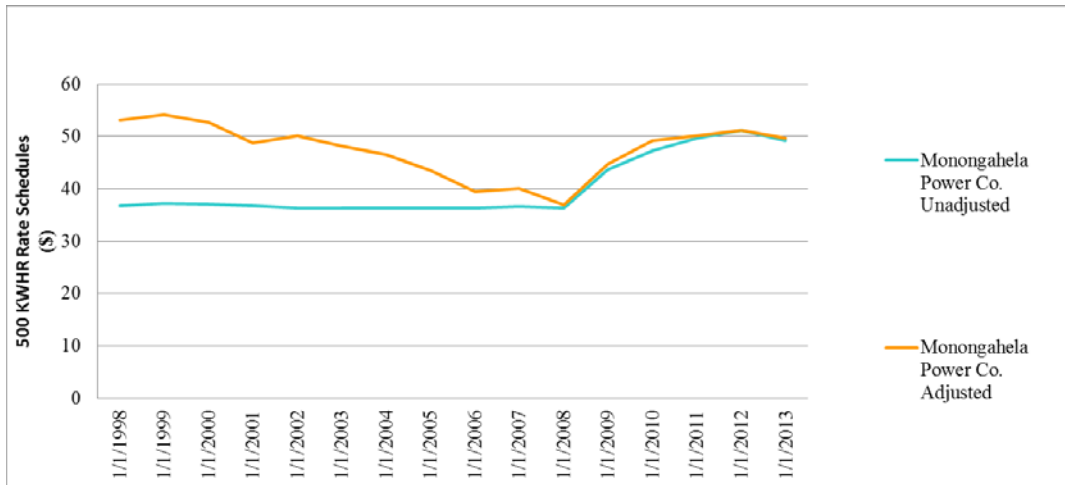
Source: 2013 American Community Survey 5-Year Estimates

Utilities and Infrastructure

Ohio County has 16 utility companies according to the West Virginia Public Service Commission (PSC). Economic development depends on infrastructure, and Ohio County has several providers of water and sewer, and one major provider of electricity.

The West Virginia Public Service Commission maintains tariff rates for all companies involved in providing utilities. Of particular importance are electricity tariffs; the monitoring of these tariffs is an ongoing project. To that end, the PSC observes the growth rate of tariffs and possesses a 20-year comparison based on the average residential utility rate of the State. This provides a significant overview of how electric prices behave in West Virginia as a whole. As Figure 14 shows, if the tariffs are not adjusted by the Consumer Price Index (CPI), it would appear that rates are constantly increasing. Viewing rates in such a manner would be a misunderstanding, and would be incorrect in reference to a State with the highs and lows of West Virginia's past. The Bureau of Labor Statistics has a CPI for electricity prices dating from 1998 to 2013. The adjusted and unadjusted prices are provided in Figure 14.

Figure 14: Power Company Prices



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

The graph shows that electricity rates steadily decreased in real terms through 2008 and remained fairly constant with adjustment. Both adjusted and unadjusted prices have increased since 2008. Many possible factors contributed to this rise, including the increased costs of energy and the increased demand. Map 12 also shows the distribution of power lines, plants, and substations within West Virginia and Ohio 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. Ohio County has 8 public sewer and water providers. Maps 13 and 14 show the water and sewer facilities and the served areas for each of these utilities, as well as the solid waste management facilities in West Virginia, including one operational landfill in Ohio County.

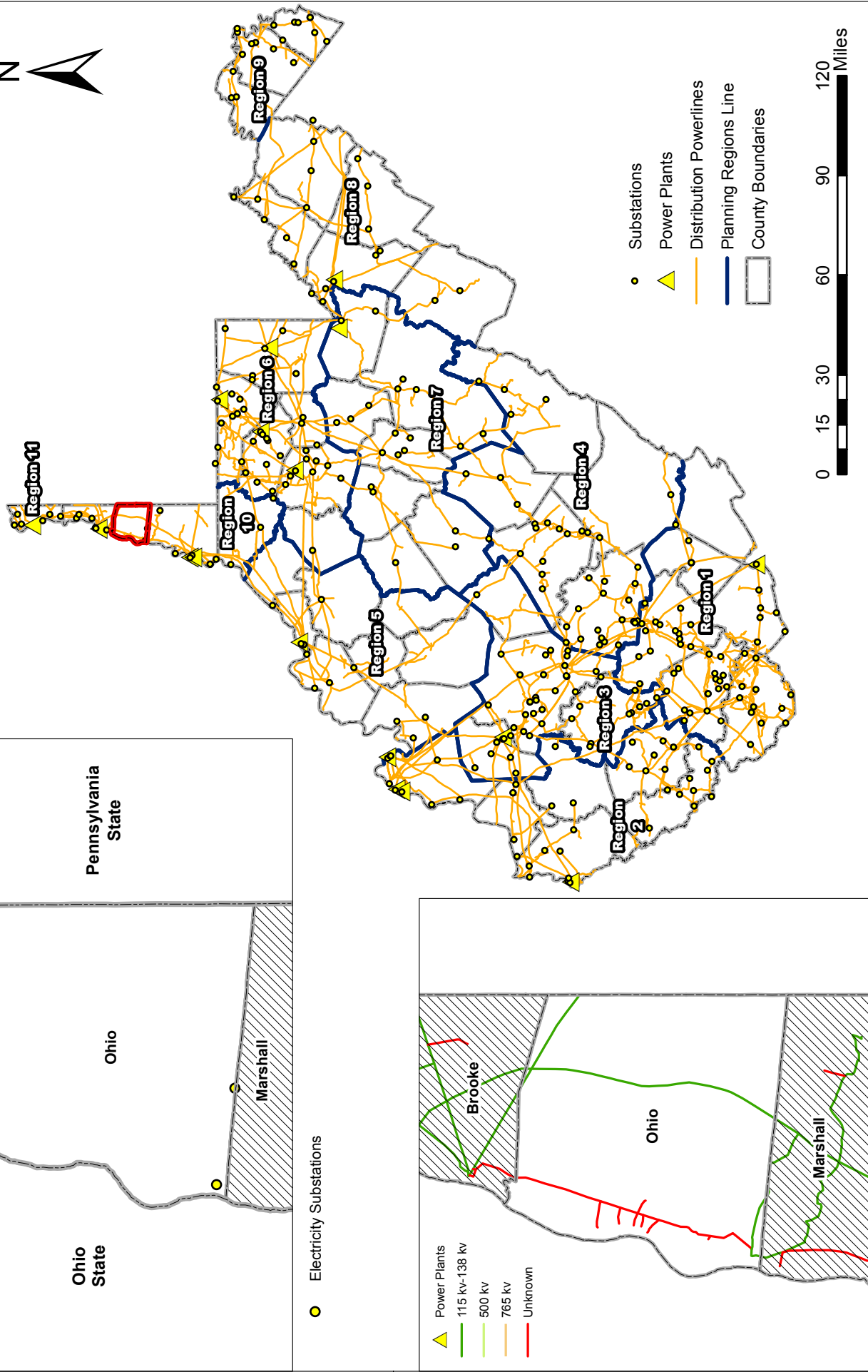
Table 1: Ohio County Water and Sewer Rates

Village of Bethlehem	
Water Rates	
First 3,000 gallons used per month	\$ 10.35 per 1,000 gallons
Next 3,000 gallons used per month	\$ 9.28 per 1,000 gallons
Next 4,000 gallons used per month	\$ 7.96 per 1,000 gallons
Next 90,000 gallons used per month	\$ 6.89 per 1,000 gallons
All Over 100,000 gallons used per month	\$ 5.83 per 1,000 gallons
Hammond Public Service District	
Water Rates	
First 3,000 gallons used per month	\$12.10 per 1,000 gallons
Next 3,000 gallons used per month	\$10.27 per 1,000 gallons
Next 4,000 gallons used per month	\$ 8.78 per 1,000 gallons
Next 10,000 gallons used per month	\$ 6.13 per 1,000 gallons
All Over 20,000 gallons used per month	\$ 4.46 per 1,000 gallons
Town of Triadelphia Water Department	
Water Rates	
First 3,000 gallons used per month	\$ 11.58 per 1,000 gallons
Next 3,000 gallons used per month	\$ 10.77 per 1,000 gallons
Next 4,000 gallons used per month	\$ 9.95 per 1,000 gallons
Next 90,000 gallons used per month	\$ 8.99 per 1,000 gallons
Next 900,000 gallons used per month	\$ 7.84 per 1,000 gallons
All Over 1,000,000 gallons used per month	\$ 6.75 per 1,000 gallons
Village of Valley Grove	
Water Rates	
First 5,000 gallons used per month	\$7.26 per thousand gallons
Next 5,000 gallons used per month	\$7.10 per thousand gallons
Next 90,000 gallons used per month	\$6.97 per thousand gallons
All Over 100,000 gallons used per month	\$6.86 per thousand gallons
City of Wheeling	
Water Rates	
First 1,000 gallons used per month	\$1 1.60 per 1,000 gallons
Next 499,000 gallons used per month	\$ 5.25 per 1,000 gallons
Over 500,000 gallons used per month	\$ 3.22 per 1,000 gallons

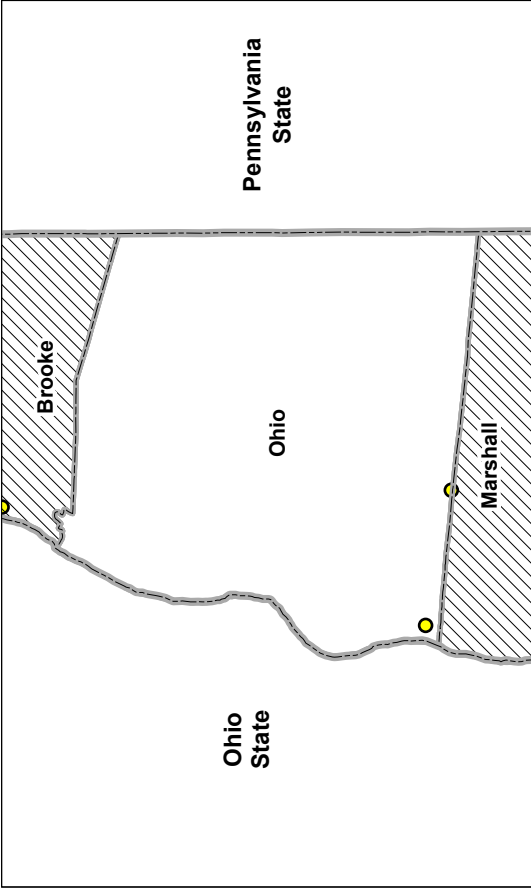
Ohio County Public Service District	
Water Rates	
First 3,000 gallons used per month	\$9.89
Next 5,000 gallons used per month	\$7.51
Next 92,000 gallons used per month	\$6.88
Next 400,000 gallons used per month	\$6.55
Next 500,000 gallons used per month	\$5.76
Next 1,000,000 gallons used per month	\$5.37
Village of Clearview	
Sewer Rates	
Service Charge:	\$12.40
Per 1,000 gallons used a month	\$1.91
Ohio County Public Service District	
Sewer Rates	
Service Charge \$9.96 per month	
Usage Charge \$7.31 per 1,000 gallons of water usage per month	
Village of Bethlehem	
Sewer Rates	
0 - 3,000 gallons used per month	\$7.30 per 1,000 gallons
3,001 - 6,000 gallons used per month	\$6.10 per 1,000 gallons
6,001 - 10,000 gallons used per month	\$5.42 per 1,000 gallons
10,001 - 100,000 gallons used per month	\$3.38 per 1,000 gallons
Over - 100,000 gallons used per month	\$2.70 per 1,000 gallons
City of Wheeling	
Sewer Rates	
First 10,000 gallons used per month	\$6.15 per 1,000 gallons
Next 90,000 gallons used per month	\$5.10 per 1,000 gallons
Next 100,000 gallons used per month	\$3.63 per 1,000 gallons
All Over 200,000 gallons used per month	\$2.46 per 1,000 gallons
Town of Triadelphia	
Sewer Rates	
First 3,000 gallons treated per month	\$7.34 per 1,000 gallons
Next 7,000 gallons treated per month	\$6.20 per 1,000 gallons
Next 990,000 gallons treated per month	\$4.40 per 1,000 gallons
All over 1,000,000 gallons treated per month	\$4.29 per 1,000 gallons

Utilities - Electricity

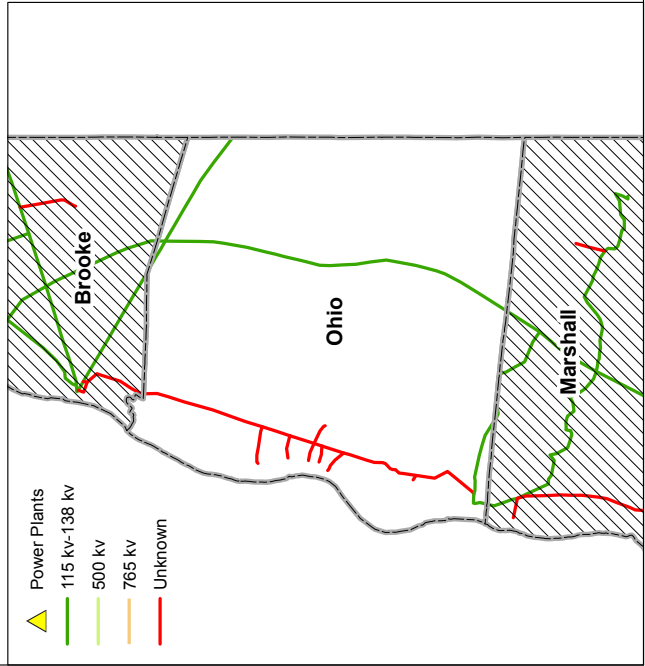
Ohio County



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



● Electricity Substations



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

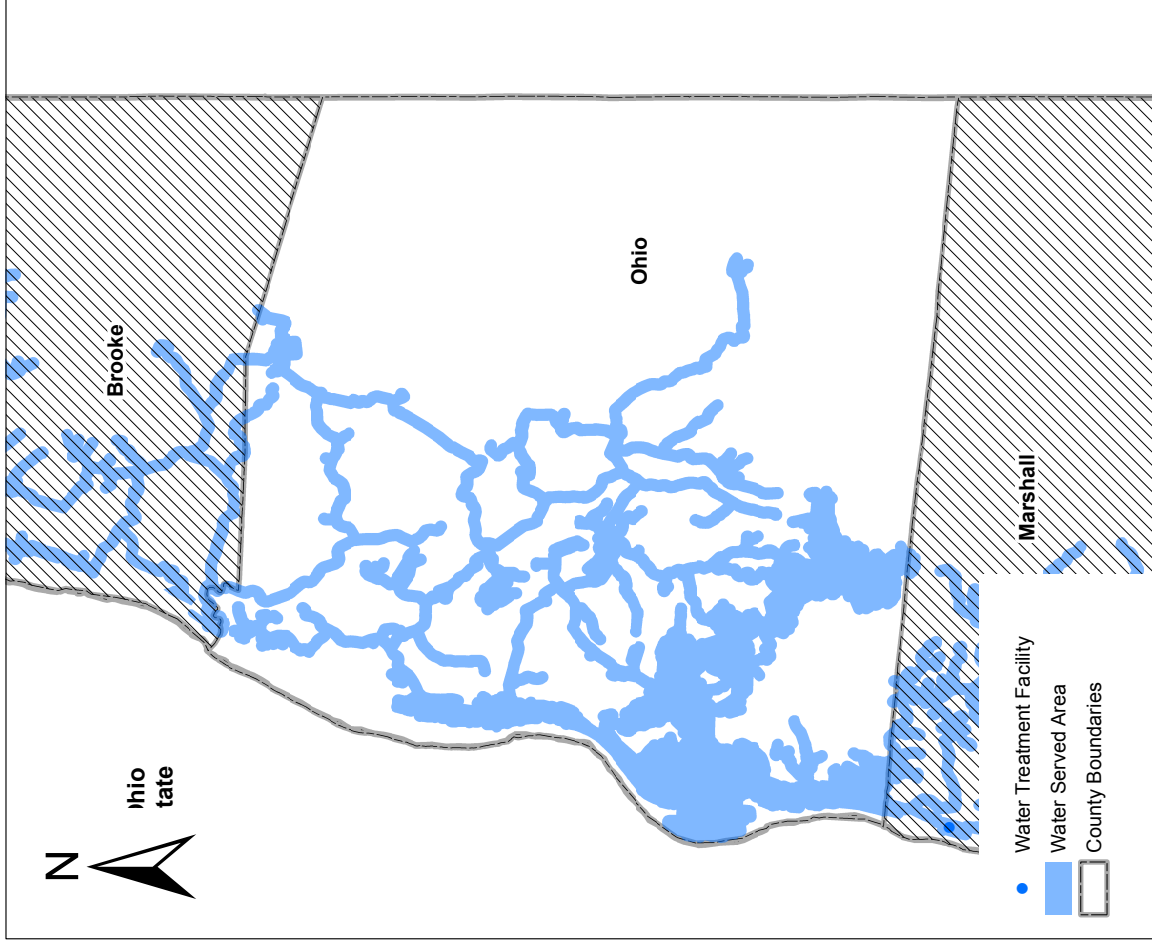
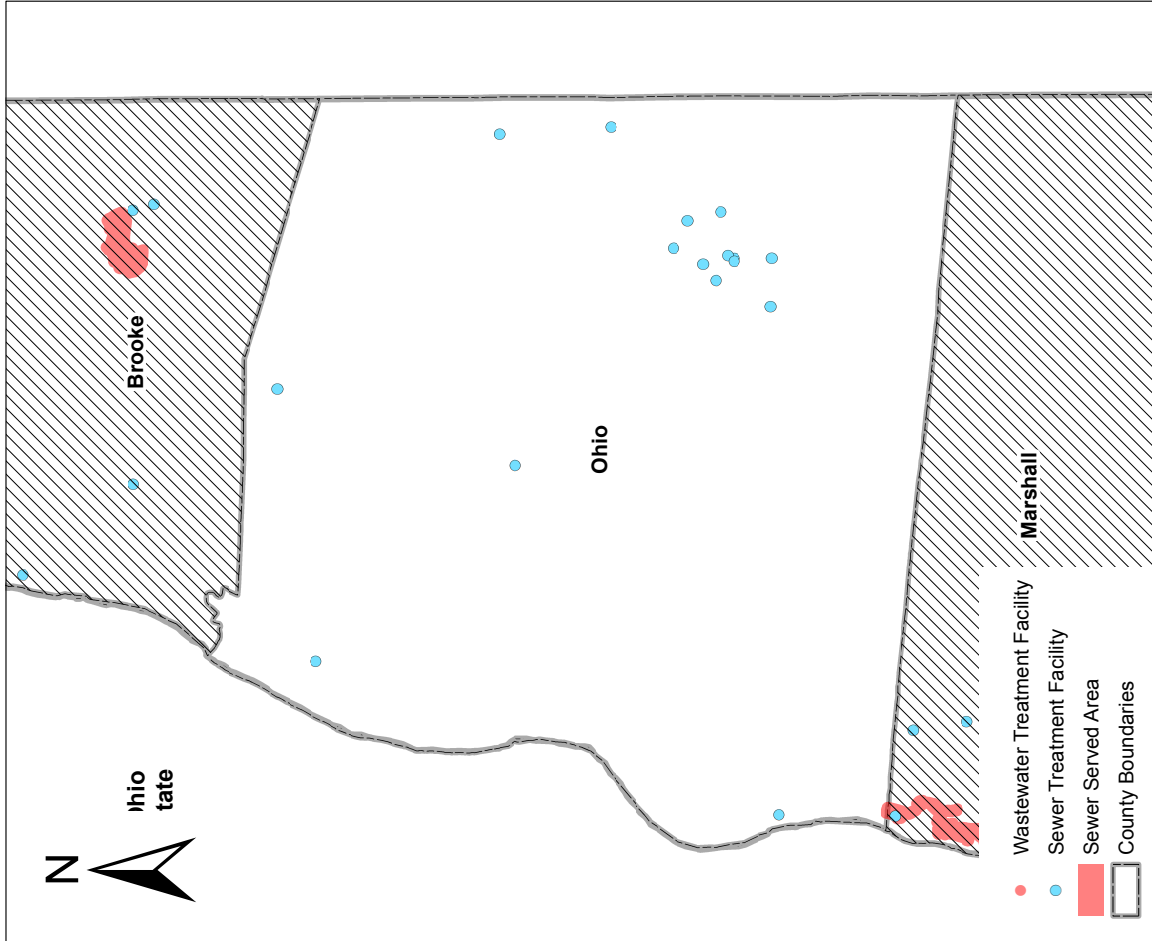
Source: West Virginia Division of Natural Resources, Statewide Addressing and Mapping 2008

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Utilities - Water and Sewer

Ohio County



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

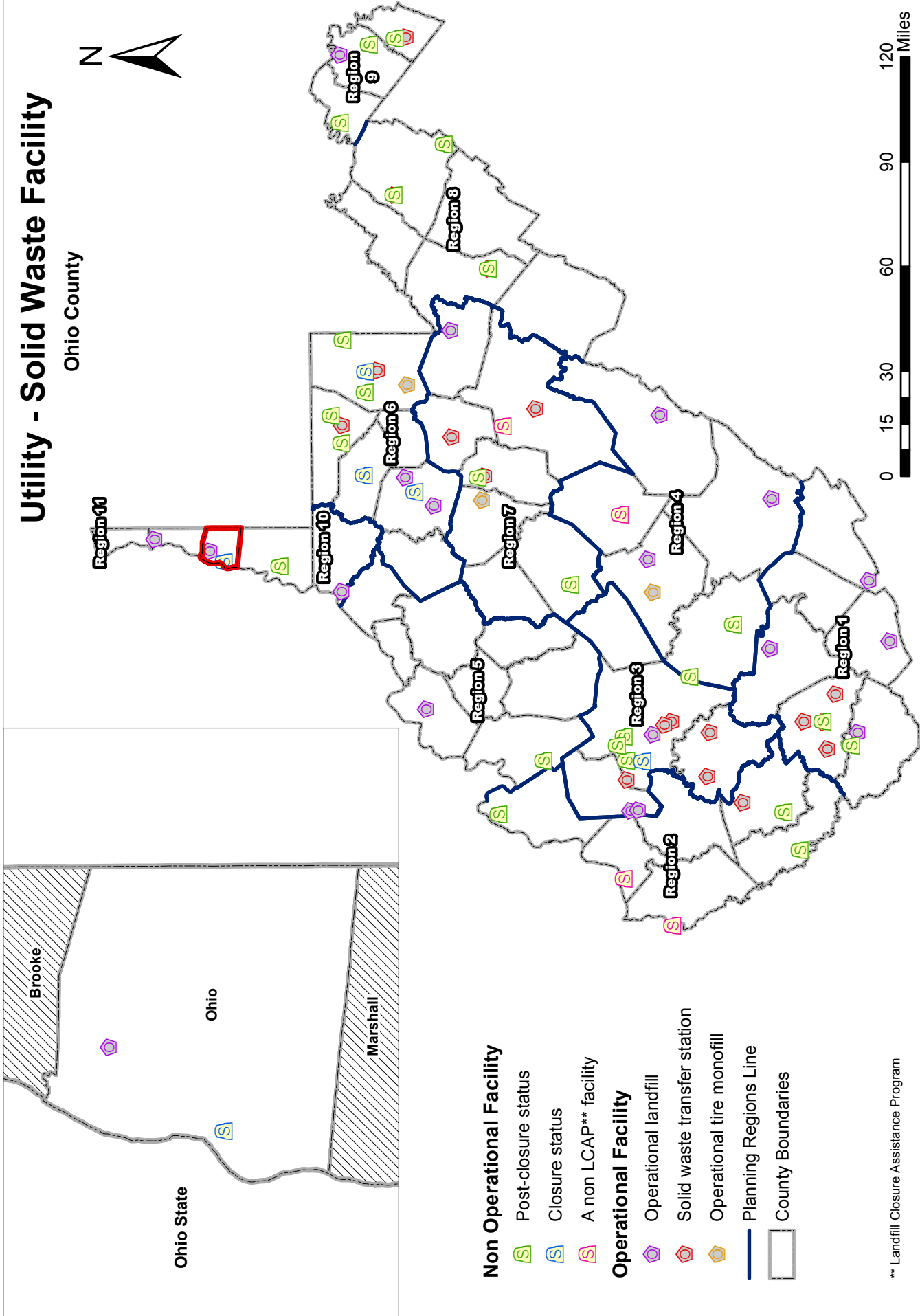
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Utility - Solid Waste Facility

Ohio 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

Source: West Virginia Solid Waste Management Board 2012

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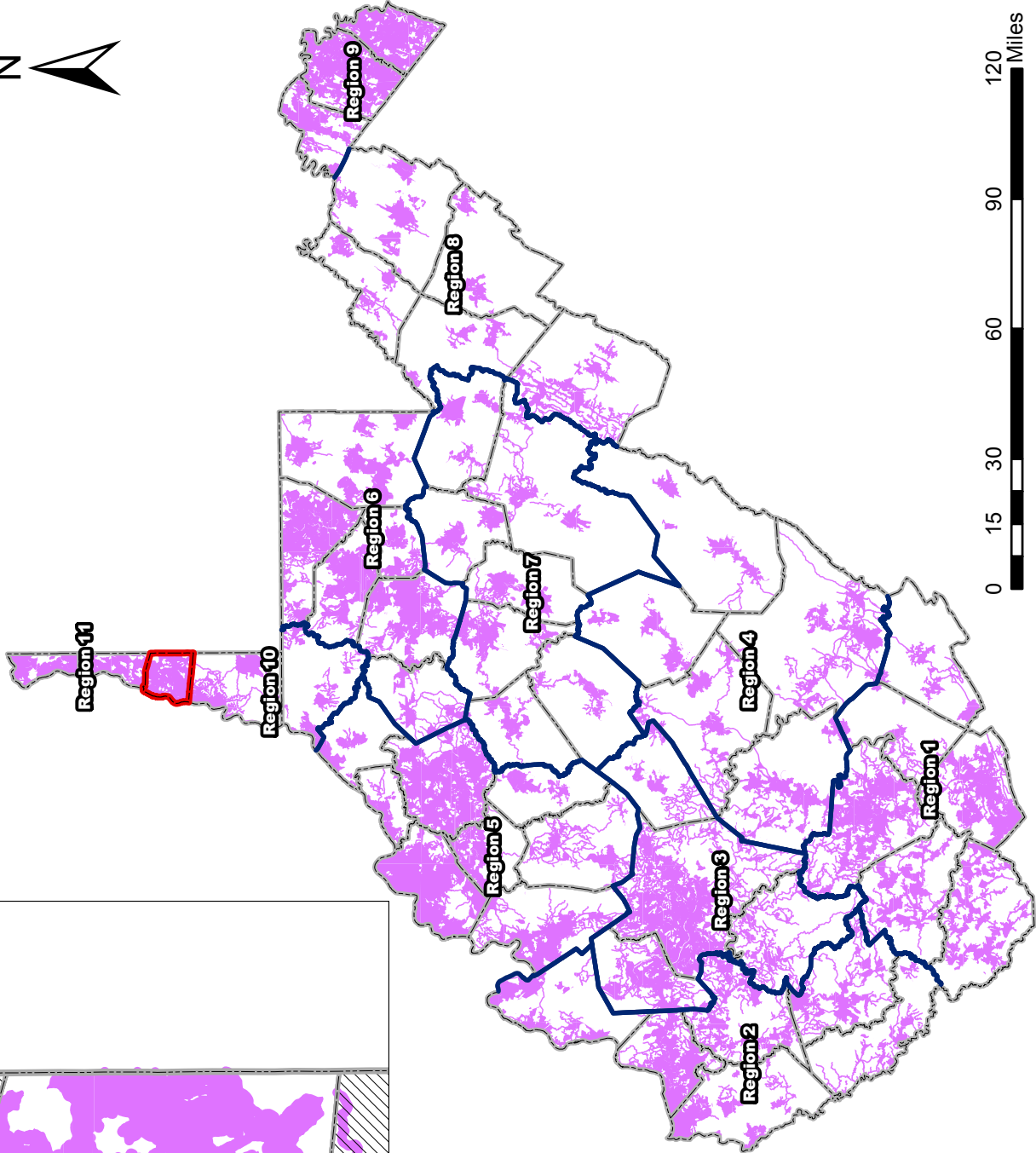
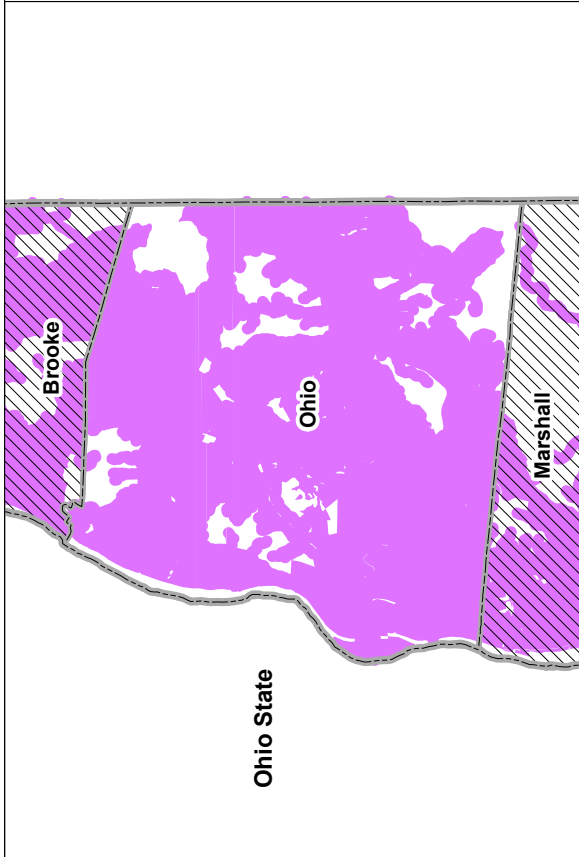
One essential modern convenience, now widely understood as an essential utility in a globalized world, is broadband access. The following 11 maps demonstrate Ohio County's broadband infrastructure in relation to the State's. The largest number of providers in Ohio County is five, which includes most of the county. Ohio County broadband infrastructure closely resembles neighboring Brooke County. Of particular note is the abundance of fixed wireless, the presence of greater than 10 mbps of wireless speed across all of the County, mostly contiguous mobile wireless coverage, and almost no areas where no broadband coverage is reported.

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

Each of these maps shows the same pattern in Ohio County internet service as exhibited by West Virginia. Internet service, specifically broadband, is non-existent in many rural areas, and instead focuses on population centers. While this may be financially wise, it deprives rural areas of an increasingly integral link to a globalized economy and society. All areas now need broadband service, and a complete inventory of these services is needed to plan for future investment in any given area. Note also that the map data is for 2014, the most recent map available. Changes have been made in recent years, thanks to broadband expansion programs encouraged by the State.

Broadband - Internet Cable and FTTP Coverage

Ohio County



- Planning Regions Line
- Cable and FTTP
- County Boundaries



Source: West Virginia Broadband Mapping Program 2014

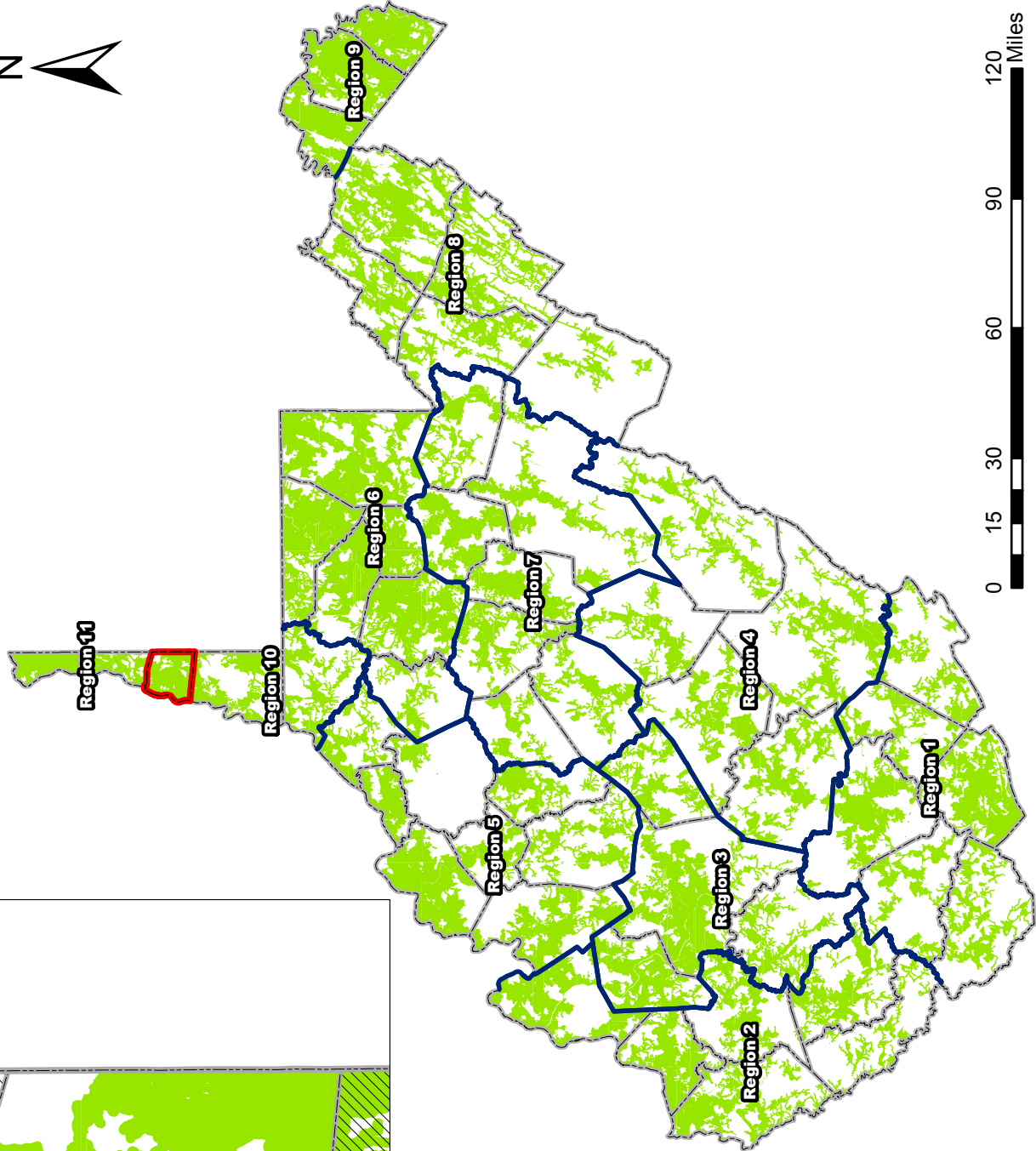
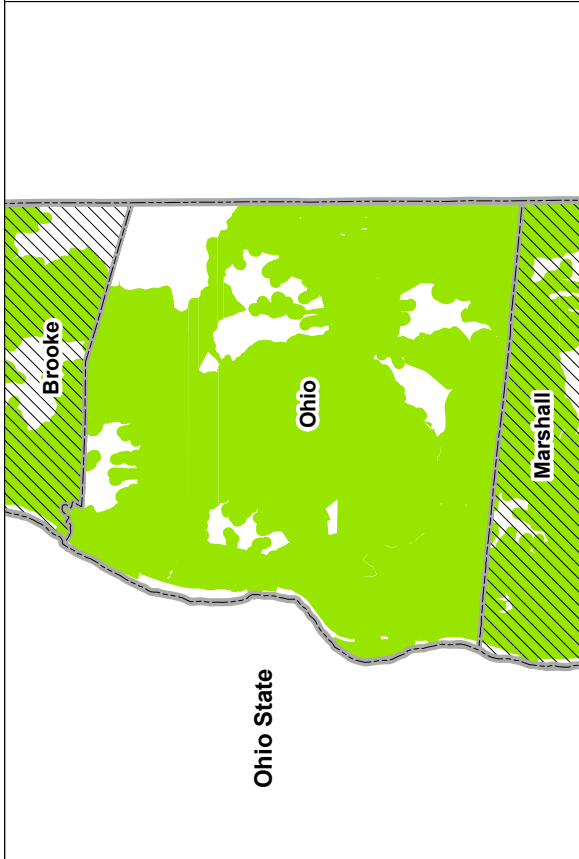
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Broadband - Internet DSL, BPL, Other Copper

Ohio County



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

Source: West Virginia Broadband Mapping Program 2014

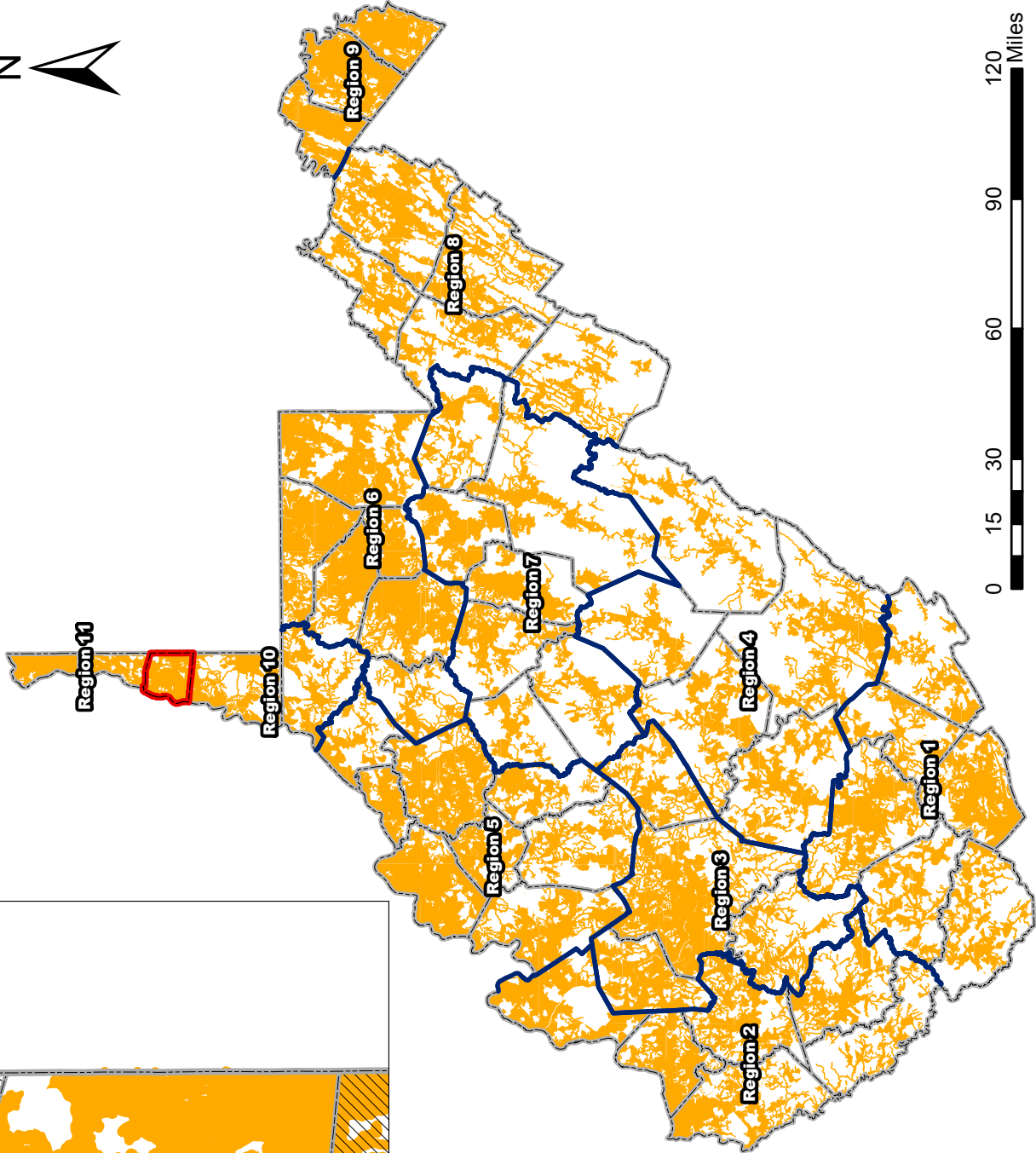
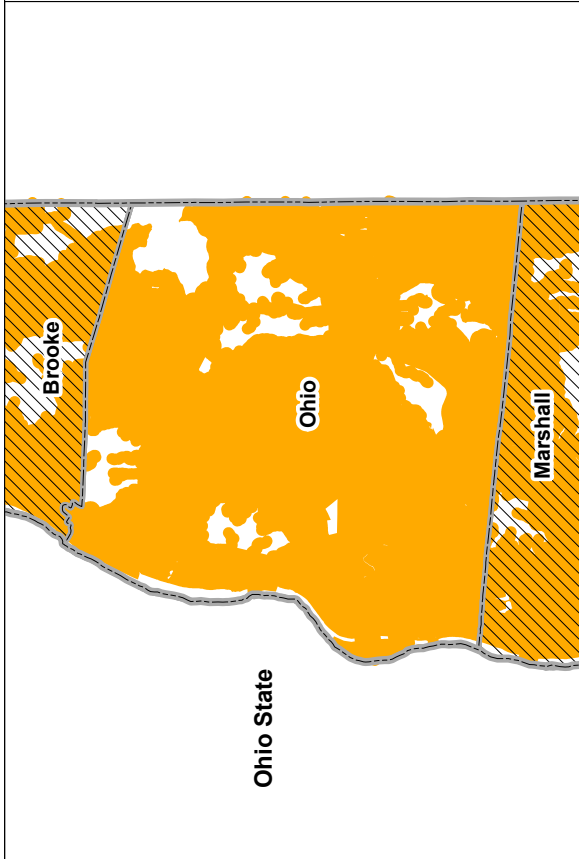
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www.rahtall.org

Broadband - Internet Wireline Coverage

Ohio County



-  Planning Regions Line
-  Wireline Coverage
-  County Boundaries

Source: West Virginia Broadband Mapping Program 2014

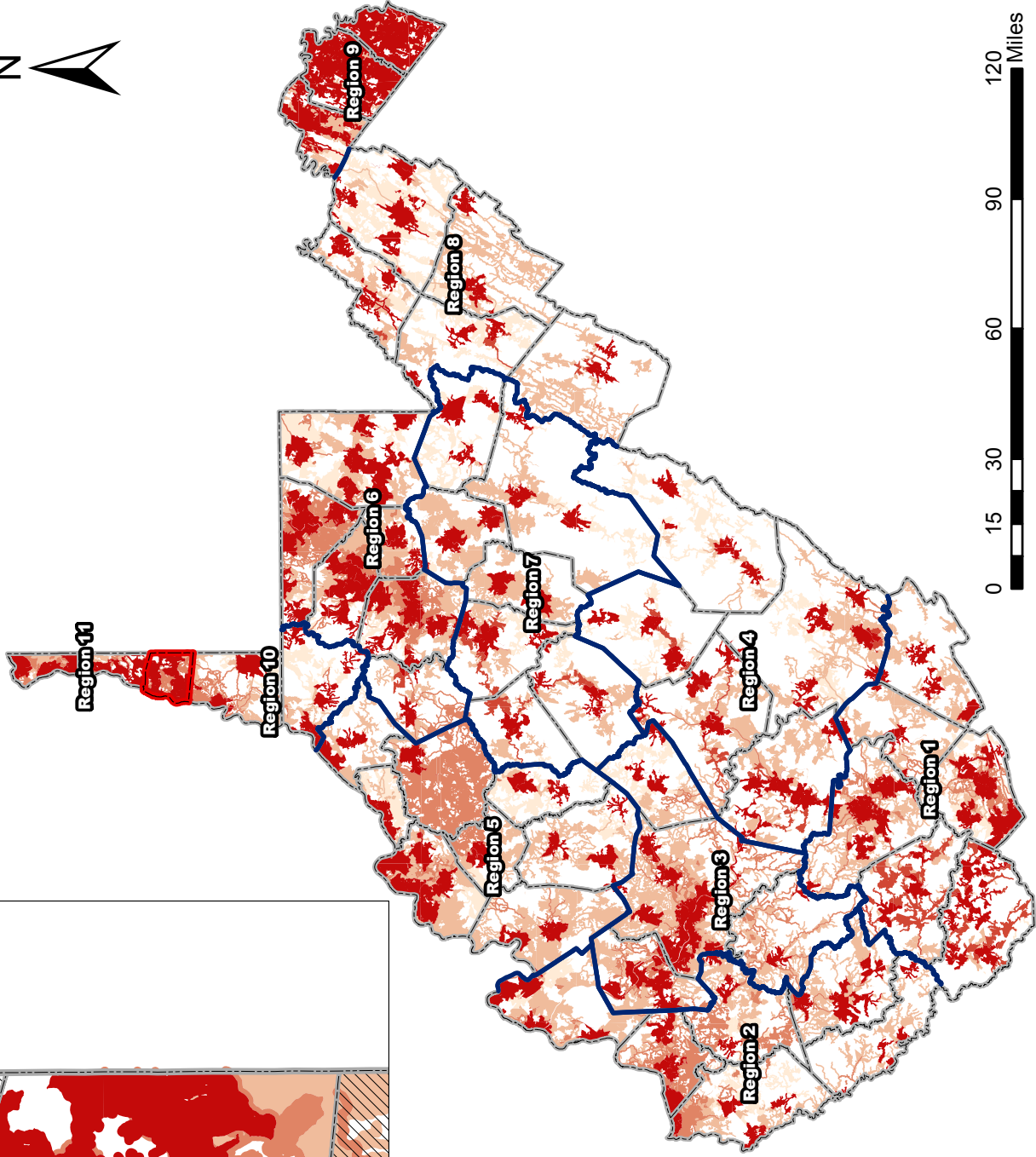
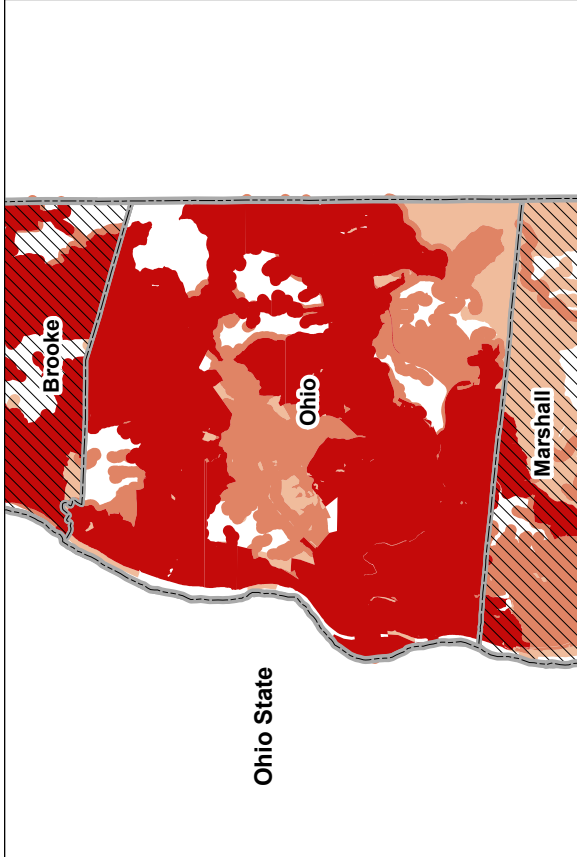
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Broadband - Internet MaxUp Speed Wireline

Ohio County



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



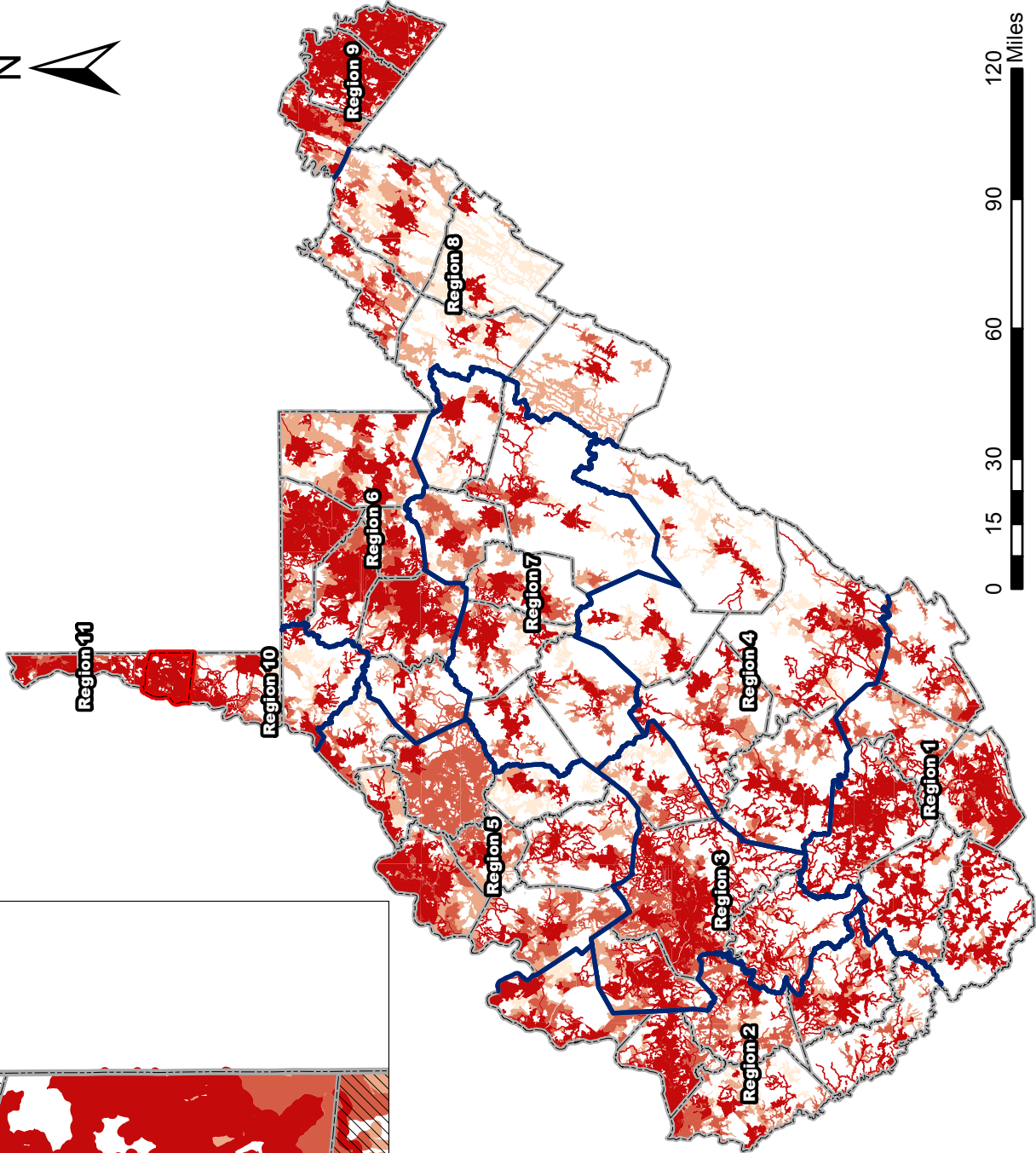
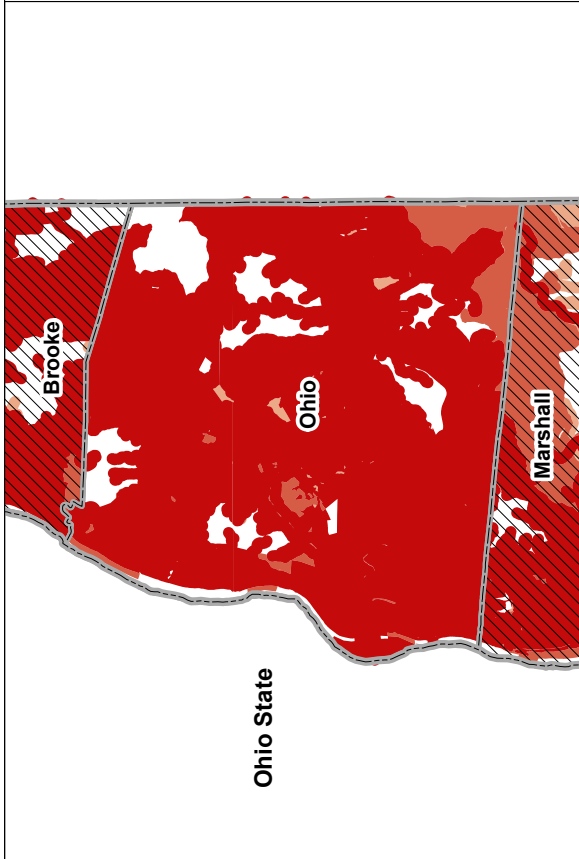
Source: West Virginia Broadband Mapping Program 2014







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Broadband - Internet MaxDown Speed Wireline

Ohio County



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

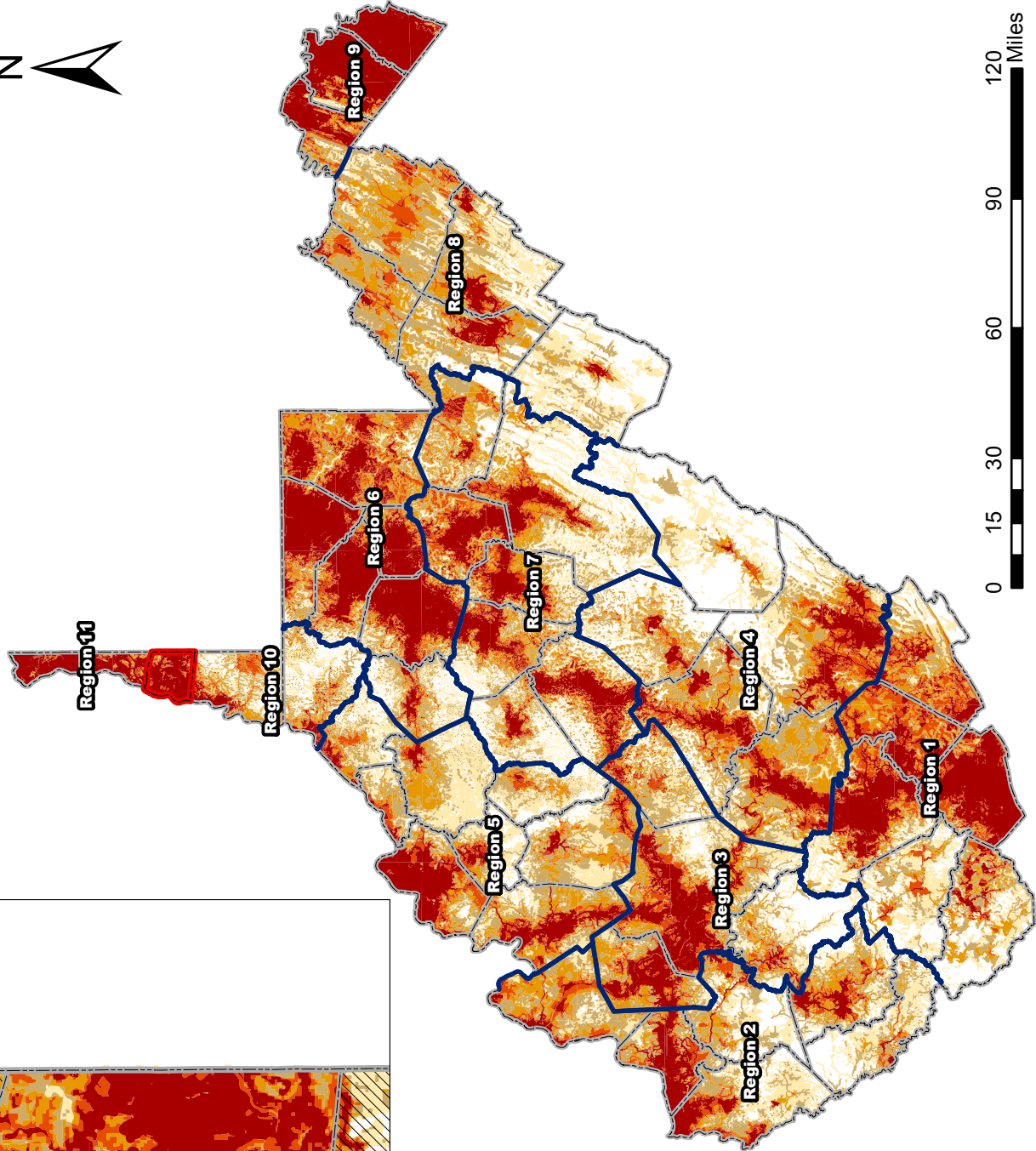
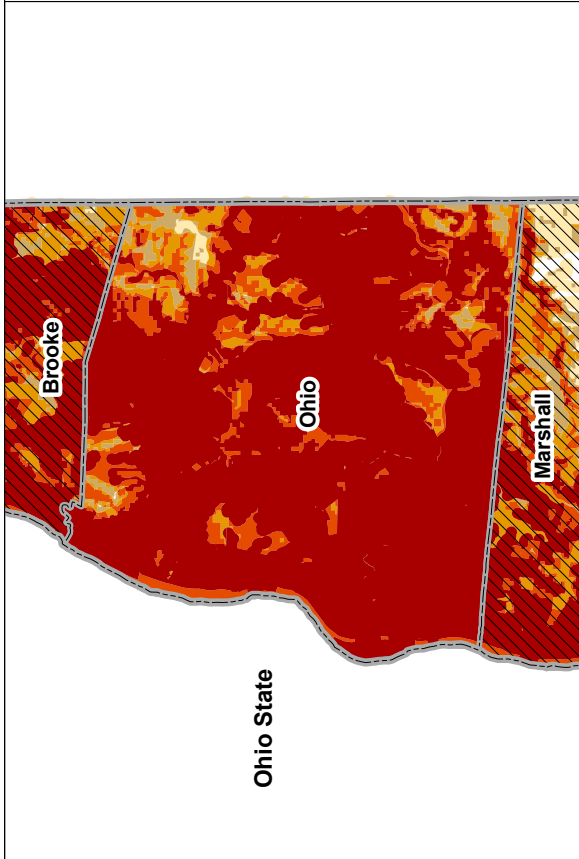
Source: West Virginia Broadband Mapping Program 2014








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Broadband - Internet Total Number of Providers

Ohio County



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



Source: West Virginia Broadband Mapping Program 2014

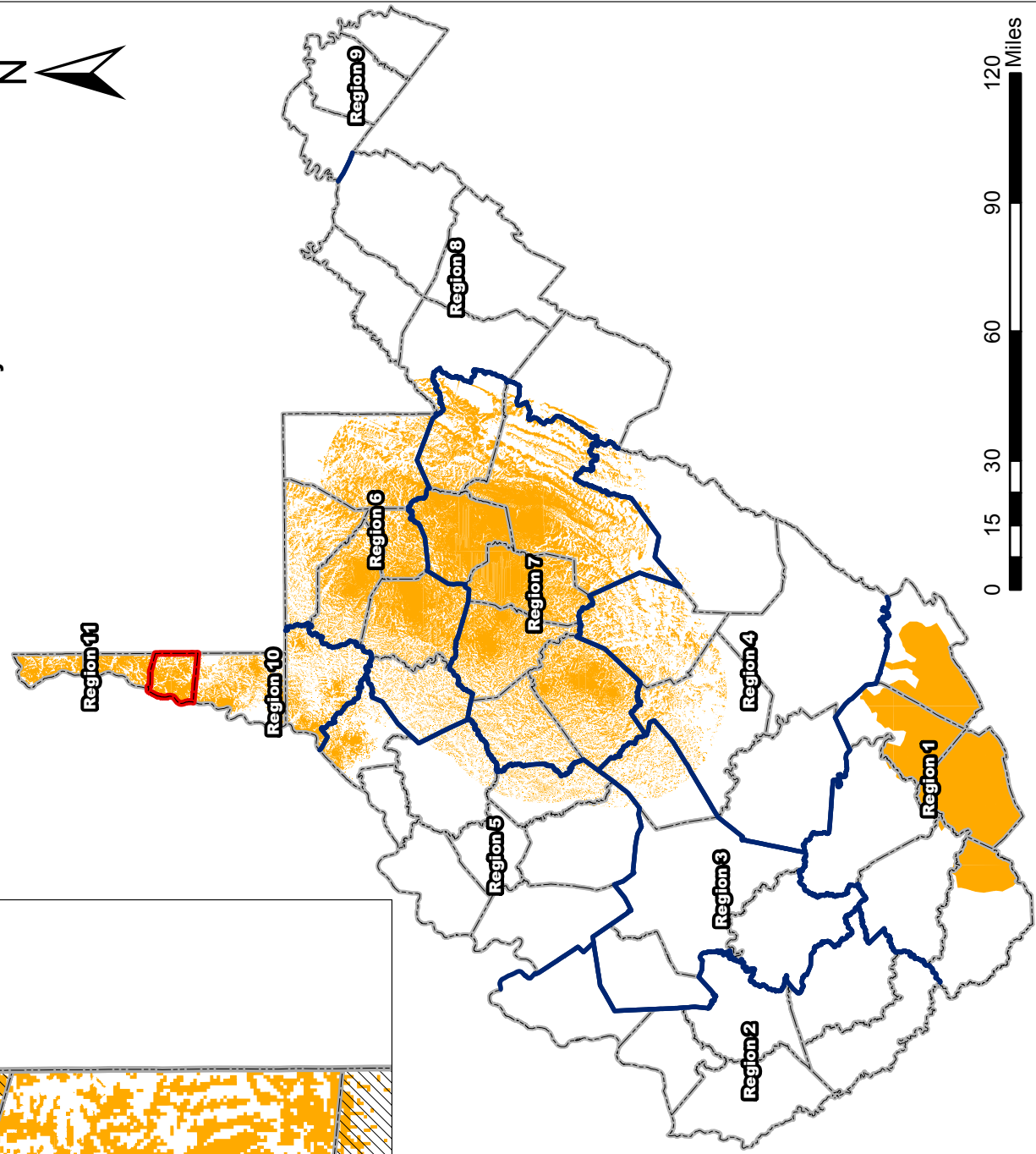
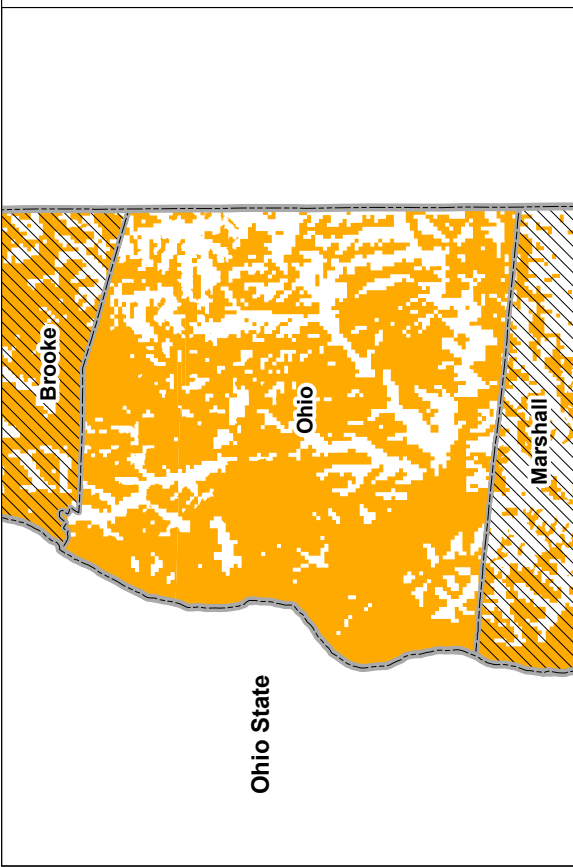
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Broadband - Internet Fixed Wireless Coverage

Ohio County



-  Planning Regions Line
-  Fixed Wireless
-  County Boundaries

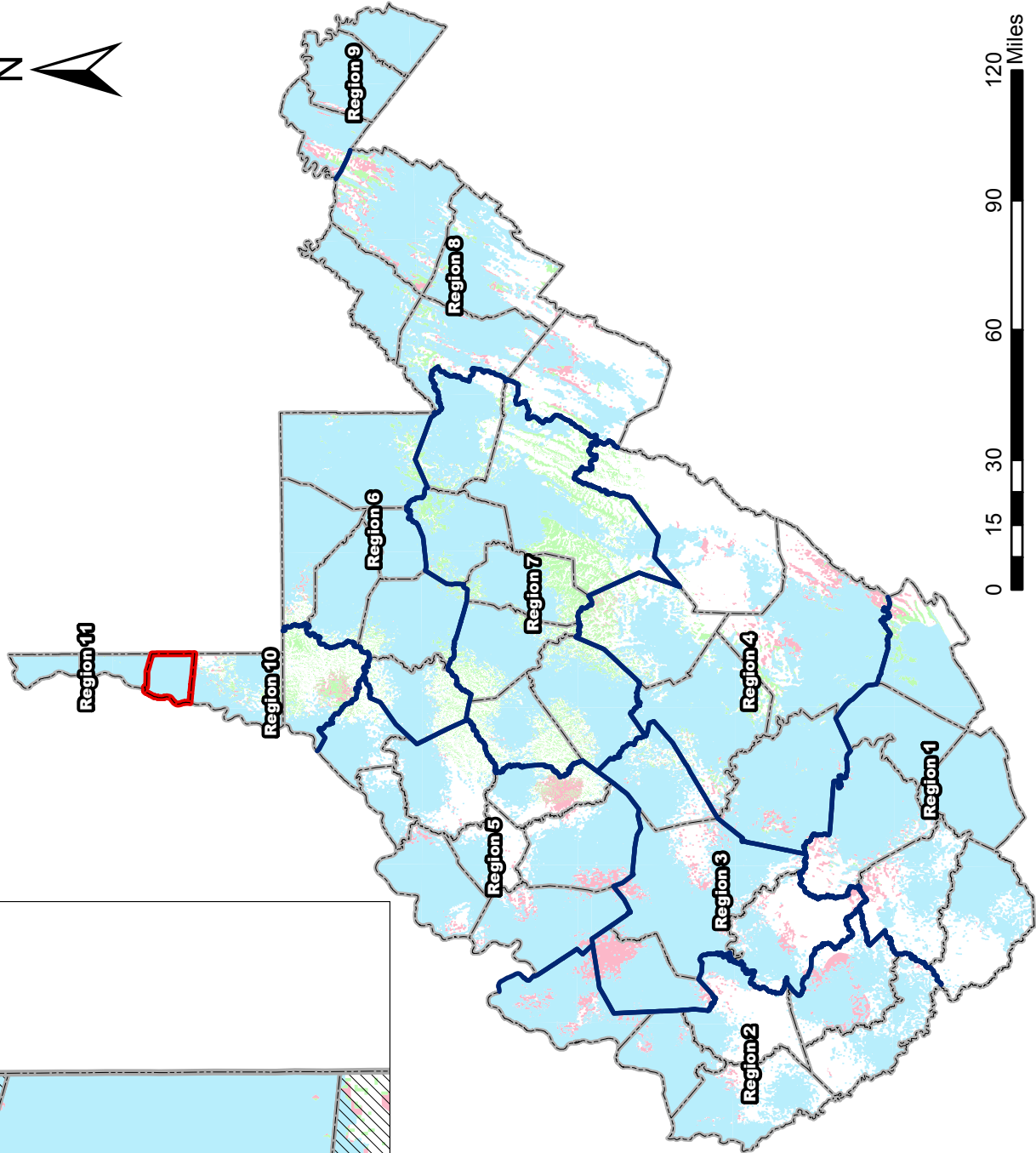
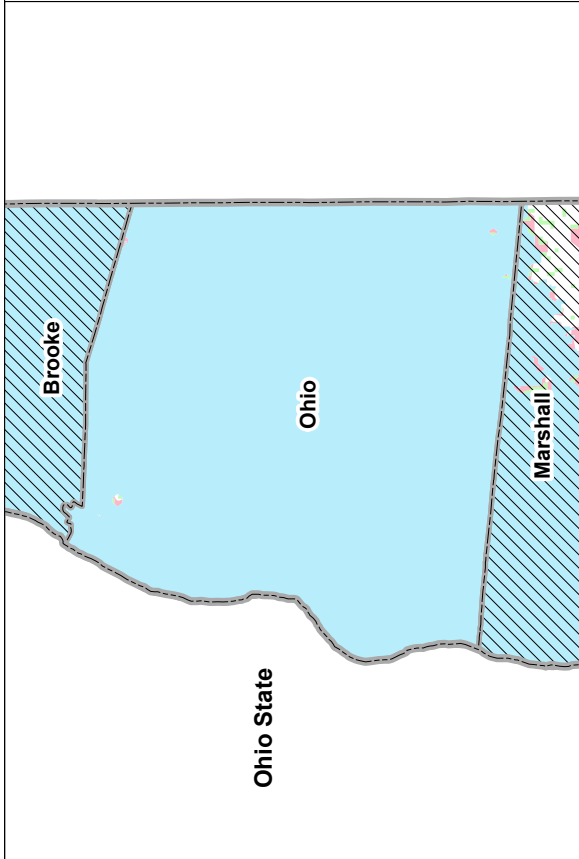
Source: West Virginia Broadband Mapping Program 2014

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Broadband - Internet MaxDown Speed Wireless

Ohio County



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



Source: West Virginia Broadband Mapping Program 2014

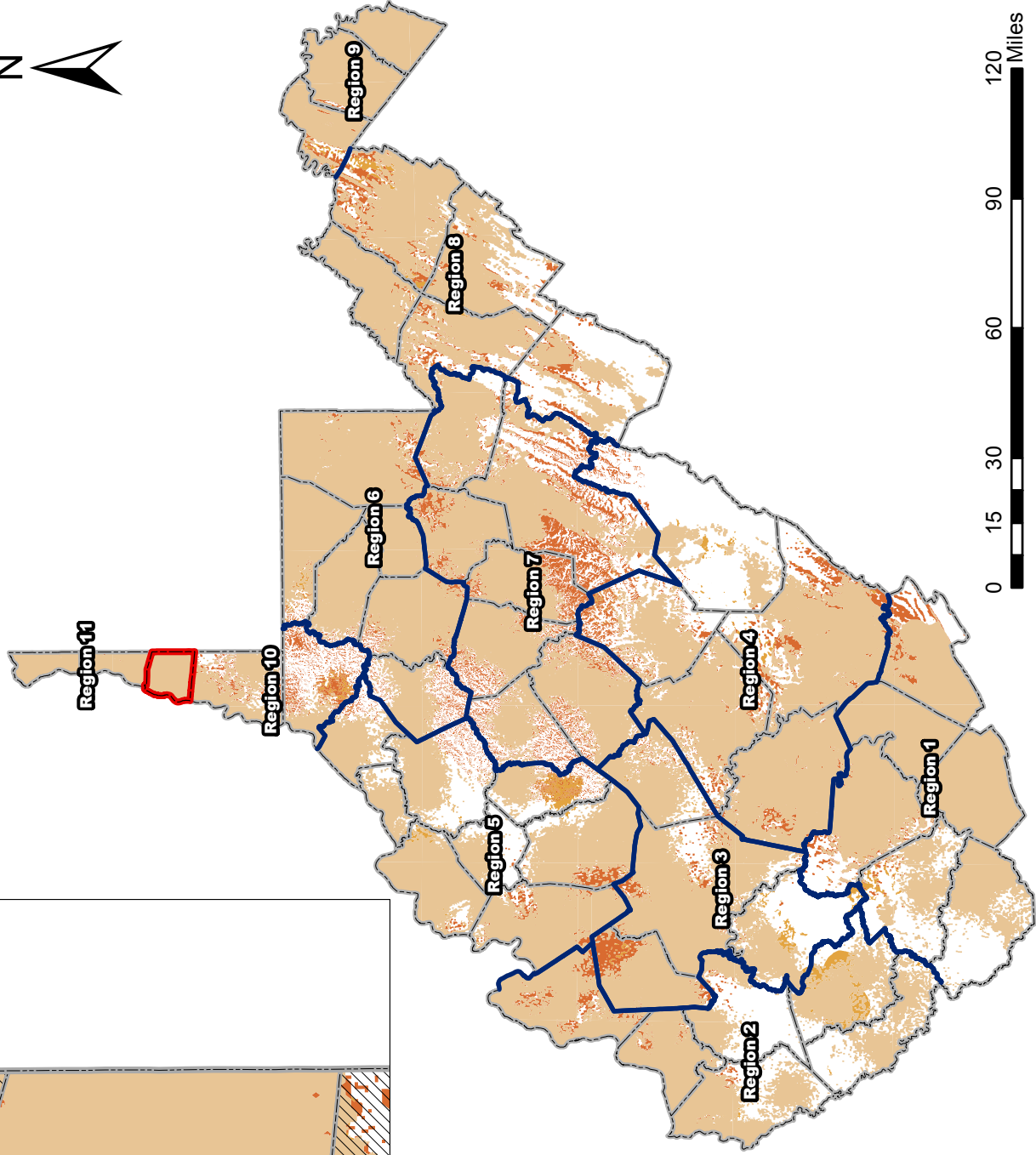
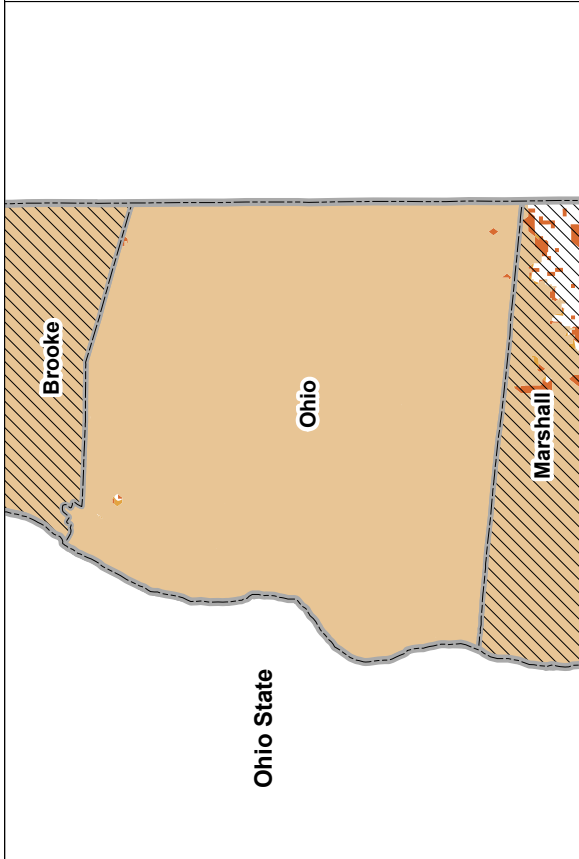
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Broadband - Internet MaxUp Speed Wireless

Ohio County



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



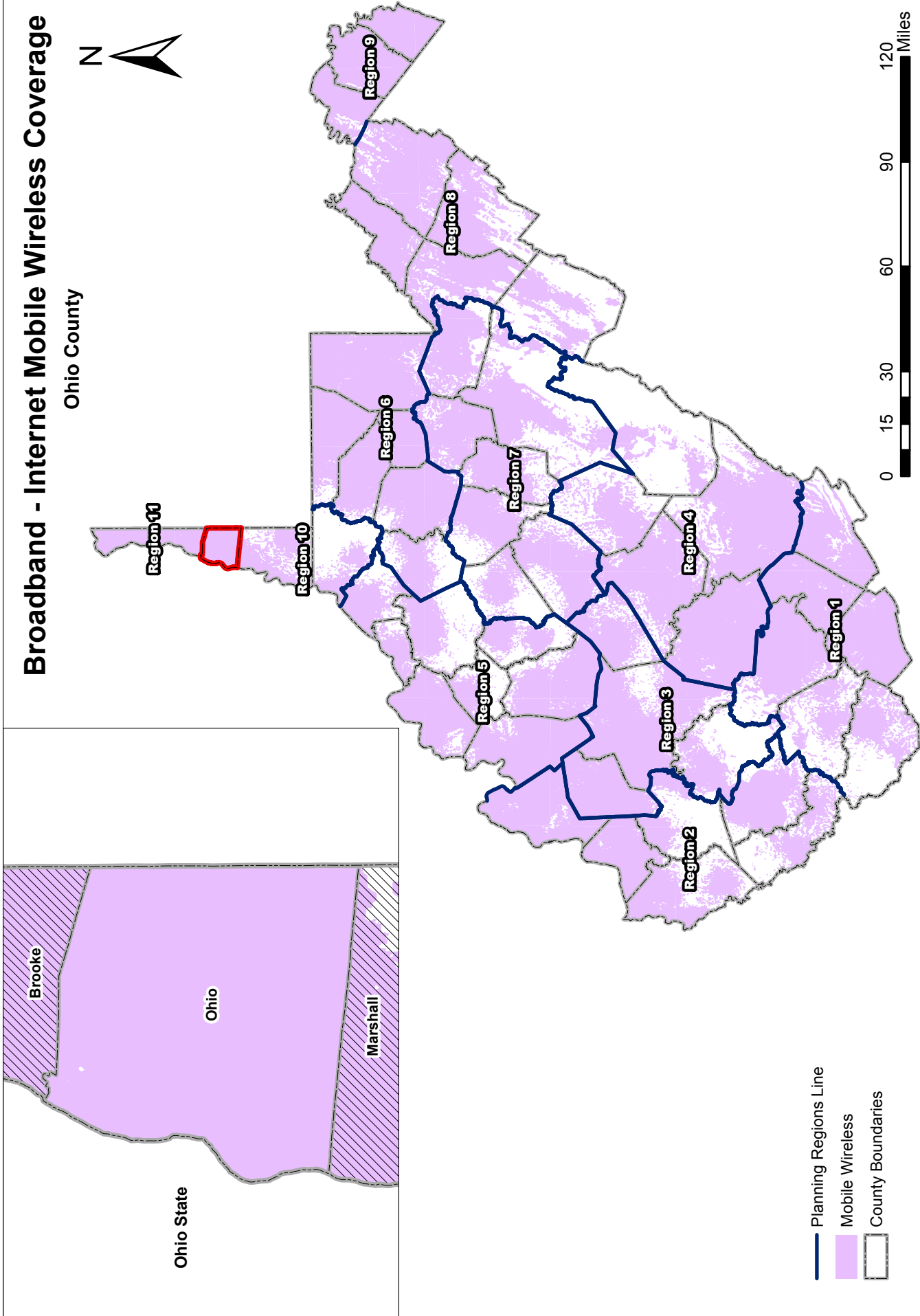
Source: West Virginia Broadband Mapping Program 2014

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Broadband - Internet Mobile Wireless Coverage

Ohio County



- Planning Regions Line
- Mobile Wireless
- County Boundaries



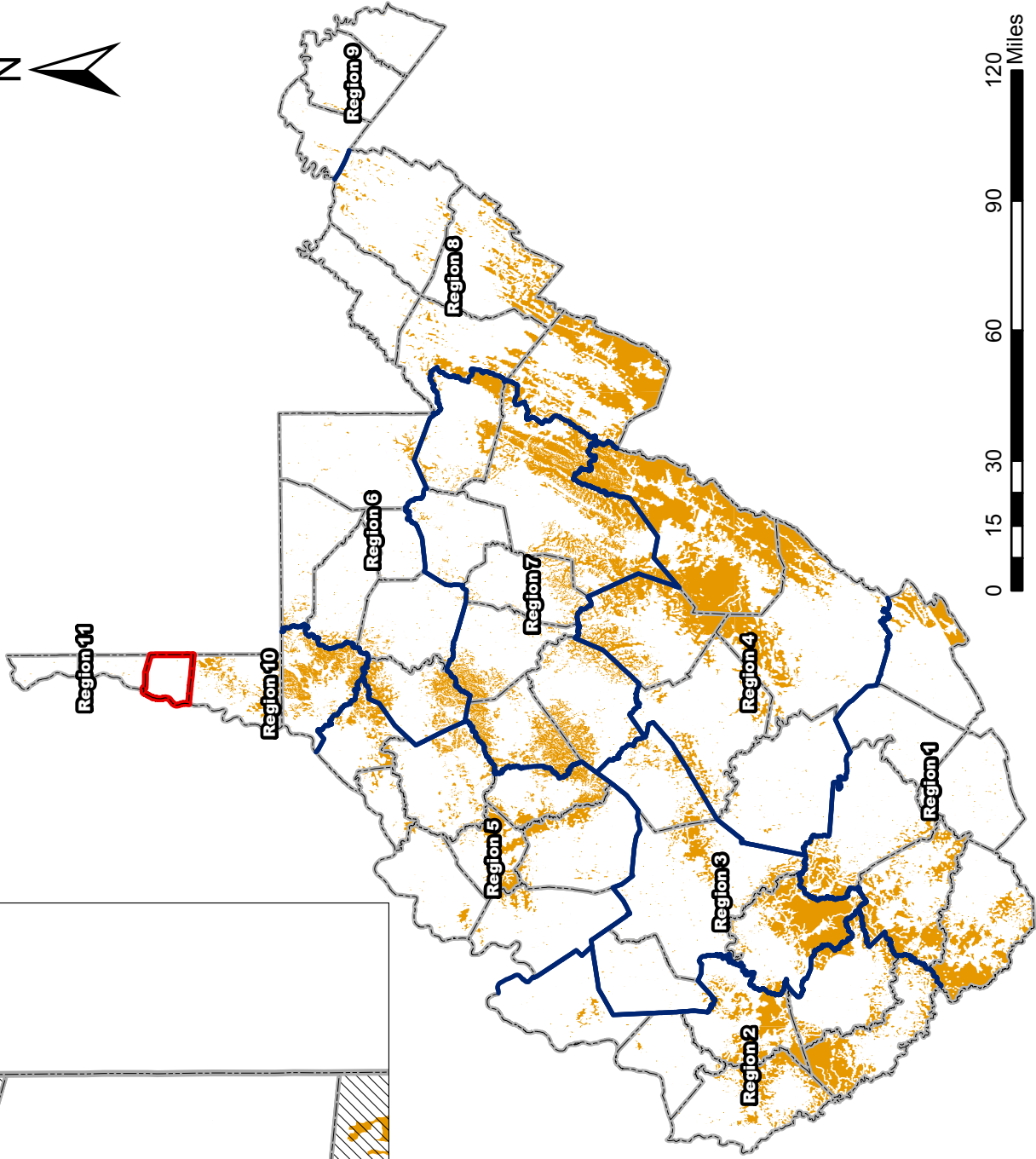
Source: West Virginia Broadband Mapping Program 2014

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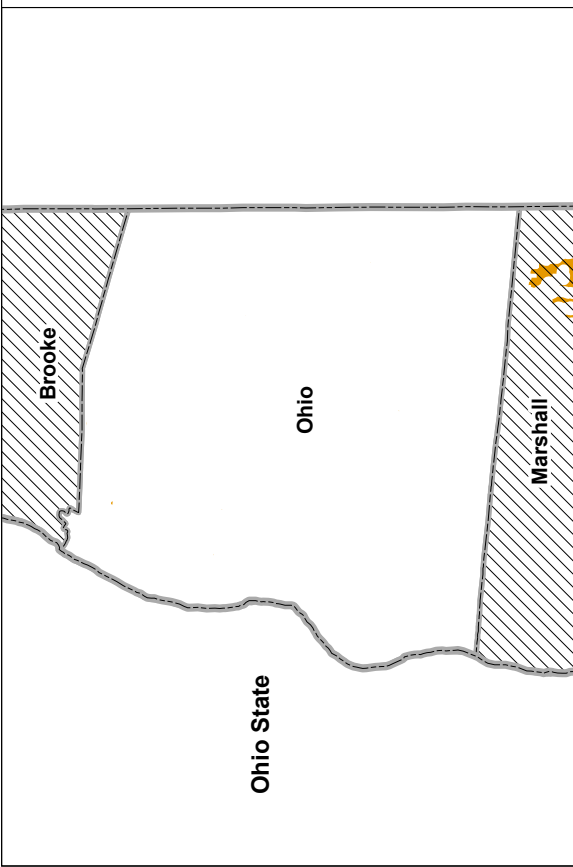


Broadband - No Broadband Coverage

Ohio County



- Planning Regions Line
- No Coverage Reported
- County Boundaries



Source: West Virginia Broadband Mapping Program 2014

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Transportation

Highways

Ohio County has two interstates – I-470 and I-70, two U.S. routes— Route 250 and Route 40, and State Routes 2, 88, 251, and 252 (Map 26).

Rail

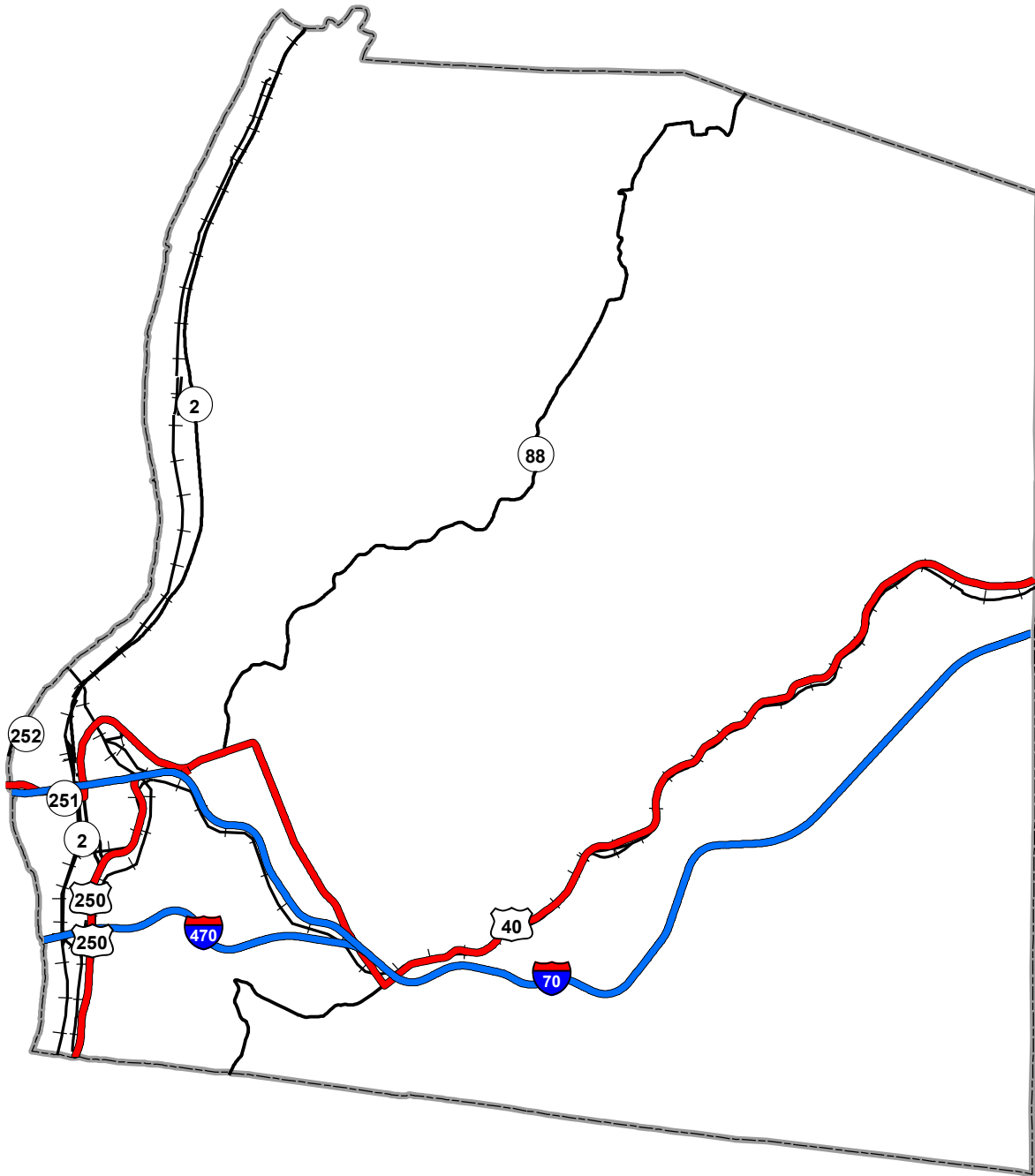
Ohio County has a rail system present in the western portion of the county.

Air

Ohio County has one airport — the Wheeling – Ohio County Airport in Wheeling.

Transportation

Ohio County



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

0 0.5 1 2 3 4 Miles

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

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www.njrati.org

Current Post-Mine Economic Development Sites

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

The Highlands

The Highlands shopping, dining and entertainment complex is a popular destination point for many shoppers. With major retailers and restaurants including Cabela's, Target, Walmart, Cracker Barrel, Olive Garden, and several others slated to open, The Highlands offers premier retail and dining offerings to consumers.⁷

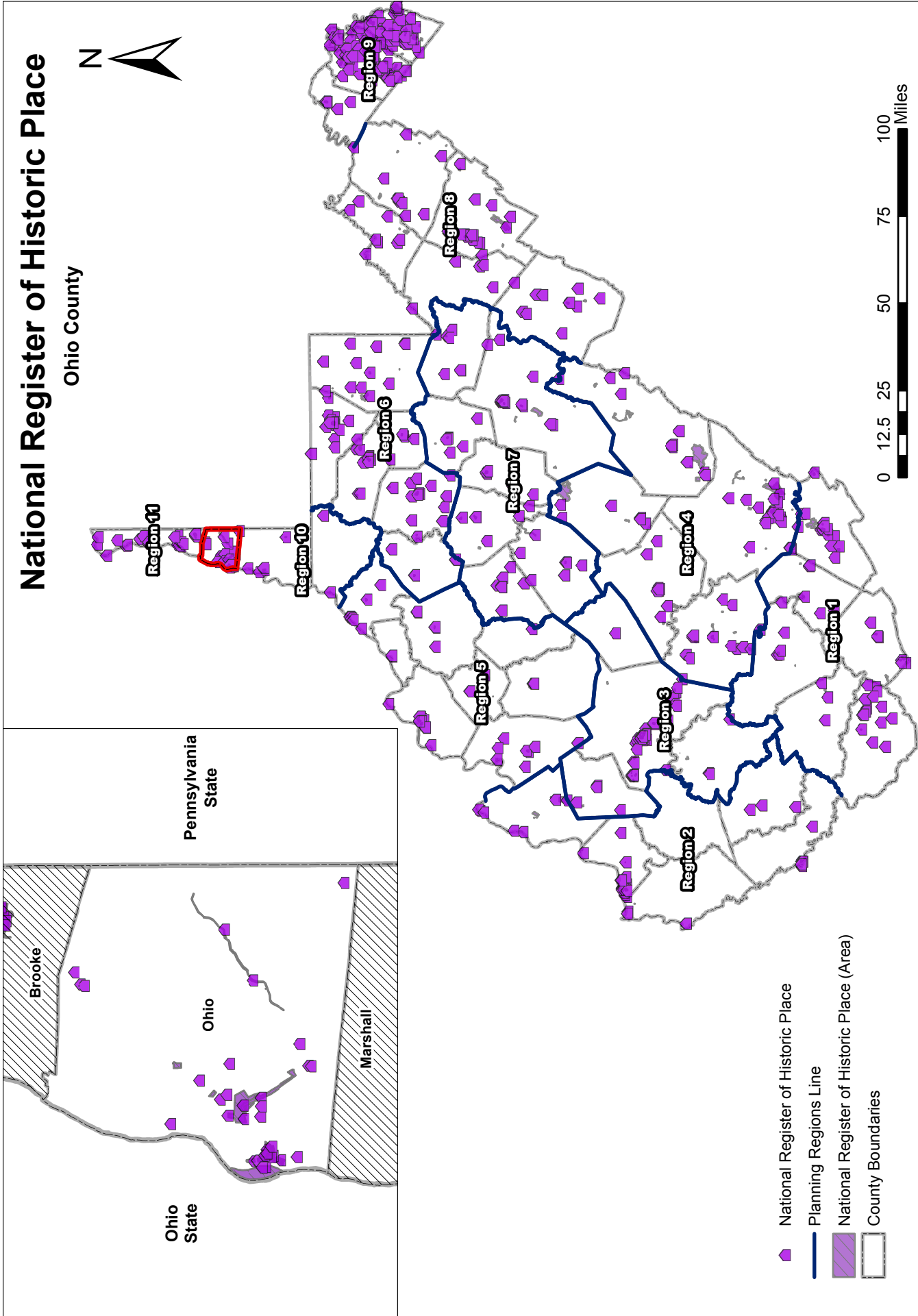
Historic Preservation





Historic preservation will be essential in a county steeped in coal mining history. Ohio County has over 30 listings in the National Register of Historic Places. There are a number of historic buildings in the County mostly built in the early 1900s that exemplify certain building styles popular at the time (Map 27). Other historic areas have been designated by West Virginia. Map 28 gives a spatial position to each designated State historic piece of architecture.

⁷ "The Highlands.com Your Online Shopping, Dining & Entertainment Guide", The Highlands, Accessed September 24, 2015, <http://www.the-highlands.com/>

National Register of Historic Place

Ohio County



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



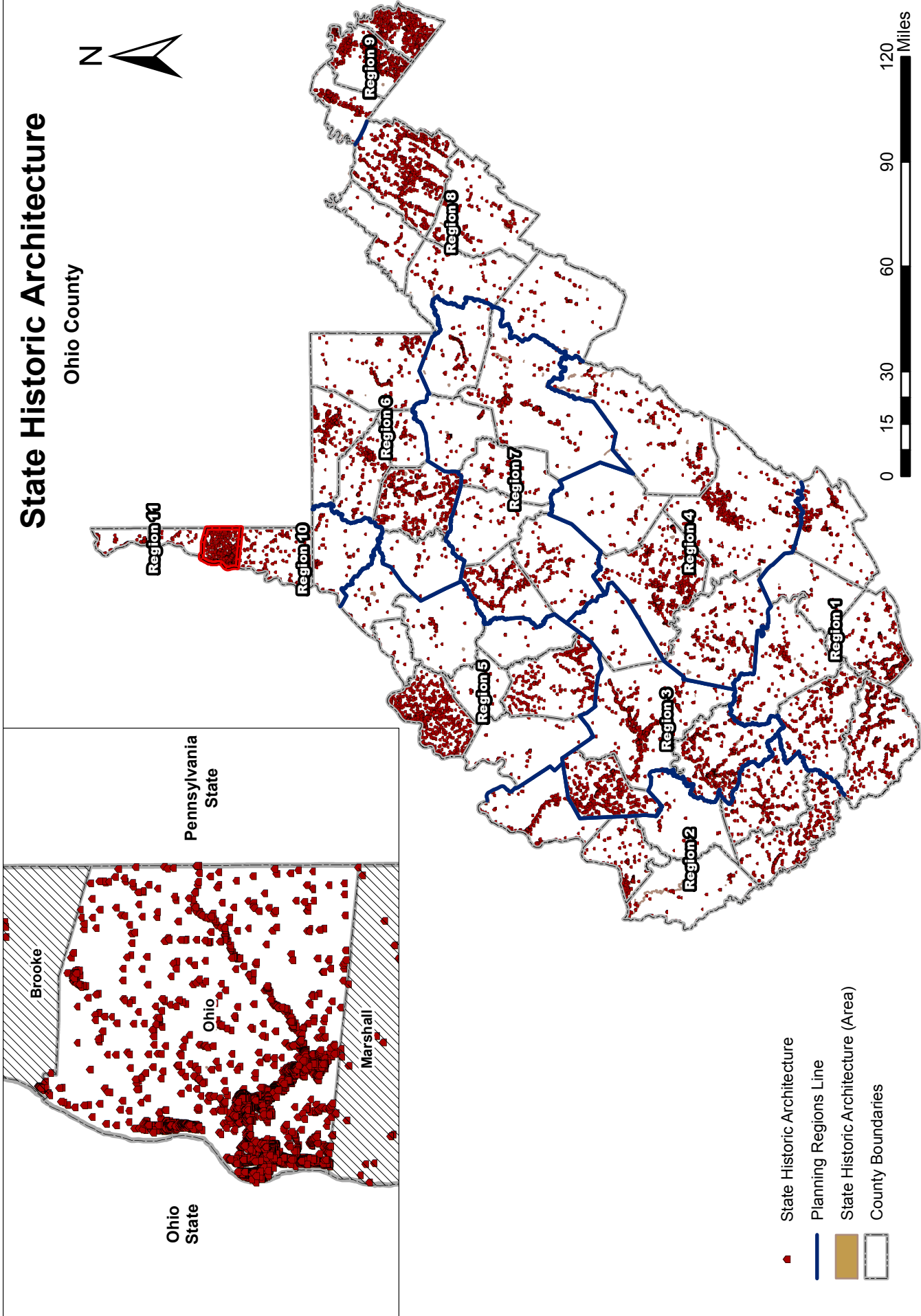
Source: West Virginia State Historic Preservation Office 2014

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State Historic Architecture

Ohio 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. Ohio 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. Ohio's wetland inventory is limited and sporadic throughout the County (Map 29).

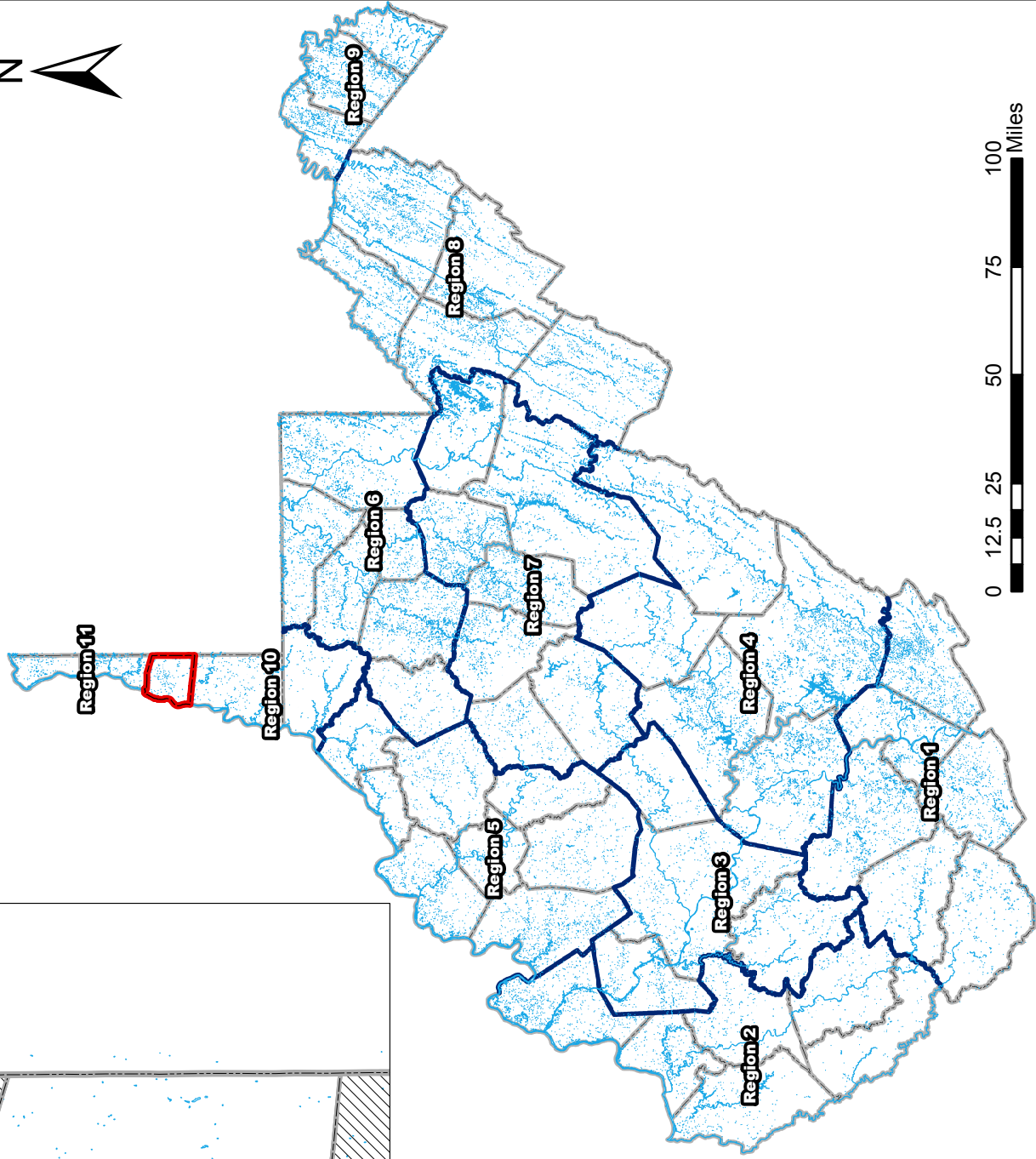
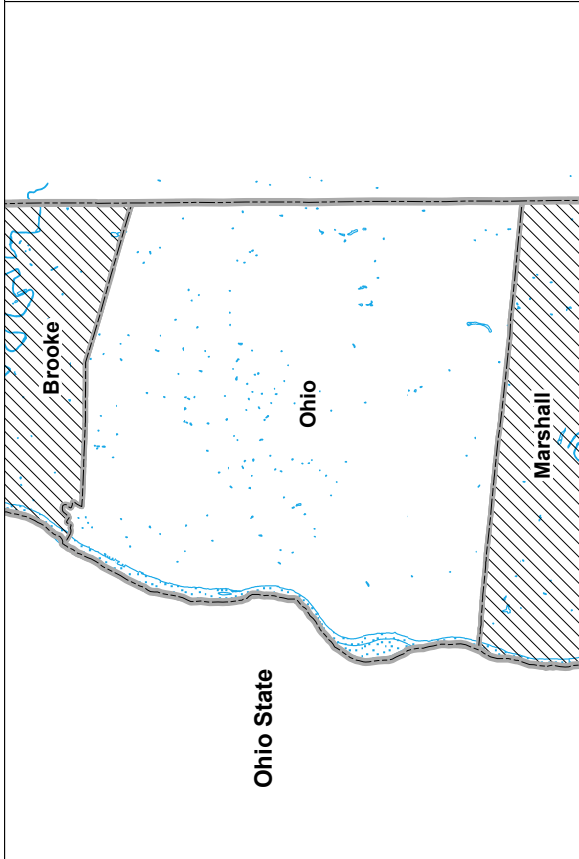
The State also possesses a respectable amount of park and forest land. Most of this land is located in the eastern portion of the State, the area that contains the main part of the Appalachian Mountain range. Ohio County contains a small wildlife management area (Map 30).

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."⁸ 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; Ohio County is not among them, but neighboring Brooke County is (Map 31).

⁸ "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

Ohio County



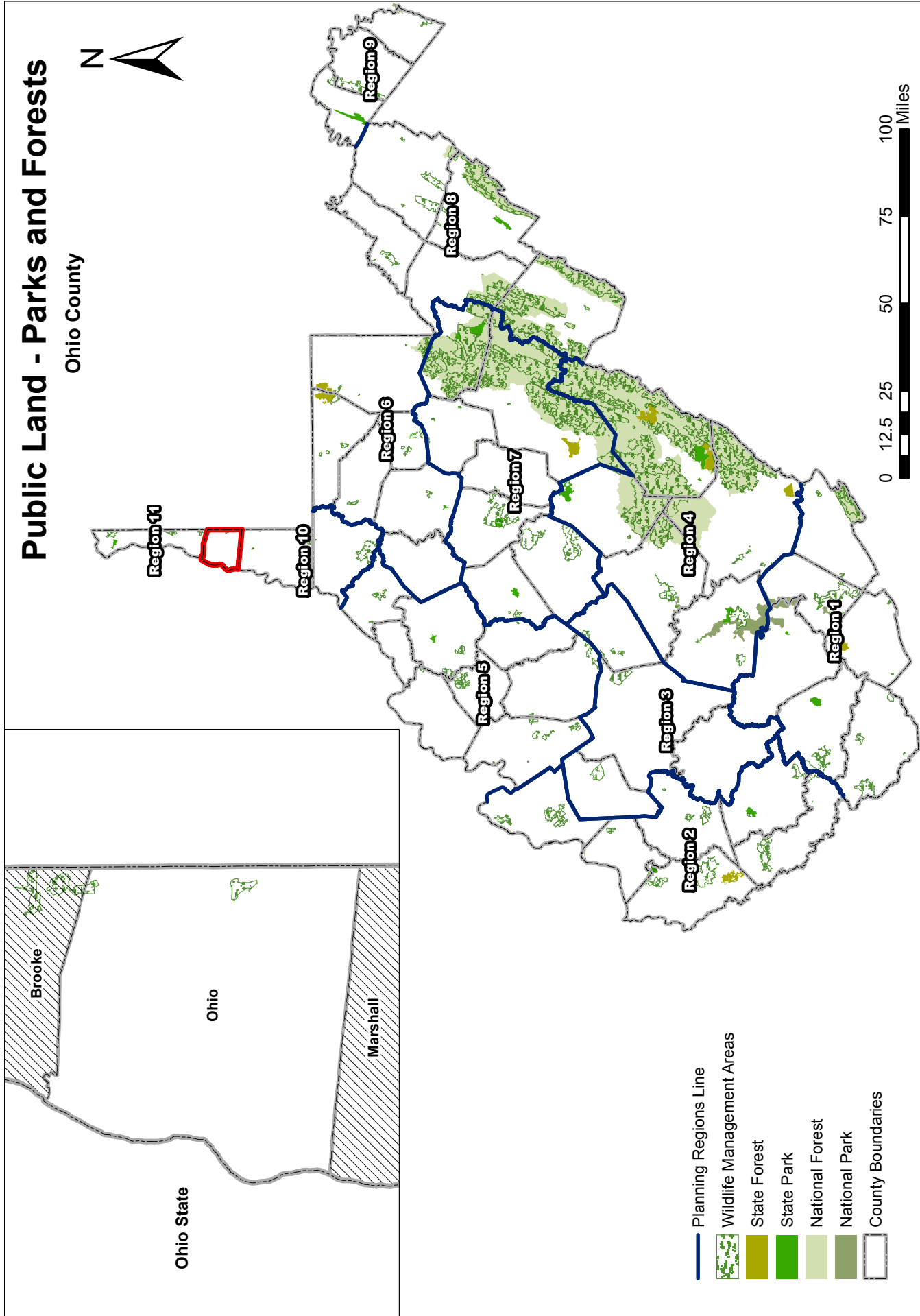
Source: United States Fish and Wildlife Service 1996








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Public Land - Parks and Forests

Ohio County



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

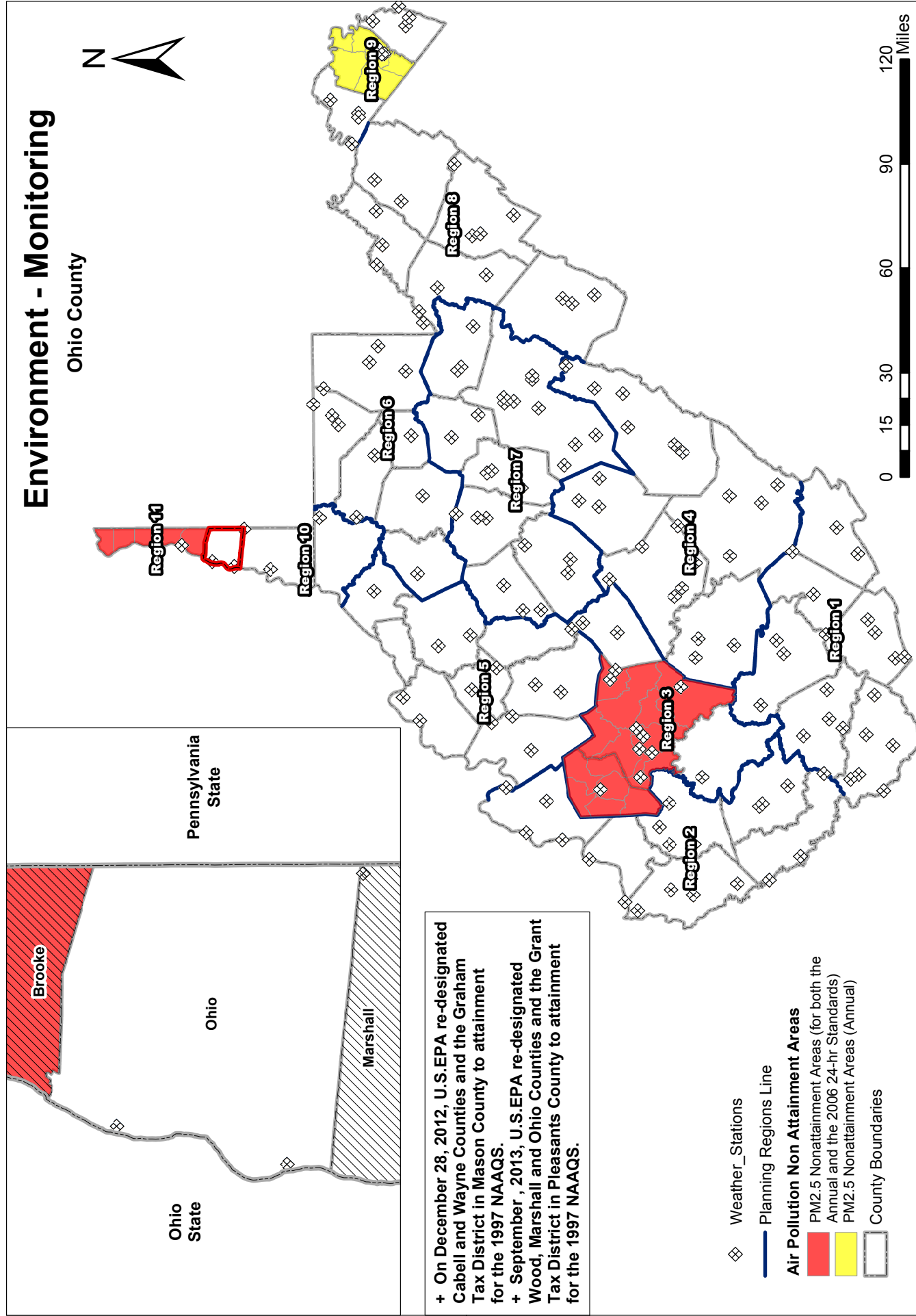
Source: Wildlife Management Areas: West Virginia Division of Natural Resources 2002; State Forest: West Virginia Division of Forestry 2004; State Park: West Virginia Division of Natural Resources, Natural Resource Analysis Center 2000; National Forest: United States Forest Service 2005; National Park: United States National Park Service 2003

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Environment - Monitoring

Ohio 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. Ohio County has gas pipelines that run through the county and a small oil field in the western region of the county, but no oil pipeline presence (Map 32). Ohio County does have play in the Marcellus shale, with a large number of permitted wells (Map 33). The Marcellus Shale will continue to be a major player in West Virginia's energy layout for the foreseeable future, and as technology improves recoverability may also.

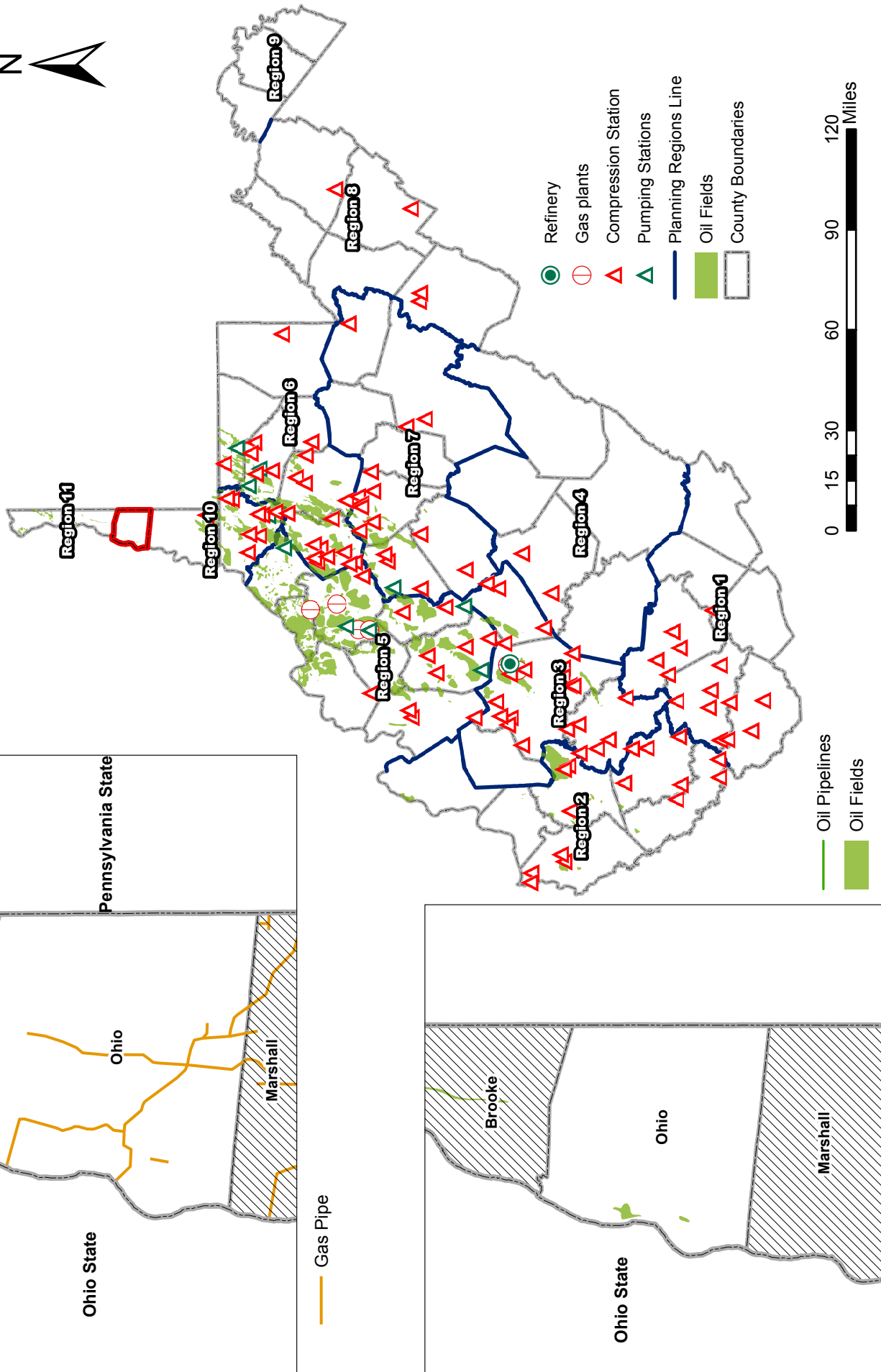
Potential renewable energy sources were also examined. Wood by-products are a potential energy source classified as biomass energy. Naturally it is most useful in areas with a great deal of wood products. West Virginia is one of the most forested States in the country. Ohio County appears to be among the least forested counties in West Virginia (Map 34), possibly explaining why the county has no current activity in the production of wood by-products (Maps 35 and 36). Other potential renewable energy sources include geothermal (Map 37), solar (Map 38), and wind (Map 39). Each of these resources was examined in a recent report from the Center of Business and Economic Research at Marshall University.⁹ 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 Ohio appears to have very little solar, geothermal, or wind power potential. 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.¹⁰

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

¹⁰ *Ibid.*

Energy - Gas and Oil

Ohio County



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

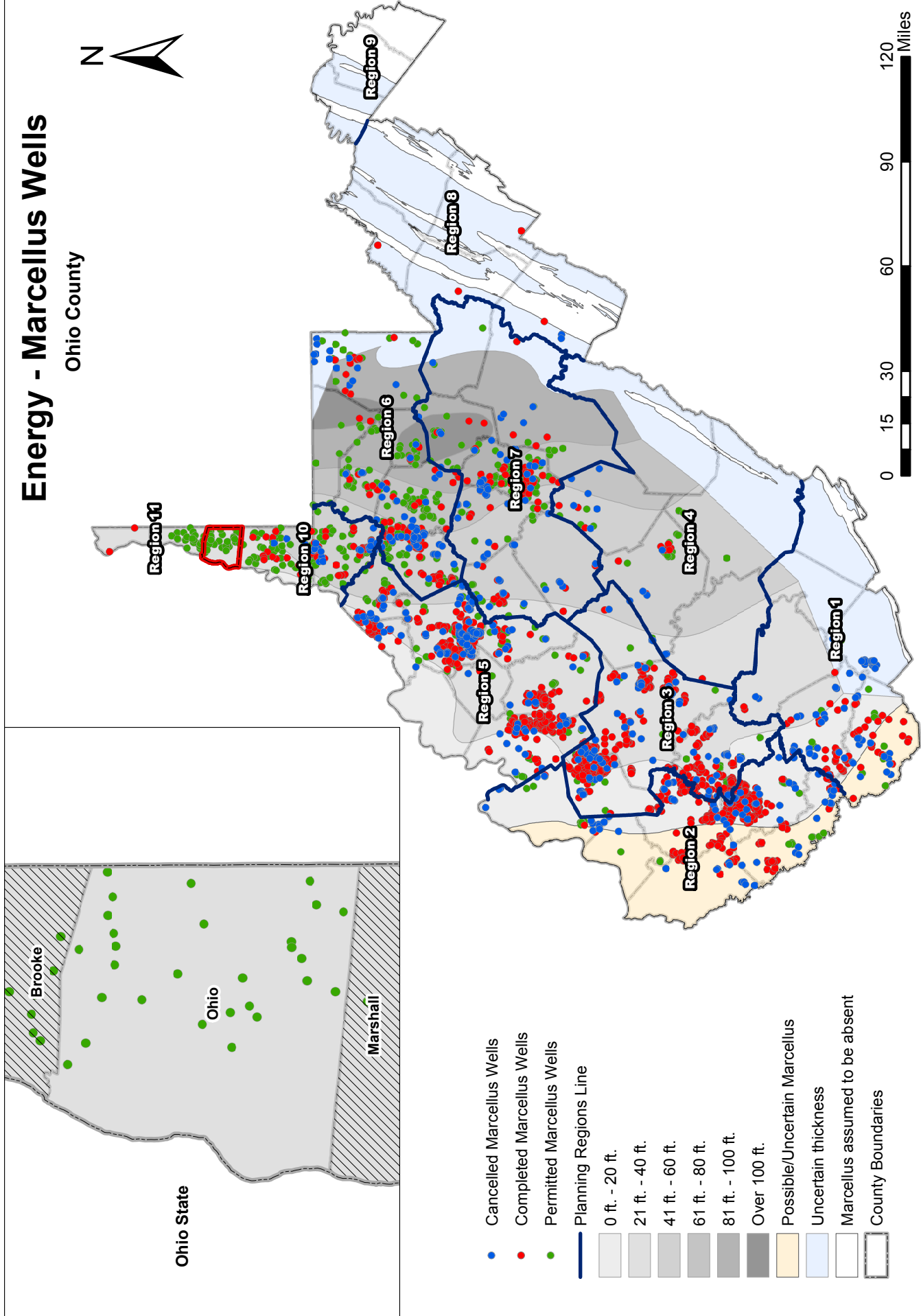


Source: West Virginia Geological and Economic Survey 2007

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Energy - Marcellus Wells

Ohio 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

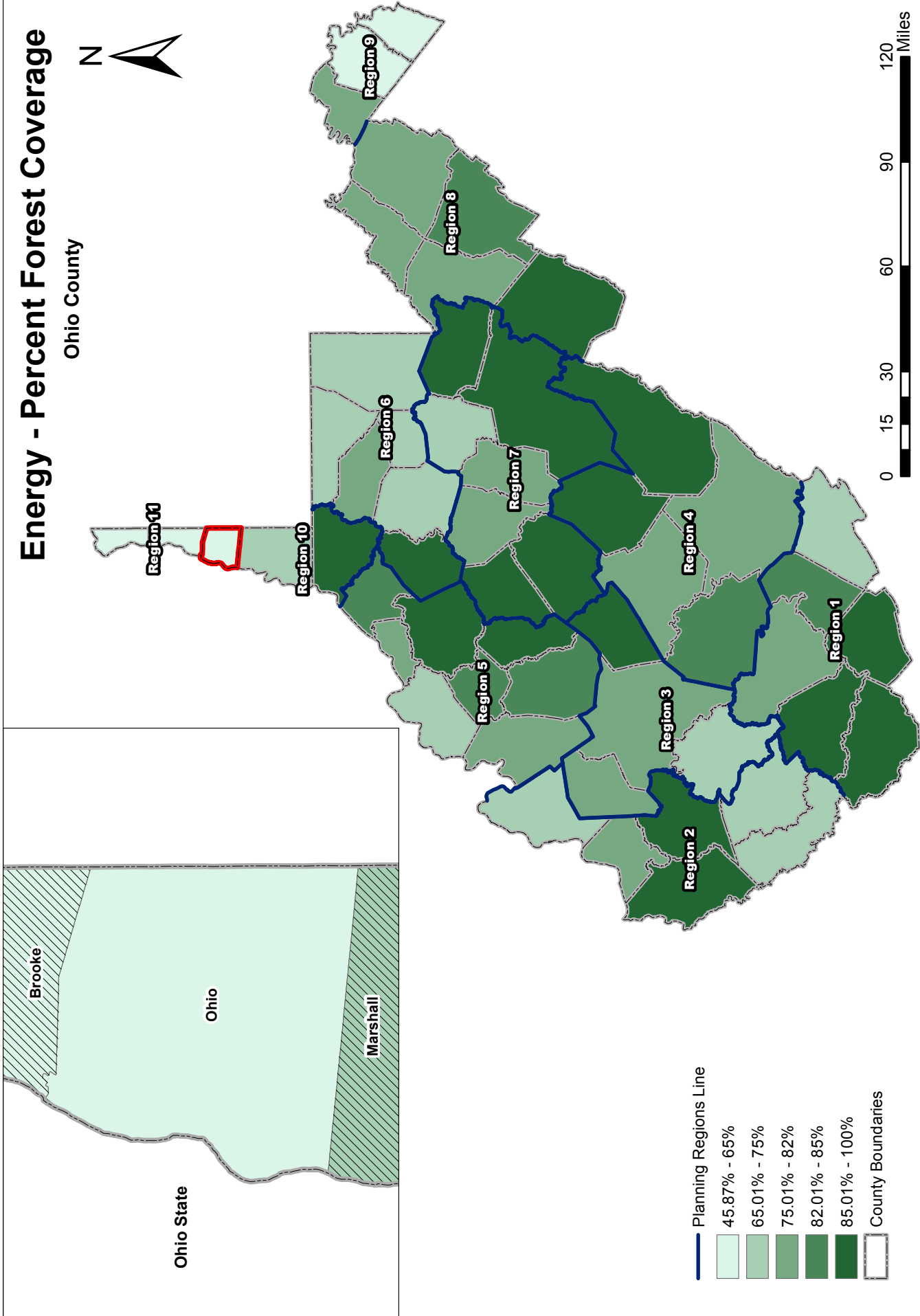
Source: West Virginia Geological and Economic Survey 2014

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Energy - Percent Forest Coverage

Ohio County



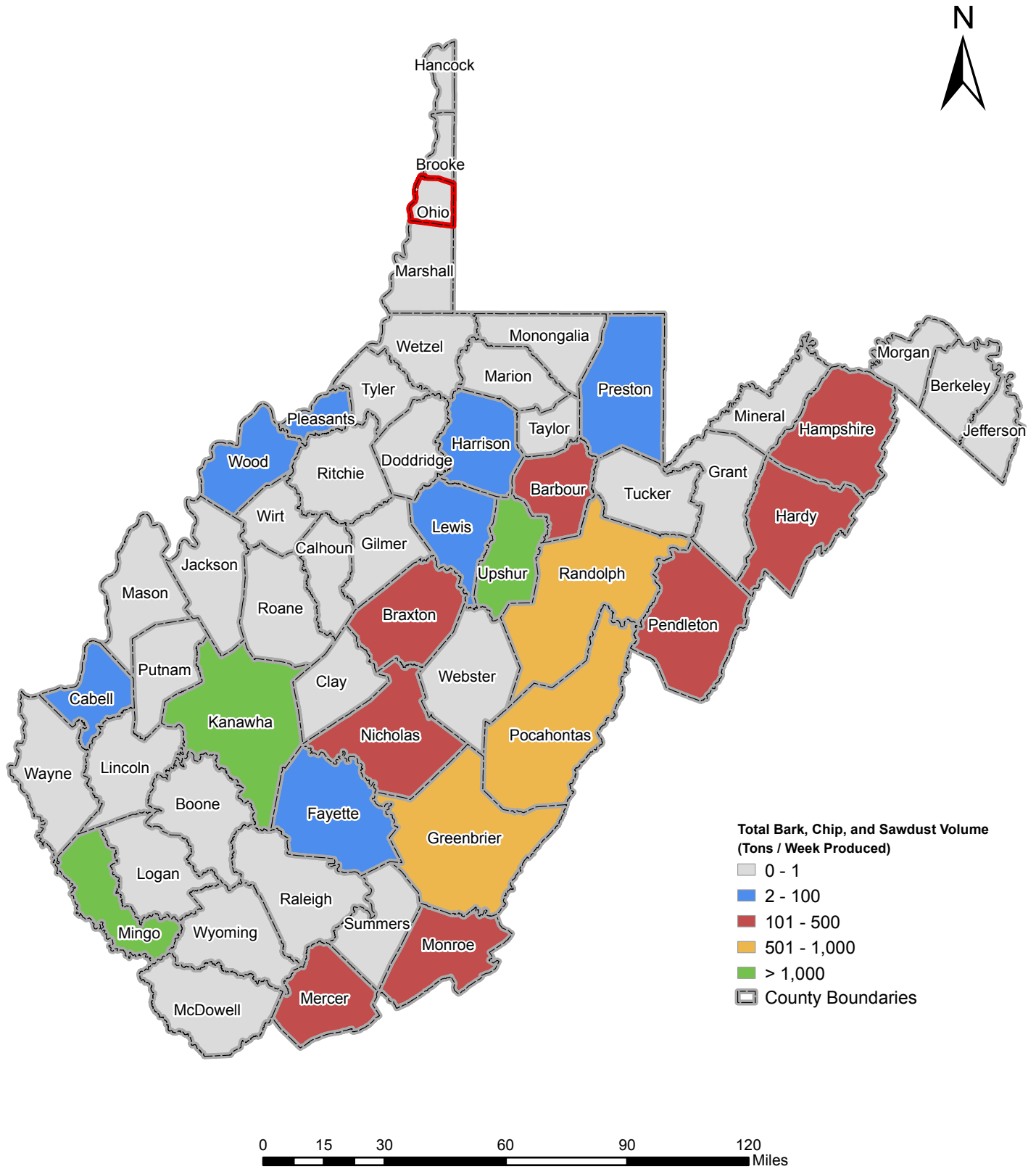
Source: Rahall Transportation Institute 2013

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Renewable Energy - Wood By Products

Bark, Chip, and Sawdust Volume Produced - Ohio County

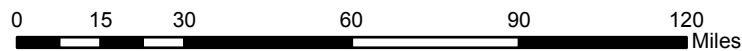
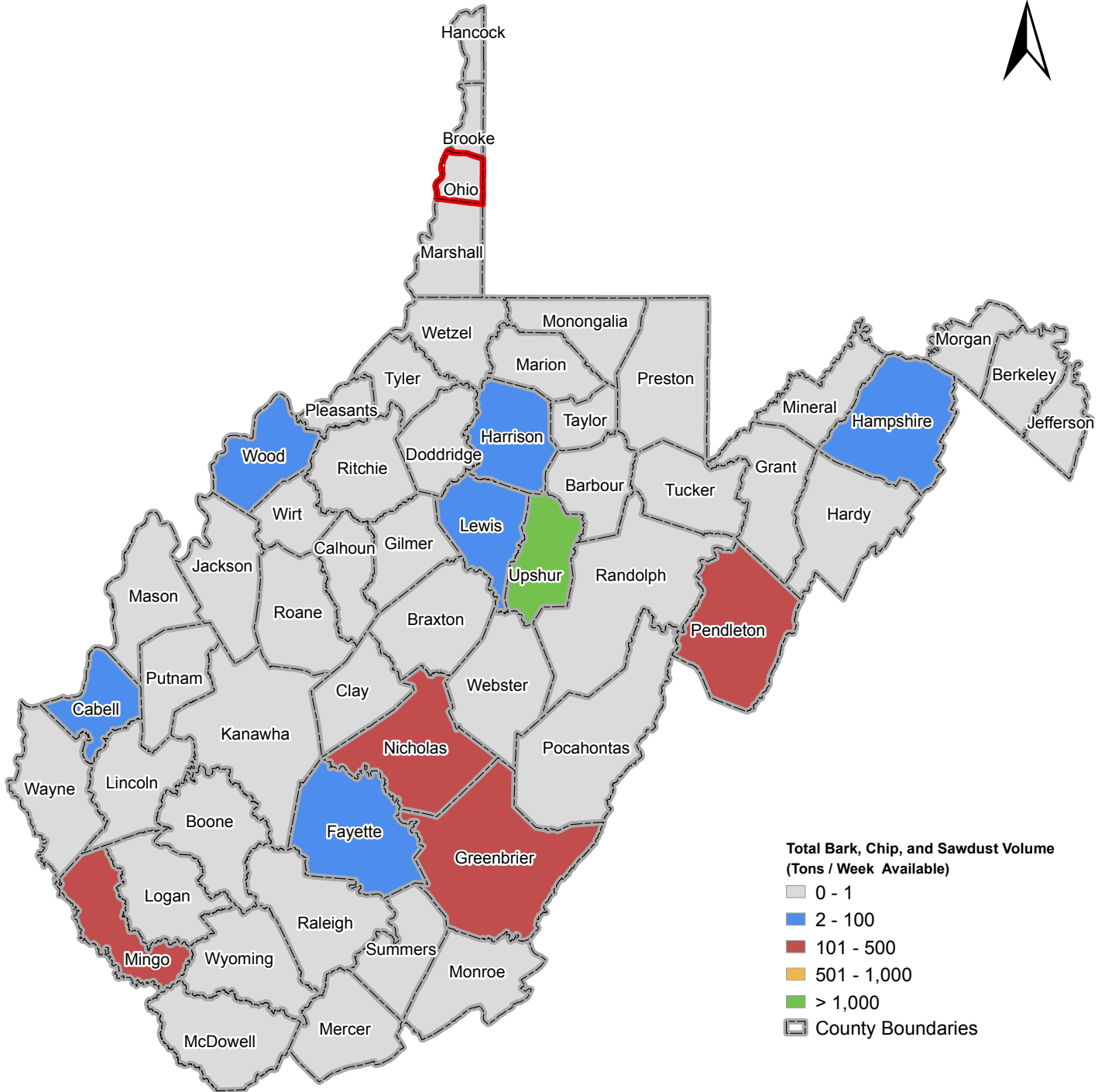


Source: West Virginia Division of Forestry 2014

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Renewable Energy - Wood By Products

Bark, Chip, and Sawdust Volume Available - Ohio County



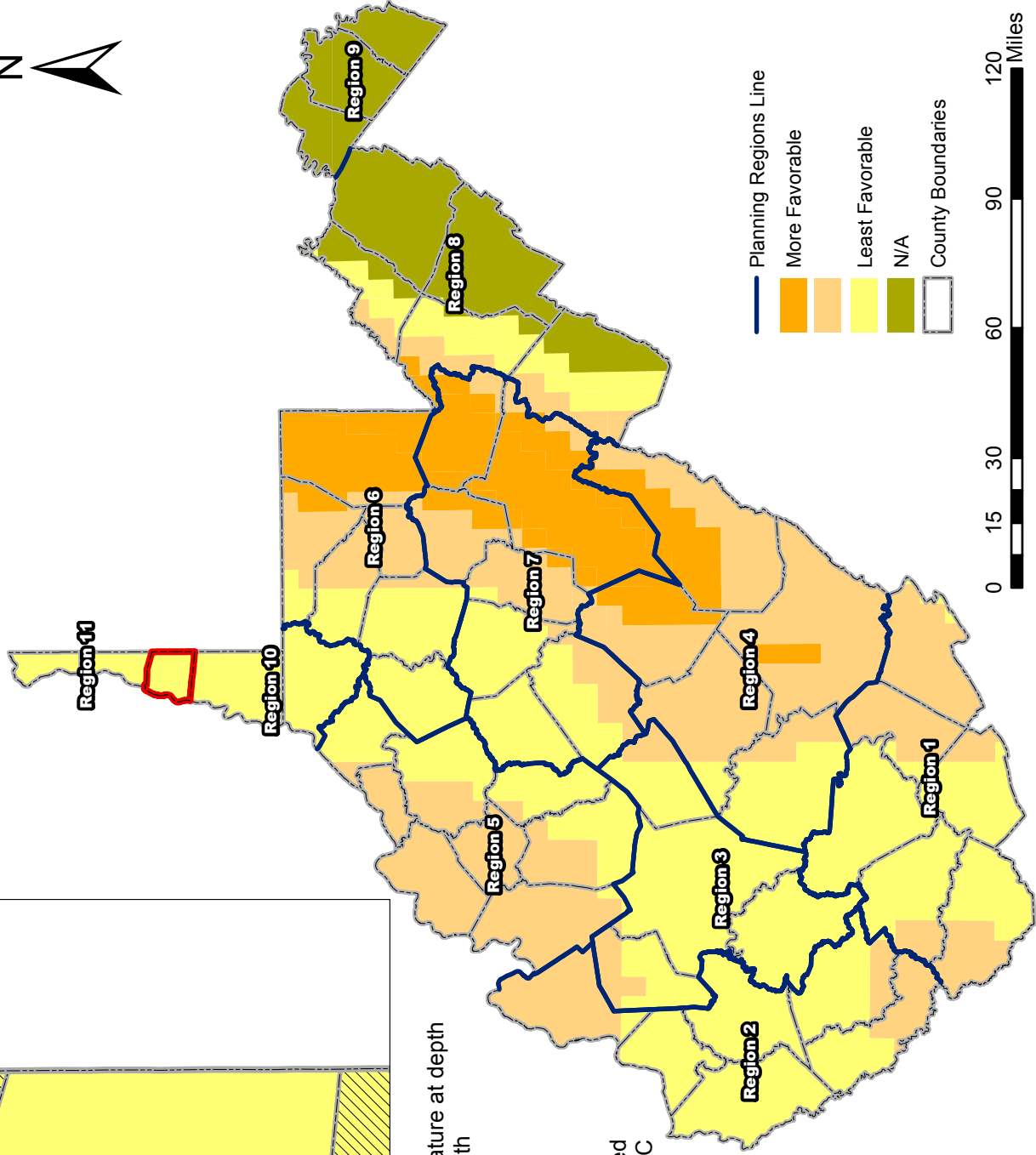
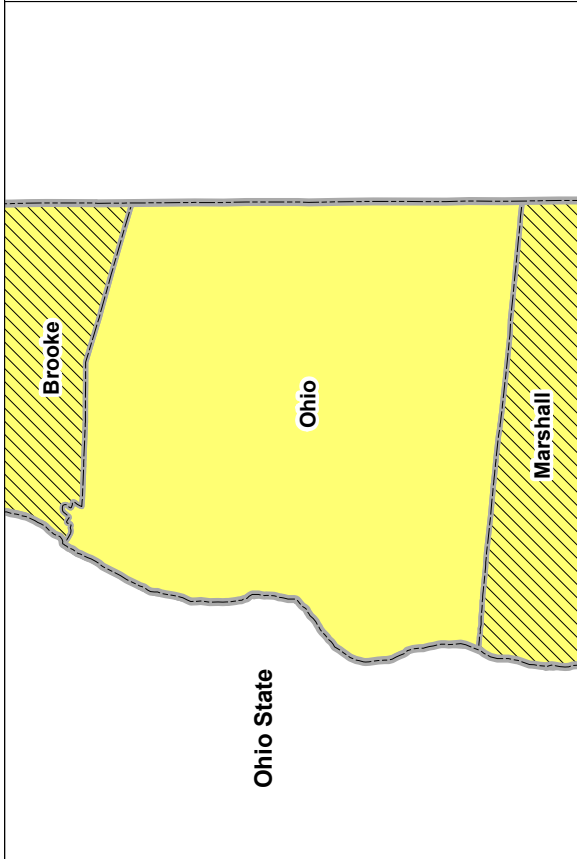
Source: West Virginia Division of Forestry 2014

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



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

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

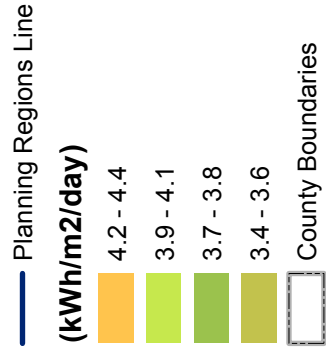
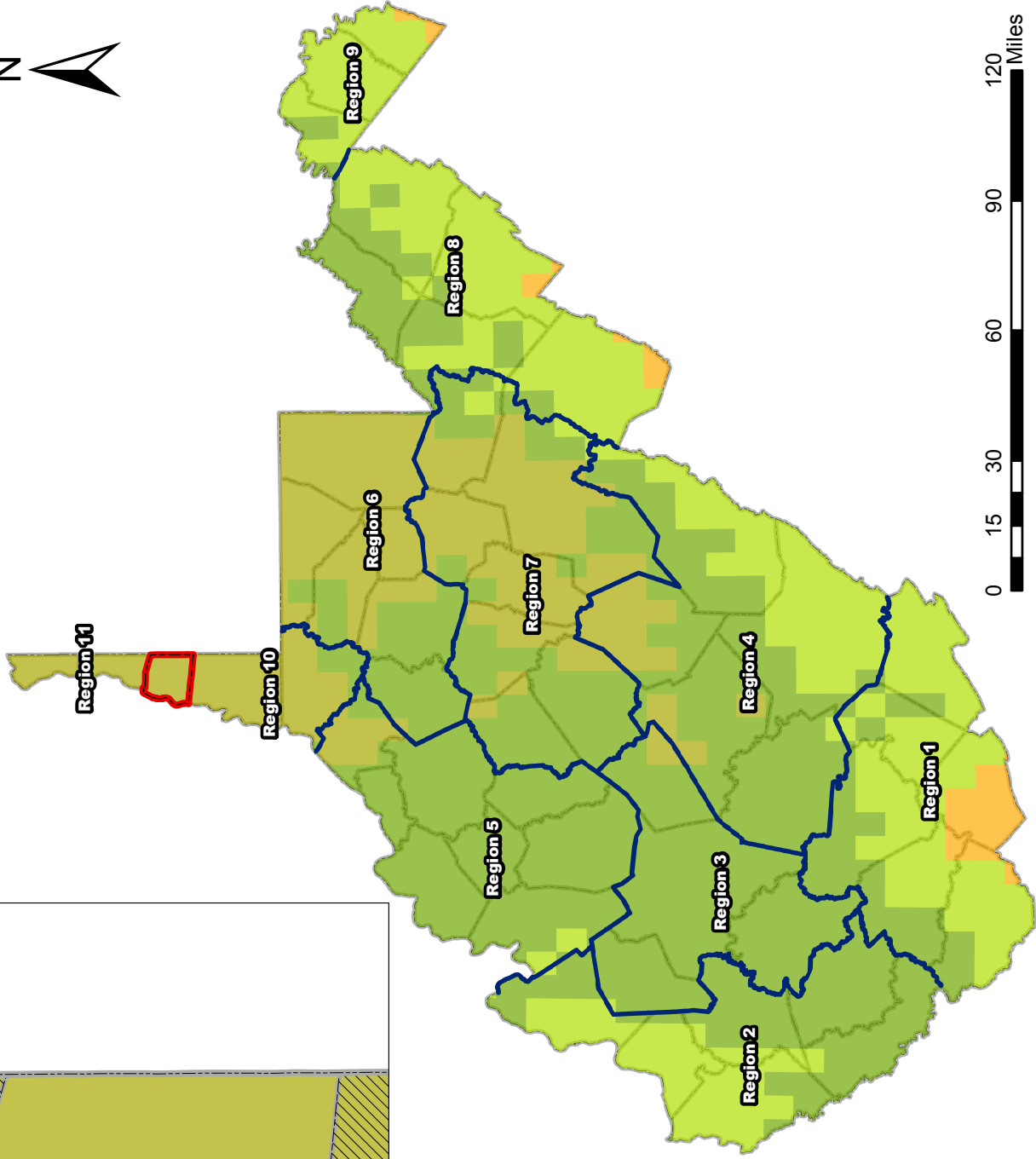
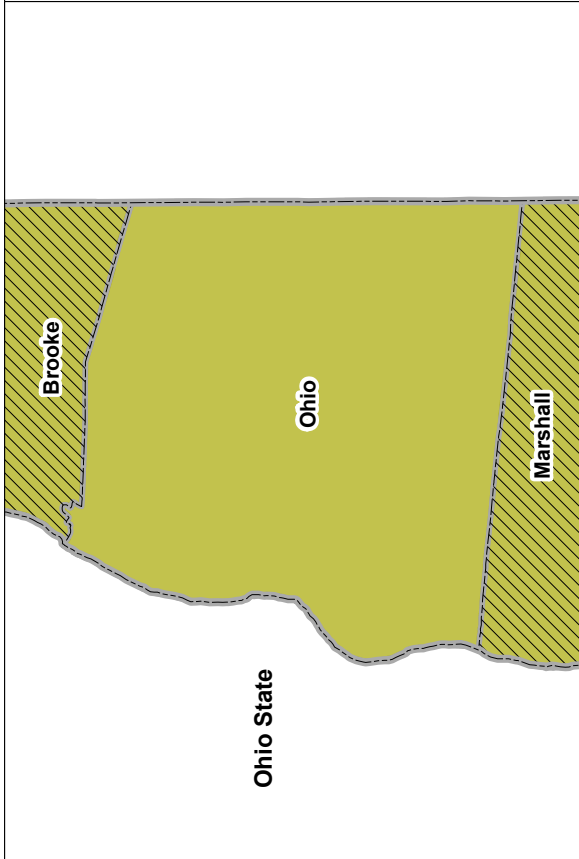


Source: National Renewable Energy Laboratory 2009

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Solar - Renewable Energy

Ohio County



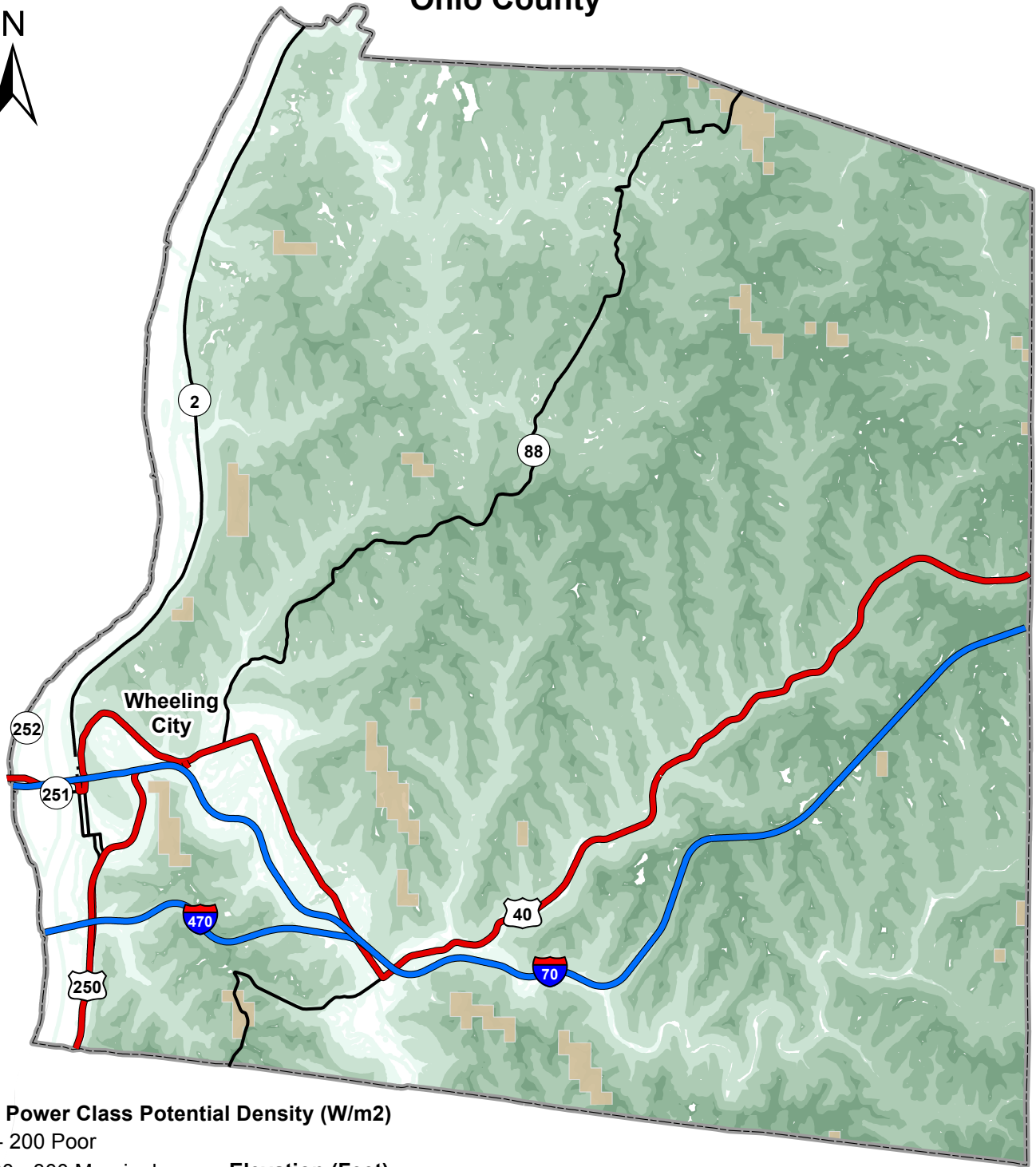
Source: National Renewable Energy Laboratory 2012

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Renewable Energy-Wind

Ohio County



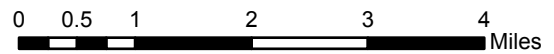
Wind Power Class Potential Density (W/m²)

- 0 - 200 Poor
- 200 - 300 Marginal
- 300 - 400 Fair
- 400 - 500 Good
- 500 - 600 Excellent
- 600 - 800 Outstanding
- > 800 Superb

Elevation (Feet)

- 640 - 780
- 781 - 980
- 981 - 1160
- 1161 - 1260
- 1261 - 1440

- Interstate
- US Routes
- WV Routes
- 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 Ohio. Tax Districts were utilized and labeled based on a particular land use practice that has previously been incorporated into the site. This criterion allows researchers and policymakers to determine suitability after weighing all the factors mentioned in the plan. A range of potential utilizations is given to give optimal control to policymakers and investors.

The table below (Table 2) provides the categories and their areas. The Smart Planning Map (Map 40) showcases the geographies separated by utilization.

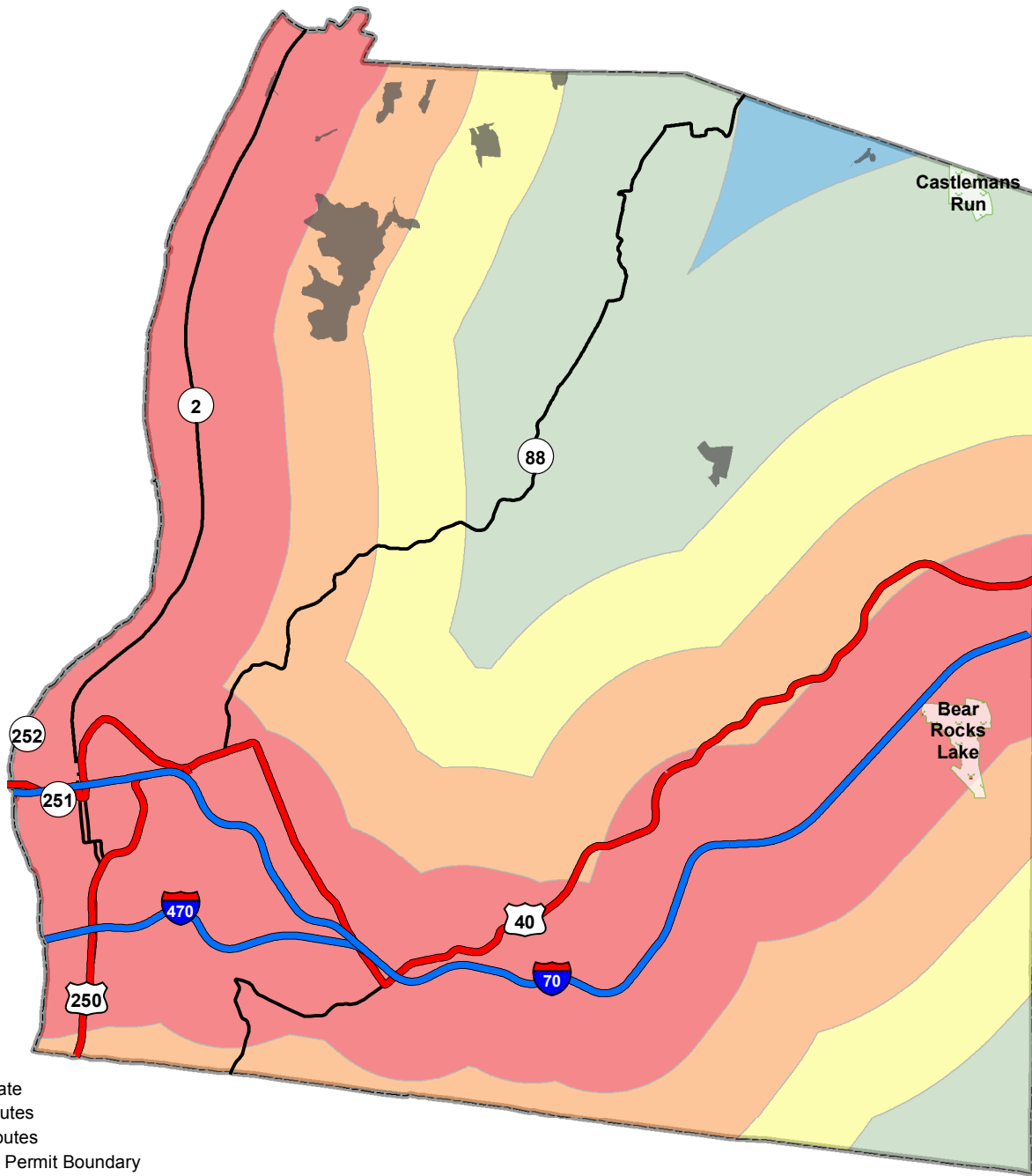
Table 2: Smart Planning Utilizations

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

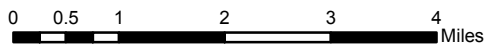
Land development or redevelopment options are determined through a review of the redevelopment authority's anticipated needs. The required infrastructure component standards are determined on a site by site basis by the county economic development authority as designated by West Virginia Code Chapter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

Landuse Criteria

Ohio County



- Interstate
- US Routes
- WV Routes
- Mining Permit Boundary
- Wild Life Management
- 0 to 1 Mile (Industrial; Commercial/Retail; Residential; Public Facilities; Recreation)
- 1 to 2 Miles (Industrial; Commercial/Retail, Residential; Public Facilities)
- 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)
- CountyBoundary



Source: Rahall Transportation Institute 2015

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V. Site Evaluation

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

Initial Data Collection:

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

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

The initial data collection revealed all the mine sites in the County. Together, the team put together 8 sites for analysis. All of the sites and their distance attributes are listed below.

Table 3: Ohio County Potential Surface Mine Sites for Development

Site No	Permitee	Permit ID	Facility Name	Acres	Issue Date	Expiration Date
1	RAYLE COAL CO.	S101988	NA	15.2	9/16/1988	9/16/1998
2	WEST VIRGINIA ENERGY INC	S007284	NA	0	10/1/1984	10/1/1989
3	RAYLE COAL CO.	S103187	NA	201	10/1/1987	10/1/1997
4	WEST VIRGINIA ENERGY INC	Z008281	NA	0	8/3/1981	8/3/1992
5	RAYLE COAL CO.	S009984	NA	0	12/18/1984	12/18/1994
6	RAYLE COAL CO.	S000179	NA	0	1/8/1979	1/8/1984
7	WEST VIRGINIA ENERGY INC	S006982	NA	0	7/16/1982	7/16/1992
8	RAYLE COAL CO.	S100891	NA	149.7	2/21/1992	2/21/1997

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)
 - Distance to Intermodal Terminal Facility, National Waterway Network
 - Distance to nearest Sewer/ Solid Waste Treatment Facility

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

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

Table 4: Assessment of Distances

Site No	Permit ID	Interstate (IS)	Sign - IS	Existing Highway (EH)	Sign - EH	Paved Road	Paved Road Name
1	S101988	6.66	I70	3.20	S2	0.05	GLENN'S RUN (CHERRY HILL)
2	S007284	9.60	I70	2.06	S2	0.34	GIRTYS POINT ROAD
3	S103187	6.16	I70	2.69	S2	0.23	GLENN'S RUN (CHERRY HILL)
4	Z008281	9.53	I70	3.72	S2	0.41	HUFF RUN ROAD
5	S009984	6.68	I70	1.94	S2	0.01	KEILLY - DELAPLAIN ROAD
6	S000179	7.47	I70	0.92	S2	0.01	STONE & SHANNON ROAD
7	S006982	8.57	I70	3.64	S2	0.39	WADDELS RUN ORAD
8	S100891	6.20	I70	2.39	S2	0.11	KEILLY - DELAPLAIN ROAD

Table 5: Shortest Distances from Sites to Other Transportation Methods

Site No	Permit ID	Railroad	IF	Intermodal Facility (IF) Name	NW	National Waterway (NW) Name
1	S101988	7.79	18.91	Petroleum Fuel & Terminal: Weirton	6.74	OHIO RIVER
2	S007284	6.92	17.58	Petroleum Fuel & Terminal: Weirton	9.67	OHIO RIVER
3	S103187	7.09	19.76	Petroleum Fuel & Terminal: Weirton	6.23	OHIO RIVER
4	Z008281	7.37	17.79	Petroleum Fuel & Terminal: Weirton	9.63	OHIO RIVER
5	S009984	8.07	17.46	Petroleum Fuel & Terminal: Weirton	6.76	OHIO RIVER
6	S000179	7.47	16.61	Petroleum Fuel & Terminal: Weirton	7.54	OHIO RIVER
7	S006982	7.29	19.16	Petroleum Fuel & Terminal: Weirton	8.64	OHIO RIVER
8	S100891	7.74	18.08	Petroleum Fuel & Terminal: Weirton	6.27	OHIO RIVER

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

Site No	Permit ID	Dist - SL	Utility (SL)	Dist - WL	Utility (WL)
1	S101988	5.82	Town of Bethany Sanitation Board	0.05	Ohio County Public Service District
2	S007284	4.44	Town of Bethany Sanitation Board	0.39	Hammond Public Service District
3	S103187	6.61	Town of Bethany Sanitation Board	0.27	Ohio County Public Service District
4	Z008281	4.13	Town of Bethany Sanitation Board	0.64	Ohio County Public Service District
5	S009984	5.96	Town of Bethany Sanitation Board	0.00	Ohio County Public Service District
6	S000179	5.91	Town of Bethany Sanitation Board	0.01	Ohio County Public Service District
7	S006982	4.40	Town of Bethany Sanitation Board	0.68	Ohio County Public Service District
8	S100891	6.58	Town of Bethany Sanitation Board	0.14	Ohio County Public Service District

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

Site No	Permit ID	Dist - BB	Provider (BB)	Dist - PL	Type (PL)	Size_kV
1	S101988	0.45	Frontier West Virginia, Inc.	0.64	Sub-Transmission	Unknown
2	S007284	0.14	Frontier West Virginia, Inc.	0.82	Sub-Transmission	Unknown
3	S103187	0.47	Comcast Cable Communications, LLC	0.18	Sub-Transmission	Unknown
4	Z008281	0.31	Frontier West Virginia, Inc.	1.55	Sub-Transmission	Unknown
5	S009984	0.49	Frontier West Virginia, Inc.	0.27	Sub-Transmission	Unknown
6	S000179	1.10	Frontier West Virginia, Inc.	0.74	Sub-Transmission	Unknown
7	S006982	0.20	Frontier West Virginia, Inc.	1.11	Sub-Transmission	Unknown
8	S100891	1.04	Frontier West Virginia, Inc.	0.63	Sub-Transmission	Unknown

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

Site No	Permit ID	Dist - SW	Facility (SW)	Dist - SD	Facility (SD)
1	S101988	3.20	PAUL VI PASTORAL CENTER	0.83	North Fork Landfill
2	S007284	2.61	WEST LIBERTY ELEM.	3.69	North Fork Landfill
3	S103187	2.70	PAUL VI PASTORAL CENTER	1.68	North Fork Landfill
4	Z008281	2.30	WEST LIBERTY ELEM.	2.15	North Fork Landfill
5	S009984	0.82	PAUL VI PASTORAL CENTER	2.14	North Fork Landfill
6	S000179	0.85	PAUL VI PASTORAL CENTER	3.79	North Fork Landfill
7	S006982	3.73	PAUL VI PASTORAL CENTER	1.46	North Fork Landfill
8	S100891	0.65	PAUL VI PASTORAL CENTER	2.82	North Fork Landfill

Table 9: Shortest Distances from Sites to Gas Pipe (GP) and Oil Pipe (OP)

Site No	Permit ID	Dist - GP	Company Gas Pipe	Dist - OP	Company Oil Pipeline
1	S101988	0.55	Columbia Gas Transmission Corp.	1.82	CL
2	S007284	1.76	Columbia Gas Transmission Corp.	1.52	CL
3	S103187	0.04	Columbia Gas Transmission Corp.	2.28	CL
4	Z008281	1.42	Columbia Gas Transmission Corp.	0.79	CL
5	S009984	0.88	Columbia Gas Transmission Corp.	2.70	CL
6	S000179	1.53	Columbia Gas Transmission Corp.	3.07	CL
7	S006982	1.84	Columbia Gas Transmission Corp.	1.22	CL
8	S100891	0.36	Columbia Gas Transmission Corp.	3.10	CL

Suitability Model

The suitability model for Ohio 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 Ohio County and expert advice about important factors to site development.¹¹ Then, scores for each site are given by comparing the closest distance from the site to all factors within given distance thresholds. There are four sets of scores in this suitability model: **absolute scores**, **relative scores**, and the **total score**.

Absolute scores are given by comparing certain distance thresholds with the results of GIS Distance Analysis. Thresholds are determined mainly based on the researcher’s experience, characteristics of the considered criteria and the priority given to the criteria. For example, if the closest distance from a site to an existing highway ranges from 2.5 to 5 miles, the site will be given 7 points for the Existing Highways Criteria. Absolute scores will directly affect the site selection. Different score categories may result in significant change in the cost of investment, and will thus impact the County’s decisions.

Relative scores, on the other hand, depend solely on the closest distances of sites to relative criteria features. Initially, statistical values will be computed according to distance values from all sites to a certain factor (criteria), including min, quartile 1 – Q1, quartile 2 – Q2, quartile 3 – Q3, and max. Then, distance values will be classified into four groups and given the scores shown in Table 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.

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

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

¹¹ Joseph, M. *A Decision-Support Model of Land Suitability Analysis for the Ohio Lake Erie Balanced Growth Program*. EcoCity Cleveland. (2006).

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

1. Weighting

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

Table 5: Weighting Sites Selection Criteria

No	Criteria	Weight
1	Broadband	9
2	Gas Pipes	6
3	National Waterway Network	4
4	Oil Pipelines	6
5	Power Lines	10
6	Railroads	5
7	Sewer Lines	8
8	Water Lines	10
9	Existing Highway	8
10	Intermodal Terminal Facilities	6
11	Interstate	8
12	Sewer Treatment Facilities	7
13	Solid Waste Treatment Facilities	8

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 6: Absolute Scoring System

Absolute Score		10	7	5	3	1
Criteria (Miles)	Broadband	0 - 0.5	0.5 - 2	2 - 3	3 - 4	> 4
	Gas Pipes	0 - 0.5	0.5 - 1.5	1.5 - 2	2 - 2.5	> 2.5
	National Waterway Network	0 - 2.5	2.5 - 5	5 - 7.5	7.5 - 10	> 10
	Oil Pipelines	0 - 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 1	> 1
	Power Lines	0 - 0.5	0.5 - 1.5	1.5 - 2	2 - 2.5	> 2.5
	Railroads	0 - 1	1 - 3	3 - 4	4 - 5	> 5
	Sewer Lines	0 - 1	1 - 3	3 - 4	4 - 5	> 5
	Water Lines	0 - 0.25	0.25 - 0.5	0.5 - 0.75	0.75 - 1	> 1
	Existing Highway	0 - 5	5 - 10	10 - 15	15 - 20	> 20
	Intermodal Terminal Facilities	0 - 10	10 - 20	20 - 30	30 - 40	> 40
	Interstate	0 - 5	5 - 14	14 - 22	22 - 30	> 30
	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

2.2 Relative Scores:

Table 12 shows four statistical groups and their relative scores in the Ohio 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 7: Relative Scoring System

		Threshold (Distances in miles)		Min - Q1	Q1 - Q2	Q2 - Q3	Q3 - Max
		Relative Score		10	7.5	5	2.5
No.	Criteria	Min	Q1	Q2	Q3	Max	
1	Broadband	0.14	0.29	0.46	0.63	1.10	
2	Gas Pipes	0.04	0.51	1.15	1.59	1.84	
3	National Waterway Network	6.23	6.63	7.15	8.89	9.67	
4	Pipe Lines	0.79	1.45	2.05	2.79	3.10	
5	Power Lines	0.18	0.54	0.69	0.89	1.55	
6	Railroads	6.92	7.24	7.42	7.75	8.07	
7	Sewer Lines	4.13	4.43	5.87	6.11	6.61	
8	Water Lines	0.00	0.04	0.20	0.45	0.68	
9	Existing Highway	0.92	2.03	2.54	3.31	3.72	
10	Intermodal Terminal Facilities	16.61	17.55	17.93	18.97	19.76	
11	Interstate	6.16	6.55	7.08	8.81	9.60	
12	Sewer Treatment Facilities	0.65	0.84	2.46	2.82	3.73	
13	Solid Waste Treatment Facilities	0.83	1.63	2.14	3.04	3.79	

3. Ohio County’s Suitability Model:

Table 13 shows the total scores of all studied sites in Ohio County. Site 5 (Permit ID = S009984) has the highest score of 593.75. 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 8 analyzed potential development sites of Ohio County, it is easy to notice the top five sites and determine the most suitable sites for investment.

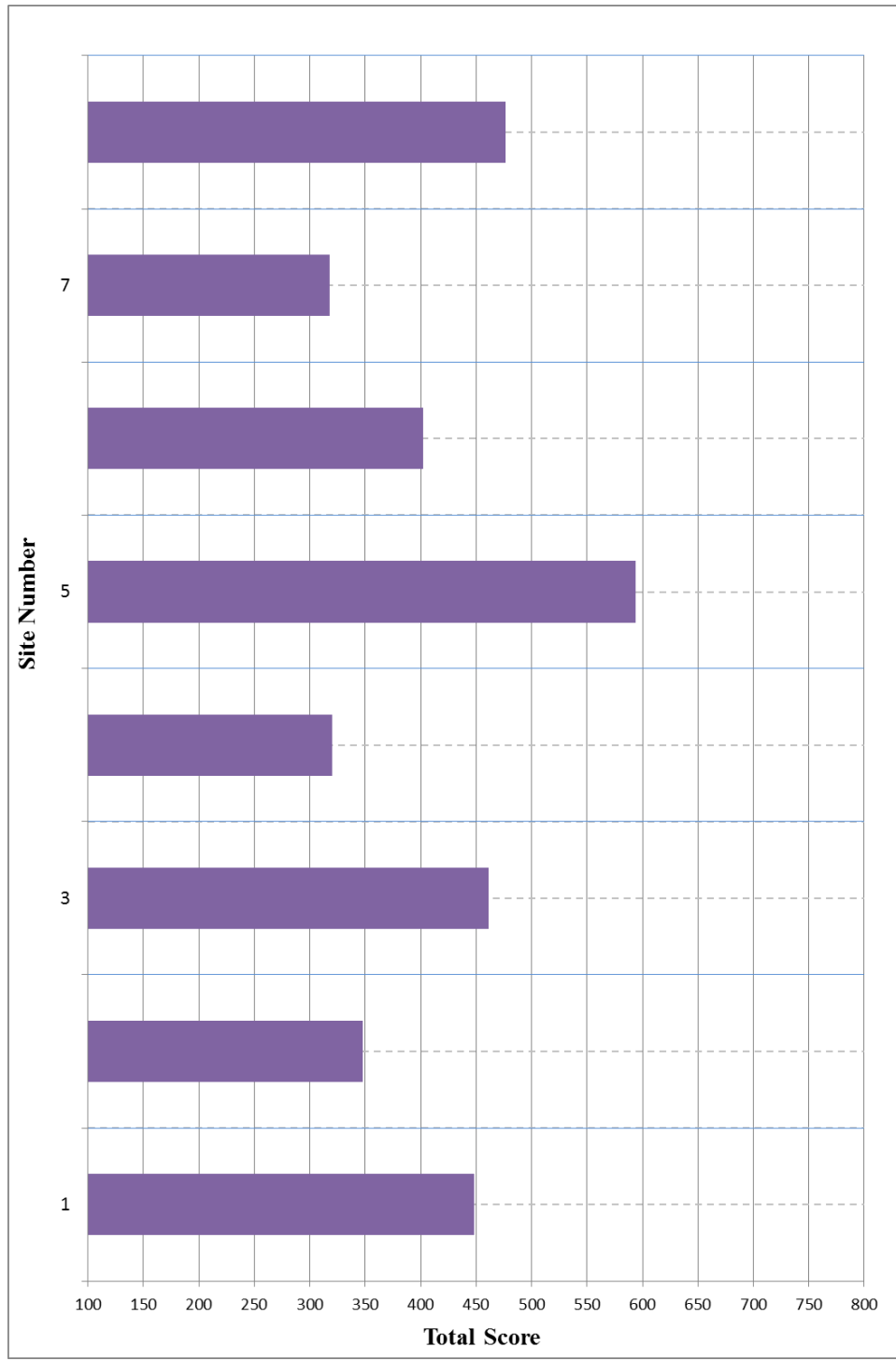
Certainly, any change in weight values or the scoring system will result in different output and may change the decision. For better analysis and decision-making, the dynamic suitability model, which allows modification in criteria’s weights, thresholds and scores is available for distribution through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

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

Table 8: Total Score of Mine Sites in Ohio County

Site No	Permitee	PermitID	Score
1	RAYLE COAL CO.	S101988	448.5
2	WEST VIRGINIA ENERGY INC	S007284	348
3	RAYLE COAL CO.	S103187	461
4	WEST VIRGINIA ENERGY INC	Z008281	320.25
5	RAYLE COAL CO.	S009984	593.75
6	RAYLE COAL CO.	S000179	402.25
7	WEST VIRGINIA ENERGY INC	S006982	318
8	RAYLE COAL CO.	S100891	476.25

Figure 15: Ohio 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.¹² It is reasonable to consider unemployment within 15 miles of the site as an upper limit for a potential employer. This data set does not provide a skill set analysis however; therefore employers may not find the labor skills they need. This dataset provides the pool of labor resources from which to choose.

Table 9: Employment and Unemployment within 5-, 10- and 15-mile Radii from the Site

Site No	Permit ID	Emp_05	Unemp_05	Emp_10	Unemp_10	Emp_15	Unemp_15
1	S101988	6,493	415	20,449	1,428	20,604	1,435
2	S007284	3,732	271	19,129	1,322	20,604	1,435
3	S103187	7,829	508	20,442	1,428	20,604	1,435
4	Z008281	4,212	304	20,066	1,392	20,604	1,435
5	S009984	4,885	328	20,175	1,417	20,604	1,435
6	S000179	3,859	264	19,447	1,364	20,604	1,435
7	S006982	4,201	298	20,021	1,392	20,604	1,435
8	S100891	5,536	370	20,180	1,417	20,604	1,435

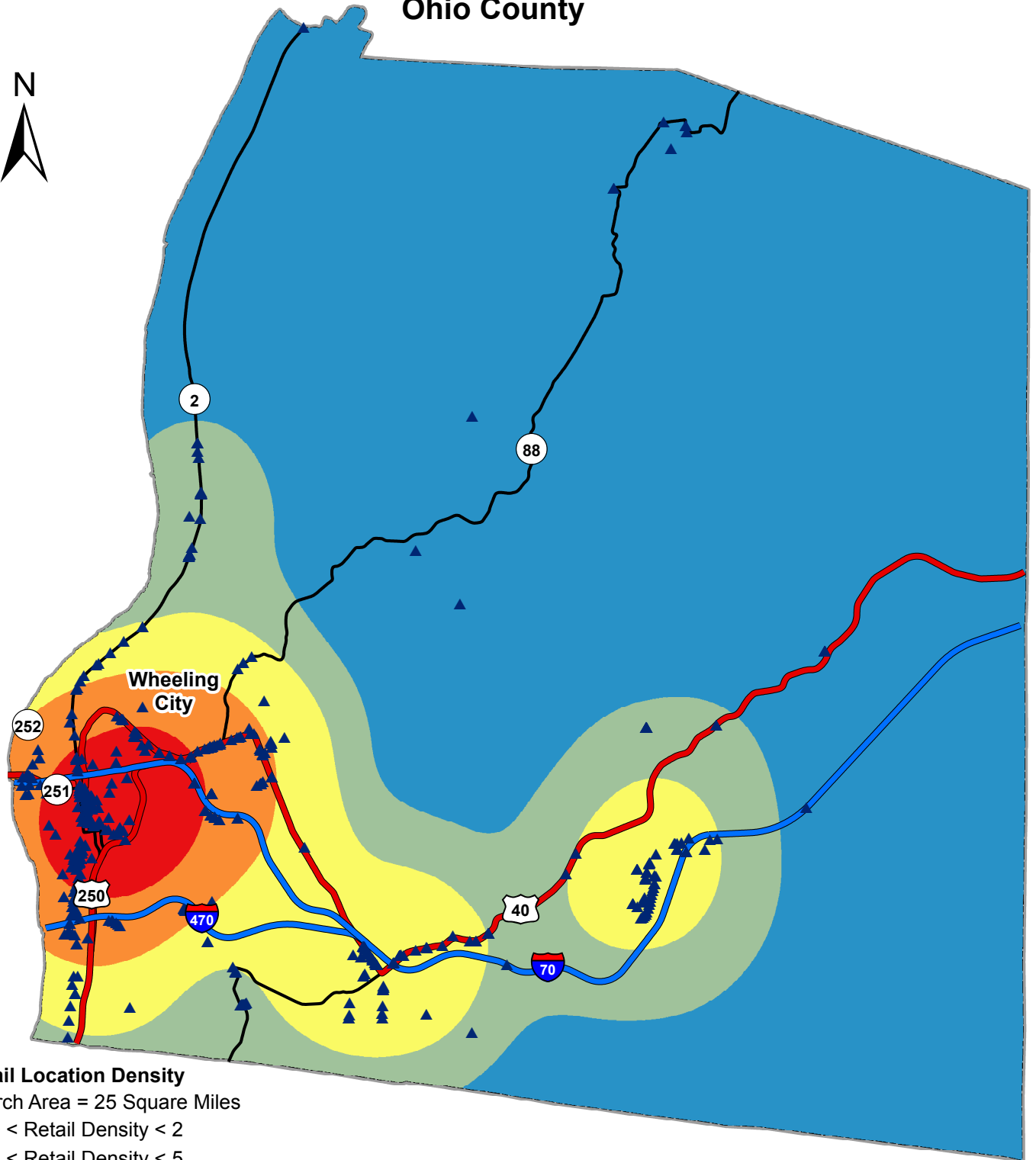
Retail Location Analysis

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.

¹² Gary Langer, "Poll: Traffic in the United States," ABC News Online, February 13, 2005, Accessed March 1, 2013, <http://abcnews.go.com/Technology/Traffic/story?id=485098&page=1>.

Retail Location Density

Ohio County

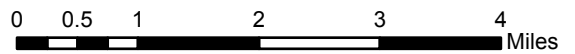


Retail Location Density

Search Area = 25 Square Miles

- 0 < Retail Density < 2
- 2 < Retail Density < 5
- 5 < Retail Density < 10
- 10 < Retail Density < 17
- 17 < Retail Density < 23
- County Boundary

- ▲ Retail Location
- Interstate
- US Routes
- WV Routes



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VI. Conclusion

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

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