

CHAPTER 3

REGIONAL SETTING

REGIONAL SETTING

Understanding the region's physical, social, economic, and cultural characteristics is essential for effective hazard mitigation planning. These attributes directly influence hazard vulnerability and the capacity to prepare for, respond to, and recover from disasters. This chapter is organized into six sections: Planning Area, Population Characteristics, Housing Characteristics, Economic Characteristics, Environmental Characteristics, and Historic & Cultural Resources. Together, these sections provide the context necessary for understanding hazard vulnerability and developing effective mitigation strategies across the region.

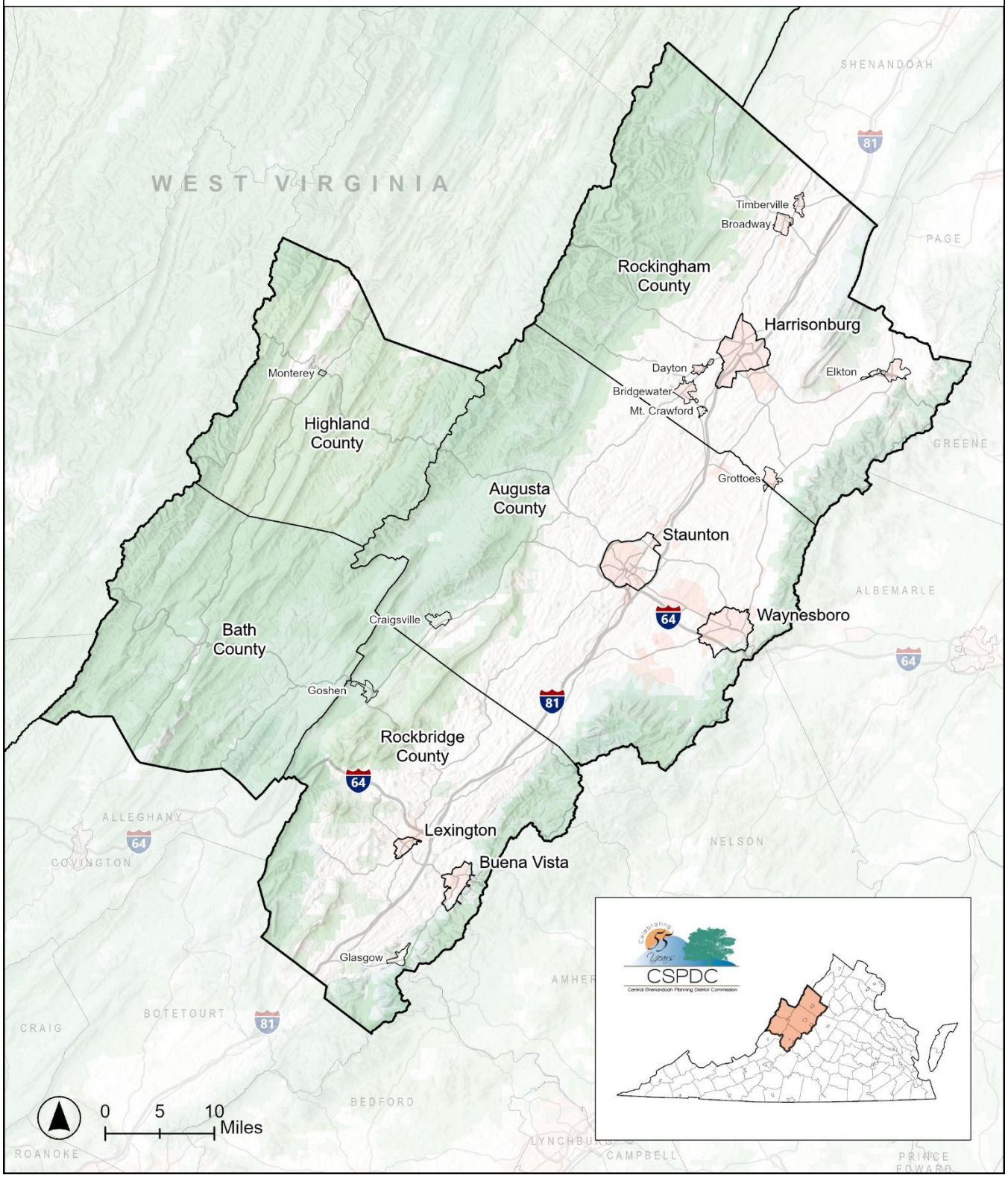
PLANNING AREA & SPECIAL DISTRICTS

The Central Shenandoah Planning District encompasses 21 jurisdictions in Virginia's Shenandoah Valley, positioned along Interstate 81 and Interstate 64 corridors (see Map 3.1). Covering 3,439 square miles, the CSPDC represents the state's largest geographic planning district. The region includes five counties (Augusta, Bath, Highland, Rockbridge, and Rockingham), five independent cities (Buena Vista, Harrisonburg, Lexington, Staunton, and Waynesboro), and eleven incorporated towns (Bridgewater, Broadway, Craigsville, Dayton, Elkton, Goshen, Glasgow, Grottoes, Monterey, Mount Crawford, and Timberville).

Special districts are governmental entities that provide specific services across jurisdictional boundaries. Their inclusion in this plan is important because they own and operate critical infrastructure and serve populations spanning multiple localities. Four special districts participated in this plan:

- **James Madison University (JMU)** in Harrisonburg serves over 22,000 students and employs approximately 4,000 faculty and staff. The university's dense campus population and residence halls present unique emergency management considerations requiring coordination with city and regional response during disasters.
- **Maury Service Authority (MSA)** provides water and wastewater services to approximately 8,000 customers across roughly 50 square miles in Rockbridge County and Lexington. Protection of the Authority's treatment facilities, distribution systems, and wastewater infrastructure is vital to maintaining community resilience.
- **Bath County Service Authority (BCSA)** provides water and wastewater services to communities within Bath County, including Warm Springs and surrounding areas. Given the county's rural character and dispersed population, the Authority's infrastructure serves as critical lifeline systems for residents and the region's tourism economy.
- **Augusta Water** provides water and wastewater services to more than 16,000 water customers and 10,000 wastewater customers in various communities across Augusta County, with the largest concentration being in the South River and Verona service areas. Augusta Water manages ten (10) separate public water systems and nine (9) wastewater treatment facilities along with their associated distribution and collection facilities. Protection of Augusta Water's infrastructure is vital to resilience in Augusta County and supports the protection of public health and the environment.

Map 3.1. Planning Area



POPULATION CHARACTERISTICS

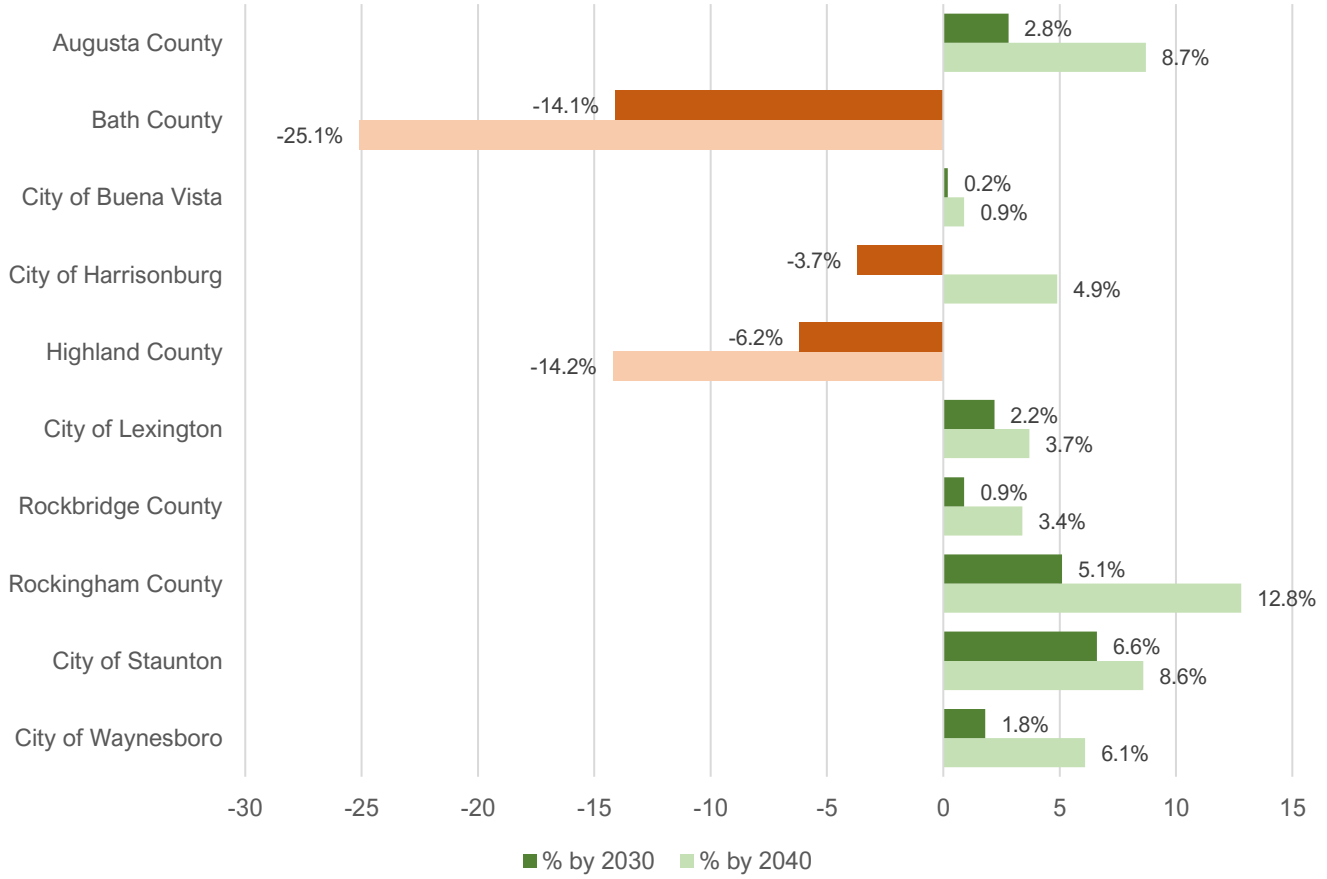
In 2023, the region had an estimated population of 310,528 (Weldon Cooper Center, 2023). As shown in Map 3.2, most residents live in the valley between the Blue Ridge and Allegheny Mountains, with cities having the highest population densities. Population distribution varies significantly across the region; Table 3.1 details total population, change, and density for each locality.

Between 2013 and 2023, the region's population grew by 5.8%. Much of the growth was captured in census tracts surrounding the region's cities as shown in Map 3.3. During the same time, some of the region's most rural areas, namely Bath County, the western parts of Rockingham and Augusta counties, and the southern part of Rockbridge County, appeared to decline in population. Looking forward, demographic projections suggest continued but slower growth across much of the region.

POPULATION PROJECTION

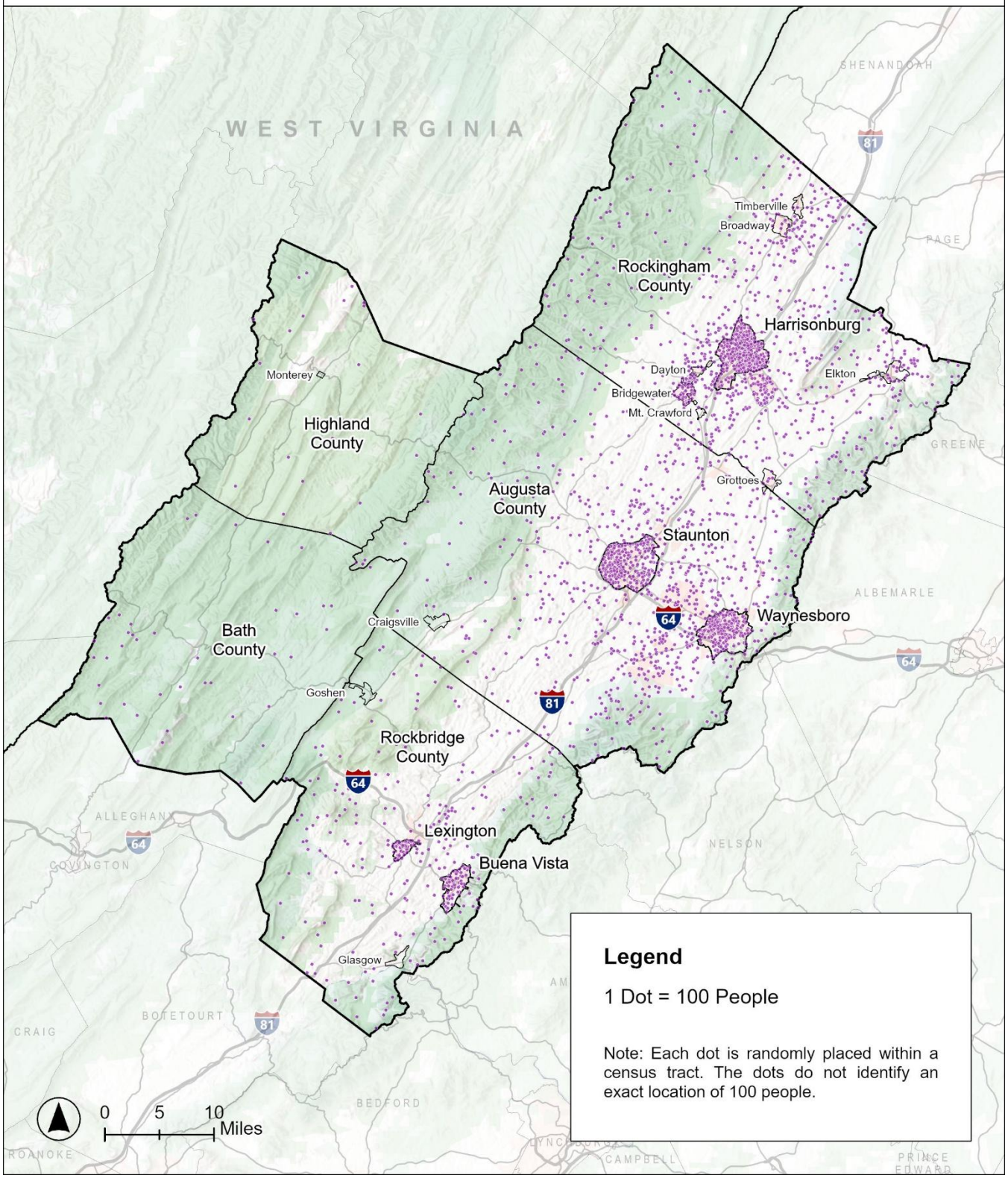
The Weldon Cooper Center provides population projections for 2030, 2040, and 2050 for counties and cities. According to the Center's 2022 population projection dataset, the region's population is estimated to grow by 2.0% by the end of the decade. Chart 3.1 shows the anticipated percent change in population per city and county in the region by 2030 and 2040 (projections were not available for incorporated towns).

Chart 3.1. Estimated Percent Change in Population by 2030 and 2040



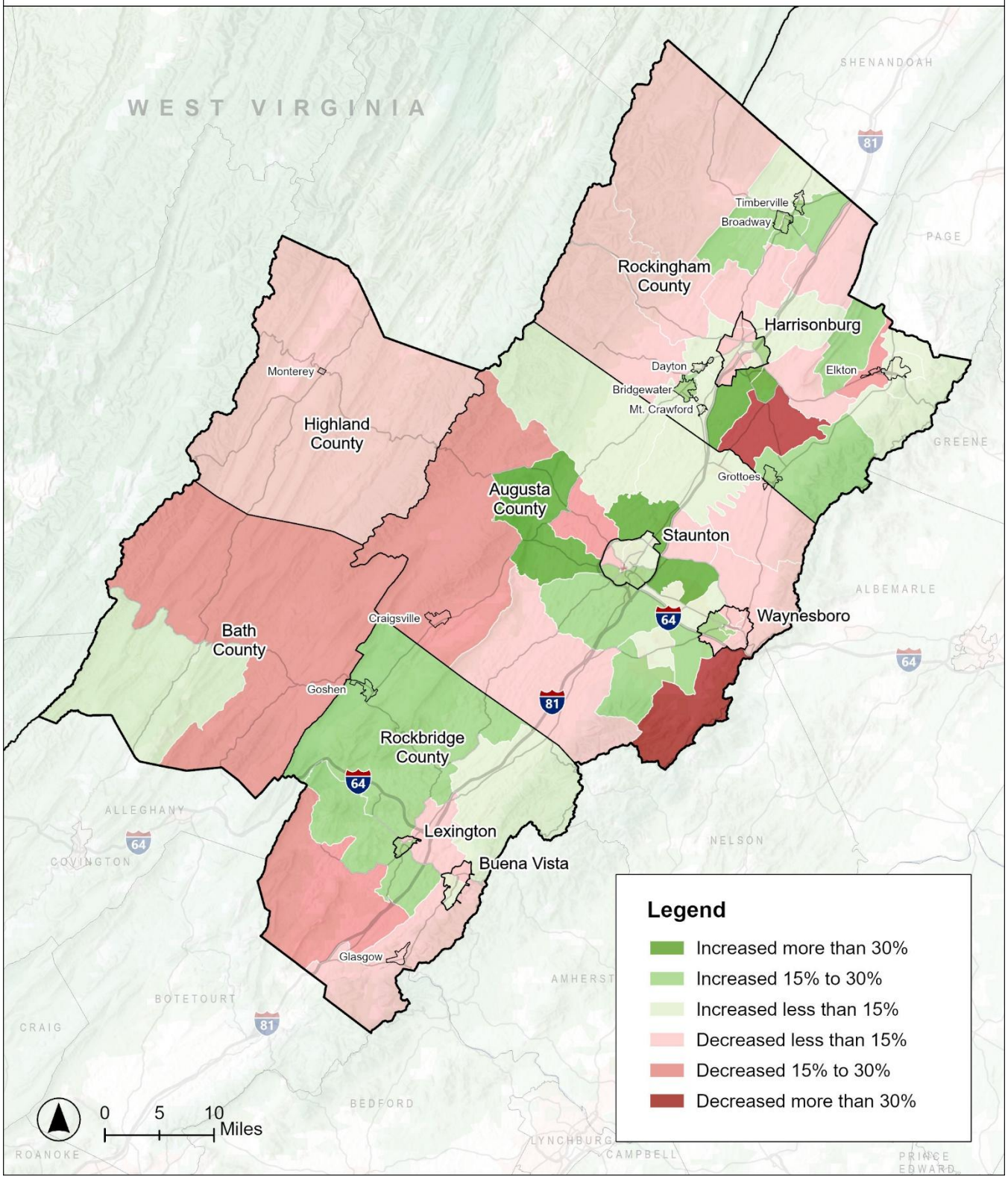
Data Source(s): Weldon Cooper Center for Public Service, 2022

Map 3.2. Population Density, 2023



Data Source(s): U.S. Census, American Community Survey, 5-Year Estimates Table S0101, 2023

Map 3.3. Population Change by Census Tract, 2013-2023



Data Source(s): U.S. Census, American Community Survey, 5-Year Estimates Table S0101, 2013 & 2023

Table 3.1. Population Change, 2013-2023						
		2013 Population	2023 Population	Population Change (%)	Total Land Area	People per Square Mile
Harrisonburg-Rockingham	City of Harrisonburg	51,918	55,990	7.8%	17.34 mi^2	~ 3,229
	Rockingham County	58,539	63,138	7.9%	840.60 mi^2	~ 75
	Town of Bridgewater[1]	5,815	6,765	16.3%	2.52 mi^2	~ 2,685
	Town of Broadway	3,748	4,317	15.2%	2.40 mi^2	~ 1,799
	Town of Dayton	1,556	1,740	11.8%	1.03 mi^2	~ 1,689
	Town of Elkton	2,756	3,036	10.2%	3.42 mi^2	~ 888
	Town of Grottoes	2,696	2,996	11.1%	2.07 mi^2	~ 1447
	Town of Mt. Crawford	437	454	3.9%	0.51 mi^2	~ 890
	Town of Timberville	2,548	3,062	20.2%	1.35 mi^2	~ 2,268
Staunton-Augusta-Waynesboro	City of Staunton	24,514	25,669	4.7%	19.98 mi^2	~ 1,285
	City of Waynesboro	21,321	22,651	6.2%	15.11 mi^2	~ 1,499
	Augusta County	73,491	77,003	4.8%	968.68 mi^2	~ 79
	Town of Craigsville	921	910	-1.2%	2.07 mi^2	~ 440
Lexington-Rockbridge-Buena Vista	City of Buena Vista	6,706	6,523	-2.7%	6.52 mi^2	~ 1,000
	City of Lexington	7,207	7,331	1.7%	2.53 mi^2	~ 2,898
	Rockbridge County	20,946	21,091	0.7%	596.65 mi^2	~ 35
	Town of Glasgow	1,107	1,037	-6.3%	1.53 mi^2	~ 678
	Town of Goshen	370	334	-9.7%	1.77 mi^2	~ 189
Bath-Highland	Bath County	4,783	4,230	-11.6%	534.62 mi^2	~ 8
	Highland County	2,126	2,079	-2.2%	415.58 mi^2	~ 5
	Town of Monterey	137	172	25.5%	0.27 mi^2	~ 637
CSPDC Total		293,642	310,528	5.8%	3,436.55 mi^2	--

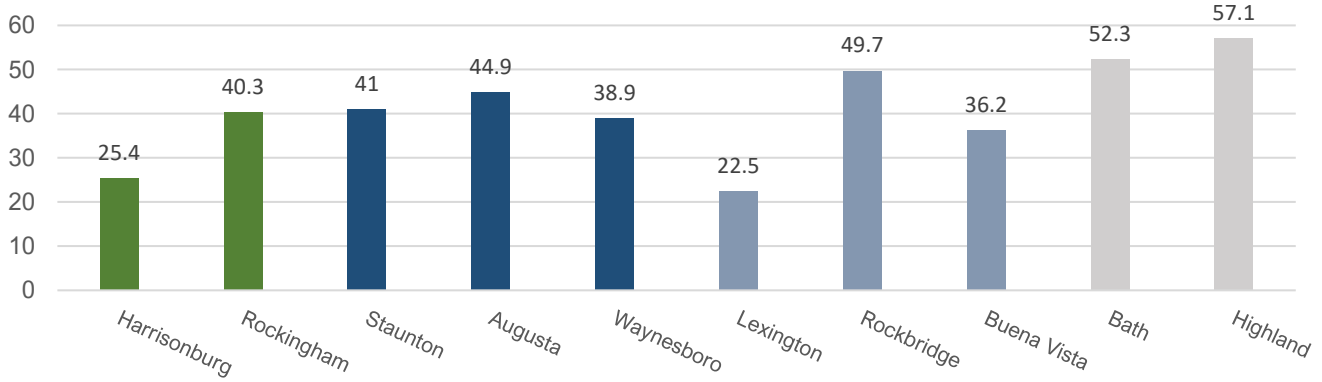
Data Source(s): Weldon Cooper Center for Public Service, Demographics Research Group.

Population trends directly affect disaster preparedness and response. Growing areas like Rockingham County and Harrisonburg will likely need expanded emergency services, evacuation routes, and shelters. Rural areas, like Bath County, that appear to be declining in population face the likelihood of fewer emergency responders, volunteers, and reduced tax revenue for mitigation projects. Communities losing population may also have aging infrastructure requiring upgrades to remain safe from hazardous events. Understanding these shifts helps allocate resources and identify where regional cooperation is essential.

MEDIAN AGE

The region's median age is approximately 41 years, slightly above the state median of 39 years (Weldon Cooper Center, 2023). Bath County (53 years), Highland County (51 years), and Rockbridge County (46 years) have notably older populations, while Harrisonburg (26 years) is youngest due to James Madison University's student population. Aging populations in particular may require special considerations including accessible evacuation assistance, emergency shelters designed for mobility limitations, and backup power for medical equipment during outages.

Chart 3.2. Estimated Median Age by City/County, 2023



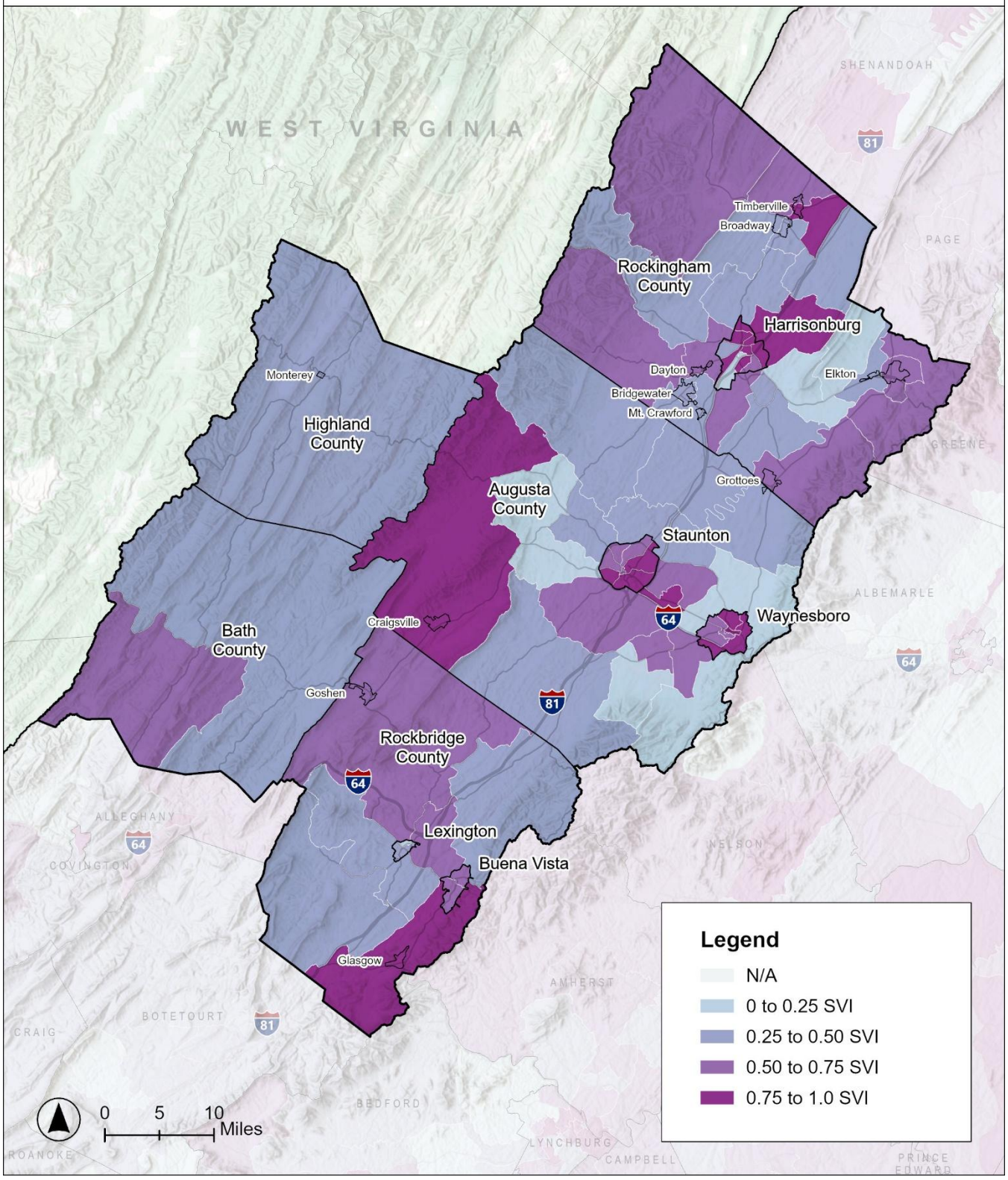
Data Source(s): U.S. Census, American Community Survey, 5-Year Estimates Table S0101, 2023

SOCIALLY VULNERABLE AREAS

The Pandemic and All-Hazards Preparedness Act of 2006 prompted the Centers for Disease Control (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR) to develop the Social Vulnerability Index (SVI). SVI is a place-based index, database, and mapping application designed to identify and quantify communities experiencing social vulnerability and that may need extra support during disasters.

Social vulnerability refers to demographic and socioeconomic factors such as poverty, limited transportation access, and crowded housing that make it harder for communities to prepare for, respond to, and recover from hazards. The SVI uses 16 variables from the American Community Survey to measure vulnerability. Map 3.4. shows the overall SVI scores by census tract; areas with scores of 0.5 or higher face particular challenges (meaning they are more vulnerable than at least 50% of census tracts nationwide). Several census tracts in Harrisonburg, Staunton, and Waynesboro show SVI scores above 0.5, indicating populations that may require targeted outreach for emergency preparedness programs, priority evacuation assistance, and additional recovery resources following disasters.

Map 3.4. Social Vulnerability Index by Census Tract, 2022



Data Source(s): CDC/ATSDR Social Vulnerability Index, 2022 Database, Virginia.

HOUSING CHARACTERISTICS

In 2025, the CSPDC completed a Regional Housing Study that provides comprehensive data on the region's housing stock and needs. The region contains approximately 140,000 housing units, with an overall homeownership rate of 67%, slightly higher than the state average. However, housing affordability remains a significant challenge, with many households experiencing cost burden (paying more than 30% of income on housing). The region's housing market affects disaster resilience in several ways: renters typically have less access to insurance and recovery resources than homeowners, older housing stock may be less resilient to hazards, and housing affordability pressures can force families into higher-risk areas or less resilient structures.

HOUSING VULNERABILITY FACTORS

The CSPDC Regional Housing Study found that approximately 5,000 households are at risk of homelessness in the region and approximately 265 people are experiencing homelessness. Furthermore, according to U.S. Department of Housing and Urban Development (HUD) point-in-time counts, the region has about 33 chronically unhoused individuals.

Notably, the region has a relatively tight housing market, meaning that homeownership is generally less affordable and attainable. Affordable housing options are often most at-risk to hazards. For example, renters are not always afforded the same insurance opportunities or disaster recovery resources. Additionally, people living in manufactured or mobile homes have a greater likelihood of losing their structure during a disaster if it is not properly anchored. Table 3.2 details the estimated number of manufactured homes in the region by City or County (data was not available on the Town scale).

Table 3.2. Estimated Number of Manufactured Homes by City/County, 2023

Augusta County	2,946	City of Buena Vista	133
Bath County	392	City of Harrisonburg	218
Highland County	295	City of Lexington	0
Rockbridge County	1,183	City of Staunton	49
Rockingham County	3,120	City of Waynesboro	60

Data Source(s): U.S. Census, American Community Survey, 5-Year Estimates, Tables B25024 & B25032, 2023

Manufactured homes represent nearly 8,000 housing units across the region, with Rockingham County having the highest estimated amount at over 3,100 units, followed by Augusta County with nearly 3,000 units. These homes provide affordable housing options for many families but are more vulnerable to high winds, tornadoes, and flooding if not properly anchored to permanent foundations. Residents of manufactured homes may face unique challenges in obtaining homeowners insurance and accessing disaster assistance programs, as some federal and state programs have historically had different eligibility requirements for manufactured housing.

ECONOMIC CHARACTERISTICS

The Central Shenandoah region's economy is diverse, with major employment sectors including education, healthcare, manufacturing, agriculture, and tourism. It is home to two of the top five agriculture-producing counties in Virginia, with more than $1.5 billion annually in commodities sold (U.S. Department of Agriculture [USDA], 2022) and employment rates in agricultural and forestry above the national average. Manufacturing constitutes the largest private-sector employment, with strong concentrations in food and beverage processing, plastics, automotive, HVAC, and life sciences. Information technology and professional services represent a growing sector, with the Shenandoah Valley designated as one of three targeted locations in Virginia's Rural and Small Metro Tech Centers Initiative, leveraging regional workforce development programs to attract technology and cybersecurity firms (Shenandoah Valley Partnership, n.d.).

As of 2023, the regional unemployment rate averaged 4.6%, close to the state average of 4.3%, though rates vary by locality from a high in Highland County to a low in the City of Lexington (U.S. Census, Table DP03, 2023). In the same year, the regional median household income was approximately $67,000, ranging from around $56,000 in Waynesboro to around $89,000 in Lexington (see Table 3.3). These economic conditions can influence disaster preparedness and recovery capacity, as income levels affect available resources for disaster preparation, insurance coverage, and post-disaster rebuilding, while economic diversity and strength are factors that contribute to community resilience and recovery timelines.

Table 3.3. Estimated Median Household Income by City/County, 2023

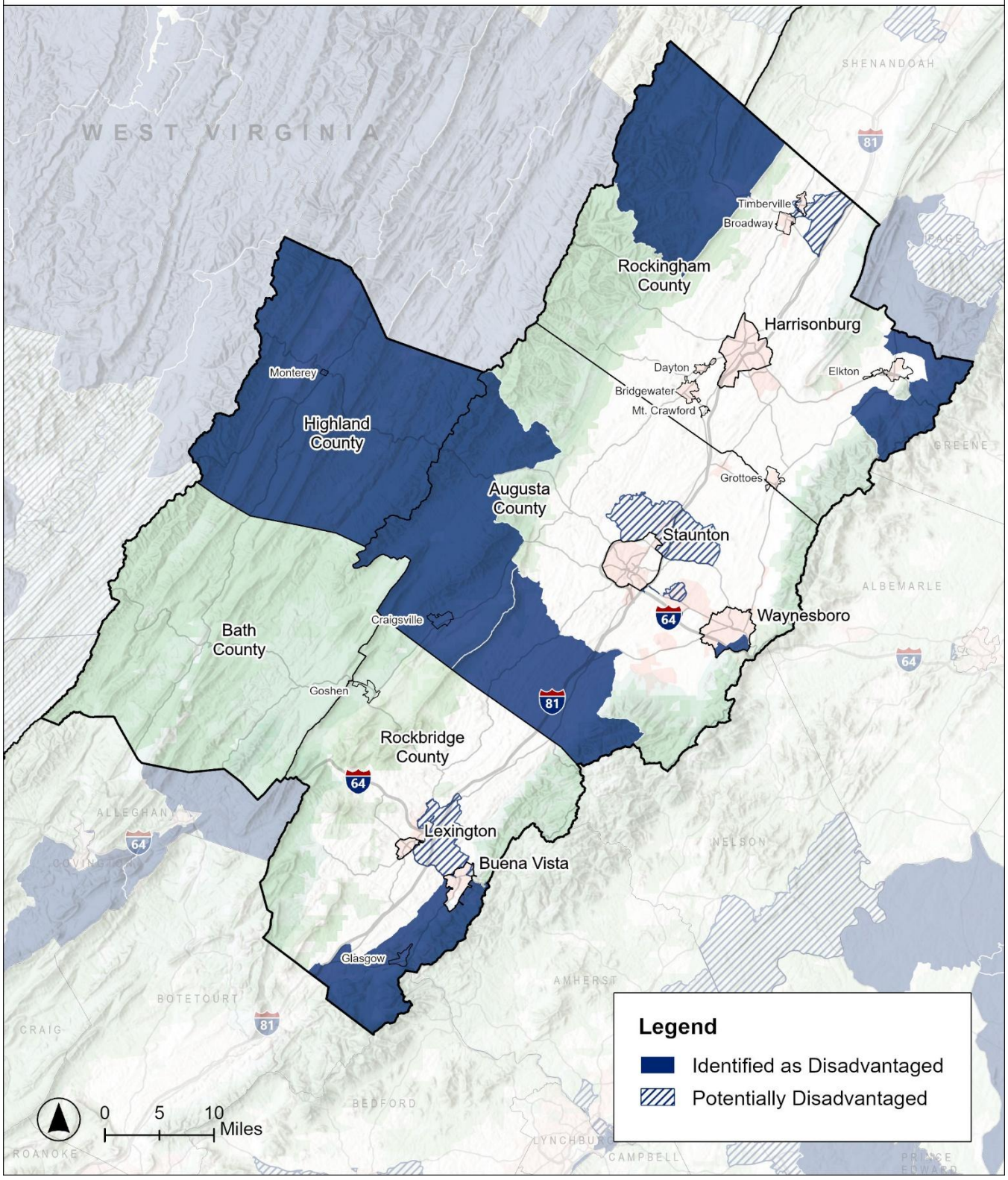
Augusta County	$79,972	City of Buena Vista	$54,458
Bath County	$61,709	City of Harrisonburg	$59,752
Highland County	$62,946	City of Lexington	$89,598
Rockbridge County	$63,975	City of Staunton	$62,586
Rockingham County	$78,468	City of Waynesboro	$56,364

Data Source(s): U.S. Census, American Community Survey, 5-Year Estimates, Table S1901, 2023

ECONOMICALLY DISADVANTAGED RURAL COMMUNITIES

Beyond regional economic indicators, FEMA has identified specific rural communities within the planning area that may qualify for enhanced grant assistance. Economically Disadvantaged Rural Communities (EDRCs) are defined as communities of 3,000 or fewer individuals that are economically disadvantaged, with residents having an average per capita annual income not exceeding 80% of the national per capita income (FEMA, 2023). FEMA Region 3, which covers Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia, created a map to identify potential EDRCs. The map uses 2021 American Community Survey (ACS) 5-year estimates for income and population. This information is purely for planning purposes and is intended to serve as a starting point for considering projects that could leverage a lower match in the Building Resilient Infrastructure and Communities (BRIC) grant program. Map 3.5 shows the potential EDRCs in the region.

Map 3.5. FEMA Region 3 Economically Disadvantaged Rural Communities



Data Source(s): FEMA Region 3 Economically Disadvantaged Rural Communities, 2021 American Community Survey

ENVIRONMENTAL CHARACTERISTICS

While socioeconomic factors influence community resilience, the region's physical environment directly determines exposure to specific natural hazards. Understanding the region's diverse geology and environmental features is essential for identifying areas of heightened risk and developing targeted mitigation strategies. The following sections detail the region's geology, land cover, and hydrology.

GEOLOGIC FORMATIONS

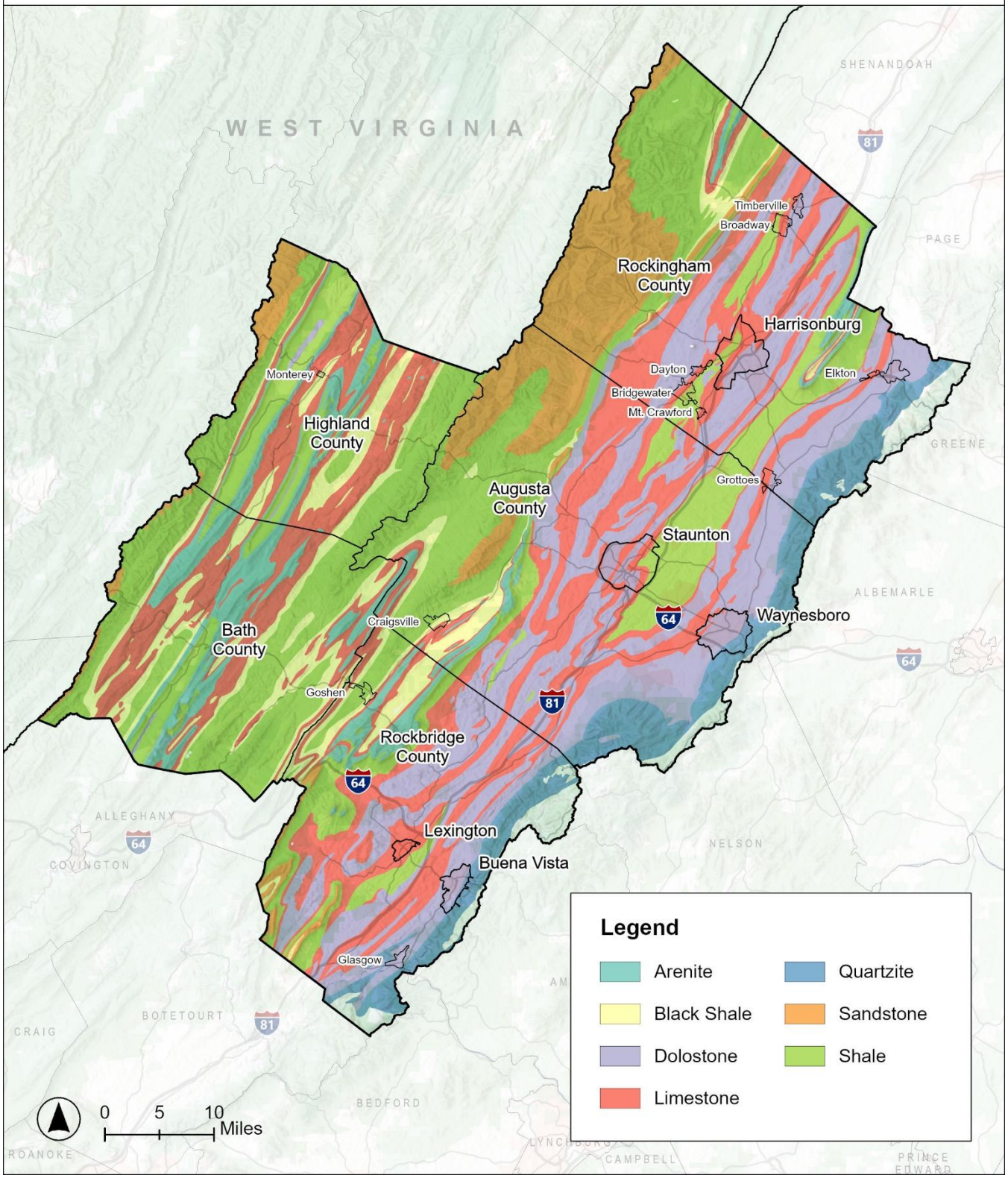
The region's karst topography significantly affects how the region responds to natural hazards. Limestone and dolomite, which make up over 40% of the region's bedrock, are soluble rocks that create underground caverns and sinkholes—unique features for tourism at places like Grand Caverns and Natural Bridge, but potentially hazardous for buildings, roads, and utilities. Shale, the most common rock type in the region (comprising nearly 29% of the geology), tends to hold water and can contribute to landslides on steep slopes when saturated. Meanwhile, sandstone and quartzite formations often create the region's ridgelines and affect how water drains across the landscape. Table 3.4 and Map 3.6 further detail the primary rock types in the region, according to the Virginia Department of Mines, Minerals, and Energy (DMME).

Table 3.4. Primary Rock Types

	Type	Total Land Area	% of Region's Land Area
	Arenite	190.70 mi^2	5.55%
	Basalt	0.21 mi^2	0.01%
	Black Shale	221.63 mi^2	6.45%
	Dolostone (Dolomite)	694.33 mi^2	20.20%
	Gneiss	1.51 mi^2	0.04%
	Granite	8.23 mi^2	0.24%
	Granitic Gneiss	6.66 mi^2	0.19%
	Granodiorite	0.05 mi^2	0.00%
	Granulite	22.20 mi^2	0.65%
	Limestone	780.48 mi^2	22.71%
	Meta-Basalt	36.24 mi^2	1.05%
	Peridotite	0.04 mi^2	0.00%
	Quartzite	195.94 mi^2	5.70%
	Sandstone	286.62 mi^2	8.34%
	Shale	987.05 mi^2	28.72%

Data Source(s): Virginia Energy, Geology and Mineral Resources, Mapping Center, 2024.

Map 3.6. Primary Rock Types



Data Source(s): Virginia Energy, Geology and Mineral Resources, Mapping Center, 2024.

LAND COVER

The region encompasses approximately 2.2 million acres, with land cover patterns that directly influence hazard exposure and emergency response capabilities. As shown in Map 3.7, the landscape is dominated by forest and agriculture, with urban development concentrated in valley cities. Over 1 million acres are publicly held within Shenandoah National Park and the George Washington and Jefferson National Forests, requiring coordination with federal agencies during emergencies.

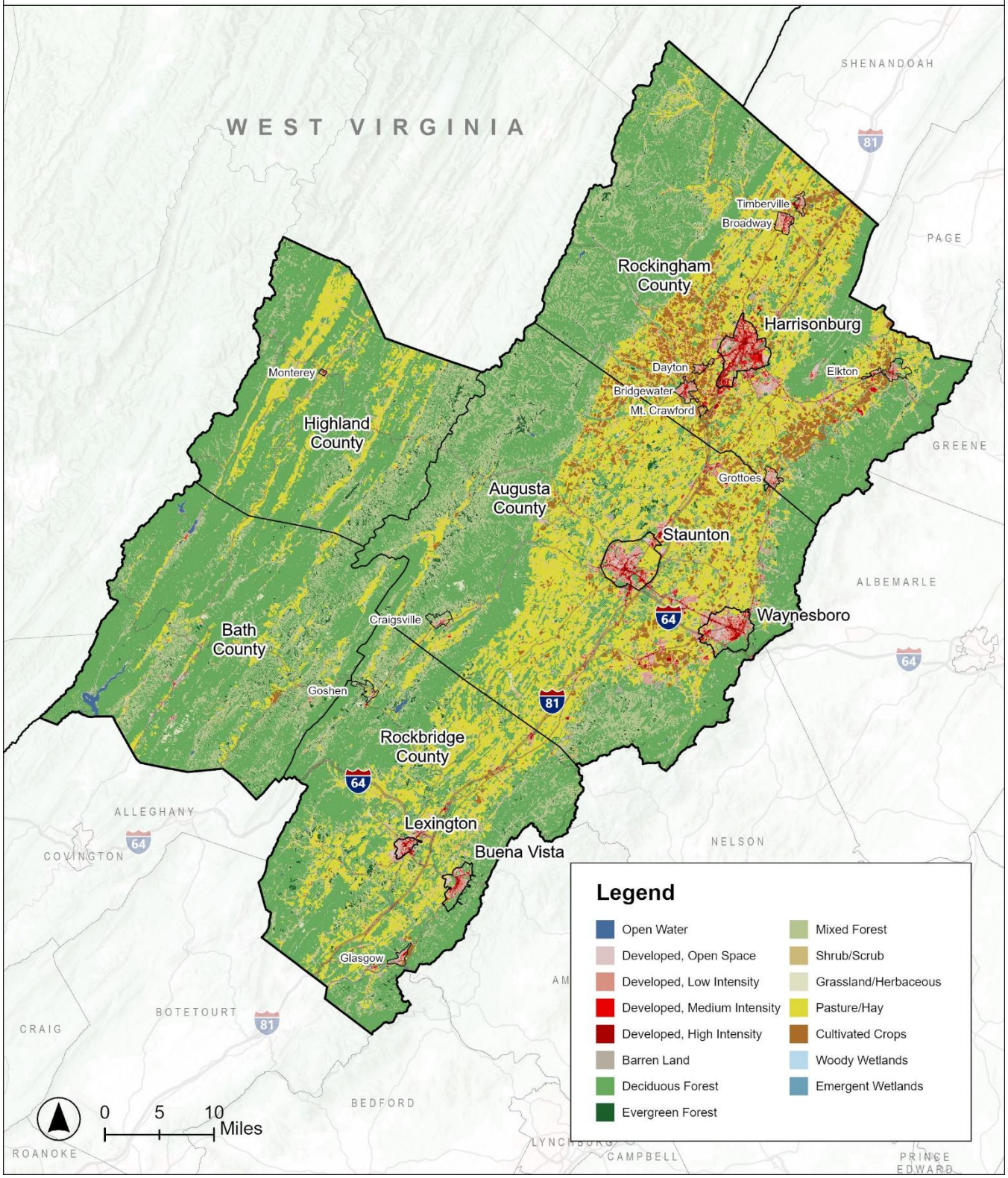
- **Forest Land:** Forested areas, predominantly mixed hardwoods including oaks, hickories, and maples, cover approximately 68% of the region. These forests absorb rainfall to mitigate flooding, stabilize slopes to prevent erosion and landslides, and maintain water quality in streams and rivers. However, during extended dry periods, particularly in late summer and fall, the forests become vulnerable to wildfire. The region's forestry industry, outdoor recreation economy, and watershed health depend on forest protection.
- **Agricultural Land:** Agricultural lands occupy the fertile valley floors, contributing significantly to the regional economy while facing distinct vulnerabilities. These low-lying areas are susceptible to riverine and flash flooding, especially along major waterways such as the North and South Forks of the Shenandoah River. Prolonged drought conditions can severely impact crop yields and livestock operations.
- **Urban and Developed Areas:** Cities such as Harrisonburg, Staunton, and Waynesboro contain the region's highest population densities and most critical infrastructure. Notably, Impervious surfaces in developed areas such as roads, parking lots, and buildings can increase stormwater runoff and can exacerbate flooding in downstream areas.

LAND COVER CHANGE

Understanding development patterns is essential for assessing changing hazard exposure over time. Map 3.8 shows land cover change between 2014 and 2021 using data from the Chesapeake Bay Land Cover/Land Use (LULC) database, a high-resolution dataset that tracks landscape changes across the Chesapeake Bay watershed, including the Central Shenandoah region.

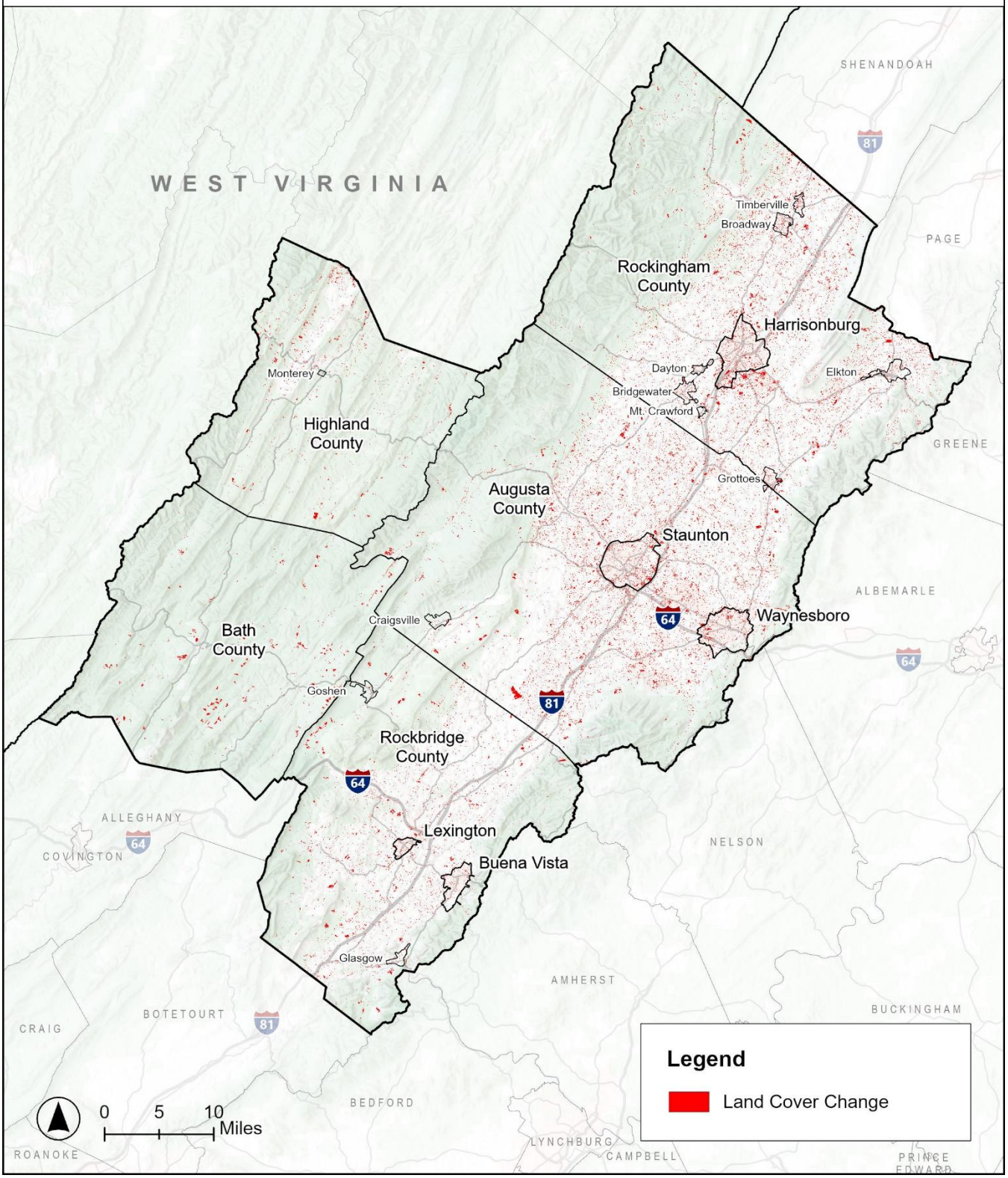
The analysis reveals a dispersed development pattern throughout the valley, with notable concentrations of new development occurring south of Harrisonburg, in the southeast portion of Staunton, northwest of Waynesboro, and along the I-81 and I-64 corridors. These development trends indicate areas where hazard exposure may be increasing, particularly for flooding along major transportation routes and in previously undeveloped floodplain areas. As development continues, maintaining natural drainage patterns and implementing sound stormwater management practices become increasingly important for reducing flood risk and protecting water quality.

Map 3.7. Land Cover



Data Source(s): USGS National Land Cover Database, 2023

Map 3.8. Land Cover Change, 2014-2021



Data Source(s): Chesapeake Bay Land Use/Land Cover Database, 2024 Edition, 2025

HYDROLOGY

The region's rivers and streams shape flood risk, provide drinking water, and serve as natural boundaries for emergency management. Surface water in the region drains into the Potomac River basin and the James River basin. Major tributaries include the Bullpasture, Calfpasture, Cowpasture, Jackson, Middle, North, and South Rivers, along with the North and South Forks of the Shenandoah River (see Map 3.9).

Understanding this drainage network is critical for flood prediction and emergency response. Communities along these waterways must coordinate flood warnings, as heavy rainfall upstream can rapidly affect downstream areas. The region's position at the headwaters also means that local land use decisions, such as development patterns and stormwater management, have cascading effects throughout the watershed.

The North and South Forks of the Shenandoah River drain much of the region's rainfall. During heavy precipitation, these waterways can rise rapidly, affecting low-lying areas, bridges, and communities along their banks. Smaller tributaries, including the Maury River (formed by the confluence of the Cowpasture and Calfpasture Rivers), can flash flood with little warning, particularly in narrow valley areas.

Additionally, many of these major waterways are used as public water supply sources. There are several reservoir impoundments that have uses such as public water supply, flood control measures, or outdoor recreation opportunities. Lake Moomaw in Bath County, with a surface area of 2,530 acres, is the second largest multi-purpose reservoir in western Virginia, created by the U.S. Army Corps of Engineers' Gathright Dam on the Jackson River in the 1980s.

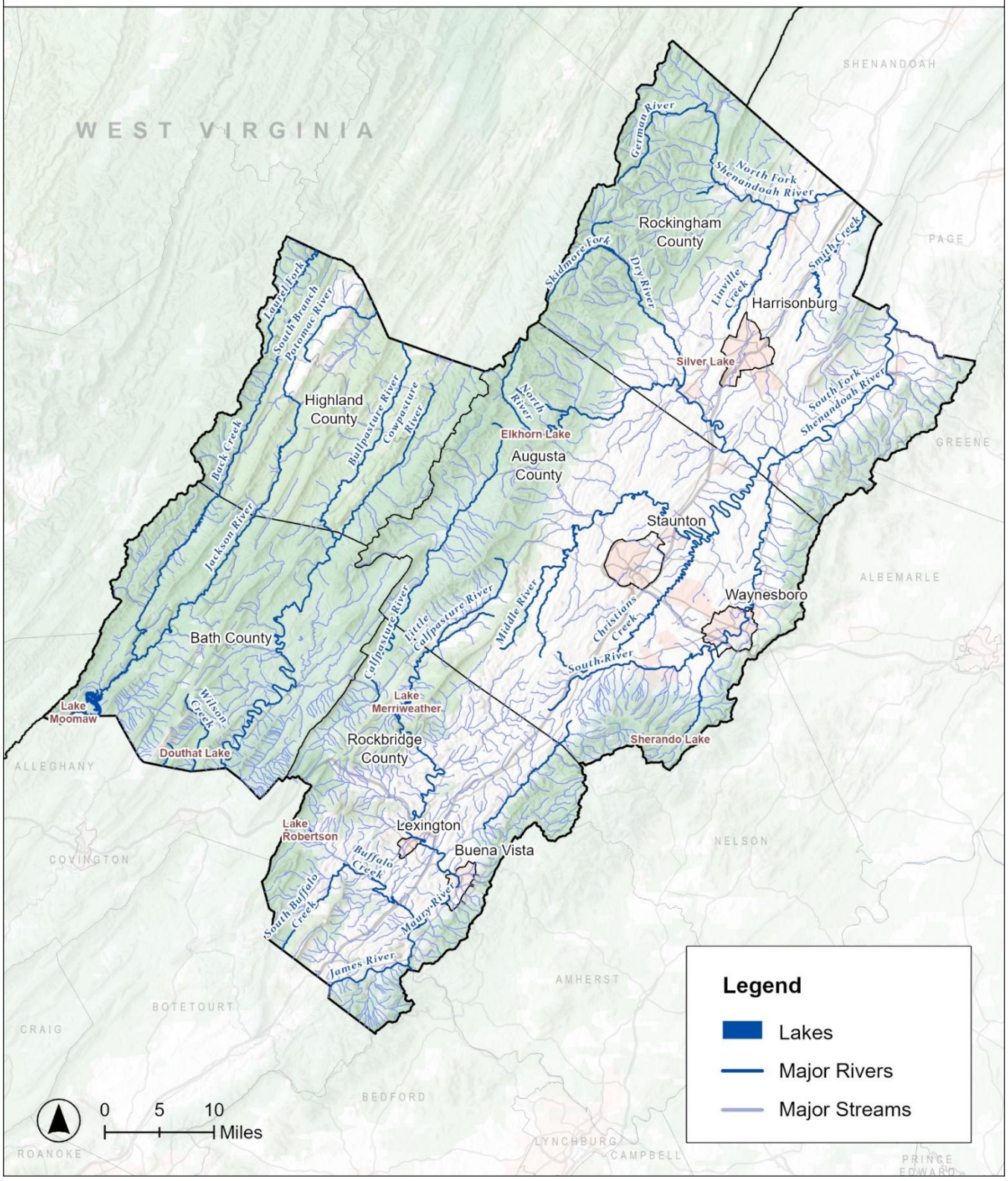
HISTORIC & CULTURAL RESOURCES

The Central Shenandoah Region has a rich history that spans nearly three centuries. Augusta County was founded in 1738, Rockbridge in 1777, Rockingham in 1778, Bath in 1790, and Highland in 1847. Together, these counties contain a large collection of historic and cultural sites attracting visitors and residents alike.

Across the region, there are 13 National Historic Landmarks and more than 270 properties listed on the National Register of Historic Places. These sites reflect the region’s important role in American history—from the birthplace of President Woodrow Wilson in Staunton, to the historic campuses of Washington and Lee University and the Virginia Military Institute in Lexington. Natural landmarks such as Natural Bridge and Grand Caverns are also key cultural and economic assets that draw visitors from around the world.

Similarly, the region’s parks, forests, and scenic byways reflect its historical landscape. The Skyline Drive Historic District, a scenic highway along the Blue Ridge Mountains, crosses eight counties, including Augusta and Rockingham (Virginia Department of Historic Resources, 2024). The Blue Ridge Parkway, which begins in Augusta and continues through Rockbridge and eventually into North Carolina, was designated as National Historic Landmark, the highest federal recognition for historical significance (Seaton, 2024). The loss of historical and cultural resources would be significant, not only for the irreplaceable historical materials but also for the region's tourism economy, sense of place, and collective memory. Protecting these irreplaceable resources requires specialized mitigation strategies and coordination with historic preservation professionals during pre-disaster planning and post-disaster recovery.

Map 3.9. Hydrology



Data Source(s): VGIN, Virginia National Hydrography Dataset (NHD), 2022.

Historic and cultural resources are an essential part of the region's identity, but they also face unique risks. Many historic buildings were constructed with materials and methods that do not meet modern building codes. Older wood frames, unreinforced masonry, and original foundations make them more vulnerable to hazards such as earthquakes, flooding, and fires. In addition, few have modern fire suppression or protective systems, making disaster response and recovery more difficult. Table 3.5 accounts for the number of National Historic Landmarks and properties listed on the National Register of Historic Places in the region.

Table 3.5. Historic Resources

Locality	# Historic Places	# Historic Landmarks	National Historic Landmark (NHL) Designations
Augusta County	60	3	• Grand Caverns (1973) • Skyline Drive (2008) • Blue Ridge Parkway (2024)
City of Staunton	36	1	• Woodrow Wilson's Birthplace (1964)
City of Waynesboro	11	0	
Bath County	25	1	• The Homestead (1991)
Highland County	8	1	• Butler Cave-Breathing Cave (1973)
Rockbridge County	52	3	• Cyrus McCormick Farm and Workshop (1964) • Rich Hole (1974) • Natural Bridge (1998)
City of Buena Vista	5	0	
City of Lexington	18	4	• Lee Chapel, Washington & Lee University (1960) • Barracks Virginia Military Institute (1965) • W&L University Historic District (1971) • Virginia Military Institute Historic District (1971)
Rockingham County	44	1	• Skyline Drive (2008)
City of Harrisonburg	14	0	

Data Source(s): National Register of Historic Places (2024) and National Register of Historic Landmarks (2024).