



# Part I. Background Information



Source: NPS n.d.



## SECTION 1. INTRODUCTION

### 1.1 Overview

The State of West Virginia (the State) has experienced hazardous events of all kinds, including events resulting from both natural and man-made hazards.

The State has received 77 federal disaster declarations since 1954. Of these, 32 involved floods and 31 involved severe storm incidents. Of the 77 federal disasters, 66 were major disaster declarations (DR), 9 were emergency declarations (ER), and 2 were fire suppression assistance (now known as fire management assistance declarations [FM]). All have resulted in a hefty cost to the State's people, environment, property, and economy.

Reducing risks associated with hazards requires an integrated and collaborative approach that emphasizes building community resilience through federal, state, and local cooperation. Preparing a hazard mitigation plan is a pathway to effectively reduce risk.

Hazard mitigation is the sustained effort to reduce loss of life and property by lessening or eliminating the impacts of disasters, natural hazards, and human-caused threats. It creates safer communities and helps maintain the quality of life. Effective hazard mitigation requires an understanding of all risks and investment in long-term community well-being through the implementation of short-term and long-term strategies before the next disaster (FEMA 2022). The purpose of hazard mitigation planning is to identify and assess hazards that impact the state, develop a strategy to reduce losses from those hazards, and establish a coordinated process to implement the strategy

Since 2004, the State has been eligible to receive non-emergency Stafford Act assistance and federal mitigation pre-disaster assistance by maintaining an approved state hazard mitigation plan (SHMP) compliant with Title 44 of the Code of Federal Regulations (C.F.R.) Section 201.4 (44 C.F.R. §201.4) and related FEMA mitigation planning guidance. This also qualifies the State to obtain funding for repairing and replacing infrastructure damaged in natural disasters. The 2018 SHMP was approved on October 17, 2018, and has an expiration date of October 16, 2023. The State is committed to updating and implementing its long-term strategy for reducing the risks of hazards, as documented in this updated 2023 SHMP.

The 2023 SHMP demonstrates the State's continued commitment to reduce risks from identified natural and man-made hazards and maintain eligibility for Federal assistance. This plan will interpret climate change as changing weather patterns and future conditions, as FEMA requires. The SHMP serves as a guide for state, regional, and local decision-makers to make important risk-informed decisions to reduce the impacts of the identified hazards on people, property, and the environment.

#### Key Terms

**Hazard Mitigation** – Sustained action to reduce or eliminate the long-term risk to human life and property from hazards.

**State Hazard Mitigation Plan** – Demonstrates the State's commitment to reduce risks from natural hazards and serves as a guide for decision makers for reducing the effects of natural hazards as resources are committed.

Source: FEMA State Mitigation Plan Review Guide, effective March 2016.



## 1.2 Authority, References, and Assurances

**44 C.F.R. §201.4(c)(2)(ii):** The plan must include assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 C.F.R. parts 200 and 3002. The State will amend its plan whenever necessary to reflect changes in State or Federal statutes and regulations.

### 1.2.1 State Authorities

West Virginia's SHMP effort is led by the West Virginia Emergency Management Division (WVEMD), whose mission is to ensure protection of life and property by providing coordination, guidance, support, and assistance to local emergency managers and first responders. Authorized by the West Virginia State Code and the West Virginia Emergency Operations Plan, the agency manages disaster preparedness, mitigation, response, and recovery efforts throughout West Virginia by working alongside all responsible government and non-governmental agencies. In the event of a federally declared disaster, FEMA works closely with WVEMD to administer assistance programs.

The primary responsibilities of WVEMD in preparing and implementing the SHMP are as follows:

- Ensure that the SHMP meets FEMA requirements and is approved by FEMA.
- Coordinate the continued development of the SHMP with stakeholders, strategic working groups, and outreach to other local, public/private, state, and federal agencies in order to keep the plan relevant.
- Provide opportunities for stakeholder involvement in the continuous update and implementation of the SHMP.
- Administer FEMA hazard mitigation assistance programs, including the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) grant program, and Flood Mitigation Assistance (FMA) program.
- Support the Department of Environmental Protection (DEP) with the administration of the Rehabilitation of High Hazard Potential Dams (HHPD) grant program.
- Support integration of local and regional hazard mitigation efforts with the SHMP.

### 1.2.2 Federal Guidance and References

FEMA requires that states update their hazard mitigation plans every five years and submit them to FEMA for review and approval. States must ensure that each plan update reflects changes in development, progress in statewide mitigation efforts, and changes in priorities. FEMA provides resource and guidance documents to aid states in meeting federal hazard mitigation planning requirements. This update to West Virginia's SHMP used FEMA's most recent State Mitigation Planning Policy Guide, effective April 2023. That document provides critical guidance on prioritizing the inclusion of socially vulnerable and underserved communities and planning for future conditions that may impact the location, intensity, and frequency of hazards.



### Planning for Equitable Outcomes

FEMA defines equity as the consistent and systematic fair, just, and impartial treatment of all individuals. Centering equity in the SHMP helps ensure an inclusive planning process that benefits the whole community. Inclusive processes take time and thoughtful planning to ensure that everyone has the resources to meaningfully participate, make progress, and benefit from hazard mitigation. Equity is essential to reducing risk to the whole community, including those who face barriers to accessing assistance and populations disproportionately affected by disasters.

### Planning for Future Conditions

Future conditions, such as changes in population, development, and the nature of the hazards themselves, can impact the frequency, duration, and intensity of hazards, such as wildfires, extreme heat, drought, storms, and heavy precipitation. Communities are continuously responding to these changing conditions. These variations create new risks to state and local governments and challenge pre-existing mitigation plans. They also pose a unique threat to the nation’s most at-risk populations by exacerbating the impacts of disasters on underserved and socially vulnerable populations who already experience the greatest losses from natural hazards.

While adaptation efforts may be undertaken separately or in addition to the hazard mitigation planning process, hazard mitigation and adaptation are complementary efforts that have the same goal: long-term risk reduction for people and increased safety for communities. Adapting to projected future conditions is a form of hazard mitigation. An SHMP that addresses future conditions in its risk assessment and includes adaptation actions in its mitigation strategy may reduce risk to current and future events.

### Eligibility for FEMA Assistance

In accordance with 44 C.F.R. §201.4(a), states must have an approved SHMP meeting the requirements in 44 C.F.R. §201.4 as a condition of receiving certain non-emergency assistance under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) and FEMA mitigation grants, including the following programs:

- Public Assistance Categories C–G (PA C–G)
- Fire Management Assistance Grants (FMAG)
- BRIC
- HMGP
- HMGP Post Fire
- FMA
- Rehabilitation of HHPD

Authority for this plan originates from the following federal sources:

- Robert T. Stafford Disaster Relief and Emergency Assistance, 42 U.S.C., Section 322, as amended
- Code of Federal Regulations (C.F.R.), Title 44, Parts 79.4, 201 and 206
- Disaster Mitigation Act (DMA) of 2000, Public Law 106-390, as amended

The Stafford Act, Public Law 100-707, signed into law in 1988, amended the Disaster Relief Act of 1974 (Public Law 93-288). The Stafford Act constitutes the statutory authority for most federal disaster response activities.





The DMA of 2000 is the current federal regulation addressing hazard mitigation planning. It amended the Stafford Act to require the preparation of hazard mitigation plans by state and local governments, emphasizing planning for disasters before they occur. The requirement for an SHMP is continued as a condition for disaster assistance.

The following FEMA guides and reference documents were used to prepare the 2023 SHMP. Refer to the References section for a complete list of resources used to prepare the plan.

- State Mitigation Planning Policy Guide, April 2023
- State Mitigation Planning Key Topics Bulletin: Mitigation Capabilities, November 2022
- State Mitigation Planning Key Topics Bulletin: Planning Process, October 2022
- State Mitigation Planning Key Topics Bulletin: Mitigation Strategy, October 2016
- State Mitigation Planning Key Topics Bulletin: Risk Assessment, June 2016
- Plan Integration: Linking Local Planning Efforts, July 2015
- Hazard Mitigation Assistance Guidance, February 2015
- Integrating Disaster Data into Hazard Mitigation Planning: A State and Local Mitigation Planning How-to-Guide, February 2015
- Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials, March 2013
- Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards, January 2013

### 1.2.3 Assurances

As a condition of approval of an SHMP by the FEMA Regional Administrator, 44 C.F.R. §201.4(c)(7) requires that the plan contain certain assurances. The assurances convey that the state is aware of, and understands, the obligations to comply with applicable federal statutes and regulations, including grant programs, grant management, and mitigation planning.

Accordingly, under the authorities provided in WV Code § 15-5-1, *et seq*, and Executive Order No. 18-03, WVEMD pledges that it will continue to:

- Comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 C.F.R. §13.11(c), including the timely submission of quarterly financial and performance reports; and
- Update and amend the State Hazard Mitigation Plan whenever necessary to reflect changes in state or federal laws and statutes as required in 44 C.F.R. §13.11(d).

## 1.3 Organization of the Plan

West Virginia's 2023 SHMP has been designed to use plain language and provide an engaging experience for readers by focusing on making critical information easily identifiable and ensuring that the plan is accessible. Additionally, the SHMP is a resource for local governments to better support work at the local and regional levels.



The 2023 SHMP represents a significant revision to the 2018 SHMP. The SHMP continues to be a “living document” that supports relationship building, promotes resiliency and sustainability, aids in consistent evaluation, and provides a means to reduce the costs associated with response and recovery.

An updated outline of the 2023 SHMP is presented below with a brief summary of each section’s contents.

- **Section 1: Introduction**—This section defines mitigation and the planning requirements for the SHMP. It also discusses the 2023 SHMP organization and a summary of changes made during the 2023 update.
- **Section 2: State Profile**—This section provides a description of the State’s physical setting, demographics, economy, state assets and critical facilities, cultural assets, natural resources, and land use and development.
- **Section 3: Planning Process**—This section documents the planning process, including the agencies, stakeholders, and subject matter experts involved and the manner of their involvement. It highlights the extended outreach efforts conducted to encourage participation and increased engagement during the 2023 SHMP update. This section also describes how the planning process has been integrated into ongoing federal and state programs and initiatives.
- **Section 4: Risk Assessment**—This section provides an overview of the risk assessment, including the process to identify hazards, the asset inventories collected and utilized, and the hazard-specific data and methodologies used in the vulnerability assessment.
- **Section 5: Hazard Overview**—This section lists any commonly recognized natural hazards that were not included in the SHMP and explains why.
  - **Sections 5.1 through 5.16: Risk Assessment for Each Hazard**—The risk assessment for each hazard is divided into two parts: (1) hazard profile and (2) vulnerability assessment. The vulnerability assessment follows the hazard profile so that all information about a hazard is found in one section.
    - All hazard profiles and vulnerability assessments have been updated and enhanced to include more detailed and current technical information. The hazard profile includes a hazard description, location, extent, warning time, previous occurrences and losses, probability of future occurrence, and potential effects of future conditions.
    - The vulnerability assessment includes qualitative and quantitative assessments of state assets and counties, including buildings, roads, critical facilities, population, the built environment, land use, environmental resources, cultural assets, and projected development.
- **Sections 6 through 8: Capability Assessment**—These sections provide a comprehensive review and evaluation of state and local capabilities used to support and facilitate mitigation activities and describes the process utilized by West Virginia to support, promote, and coordinate mitigation planning at the local level.
- **Section 9: Progress on Previous Plan**—This section provides a description of the status of each mitigation action in the previous plan and lists an action as completed or not completed. If the action is incomplete, the action is either included in the updated SHMP or discontinued.
- **Section 10: Goals for Hazard Mitigation**—This section includes goals to reduce long-term vulnerabilities from the identified hazards. These goals represent what the State seeks to accomplish through mitigation plan implementation using a variety of funding.



- **Section 11: Mitigation Strategy**—This section sets the State’s mitigation program priorities and helps to guide the counties as they update their plans. This section also includes goals and objectives and evaluates the previous SHMP’s actions.
- **Section 12: Adoption**—This section includes information regarding adopting the SHMP.
- **Section 13: Review, Evaluation, and Implementation**—This section describes how the SHMP will be enforced and remain relevant and includes the system for tracking the implementation of the mitigation actions and projects identified in the mitigation strategy.
- **Appendix A: Meeting Documentation** – This appendix includes materials (e.g., meeting notes, presentations, handouts, sign-in sheets) from each planning meeting.
- **Appendix B: Outreach Documentation** – This appendix includes meeting invitations, information-gathering worksheets, survey results, and other outreach conducted during the planning process.
- **Appendix C: Dams Listed on the National Inventory of Dams** – This appendix lists the 561 dams included in the U.S. Army Corps of Engineers’ National Inventory of Dams.

## 1.4 Overview of Changes from 2018 to 2023

WVEMD’s vision for the 2023 SHMP is to streamline the plan, resulting in a practical and more readable document for the public and an implementable document for the State to support future risk reduction. In addition, the 2023 SHMP will serve as a technical reference for the next round of local hazard mitigation plan (LHMP) updates with a robust risk assessment that expands the assets assessed and integrates the best available data.

With that in mind, the 2023 SHMP includes a comprehensive update to the 2018 SHMP risk assessment. The 2023 SHMP has been reformatted and organized to be more readable while paralleling the structure of the requirements outlined in 44 C.F.R. §201.4 and FEMA’s State Mitigation Planning Policy.

The 2023 SHMP includes references to the C.F.R. throughout to provide the reader with context. These references provide specific section and subsection notations. References to the C.F.R. appear in light blue text boxes, as seen in an example below:

**44 C.F.R. §201.4(a):** States must have an approved Standard State Mitigation Plans meeting the requirements of this section as a condition of receiving non-emergency Stafford Act assistance and FEMA mitigation grants.

Table 1-1 crosswalks the section changes from the 2018 SHMP to the 2023 SHMP.

***Table 1-1 Crosswalk of Section Changes to the 2023 SHMP***

2018	2023
Section 1 – Introduction	Section 1 – Introduction
Section 2 – Planning Process	Section 3 – Planning Profile
Section 3 – State Profile	Section 2 – State Profile
Section 4 – Hazard Identification and Risk Analysis	Section 4 – Risk Assessment and Section 5 – Hazard Profiles
Section 5 – Supporting Local Plans	Section 8 – Local Government Planning Coordination
Section 6 – Mitigation Strategies	Section 9 – Progress on Previous Plan, Section 10 – Goals for Hazard Mitigation, and Section 11 – Mitigation Actions



2018	2023
Section 7 – Plan Monitoring, Maintenance & Revision	Section 13 – Review, Evaluation, and Implementation
Appendix A – Capability Assessment	Section 6 – Local Capabilities and Section 7 – State Capabilities
Appendix I – Adoption Letter	Section 12 – Adoption

Source: WVEMD 2018

At the beginning of each section, there is a bulleted summary of changes made. The following highlights the significant changes and enhancements made for the 2023 SHMP organized by key topic.

### Planning Process

- One of the WVEMD priorities for the 2023 SHMP was to ensure increased outreach and collaboration among various sectors to ensure a comprehensive update. The following sectors were engaged throughout the planning process: emergency management, economic development, land use and development, housing, health and social services, infrastructure, natural and cultural resources, and academia.

### Risk Assessment

- State Buildings**—An enhancement to the 2023 SHMP was utilizing data provided directly from the State through the WVEMD. Through increased interagency coordination between the WVEMD and the State Resiliency Office (SRO), this dataset was made available to utilize in the 2023 risk assessment update. New state buildings were not available for the 2018 SHMP; therefore, changes in risk and vulnerability of these facilities over the performance period of the plan cannot be assessed.
- Critical Facilities**—Another enhancement to the 2023 SHMP risk assessment was the updated definition of a critical facility and the utilization of a more robust critical facility and infrastructure dataset. For the 2023 SHMP, the definition and identification of critical facilities used were a result of a collaborative planning effort conducted with county, state, federal, private sector, and non-governmental organizations.
- Socially Vulnerable Populations**—Impacts to socially vulnerable populations, such as children, older adults, and persons with disabilities, were integrated into the risk assessment to adhere to FEMA guidelines.
- Local Vulnerability**—The enhanced risk assessment not only evaluates state assets but also evaluates local vulnerability to the identified hazards so that results may be integrated into upcoming LHMP updates. Each section discusses potential impacts to the population, built environment, and critical facilities.

### Capabilities

- State and local capabilities have been comprehensively reviewed, updated, and reformatted. The following plan elements have been consolidated into a single section: State Mitigation Capability Assessment, Local Capability Assessment, and Local Government Planning Coordination.





### *Mitigation Strategy*

- The 2018 SHMP mitigation actions, updated risk assessment, updated capability assessment, and LHMP actions were used to identify mitigation actions for the 2023 SHMP. Each identified mitigation action now includes detailed implementation information as well as a clearly articulated and uniformly applied prioritization scheme.



## SECTION 2. STATE PROFILE

### 2023 SHMP UPDATE CHANGES

- ❖ The 2023 State Hazard Mitigation Plan (SHMP) includes demographics related to vulnerable populations.
- ❖ All data presented was updated, as appropriate, including demographic information and land use and development statistics.
- ❖ Sections were added and expanded to provide additional context for understanding mitigation and risk within the state and to frame the Risk Assessment presented in Section 4 of the 2023 SHMP.
- ❖ All mapping was updated using the best available data.

### 2.1 Historic Overview

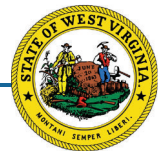
Exploration of West Virginia began in the 17<sup>th</sup> century, and settlements were established beginning in the early 18<sup>th</sup> century. During the Seven Years War, which took place between 1754–1763, the population in the area expanded westward, and a 14<sup>th</sup> colony, to be named Vandalia, was proposed in 1769 (Anderson 1979). Several years later residents of western lands claimed by Virginia and Pennsylvania moved to establish a 14<sup>th</sup> state, Westsylvania. In the mid-19<sup>th</sup> century, West Virginia was separated from Virginia and admitted to the Union as a state on June 20, 1863 (National Archives 2019). The capital was permanently established at Charleston in 1885.

West Virginia's industrial emergence, encouraged by railroad expansion, began in the 1870s. Its natural resources of timber, coal, salt, oil, and natural gas substantially contributed to the establishment of a more modern industrial system, with mining becoming one of the most populous jobs. West Virginia's coal resources were increasingly valuable both nationally and internationally. In the early 21<sup>st</sup> century, half of all the coal exported from the United States was mined in West Virginia, mostly via mountaintop removal. West Virginia continues to lead the country in underground coal production.

### 2.2 Political Divisions and Government

The current capital of West Virginia is Charleston, located in Kanawha County, with a population of 48,864, according to 2020 U.S. Decennial Census. West Virginia is divided into 55 separate counties (shown below in Figure 2-1), 231 incorporated municipalities, and numerous unincorporated towns. Most of the counties in the state, are small in size with 40 of the 55 counties measuring less than 500 square miles, as shown in Table 2-1. West Virginia is represented in the U.S. Congress by two senators and two representatives.





**Table 2-1. Land Area of Counties**

County	Area (sq. mi.)	County	Area (sq. mi.)
Barbour	341.06	Mineral	327.83
Berkeley	321.14	Mingo	423.11
Boone	501.54	Monongalia	360.06
Braxton	510.81	Monroe	472.75
Brooke	89.21	Morgan	229.07
Cabell	281.02	Nicholas	646.82
Calhoun	279.25	Ohio	105.82
Clay	341.9	Pendleton	696.05
Doddridge	319.72	Pleasants	130.1
Fayette	661.55	Pocahontas	940.28
Gilmer	338.5	Preston	648.81
Grant	477.37	Putnam	345.67
Greenbrier	1019.57	Raleigh	605.35
Hampshire	640.25	Randolph	1039.68
Hancock	82.61	Ritchie	451.99
Hardy	582.31	Roane	483.56
Harrison	416.01	Summers	360.46
Jackson	464.35	Taylor	172.77
Jefferson	209.64	Tucker	418.92
Kanawha	901.59	Tyler	256.29
Lewis	384.9	Upshur	354.64
Lincoln	437.04	Wayne	505.98
Logan	453.74	Webster	553.47
Marion	308.74	Wetzel	358.06
Marshall	305.43	Wirt	232.51
Mason	430.75	Wood	366.26
McDowell	533.46	Wyoming	499.45
Mercer	418.99	<b>TOTAL</b>	<b>24,038.21</b>

The 1971 Regional Planning and Development Act and reenacted West Virginia Code, Chapter 8, Article 25, mandated that West Virginia be divided into 11 regions to serve as "development districts" to utilize funding resources more effectively as well as maximize small communities' chances of attracting funds from federal, state, and local organizations to foster community and cooperation throughout the state.

The Regional Planning and Development Councils (RPDC) focus on expansion and improvement of water and sewer facilities, infrastructure, transportation, employment, industry, small business development, housing, health care, education, and recreation. By coordinating closely with agencies and departments in the region, the RPDCs promote stability, growth, and progress in West Virginia, especially through assisting local jurisdictions that may be too small to maintain staff for grant writing and planning services. The RPDCs are shown in Figure 2-2, and the counties included in each are listed in Table 2-2.



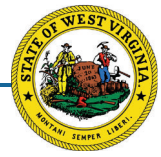
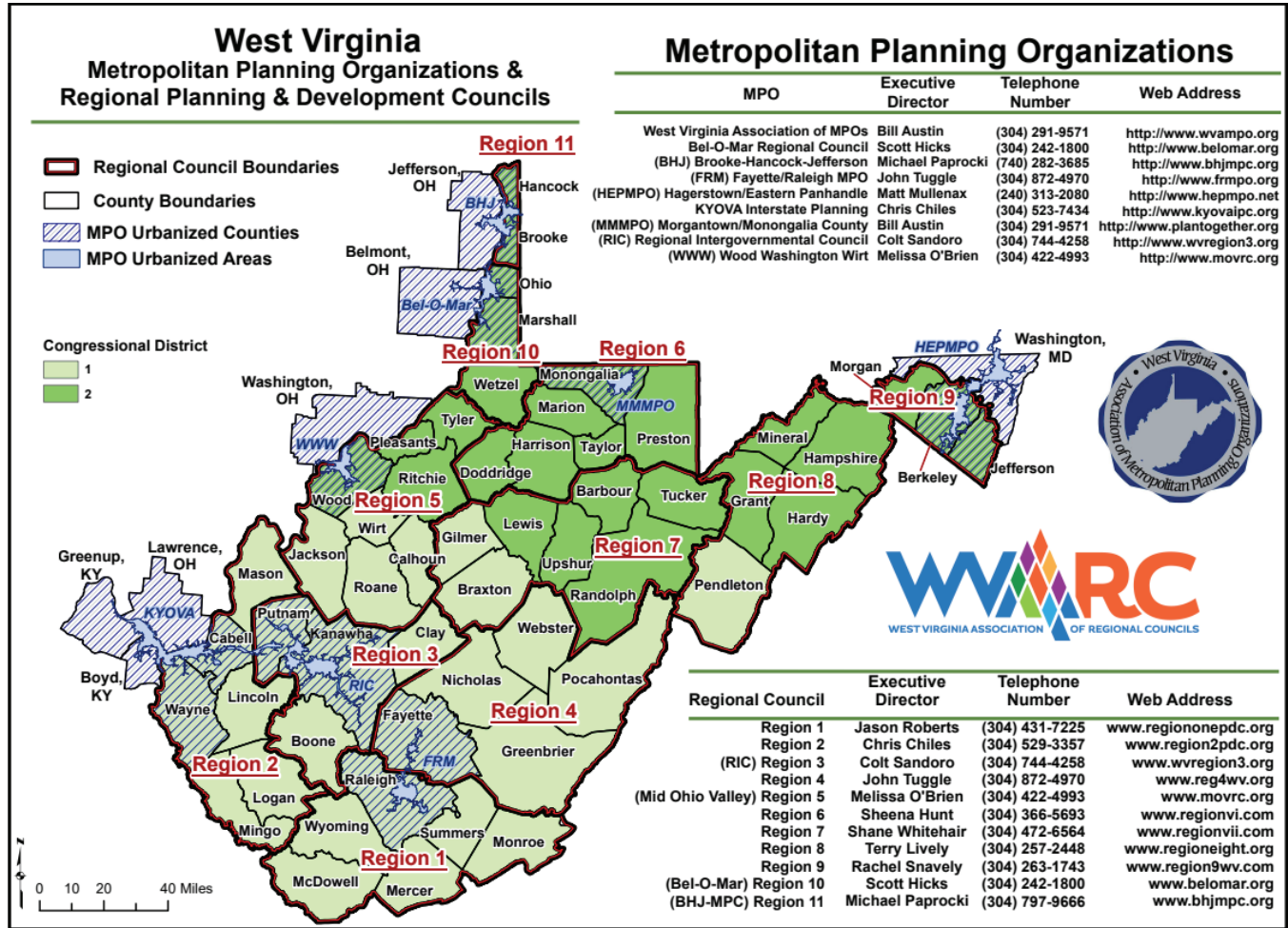


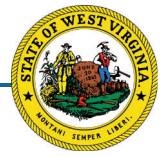
Figure 2-2. Metropolitan Planning Organizations and Regional Planning and Development Councils



Source: Region 1 Planning & Development Council 2023

Table 2-2. Regional Planning and Development Councils

Council Names	Counties Included
Region 1 Planning & Development Council	McDowell, Mercer, Monroe, Raleigh, Summers, and Wyoming
Region 2 Planning & Development Council	Cabell, Lincoln, Logan, Mason, Mingo, and Wayne
Region 3 PDC (Regional Intergovernmental Council)	Boone, Clay, Kanawha, and Putnam
Region 4 Planning & Development Council	Fayette, Greenbrier, Nicholas, Pocahontas, and Webster
Region 5 PDC (Mid-Ohio Valley Regional Council)	Calhoun, Jackson, Pleasants, Ritchie, Roane, Tyler, Wirt, and Wood
Region 6 Planning & Development Council	Doddridge, Harrison, Marion, Monongalia, Preston, and Taylor
Region 7 Planning & Development Council	Barbour, Braxton, Gilmer, Lewis, Randolph, Tucker, and Upshur
Region 8 Planning & Development Council	Grant, Hampshire, Hardy, Mineral, and Pendleton



Council Names	Counties Included
Region 9 Planning & Development Council	Berkeley, Jefferson, and Morgan
Region 10 PDC (Belomar Regional Council)	Marshall, Ohio, Wetzel, and Belmont, OH
Region 11 PDC (Brooke Hancock Jefferson Metropolitan Planning Commission)	Brooke and Hancock

Source: WVRC 2023

The RPDCs also offer local jurisdictions innovative solutions to growth-related problems by identifying and prioritizing goals; creating proactive strategies to realize these objectives; applying for funding packages; soliciting engineers, architects, attorneys, bond counsel, accountants, and other consultants, as needed, for each endeavor; and administering the projects to ensure funding is properly managed and all program guidelines are followed.

To accomplish these tasks, the RPDCs provide a multitude of services, varied by Council, including grant writing, labor compliance, workforce development, intergovernmental reviews, census report updates, public and governmental engagement strategies, environmental reviews, financial administration, drawdowns, account maintenance, income surveys, mapping capabilities, aging services and programs, revolving loan funds that assist new and expanding businesses, and a wealth of programmatic knowledge (West Virginia Association of Regional Councils 2023).

The RPDCs coordinate development of local hazard mitigation plans (LHMP) within the State. Jefferson County maintains its own LHMP and is not included in the Region 9 LHMP. A complete listing of the counties in each RPDC is provided in Table 2-2 and depicted in Figure 2-2.

## 2.3 Physical Setting

This section describes the State’s geography, topography, and climate.

### 2.3.1 Geography and Topography

West Virginia is the 10<sup>th</sup> smallest state and is located in the South Atlantic Region of the United States. West Virginia is bordered by Pennsylvania to the north, Maryland and Virginia to the east, Kentucky to the southwest, and Ohio to the northwest.

West Virginia is irregularly shaped because most of its borders follow natural features, such as the western border created by the Ohio River and the eastern border created by the Appalachian Mountains. The state can be divided into two geographical regions. West Virginia lies within two divisions of the Appalachian Highlands. Most of the eastern panhandle, which is crossed by the Allegheny Mountains, is in the Ridge and Valley region. The remainder, or more than two-thirds of the state, is part of the Allegheny Plateau, to the west of a bold escarpment known as the Allegheny Front, and tilts toward the Ohio River.

The mean elevation of West Virginia is 1,654 ft (458 m), higher than any other state east of the Mississippi River. Its highest point, Spruce Knob, is 4,862 ft (1,483 m) above sea level. Major lowlands lie along the rivers, especially the Potomac, Ohio, and Kanawha. A point on the Potomac River near Harpers Ferry has the lowest elevation, only 240 ft (73 m) above sea level (Marshall University n.d.).



The mountainous topography of West Virginia contributes greatly to the hazards threatening the state. A review of the state’s early history shows that development occurred primarily along rivers. Steep inclines and rocky terrain discouraged development on the mountainsides and resulted in the establishment of cities and towns in the valleys. Heavy rains, which commonly occur in West Virginia, often result in flooding in those same valleys. As such, flooding is the one of the most frequent and devastating disasters threatening West Virginia (WVEMD 2018).

### 2.3.2 Hydrography and Hydrology

The most significant river of West Virginia is the Ohio River. Along with its tributaries (Big Sandy River and Tug Fork), it forms the state's southwestern border. Other rivers include the Potomac and its North and South branches, Guyandotte, Kanawha, Little Kanawha, Cacapon, Cheat, Greenbrier, and the New River. West Virginia’s lowest point is situated at the Potomac River (240ft), in Jefferson County along the state’s border with Virginia.

West Virginia has 32 watersheds divided according to the United States Geological Survey (USGS) hydrologic unit code (HUC)-8 division (USGS 2023). Rivers and streams in the eastern portion of the state generally drain into the Atlantic Ocean, while rivers and streams in the western sections of the state drain into the Mississippi River. Major watersheds include the Shenandoah, Cheat, James, Kanawha, Monongahela, New, Ohio, Potomac, Shenandoah, and Youghiogheny. West Virginia’s HUC-8 watersheds are shown in Figure 2-3. Table 2-3 shows the stream miles and drainage area for each of these watersheds.

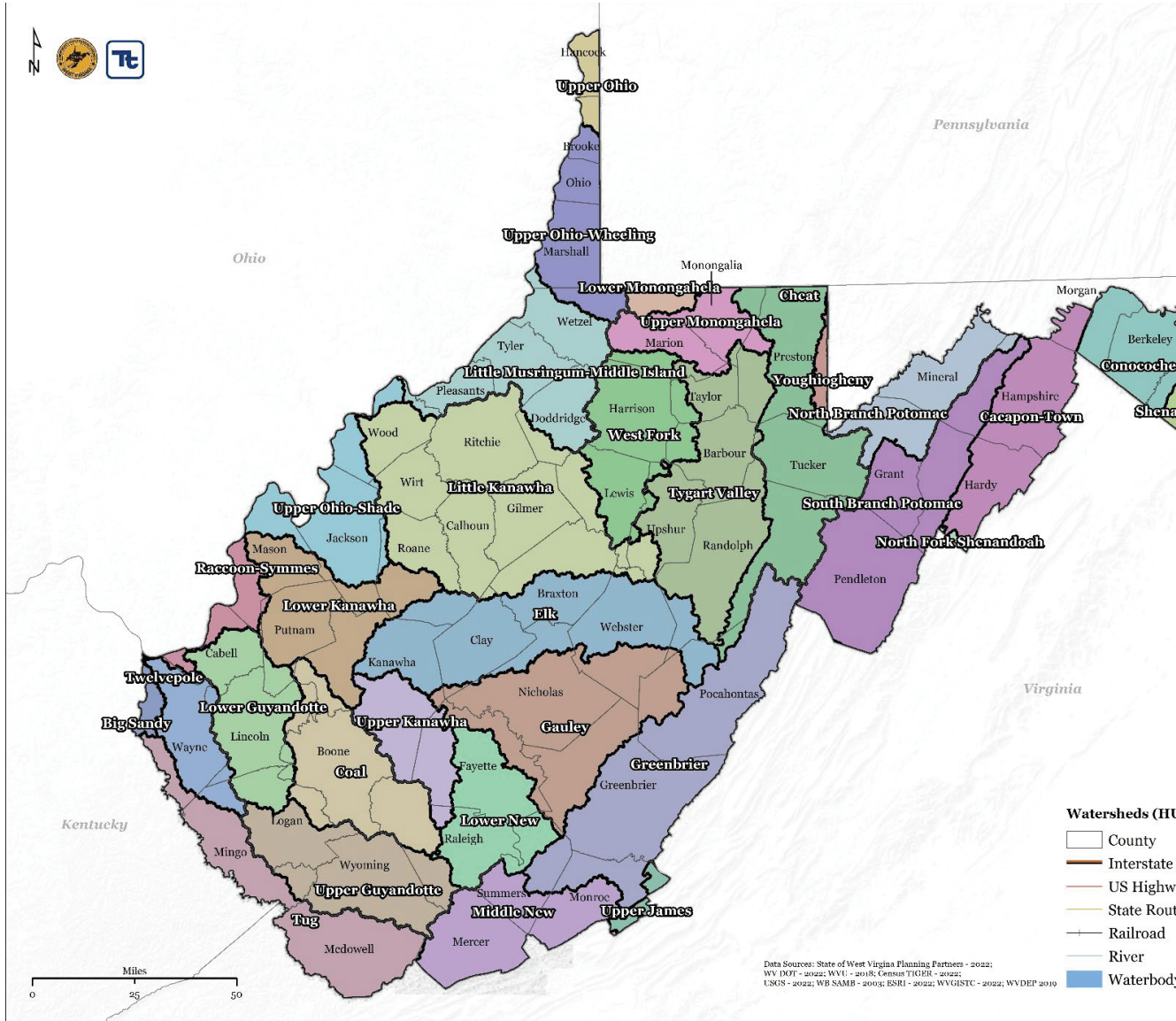
**Table 2-3. HUC-8 Watersheds in West Virginia**

Watershed	Stream Miles (mi.)	Drainage Area (sq. mi.)	Watershed	Stream Miles (mi.)	Drainage Area (sq. mi.)
Upper Ohio North Watershed	246	126	James River Watershed	217	71
Upper Ohio South Watershed	1,234	561	Upper New River Watershed	2,000	800
Middle Ohio North Watershed	2,283	953	Greenbrier River Watershed	3,509	1,646
Middle Ohio South Watershed	1,803	705	Lower New River Watershed	1,612	691
Little Kanawha River Watershed	5,425	2,309	Gauley River Watershed	3,063	1,419
Tygart Valley River Watershed	3,226	3,226	Upper Kanawha River Watershed	1,244	519
West Fork River Watershed	1,888	880	Elk River Watershed	3,213	1,532
Monongahela River Watershed	867	456	Lower Kanawha River Watershed	1,965	924
Cheat River Watershed	2,538	1,324	Coal River Watershed	2,232	892
Dunkard Creek Watershed	246	109	Upper Guyandotte River Watershed	2,200	940
Youghiogheny River Watershed	127	72	Lower Guyandotte River Watershed	1,796	740
South Branch of the Potomac River Watershed	3,476	1,480	Tug Fork Watershed	2,249	935
North Branch of the Potomac River Watershed	1,173	1,343	Big Sandy River Watershed	201	74
Cacapon River Watershed	1,971	840	Lower Ohio River Watershed	546	221
Potomac Direct Drains Watershed	1,085	593	Twelvepole Creek Watershed	1,139	442
Shenandoah Hardy Watershed	47	17			
Shenandoah Jefferson Watershed	140	103	<b>TOTAL</b>	<b>54,961</b>	<b>26,943</b>

Source: WVDEP 2013

Note: Watersheds are listed above organized by the regions delineated in the source document.

Figure 2-3. West Virginia Watersheds







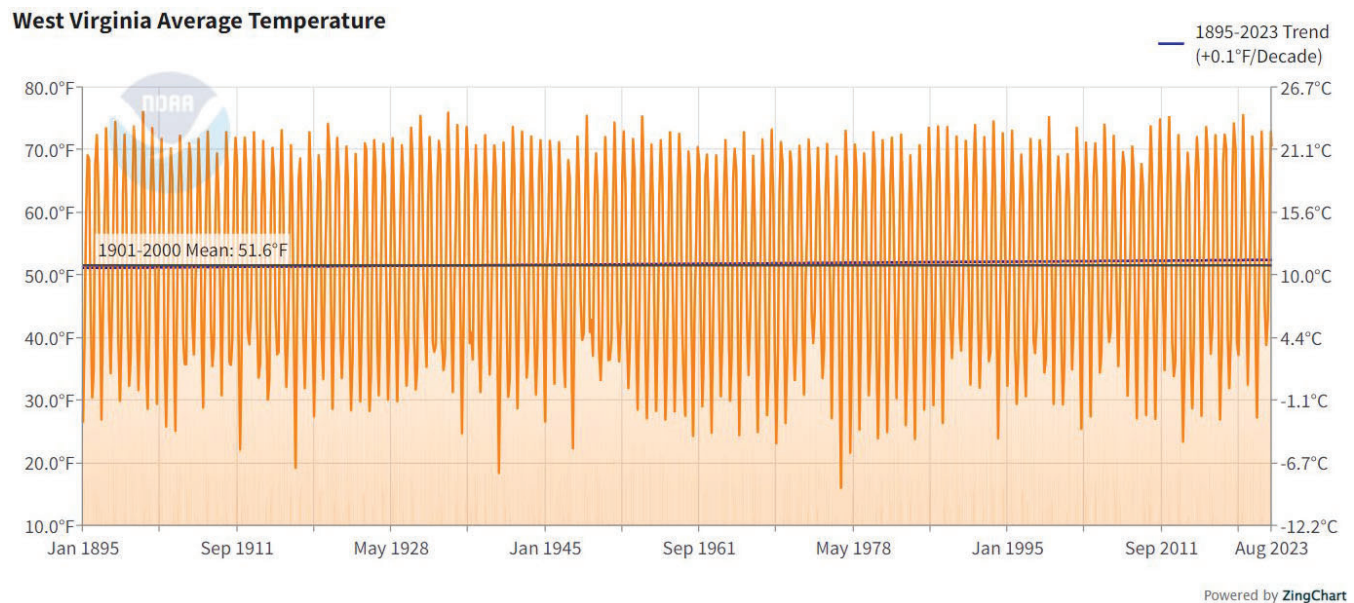
### 2.3.3 Climate

#### TEMPERATURE

West Virginia experiences moderately cold winters and warm, humid summers (Runkle 2022). The topography of the state varies climate conditions considerably. Winter minimum temperatures range from approximately 20 degrees Fahrenheit in the mountains of the central and northeastern parts of the state to around 30 degrees Fahrenheit in the southern end of the State. The state’s high elevation moderates summer temperatures, with average maximums ranging from approximately 85 degrees Fahrenheit in the southwest parts of the state to less than 80 degrees Fahrenheit in the east-central mountains.

Figure 2-4 shows the average temperature for each month from January 1895 through August 2023 (National Oceanic and Atmospheric Administration [NOAA] 2023). Since 1895, the average temperature in West Virginia has risen approximately 0.1 degrees Fahrenheit per decade.

*Figure 2-4. Average Temperature Over Time*



Source: NOAA 2023

Additional information about how long-term changes in temperature across the State affect hazards is provided in each of the hazard profiles in Sections 5.1 through 5.16.

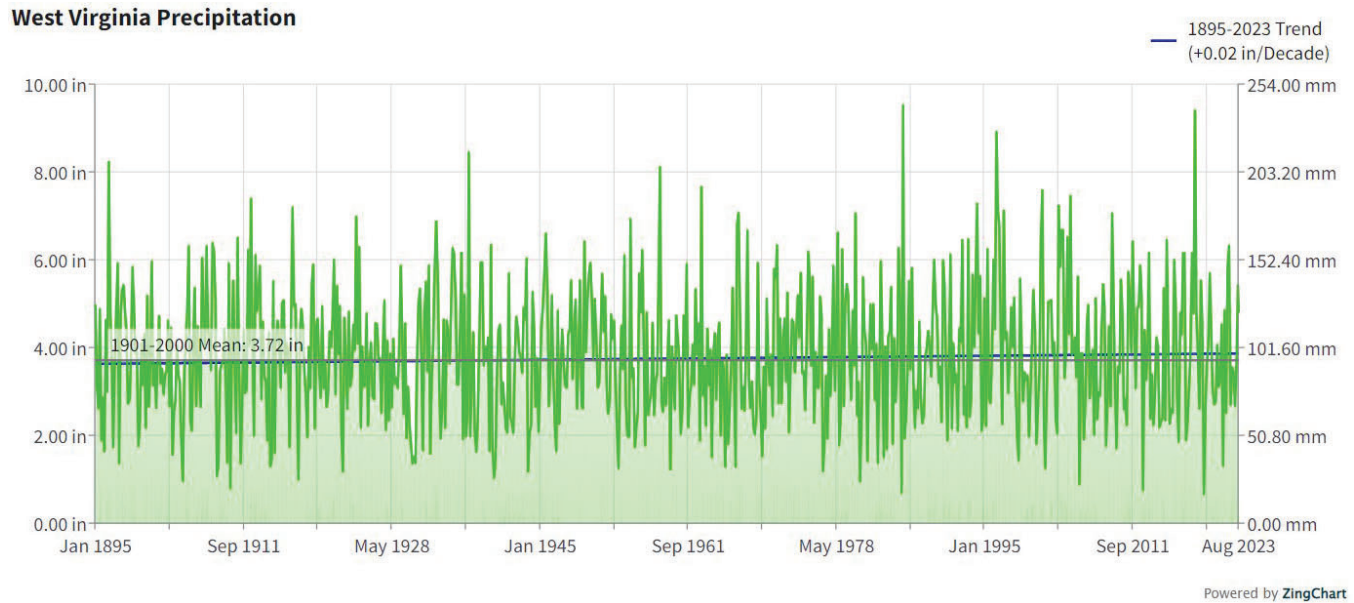
#### PRECIPITATION

Average annual precipitation in West Virginia varies by location (Runkle 2022). The state’s eastern panhandle experiences a rain shadow effect from the Allegheny Mountains; annual precipitation averages 35 inches. In the western parts of the state along the Ohio River, annual precipitation is approximately 40 inches. The central portion of the state receives 50 or more inches of precipitation in an average year. Additionally, the mountains in West Virginia experience an average of 100 inches of snow per year.



Figure 2-5 shows the monthly precipitation from January 1895 through August 2023 (NOAA 2023). Since 1895, the average amount of precipitation in West Virginia has risen approximately 0.02 inches per decade.

**Figure 2-5. Precipitation Over Time**



Source: NOAA 2023

Additional information about how long-term changes in precipitation across the State affect hazards is provided in each of the hazard profiles in Sections 5.1 through 5.16.

## 2.4 Demographics

The following sections discuss demographic information for the State.

### 2.4.1 Population

Population in West Virginia followed the national trend from 1900 to 1950 with the population increasing to 2 million. This period of growth is followed by a population decline from 1950 to 1970 due to the displacement of miners in the coal industry by mechanization. Population increased again in 1980 through 2000 and stabilized yielding a 2.5 percent increase through the 20th century and has been slowly decreasing since. According to 2020 Census data, the State has a resident population of 1,793,716 people. Between 2010 and 2020, the State’s resident population decreased by 3.2% (U.S. Census Bureau 2023). Only 8 of the 55 counties experienced a population increase between 2010 and 2020. Table 2-4 shows the population changes of each county from 2010 to 2020.

**Table 2-4. Census Resident Population by County, 2010 to 2020**

County	Resident Population			County	Resident Population		
	2010	2020	% Change (2010 to 2020)		2010	2020	% Change (2010 to 2020)
Barbour	16,589	15,465	-6.8%	Mineral	28,212	26,938	-4.5%



County	Resident Population			County	Resident Population		
	2010	2020	% Change (2010 to 2020)		2010	2020	% Change (2010 to 2020)
Berkeley	104,169	122,076	17.2%	Mingo	26,839	23,568	-12.2%
Boone	24,629	21,809	-11.4%	Monongalia	96,189	105,822	10.0%
Braxton	14,523	12,447	-14.3%	Monroe	13,502	12,376	-8.3%
Brooke	24,069	22,559	-6.3%	Morgan	17,541	17,063	-2.7%
Cabell	96,319	94,350	-2.0%	Nicholas	26,233	24,604	-6.2%
Calhoun	7,627	6,229	-18.3%	Ohio	44,443	42,425	-4.5%
Clay	9,386	8,051	-14.2%	Pendleton	7,695	6,143	-20.2%
Doddridge	8,202	7,808	-4.8%	Pleasants	7,605	7,653	0.6%
Fayette	46,039	40,488	-12.1%	Pocahontas	8,719	7,869	-9.7%
Gilmer	8,693	7,408	-14.8%	Preston	33,520	34,216	2.1%
Grant	11,937	10,976	-8.1%	Putnam	55,486	57,440	3.5%
Greenbrier	35,480	32,977	-7.1%	Raleigh	78,859	74,591	-5.4%
Hampshire	23,964	23,093	-3.6%	Randolph	29,405	27,932	-5.0%
Hancock	30,676	29,095	-5.2%	Ritchie	10,449	8,444	-19.2%
Hardy	14,025	14,299	2.0%	Roane	14,926	14,028	-6.0%
Harrison	69,099	65,921	-4.6%	Summers	13,927	11,959	-14.1%
Jackson	29,211	27,791	-4.9%	Taylor	16,895	16,705	-1.1%
Jefferson	53,498	57,701	7.9%	Tucker	7,141	6,762	-5.3%
Kanawha	193,063	180,745	-6.4%	Tyler	9,208	8,313	-9.7%
Lewis	16,372	17,033	4.0%	Upshur	24,254	23,816	-1.8%
Lincoln	21,720	20,463	-5.8%	Wayne	42,481	38,982	-8.2%
Logan	36,743	32,567	-11.4%	Webster	9,154	8,378	-8.5%
Marion	56,418	56,205	-0.4%	Wetzel	16,583	14,442	-12.9%
Marshall	33,107	30,591	-7.6%	Wirt	5,717	5,194	-9.1%
Mason	27,324	25,453	-6.8%	Wood	86,956	84,296	-3.1%
McDowell	22,113	19,111	-13.6%	Wyoming	23,796	21,382	-10.1%
Mercer	62,264	59,664	-4.2%				
				<b>Total</b>	<b>1,852,994</b>	<b>1,793,716</b>	<b>-3.2%</b>

Source: U.S. Census Bureau 2023

Population projections for the state indicate that the statewide population is expected to continue to decrease from 2025 through 2035, but at a slower rate than population decreased from 2010 to 2020. Table 2-5 shows population projections for each county through 2035.

**Table 2-5. Resident Population Projections by County, 2025–2035**

County	Population Projections			% Change (2025 to 2035)
	2025	2030	2035	
Barbour	18,211	18,517	18,710	2.7%
Berkeley	141,615	155,566	169,633	19.8%
Boone	23,205	22,492	21,717	-6.4%
Braxton	14,187	13,932	13,811	-2.7%
Brooke	21,950	20,964	19,956	-9.1%
Cabell	95,772	95,722	95,094	-0.7%



County	Population Projections			% Change (2025 to 2035)
	2025	2030	2035	
Calhoun	7,599	7,429	7,203	-5.2%
Clay	7,829	7,359	6,885	-12.1%
Doddridge	7,681	7,314	6,865	-10.6%
Fayette	44,007	42,749	41,246	-6.3%
Gilmer	8,508	8,310	8,083	-5.0%
Grant	12,220	12,027	11,800	-3.4%
Greenbrier	37,182	37,064	36,655	-1.4%
Hampshire	27,188	27,621	27,747	2.1%
Hancock	27,934	26,797	25,569	-8.5%
Hardy	16,012	16,372	16,567	3.5%
Harrison	70,664	70,528	69,968	-1.0%
Jackson	31,261	31,531	31,671	1.3%
Jefferson	67,075	71,208	75,035	11.9%
Kanawha	188,567	185,722	182,143	-3.4%
Lewis	15,820	15,497	15,104	-4.5%
Lincoln	20,521	19,822	19,005	-7.4%
Logan	34,145	32,702	31,079	-9.0%
McDowell	19,059	18,046	19,059	0.0%
Marion	56,698	56,328	55,688	-1.8%
Marshall	29,636	28,092	26,503	-10.6%
Mason	27,471	27,252	26,883	-2.1%
Mercer	58,829	60,112	58,829	0.0%
Mineral	29,264	29,123	28,765	-1.7%
Mingo	24,377	23,318	22,171	-9.0%
Monongalia	114,561	121,820	129,768	13.3%
Monroe	12,609	12,211	11,770	-6.7%
Morgan	20,500	21,032	21,294	3.9%
Nicholas	25,921	25,451	24,792	-4.4%
Ohio	42,085	41,184	40,155	-4.6%
Pendleton	6,991	6,649	6,252	-10.6%
Pleasants	7,289	6,954	6,626	-9.1%
Pocahontas	8,224	7,849	7,414	-9.8%
Preston	34,151	33,750	33,037	-3.3%
Putnam	59,029	59,295	59,176	0.2%
Raleigh	79,856	78,989	77,940	-2.4%
Randolph	29,079	28,359	27,389	-5.8%
Ritchie	10,620	10,442	10,183	-4.1%
Roane	14,028	13,415	12,790	-8.8%
Summers	12,866	12,524	12,014	-6.6%
Taylor	18,733	18,905	19,071	1.8%
Tucker	6,930	6,722	6,473	-6.6%
Tyler	8,082	7,585	7,052	-12.7%
Upshur	25,168	25,085	24,805	-1.4%
Wayne	40,562	39,320	37,979	-6.4%
Webster	8,814	8,578	8,300	-5.8%
Wetzel	14,868	14,133	13,378	-10.0%





County	Population Projections			% Change (2025 to 2035)
	2025	2030	2035	
Wirt	5,488	5,260	5,005	-8.8%
Wood	86,526	85,495	84,038	-2.9%
Wyoming	21,121	20,010	18,913	-10.5%
<b>West Virginia State</b>	<b>1,898,588</b>	<b>1,900,533</b>	<b>1,895,058</b>	<b>-0.19%</b>

Source: WVU 2011

## 2.4.2 Age Distribution

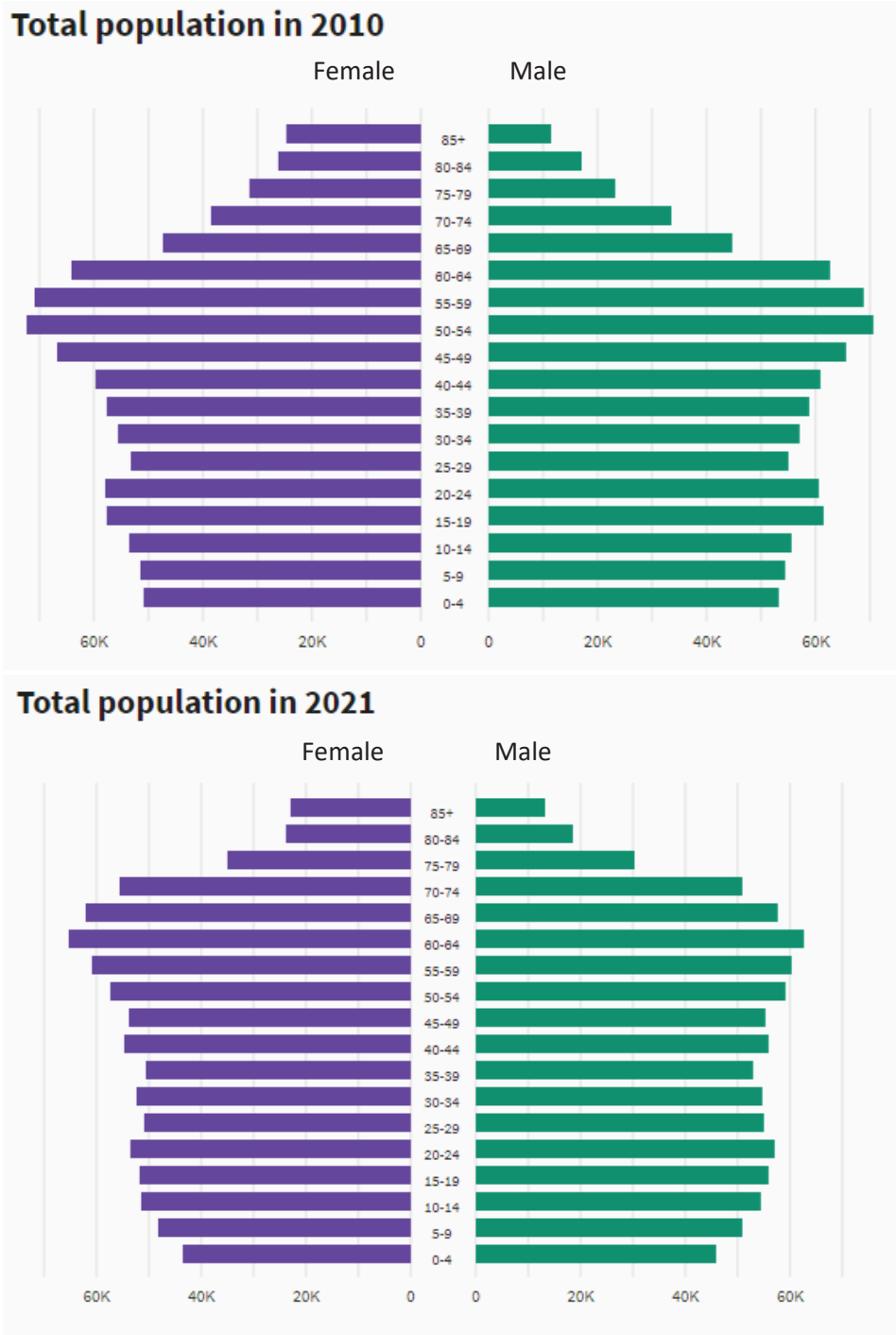
Age can correspond to vulnerability to hazards. As a group, older adults are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. Older adults living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to potential isolation caused by the event.

Children under 14 are also particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness, and this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

West Virginia’s median age is 42.7 years, which is higher than the nation’s median age of 38.3 years. The distribution of West Virginia’s population by age group in 2010 and 2021 are shown in Figure 2-6. As can be seen in the figure, the distribution among the age groups has not changed much in that time period, but the overall numbers of people in each age group have generally decreased, reflecting the population decline described in Section 2.4.2. The figure is broken down by sex, with the distribution for females shown on the left and the distribution for males shown on the right.



Figure 2-6. WV Population Age Distribution in 2010 and 2021



Source: USAFacts.org 2022



### 2.4.3 Racial Distribution

According to the U.S. Census Bureau’s 5-year estimates ending in 2021, the population of West Virginia is predominantly white (1,610,749 residents, or 89.8 percent of the population), followed by residents of two or more races (84,944 residents or 4.7 percent of the population) and Black or African American (65,813 residents or 3.7 percent of the population) (U.S. Census Bureau 2023) Table 2-6 shows the population distribution by race for each county.

**Table 2-6. Racial Distribution of the State of West Virginia**

County	White	Black or African American	American Indian and Alaskan Native	Asian	Native Hawaiian and Pacific Islander	Some other race alone	Two or more races	Total
Barbour	14,460	271	37	32	0	42	623	15,465
Berkeley	98,281	9,364	407	1,496	52	2,756	9,720	122,076
Boone	20,780	135	46	36	2	24	776	21,809
Braxton	11,976	50	19	23	11	25	343	12,447
Brooke	20,915	368	39	55	0	108	1,074	22,559
Cabell	82,665	4,811	209	1,345	20	658	4,642	94,350
Calhoun	6,003	13	12	13	2	2	184	6,229
Clay	7,671	13	29	16	0	1	321	8,051
Doddridge	7,304	174	18	15	0	35	262	7,808
Fayette	36,483	1,680	104	105	2	206	1,908	40,488
Gilmer	6,220	937	11	31	3	9	197	7,408
Grant	10,489	85	21	24	0	54	303	10,976
Greenbrier	30,360	792	70	198	6	235	1,316	32,977
Hampshire	21,775	188	35	61	4	153	877	23,093
Hancock	26,661	703	36	110	9	126	1,450	29,095
Hardy	12,835	414	35	59	0	325	631	14,299
Harrison	60,334	1,118	157	489	28	387	3,408	65,921
Jackson	26,516	101	46	91	2	127	908	27,791
Jefferson	46,825	3,459	141	837	13	1,689	4,737	57,701
Kanawha	153,637	13,592	402	2,149	51	1,349	9,565	180,745
Lewis	16,162	69	23	58	8	46	667	17,033
Lincoln	19,793	49	22	26	0	45	528	20,463
Logan	30,884	581	42	67	1	64	928	32,567
McDowell	16,195	2,163	22	20	4	56	651	19,111
Marion	50,578	1,867	139	256	43	200	3,122	56,205
Marshall	28,797	264	39	108	7	129	1,247	30,591
Mason	24,401	193	39	83	5	40	692	25,453
Mercer	52,554	3,720	176	296	7	266	2,645	59,664
Mineral	24,734	723	41	117	5	104	1,214	26,938
Mingo	22,383	409	36	32	0	47	661	23,568
Monongalia	90,012	4,160	185	3,755	71	1,157	6,482	105,822
Monroe	11,771	113	28	11	0	53	400	12,376
Morgan	15,985	112	40	83	0	82	761	17,063



County	White	Black or African American	American Indian and Alaskan Native	Asian	Native Hawaiian and Pacific Islander	Some other race alone	Two or more races	Total
Nicholas	23,603	61	45	74	7	38	776	24,604
Ohio	37,769	1,661	77	392	20	281	2,225	42,425
Pendleton	5,845	82	14	0	5	19	178	6,143
Pleasants	7,248	95	22	17	0	21	250	7,653
Pocahontas	7,497	57	26	9	4	36	240	7,869
Preston	30,832	2,042	76	57	5	70	1,134	34,216
Putnam	53,364	656	96	577	7	395	2,345	57,440
Raleigh	64,025	5,847	136	831	16	409	3,327	74,591
Randolph	26,144	433	61	104	1	140	1,049	27,932
Ritchie	8,155	17	9	23	7	20	213	8,444
Roane	13,305	39	28	38	1	43	574	14,028
Summers	10,930	402	35	33	0	38	521	11,959
Taylor	15,710	114	19	41	0	38	783	16,705
Tucker	6,457	21	4	6	1	23	250	6,762
Tyler	7,981	4	17	3	0	18	290	8,313
Upshur	22,474	223	37	88	6	87	901	23,816
Wayne	37,339	168	56	83	10	121	1,205	38,982
Webster	8,105	13	14	4	2	20	220	8,378
Wetzel	13,752	34	18	50	0	49	539	14,442
Wirt	5,013	6	4	0	4	9	158	5,194
Wood	78,170	1,040	174	564	23	404	3,921	84,296
Wyoming	20,592	107	32	18	1	30	602	21,382
<b>TOTAL</b>	<b>1,610,749</b>	<b>65,813</b>	<b>3,706</b>	<b>15,109</b>	<b>476</b>	<b>12,919</b>	<b>84,944</b>	<b>1,793,716</b>

Source: U.S. Census Bureau 2023

## 2.4.4 Socially Vulnerable Populations

The ability of an individual or community to withstand and quickly recover from hazards and threats is critical to successfully executing the disaster management process. The same disaster or emergency can impact different populations in different ways. For example, differences in age, income, disabilities, and English proficiency affect people’s ability to cope with the effects of disasters. Individuals may also face compounding barriers because they may fall within multiple categories of vulnerability.

Identifying concentrations of vulnerable and underserved populations can assist communities in targeting preparedness, response, recovery, and mitigation actions. The state will need to ensure that considerations for vulnerable populations, such as mobility and financial challenges, are included in the decision-making process when identifying projects to mitigate risk and carrying out disaster management processes.





### **Socially Vulnerable Populations**

- Children (aged 5 years and under) are dependent on others to safely access resources during emergencies.
- Older adults (aged 65 and over) are more likely to lack the physical and economic resources necessary for response to hazard events.
- Economically disadvantaged populations are likely to lack the resources to adequately prepare for and respond to hazards.
- People with disabilities are faced with increased levels of cognitive and physical difficulty, which may reduce their capacity to receive, process and respond to emergency information and warnings.
- Individuals with limited English proficiency may have difficulty with understanding information being conveyed to them. Cultural differences can also add complexity to how information is being conveyed to populations with limited English Proficiency (CDC 2022)

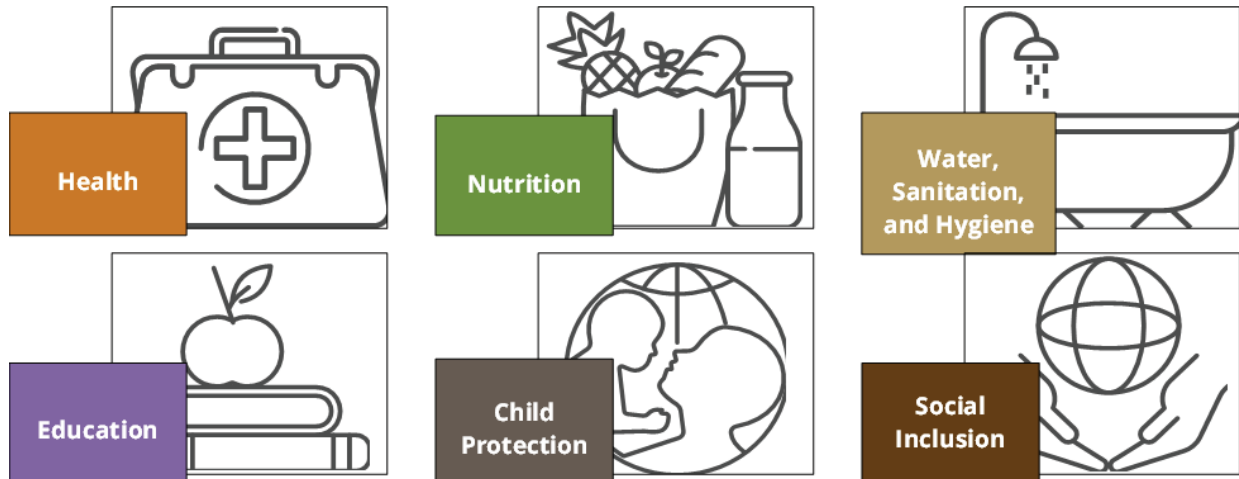
Social vulnerability for each of the below categories is shown in Figure 2-9. Figure 2-10 shows census tracts with high social vulnerability overall.

### **CHILDREN**

Risk is disproportionately higher for children due to their dependency on others to safely access resources during emergencies and the potential for long-term impacts of trauma experienced during a crisis. During an emergency, children may not be able to avoid hazards or make critical decisions for their safety; this requires them to depend on others. Extended disruptions in education systems during recovery can have lifelong impacts on the developmental capabilities of children (UNICEF 2016). Additionally, children may often experience increased health risks from exposure to hazards. Strategies, such as Child-Centered Disaster Risk Reduction (CCDRR), prioritize preparing and protecting children by focusing on six sectors where children have the highest vulnerabilities, as shown in Figure 2-7 (UNICEF 2016):



**Figure 2-7. Sectors in Which Children Have the Highest Vulnerabilities**



**OLDER ADULTS**

Older adults are susceptible to a myriad of increased risks due to several factors, including health, finances, and mobility. Those living on their own may have more difficulty evacuating their homes, and those living in group quarters, such as senior care and living centers, depend upon facility operators executing emergency preparedness measures. Older adults may face greater limitations with driving and therefore require special evacuation plans. They may also have hearing or vision impairments that could make receiving emergency instructions difficult.

**PERSONS WITH DISABILITIES**

The Centers for Disease Control and Prevention (CDC) defines a disability as a “condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions)” (CDC 2020). These impairments may increase the level of difficulty that individuals may face during a hazard event. Cognitive impairments may reduce an individual’s capacity to receive, process, and respond to emergency information or warnings. Individuals with a physical or sensory disability may face issues of mobility, sight, hearing, or reliance on specialized medical equipment.

According to the CDC, 61 million adults in the United States live with a disability (CDC 2022). This equates to about one in four adults. This population is likely to have more difficulty responding to a hazard event than the general population. State and local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs in order to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability allows emergency management personnel and first responders to have personnel available who can provide services needed by those with access and functional needs. According to the 2021 American Community Survey estimates, persons with disabilities make up approximately 18.7% of the total population of the State (U.S. Census 2023).



**Table 2-7. Types of Disabilities in West Virginia in 2022**

Measure	Percentage
Hearing Difficulty	5.5%
Vision Difficulty	3.4%
Cognitive Difficulty	7.7%
Ambulatory Difficulty	10.4%
Self – care Difficulty	4.1%
Independent Living Difficulty	8.5%

Source: Census 2022

### ECONOMICALLY DISADVANTAGED

Limited finances pose a barrier to obtaining resources and supplies to prepare for emergencies and disasters. Individuals and households facing financial challenges are likely to evaluate their risk and make decisions based on the major economic impact to their family, including determining if they have the financial means to safely evacuate. Economically disadvantaged individuals and households may require additional support and resources in the areas shown in Figure 2-8. West Virginia has a 16.8 percent poverty rate, whereas the United States has a 12.8 percent poverty rate, making West Virginia more vulnerable (U.S. Census 2023).

**Figure 2-8. Areas in Which Economically Disadvantaged Families May Require Assistance**



### PERSONS WITH LIMITED ACCESS TO TRANSPORTATION

Individuals with limited or no access to transportation face a higher risk during emergencies due to the challenges of being unable to move out of harm’s way. With people remaining in place during emergencies, first responders may be unable to render assistance due to inaccessible roadways or other conditions present during an emergency or disaster.

### LIMITED ENGLISH PROFICIENCY

Individuals who are not fluent or do not possess a working proficiency in English may have difficulty understanding information being conveyed to them. Cultural differences can also add complexity to how information is being conveyed to populations with limited English proficiency, which may make it more difficult to explain an emergency evacuation or communication with first responders (CDC 2021).



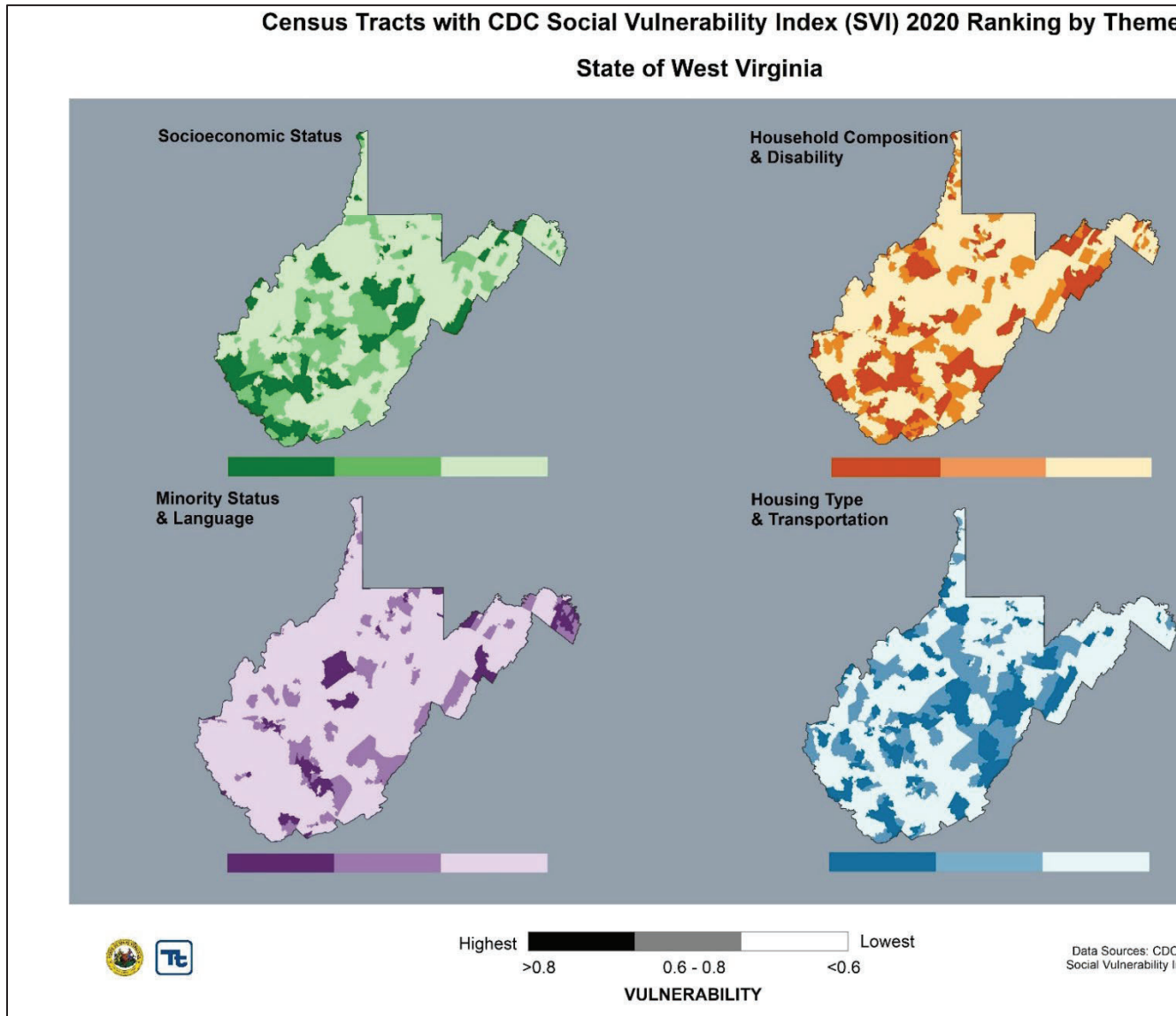
## **PERSONS EXPERIENCING HOMELESSNESS**

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As of 2018, 1,243 persons experienced homelessness in the State. This represents a decrease of nearly 38% from 2014. According to the U.S. Department of Health and Human Services, people experiencing homelessness have limited resources and are likely to have previously experienced traumatic events. As a result, such persons may be more at risk to adverse physical and psychological reactions after a disaster event than the general population. In addition, many persons experiencing homelessness are unsheltered and may be particularly vulnerable to some hazard events due to inadequate shelters (for example, tents), exposure to the elements, and residing in high-hazard risk areas, such as along creeks and streams. Persons experiencing homelessness may not be adequately alerted via established warning systems to seek adequate shelter (National Alliance to End Homelessness n.d.).



Figure 2-9. Social Vulnerability Index for the State of West Virginia







## 2.5 Economy

The following sections provide information on the State’s economy.

### 2.5.1 Employment and Industry

The most common industries in West Virginia, in relation to number of employees, are general medical and surgical hospitals, elementary and secondary schools, and food service. The most specialized industries in West Virginia would be coal mining, pipeline transportation and veneer, plywood, and engineered wood products (DataUSA n.d.)

According to the 2020 Census, there are 786,365 employed civilians in the state. Of these employees, the largest proportion (27.6%) are employed in the educational services and health care and social assistance. Other notable fields include arts, entertainment, recreation, accommodation, and food services (9%); retail (12.7%); and professional, scientific, management, administrative, and waste management services (8%). It should be noted that these estimates do not include military populations. The U.S. Department of Defense (U.S. DOD) estimates that there are 123 active-duty military in the state as of 2021 (U.S. DOD 2021).

### 2.5.2 Income

In the United States, individual households are expected to use private resources to prepare for, respond to, and recover from disasters to some extent. This means that households living in poverty or experiencing financial difficulties are automatically disadvantaged when confronting hazards. A household that experiences financial difficulties may find it hard or impossible to invest in other areas that can increase safety and resilience. Necessary structural and mechanical improvements, modern technology to access information, vehicles to improve mobility and evacuation procedures, among other investments, may not be possible for people to afford. Additionally, low-income residents typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes and floods than other types of housing. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level or experiencing financial difficulties have a great deal to lose during an event and may be the least prepared to deal with potential losses.

West Virginia has a median household income of \$50,884 which is significantly less than the median annual income of \$69,717 across the entire United States, reflecting a higher vulnerability in West Virginia than throughout the entire nation (U.S. Census 2023).

**Table 2-8. Income Statistics in the State of West Virginia by County in 2020**

County	Median Household Income	Population Below Poverty Level in the Past 12 Months	
		Percent	Number
Barbour	\$42,260	20.8%	3,111
Berkeley	\$68,101	10.7%	12,751
Boone	\$50,598	17.8%	3,866
Braxton	\$42,519	18.3%	2,265
Brooke	\$51,210	11.8%	2,560
Cabell	\$43,779	21.2%	19,241



County	Median Household Income	Population Below Poverty Level in the Past 12 Months	
		Percent	Number
Calhoun	\$37,428	28.4%	1,805
Clay	\$37,197	26.3%	2,117
Doddridge	\$58,750	15.2%	1,079
Fayette	\$45,988	21.0%	8,323
Gilmer	\$45,870	11.8%	712
Grant	\$47,224	12.1%	1,327
Greenbrier	\$41,694	18.9%	6,158
Hampshire	\$50,890	17.9%	4,017
Hancock	\$52,062	14.1%	4,068
Hardy	\$46,592	18.3%	2,585
Harrison	\$54,124	15.2%	9,846
Jackson	\$53,165	18.1%	5,023
Jefferson	\$86,711	9.7%	5,442
Kanawha	\$50,574	16.4%	29,453
Lewis	\$45,345	17.2%	2,854
Lincoln	\$46,683	20.6%	4,217
Logan	\$38,493	25.7%	8,269
McDowell	\$30,127	28.9%	5,191
Marion	\$55,094	14.6%	8,028
Marshall	\$52,371	14.5%	4,374
Mason	\$49,957	16.5%	4,117
Mercer	\$43,293	18.9%	11,029
Mineral	\$57,345	12.1%	3,158
Mingo	\$35,349	28.2%	6,699
Monongalia	\$56,466	19.3%	19,285
Monroe	\$47,417	14.4%	1,796
Morgan	\$56,616	8.0%	1,355
Nicholas	\$42,946	18.6%	4,582
Ohio	\$51,516	13.3%	5,337
Pendleton	\$46,506	16.1%	993
Pleasants	\$58,433	7.4%	527
Pocahontas	\$37,225	17.5%	1,350
Preston	\$55,755	14.4%	4,530
Putnam	\$68,740	10.5%	5,957
Raleigh	\$43,150	22.5%	16,230
Randolph	\$47,343	15.2%	3,936
Ritchie	\$45,184	18.2%	1,536
Roane	\$38,608	21.3%	2,989
Summers	\$41,077	22.6%	2,564
Taylor	\$52,823	16.2%	2,656
Tucker	\$49,808	9.9%	651
Tyler	\$50,601	12.0%	993
Upshur	\$44,470	20.0%	4,557
Wayne	\$45,591	17.3%	6,785
Webster	\$37,720	21.5%	1,791
Wetzel	\$47,611	18.8%	2,684





County	Median Household Income	Population Below Poverty Level in the Past 12 Months	
		Percent	Number
Wirt	\$49,441	20.9%	1,096
Wood	\$50,231	14.8%	12,360
Wyoming	\$44,630	25.3%	5,407
<b>West Virginia State</b>	<b>\$50,884</b>	<b>16.9%</b>	<b>295,632</b>

Source: U.S. Census Bureau 2023

## 2.6 State Assets and Critical Facilities

The following sections provide information on state assets and critical facilities within the state. The vulnerability of state assets and critical facilities to the identified hazards of concern are discussed in Section 4 (Risk Assessment).

### 2.6.1 State Buildings

The State owns and/or leases buildings in all of its counties. Statewide, there are 1,117 state-owned or leased buildings with a total estimated replacement value of just over \$6.1 billion (see Table 2-9). The highest percentage of these facilities, 17.91%, are located in Kanawha County. A breakdown of the number and replacement cost value of state-owned or leased buildings by state agency can be found in Section 4 (Risk Assessment).

**Table 2-9. Number and Replacement Cost Value of State Buildings by County**

County	Total Number of State Buildings <sup>a</sup>		Total Replacement Cost Value <sup>b</sup>	
	Number	Percent	Dollar Value	Percent
Barbour	10	0.90%	\$1,226,301	0.02%
Berkeley	50	4.48%	\$75,495,416	1.24%
Boone	14	1.25%	\$44,293,611	0.73%
Braxton	18	1.61%	\$7,872,767	0.13%
Brooke	4	0.36%	\$3,180,003	0.05%
Cabell	42	3.76%	\$219,226,653	3.59%
Calhoun	4	0.36%	\$378,405	0.01%
Clay	5	0.45%	\$743,106	0.01%
Doddridge	12	1.07%	\$75,001,944	1.23%
Fayette	22	1.97%	\$189,552,329	3.11%
Gilmer	6	0.54%	\$102,229,007	1.67%
Grant	6	0.54%	\$2,272,485	0.04%
Greenbrier	31	2.78%	\$114,552,152	1.88%
Hampshire	16	1.43%	\$81,457,698	1.33%
Hancock	11	0.98%	\$5,900,061	0.10%
Hardy	17	1.52%	\$48,772,559	0.80%
Harrison	36	3.22%	\$92,890,150	1.52%
Jackson	9	0.81%	\$43,378,014	0.71%
Jefferson	13	1.16%	\$279,040,412	4.57%
Kanawha	200	17.91%	\$998,692,998	16.36%





County	Total Number of State Buildings <sup>a</sup>		Total Replacement Cost Value <sup>b</sup>	
	Number	Percent	Dollar Value	Percent
Lewis	19	1.70%	\$83,222,741	1.36%
Lincoln	7	0.63%	\$1,631,008	0.03%
Logan	24	2.15%	\$90,013,247	1.47%
Marion	32	2.86%	\$269,370,410	4.41%
Marshall	14	1.25%	\$83,738,272	1.37%
Mason	20	1.79%	\$75,424,570	1.24%
McDowell	13	1.16%	\$2,430,014	0.04%
Mercer	28	2.51%	\$343,799,147	5.63%
Mineral	14	1.25%	\$138,244,637	2.26%
Mingo	13	1.16%	\$23,756,135	0.39%
Monongalia	34	3.04%	\$1,605,027,842	26.29%
Monroe	7	0.63%	\$1,463,850	0.02%
Morgan	31	2.78%	\$93,738,803	1.54%
Nicholas	15	1.34%	\$9,785,397	0.16%
Ohio	30	2.69%	\$28,660,306	0.47%
Pendleton	5	0.45%	\$1,191,904	0.02%
Pleasants	6	0.54%	\$31,131,899	0.51%
Pocahontas	13	1.16%	\$36,280,530	0.59%
Preston	26	2.33%	\$89,928,281	1.47%
Putnam	25	2.24%	\$91,192,117	1.49%
Raleigh	51	4.57%	\$162,946,727	2.67%
Randolph	29	2.60%	\$133,481,150	2.19%
Ritchie	8	0.72%	\$9,535,900	0.16%
Roane	9	0.81%	\$2,591,249	0.04%
Summers	7	0.63%	\$61,399,017	1.01%
Taylor	7	0.63%	\$35,811,537	0.59%
Tucker	11	0.98%	\$22,322,036	0.37%
Tyler	5	0.45%	\$1,640,214	0.03%
Upshur	11	0.98%	\$23,678,716	0.39%
Wayne	12	1.07%	\$13,977,493	0.23%
Webster	8	0.72%	\$2,930,121	0.05%
Wetzel	7	0.63%	\$1,260,909	0.02%
Wirt	3	0.27%	\$138,503	0.00%
Wood	41	3.67%	\$145,288,298	2.38%
Wyoming	6	0.54%	\$801,905	0.01%
<b>Total</b>	<b>1,117</b>	<b>100.00%</b>	<b>\$6,103,990,956</b>	<b>100.00%</b>

**Notes:**

a. Not all identified facilities included sufficient information to be geocoded; therefore, the vulnerability assessment results provided for each hazard in Section 4 will show a discrepancy in the total number and replacement cost value of facilities. For more information, please see Section 4.1.

b. Total replacement cost value represents both structure and contents. For more information, please see Section 4.0.



## 2.6.2 State Roads

The State Department of Transportation Highways Division is charged with maintaining the state highway system, which amounts to more than 3,924 miles of road statewide. Local roads are maintained by the state’s counties and municipalities. The length and of total interstate, U.S. highway and state roads by county is shown in Table 2-10.

**Table 2-10. Highway Type by County**

County	Interstate Total Length (Miles)	U.S. Highway Total Length (Miles)	State Highway Total Length (Miles)
Barbour	0.0	82.5	53.2
Berkeley	64.1	52.7	67.9
Boone	0.0	45.4	88.7
Braxton	88.6	50.0	57.6
Brooke	0.0	16.7	52.0
Cabell	61.2	58.7	57.2
Calhoun	0.0	30.7	54.8
Clay	18.3	0.0	70.6
Doddridge	0.0	37.7	44.0
Fayette	32.1	149.5	103.3
Gilmer	0.5	52.8	49.1
Grant	0.0	94.1	61.5
Greenbrier	80.3	155.5	76.2
Hampshire	0.0	85.6	63.5
Hancock	0.0	8.5	34.9
Hardy	0.0	116.3	40.1
Harrison	58.1	109.1	73.9
Jackson	85.9	34.0	50.5
Jefferson	0.0	35.8	76.0
Kanawha	212.1	171.4	123.1
Lewis	52.2	119.5	3.4
Lincoln	0.0	9.5	80.0
Logan	0.0	40.0	105.5
Marion	35.0	99.0	26.6
Marshall	0.0	81.4	44.1
Mason	0.0	40.1	109.3
McDowell	0.0	107.6	157.1
Mercer	62.2	163.6	94.5
Mineral	0.0	54.8	67.4
Mingo	0.0	176.7	44.4
Monongalia	80.6	87.4	74.3
Monroe	0.0	66.6	61.1
Morgan	0.0	55.4	35.1
Nicholas	0.0	66.3	131.3
Ohio	47.2	40.1	26.7
Pendleton	0.0	168.6	22.7
Pleasants	0.0	0.0	28.7



County	Interstate Total Length (Miles)	U.S. Highway Total Length (Miles)	State Highway Total Length (Miles)
Pocahontas	0.0	118.1	131.4
Preston	38.3	65.7	113.6
Putnam	38.4	54.5	89.6
Raleigh	109.4	64.0	152.1
Randolph	0.0	218.7	24.8
Ritchie	0.0	42.9	102.2
Roane	31.6	88.3	40.7
Summers	22.5	0.0	79.1
Taylor	0.0	99.3	13.0
Tucker	0.0	115.9	73.0
Tyler	0.0	0.0	58.6
Upshur	0.0	49.1	31.9
Wayne	12.6	148.4	87.1
Webster	0.0	0.0	87.4
Wetzel	0.0	22.1	84.2
Wirt	0.0	0.0	48.8
Wood	69.2	56.3	119.3
Wyoming	0.0	35.9	176.7
<b>Total</b>	<b>1,300.4</b>	<b>3,942.8</b>	<b>3,923.8</b>

### 2.6.3 Critical Facilities

Critical facilities are those that are vital to the state and its communities, such as water supply systems, emergency services, telecommunications, and transportation. The Federal Emergency Management Agency (FEMA) has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function (FEMA 2020).

During the development of the 2023 SHMP, the identified critical facilities were categorized into one of the types of Community Lifelines. Table 2-11 shows the state’s critical facilities by lifeline category and replacement cost value. Safety and Security lifelines (which include government facilities) account for more than 80 percent of all critical facilities in the state. Table 2-12 shows the state’s critical facilities by county. Nearly half (38.92%) of all of the state’s critical facilities are located in Kanawha County.

**Table 2-11. Critical Facilities by Lifeline Category and Replacement Cost Value**

Facility Lifeline Category	Total Number of Critical Facilities <sup>a</sup>	Total Replacement Cost Value <sup>a, b</sup>
Communications	7	\$10,240,007
Energy	0	\$0
Food, Water, Shelter	8	\$2,384,067
Hazardous Material	0	\$0
Health & Medical	12	\$200,276,228
Safety & Security	149	\$876,836,738



Facility Lifeline Category	Total Number of Critical Facilities <sup>a</sup>	Total Replacement Cost Value <sup>a, b</sup>
Transportation	9	\$44,654,481
<b>Total</b>	<b>185</b>	<b>\$1,134,391,521</b>

Notes:

a. Not all identified facilities included sufficient information to be geocoded; therefore, the vulnerability assessment results provided for each hazard in Section 4 will show a discrepancy in the total number and replacement cost value of facilities. For more information, please see Section 4.1.

b. Total replacement cost value represents both structure and contents.

**Table 2-12. Critical Facilities by County**

County	Total Number of Critical Facilities <sup>d</sup>		County	Total Number of Critical Facilities <sup>d</sup>	
	Number	Percent		Number	Percent
Barbour	1	0.54%	Mineral	1	0.54%
Berkeley	5	2.70%	Mingo	2	1.08%
Boone	2	1.08%	Monongalia	4	2.16%
Braxton	2	1.08%	Monroe	0	0.00%
Brooke	0	0.00%	Morgan	0	0.00%
Cabell	7	3.78%	Nicholas	2	1.08%
Calhoun	0	0.00%	Ohio	6	3.24%
Clay	0	0.00%	Pendleton	1	0.54%
Doddridge	3	1.62%	Pleasants	1	0.54%
Fayette	3	1.62%	Pocahontas	1	0.54%
Gilmer	0	0.00%	Preston	1	0.54%
Grant	0	0.00%	Putnam	3	1.62%
Greenbrier	4	2.16%	Raleigh	8	4.32%
Hampshire	4	2.16%	Randolph	4	2.16%
Hancock	2	1.08%	Ritchie	0	0.00%
Hardy	5	2.70%	Roane	2	1.08%
Harrison	3	1.62%	Summers	1	0.54%
Jackson	0	0.00%	Taylor	1	0.54%
Jefferson	2	1.08%	Tucker	1	0.54%
Kanawha	72	38.92%	Tyler	0	0.00%
Lewis	1	0.54%	Upshur	1	0.54%
Lincoln	0	0.00%	Wayne	0	0.00%
Logan	4	2.16%	Webster	1	0.54%
Marion	5	2.70%	Wetzel	0	0.00%
Marshall	2	1.08%	Wirt	0	0.00%
Mason	3	1.62%	Wood	6	3.24%
McDowell	5	2.70%	Wyoming	0	0.00%
Mercer	3	1.62%	<b>Total</b>	<b>185</b>	<b>100%</b>



## 2.7 Land Use and Development

Land use and development patterns are major factors that influence risk to hazards. Major areas of concern are where the built environment intersects hazard risk areas, such as roads and pipelines. Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to understanding the state’s overall risk to its hazards of concern.

### 2.7.1 Changes in Development Over the Performance Period of the 2018 SHMP

There is no statewide system that tracks development throughout the state. The LHMPs were reviewed, but they do not report much information on significant changes in development at the county and municipal levels. Throughout the planning process, SPT members stated that new development in the state is primarily focused on redeveloping areas that have already been developed, as opposed to spreading development into new areas.

The U.S. Census Bureau’s American Community Survey estimates that there are 893,615 housing units in the State, with 743,235 of these units being occupied (U.S. Census 2023), as shown in Table 2-13.

The 2035 population projections indicate that the state’s population is expected to decrease. Assuming the average household size and occupancy rate remain constant, more residential building units are expected to be vacant. There has been a steady decline in new housing units being built from the 1970s to 2014 and beyond.

**Table 2-13. Housing Structures Built, 1970-2022**

Year Built	Number of Residential Structures
Built 2014 or later	16,003
Built 2010 to 2013	20,618
Built 2000 to 2009	101,197
Built 1990 to 1999	120,684
Built 1980 to 1989	109,200
Built 1970 to 1979	144,823
Built 1960 to 1969	80,484
Built 1950 to 1959	94,586
Built 1940 to 1949	64,522
Built 1939 or earlier	141,498
<b>Total</b>	<b>893,615</b>

Source: U.S. Census 2023

According to the U.S. Department of Housing and Urban Development (U.S. HUD) SOCDs Building Permits Database, there were more than 16,200 building permits issued for new residential construction in West Virginia between 2018 and 2022. Table 2-14 shows the number of residential permits in that timeframe by county.

**Table 2-14. New Residential Construction by County, 2018 to 2022**

County	2018	2019	2020	2021	2022	Total
Barbour County	4	4	2	8	2	20
Berkeley County	1,083	1,261	1,383	1,344	1,493	6,564
Boone County	6	6	15	12	13	52
Braxton County	-	-	-	-	-	-
Brooke County	5	8	8	10	11	42





County	2018	2019	2020	2021	2022	Total
Cabell County	99	134	61	56	66	416
Clay County	18	41	24	20	16	119
Fayette County	24	38	32	32	37	163
Gilmer County	36	58	9	10	8	121
Grant County	65	61	29	40	35	230
Greenbrier County	71	55	76	61	93	356
Hampshire County	60	88	102	126	125	501
Hancock County	15	16	16	18	22	87
Hardy County	40	58	63	81	59	301
Harrison County	151	49	62	141	131	534
Jackson County	2	-	2	-	1	5
Jefferson County	217	197	288	689	528	1,919
Kanawha County	82	253	272	221	130	958
Lewis County	-	-	-	-	-	-
Lincoln County	18	18	23	7	-	66
Logan County	-	2	1	1	2	6
Marion County	21	54	29	19	20	143
Marshall County	-	2	3	-	-	5
Mason County	5	3	1	2	3	14
McDowell County	2	22	18	9	4	55
Mercer County	5	4	5	5	1	20
Mineral County	37	40	75	33	42	227
Mingo County	-	-	-	-	-	-
Monongalia County	259	26	23	14	8	330
Monroe County	-	-	1	1	1	3
Morgan County	36	57	75	92	112	372
Nicholas County	-	5	4	5	5	19
Ohio County	1	2	49	92	8	152
Pendleton County	10	14	17	26	18	85
Pleasants County	9	10	4	11	4	38
Pocahontas County	4	6	5	6	6	27
Preston County	7	8	2	7	3	27
Putnam County	85	62	73	132	95	447
Raleigh County	62	39	43	71	67	282
Randolph County	13	6	2	1	24	46
Ritchie County	54	14	18	23	16	125
Roane County	-	-	-	21	-	21
Summers County	21	16	15	13	13	78
Taylor County	-	3	-	-	-	3
Tucker County	1	14	3	11	-	29
Tyler County	10	-	-	-	-	10
Upshur County	44	31	50	55	45	225
Wayne County	28	27	78	71	65	269
Webster County	-	-	-	-	-	-
Wetzel County	50	54	59	5	-	168
Wirt County	9	9	11	13	11	53
Wood County	116	133	72	96	55	472
Wyoming County	2	2	1	1	1	7
<b>Total</b>	<b>2,887</b>	<b>3,010</b>	<b>3,204</b>	<b>3,712</b>	<b>3,399</b>	<b>16,212</b>

Source: U.S. HUD 2023



## 2.7.2 Current Land Use and Development

As shown in Table 2-15 and Figure 2-11, the vast majority of the State is covered in forest and natural vegetation. Only 3.0 percent of the land in West Virginia is considered urban or roads and impervious surfaces, while 95.7 percent of the state’s land area is classified as agriculture, barren land, forest, grasslands/agricultural, and natural vegetation. The effects of land use and development on vulnerability to hazards are described in the hazard profiles in Section 5.

**Table 2-15. Land Use and Land Cover in West Virginia**

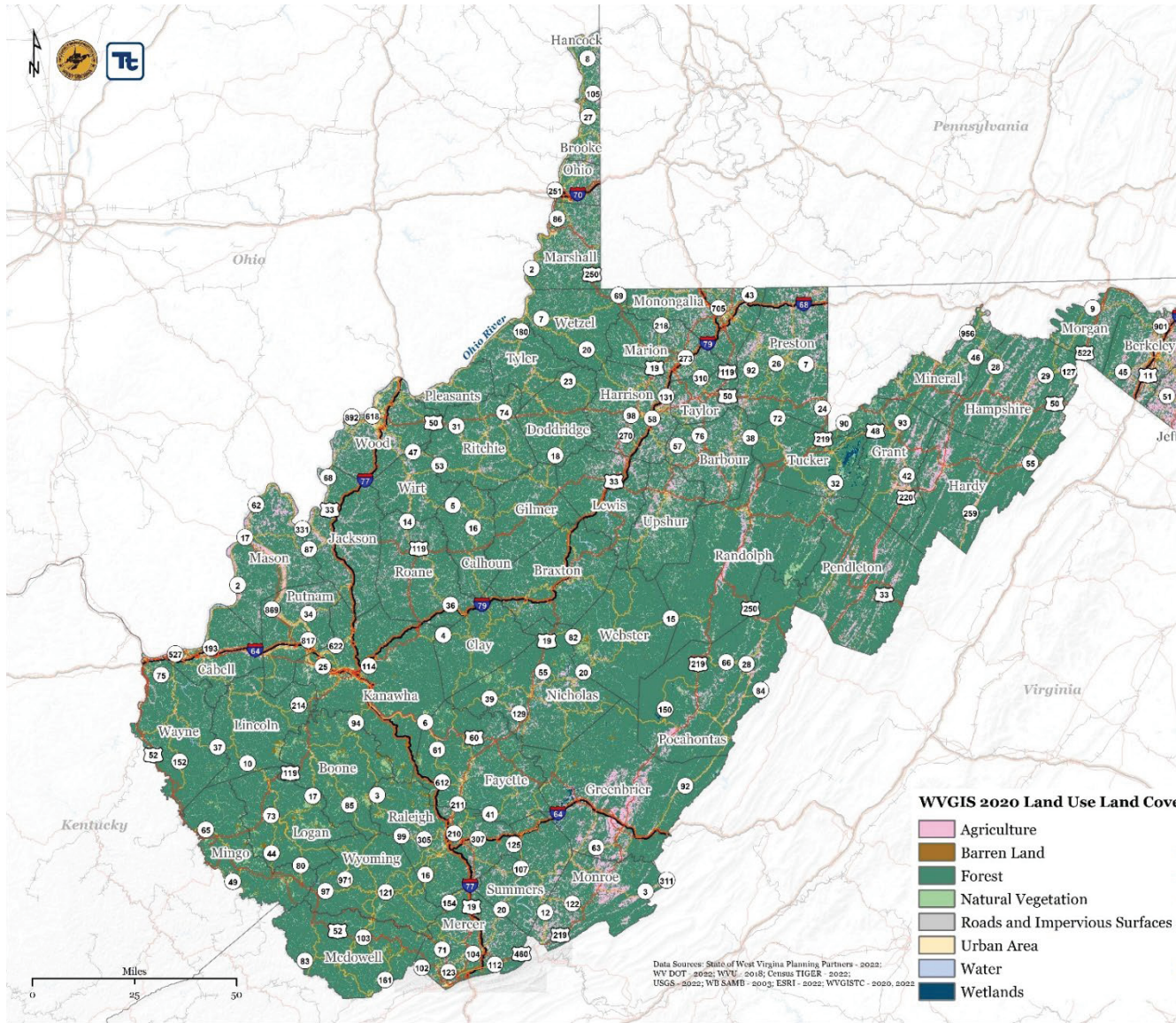
Land Use Category	2011 Data		2020 Data	
	Acreage	Percent of State	Acreage	Percent of State
Agriculture	N/A	N/A	998,431.2	6.4%
Barren Land	237,711.6	1.5%	197,158.2	1.3%
Forest	12,976,868.3	83.7%	12,665,056.6	81.7%
Grasslands/Agricultural	1,617,288.7	10.4%	N/A	N/A
Natural Vegetation	125,950.7	0.8%	964,317.0	6.2%
Roads and Impervious Surfaces	354,296.9	2.3%	264,557.6	1.7%
Urban Area	N/A	N/A	205,471.5	1.3%
Water	150,034.9	1.0%	156,403.3	1.0%
Wetlands	36,964.1	0.2%	41,915.9	0.3%
<b>Total</b>	<b>15,499,115.2</b>	<b>100.0%</b>	<b>15,493,311.3</b>	<b>100.0%</b>

Sources: WVU 2011, 2020

Note: 2011 and 2020 categories are different due to source changing and expanding on their categories. There may be minor discrepancies.

Land use planning and management is vital to reducing and mitigating damages. The State relies on local-level planning and regulation conducted by the RPDCs, counties, and municipalities to ensure development occurs in a safe manner. The State’s programs to provide oversight and technical assistance in these areas are described in Section 6.

Figure 2-11. Landcover and Land Use in West Virginia





### 2.7.3 Projected Changes in Development

Just as there is no statewide system for tracking where development occurred over the performance period of the 2018 SHMP, there is also no statewide system for tracking where development is likely to occur over the performance period of the 2023 SHMP. As stated above and elsewhere in this SHMP, new development is expected to occur in already-developed area rather than in areas that are currently undeveloped.

## 2.8 Environmental Resources

Environmental resources are identified because they are impacted by hazard events and can influence the way in which hazards impact the built environment. Environmental resources include the following assets:

- **State Parks and Forests** — There are a large number of beloved parks and forests in West Virginia that provide valuable recreational opportunities, economic benefits, and provide for the protection of natural resources.
- **Wetlands** — Wetlands provide a multitude of benefits, including habitat for fish and wildlife, groundwater recharge, flood reduction, water quality, food, and recreational opportunities.
- **Critical Habitat** — Critical habitat is the term used in the Endangered Species Act to define those areas of habitat that are known to be essential for an endangered or threatened species to recover and that require special management or protection.

### 2.8.1 State and National Forests and Parks

West Virginia is home to not only popular national parks and forests but also national trails and rivers. The most popular trail is the Appalachian Trail, which stretches more than 2,180 miles long from Maine to Georgia. Popular national parks in West Virginia include the Chesapeake and Ohio Canal, which was used to transport coal, lumber, and agricultural products to communities along the Potomac River; Harpers Ferry, which is famous for being a key location in the events that ignited the Civil War; and New River Gorge, which is among the oldest rivers on the continent (NPS n.d.). Figure 2-12 shows the locations of national parks and forests in the State. Table 2-16 lists West Virginia’s state forests, and Table 2-17 lists West Virginia’s state parks; they are shown in Figure 2-13.

*Table 2-16. State Forests in West Virginia*

State Forest	Counties	Acres
Cabwaylingo State Forest	Cabell, Wayne, Lincoln, Mingo	8,150
Calvin Price State Forest	Pocahontas, Greenbrier	9,400
Camp Creek State Forest	Mercer	5,269
Coopers Rock State Forest	Monongalia, Preston	12,747
Greenbrier State Forest	Greenbrier	5,133
Kumbrabow State Forest	Randolph	9,474
Seneca State Forest	Pocahontas	12,884
<b>Total</b>		<b>50,173</b>

*Source: WV Division of Forestry (WVDOF) 2023*





**Table 2-17. State Parks in West Virginia**

State Park	County	Acres
Audra State Park	Barbour	341.0
Audra State Park	Upshur	2.9
Babcock State Park	Fayette	4,058.3
Beartown State Park	Greenbrier	91.2
Beartown State Park	Pocahontas	16.2
Beech Fork State Park	Cabell	956.9
Beech Fork State Park	Wayne	875.4
Berkeley Springs State Park	Morgan	5.2
Blackwater Falls State Park	Tucker	2,279.0
Blennerhassett Island Historical State Park	Wood	502.6
Bluestone State Park	Summers	1,113.2
Cacapon Resort State Park	Hampshire	100.8
Cacapon Resort State Park	Morgan	6,199.5
Camp Creek State Park	Mercer	558.6
Canaan Valley Resort State Park	Tucker	5,804.9
Carnifex Ferry Battlefield State Park	Nicholas	291.8
Cass Scenic Railroad State Park	Pocahontas	382.4
Cathedral State Park	Preston	127.1
Cedar Creek State Park	Gilmer	2,504.9
Chief Logan State Park	Logan	3,316.3
Droop Mountain Battlefield State Park	Pocahontas	292.4
Fairfax Stone State Park	Grant	0.8
Fairfax Stone State Park	Preston	<0.1
Fairfax Stone State Park	Tucker	2.8
Hawks Nest State Park	Fayette	206.9
Holly River State Park	Webster	8,122.4
Little Beaver State Park	Raleigh	551.1
Lost River State Park	Hardy	4,094.1
Moncove Lake State Park	Monroe	124.5
North Bend State Park	Ritchie	2,762.5
Panther State Forest	Mcdowell	32.4
Pinnacle Rock State Park	Mercer	392.6
Pipestem Resort State Park	Mercer	1,002.2
Pipestem Resort State Park	Summers	3,205.3
Pricketts Fort State Park	Marion	214.3
Stonewall Resort State Park	Lewis	1,841.5
Tomlinson Run State Park	Hancock	1,359.7
Tu-Endie-Wei State Park	Mason	3.5
Twin Falls Resort State Park	Wyoming	3,741.6
Tygart Lake State Park	Taylor	2,101.4
Valley Falls State Park	Marion	658.1
Valley Falls State Park	Taylor	531.2
Watoga State Park	Pocahontas	10,205.9
Watters Smith Memorial State Park	Harrison	537.0
<b>Total</b>		<b>71,512.4</b>

Source: WVDOF 2023



Figure 2-12. National Parks and Forests In West Virginia

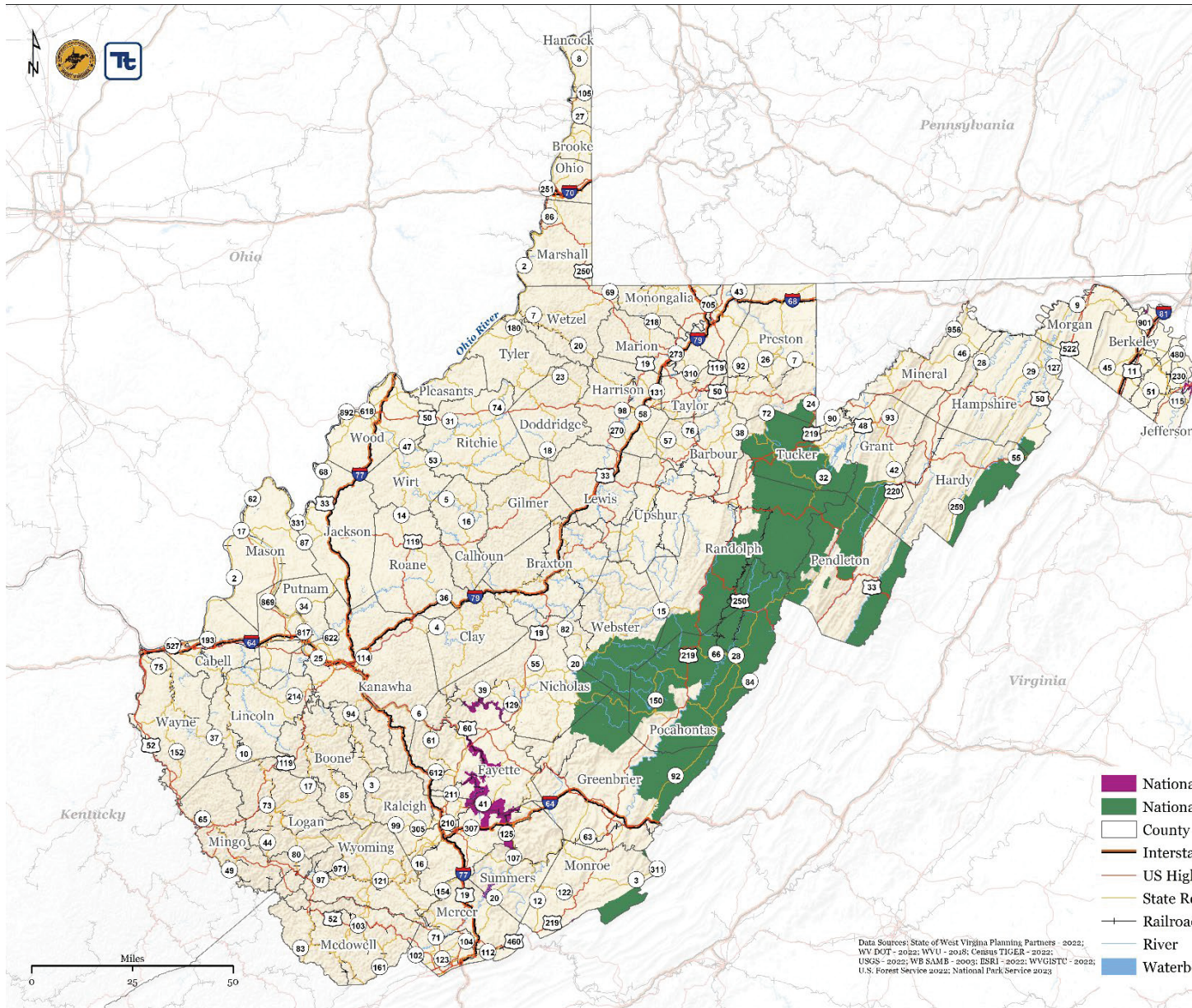
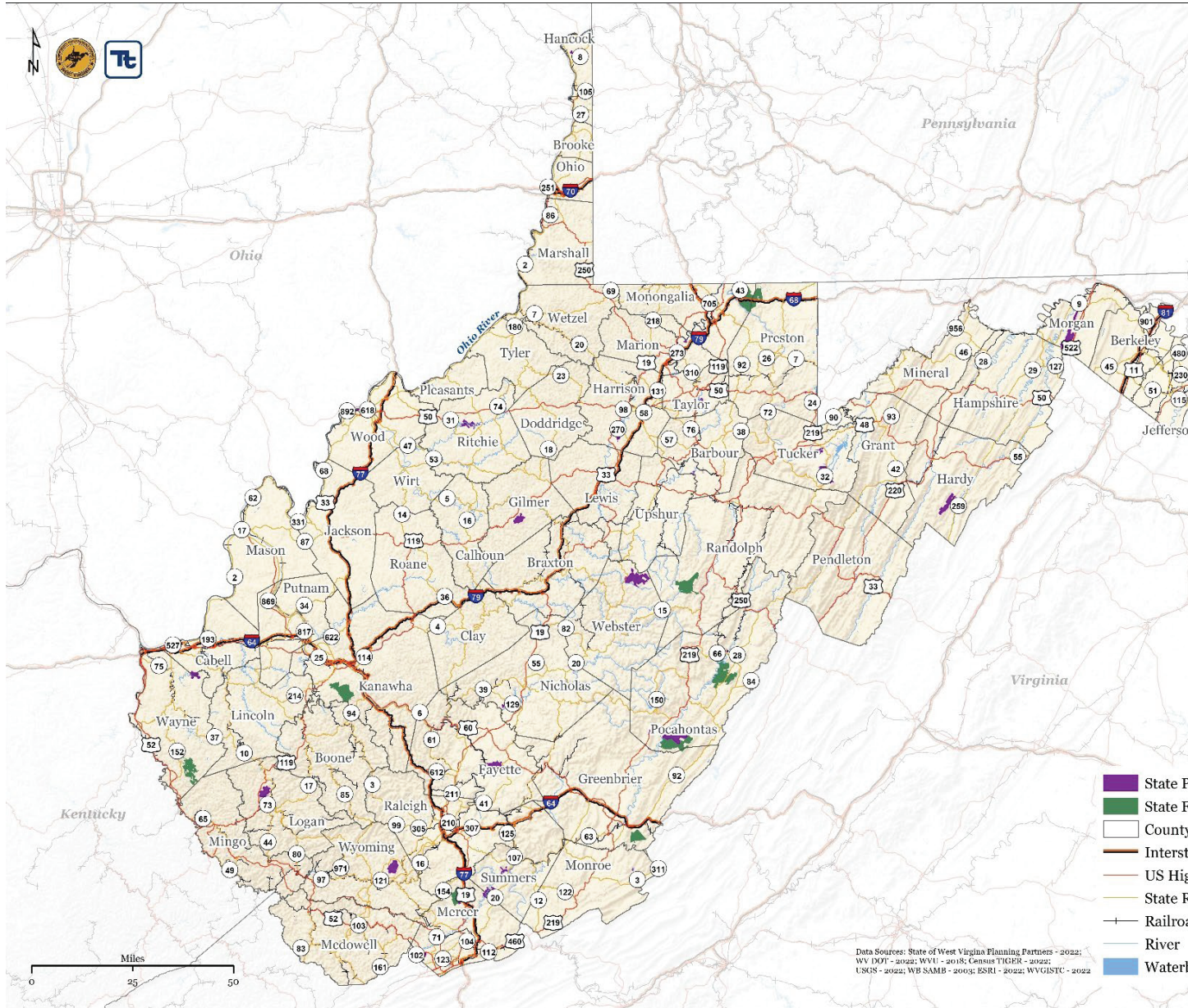




Figure 2-13. State Parks and Forests in West Virginia





## 2.8.2 Wetland Areas

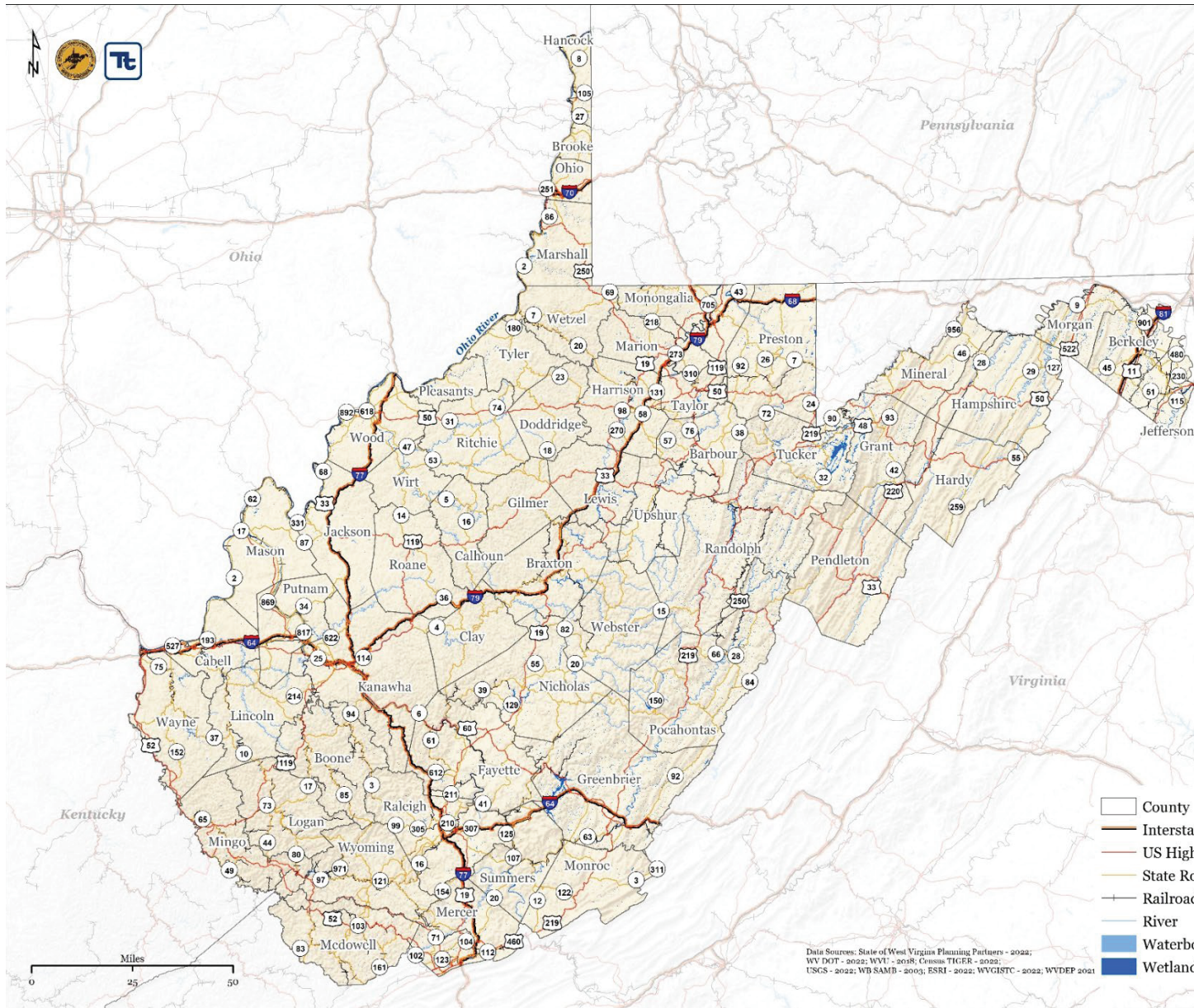
West Virginia (WVDEP n.d.) defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” The State separated its vegetated wetlands into three major types based on the vegetation that dominates the area:

1. Emergent wetlands have significant amounts of grasses, sedges, and other non-woody plants.
2. Shrub wetlands are characterized by low to medium-height woody plants
3. Forested wetlands are dominated by woody plants, 20 feet or higher

Figure 2-14 shows the location of West Virginia’s wetland areas as well as location of other waterbodies.



Figure 2-14. Wetland Areas and Other Waterbodies





### 2.8.3 Critical Habitats and Wildlife Management Areas

A critical habitat is defined as the specific areas that are essential to species conservation for endangered or threatened species under the Endangered Species Act. When determining a critical habitat, an evaluation of areas currently occupied by the species of concern is completed so that scientists know what physical and biological features are needed by the species to achieve a long life as well as reproduction (U.S. Fish and Wildlife Service n.d.). Figure 2-15 depicts the location of these critical habitat areas.

West Virginia created a Statewide Wildlife Management Program, which is designed to manage and conserve habitats for a variety of wildlife species as well as to improve public access to these areas. Some of these management activities consist of planting trees and shrubs for shelter and food. In addition, development projects are also being managed and maintained to provide better access to recreational opportunities, such as construction of roads, trails, and parking lots (WVDNR 2023). Table 2-18 and Figure 2-16 show and describe where the Wildlife Management areas are located in the state.



Figure 2-15. Critical Habitats in West Virginia

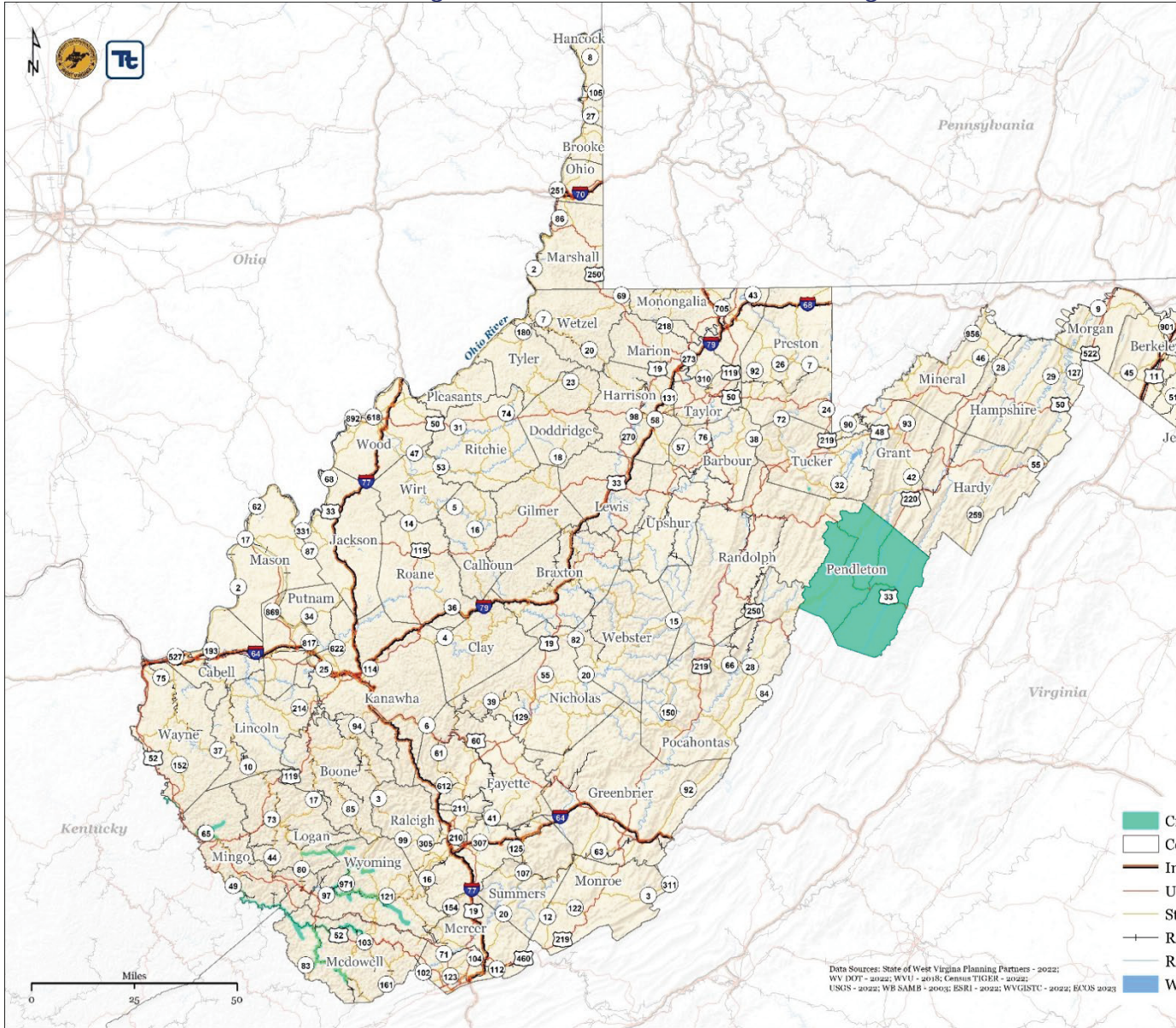
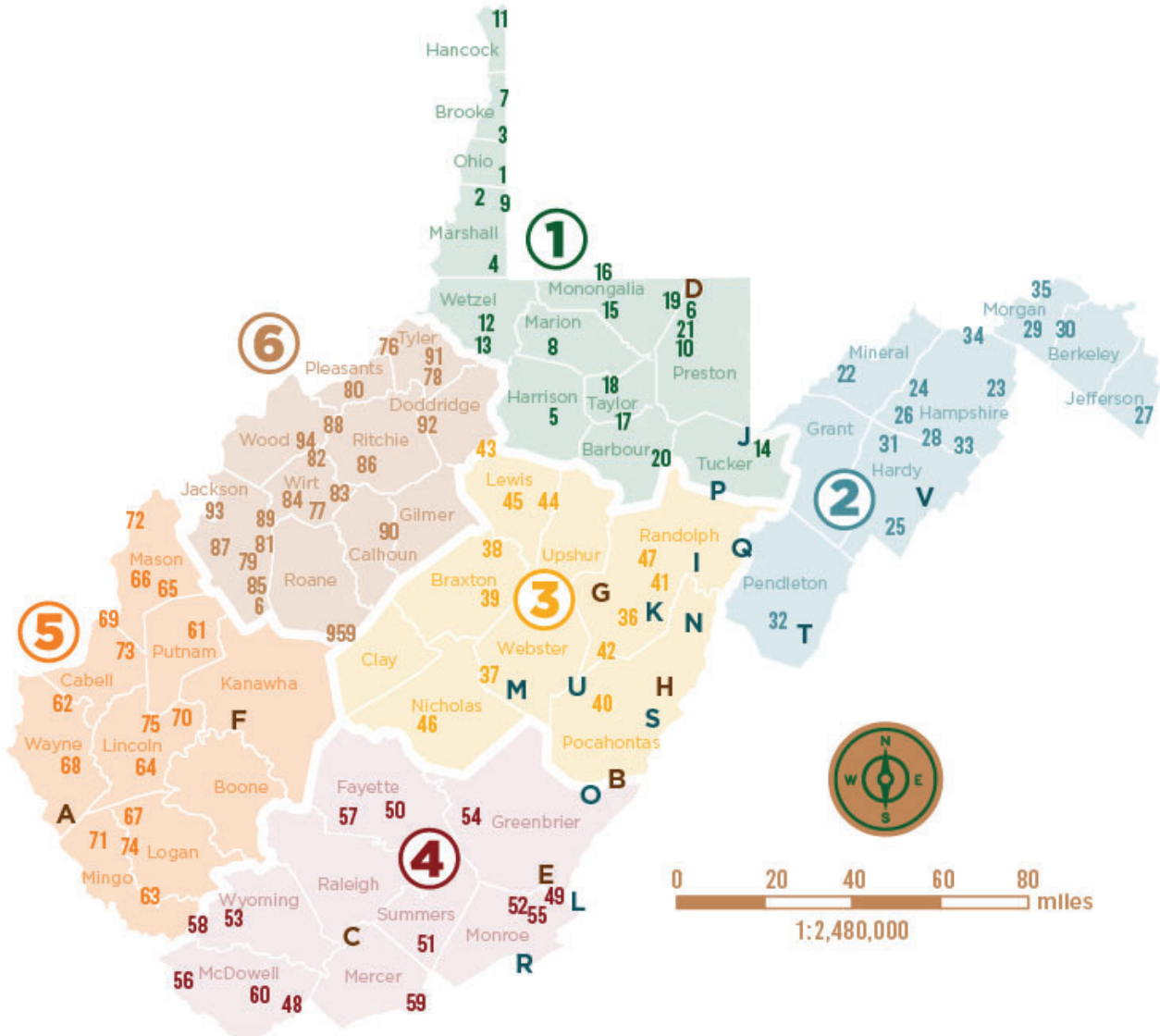




Figure 2-16. Wildlife Management Areas in West Virginia



Source: WVDNR 2023

Table 2-18. West Virginia Wildlife Management Areas

County/Countries	Wildlife Management Areas	County/Countries	Wildlife Management Areas
<b>District 1</b>			
Ohio	1. Bear Rock Lakes	Monongalia	17. Teter Creek 15. Little Indian Creek 16. Pedlar
Marshall	2. Burches Run 10. Dunkard Fork	Barbour & Taylor	17. Pleasant Creek
Brooke & Ohio	3. Castlemans Run Lake	Taylor	18. Pruntytown State Farm
Marshall & Wetzel	4. Cecil H. Underwood	Monongalia & Preston	19. Snake Hill



County/Counties	Wildlife Management Areas	County/Counties	Wildlife Management Areas
Harrison	5. Center Branch	Barbour	20. Teter Creek
Brooke	6. Cheat Canyon 7. Cross Creek	Preston	10. Fairfax Pond-Rehe 21. Upper Deckers Creek
Hancock	11. Hillcrest	Marion	8. Dents Run
Wetzel	12. Lantz Farm & Nature Preserve 13. Lewis Wetzel	Tucker	14. Little Canaan
<b>District 2</b>			
Mineral	22. Allegheny	Hardy & Hampshire	31. South Branch
Hampshire	23. Edwards Run 24. Fort Mill Ridge 26. Nathaniel Mountain 28. Short Mountain 34. White Horse Mountain	Pendleton	32. Thorn Creek
Jefferson	27. Shannondale Springs	Hardy	25. Lost River 33. Warden Lake
Berkeley & Morgan	30. Sleepy Creek 29. Sideling Hill	Morgan	35. Widmeyer
<b>District 3</b>			
Randolph	36. Becky Creek 35. Huttonsville 47. Valley Bend	Pocahontas & Randolph	42. Slatyfork
Webster	37. Big Ditch	Lewis	43. Smoke Camp 45. Stonewall Jackson Lake
Braxton	38. Burnsville Lake 39. Elk River	Lewis & Upshur	44. Stonecoal Lake
Pocahontas	40. Handley	Nicholas	46. Summersville Lake
<b>District 4</b>			
McDowell	48. Anawalt Lake 60. Tug Fork 56. Panther	Greenbrier	54. Meadow River
Fayette	45. Beury Mountain 57. Plum Orchard Lake	Monroe	55. Moncove Lake 49. Andrew Rowan 52. Daniels Ridge
Summers, Mercer & Monroe	51. Bluestone Lake	Mingo & Wyoming	58. R.D. Bailey Lake
Wyoming	53. Horse Creek Lake	Mercer	59. Tate Lohr
<b>District 5</b>			
Putnam	61. Amherst/Plymouth	Cabell & Mason	69. Green Bottom
Cabell & Wayne	62. Beech Fork Lake	Mingo	71. Laurel Lake 63. Big South
Lincoln	64. Big Ugly 70. Hilbert 75. Upper Mud River	Cabell	73. Millcreek
Mason	65. Bright McCausland Homestead 66. Chief Cornstalk 72. McClintic	Logan	74. Tomblin 67. Chief Logan
Wayne	68. East Lynn Lake		



County/Counties	Wildlife Management Areas	County/Counties	Wildlife Management Areas
<b>District 6</b>			
Tyler	76. Buffalo Run 78. Conway Run Lake 91. The Jug	Calhoun & Gilmer	90. Stumptown
Jackson	69. Frozen Camp 85. O'Brien Lake 87. Rollins Lake 93. Turkey Run 96. Woodrum Lake 79. Elk Fork Lake 81. Frozen Camp 89. Sandy Creek	Barbour	14. Pleasant Creek 17. Teter Creek
Ritchie & Wirt	82. Hughes River 77. Burning Springs 83. Little Kanawha River 84. Lynn Camp	Roane	95. Wallback
Ritchie	86. Ritchie Mines	Pleasants	80. Federal Ridge
Wood & Ritchie	88. Sandhill 95. Walker Creek	Doddridge	92. Toll Gate